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Research Relating to Marketing of Farm Products ---Scope and Method

Next to farm management, research in the marketing of farm products has received more attention than research in any other phase of agricultural economics. It was the addition of marketing to farm management about 1910 that principally gave body to the newly developing field of agricultural economics. The results of two pioneer studies in the economics of marketing were published in 1913, one, the Wisconsin study of *The Marketing of Wisconsin Cheese*, and the other the Minnesota *Studies in Egg Marketing*.¹ There had been earlier studies by the Department of Agriculture in Washington, but these had mostly dealt with physical problems of preparation for market, packing and handling.

The first fifteen years of the century were enlivened by much discussion of the rising cost of food, and presently this took the form of the question: Who gets the consumers' dollar? The producer point of view was expressed in the demand that our agricultural colleges give part of their attention to the prices which farmers get for their products, instead of merely helping them to produce more and more at lower prices. It was out of this discussion that marketing as a field of teaching and research arose in our agricultural colleges and experiment stations, and that the old Bureau of Markets in the United States Department of Agriculture was born in 1917.

The importance of marketing research today may be judged by the fact that 265 of the 816 projects recorded in "Classified List of Projects in Agricultural Economics and Rural Sociology" in 1931 deal with marketing, as compared with 252 for farm management. The state experiment stations, however, have only 115 marketing projects as compared with 205 farm management projects.

OBJECTIVES

The purposes of this report are: To outline marketing as a field of research in agricultural economics; to indicate its relationship to other parts of the field; to describe briefly the present status and

(1) Taylor, H. C., Schoenfeld, W. A., and Wehrwein, G. S., Wisconsin Bulletin 231.

Thompson, C. W., Minnesota Bulletin 132.

recent trends in research in marketing of farm products; to outline a considerable number of projects representative of those now under way or needed to round out the program of research in marketing of farm products; and to suggest methods and procedures which are being used or which may be used to advantage in different types of projects.

It is hoped that this report, representing as it does the viewpoints and judgments of a large number of workers, many of whom have had considerable experience in research in other parts of the field of agricultural economics as well as in marketing of farm products, will be of assistance to those engaged in research in the marketing of farm products and to those responsible for its conduct, in choosing projects to be undertaken and in deciding upon methods to be employed and procedures to be followed.

MARKETING AS A FIELD OF RESEARCH IN AGRICULTURAL ECONOMICS

(By John D. Black.)

That marketing research receives so much attention is not hard to understand when one realizes that the field covers the whole process of getting goods from producer to consumer, and that after railway and water transportation and commercial storage charges are taken out, as much as a third or a half of the prices paid by consumers of many products is absorbed by what are recognized as essentially marketing operations.

Marketing is of course a form of production, coordinate with *primary production* (on farms and in factories), *transportation, storage and monetary exchange*. The contribution which the marketing process makes to the social product is through facilitating the change of ownership or possession of commodities (or services), in modern society through facilitating a whole chain of such changes, such as from primary producer to local buyer, local buyer to commission merchant, commission merchant to jobber, jobber to retailer and retailer to consumer.

This change of ownership or possession of commodities has two aspects: one, the associated physical movement and handling of the goods, as in sorting, packing, transporting, storing, processing, conditioning, holding in stock, packaging and the like; the other the change of title to the commodities. In the first aspect, the utilities created are of form, place and time; in the second, of possession. The second phase is all that is essentially marketing, considered as an economic process. It is the creating of possession utility by making a sale or a purchase, that is the essence of marketing. But the physical operations above named are necessary to effective buying and selling, and many of them are closely identified with it, and hence

to put them into a separate division of production for purposes of study and research would lead only to highly artificial results.

Limits of the field.

It must be recognized, however, that research with respect to these physical and chemical operations calls for training of the sort given in the natural sciences and their applied derivatives (agronomy, animal and dairy husbandry, horticulture, engineering, etc.); and that projects dealing mostly with these natural science phases of the handling of goods between producer and consumer should be conducted by the appropriate specialists. The many projects including both natural-science and economic-science considerations should be developed as joint projects between workers in economics and in some one or more of the natural or derived applied sciences. The leadership in the project should depend largely upon whether economic or natural science considerations are paramount, or whether the end result desired is economic or natural science. Thus a project in the relation of quality characters to demand might call for more work by natural science technicians than by economists, and yet if the final result wanted was an explanation in terms of demand curves, the leadership should be in the hands of economists. This description fits most projects in market grades, as will be apparent from the discussion of Projects 36 and 42 following.

It must be recognized in this connection that economics is by nature a science of coordination, of coordination of the facts and principles of the natural and derived natural sciences of physics, chemistry, engineering, soils, meteorology, husbandry and the like, together with the distinctly human sciences of physiology and individual psychology, and with the science of value and price and all that attaches to these two concepts. Whenever a project is of such a nature that the conclusions sought require coordination with considerations of value and price, then economists are needed at least as collaborators, and in most cases should have principal responsibility for the project.

It follows from the foregoing that it is entirely possible for divisions of agronomy, horticulture, dairy husbandry and the like to be carrying on well-conceived programs of research in marketing running parallel with the program of the economics division, and not overlapping upon it any more than is normally to be expected of programs of research. In practice, however, there is frequently more overlapping than is wise, and economists are as often at fault in this respect as the workers in the other fields mentioned. This statement does not refer to projects designed to cross the boundaries between fields by collaboration between departments, which is nearly always to be commended. It refers instead to the practice which some economists have of trying to work segments of natural science analysis which they are not qualified to make, into their projects, and trying

to do the analytical work themselves; and to a parallel practice followed probably by a greater number of workers in the applied natural sciences. The most conspicuous examples of the latter appear in those experiment stations in which research is largely organized on a commodity basis. Such commodity departments are almost certain to be dominated by men with a natural science background, and if they employ economic specialists (commonly they do not), they employ persons whose training and experience is much more in the natural sciences than in economics.

This is a good place at which to remark that the organization of the work of the old Bureau of Markets on a commodity basis worked out in the manner just indicated, and that the form of organization and type of personnel resulting has largely been carried over into the present Bureau of Agricultural Economics.

The projects outlined in this report are limited to those more largely economic than natural science in content, emphasis, or type of result sought; but some of them call for much help from workers in the natural sciences, and collaboration is definitely suggested for a number of them.

Some projects on the consumption basis of marketing will require collaboration with home economists, or specialists in the natural science aspects of foods, and others, with social psychologists.

Another important delimitation to make is to set apart from marketing the whole sphere of railway, water and highway transportation. The only basis for doing this is that it is important enough commonly to be organized into separate enterprises apart from marketing enterprises. Transportation not thus organized, as delivery of purchases to consumers by retailers, is considered a part of marketing. Moreover, those phases of transportation which relate to the care and handling of the commodities themselves are likely to be analyzed as part of the marketing problem, although not of the economic aspects of it. Finally, any analysis that relates to the economics of the use of railway, water, and highway facilities—over what routes to ship, facilities to use, etc.—is likely to be considered as marketing analysis.¹ Projects of this latter type, however, are listed as "Joint with Transportation" in this report.

The foregoing principles of delimitation apply to storage, risk bearing and credit provision in the same way as to transportation. In so far as these are organized in separate enterprises—as credit provision almost always is—the concern of the marketing specialist is with how to use them, and with certain commodity aspects relevant thereto. Much storage is closely associated with marketing proper, and likewise much risk bearing, the latter as strikingly illustrated in futures markets. But many types of specialized insurance agencies have developed for spreading risks connected with commodities in storage;

(1) See the report in this series on Transportation of Farm Products.

in transit and in stock, as well as with real property risks of enterprises using buildings.

More difficult to classify are many processing plants closely associated with marketing, such as creameries, cheese factories, country milk plants, poultry dressing plants and cotton gins. The Federal Census classifies these as manufacturing establishments. Agricultural economists have commonly treated them as marketing enterprises, since they exist for the purpose of getting a farm product in condition for sale, are located close to the producer, and most of them, originally if not now, sold the product themselves after they had processed it. This classification will be continued in this report. Processing plants of the types largely located in central markets or consuming centers, such as flour mills and meat packing plants, will not be included.

For purposes of such a report as this, as well as organizing research or teaching programs in marketing in an agricultural institution, a separation needs to be made between the marketing of farm products and the marketing of manufactured products. Obviously no definite line can or need be drawn. The general statement will ordinarily suffice that once the commodity has gone through a *major conversion process in a manufacturing center*, it is no longer a farm product. Butter is called a farm product because for the most part it is manufactured in plants near to farms, or even on farms themselves. Flour, however, is not ordinarily considered a farm product because most of the milling is in the cities, and the wheat is mostly not delivered directly from farms. Meat and meat products are in the twilight zone, although almost always considered manufactured products.

Even though flour is a manufactured product, the agricultural economist must concern himself with its marketing, and likewise with the manufacture and marketing of bread. But it is not expected that he will center his researches upon them. He will merely reach over into these parts of the whole marketing process when he needs to find an explanation of some phase of wheat marketing. In turn, the student of marketing of manufactured products needs to reach back to the marketing of raw materials for an explanation of some of his phenomena. The difference between the marketing of farm products and of manufactured products is in the center upon which each is focused, not in any hard-and-fast boundary lines.

Relation to other fields.

The interest of agriculturists in cooperation is such that it has been deemed advisable in organizing the Scope and Method project to set up a special sub-field of research devoted to the subject, in which the unifying principle is the *cooperative mode of economic functioning* as distinguished from the *private* or *competitive*; and all matters involving especially, or peculiar to, the cooperative mode of

economic functioning, have been separated out of the sub-field of primary production (Farm Management), and out of the sub-fields of Credit, Insurance and Transportation as well as out of the sub-field of Marketing. The line of demarcation which has been established between Cooperation and Marketing is as follows: Matters equally relevant to both private and cooperative enterprise in marketing are included in Marketing; those especially relevant to cooperative enterprise are included under Cooperation. Thus membership relations are peculiarly a problem of cooperative marketing; likewise prorating of pool expenses and pool receipts.

Basic to any analysis of marketing is an understanding of consumption and demand. For much marketing analysis, especially that which considers a commodity at a time, the more effective starting point is with the consumers rather than with the producers. In the outline of projects which follow, those dealing with consumption are placed first, except for certain introductory ones dealing with the market as a whole. It must be understood, however, that the point of view in these projects is that of Marketing, not that of the Economics of Consumption. This means that consumer demand is accepted pretty much as it is, without a thorough attempt to get behind it and explain why consumers spend their incomes as they do for the product in question, or how this particular expenditure fits into the whole system of expenditures. To have undertaken the latter would have led us into detailed studies of urban budgets and the like, a questionable venture for farm economists. This does not mean, however, that marketing analyses may not properly include examining the superficial relation between consumption and earning power or nationality, or seasonal or daily variations in purchases.

Although marketing has been set up as separate from Farm Management (primary production), transportation, storage, exchange and consumption, many actual marketing research problems reach over into one or more of these fields. Problems of standardization, for example, or of control of movement of commodities to market, need to be worked out in conjunction with Farm Management. The latter also need to be worked out in conjunction with Credit.

The most important relationship of marketing with other fields is its relationship to Prices of Farm Products. Most marketing specialists consider market prices one division of this field. A most important phase of every change-of-ownership transaction is the price at which it is negotiated. But it is noteworthy that few marketing specialists devote enough attention to prices to become adept price analysts. The chapters on price in the textbooks on marketing are the least adequate of any. Moreover, if a marketing worker does become skillful in price analysis he looks upon himself as a price specialist rather than a marketing specialist. The reason for the foregoing is probably that considerable price analysis calls

for a degree of familiarity with the difficult body of economic theory relating to value and price, and a command of types of analytic technique, that is not likely to be possessed by the usual worker in the field of marketing, whose interest, after all, is primarily in problems of market structure and organization and marketing practices. Another element in the situation is that important problems in other fields, such as Farm Management, Credit, and Transportation, involve price analysis—for example, elasticity of production, and shifts in types of farming; and these call for command of much the same theory and technique as do the price problems of marketing. For these reasons prices have increasingly come to be looked upon as a special field of teaching and research in agricultural economics; and this situation has been accepted in organizing the Scope and Method projects.

An alternative plan might have been to put into the field of marketing those price projects which are closely related to marketing structure and functioning—for the most part, the projects dealing with short-time movements; and to include in the special field of prices the projects closely related to production and money and credit—for the most part, the projects dealing with long-time movements in prices. It is true that the analytical procedures involved tend to differentiate somewhat along these lines. But so many of the projects had as much reason for being in one group as in the other that this scheme of classification was abandoned. Long-time prices, after all, are merely averages of short-time prices. Accordingly, all projects directed at explaining any kind of a price movement in any market are put in the report in this series dealing with Prices of Farm Products.

However, it is impossible to put too much emphasis on the dependence which much price analysis has upon an understanding of market structure and organization, and a knowledge of marketing practices. Accordingly, about a third of the projects in the report on Prices of Farm Products are designated as "Joint with Marketing." This means that ordinarily some worker in the field of marketing should collaborate in the project. Much of the work of the price specialists in the past twelve years has suffered because those doing it were not well informed as to the commodity whose prices they were analyzing and as to the markets and marketing practices involved.

It will be apparent after study of the 66 projects outlined or listed below that the research worker in the field of marketing has ample opportunity for the exercise of his intellectual energy without going into price analysis. There has been a tendency in the last ten years for marketing men to become fascinated with price analysis, and to neglect the other phases of marketing, with the result that progress in this field has slackened somewhat. Those responsible for this

report have hoped that one of its effects will be to restore attention to the other and equally important aspects of marketing.

The extreme width and diversity of the field of marketing as laid out in the 66 projects is one of its major weaknesses. Consider Group D, dealing with Marketing Organization. Bulletin No. 13 in this series contains 300 pages devoted to the discussion of 38 projects in Farm Management. Group D of the present report discusses or lists 12 projects in 54 pages. Yet the marketing enterprises in question are more diverse and have more involved problems than the farms to be analyzed in the projects outlined for Farm Management. This points to the conclusion that research in marketing organization is still in its rudimentary stages. The same is true of research in most of the other aspects of marketing. Moreover, it seems clear that the research resources needed to change the situation will become available only slowly. Hence we are confronted with the prospect of a thin spreading of our efforts over a very wide field for many years to come.

Marketing as a science.

In this report, marketing will be treated both as pure and as applied science. As pure science it seeks to develop and extend a body of principles relating to how commodities are distributed among consumers and how our resources are employed in this distribution. As applied science, it seeks to apply these principles to the business of buying and selling of commodities.

The conception of marketing as comprising in part pure science objectives is not plausible, however, unless one holds to a different notion of pure science than is altogether common, a notion, namely, of pure science as both general and specific. The economic principles pertaining to value may be narrowed down successively to producers' goods, to real property used in production, and to grain elevators. They are as definitely principles, and as surely pure science, in these restricted connections as in their larger ones. But they are specialized principles, and they constitute specialized pure science.

It is only when principles have been reduced to their specialized forms that the applied scientists can make use of them—that they can be applied to the highly concrete and highly specific situations with which applied scientists have to deal. In practice, many pure scientists are not interested in developing the specialized forms of principles, and therefore the applied scientists may find themselves not only applying principles, but attempting to develop their own. But they do not all have the background in economics needed for the task and may attempt to develop sets of principles that are largely unrelated to the general principles of economic science, perhaps even at variance with them. This has frequently been the case with marketing, especially as handled in schools of commerce or business. The principles so enunciated may of course be definite contributions

to economic science, even though they may appear to contradict accepted doctrines; but in most cases they represent the results of inadequate analysis, or wrong interpretation of results.

Further progress in marketing as science calls for a closer union of the efforts of the pure scientists and the applied scientists. In the ranks of the former must be found more men willing to refine and specialize their principles to the point where they can be put to work; and in the ranks of the latter, more who will tie their work more closely with that of the pure scientists. It would appear that the applied science workers in the field will always have to perform the final steps in the reduction of principles to a working basis. This is entirely proper, for at this point generalization and application merge into each other. The conclusions from studies of restricted scope, such as of grain elevators in the hard spring wheat area, are specifically true only for elevators of that type, and they can be applied only to such elevators.²

The projects outlined below nearly all fall in the division of specialized pure science. Many of them have such restricted scope as to produce principles that can be applied, as specifically stated, only within a limited universe. But out of many such specific principles can be developed, by the process of induction, the larger principles of economic science.

The four approaches in marketing analysis.

Early analysis in marketing commonly followed the *commodity approach*. It undertook to cover all aspects, or such aspects as were recognized, for some one commodity. In the next stage of marketing analysis, the approach by "*functions*" was most commonly followed; that is, an attempt was made to break up the whole process of getting goods from the producer to the consumer into functions, or operations, or services, such as assembling, transporting, buying, dispersing, selling, risk-taking, etc., and analyzing these operations as such.

In the third stage emphasis was shifted more to the approach by *marketing business units*, agencies or institutions, in recognition of the fact that marketing is a business, and is conducted by business units.

Recently, more attention has been given to studies of *marketing areas* as such, in recognition of the importance of observing the marketing process as a whole rather than unit by unit, or service by service. One can not say, however, that this approach is receiving major emphasis at this time, or is ever likely to do so.

Although emphasis has changed with the years as indicated, all four approaches are commonly followed, and all lead to worthwhile contributions. The commodity approach is now largely restricted to

(2) For further details of the relation between pure, specialized and applied science, see "Farm Management as Applied Science" in the Farm Management report in this series.

products of lesser importance whose marketing is little known. (See Groups A and H for examples.) The functional approach is followed for intensive studies of specialized operations such as grading, inspection and advertising. (See Groups E and F for examples.) The approach by business units, agencies or institutions is being followed with all types of marketing businesses and institutions. (See Groups D and G for examples.) The area approach appeals to sociologists, geographers and economic historians more than to marketing specialists. (See Group A for examples.)

HISTORY OF RESEARCH IN MARKETING AND CURRENT TRENDS.

(By H. B. Price and John M. Cassels.)

The history of marketing research can be divided into four periods as follows: before 1910, from 1910 to the end of the World War, from then until about 1928, and from then to the present.

The first of these periods was characterized by scattering studies made mostly in the various departments of the federal government, particularly in the Department of Agriculture, relating mainly to methods of handling, preparation for market, and quality in products, with especial reference to the export trade. Farmers Bulletin No. 62 (1897), a good example of the early work, discusses packing, preparation for market, functions of commission merchants, and instructions for handling and marketing fruits, vegetables, meats and eggs.¹ Other studies dealt with the possibilities of developing markets, particularly foreign markets.

The second period dates from the awakening of interest in marketing precipitated by the rising prices and increased cost of living in the early days of the present century. The federal government at this time started investigations of fruit marketing, and of marketing structure for such products as cotton, poultry and eggs, and dairy products. Some of the agricultural experiment stations started investigational work in marketing at this time, notably Wisconsin and Minnesota. An Office of Markets and Rural Organization was created by the Department of Agriculture in 1913, and a Bureau of Markets in 1917.

The emphasis at this stage of research was more upon marketing structure and less upon physical handling than in the earlier period; but emphasis upon physical problems was still strong. The customary approach with studies of structure was to determine who was responsible for the physical handling of goods and the exchange of ownership, and how the processes of marketing took place. The result was a descriptive analysis of types of middlemen and how they func-

(1) For further discussion of the early history of research in marketing, see Horner, "The United States Governmental Activities in the Field of Agricultural Economics Prior to 1918," *Journal of Farm Economics*, October, 1928.

tioned, and how the marketing functions were performed, with some attempt at comparison of different channels of distribution. A common method of summarizing such studies was to show how the consumers' dollar was divided between middlemen, transportation agencies and producers. The first two textbooks on agricultural marketing, published in 1914² incorporated this approach to the analysis of marketing, and the influence of this in later research is indicated by the emphasis on the functional approach in the majority of subsequent texts that have been published.

The next step in research emphasized efficiency in marketing. Descriptive analysis could provide much general information about marketing systems, but it could not successfully point out weaknesses or suggest how weaknesses might be overcome. Three types of studies come to be undertaken, namely, studies (1) of margins and costs in marketing, (2) of marketing organization, and (3) of management problems of handling and selling. The decline in prices of farm products in 1920-21 had not brought retail prices down with it. Upon reaching Washington in 1921, Secretary of Agriculture H. C. Wallace at once demanded the facts as to this situation and an explanation of them; and when he did not get them from his Bureau of Markets, set up the present Bureau of Agricultural Economics, bringing together in one unit all the economic work of the Department of Agriculture. A new unit, called the Cost of Marketing Division was set up, which proceeded to determine whether the spreads or margins on farm products needed to be as high as they were by ascertaining the necessary costs of various types of middleman agencies—livestock shipping associations and local buyers of livestock, retail meat dealers, potato buyers and dealers, etc. These efforts very soon demonstrated their futility, and the emphasis was shifted to comparative studies of margins, with little better effects, with the result that presently the Cost of Marketing Division was disbanded.³

The Joint Commission of Agricultural Inquiry which was set up in the closing days of the Wilson administration and reported its findings to Congress in December 1921 attempted to analyze the problem of high margins by reverting back to the methods of the preceding period and dividing up the consumers' dollar between the different contributors.⁴

An approach somewhat related to the above was to study margins and costs of individual concerns in order to set up standards for the various business units to aspire to as norms of reasonable accomplish-

(2) Weld, *Marketing Farm Products*, and Huebner, *Agricultural Commerce*.

(3) For further discussion of this incident, see "Cost and Margins," by J. D. Black and H. B. Price in *The Annals* for January 1925, pp. 184-200.

(4) Part IV, *Marketing and Distribution, Report of the Joint Commission of Agricultural Inquiry*.

ment,⁵ or to furnish a standard by which the interested public might determine what margins or costs were reasonable and thus have a basis for forcing or inducing middlemen to reduce margins.⁶ As one would expect, the studies with the latter of these objectives have thus far fallen considerably short of accomplishing either purpose. Many of the studies with the first objective have not been very helpful because the simple averages of costs and margins generally set up as norms included as much good practice as bad, and the conditions under which the different marketing concerns operated were not comparable, so that the reasonableness of the margins and costs could not be successfully ascertained.

A somewhat different approach and a later development was the analysis of internal organization of marketing business enterprises. Unlike the studies of cost and incomes, these studies included a sufficiently detailed analysis of the conditions of business operations so that the norms (whether they were prices paid or received for products, costs, income or other important measures of efficiency) could really be used as standards of performance. The first study of this type was a detailed analysis of 88 creameries in which statistical measurement was made of the factors affecting efficiency of creamery operation.⁷ Other similar studies are cited in connection with the projects in Group D following. An important limitation of this method of marketing analysis is that a considerable number of fairly similar business enterprises is needed to furnish the data for analysis. It can not, therefore, be used with large organizations of which there are only a few, which also are likely to differ greatly.

The majority of the studies in the third stage have dealt with specific business problems, such as storing, selling, and obtaining market information.⁸ Some studies of this type took the form of detailed analysis of the management problems of large individual

(5) *Efficient Operation of Local Elevators: Costs and Incomes*, Minnesota Special Bulletin 114, by H. B. Price and H. B. Rowe (1927).

Farmers' Elevators in North Dakota, North Dakota Bulletin 206, by A. H. Benton and M. F. Peightal (1927).

(6) *Report of Federal Trade Commission on Grain Trade*, Vol. IV, Middlemen's Profits and Margins (1924).

(7) *Economic Aspects of Creamery Organization*, Minnesota Technical Bulletin 26, by J. D. Black and E. S. Guthrie (1924).

(8) *Management Problems of Cooperatives Associations Marketing Fruits and Vegetables*, U. S. D. A. Bulletin 1414, by A. W. McKay and W. J. Kuhrt (1926).

Cooperative Butter Marketing in Wisconsin, Wisconsin Bulletin 401, by T. Macklin and M. A. Schaars (1928).

Local Cooperatives Livestock Marketing Associations in Iowa since 1920, Iowa Bulletin 254, by D. A. Fitzgerald (1928).

Management Problems of Farmers' Elevators, Minnesota Bulletin 224, by H. B. Price and C. M. Arthur (1925).

marketing organizations.⁹ This approach was developed farthest by the Division of Cooperation when it was a unit of the U. S. Department of Agriculture.

In the last of the four periods, dating from about 1928, the emphasis on internal marketing organization and marketing business practices has continued, but there probably has been in addition a larger interest in inter-unit relationships; and marketing research generally has been characterized by broadening out to include studies of related or outlying fields, or of hitherto neglected aspects of marketing. This is illustrated by the several studies in motor transportation of farm products which have been completed or are now being made, which have dealt largely with the effect of this new mode of transportation upon marketing organization and marketing practices;¹⁰ by the studies of factors affecting consumer demand, of quality as a factor in the price of farm products, of the flow of products to market, and of market areas. Examples of all of these will be cited in connection with project discussions below.

The changes which have taken place in the past, and the current trends, are brought out clearly in the following tables based on a comparison of the titles in the two bibliographies of marketing research published by the Bureau of Agricultural Economics Library, one of all studies up to 1925, and the other of studies between 1925 and 1930;¹¹ also of the titles of projects now under way in the agricultural experiment stations and in the Bureau of Agricultural Economics.¹² Although these compilations do not pretend to cover all the work that has been done, and although it is difficult in some instances to determine from the information given in the bibliographies the exact nature of the studies referred to, it is possible nevertheless to obtain from these sources a very good idea of the growth and character of research in the field of agricultural marketing.

(9) *Farmers' Cooperative Business Study: Staple Cotton Growers*, U. S. D. A. Dept. Circular 897, by A. V. Swarthout (1926).

Sales Methods of a Growers' National Marketing Agency, U. S. D. A. Bulletin 1109, by Asher Hobson and B. J. Chaney (1928).

Marketing Country Creamery Butter by a Cooperative Sales Agency, Minnesota Bulletin 244, by H. B. Price (1928).

The Cooperative Marketing of Fruits and Vegetables on the St. Louis Market, Missouri Bulletin 277, by F. L. Thomsen (1929).

(10) *The Marketing and Distribution of Fruits and Vegetables by Motor Truck*, U. S. D. A. Technical Bulletin 272, by B. Edwards and J. W. Park (1931).

(11) *Bibliography on the Marketing of Agricultural Products* compiled under the direction of Mary G. Lacy, Librarian of the Bureau of Agricultural Economics, 1925.

State and Federal Publications Dealing with the Marketing of Agricultural Products Issued Since 1924, compiled by Louise O. Bercaw, Library, Bureau of Agricultural Economics, 1930.

(12) *Classified List of Projects in Agricultural Economics and Rural Sociology for the Year Ending June 30, 1931*, compiled by B. Youngblood in the Office of Experiment Stations.

Research in Progress in the Bureau of Agricultural Economics, July 1, 1932, issued by the Bureau of Agricultural Economics.

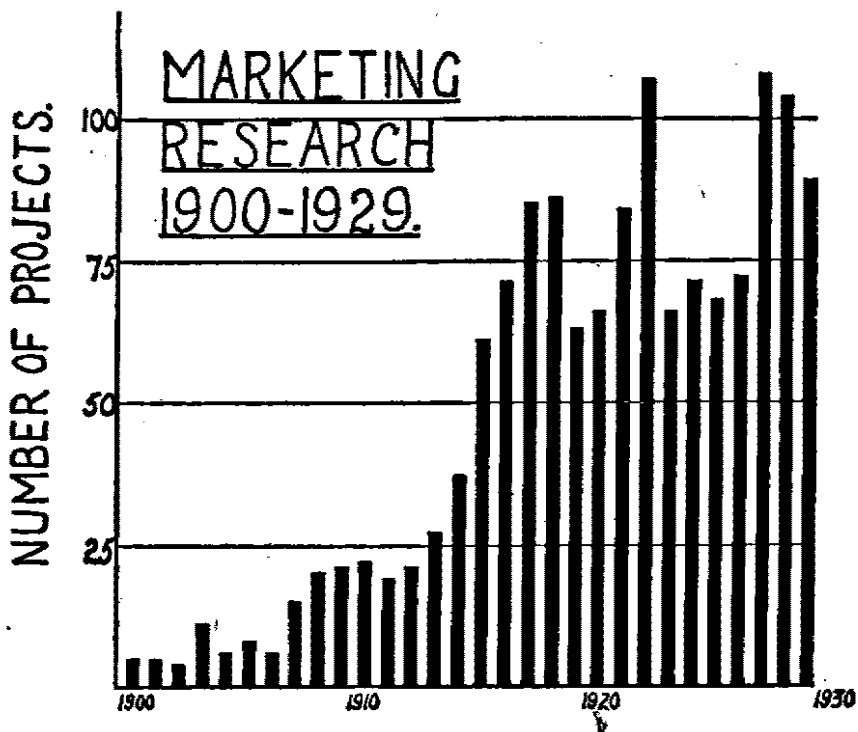


CHART I. GROWTH OF RESEARCH IN THE MARKETING OF FARM PRODUCTS, 1900-1929.

In these bibliographies 1453 studies were found that could be used in the present analysis. Of that number only 25 had appeared before the close of the last century. The course of development since 1900 is clearly shown in Chart I. For the first seven years, there was little interest in marketing and the average annual output of publications was around six; during the next eight years interest definitely increased and the output rose to an average of twenty-three; then with the World War came the great stimulus which brought marketing research to its present level with an average of eighty studies per year.

In the lists of current projects for the years 1931 and 1932 there are 265 that relate to "marketing" as that term is used in the present series of reports. There are 115 reported by the state experiment stations. This is to be compared with 205 projects in Farm Management. In the Bureau of Agricultural Economics, 150 projects are listed in marketing as compared with only 47 in farm management; but this in part reflects differences in types of projects or organization of the work.

In 1927 when the Advisory Committee on Agriculture of the Social Science Research Council made its survey of research in the state

experiment stations, 88 projects were classified as marketing.¹ The increase in four years has been 27, or 30 percent. In the same period, the farm management projects have increased in number from 125 to 205, or 64 percent. Thus there has been definite slackening of interest in marketing research in the state agricultural experiment stations. Lack of leadership in the Bureau of Agricultural Economics has no doubt been a major cause of this.

MARKETING RESEARCH BY SUB-FIELDS.

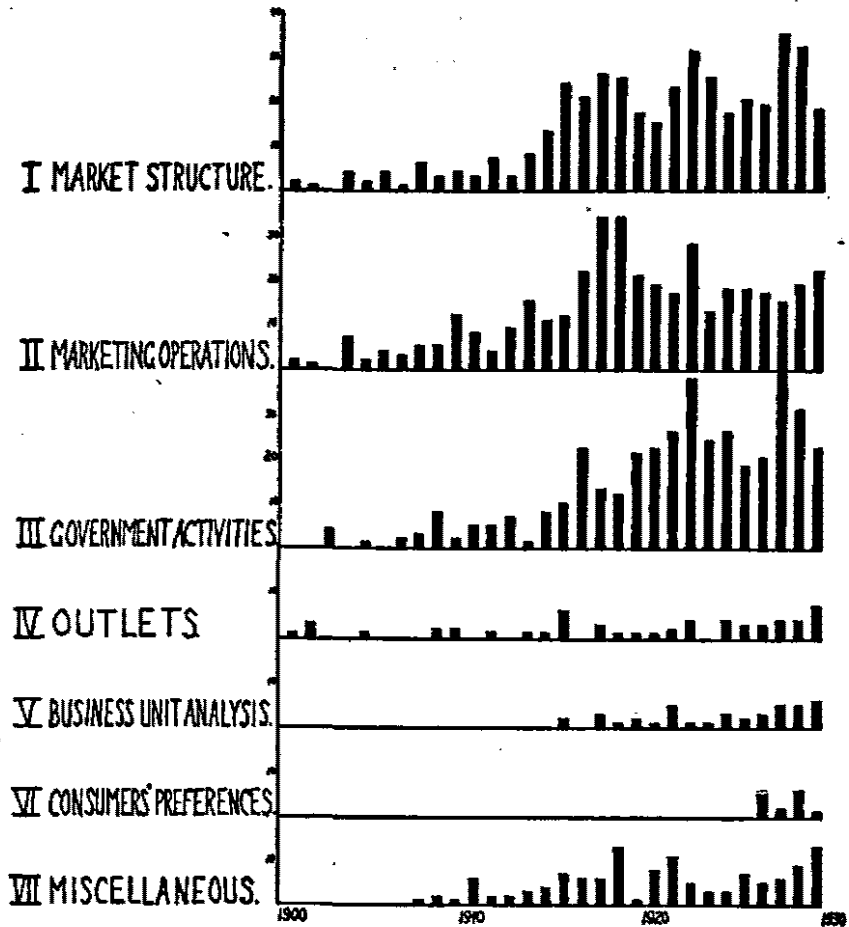


CHART II. VOLUME OF RESEARCH IN THE MARKETING OF FARM PRODUCTS BY SUB-FIELDS, 1900-29.

Of the 1453 studies published prior to 1930, apparently 417 deal with market structure and the channels of distribution for various

(1) *A preliminary Report of a Survey of Economic Research in Agriculture in the Year 1926-27*, Volume III.

commodities (covered in Groups A and H of this report), 403 deal with particular marketing operations such as storage, packaging, etc., commonly performed by private marketing agencies (covered in Group E), 394 deal with governmental activities connected with marketing, mainly grading (covered in Group F), 58 deal with market outlets and inter-regional competition (covered in Group C), 40 deal with business unit analyses of particular types of marketing agencies (covered in Group D), 14 deal with consumers' preferences (covered in Group B) and 127 are of a miscellaneous character (see Groups G and I).

The development of research is indicated in Chart II. Throughout the whole period the projects dealing with market structure have constituted about the same proportion of the total. In the second sub-field the numerical peak was reached in 1917 with 34 studies, but even earlier its relative importance had begun to decline. In the five-year period 1905-1909, projects of this type constituted 41 percent of the total, and in the subsequent five-year periods 37, 33, 24 and 20 percent respectively. Projects concerned with grading and other governmental activities became particularly important in the last decade, during which two-thirds of all such projects were undertaken. The peak of absolute and of relative importance was reached in the five-year period from 1920 to 1924, when projects of this nature represented 34 percent of the total. In the fourth sub-field the number of studies has increased so little that its relative importance has declined from 16 percent to 4 percent. The studies dealing with business unit analysis have been undertaken only since 1915. They have gained steadily in importance, especially since 1925. The type of research which has been most recently developed is that which deals with consumers' preferences. The first studies of this sort appeared in 1926.

To bring this analysis of recent trends down to date, we may compare the percentages of current projects falling in each of the above sub-fields with the percentages of past projects. These are set out in the following table:

Sub-fields	Studies published prior to 1930 (percentages)	Research in progress 1931 and 1932 (percentages)
I Market Structures	28	19
II Marketing Operations	28	17
III Government Activities	27	27
IV Outlets	4	15
V Business Unit Analysis	3	7
VI Consumers' Preferences	1	11
VII Miscellaneous	9	4
All	100	100

It is evident that research in marketing is giving relatively less attention than formerly to projects dealing with market structure or particular marketing operations, about the same attention to

government activities, and relatively much greater prominence to business unit analysis, competing outlets, and consumers' preferences.

Many of the projects in the second group deal with the physical handling of the products; and the present tendency in marketing research is towards economic rather than technical analysis. As a quantitative measure of this changing emphasis, we may compare the number of projects past and present that can be classified as largely non-economic in technique. Among the studies made before 1930, there were about 24 percent of this type, whereas the percentage among current projects is only 18 percent. The proportion of such projects is highest in the work done by the United States Department of Agriculture—37 percent before 1930 and 30 percent now. Of the work done by the land-grant experiment stations, 25 percent was formerly of this largely non-economic character, but the proportion is only 2½ percent in the list prepared by the Office of Experiment Stations.¹⁸ Of the research done by other agencies in the past, only 12 percent was of this sort. Information on their current research is not available. Other characteristics of the research done by these different agencies are indicated in the following tables, which show the percentages of the projects of each type that were undertaken by each type of institution down to 1930:

Sub-fields	United States Department of Agriculture	Experiment Stations	Others	All
I Market Structure	24	38	38	100
II Marketing Operations	40	37	23	100
III Governmental Activities	35	19	46	100
IV Outlets	27	18	55	100
V Business Unit Analysis	18	60	27	100
VI Consumers' Preferences	21	58	21	100
VII Miscellaneous	12	31	57	100
Average (Weighted)	30	32	38	100

The United States Department of Agriculture has worked the most extensively in the field of marketing operations; also in the field of government activities, particularly grading regulations. But an even larger proportion of studies of this latter sort have been made by the state department of markets and agriculture. The state departments and some other agencies, such as the Federal Trade Commission and the Tariff Commission, have done most of the work relating to market outlets and inter-regional competition. On the other hand, the newer types of study dealing with consumers' preferences and business unit analysis have been undertaken mainly by the land-grant experiment stations.

(18) The definition of "economic" followed in this classification was very liberal. One might easily have been followed that would have put nearly twice as many projects in the non-economic category. In general, projects of the type included in this report were called economic, although it will be apparent from a reading of them that many require the use of a large amount of technique of the applied natural science type. Dr. Youngblood may have made the percentage for current research low by largely omitting the technical projects from his list.

The current projects reported by the United States Department of Agriculture and the state experiment stations are classified in the following table:

Sub-fields	United States Department of Agriculture (number)	Experiment Stations (number)	Total (number)
I Market Structure	9	47	56
II Marketing Operations	29	16	45
III Government Activities	61	8	69
IV Outlets	26	12	38
V Business Unit Analysis	5	14	19
VI Consumers' Preferences	15	18	26
VII Miscellaneous	5	5	10
Total	150	115	265

From these figures it is apparent that in the work of the United States Department of Agriculture, the emphasis is being placed upon the sub-fields II, III and IV, market operations, government activities, and market outlets. More than three-quarters of the projects fall within these groups, and more than half of these relate to the government regulation of grades; and hence have a predominantly natural-science character. Of the projects reported by the experiment stations, less than one-third are of these types. By far the largest number deal with market structure (including general commodity studies); but the problems of business unit analysis and consumers' preferences are also given more attention by the experiment stations than by the United States Department of Agriculture.

SOURCES OF DATA

Sources of data are discussed below in connection with the individual projects. In none of them, however, is any reference made to the data of the 1930 Census of Distribution, the reports of which were not available when the project discussions were prepared. Neither has it been possible to include any general discussion of the use of these census data, since not all of the volumes on distribution had been published when this bulletin went to press. Research workers in the field of marketing will want to make every possible use of this material, not only because it is wasteful of resources not to use data already collected, but because a thorough testing of the material of this first census of distribution is needed as a guide to revision of methods for the next census in 1940. The more of the needed revisions that can be made in 1940, the sooner will the census of distribution attain fairly definite form, so that the data are comparable from decade to decade.

The following discussions of the 1940 Census of Distribution will be of some guidance in the use of this material. No doubt some of Mr. Bohannon's hopes as to the value and usefulness of the data will not be realized, but more certain is it that the possibilities of the use of the data will never be fully realized.

McFall, Robert J., "The Census of Distribution", *Journal of the American Statistical Association*, September, 1932, pp. 802-806.

Bohannon, Charles D., "Statement of the Reports to be Issued on Distribution of Agricultural Commodities and on Trade in the Small City and Rural Area", Bureau of the Census.

Bohannon, Charles D., "The First Census of Distribution with Especial Reference to its Possible Contribution to State and National Agricultural Policies and Research", Bureau of the Census (mimeographed).

ANALYSIS BY PROJECTS

We now come to the main purpose of the report, which is to outline the field under discussion in terms of a suggested list of possible research projects, and to discuss methodology for each of them. This list is not intended to include every conceivable project, but instead merely to be representative as to topics and methodology. These projects were selected with the thought constantly in mind of an agricultural experiment station, or of the United States Department of Agriculture, or of certain other agencies likely to be engaging in research in the marketing of farm products. The choice of a project by such agencies depends upon what projects have preceded it, the resources of men and funds available, and a host of other considerations. Accordingly, the projects are not mutually exclusive. Some are comprehensive calling for macroscopic analysis of a large subject; others confined to narrow subjects or to limited areas. Under such circumstances, the broad projects may cover the same field as several narrow ones; but in far less detail. A research agency wishing to do so can combine several of the narrow projects into a detailed study of a rather large subject. This is most likely to be done when a limited area is to be covered, as in some of the case studies outlined below. In some instances projects overlap, but approach the subject from a different direction. In the actual discussion of these projects, an effort has been made to avoid duplication by cross-referencing to other projects; but a certain amount of it is inevitable under the foregoing circumstances.

It also needs to be explained that some projects have been listed that are not likely to yield tangible results, at least for the present, since neither adequate data nor satisfactory methods of attack are

at present available. It still seems likely, however, that progress will be assisted by calling attention to these problems, and by stimulating deductive and qualitative analyses which may lead to the collection of more adequate data and the development of more effective methods of attack. The limitations to present attack on such problems are, however, indicated in the discussion of them.

GROUP A

Projects Relating to the Structure of Markets and Market Areas.

The projects in this group do not in themselves provide solutions of marketing problems, but they furnish a much needed foundation for studies with such an objective. This distinction is kept clearly in mind in all the project discussions following. This is necessary because in the past many studies less thorough than these have been undertaken with the idea that they in themselves would furnish solutions of marketing difficulties, with unfortunate results.

It will be noted that although description of the sort that Dr. E. G. Nourse calls "qualitative description"¹ predominates in all these projects, much emphasis is given to explaining and accounting for the structures that are found.

PROJECT 1. Channels of Distribution.

OBJECTIVE: To trace the marketing of a commodity from its source to its consumers, indicating through what agencies it passes, the methods of sale, marketing practices, charges, etc.

(H. E. Erdman.)

The study will determine, approximately at least, the proportions of the supply handled by each series of successive middlemen and will endeavor to account for the more important differences that are found in the sequence and combination of the marketing operations involved. It will analyse the functions performed by such agencies as country buyers, wholesale receivers, commission men, auctions, jobbers, brokers, and retailers, and will explain why in certain cases these services are taken over by other agencies or are dispensed with altogether. In connection with the customs and practices of the

(1) See *Research Method and Procedure in Agricultural Economics*.

trade, it will deal with the following: the definition of terms by the trade association; the nature of the contract of sale; credit allowed; discounts and rebates provided; the tolerance of shrinkage and substitution; the responsibility for deterioration in transit; provision for inspection and for the adjustment of claims; the methods of negotiation between the various dealers; guarantees of price maintenance by sellers; price agreements among competing dealers; agreements between buyers and sellers in regard to resale prices; arrangements for joint advertising campaigns; understandings in regard to the legitimate spheres of business for the different types of dealers and the attitude of the trade towards those who attempt to poach on the business of others, as when a wholesaler sells direct to consumers or a shipper deals directly with a retail customer; and so on.¹

The question of dealers' margins, although related to the present study, requires a somewhat different type of analysis, and is dealt with in the bulletin on research in relation to the Prices of Farm Products.² Charges such as brokers' commissions which are made on the basis of a fixed rate per unit or per cent may easily be included in either of these projects.

The project should be limited to the marketing of a single commodity or group of closely related commodities. The size and difficulty of the undertaking will depend upon the nature of the commodity selected. The study may deal with the channels leading from a specialized producing area to widely scattered consumers, or it may deal with the channels leading into a concentrated consuming area from various sources of supply. The exact form of the study must be determined mainly by the interests of the investigators, the significance of the problems at hand, and the opportunities afforded by geographic situation, financial resources, and personal qualifications.

Although many studies of this sort have already been made, and the marketing channels for the more important agricultural commodities are fairly well known, some exploratory work still remains to be done in connection with minor products, and much may be contributed in quantitative accuracy to the knowledge we already possess. Very significant studies may also be made of the changes which take place from time to time in the distributive organization for each of the different commodities.

Projects of this sort will be of value not only in enabling producers and consumers to understand more clearly the nature of the

(1) Dr. Nourse doubts whether all these customs and practices are germane to a project on marketing channels. It surely is true that much less comprehensive projects could be undertaken, and no doubt advisedly in many cases. (Editors.)

(2) A project on margins could be combined with this type of project in some cases to the advantage of both. Early projects in marketing channels used to determine how the consumers' dollar was divided between the producer and different marketing agencies. These were not really properly developed margin studies. (Editors.)

marketing process, but also in affording to research workers the necessary foundation for more detailed studies relating to the efficiency of particular business units or particular marketing arrangements.

Data.

Much useful information may be supplied by government inspectors and market-news men, but most of the basic data must be obtained directly from the marketing agencies themselves. In order to determine the proportions of the supply passing through the various channels, it will be necessary to obtain figures showing the total amounts of the commodity handled by each of the middlemen concerned, the nature of the other agencies with which he deals, and the volume of business done with each particular type of agency preceding or following him in the distribution chain. This information is contained in the books of the individual dealers in more or less convenient form according to the type of business and the method of bookkeeping employed. The problem for the investigator is to get access to these records and to abstract the information he requires. If the manager of the business is willing to have the tabulations made by his own office staff, it is entirely to the advantage of the investigator. Some managers will prefer to do this rather than have strangers handling the books. Information relating to trade practices will be obtained through personal interviews rather than from written records.³

The importance of establishing friendly contacts with the members of the trade can hardly be overemphasized. Careful thought and tactful negotiation will be necessary in order to win the confidence of the men who have the most intimate knowledge of the business. If the business is of a seasonal nature, contacts should first be made in the slack period shortly before the rush begins. At such a time the men in the business are more likely to have leisure for some friendly discussions. It is then they are most likely to have office help available to make the tabulations required. On the other hand, it is essential that the investigation should continue through the busy season and that observations should be made when the various marketing agencies are at the height of their activity. The project should be discussed with key men while it is still in the planning stage. These should include

(3) "More emphasis is given to the collection and analysis of statistics showing the relative importance of the various channels of distribution and the agencies at various stages in the channels than is ordinarily advisable in a preliminary marketing study. The *amount* of business will be difficult to obtain in many instances, and probably in most studies as comprehensive as this one, the data can be summarized only in a most general manner. As for the comparative value of such data in pointing out inter-market relations, I would say that they could be used only in an equally general manner. Unless data of a comparable character were obtained at an earlier period, comparisons of marketing channels will probably be very difficult because changes in channels so often involve the disappearance of certain middlemen, and also because individual agencies generally preserve their records only for a very short period of time."

(H. B. Price.)

some of the more important dealers, particularly the officers of any trade associations, and also the officers of the cooperative marketing organizations. Although the introductory interviews are likely to be somewhat discouraging, it is practically certain that many of these men can eventually be won over to take a genuine interest in the success of the project. Special care must be taken to avoid entanglements with any one of the conflicting groups in the market; for example, the investigator must not allow his interests to be identified with those of the cooperatives. If he is to succeed in his undertaking, he must maintain a strictly neutral attitude. He must also be scrupulously careful never to betray, even accidentally, the confidence of anyone from whom he has received information. He must be on his guard against the attempts of some "smart" dealers to pump him for information about the business of their competitors. Difficulties of this sort are more commonly encountered in the field of marketing research than in most other fields.

In order to get a thorough understanding of the actual dealings, the investigation must be conducted with great patience and perseverance. It will probably be wise to ask at the outset only for information which is likely to be granted freely. Such matters as price agreements and special rebates should be passed over until more confidential relations have been established. Even in the final stages of the investigation, it may be advisable to broach certain questions only with those men who have shown themselves most friendly and communicative. A great deal may be learned simply by observation if a person is on the alert. It may also be suggested that in many cases better results will be obtained by casually directing discussion to a topic of interest than by more obvious and deliberate interrogation.

Where organized exchanges exist the rules of the exchange will give the investigator a good start toward understanding trade practices and will give him a good basis of information to guide his interviews with members of the trade. Secretaries of the exchanges and secretaries of the various trade associations of middlemen are usually well-informed and helpful and often have considerable information in their files. They can often help in determining the key men in the trade and sometimes are glad to assist the investigator in making contacts.

A project of this sort may best be handled by a single investigator with some clerical assistance. He should probably spend several weeks in the producing area (or areas) and several more in the central market (or markets). If the investigation carries him beyond his own state, cooperative arrangements should be made with the United States Bureau of Agricultural Economics and with the agricultural experiment station of the state concerned. It is easily conceivable that the dealers at such markets as New York and Chicago may be-

come weary of investigations by men from each of the various states from which their supplies are drawn. Superficial studies by men from distant states may greatly increase the difficulties of the local research workers in making more intensive studies of their own.

In order that the conclusions drawn from this study may have the highest practical value, it is necessary that they should be based on data that are truly representative of the trade as a whole. Since it is generally impossible to get information from every agency concerned, the question of sampling is bound to arise and must receive careful consideration. In attempting to measure quantitatively the importance of the various marketing channels it is particularly important that the figures should be fairly complete. An estimate should be made of the percentage of the total volume of business covered in the study, and the nature of the omissions should be explained as fully as possible. If estimates can be made by men familiar with the business to cover these omissions, they should be reported in the study and given due weight in the conclusions drawn. In dealing with these estimates and in dealing with all the information relating to trade practices, etc., the reliability and competence of the informants are more important than their numbers. Here it is a matter of weighing evidence rather than of calculating probabilities. A great deal depends on the shrewdness and good judgment of the investigator.

Analysis of data.

The analysis of the data collected on the quantities handled by particular agencies will be of a simple statistical nature. Each agency will be classified according to its type—wholesale receiver, commission merchant, broker, retailer, etc.—and the volume of trade between each of the types of middlemen will be calculated from the records obtained. To account for the relative importance of the different channels and the different agencies, the numerical information must be supplemented by the general knowledge of the business acquired during the investigation. If particular points are difficult to account for, the figures will have to be checked and further inquiries made. If there are features in this distributive system which are unusual, these will deserve especial attention. Comparison will also be made, where possible, with channels followed by the same commodity at an earlier date. Reasons to account for the changes will be sought and the changes found in the case of this commodity will be compared with those found in connection with other commodities. In this way some conclusions may be reached as to the general trend of inter-unit marketing organization.

The analysis of the information gathered relating to trade practices will be less formal in its character. A good deal of it will be done while the investigator is actively engaged in his field work. The

final stage will consist in a reorganization of field notes according to the topics dealt with, a careful weighing of the evidence on each particular point, and an attempt to draw from the mass of information accumulated the conclusions that are most significant and useful. In all of this analysis, care must be taken to avoid, on the one hand, the popular prejudice against middlemen, and on the other hand, the academic assumption that free competition is a guarantee of efficient service from the social point of view. It must also be borne in mind that diversity in the methods of distribution is not unnatural. Differences in the channels of trade do not necessarily indicate disorganization and inefficiency. Differences in the conditions and in the persons concerned may justify the existence side by side of long and short channels of distribution.

In presenting the results of this study, use may well be made of diagrams representing the various types of middlemen and the volume of business passing through each of the various channels found in the market. It is essential, in such diagrams, that the relative importance of the different channels should stand out clearly at a glance. Ingenuity and thought expended in attaining this end will generally bring excellent returns.

The list of references following indicates that projects of this type are still in progress. Dr. Stokdyk's recent artichoke study is an example of the form such projects are now likely to take. Dr. W. O. Hedrick has recently been tracing out the marketing channels for Michigan beans. Miss Jefferson is centering her attention on one group of marketing intermediaries in fruits and vegetables, the wholesalers, and observing the changes taking place, particularly the developments connected with the emergence of the travelling jobber.⁴

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(4) Dr. Spencer believes that the practical objectives of this project and of several similar projects in this Group should be more emphasized.

PROJECT 2. Boundaries of a Supply Area.

Objective: To locate the limits of the production area for a product concentrated at a given central market, to find the factors determining these limits, and to account for the fluctuations in these limits from year to year.

(O. B. Jesness.)

A geographic study of this kind will bring out in a realistic way the close relationships between the problems of commodity distribution, transportation rates, and regional price differentials. It will contribute to our understanding of the marketing structure for the commodity concerned. It will be useful in any attempt to study local farm prices or to explain the local differences that occur. It may have a direct application in the development of new methods or agencies, as for instance, in the organization of a producers' marketing enterprise. A knowledge of the boundaries of the supply area will be helpful in collecting, disseminating and interpreting crop and market news. This knowledge is of particular importance in connection with any revision that may be made in the railroad rate structure. Only with a knowledge of the market areas can the effects of rate changes upon producers and dealers be determined in advance.¹

This project constitutes the first step in a geographic approach to marketing, and it leaves to Project 3 the task of describing in some detail the internal structure of the area that is outlined. It is closely related to the projects in the reports on Transportation and on Prices of Farm Products which deal with market differentials.

The present project is set up as one to deal with the supply area for a single commodity or for a closely allied group. It may be convenient, however, to carry it on in conjunction with parallel projects relating to other commodities sold through the same central market but having different supply areas. This will generally be the case if the investigator is more interested in the market city than in any particular commodity.

Basic analysis.

It must be recognized at the outset that, although the market area for any specific product remains sufficiently constant to preserve its identity, there are likely to be considerable variations in the boundary lines from period to period. The areas may also be different for different grades of the same commodity, and the relation of these areas may change as time goes on.

Two fundamental factors determine the limits of a market area,

(1) "The study should point out the prospects for expansion of the supply area, and the possibilities of competition from new sources of supply. The development of roads and trucks and other transportation lines no doubt will be found to be a factor in the development of the supply area." (Leland Spencer.)

namely, the conditions of supply and demand at various points, and the relative costs of transportation from one to another. The term costs of transportation, as used here, must be interpreted broadly to include a consideration of such things as the convenience of the service, the reliability of the agency, the time lost in transit (particularly important with perishables), the advantage of securing assorted cars, etc. It would also have to include the customs duty payable in cases where a tariff barrier has to be crossed.²

With a knowledge of the prevailing costs of transportation, it is possible to calculate theoretically the limits which would tend to be established under given sets of price conditions. The effects of changes in transportation rates may be calculated in a similar way. The principles here involved have been discussed by Professor Frank Fetter³ and by Professor J. D. Black.⁴

Although it would be possible by purely empirical methods to locate the limits of a market area, some theoretical analysis is essential in explaining why they are located where they are and why they change from time to time. A complete explanation would involve an intricate study of supply and demand in a large number of interrelated producing and consuming areas; it would also involve a study of the factors which determine railroad rates and other transportation costs. Such studies, however, belong to other fields of economic research, and in the present project, prices and rates may be accepted themselves as the ultimate elements in the problem.

If the empirical results are to be accounted for by the theoretical analysis based on these factors, two conditions must be fulfilled: first, the boundary must run through points at which the local prices at any given time, plus the costs of transportation from each point respectively, are equal to the central market price; second, when the boundary divides one market area from another it must run through points where the difference in the costs of transportation to the competing markets is just sufficient to offset the difference in the prices prevailing in them. That is, there must be a consistent price and transport relationship between the different points shipping to the same market at the same time and between the different markets

(2) "I would also include such local protective measures as sanitary standards, plant quarantine control and local taxation of competing commodities. The dairymen of every one of the Northeastern states, including New Jersey and New York, are trying to get the state or city health departments to keep out their competitors through refusing to approve shipments from outside plants. It is not safe to neglect the importance of these items in calculating the limits of production and market areas." (W. P. Hedden.)

Professor Clark thinks that the growing importance of trucking to local markets should be recognized specifically in the statement of this project and No. 8.

(3) "The Economic Law of Market Areas," *Quarterly Journal of Economics*, May 1924.

(4) "The Geography of the Twin Cities Market Area for Farm Products," Chapter XVI in *The Marketing of Farm Products*, edited by H. B. Price.

drawing*simultaneously from the same producing territory. When the commodity is one, such as strawberries, which is derived from entirely different sources at different seasons of the year, special care must be taken in working out the theoretical analysis.

When the empirical results are at variance with what would be expected in view of the existing prices and transportation costs (allowance being made for inaccuracies in the data particularly on prices), the investigator's attention is directed to an examination of other factors which might account for the discrepancies discovered. In this way a satisfactory explanation of the market area may in the end be reached, and a good deal of light may be thrown incidentally upon the theoretical assumptions commonly made with regard to the economic behavior of buyers and sellers.

Data.

One of the first requisites is a good map covering the territory to be studied, including competing market centers, and showing in detail all the transportation facilities available. Such maps are prepared commercially for sale to marketing agencies and are known as "shippers' maps".

Information as to the origin of shipments coming into the market can be obtained most completely from the records of the railway companies and other transportation agencies; but a large amount of work may be involved in making the necessary transcriptions and tabulations. The form in which the records are kept will greatly affect the amount of work involved. This work may already have been done by arrangements between the transportation agencies and the U. S. Department of Agriculture, and may be kept on file or published in the form of data in carlot loadings or unloads, either by counties or by shipping points. For some commodities, it may be more readily obtained. If the commodity passes through the hands of brokers, they may have the data in readily available form. In any case, these middlemen agencies will be able to contribute much to an understanding of the whole problem. Prices for important central markets may be found in reports published by government agencies and in trade papers. For other markets, they will have to be sought in the records of some of the marketing agencies. If refined data are needed, this may be necessary in any case. Local prices, in a similar way, may be obtained from published reports or from local agents, country buyers, or farm producers. Data on transportation costs and services should be obtained directly from the transportation services themselves, but supplementary information about the advantages and disadvantages of shipping over different routes should be collected from the various members of "the trade". Information about the physical characteristics of the commodity, the technique of handling it, the peculiarities of market preferences, etc., can be furnished by government inspectors and ex-

periment station specialists as well as by the those actively engaged in the marketing business.

It is important that full information should be secured separately for each variety and grade of the commodity. Distinctions of time are also important. In order that variations from season to season and from year to year may be observed, the data should represent cross-sections for each season of the year and should extend back for at least a half-dozen years. When changes are known to have taken place in the transportation rate structure, special observations should be made for the periods immediately before and after.

Some of the data may be collected by the questionnaire method, but for most of the primary facts, reliance will have to be placed on the personal survey method. When once the outlines of the market area have been roughly determined, attention may be concentrated on the marginal territories.

A single investigator with some clerical assistance will be able to handle the project satisfactorily. He will divide his time as circumstances dictate between the central market that is being studied, the important rival markets (if accessible) and the border zones of the producing area.

Since the limits of a market area are determined, not by the movement of the bulk of the commodity, but by the marginal shipments, the accuracy of the results obtained in the present project depends in an unusual degree upon the completeness of the information upon which it is based. On the other hand, fortunately, a very high degree of refinement is not essential to the value of the conclusions. Ordinarily if data are secured from the principal dealers in the business, the sample will be sufficiently representative for all practical purposes. If it is known, however, that some particular dealers make a specialty of keeping in touch with distant sources of supply, they should certainly be included in the survey. Shipments, however, which are clearly abnormal or experimental in nature should be treated separately from those which are normal.

Analysis of data.

When the basic field work has been done, the market area for each of the periods dealt with should be outlined on a simple map of fairly large scale. These maps may then be compared with one another and from them another may be prepared to show the central region which is consistently included in the supply area, the outlying regions which are more or less regularly brought in, and the exceptional sources of supply which are tapped only occasionally. Separate maps of this sort may be made for the different seasons of the year if the variations are sufficiently regular to warrant this.

The investigator should next examine each of the original maps in the light of the theoretical analysis already discussed. In doing this it will be helpful to have plotted on the maps a series of lines around the market center (and around competing market centers) to indi-

cate the zones of equal transportation costs. Since these costs are fairly stable, the labor involved will not be excessive. When these lines have been drawn in, the prices in the central markets and at the boundary points should be noted. It will be possible then to see very easily whether or not the movement of the commodity was consistent with the price-and-rate structure existing at the time.

A couple of examples will make this clear. First, if it is found that on the northern boundary in the 10-cent freight zone the price was \$.50, while on the western boundary in the 7-cent freight zone it was \$.55, it is apparent that perfect competitive equilibrium has not been established. It would appear either that the producers in the north were selling for a price two cents below what they might have had, or else that the buyers were paying two cents more than they need have paid to the shippers in the west. When the investigator inquires into this situation he may find that the producers in the north are in a weak bargaining position, or that their greater distance from the market keeps their shipments from arriving in as good condition as those from the west; or they may be unable to ship in convenient quantities or to provide the assortments of commodities necessary to make up the most desirable carloads; or it may be that the dealers who buy from the west are bound by custom or contract to the producers there and are unable to take advantage of the lower price prevailing in the north.

Second, if the price in market A is 2 cents higher than in the adjacent market B, the boundary between their supply areas should run through those sections on the map where the freight zones for A overlap zones for B which represent a 2-cent lower rate. Theoretical boundaries can be calculated in this way for any price differentials which happen to exist. If, then, it is found that the actual boundaries fail to coincide with the theoretical, new factors must be introduced into the explanation to account for the discrepancies. It may be that prices or transportation costs have changed so recently that sufficient time has not been allowed for the necessary readjustments to be made. If that is so, a study of the maps representing conditions at successive periods of time should yield some interesting conclusions in regard to the rate at which adjustments are likely to be made. It may be, however, that conditions are stable and that the explanation is to be found in peculiarities of the two markets, such as health regulations or grading requirements, which make access to the one more difficult relatively than would at first appear. Many significant facts may be discovered which cannot be foreseen till the final stages of the investigation are reached.

Studies of this type are not often made. Professor Duddy of the University of Chicago has completed studies roughly similar to the project outline for the livestock and grain supply territory of the

Chicago market.⁵ A group of workers, some calling themselves geographers and some sociologists, are making studies of the same general description for a number of market areas. These will be discussed in the report on Rural Organization in this series. Illinois and Iowa have made studies from other points of view of competition in the twilight zone of the Chicago livestock market area. Dr. Hart-sough's work on the Minneapolis-St. Paul market, cited in Project 4, should also be mentioned in connection with this project.

PROJECT 3. Geographic Structure of a Producers' Market Area.¹

Objective: To describe for a particular product the structure and organization of its producers' market area (both producing territory and market center), and to account for the same.

(O. B. Jesness and J. M. Cassels.)

This project is of a rather comprehensive nature. It combines, to a certain extent, and supplements the two preceding studies. It deals with the functional and relational problems of Project 1 in the geographic setting provided by Project 2, and it goes beyond them both in the description and analysis of the territorial arrangements of the whole marketing system. Spatial relationships are introduced into the study of the channels of distribution, and the outline map of the market area is filled in with realistic details descriptive of its internal structure. As in the two earlier projects, the research is here outlined for the marketing organization for a single commodity or for a closely related group of commodities.

Much of the discussion relating to Projects 1 and 2 has a bearing on the present one, and as it will not be repeated here, these projects should be re-read in this connection. Other projects to which reference should be made are Nos. 27, 34, 53, 57 and 58 in this bulletin; also Nos. 6 and 7 in the bulletin on research in Farm Management.

In this project the individual marketing units will be treated for the most part as separate entities instead of being merged, as in Project 1, into general categories according to type. Here we are concerned with the actual locations of the different agencies, with the numbers of the different kinds at different places, and with their importance individually as well as collectively.

A theoretical analysis of the geographic arrangement of economic

(5) Duddy, E. A., and Revzan, David A., *The Chicago Livestock Market*. Chicago, University of Chicago Press, 1931.

(1) By producers' market is intended to be designated the part of the distribution process that comes before the processor or jobber—the part that is associated with the assembly of the commodity.

units was first worked out by Johann Heinrich von Thünen² to account for the location of different types of agricultural production; it was later developed more elaborately by Alfred Weber³ to explain the changes that take place from time to time in the location of manufacturing industries. With some modification the same type of analysis may be employed in the study of the geographic structure of a marketing area. Von Thünen and Weber sought to account for spatial relations in terms of ultimate economic forces but in the present project (as in Project 2) the analysis will be reduced to no more ultimate terms than prices, transportation costs, wages and rents.

Given the locations of producers and consumers, the principal factors affecting the location of the various marketing agencies are:

1. The nature of the commodity.
2. Transportation costs.
3. Differences in operating cost-rates at different places.
4. Advantages in access to customers at different places.
5. The economies of large-scale operations.
6. The competitive conditions in the trade.

The nature of the product determines, in a large measure, the physical treatment it must receive in marketing. Some are ready for consumption as they come from the field, some require processing, and others are the raw materials for manufacture. Some are perishable and must be handled with dispatch. Others are delicate and must be handled with special care. Some can be assembled locally in carlots while others must be collected from much wider areas to secure the most economical shipping quantities. Some can be shipped by the producers themselves while others require handling by specialists with specialized equipment. Some are important independent commodities handled by agencies exclusively devoted to their distribution; others are handled along with other commodities, but have a predominant influence on location; while still others are of minor importance and are handled by agencies whose locations are practically independent of their influence.

Transportation costs and services are of great importance. The trading points are practically certain to lie on railway lines or water routes and particular points will be specially favored by the rate structure, the connections, and the facilities provided. Transportation cost will also include, of course, the costs of hauling by road either for long distances or for local deliveries. The transportation system is the framework upon which the marketing structure must be built. Disregarding the other factors that affect the location, agencies will tend to be situated at such places as will reduce to a minimum the costs of transportation. The carlot shipping agency will tend to be as near to the producers as is consistent with the

(2) Johann Heinrich von Thünen, *Der Isolierte Staat*.

(3) Alfred Weber's *Theory of the Location of Industry*, translated by Carl Joachim Friedrich, published by University of Chicago Press, 1929.

necessity of assembling carlot quantities; and the jobber who breaks up carlots into smaller parcels will be as near to his customers as is consistent with the necessity of disposing conveniently of his carlot purchases. In this way the commodity can be moved at the lowest costs from producer to consumer—taking advantage for the longest possible distance of the minimum carlot rates. Similarly, when packaging or processing alters the shipping weight or the freight classification of the commodity, a consideration of transportation costs would require these operations to be performed at the point which would allow the commodity to move for the greatest possible part of its journey at the lowest possible rates. And again, when the processing or manufacturing involves the combination of a number of raw materials from different sources or the separation of a number of products for use in different markets, the plant for the purpose will tend to be located at the point where total transportation costs for the materials and the products taken together will be reduced to a minimum. Special attention must be paid to the concessions given by railroads and other carriers with respect to processing “in transit”, that is, the arrangement whereby a commodity after processing may continue to its destination at the through rates from its point of origin. The basic pattern is thus determined by transportation costs but it is often greatly modified by the influence of certain other factors.

Differences in the operating cost-rates associated with different locations include differences in rents, in taxes, in wages, in credit charges, and in the prices of supplies. The advantages and disadvantages of a location in respect to operating cost-rates may offset the advantages or disadvantages with respect to transportation. Transportation charges might conceivably be reduced if processing plants were located in the very heart of the consuming area, but greater economy may result from locating them at other points where rents are lower.

The advantages of particular sites in giving access to customers are of great importance in the locating of marketing agencies. Since the access to customers does not depend entirely on proximity to their homes, the locations which are most desirable from this point of view need not coincide with those from which transportation costs would be least, and they certainly will not coincide with the locations in which operating cost-rates would be lowest. Consideration must be given to the buying habits of the people and the nature of the commodity concerned. The desirable location will be different for different commodities according as they belong to the classes designated by Professor Copeland⁴ as “convenience goods”, “shopping goods” or “specialty goods”. The merchandising advantages of particular sites are of special concern to retail stores but they are also significant for jobbers, brokers and other dealers.

(4) M. T. Copeland, *Principles of Merchandising*.

The advantages of large-scale operations tend to bring about a concentration of the product at particular points which may be inconsistent with the greatest economy in transportation costs and operating cost-rates. For example, in order to obtain the economies of large-scale milling operations wheat may be transported long distances to the great milling centers although the by-products have to be returned to the producing area for consumption and the operating cost-rates are higher at the mill than at the farm.

Finally, there is the question of competition, which affects both the volume of business available for individual agencies and the efforts that are made to take advantage of all possible economies. In some cases the desire of individuals to obtain a competitive advantage may lead to a splitting up of the market that is wasteful from the social point of view. In their efforts to intercept the trade from particular areas the middlemen may locate themselves in positions which are incompatible with the most economic arrangement of the marketing machinery as a whole. On the other hand, in the absence of keen competition there may be such inertia on the part of the established agencies that they fail entirely to take advantage of the possible rearrangements that would lead to the most economical movement of the commodity from the hands of the primary producers into those of the ultimate consumers.

It is the combined influence of these six factors which should account, very largely, for the territorial characteristics of the market organization and it is upon them that attention will be centered in the present investigation. In some cases the study will, no doubt, reveal other significant factors which should be included in the final explanation of the structure of the area.

Data.

The most important sources of information have already been referred to. The Census of Distribution (1930) also contains much information relating to the number of middlemen of various kinds in the different markets of the United States which will serve as a guide and a check in the search for the more specific and detailed facts that are required for our present purpose. Figures on the distribution of population within the area will have to be obtained from the Bureau of the Census, and reports on volume of production for the commodity concerned from the Division of Crop and Livestock Estimates. Field work will commonly be needed to collect the necessary data from individual business units.

The schedules used for different types of business units will probably differ from one another in detail, but the information obtained should cover in all cases such essential matters as:

Location, and date of interview.

Type of agency (country shipper, broker, jobber).

Type of business organization (cooperative, chain-store, independent unit).

Volume of business in general.

Amount handled of the commodity in question.

Physical treatment of the commodity (processing, repacking).

Sources from which it was obtained.
Transportation agency by which it was brought.
Size of incoming shipments.
Customers to whom it was sold.
Transportation agency by which it was shipped.
Size of outgoing shipments.
Costs of hauling or delivery when done by the agency.
Rents, wage rates, and other information on costs of operation, depending on the amount of detail which can be dealt with and the amount of cooperation that can be obtained from the agencies themselves.

Analysis of data.

The information assembled that is of a territorial nature should be mapped in the most convenient and helpful ways that can be devised. The density of production in different parts of the area can be represented by a dot map based on the volume reported for each separate township. The densities of population in consuming areas may also need to be mapped in order to account for the volume of movement of the commodity through the various channels of distribution. The next step might be to locate on a railway map all the shipping points with car loadings, in the manner indicated in Project 2. If the country shipping agencies are not too numerous, they can be marked on wall maps. Other types of agencies are likely to be less numerous and should be located individually. Agencies concentrated in the central market should be located on a large-scale map of the city. Such a series of maps will in combination show clearly and comprehensively the geographical structure of the market area.

Statistical methods also may be used to aid in the analysis. Such calculations may be made, for example, as the following:

- Percentages of the total supply handled by cooperative and commercial agencies.
- Average area served by local shipping points.
- Amounts (and proportions) of the product shipped from different distance zones around the central market.
- Relations of volume of business at different points to the number of marketing agencies of different types located at them.
- And so on.

Comparisons should be made, wherever possible, with maps, measures, and descriptions based on studies of similar marketing areas. Historical changes should also be observed if earlier studies of the same area are available or if the present project can be extended to cover a long enough period of time.

In the final and most difficult stage of the analysis, the attempt to explain *why* the arrangements are what they are, the results will depend almost entirely on the penetration and good judgment of the investigator himself. Beginning with the agencies which appear to be most typical or normal, he will consider how far their positions can be accounted for by the six factors recognized in the theoretical analysis. From these more normal cases he will pass on to those that appear to be unusual or to be inconsistent with what a person would ordinarily expect. He will probably test these in his thinking by comparing existing arrangements with possible alternatives which might prove economically more desirable.

Although it will be impossible to get any quantitative measures of the causal influence attributable separately to each of the factors or of the total influence for which they are jointly responsible, the investigator may, nevertheless, form very useful estimates of their relative importance and of the extent to which they do, taken together, account for the locations of the agencies under consideration.

In those cases where the explanation based on the theoretical analysis is found to be inadequate the investigator will introduce new elements suggested by his practical acquaintance with the business. When the situation cannot be satisfactorily explained by the knowledge he already possesses he may very profitably consult again those members of the trade who have shown themselves most interested and have been most helpful in the earlier stages of the study. Even when the investigator is satisfied with his own conclusions it may be well worth while to discuss them fully with some of these men. In most cases it will be found that they greatly appreciate this evidence of confidence and copartnership.

The studies already made which come nearest to covering the ground surveyed in this project are those of milk markets and their areas of supply, such as of the New York, the Boston and the Milwaukee markets.¹ But these do not represent it very well, since milk marketing does not offer as complex an organization of the local market and the supply territory as do many of the staple products. Such studies as those of the Minneapolis and Chicago markets cited under Project 2 usually contain considerable analysis of structure as well as of boundaries.

PROJECT 4. Historical Development of a Producers' Market.

Objective: To trace the historical development of a given producers' marketing area and center, including changes in limits and structure, and to account for these changes.

(By Mildred Hartsough.)

Such a study made with reference to any single product would indicate the reasons for the present organization of the marketing area

(1) Horner, J. T., *The Detroit Milk Market*, Michigan State College Agricultural Experiment Station Special Bulletin 170, 1928.

Mortenson, W. P., *An Economic Study of the Milwaukee Milk Market*, Wisconsin Research Bulletin 113, 1932.

Norton, L. J., and Spencer, Leland, *A Preliminary Survey of Milk Marketing in New York*, Cornell Bulletin 445, 1925.

Ross, H. A., *The Supply Side of the New York Milk Market*, Cornell Bulletin 527, 1931.

Schoenfeld, W. A., *Some Economic Aspects of the Marketing of Milk and Cream in New England*, U. S. D. A. Circular 16, 1927.

Spencer, Leland, *An Economic Survey of the Los Angeles Milk Market*, University of California Agricultural Experiment Station Bulletin 513, 1931.

Tinley, J. M., and Blank, M. H., *An Analysis of the East Bay Milk Market*, University of California Agricultural Experiment Station Bulletin 534, 1932.

and marketing center in terms of its historical evolution. It would show the origin and development of the marketing agencies and practices, and relate these to geographic, economic and other factors prevailing in the area at the time.

Such analyses, by leading to a better understanding of the marketing process, would be useful in themselves, and a large number of analyses of this type, covering individual commodities produced in particular areas, and marketed through their own particular centers, would furnish valuable materials for the study of economic regionalism. For this latter purpose, these studies would have to be supplemented by others showing the distribution of goods and services through the center to the area. It would then be possible to trace the development of the various lines of relationship between an area and its center, and to make a composite study of the region as a whole, both in its interior structure and in its relations to other regions.

A project dealing with the area around Minneapolis and St. Paul will be discussed here as an illustration of the procedure that may be employed and the results that may be obtained. This is a region in which the extractive industries have always predominated, and for which the Twin Cities have long been the economic nucleus through which most of the goods produced locally have sought a market. Among the commodities which have been or are produced in the area in important quantities are furs, lumber, grain, livestock, dairy products, and iron. Of these, grain is at present the most important, and Minneapolis is one of the great primary wheat markets in the country.

The chief problems involved are:

1. Examination of the producing area and of quantities of grain produced in the period during which grain production has been important in the Northwest. This involves a study of the historical changes in the area of production and of changes in the type of farming, together with some attention to the economic factors involved. Of course, it will not be feasible in this project to make a full production economic analysis of shifts in production such as outlined in Project 3 in the report on research in Farm Management.
2. History of the rise of a grain market at Minneapolis, with the reasons therefor, and statistics of the grain marketed there; also the changes in the number of firms.
3. An historical study of the marketing agencies and practices used in the area. Included would also be a sketch of the history of transportation and rates in the area.
4. Delimitation of the area from which grain has come to the Minneapolis market. This is by far the most intricate problem in the study. (See Project 2 for fuller discussion.) It involves an investigation of the changes in means of communication and in the cost thereof between various parts of the area and Minneapolis, and between the area and other centers, such as Chicago, Duluth and Kansas City. It also involves tracing the relationship between changes in prices in the area and in various potential markets, Minneapolis included. Any exact knowledge can be based only on a good deal of first-hand study of the data as to the destination of grain shipments from boundary districts of the area over the period of the study. Several other developments are closely related to this one, e.g., those connected with the localization of the milling industry, the practices of the millers in blending wheat of different types to make a balanced flour, the

relation between freight rates on grain and those on flour, transit privileges etc. Another closely related development is that of Minneapolis as an economic center apart from the grain trade, as a distributing center and a financial center. The more important Minneapolis became as an all-round center, the greater its capacity, naturally, to draw all branches of trade in its area away from competing centers.

Data.

The sources of information include primary and secondary, printed and manuscript material, and information secured through letters and interviews. Among the more important sources are:

1. Local histories, biographies, memoirs, etc.
2. Newspapers.
3. Manuscript collections, including letters.
4. Federal, state, or local publications, such as federal and state censuses, reports of agricultural experiment stations, state departments, chambers of commerce, etc.
5. Personal interviews and correspondence with grain exchange officials, trade association officials, railroad officials, bankers, and grain elevator men.
6. Study of such records as annual reports, minutes of boards of directors and exchanges, old lists of customers, etc., in some of the older organizations.

Obviously, there will be considerable duplication of material, and the sources will vary greatly in reliability. Data should be checked and verified wherever possible, and great care exercised in the making of generalizations.

A systematic study of federal, state, and local publications should supply especially statistical material from which important tables can be compiled. Manuscript collections and newspapers should be most useful for the early period scantily covered by other types of material. The statistics found there are apt to be estimates.

Interviews should, in general, be one of the last sources of information.¹ They should be based on specific questions, and allowance should be made for bias and fallibility of memory. The interview often furnishes invaluable material, but it requires a special technique and skill. Persons interviewed may often give clues to additional documents and records. Cooperation with the local chamber of commerce and civic and commerce association should prove possible and profitable.

No amount of checking of data on information as to changes in the limits of market areas will lead to definiteness and accuracy of results. A delimitation of the marketing area at any period which has any validity requires a careful study of railroad rates on both grain and flour at the time and of grain prices at the local shipping points in relation to those at the primary markets. The statistical data must be supplemented at many points by interviews with local elevator operators, terminal grain merchants, and railroad men. In many cases it is impossible to measure statistically with any exactitude the changes which have taken place in the area

(1) Professor Clark has found interviews with key men useful at the start in helping to lay out the work to be done and to decide upon sources to explore.

over a long period of time. It is at such points as this that the interview is invaluable. The latter may lead to the discovery of old records that may disclose changes.

In a majority of studies of marketing, conducted by agricultural workers, the approach has been from the point of view of the product—grain, citrus fruit, dairy products—or of the marketing practice or method. A fresh and equally valid approach is that suggested for this project and others in this section of this report—that of the agencies and practices worked out in a particular area, and the relationship between a given producing and consuming area and its marketing center. The market develops and changes in response to changing needs, and its history is thus closely related to that of the area. If we wish to understand the development of marketing methods as an historical rather than a genetic process, there is no more enlightening method of approach than by such projects as the one suggested here. Studies of this kind lead toward a clear understanding of the marketing process in relation to the individuals and groups who have developed it, and should be of great assistance in the improvement of marketing methods in order to satisfy needs more effectively.

To be as useful as possible in this latter respect, the other products produced in the same general area, and marketed through the same center, should be similarly studied. The Twin Cities are for the Northwest not only the most important grain market; they are also a marketing center for livestock, for dairy products, a manufacturing and distributing center for groceries, dry goods, and machinery, and a financial center for both commercial and agricultural credit. In other words, the Northwest is a well-knit, fairly unified region, and the Twin Cities constitute an economic and cultural nucleus for that region. The area and the center are mutually dependent, and that interdependence is worked out in a complex network of relationships, which can be clarified only by a series of studies such as the one outlined here. The Twin Cities would not be such an important grain market were they not also a flour-milling center, and they would not be so important in either capacity if they were not the terminal point for most of the lines of transportation which serve the Northwest. And because of these and other factors, the Twin Cities are the chief center for news, music, and even styles in the Northwest.²

The concept of the region is thus an important one, not only economically, but culturally and politically as well. The racial and social make-up of the Northwest, and the changes which have taken place in that make-up, are closely related to the economic structure of the area. The Germans and the Scandinavians came to Minnesota and the Dakotas primarily because of the agricultural possibilities of the

(2) The relationships outlined by Dr. Hartsough in this and the two following paragraphs are considered fully from a research point of view in Section A of this report.

relation between freight rates on grain and those on flour, transit privileges etc. Another closely related development is that of Minneapolis as an economic center apart from the grain trade, as a distributing center and a financial center. The more important Minneapolis became as an all-round center, the greater its capacity, naturally, to draw all branches of trade in its area away from competing centers.

Data.

The sources of information include primary and secondary, printed and manuscript material, and information secured through letters and interviews. Among the more important sources are:

1. Local histories, biographies, memoirs, etc.
2. Newspapers.
3. Manuscript collections, including letters.
4. Federal, state, or local publications, such as federal and state censuses, reports of agricultural experiment stations, state departments, chambers of commerce, etc.
5. Personal interviews and correspondence with grain exchange officials, trade association officials, railroad officials, bankers, and grain elevator men.
6. Study of such records as annual reports, minutes of boards of directors and exchanges, old lists of customers, etc., in some of the older organizations.

Obviously, there will be considerable duplication of material, and the sources will vary greatly in reliability. Data should be checked and verified wherever possible, and great care exercised in the making of generalizations.

A systematic study of federal, state, and local publications should supply especially statistical material from which important tables can be compiled. Manuscript collections and newspapers should be most useful for the early period scantily covered by other types of material. The statistics found there are apt to be estimates.

Interviews should, in general, be one of the last sources of information.¹ They should be based on specific questions, and allowance should be made for bias and fallibility of memory. The interview often furnishes invaluable material, but it requires a special technique and skill. Persons interviewed may often give clues to additional documents and records. Cooperation with the local chamber of commerce and civic and commerce association should prove possible and profitable.

No amount of checking of data on information as to changes in the limits of market areas will lead to definiteness and accuracy of results. A delimitation of the marketing area at any period which has any validity requires a careful study of railroad rates on both grain and flour at the time and of grain prices at the local shipping points in relation to those at the primary markets. The statistical data must be supplemented at many points by interviews with local elevator operators, terminal grain merchants, and railroad men. In many cases it is impossible to measure statistically with any exactitude the changes which have taken place in the area

(1) Professor Clark has found interviews with key men useful at the start in helping to lay out the work to be done and to decide upon sources to explore.

over a long period of time. It is at such points as this that the interview is invaluable. The latter may lead to the discovery of old records that may disclose changes.

In a majority of studies of marketing, conducted by agricultural workers, the approach has been from the point of view of the product—grain, citrus fruit, dairy products—or of the marketing practice or method. A fresh and equally valid approach is that suggested for this project and others in this section of this report—that of the agencies and practices worked out in a particular area, and the relationship between a given producing and consuming area and its marketing center. The market develops and changes in response to changing needs, and its history is thus closely related to that of the area. If we wish to understand the development of marketing methods as an historical rather than a genetic process, there is no more enlightening method of approach than by such projects as the one suggested here. Studies of this kind lead toward a clear understanding of the marketing process in relation to the individuals and groups who have developed it, and should be of great assistance in the improvement of marketing methods in order to satisfy needs more effectively.

To be as useful as possible in this latter respect, the other products produced in the same general area, and marketed through the same center, should be similarly studied. The Twin Cities are for the Northwest not only the most important grain market; they are also a marketing center for livestock, for dairy products, a manufacturing and distributing center for groceries, dry goods, and machinery, and a financial center for both commercial and agricultural credit. In other words, the Northwest is a well-knit, fairly unified region, and the Twin Cities constitute an economic and cultural nucleus for that region. The area and the center are mutually dependent, and that interdependence is worked out in a complex network of relationships, which can be clarified only by a series of studies such as the one outlined here. The Twin Cities would not be such an important grain market were they not also a flour-milling center, and they would not be so important in either capacity if they were not the terminal point for most of the lines of transportation which serve the Northwest. And because of these and other factors, the Twin Cities are the chief center for news, music, and even styles in the Northwest.²

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(2) The relationships outlined by Dr. Hartsough in this and the two following paragraphs are considered fully from a research point of view in Section A of this report.

district, and the extent to which those possibilities have been realized has been affected in no small degree by the development of the Twin Cities. The strength of the Non-Partisan League in the first years of the twentieth century was recruited in large measure from the hostility of the farmers in Minnesota and the Dakotas to the power which they felt was being unjustly wielded by the merchants and the financiers of the metropolitan center.

Regionalism is thus much more than an economic concept. It goes much further in determining political alignments than do state, or even international, boundaries. A proper approach to both urban and rural sociology is dependent upon an appreciation of the importance of regionalism. Any study which helps to clarify our understanding of the region as an economic, political, or social concept needs no further stress on its importance. The individual studies should eventually make possible a fresh synthesis of economic and social life, in terms of individuals and groups and their inter-relationships.

Research work already done in similar and allied fields.

The departments of Agricultural Economics, Economics, and History at the University of Minnesota have already sponsored a number of studies, some of them historical, of the Minneapolis-St. Paul market and the area served by it. Among them may be mentioned:

1. H. B. Price, editor, *The Marketing of Farm Products. Studies in the Organization of the Twin Cities Market*, University of Minnesota Press, 1927. A cooperative study of the Twin City market for agricultural products.
2. M. L. Hartsough, *The Twin Cities as a Metropolitan Market. A Regional Study of the Economic Development of Minneapolis and St. Paul*, University of Minnesota Press, 1925. A study of the development of the Twin Cities as a marketing, distributing and financial center for the Northwest.
3. Henrietta M. Larson, *The Wheat Market and the Farmer in Minnesota*, Columbia University, 1926. This is an historical study, covering the period from 1858 to 1900, of wheat-growing and the development of the wheat market at Minneapolis, stressing marketing methods and practices, and laying considerable emphasis on the relation between the marketing situation and the political situation.

PROJECT 5. Boundaries of a Consuming Area.

Objective: To locate the limits of the consuming area which is supplied a given product from a given central market, to find the factors determining these limits, and to account for the fluctuations in these limits from year to year.

(By H. E. Erdman.)

The project deals with a consuming area in the same way that Project 2 deals with a producing area. The same type of theoretical analysis applies and the whole procedure will be closely parallel. In

this case, however, the data in regard to shipments will be more difficult to obtain, as they are not assembled for governmental purposes.

This project will involve mainly a study of the records of the jobbing firms of the central market studied. Thus if we desire to locate the limits of the area to which San Francisco supplies potatoes, we will have to study the shipping or sales records of those jobbers—few in number—who have salesmen on the road selling to grocers in the surrounding territory.

Another set of records will probably disclose sales to truck jobbers who supply surrounding towns. It may be necessary to go further and learn from some of these truck jobbers how far they carry potatoes in different years.

Some of the reasons for variations from year to year may be learned from the jobbers themselves. Some may have to be obtained from the retailers in the border-line areas.¹

Any one commodity, such as potatoes, may not go as far or it may go farther than one would expect, because jobbers' lines will often combine potatoes with other commodities. Obviously the salesman will not go to an additional town to sell a few potatoes unless he can also sell the rest of his line. By the same token he may sell in some additional towns because on other goods he can meet the competition from the jobbers in the adjoining territory.

Professor Duddy of the University of Chicago will shortly publish a study of *The Distribution Area of the Chicago Livestock Market*, a companion study to the one cited in Project 2 of the supply area for this market. Other analysis that fits this project is mostly included in studies of marketing channels and the like, and is very sketchily done. Other studies which will be helpful, although not covering particularly the ground of this project are:

Brice Edwards, *The Marketing and Distribution of Fruits and Vegetables by Motor Truck*, Technical Bulletin 272, U. S. Department of Agriculture, October 1931.

F. P. Weaver, *A Survey of Some Public Produce Markets in Upstate New York*, Cornell Bulletin 525, 1931.

(1) Dr. Spencer adds:

"The boundaries of a market may be determined on the basis of several conditions:

1. Extent of commuting area.
2. Area served by jobbers or large distributors, such as the large milk distributors.
3. Area for which receipts and unloads of particular commodities, such as milk or eggs, can be most easily and accurately determined".

PROJECT 6. Geographic Structure of a Consumers' Market Area.

Objective: To describe the marketing structure and organization of a given consumers' market area which is not simply a large urban center, including that of both the consuming territory and of the distributing center; and to account for the same.

(By John M. Cassels.)

This project deals with a consuming area in the same way as Project 3 deals with a producing area. The same type of theoretical analysis can be applied, but the study in this case will probably be more complicated for three reasons: first, the secondary distributing centers in the area—small jobbing centers; second, the large number and variety of retail units; and third, these various marketing agencies are likely to be less specialized along commodity lines. The quantities of given commodities bought by individual consumers are generally smaller than the quantities marketed by individual producers and the variety of goods demanded by the average household is certainly greater than the variety produced on the average farm. It is only natural, therefore, to find new problems of subdivision and assortment in the consumers' market.

In dealing with these problems, the investigator will first ascertain what particular combinations of commodities are handled by particular agencies or types of agencies in particular circumstances, and then seek in some measure to account for these. He will consider, for example, the relation between the density of population in a local district and the type of store (general, grocery-and-meat, grocery, confectionery, fruit, etc.) handling the commodity in question; or the relation between transportation practices and rates for different commodities and the combinations handled by outlying jobbers. To develop these relationships carefully, however, will require business unit analysis as detailed as that outlined in Project 28 below.

Because in this type of market, as distinguished from the producers' market, the organization is more affected by consumers' needs and less by the nature of any one commodity, it may be found desirable in certain cases to make consumers the point of departure and attempt to deal with all the marketing agencies that distribute goods of any sort to them. To farm-consumers, marketing is a problem of economical buying just as to farm-producers it is a problem of economical selling. Such analysis soon runs into the problem of trade-center organization, of the function and future of the crossroads general store, of the small village or hamlet with its two or three stores, of the larger villages or small cities supporting a number of specialized stores, etc. There is a somewhat parallel differentiation for smaller and larger jobbing centers. This type of analysis is de-

veloped more fully in the report in this series dealing with Rural Organization. Listed below are a number of studies which deal with such problems:

The Social Anatomy of an Agricultural Community, by C. J. Galpin. Research Bulletin No. 84. Agricultural Experiment Station University of Wisconsin, Madison, 1915.

Service Relations of Town and Country, by J. H. Kolb. Research Bulletin No. 58. Agricultural Experiment Station University of Wisconsin, Madison, 1928.

Farm Trade Centers in Minnesota, 1905-1929, by C. C. Zimmerman. Bulletin No. 269. Agricultural Experiment Station University of Minnesota, St. Paul, 1930.

The Rural Community, the Natural History of a Sociological Group, by Dwight Sanderson. Ginn and Co., Boston, 1932.

Dr. N. L. Whetten has recently completed an analysis of trade-center organization and trends in the same in the three Prairie Provinces of Canada, Manitoba, Saskatchewan and Alberta, in which he finds the small one-store and two-store locations increasing in numbers with the population. In general, trade centers with less than nine business units are holding their own with the larger trade centers so far as mere numbers are concerned. Dr. Whetten thinks that a larger part of the business dealings of the population is no doubt being concentrated in the larger villages and cities as the country develops; but that the small local store has certain functions reserved to it which keep it in existence. This finding is similar to that of Dr. Zimmerman in the Minnesota study cited above. It is somewhat at variance with the conclusions of Dr. Sanderson and Dr. Kolb.

PROJECT 7. Distributing Organization of a Large Urban Marketing Center for Farm Products.

Objectives: To describe the marketing structure and organization of a given consumers' market area which is a large urban center; and to account for the same.

Such studies as Dr. E. G. Nourse's of *The Chicago Produce Market*¹, as that of Dr. H. B. Price and associates at the University of Minnesota, of the Minneapolis-St. Paul market for farm products, published under the misleading title of *The Marketing of Farm Products*², and that of New York City by Mr. W. P. Hedden and associates in the Port of New York authority³, fit in a general way under this project.⁴

(1) Houghton, Mifflin Co., 1916.

(2) University of Minnesota Press, 1927.

(3) *How Cities Are Fed*, D. C. Heath and Co., 1929.

(4) Other references which might be added to this project are:

Rasmussen, M. P., *Some Facts Concerning the Distribution of Fruits and Vegetables by Wholesalers and Jobbers in Large Terminal Markets*, Cornell Bulletin 494.

Thomsen, F. L., *The Cooperative Marketing of Fruits and Vegetables on the St. Louis Market*, Missouri Bulletin 277.

GROUP B

Projects Relating to the Consumption Basis of the Marketing of Farm Products.

The consumption of farm products will be influenced by many factors, among which will be price, the character of the commodity, the nature of the consumers and their utilization of the product. The projects which relate directly to the influence of price and changes in the influence of price are described in the report on Research Relating to Prices of Farm Products. The projects described in the present report are those which deal more directly with the characteristics of consumers, the nature of the product itself and the utilization of the product. It will thus be necessary to consult both reports for a complete survey of research projects in the field.

PROJECT 8. Determination of a Demand Curve in a Consumers' Market. (*See report on Prices of Farm Products.*)

Objectives: To derive and account for the slope and shape of the demand curve for a given product prevailing in a given consumers' market for a period somewhere nearly homogeneous.

PROJECT 9. Same as No. 8 in a Market In Which Manufacturers Are the Buyers. (*See report on Prices of Farm Products.*)

PROJECT 10. Changes in the Slope and Shape of Demand Curves. (*See report on Prices of Farm Products.*)

Objectives: To determine and measure the changes in the slope and shape of the demand curve for a given product in the consumers' or processors' market from day to day, month to month, and year to year—the trends and cycles if any; and account for the changes.

PROJECT 11. Rates of Consumption.

Objective: To determine the rate of consumption of different farm products by given population groups, to account for differences in rates between different groups, and to explain variations in the rates for the respective groups at different periods of time.¹

(By D. R. G. Cowan.)

A. *Measurement of the rate of consumption of a group in a given period.*

(1) The analysis of the data obtained in such a project as this may also take the form of deriving demand curves. The methodology for this is discussed in the report on Prices of Farm Products.

A "population" group is any group possessing a characteristic differing in kind or degree from others, which is significant with respect to the consumption of the product in question.² There may be racial groups such as the Negroes and whites, native and foreign-born groups, income groups, occupational groups, urban and rural groups, religious groups, literate or illiterate groups, regional groups and many others. The rate of consumption in the group will ordinarily be measured by the physical quantity consumed per person, or per adult male equivalent possibly, within a given unit of time. Physical amounts are preferable to money values, since the latter are influenced more by changes in prices. It is also consumption per person that is usually of interest, since the total consumption of different groups of people depends in part upon the number of people in the groups, and the differences in their numbers obscure the differences in their consumption arising from dissimilarity of other characteristics. We must not overlook the fact, however, that per-capita computation allows only for differences in numbers and that all other differences remain. Careful definition of the product and grade is also essential, greater exactness of definition increasing the validity of comparisons.

Methods of securing the data.

There are two general methods of securing the data. The first is by obtaining a record of the purchases of a group of consumers over a period of time, and the other is by securing answers to a considerable number of inquiries made of consumers. The ideal way would be to have consumers keep a complete record of their purchases and prices over a considerable period of time. It is difficult, however, to induce any considerable number of families forming a representative group to keep enough such records accurately, and hence this procedure will be impossible in most cases. The nearest approach will be in tracing deliveries to or sales from the marketing units in one particular market. This method seldom provides a complete description of the consumption of the group. But surveys also present certain obvious difficulties.³ In the first place, if the consumer is asked for his annual consumption or a dealer for his annual sales, the figures obtained are likely to be very approximate and to contain some bias because records are seldom kept at all, and

(2) These groups may not always be easily and clearly defined. For example, how long can a family properly be regarded as retaining the characteristics of Italians with regard to consumption, and when and under what circumstances do they take on the characteristics of the native whites?

(3) Together with its disadvantages the survey possesses certain advantages. The greatest of these is the possibility of tracing consumption to individual consuming units. This may be important for nutritional and educational problems as well as economic or sales problems. For example, determination of the effect of milk drinking at school upon milk consumption in the home is probably possible only through the survey method.

when they are, they cover only very short periods.⁴ The memory can be trusted to give dependable answers only for a few preceding weeks. Unfortunately, the consumption for such short periods may not be representative on account of seasonal variation.⁵ Secondly, getting a group of individual consumers that have the required characteristic of the group under consideration is difficult. The sampling problems here involved have been discussed elsewhere.⁶

The method of securing sales by particular outlets may take the form either of sales by particular retailers or of more general sales earlier in the marketing process. Retail sales are not recorded according to customers except where credit is extended or when permission is granted to the investigating agency to install a system for this purpose in the stores. The stores in this case will have to be selected so that the consumers served by them represent the characteristics of the group whose consumption is being studied, and will possess such a distribution of variations in other characteristics that these will average out. This may involve selecting stores in neighborhoods varying in wealth and income, in proportion of factory wage-earners, in percentage urban, in percentage illiterate, and so forth. Consumers may not patronize the same store exclusively. In consequence it will be necessary to secure the retail sales of all stores, or a considerable number in each community.

A somewhat simpler approach, possible in the case of products distributed on a large scale by single organizations, such as the packers or chain store organizations, will be to examine the sales of each organization as recorded for particular areas. It will of course be difficult for the ordinary investigator to secure access to such records. They will not include sales of other competing organizations or agencies, and hence will not be complete. They will reflect variations from area to area in so far as the organization handles the same proportion of the trade from area to area. It is also true that the sales of one organization from area to area are likely to represent a product more homogeneous in its characteristics than total consumption of the product. This is important. For example, the per-capita sales of an average grade of butter may be found to vary directly with per-capita wealth, while a lower than average grade of butter may vary inversely with the same fundamental influence.⁷ The determination of the number of persons included in the sales area and their characteristics will be extremely difficult, since trade areas

(4) See Pennsylvania Bulletin No. 245.

(5) See U. S. D. A. Technical Bulletin No. 78; also New Jersey Bulletin No. 806.

(6) See *Research Method and Procedure in Agricultural Economics*.

(7) See *Measurement of Advertising Effect* by D. R. Cowan, Bulletin, Bureau of Research and Education, Advertising Federation of America, New York.

are rarely definitely related to political subdivisions, which form the basis of much of the information required.

If we are studying the rates of consumption from the standpoint of the sales of a large cooperative or other large-scale business, we will need additional information regarding the characteristics of the areas, chiefly with respect to competition and sales effort. For such an organization we will need to study the following three sets of factors:

1. The relative importance of different consumer groups.
2. Comparative merchandising conditions, including competition.
3. Different types of selling and advertising effort.

Methods of measuring the causes of per-capita variation.

After the rates of consumption for the particular group have been determined by some of the above described methods, they may be related to the differences in characteristics of the areas. Where the survey method has been followed, cross classifications and association analysis will often suffice. Where sales by outlets are used, formal correlation is likely to prove the more effective method.

Curvilinear tendencies are quite common and logical in these cases. For instance, it is not to be expected that as we pass from low-income to high-income groups the consumption per capita will increase by successive equal or proportional increments. Nobody would expect people with an average annual income of \$25,000 to eat ten times as much chicken or cheese as people with one-tenth this income. The rate of consumption for Negroes or other groups having differences may be handled by considering the variable proportions of these in each area. The correct rate would exist where their proportion was 100 percent. The chief difficulty is that we may have no areas having 100 percent of the measured characteristics. It will then be necessary to make an estimate by extending the line of relationship to the ordinate of 100 percent.

Actually the consumption per Negro or other group may vary either directly or inversely with the proportion in the population. When foreign-born of a certain nationality are a small proportion of the population they tend to accept consuming habits established by the majority, while on the other hand if they form a proportionately large group, they do not mingle as freely with the remainder and retain their former characteristics. As a consequence, foods of foreign origin or style are consumed in the urban areas where the foreign-born are concentrated. These conditions also have a bearing upon both the merchandising conditions encountered and the selling effort put forth. Foreign-born, Negro, and other groups like to deal with retailers of their own race or nationality. Not only may a domestic concern with American-style products encounter difficulties, but its salesmen are often inclined to avoid associating with these classes of dealers.

In most cases it will be found that the effect of variations in the several factors are jointly, not additively, related to per-capita consumption. For instance, the consumption of a product may be higher in areas of higher than average income or percent of Negroes, but when the two are above average at the same time, the consumption is more than the sum of their separate effects. The consumption is higher, not only because Negroes like the product, but also because the consumption per Negro is increased by the higher than average income of the colored population. These difficulties may in part be met by the use of logarithms in handling the data, or by some method of joint correlation.

B. Changes in the consumption of a group from time to time and their causes.

The two methods described in the earlier section of obtaining the rate of consumption for a group may be employed for measuring changes in the per-capita consumption of the given class from time to time. Surveys have sometimes been used to compare consumption rates in the same areas at different time periods.⁸ However, such methods are expensive, and are generally replaced by analysis of records of movements of commodities through wholesale channels.⁹

If the same factors are again used in a multiple correlation study of the per-capita sales in different areas for a later year or years, it is possible to find what changes in comparative consumption have taken place since the previous study. The tendencies for some groups to respond more or less than others, and sometimes in opposite directions, to dynamic changes may be portrayed by contrasting the slopes of the net regression lines of the respective factors for the successive years. Among the factors which may be expected to affect these rates of consumption are:¹⁰

1. The physical characteristics of the product.
2. The competition of other products.
3. The demand of other groups, affecting both the comparative consumption and the price.
4. Slow changes in the consuming habits, tastes, and preferences of different classes.
5. The employment and income of different groups.
6. Changes in advertising appeals and selling effort.
7. The price of the standardized product.

(8) See Pennsylvania Bulletin No. 245.

(9) See U. S. D. A. Technical Bulletin No. 78.

(10) Another important factor in determining per-capita consumption is the size and composition of the family. This analysis will only be possible in the case of survey data, since only here do we have a description of individual consuming units. Analysis of the consumption rates of dairy products has indicated the great variation induced by this factor. (See New Jersey Bulletin No. 506.) Reduction of families to equivalent adult males or similar measures is evidently entirely inadequate and special studies for each product must be made. Mr. Hedden thinks that conclusions for milk may not be true for all products. He also points out that other factors may be important for other products, such as weather in short-run changes in milk consumption.

One of the principal reasons for changes in the rate from period to period will be changes in the price of the product. It will be worth while to use this as an illustration of the procedure and results which may be secured from an examination of the changes in rates.

While a change in price may influence the consumption of all groups to some extent, it may affect some groups more than others. An increase in price may not affect the consumption of a high-income group, while the consumption of low-income groups may show a precipitate decline, as manifested by the increased steepness in the net regression line of per-capita consumption with per-capita income. Again, the consumption of the wage-earning group may respond so markedly to a price decline that the correlation between per-capita consumption and percent wage-earners may change from negative to positive. For most products, the greater responsiveness or sensitivity in consumption of certain products to price changes is found in the case of wage-earners, foreign-born, Negroes and other low-income groups.

When a group is definitely classified by a fixed characteristic (Negro, German, etc.), it is necessary to compare at different prices the consumption of areas having 100 percent of that characteristic; for example, 100 percent Negroes. From measurements obtained in this manner, the demand curve of the Negro group may be derived by plotting the average per-capita consumption of Negroes with corresponding prices. A similar procedure may be followed for the variables which vary in degree, such as income. There may be any number of different income groups with corresponding differences in the responsiveness of their consumption. As the price rises by successive intervals of 10 cents, the consumption of these groups falls rapidly, while the response to each price change is less and less the higher the income group. Thus, the "average" demand curve does not depict the responsiveness of consumption of given income groups to price changes.¹¹ The income groups below average show the greatest responsiveness to changes in low prices, to which the consumption of high income groups show meager response. On the other hand, the latter respond to changes in extremely high prices. It is probable, therefore, that the former are concave while the latter are convex. Since the low income groups contain more people, they give the "average" demand curve its well known shape.

(11) The relationship between income and consumption is of sufficient importance to warrant special attention in these studies. It is one of the few consumptive relations of a purely economic character which can be stated quantitatively, easily and definitely. Income consumption coefficients similar to elasticity of demand coefficients may be calculated. These promise to become important tools in the study of changes in demand. If we can assume that our classes of consumers are alike except for income, our income consumption coefficient, even when determined solely from survey data, will tell us much about the reactions to higher or lower incomes. See A. C. Pigou, *Economics of Welfare*, Appendix II; New Jersey Agricultural Experiment Station Bulletin No. 506, pp. 36-39; Jacob Marschak, *Elastizität der Nachfrage*, published by J. C. B. Mohr, Tübingen, 1931.

C. Further discussion of use of sales records of a selling organization.

(By Rex W. Cox.)

(Any experiment station or other research organization may find itself afforded the opportunity of analyzing the sales records of some selling organization, such as a cooperative or a chain store system. Dr. Cowan has discussed above how these records may be used in a consumption analysis. Dr. Cox has some additional useful suggestions. EDITOR'S NOTE.)

Sales records of an organization or a market represent data obtained either from individual marketing units or from a survey conducted among consuming units. These records are obtained and analyzed in order that information may be derived as to (1) the elasticity of demand of the product in question, either for the entire group of consumers or for a particular group whose identity is described by some special characteristic; (2) changes in demand from one period to another; and (3) the influence of specific factors on variations in demand.

The first method of approach in obtaining the data, that of tracing deliveries to consumers, involves the association of deliveries and sales. A complete association indicates complete identification of all deliveries and all consumers of the particular product in question. It is evident that such completeness is not possible. Probably the nearest approach is in the case of milk sales, which are concentrated in the hands of a relatively few dealers, with records of daily deliveries over a period of years. Even under such conditions, surveys conducted among consuming units indicate that certain classes of consumers may fail to be identified with the sales as recorded by the milk-delivering organizations.

Chain store records permit an analysis of demand, but obviously there are certain limitations to their use. The number of consumers associated with any store or all chain stores is not known. An additional problem is the shifting of consumers from a chain store to another type of store. The former objection may be met in part by associating specific areas with chain store deliveries, and selecting areas where the chain store is the dominant type, and by including the records from all of the chain stores in the area. The shifting of consumers from area to area may be partly corrected by making adjustments on the basis of changes in total sales.

A comparison of the demand of two or more types of consumers for a product necessitates the defining and identification of the various types. The designation of specific market areas as associated with particular consumer characteristics makes possible the relating of sales to the various types. The identifying characteristics which are perhaps most useful in outlining areas are nationality or race, income, and occupation.

One of the main difficulties encountered in the analysis of sales records is the lack of data that make possible the determination of per-capita consumption. In the case of milk deliveries, with the business in the hands of a comparatively few marketing units, the per-capita consumption of milk (for the entire area) may be estimated by making adjustments on the basis of changes in total population. On the other hand, population figures are not available for determining changes in the individual market areas which have been designated more or less arbitrarily. In the absence of a per-capita figure, one must rely on per-family consumption. In the case of chain store deliveries, purchases can not be estimated on the per-family basis. In the latter situation, the maintenance of uniform conditions in the area becomes all the more important.

Some of the deficiencies as stated above are overcome in part through a survey of the various groups concerned in the analysis. Not only does the survey provide for a determination of per-capita consumption, but it also provides for a rather complete analysis of the composition of the family, and the relating of sizes of family to the consumption of the product. The survey method of approach also involves a classification of consumers into areas, the identifying characteristics being those which previously have been assumed to have considerable influence on the demand for the product. Bias in reports given to enumerators may be corrected by comparing actual purchases with the reported purchases of identical consumers, if actual purchases are available as in the case of milk deliveries, or by comparing the reported purchases of the entire number of families with their actual purchases during one month of the year.

Having sales deliveries of the marketing units of a particular product for each area, what specific information may be derived therefrom? Where there is a distinctive and fairly uniform type of consumer in particular areas, it is possible to establish demand curves by nationalities and income groups. The relationship between income and consumption, although it may not yield the conventional demand curve, is of considerable importance. Elasticity of demand tells us the effect of variations in the price of the particular product, other things remaining the same, while, if it is assumed that classes of consumers are alike except for income, an income-consumption coefficient indicates the reaction of consumers at lower and higher income levels. The effect of employment and wages upon the consumption of particular products may also be measured.¹

A knowledge of the irregular or intermittent fluctuations in demand, or those due to price changes and industrial conditions, is of use to the marketing unit organization in that a forecast of the effect of changes in price or in employment may be obtained in part.

If data are available over a period of years, the demand curve may

(1) See projects in the report on Prices of Farm Products for discussion of methods of deriving demand curves.

be found to shift its position. If we assume a constant elasticity, relationships may be established between change in demand and factors that account for these changes, such as general business conditions. Other factors which are related to changes in demand, but which are more or less incapable of absolute measurement, are publicity, advertising, and education. The latter are of particular importance in the case of milk products.

Other regular or recurring variations in consumption are seasonal and day-of-the-week variations, and holiday fluctuations. These variations are not uniform from group to group of consumers, but usually show a relationship to the nationality and income of the group.

Current research.

A considerable volume of research dealing with the rates of consumption, or more particularly with variations and changes in these rates, is being carried on by the commercial research agencies. Some selling organizations are going so far as to set up sales quotas by districts or branch houses, based on composition and condition of the population, which they expect their staffs to attain.² Dr. Harry Ross, now with Borden's, has made several such studies of rates of milk consumption, using the sales records of milk distributors.³ Another study using sales records was recently made of Boston milk consumption under the leadership of Dr. F. V. Waugh.⁴ Rates of consumption are included in the Cornell study, conducted by Dr. W. C. Hopper, of the Albany market for fruit and vegetables. The possibilities and limitations of the use of the survey method in such projects should be revealed somewhat by the analysis being made by Mr. Alexander Sturges, and cited under Project 13.

Dr. Cowan has commented on Dr. Cox's discussion as follows: If one is interested really in explaining variations in rates of consumption, it is easy to overstate the significance of income. For a number of food items, the other variables show higher determinations than income. Size of family can be used as a variable in studies using census area as units as well as in survey studies. Similarly, populations can be segregated by market areas as a basis for such analysis. The Commercial Research Department of Swift and Company has done this for the whole United States.

(2) Dr. Cowan has been engaged in commercial research on this type of problem since he left the University of Missouri in 1924.

(3) Ross, H. A., *The Marketing of Milk in the Chicago Dairy District*, Illinois Bulletin 269, 1925.

Ross, H. A., *Some Factors Affecting the Demand for Milk and Cream in the Metropolitan Area of New York*, United States Department of Agriculture Technical Bulletin 78, 1928.

(4) Waugh, F. V., *The Consumption of Milk and Dairy Products in Metropolitan Boston in December, 1930*, New England Research Council on Marketing and Food Supply.

PROJECT 12. Retailers' Choices as a Factor in Modifying Consumption.

Objective: To determine the extent to which consumption is modified by retailers' choices of types and kinds of commodities, and the factors determining retailers' choices.

(By Earl R. French.)

Studies at the New York market, dealing with apples and butter, indicate that it is possible for retailers to shift a large percentage of the consumers they serve to another type of product; also even to introduce and maintain a variety, grade or size of product which is less preferred by a large group of the population than one which formerly was being purchased. Information indicating the degree to which the retailers' choice is influencing consumption would be useful to distributors in determining and carrying through production, grading and packing programs, as well as sales and advertising policies.

This project might be confined to the distribution of a single commodity among dealers representing each of the principal retail mediums for a single city of 100,000 population or more. It would be advisable, however, to have the project embrace three or four selected city markets, because of the possible lack of comparability between markets. The project might concern itself with a single commodity, but this would not be the most efficient use of the research personnel. One or two commodities could be added to the major one with comparatively little additional overhead expense. A limited number of commodities at most should be handled.

A cross-section of a large city market would include highly diversified types of retail managements as well as varying classes of consumers who exercise greater or less independence in selecting foods. Therefore not only does a substantial number of operators need to be included, but these need to be selected so as to cover these several variables. The period covered should be at least one season.

The following data will need to be collected by field men from retailers, some being obtained by interviews, some by observations and inspection of commodities, some by transcription of records:

- (a) Data showing the character of the products carried.
- (b) Prices connected with each of the principal characteristics of the products handled, as they relate to quantity and quality.
- (c) Information portraying the attitude of the operators with regard to their demand requirements and the trading practices pursued by them.

Data should be obtained of methods of selecting commodities for 2000 to 3000 consumers in each of the different districts studied. These records are to be obtained by personal observation of investigators who will tabulate orders as made at the store and indicate specifically whether selection is by telephone, personal inspection, brand, recommendations of clerk, or in keeping with previous orders, or otherwise.

These data are to be analyzed to ascertain the type and kind of products finding an outlet in the different trade channels, as well as within the same trade channel supplying different classes of con-

sumers, to determine the reasons that retailers are carrying the products which they are found to be handling, and to develop the information which will show the extent to which retailers are influencing consumers' choice among different races or income groups.

Prices at wholesale should also be collected, matched and analyzed for the purpose of determining the elements of gross profit for the different commodities and types of commodities; also the mark-up policy in its relationship to elements of competition.

Data should then be secured from distributive units supplying the retail units sampled to determine the sales efforts exerted in the marketing of products, and other facts important in appraising the system of distribution followed by each. This material would be analyzed to determine the relative importance of merchandising policies of jobbers, wholesalers and producer distributors in influencing the retailer's demand. Details of methods of analysis are important, but are omitted because we have no experience to draw upon.

PROJECT 13. Market Behavior of Consumers.

Objective: To explain and predict the market behavior of certain groups of consumers with respect to particular products or types of products.

(By Warren C. Waite.)

In order that the analysis and methods may be clearly defined it is essential to define as precisely as possible at the outset certain fundamental concepts. These are: overt behavior, opinions, knowledge and attitudes. The term "overt behavior" means observable behavior of the individual or group. The concept "opinion" will be taken for our purposes to mean a verbal expression of past overt behavior, of knowledge or of an attitude. The term "attitude" is taken to mean a tendency to act in a certain way, that is, a certain bent, proclivity, bias or predisposition to a certain type of activity. The social psychologists, who have done the major portion of the work on attitudes, interpret the term broadly to cover general and important inclinations, such as an attitude toward cooperative or chain stores. Here it is interpreted narrowly as well, to apply to such things as consumer preference for particular goods or brands. We also distinguish attitudes from "knowledge," and by the latter term mean the specific information which the subject possesses regarding the commodity or situation, whether this be true or false. Attitudes are obviously closely connected and in part dependent on knowledge, but it seems desirable to keep the study of these two distinct.¹

(1) The following references will prove useful on these points:

Bain, Read, "An Attitude on Attitude Research." *American Journal of Sociology*, May, 1928, p. 940.

Thurstone, L. L., "Attitudes Can be Measured." *American Journal of Sociology*, January, 1928, p. 259.

(Continued on page 57)

We may attempt to secure the means of prediction of market behavior in three ways: first, by examining the past overt behavior of our subjects in certain situations; second, by determining their knowledge of the object or situation; and third, by a study of attitudes. We will examine projects of each of these types in order. Two methods will be open in each approach, the first, that of analogy from past overt behavior, and the other, that of securing opinions from the subjects or those acquainted with the situation.

If our subjects were the same and the situation which we wish to examine identical with past situations, then observation of overt behavior in these past situations would be the most useful method of analysis. If our observation of past overt behavior has been correct and our generalization legitimate, we must establish by analogy essential similarity of our subjects and of the new situation to the old. On the other hand, if we wish to predict the overt behavior of our subjects in a new situation or in one in which we have been unable to observe their past overt behavior, then additional steps with their accompanying uncertainties are introduced, and more elaborate methods are necessary. Unfortunately, many of our practical problems are of this type.

There has been some confusion among these categories, and in consequence a separate statement of each is given below.

1. Determination of past overt behavior.

a. *By observation.*

This information is informally used by all market agencies. Successful merchants have observed certain modes of action of consumers and accommodate their merchandising policies to the characteristics. It has also been made the subject of considerable formal research, particularly by those connected with the direct sale of goods to consumers. The method followed has generally consisted of placing observers at strategic points and counting the number of cases in the various categories. The movement of fashions has been watched by observing the proportion of types of garments worn by persons passing stated locations at intervals. Moreover, this is the method which underlies the usual statistical analysis, say the price-supply relationship.

Another method is that of direct experimentation with selected groups, usually consumers. This is being constantly done by merchants with their customers, and in preliminary tests previous to general advertising campaigns. Occasionally it becomes a method

(Continued from page 56)

Allport, G. W., "The Composition of Political Attitudes." *American Journal of Sociology*, September, 1929, p. 220.

Bernard, L. L., *Introduction to Social Psychology*. Henry Holt & Co., New York, 1926.

Zimmerman, C. C., Project 43 in the report in this series on Research in Public Finance; also the forthcoming report on Research in Rural Social Psychology.

of formal research. The Bureau of Agricultural Economics, for example, has a project in which government-graded eggs are offered alongside the regular brands in certain chain stores, for the purpose of observing the consumers' reaction to graded eggs where they are readily available.

b. *By expression of verbal opinions.*

When the past overt behavior of our subjects is unknown but we wish to determine it, or current behavior is difficult to observe, we must resort to an expression of opinion either by the subject himself or by an acquainted person. The former involves either the ordinary survey or the mailed questionnaire method, while the latter is that of the "participant observer."

This expression of opinion introduces a new and dangerous source of error. While questions regarding past action are on a somewhat safer footing than many other types, it is not at all certain that the description of this past overt behavior will be correct. There may be mistake due to failure of memory or disinclination to answer. There is no more persistent error in this type of research than the belief that these answers are correct, or that with a sufficient number of cases the inaccuracies in replies will balance themselves out. There is little data on the correctness of verbal opinions obtained by mailed questionnaires, but what little data exist indicate strongly the inadequacies and dangers of the method. The whole method of survey and questionnaires must be considered on trial for such projects and treated cautiously until some objective judgments as to the degrees of accuracies with which questions as to verbal opinions are answered are obtained.

2. Determination of knowledge possessed by consumers.

a. *From overt behavior.*

We may gain some idea of the knowledge of consumers by their overt behavior; but generally this is of a negative character, that is, we discover lack of knowledge; and our observation does not often enable us to separate knowledge of the product from certain attitudes. For example, observation of purchases of oranges in New York City by consumers indicates that they do not purchase sizes which yield them the largest juice content per dollar. This may be due to lack of knowledge, to other uses of oranges, or to unreasoned prejudices or attitudes. The procedure in these studies is ordinarily to secure a rating of objects by the group examined, and have these objects classified later by an acknowledged expert. Studies with a procedure similar to that described in Project 14 have been used to infer consumers knowledge of various products. Examples of studies of this type are:

Pennsylvania Agricultural Experiment Station Bulletin No. 222, *A Study of Egg and Poultry Consumption in Pennsylvania.*

b. *Expression of opinion.*

The more usual and generally the more certain method of discovering knowledge of products or situations is by a direct questioning of the persons concerned. If the questions are specific and well selected, many significant details will be disclosed. The method has been successfully used in determining the knowledge of consumers of such things as kinds and sizes of prunes and the nature of pasteurized milk. Studies are seldom exclusively of this type, but questions of this type are found on nearly all marketing inquiries.

For examples, see portions of:

U. S. D. A. Department Circular No. 416. *Demand, Marketing and Production of Oregon Prunes.*

U. S. D. A. Bureau of Agricultural Economics Mimeographed Release, September, 1924, "Factors Influencing the Demand for Farm Products."

3. **Determination of Attitudes.**

a. *By observation of overt behavior.*

This method was recommended by the committee on attitudes reporting to the conference on methods of rural sociologists in January, 1930, in the following statement: "That where possible, overt behavior be used as the basis of study. We suggest a word of caution as to the wholesale acceptance of vocal or verbal response as a reliable index of attitude." Although logically more sound, this procedure has been used relatively little as compared to the method of expressed opinion.

In the case of marketing research, it is not clear that the determination of attitudes will be particularly useful, since here we are interested in the prediction of overt behavior and not psychological investigations. It would appear safer to pass directly from an observation of past overt behavior to a prediction of new overt behavior without the intervening step of a speculation regarding the meaning of past behavior in terms of attitudes.

b. *By expression of opinion.*

Attempts to secure attitudes by means of questions yield extremely dubious results, particularly if the term attitude is extended to include anything other than the most general inclination. Persons seldom know what they will do in new circumstances or precisely why they acted as they did in old situations. When inquiries are made, we secure, in consequence, either a prediction of action in unexperienced situations or a rationalized explanation of past action. Either of these may be of little value in analyzing the new situation. In consequence, this method of approach should in the writer's judgment be discarded except where no other is available. The reader should not, however, accept such a judgment without informing him-

self as to the points of view of the specialist working with attitude measurement. There are many cases where it will prove the only possible method of approach. These are the cases where we are unable to secure an observation or statement of reaction of our group in a previous similar situation. Examples of important projects which may fall in this group are:

1. Investigations of consumer preferences for certain commodities.
2. The standing of certain cooperatives in the community.
3. The political or social viewpoint of an agricultural group.
4. The attitude toward certain existing or proposed marketing institutions—such as the Federal Farm Board or future trading.

Current research.

Projects of the type here outlined have commonly been called "consumer preference" studies, and have had considerable vogue within the past ten years.¹ The usual procedure has been to obtain an expression of opinions or preferences from the consumer either by interview or by mailed questionnaire. There are some types of question which will give a significant answer in an interview, and would do this even by mail if only a representative group of persons would choose to answer the inquiry.² But the questioning must be more skillfully done than in most of these early studies. The techniques for studies of "attitudes" had not then been developed by the social psychologists.

Projects under way during the past year are the Wisconsin study of consumers' cheese preference, and Dr. Lininger's study of consumers' attitudes toward milk and other dairy products in Pennsylvania territory. The Wisconsin study is significant because no questions are being used; instead the consumer is allowed to act in an experimental set-up. In the Pennsylvania study, the evidence obtained from questioning consumers was checked against records of purchases, dealers' sales, and daily receipts. Illinois made a study of consumers' preference for egg color, working in cooperation with the

(1) Following are some of the reports of earlier studies:

Gardner, K. B. and Adams, L. A., *Consumer Habits and Preferences in the Purchase and Consumption of Meat*, U. S. D. A., Bulletin 1443, 1926.

Halpin, J. C. and Langeman, C. E., *What the Poultry Market Wants*, Wisconsin Circular 197, 1926.

Corbett, R. B., *Concerning Wholesale Market Preferences for Fruit and Vegetables in Providence, R. I.*, Rhode Island Bulletin 203, 1926.

Jefferson, L. P., *The Consumer Demand for Apples*, Massachusetts Bulletin 250, 1928.

Waugh, F. V., White, C. M. and Hersey, M. R., *Market Preferences and Premiums for Maine Potatoes*, Maine Bulletin 2, 1930.

(2) Types of questions giving useful and worthless answers are discussed in *Research Method and Procedure in Agricultural Economics* under the head of "Analysis of Types of Questions" in the section on the "Survey Method".

chain stores and reaching a large number of housewives very quickly. The data of course represent only expressions of preference indicated on a schedule. A study in Washington conducted by Maryland included a questionnaire on egg preferences mailed to housewives. Professor Rasmussen used a mailed questionnaire in a study of consumer preference for New York grapes, but discarded the results as having too great selectivity.

Lastly must be mentioned the study of dairy product preferences conducted in the Baltimore market by the Maryland Station in collaboration with the Bureau of Agricultural Economics. Mr. Sturges writes that the results of this study are being used to find an answer to such questions as the following:

What types of variation are introduced by enumerators; how large is this variation; can it be corrected for?

What types of questions, and of information, are probably most accurate?

What is the most efficient manner in which to analyse such survey data? Should all records be thrown together, or should the geographical or other differences in the city be maintained?

Is each record obtained in a survey of this type strictly independent of other records, in the sampling sense? Should records be taken from all the houses in a block or from one or two chosen at random?

The Baltimore records are also being combined in this analysis with the records from the Baltimore, New Jersey and Boston surveys. With some 7,000 records of a fairly comparable nature available some progress in method should result.

PROJECT 14. Physical Properties of Commodities and Their Consumption.

Objective: To determine the effects of physical properties of products upon their consumption.

(By Frederick V. Waugh and Marion D. Sweetman.)

The physical properties of products, such as size, shape, color, taste, smell and amounts of insect injury, or disease, influence consumption just as surely as does the price of the commodity. At a given price, for example, the consumption of strawberries is not likely to be fixed at a definite point, but will depend on the size, condition and other physical properties of the berries themselves. The objective of these studies is then to discover, first, what are the physical characteristics of the commodity which influence its consumption, and second, the relative importance of each. In addition, there will often be the objective of determining the influence of physical properties upon the amounts consumed for different purposes.

For example, not only will potato consumption vary with the quality of potatoes, but the proportion used for boiling, baking and french frying will also be influenced by the amounts available which are suitable for these purposes. The amounts of grapes used as table fruit, jams and jellies, and juice are influenced by the physical characteristics of the grapes which are produced. Certain aspects of this problem are considered in Project 15.

This is a new type of study and it may be begun profitably in one small town where it is possible to secure good cooperation from all the storekeepers. The disadvantage is that the result may not be typical of other towns. For this reason, it would be well to select a town with a number of stores with different classes of consumers. The project should be conducted over at least two crop years to secure a large enough range in price and qualities. One man visiting the stores once a month could collect the data.

Few studies have been made of the relation of consumption to prices. As far as the writers know, no study has ever been made of the relation of consumption to quality. A study such as the one outlined above would be of considerable value in determining grade requirements which correspond with the qualities actually controlling consumers' choices. The conclusions would be particularly important in establishing retail grades. Moreover, the results would provide producers with important information regarding types of products most acceptable to the consuming public.

The preliminary qualitative analysis may follow the methods outlined in Projects 12 and 14.

Data.

Surveys of housewives and retail buyers are useful in indicating in the case of each commodity the characteristics likely to influence consumption. The quantitative data needed are of two kinds: first, data on amounts consumed, and second, data on the quality of the commodities studied. In the case of most agricultural commodities, there is very little statistical information available along either of these lines. The United States Bureau of Agricultural Economics has, during the past two or three years, begun to collect data on the quantities of the various qualities of cotton and tobacco. Most of the information with regard to consumption and quality, however, must be unearthed by the research worker himself. Storekeepers' records are a likely source of consumption data. Grading records of cooperative marketing associations and of the state and federal inspection services are sources of data on quality. Auction sale records of fruits also provide data on grades, sizes and varieties. The "deal reports" of the United States Bureau of Agricultural Economics include useful descriptive material concerning quality.

The agricultural economist and the home economist may well cooperate on this project. They should also have assistance from the

production specialist and from the grading specialist in setting up standards of measurement of quality.

Since data on quality and consumption are lacking in published form, a large part of the project (perhaps over one-half) will be devoted to the collection of data for analysis. Certain towns or cities may be chosen to represent different income and nationality groups. Arrangements may then be made to collect periodically data on sales of the selected farm products. The total consumption of the trade area may be estimated by: (1) carlot and truck receipts; (2) records of purchases by the wholesale and retail trade; and (3) records of amounts sold by retail stores. In addition to data on consumption, it will be necessary to secure data on retail prices and quality. The best method will be to make personal visits to retail stores about once a month and get a record of the quality of the products, the retail prices, and the amounts sold.

Measurement of quality.

It is not enough for the purposes of this study to record the grade of the commodity. The physical characteristics of each lot must be determined quantitatively and in detail. Many characteristics can be measured easily. Size may be measured in inches; weight in ounces; defects in percentages; etc. The amounts of juice in different sizes of oranges and other fruits may be measured by pressing samples. The amount of waste in paring potatoes or apples can be determined by paring various samples. Such methods are fairly simple and require no elaboration.

There are, however, certain intangible qualities which are not so easily measured, and for these possible methods of measurements are outlined below. All qualities of food products appeal to us through the four senses of sight, taste, smell and touch. We may classify qualities then according to the senses to which they appeal, and indicate the possibility of measuring each.

1. Certain qualities appeal to sight, such as size, shape, color, freedom from defects, etc. Of these color is perhaps the only one which can not be measured easily. It is possible, however, to make an accurate measurement by comparing the products to a standard color chart or by a colorimeter reading.¹

2. Certain qualities appeal to taste. What we generally call the flavor of food is a combination of taste and odor. If we eliminate odor, taste can be broken up into a few simple and basic sensations, such as sweetness, acidity, saltiness and bitterness. The first three are measurable by chemical analysis.

3. Odors have been classified in four groups: fragrant, burnt, acid and caprylic. All odors are combinations of these and can

(1) See U. S. D. A. Technical Bulletin No. 154.

be designated by numbers indicating the intensity of the elements.²

4. For texture and temperature, there are such devices as the penetrometer, the hydrometer, plastometer, viscometer, gelometer, shortometer, thermometer, etc.

Analysis.

For the final conclusions all the store records may be averaged together by months and the relation determined between total sales in the town and retail prices and average quality. It will be simpler however, first to tabulate the data for each store separately and to study sales by stores. This will bring out a great deal of useful information because the quality in the individual stores may vary a great deal from month to month while the town average shows little change. We also may reach conclusions concerning the reactions of different income and nationality groups.

The preliminary analysis should be made by cross tabulation tables and the significant relationships examined further by means of correlation. A multiple correlation analysis should include price as an independent variable as well as the qualities which are found to be significant. The results will then show the net influence of each quality on sales with prices held constant. In case there has been a significant growth or decrease in the market during the period, trend must also be determined. Other factors such as seasonal variations and variations due to weather differences should be studied in the case of certain commodities. A more accurate statistical analysis may be made by joint correlation methods. As a basis for this, it will be advisable to consult the following for method:

M. J. B. Ezekiel, "The Determination of Curvilinear Regression Surfaces in the Presence of Other Variables." *Journal American Statistical Association*. September, 1926.

F. V. Waugh, "The Use of Isorropic Lines in Determining Regression Surface." *Journal American Statistical Association*. June, 1929.

Andrew Court, "The Measurement of Joint Causation." *Journal American Statistical Association*. September, 1930.

The study should also analyze the data to discover to what extent the consumers' choices are rational, and to what extent the qualities chosen represent high nutritive quality, digestibility, palatability, high sanitary quality, and economy in preparation. The results of a multiple or joint correlation analysis provide an estimate of the influence of each quality and also the influence of prices on sales. The results represent something close to a series of consumer demand curves for various qualities—or more accurately, a demand "surface," the height of which represents consumption, the axis on the base representing price and quality. There is, of course, the distinction that the curves or surfaces are not "instantaneous." They do not show what amounts consumers are willing to buy at one given

(2) See E. C. Crocker and L. F. Hendrickson in "Analysis and Classification of Odors," *The American Perfumer and Essential Oil Review*, August, 1927.

moment. Rather, they show the average relation which has existed between consumption (more correctly—sales) and prices and quality. This will serve our purpose.

PROJECT 15. Utilization of a Product.

Objective: To determine the facts as to how a given product is utilized, how utilization varies from year to year, and why utilization varies.

(By H. B. Price.)

Projects in utilization of farm products are difficult if not impossible to bring to a satisfactory conclusion. The most painstaking work thus far done along these lines is with wheat, by the Food Research Institute of Stanford University. Yet Dr. J. S. Davis writes: "Although better data are available for wheat than for most commodities, and the problem is therefore relatively simple, our painstaking and sustained efforts have not yielded results that are really satisfactory to us." It is commonly impossible, writes Dr. Davis, even to make proper adjustments for carryover because of inadequate data.

Data on utilization are occasionally very much needed, however, and workers in this field will find themselves now and then constrained to make the best of a bad job. Furthermore, attempts to use existing data will prepare the way for collecting better data later on. The discussion following must therefore be interpreted merely as outlining the project and suggesting procedures to be tried out to see what results can be obtained with various products.

The chief methodological problem of this project is to determine the utilization of a product for any year, for, having obtained the data for one year, it is largely a matter of using additional clerical force to obtain the data for other years. The second methodological problem is that of combining the data for different years to show trends, averages, variability, etc. The third problem is largely omitted from this discussion, since it involves, as explained below, a whole series of studies of the different aspects of markets and marketing organization. The data to be obtained in the study, should, however, be decided upon with a view to their suitability for such studies.

The principal classes of data that need to be obtained are: (1) total utilization, (2) utilization by classes of users, (3) utilization by classes and grades of product, and (4) location of utilization.

Total utilization for any period will generally correspond pretty closely to total domestic production after such adjustments have been made as can be in the figure for exports and imports and for carryovers. This statement assumes that wastage is a form of utilization.

This figure will ordinarily be only an approximation even for the staple products.

For utilization by users, by grades, and by locations, the data are far from adequate. For most products, the principal uses will be: for human, animal and crop consumption on farms, for manufacture of various kinds, for human and animal consumption in cities, and for export. Although there has been a great improvement in the past fifteen years in the statistics compiled relating to the disposition of agricultural produce, the published information is still inadequate for scientific research purposes. Most of the data available come from the Department of Commerce, and the most useful publication is the Biennial Census of Manufactures. Figures for each census year show the principal raw materials used in the different types of manufacture. For example, they show the amounts of unspun wool and of yarn used by the manufacturers of wool fabrics. Some adjustments are necessary to express the amounts of raw wool and yarn in a common measure, "scoured weight"; but this can be done without serious difficulty. Separate figures are given by weight for woolens and worsteds. More detailed information according to the particular kinds of cloth is not given in terms of the raw material used, but by the weight and value of the finished product. From the weight of the finished cloth a rough estimate can be made of the weight of the wool used. This involves a knowledge of the conversion ratio. Similar information is available for cotton, including, of course, a large item for export. In cases where the farm product is not used entirely (or is not used at all) as a raw material for manufacture, the census information is less satisfactory for our purpose. Data on farm uses of various agricultural farm products, when available from official or private sources, generally do not discriminate sufficiently between the various farm uses for close market analysis.

Detailed figures for utilization by grades and classes of product are almost entirely lacking. The Bureau of Agricultural Economics has taken some preliminary steps toward the securing of data by classes and grades and by type of utilization, particularly in the case of cotton, tobacco, and the uses of milk in the various dairy manufactured products. The recent reports of the Department of Commerce of the Biennial Census of Manufactures includes an increasing number of statements of the quantities of raw materials used in manufacture by certain industries. For such major crops as wheat and tobacco, data on commercial stocks do not differentiate between types and sub-classes, and even official reports do not give the quantities of the various grades exported and imported for a product as well standardized as wheat. Utilization by locations is covered to some extent in the Census of Manufactures where separate figures are given for individual states.

Owing to the confidential character of much of the information that is needed, particularly the purchases of processors, much difficulty will doubtless be experienced in obtaining the desired data from private sources. One will probably have to be content with only a sample of such data at the best.

Once data for the utilization of a product during a period of years have been assembled, some simple statistical analysis may reveal very significant time relationships or trends, perhaps a steady upward trend in the export of cotton, or a downward trend per capita in the human consumption of wheat. One may find that in years of depression the industrial consumption of cotton falls off far more than the consumption for clothing, or that consumption of fruit is more affected in certain localities than in others; that in particular uses one product is gaining at the expense of another, or that particular changes in industrial processes favor one grade of a product rather than another. To discover such facts, the utilization of each grade in each use and in each locality must be studied separately by time series analysis, and proportions must be carefully considered as well as absolute quantities.

As indicated above, studies of utilization cannot proceed far beyond the descriptive stage before they become dependent upon the results of additional research. For example, the effect upon utilization of such factors as the price of a product, the price of substitutes or of competing products, quality, shifts in habits of consumers, or location of stocks cannot be considered until there is an understanding of the nature of demand for the product, and of the effect of quality on consumption or on the market movement of the product. Research can probably be advantageously pursued in these various problems simultaneously with an examination of utilization, if the resources of a research organization are adequate. Some economy in the assembly of data can doubtless be affected by such an arrangement, and many of the data are useful for two or more studies. A further advantage of this arrangement is the opportunity for research specialists in marketing and price analysis to collaborate on projects in closely related fields.

GROUP C

Projects Relating to Market Outlets.

To marketing agencies, and to the sales departments of enterprises distributing their own products, the most acute marketing problem is that of finding sales outlets. If an experiment station director were to ask a cooperative organization in his state what his station could do that would be of greatest aid, the most frequent answer would be: "Something that will help us find an outlet for our

products". Finding market outlets is the principal service which the Division of Foreign and Domestic Commerce of the United States Department of Commerce has been attempting to perform.

A common point of view with respect to such activity is that all that is required is the establishment of good trade contacts and subsequent negotiation. Another point of view is that knowledge of the product and education in its use are the primary requirements. A third point of view is that while both of the foregoing are essential, much effort can be wasted unless analyses of an economic nature are also made. The discussion following is in accord with the last of these three approaches.

Analyses of an economic nature may be grouped under two heads: one, those relating to rates of consumption and competition in consuming areas; and the other, those relating to competition in producing areas. The competition in consuming areas is with other marketing or selling agencies, and with similar products or substitutes. Whether it will pay to undertake to develop a given market outlet must in many cases be decided upon a knowledge of the comparative advantages in production of other areas contending for the market.

The projects here listed cover the foregoing aspects of the problem, together with certain international questions involved. The first two projects assume no international restrictions interfering with competition between areas; the third project takes up the effects of such restrictions.

None of the analyses presented is outlined in any detail. Research on market outlet problems is scarcely begun, and adequate details are not yet available. The preponderance of real opinion, even in most governmental agencies, still stresses contacts and negotiations as the best means for developing outlets, and, since what research there is is largely technical, sales promotion is going forward without the guidance of basic research.

PROJECT 16. Competition in Outlet Areas.

Objective: To determine the extent to which some product of a specified area can probably be sold in a given market outlet.

(By H. E. Erdman and J. D. Black.)

The market outlet analyzed may be a new one for the product and the problem may be to determine whether it is worth while to try to develop it. It may be an old market and the issue may be whether or not it is worth while to try to expand it, or perhaps merely to hold it.

In either case, the analysis needed for such a project should include the following:

1. Description and classification of products competing in consumption in the consuming area; uses to which each type of product is put.
2. Analysis of reasons why these types are put to their respective uses. This may take one or both of the following forms, depending upon the type of product:
 - (a) Analysis of uses, and of the properties of the various types of products, to determine if existing use practices are well founded.
 - (b) Consumer preference study, first to determine the nature of the preferences, and second, to determine the reasons for these preferences, their origins and bases. These preferences may arise from the properties of the products themselves, or trace back to nationality antecedents, or reflect the effect of advertising and sales promotion efforts, or may have been determined by the buying policies of retailers, etc.
3. Determination of whether or not the product from the specified area is capable of taking the place of other products now used in the consuming area; and the converse of this, whether these products could be substituted for the product in question. This may involve carrying on tests or trying out changes in the technique of use or handling or distributing of the product; or converting of consumers from present preferences.
4. Analysis of factors associated with variations in rates of consumption of the given product and competing products. This will include trends as well as year-to-year and monthly variations.
5. Analysis of variations in production in the several competing areas, both volume and quality, including trends in same.
6. Description of methods of distribution within the consuming area, including especially the variations associated with differences in types of products and points of origin.
7. Analysis of prices of products from competing areas (including relationships to type and quality and to methods of distribution and sale) and variations of prices over time, and factors associated therewith.

It is obvious that a project of this kind is broad in scope. It calls for the services of commodity specialists qualified to make physical and chemical and other analyses of products, to analyze their uses, and to carry out tests of such products. It also calls at the other extreme for use of techniques in attitude analysis such as social psychologists are developing; and for price analyses requiring

command of more formal statistical techniques. Such projects should therefore be organized so as to secure full collaboration between marketing specialists and groups of workers in these other fields.

Of course no attempt will be made here to outline the methodology for analysis of properties of different products. The methods and procedures involved in the study of consumer preferences and rates of consumption are discussed in Projects 11 to 14 above. The possibilities in the way of getting consumers to want the given product in place of others can be determined in the last analysis only by conducting trials. Such trials may be conducted systematically enough so that they can properly be called experiments. The analysis of conditions affecting volume and quality of production in the competing areas is developed in Project 17 following, which commonly will be a companion project to this one. The price analysis required is developed in the report in this series on Research Relating to Prices of Farm Products. The research on methods of distribution is outlined in Projects 6 and 7 above.

Projects of this type will be hampered considerably by deficiencies in the records of shipments and receipts from the different areas and of prices by type and quality.

The nature of this project will be better comprehended if we take a particular problem as an example, such as the problem of the market outlet for potatoes from the Delta region of California in the San Francisco market. In many ways it would be desirable to include in the study the "Bay Cities" group, consisting of the cities of San Francisco, Oakland, Alameda, Berkeley, and Richmond. These cities are substantially one metropolitan area, although there are separate jobbing centers for San Francisco, Oakland, and Richmond. However, trucked receipts are available only for San Francisco, and not for this city prior to 1930.

In any metropolitan area like this, there are likely to be supplies of potatoes from a number of areas at any given time. Some of these are particularly favored for certain uses—baking, boiling, potato-chip manufacture, etc. Some may be given preference because there are fewer defects, because they have better shape or are better graded, or because they have inherent qualities that make them more desirable for the several purposes, or because the habits of the population cause them to be in special demand. Even such a thing as "old country" custom may have a bearing on preference.

As to the supply factors, the potatoes from some of the competing areas may have alternative market outlets, or storage facilities may be available, etc. New areas may come into production or an old one may have an unusually large crop some year. In either case, a new supply may take a share of the market because it sells at a sufficient discount to move what will not bring more elsewhere.

The degree to which one variety is substituted for another will doubtless vary with the price structure. If a potato which is excellent for baking is relatively high in price at any given time, there may be a considerable use of a less desirable type for that purpose. On the other hand, there may also be an absolute curtailment in the use of baked potatoes.

The retail and the jobbing prices may be quite different from year to year and from one part of the year to another. Thus, if baking potatoes are scarce and prices high as compared with cooking potatoes, the baking potatoes may be retailed in small units at wide spreads per pound, while cooking potatoes may be retailed in large units at low spreads per pound.

The data on receipts will be obtained from market news reports and from reports issued by the dealers. Data on prices will mainly be obtained from market news reports. Information on potato uses will have to be obtained through personal interviews. The best sources at the start will be the various elements in the central market, particularly brokers, the potato salesmen of wholesale receivers and jobbers, and chain-store buyers. Hotel and restaurant men and manufacturers of potato chips could supply additional information. Information on storage receipts and discharges will have to be obtained from storage companies.

It is entirely possible that data on many of the aspects covered by this project will not prove to be available in sufficient detail to be of service. In that case, the most satisfactory solution will be to get certain chain-store organizations, storage companies, truck companies, and jobbers to keep the necessary records for a year.

Any data on receipts must be carefully checked for discrepancies, particularly at the earlier stages when reports were often very incomplete. Even during later periods just before truck receipts were reported, there may have been serious discrepancies at certain times.

Information obtained on uses, particularly if it is in any sense of the "opinion" type, needs to be carefully examined. It may prove to be inaccurate not only as to observation, but may be related only to the particular price situation that has obtained in the immediate past and thus have no reference to demand for each of the types, in the demand-schedule sense. A drop in the price of a given product may lead to an increase in the amount taken, but if prices of other things have also dropped it may not. For this reason price relationships cannot be set up as simple price-quantity relationships or demand schedules without very careful analysis.¹

(1) Professor A. B. Cox's comment upon this project is as follows:

"I think the only scientific approach is from the standpoint of the analysis by competing economic regions modified by economic institutions. Volume of demand in a region is determined by the volume of production of goods and services in that region, and the appreciation of undeveloped resources or re-

(Continued on page 72)

Few studies of competition in outlet areas have been made, and those made are included in other projects, and developed only to a limited extent. Other studies, however, contain analysis similar to that above outlined. Those interested in this type of project will benefit from examining the following studies:

Corbett, R. B., *Concerning Wholesale Market Preference for Fruits and Vegetables in Providence, R. I.*, Rhode Island Experimental Station Bulletin 208.

Critchfield, Burke H., *Demand, Marketing, and Production of Oregon and Washington Prunes*, United States Department of Agriculture, Department Circular 412.

Gabriel, H. S., *The Marketing of Delaware Cantaloupes*, Part II, Consumer Demand, Delaware Bulletin 165.

Stokdyk, E. A., et al., *Marketing California Apples*, California Bulletin 501.

Waugh, F. V., *Quality as a Determinant of Vegetable Prices*, Columbia University Studies, History, Economics, and Public Law, No. 812, 1929.

PROJECT 17. Competition in Producing Areas.

Objective: To determine whether or not a given area will be able to compete successfully in the production of the product in question with other areas selling in the same market.

(By J. D. Black.)

The advantages which the products of an area enjoy, or disadvantages suffered, in a consuming area, may be completely offset by advantages or disadvantages in production or transportation. The term advantage should be here understood in the *comparative* sense as in the Principle of Comparative Advantage. A competing area may have poorer soil, less favorable climate, or be farther from market, and yet have comparative advantage over another area in the production of this product because it has no other product to turn to offering a better outlet when prices fall, whereas the other area has another product which it can advantageously turn to if the price of the product in question falls only a little.

The type of analysis required for such a project has been developed rather fully in Project 6, called "Interregional Competition in Agricultural Production" in the report in this series on Research in Farm Management. The project is there outlined on four different levels of intensity, depending upon data available and re-

(Continued from page 71)

sources in process of development. The nature and quality of goods and services demanded are determined largely by the regional environment, that is, the climate, the nature of goods produced and the stage of economic development. One can readily understand this by visiting the stores in a ranch country and seeing what they sell compared with the stores, say, in a New England village. The size of the area from which a regional market draws its supplies will depend on the nature of the goods, the volume of demand, and the transportation facilities available. Having thus made a regional analysis, the producers are in position to know to what extent they should try to modify production to meet consumer requirements or to cater to such special requirements of the market as the nature and size of packages, and a host of similar requisites to make trade relations agreeable."

sources of time and money available. Ordinarily the analysis needed when the objective relates to market outlets will be on B or C levels of intensity.

A study which Mr. A. H. Lindsay is making of the competitive factors of supply and price in the secondary milk markets of Massachusetts has a definite relation to this project and to No. 17; also some of the "consumer area" studies which have undertaken to determine whether an area could produce its own supplies in competition with outside areas.

**PROJECT 18. Effect on Market Outlets of
Artificial Measures Affecting International Trade.
(Joint with Agricultural Policy.)**

Objective: To determine the effect on competition for a market outlet of any of the artificial measures now taken to restrict, expand or otherwise affect international trade.

(By Asher Hobson and M. R. Benedict.)

All the measures comprehended under the above description need to be considered in research projects in which the point of view is that of the welfare of some social group, perhaps as small a group as the producers of the products concerned, perhaps the consumers of it in addition, and the processors and distributing agencies, and surely in all cases the nation as a whole and the society of nations. These measures will be analyzed from this point of view in the report in this series dealing with Research in Agricultural Policy. In this project, the approach is from the point of view of a single product of a particular area, and the effect upon its market outlets of whatever trade control provisions may be in force.¹

The measures that may affect market outlets can be classified as follows:

A. Measures restricting imports.

(1) By direct methods:

- (a) Protective tariffs.
- (b) Prohibitions, importation contingents and special government permits or licenses for importing.
- (c) Government import monopolies which are supposed to follow a protective purchasing policy.
- (d) Stipulated minimum percentages of home-produced material that must be used in manufacturing.

(2) By indirect methods:

- (a) Rules, standards and norms regarding the kind, quality or shape of packing material and containers

(1) "This project seems more or less meaningless to me until it is studied in its general relationships in a production program". (A. B. Cox.)

or individual pieces of merchandise with the object of keeping out products from particular countries.

- (b) Sanitary regulations regarding imported merchandise, used speciously as economic protection measures.
- (c) Commercial laws designed to make difficult the operations of foreign importing firms and their representatives.

B. *Measures facilitating imports.*

In general, direct or indirect encouragements of imports are more likely to be resorted to in behalf of manufacturing industry than of agriculture, more commonly taking the form of imports of raw materials for manufacture. But imports of agricultural products that are consumed by certain branches of agriculture may be left unimpeded, or may even be actively encouraged for the benefit of farmers also. Introduction of new species of animals or plants, importation of feedstuffs, importation of livestock for further maturing and fattening, are illustrations of what is meant. Such measures obviously may occasionally affect the market outlets for the farm products to which they apply.

C. *Measures restricting exports.*

(1) By direct methods:

- (a) Export duties.
- (b) Embargoes, contingents, and government permits or licenses.
- (c) Government export monopolies and compulsory export pools under government control.
- (d) Practices of semi-official institutions not having monopoly character but limiting liberty of trading by their various activities.
- (e) International agreements, governmental or private, providing for a common restriction of exports and/or the regional allocation of foreign markets among the individual countries entering the agreement.
- (f) Fixed minimum export prices.
- (g) Division of world markets into regions to each of which only a limited number of exporters are allowed to export.
- (h) Exclusion of inferior grades of merchandise from exports by establishing export standards and government control, incidentally combined with the creation of national trademarks.

- (2) By indirect methods:
(a) Restriction of exports by curtailing production and/or by encouraging domestic consumption.

D. *Measures promoting exports.*

- (1) Export bounties and premiums.
- (2) Production bounties and premiums, and all of the more common forms of aid to domestic agriculture.
- (3) Indirect bounties in the form of excessive drawback allowances.
- (4) Reduction or remission of domestic taxes on exported products.
- (5) Marketing aids to exporting, such as provision of cheap warehouse facilities and favors of various sorts in the handling of the product.
- (6) Shipping aids to exporting, such as lower transportation rates, and other shipping favors.

Illustrations of effects that might be investigated in such a project as this are the following: What have been the effects on our trade in grain of the German system of import certificates on grain? Similarly, what have been the effects on our export wheat trade of the mixing regulations on flour-milling employed by Germany and other countries? To what extent have the domestic prices of these countries been raised by prescribing minimum percentages of domestic grain which shall be consumed in milling, and what are the internal and external effects associated with these price changes? What have been the corresponding effects of the Spanish and Portuguese prohibitions and licensing of imports of cereals? Of the restriction of exports of cereals from the Danubian countries through the formation of export monopolies and of other agencies for the restriction and regulation of exports? Of the international agreement among these countries providing for a common program of restriction? Of the recently established international sugar cartel? Of the Australian export bounty on butter; and her export bounty on wheat? Of the Polish and Hungarian export bounties on wheat and rye? Of the numerous indirect aids to production and marketing of exported products employed by these and other countries? Of government purchasing, and of other measures directly or indirectly fixing prices of cereals, as in Norway, Switzerland and South Africa?

These provisions have of course been established not with the idea in mind simply of changing the currents of trade as such, but rather with the hope of benefiting certain domestic groups by raising the prices of their products, or in other ways, or perhaps of making the country more self-sufficient as a war-preparedness measure. But they have important effects on the movements of international trade, and it is these effects with which we are concerned in this project.

The analytical approach involved is simply an extension of that outlined in Projects 16 and 17. Having determined the advantages which the product of an area enjoys in a given consuming area, located in this case in a foreign country, the further point to be determined is to what extent these advantages are offset by the trade control measures which have been established. In some cases, of course, it will be disadvantages that are offset. Some of the control measures will be such that their effects can be expressed as definite price changes. Protective tariffs and export bounties are of this type. Others will not lend themselves to such measurement—sanitary regulations, for example. Similarly, the effects of such control measures may be combined with comparative advantage in production to see how it changes the situation.

The effects of measures which produce their effects on prices can be analyzed in much the same manner as the effects of changes in transportation rates, or changes in import or export duties; and analysis of this sort is fully developed elsewhere.¹ Suffice to say here that the first step in cases where a trade control measure has already been put in force is to determine the effect which the given restriction has had upon the volume and direction of movement. A workable estimate of this change in volume can probably be obtained in most such cases by studying the trends and averages of such shipments before and after the change, allowing carefully for effects of other changes that may have occurred in the same period. For example, such a violent drop in wheat prices as has occurred in the last few years may easily more than offset the effect of any given restriction on wheat movement. In the case of such commodities as sugar and rubber, radically changed price levels have resulted in opening up or closing whole categories of uses for the product. The second step is to determine the price effects that have been associated with these changes in movement of the product. These could be ascertained simply enough from direct comparison of prices in the given country before and after the instituting of the control measures, were it not that the effects sought are likely to be marked by a great variety of other influences, just as are the effects on movements. The statistical problems involved are difficult indeed, and no less the qualitative analysis.

In case the control measures are newly established, or only contemplated, the analysis will need to follow the lines for supply-price analysis outlined in the report on research in *Prices of Farm Products*. This type of analysis will probably need to be resorted to for final results even where records are available for a sufficient period before and after the institution of the control measure.

Most data for analysis of this type will have to be drawn from official records of the countries concerned, and from data of the

(1) In the reports in this series on Transportation and on Agricultural Policy. Also see "Analysis of Tariff Duties" in the *Journal of Farm Economics*, January, 1930.

International Institute of Agriculture, of the League of Nations, and of the United States Department of Agriculture. Direct field studies will not usually be possible, though these may be carried on in some cases by representatives of tariff commissions, by trade promotion representatives, and by the offices of various consular representatives. A large volume of material bearing on the subject will also be found in the records and publications of the United States Tariff Commission.

GROUP D

Projects Relating to the Organization of Marketing Business Units.

GENERAL METHODOLOGY OF ORGANIZATION ANALYSIS.

(By J. D. Black.)

The problems of marketing organization may be placed under the following heads: (I) problems of combination of factors of production used, of commodities handled, and of services performed; (II) problems of operating set-up, comprising layout of work, layout of plant, departmentization and lines of responsibility and authority, etc.; (III) problems of entrepreneurial and financial organization, comprising form of corporate or partnership or one-man business set-up, capitalization and financing, etc.

The first two groups of these belong definitely in the field of production economics. They exemplify the same principles of production economics as do similar problems in the field of farm and factory organization, the body of principles presented in Part II of *Production Organization* by J. D. and A. G. Black, and in Parts II, III and IV of *Production Economics* by J. D. Black. The later chapter in each of these volumes bearing the title "Marketing Organization" presents in very sketchy manner some of the exemplifications in the field of marketing of the principles outlined in the earlier chapters. The third group of problems is commonly covered in large part in treatises on corporation finance, although always too narrowly for purposes of marketing analysis. Much marketing is not done by corporations.

Unfortunately there is no treatise available developing the principles of marketing organization as here conceived. Some of the studies listed below contain useful material for such a treatise; but a large program of research is still needed before any satisfactory treatise can be written. It is hoped that this report on Scope and Method of Research in Marketing of Farm Products may be instrumental in getting some of this research done.

Progress in research in marketing organization has of course been delayed by the early emphasis on the approach to marketing analysis

by the so-called "functions". Marketing business is for the most part transacted by marketing business units and not by functions. Only a small fraction of our marketing business units confine their activities to performing one function.

Measures of effectiveness of organization.

A. Unit costs.

Because research in this field is still in its early stages, certain explanations are needed as a foundation for any intelligent discussion of projects. First must be discussed the matter of measures of effectiveness of organization and practices in the field of marketing. *Unit cost of handling the commodity*, including the buying and selling and whatever physical treatment the commodity must have, has been most commonly set up as such a measure. Properly supplemented, it is a very useful measure, even though not always a complete measure, for most enterprises handling only one product, such as a creamery with no sidelines or by-products, or a milk plant, or a grain elevator handling only one kind of grain and selling no supplies. It can be used even though more than one commodity is handled, under the following circumstances: (a) When the only purpose is the comparing of individual plants in a group, and these plants handle the same combination of products in approximately the same proportions. The grain elevators in one section of Iowa are likely to be handling corn and oats only and in about the same proportions. It is also possible to select retail stores handling the same assortment of commodities in about the same proportions. (b) When the proportions between products vary, but the variations in these proportions can be used as a variable in the analysis, so that in the final results any plant is compared only with plants having the same proportion. (c) When the other product or products or commodities are of minor importance, entailing no additional overhead expenditure. In such a situation, one can get an acceptable unit-cost figure merely by deducting the prime costs connected with the handling of the minor products or commodities.

In all problems complying with the above conditions, unit costs are very simply determined merely by dividing total annual costs by the number of units handled in the year. Of course, estimates of the usual sort will need to be made for value of plant, and supply inventories, depreciation of plant and other such items.

One must point out, however, that various differences between plants may make calculations of unit costs difficult or impossible even though one product only is handled, or conditions (a), (b), and (c) above are fulfilled. One such difference is that some of the enterprises use much family labor and some of them little or none. Family labor tends to be used much less sparingly than hired labor. If family labor is valued at hired-labor rates, the enterprises using family

labor will therefore tend to have the higher labor costs. There seems to be no way of valuing family labor so that labor costs under such circumstances are brought to a comparable basis. Such valuations are commonly attempted, it is true, but this does not recommend them, since the conclusions based upon them are frequently incorrect.

A similar difference is that some enterprises are operated by their owners and others by hired managers. It is difficult if not impossible to reduce these to a comparable unit-cost basis. This does not mean, however, that it may not be worth while to calculate unit-cost figures for them. But one must not use such figures as if they were strictly comparable.

Unit-cost figures in such cases as the foregoing can not safely be taken as absolute figures of costs; but if all that one wants is figures for comparisons, then it may be possible to group enterprises in such a way that only those having approximately the same combination of family and hired labor are compared, or the same types of owner operation.

Another use of all such measures is of course in year-to-year comparisons. These are safer than comparisons between business units, but one must be sure that the family-labor arrangements have not changed appreciably. If they have, and family labor is over-valued, as is usually the case, then the unit costs will rise if more family labor is used, and vice versa.

Unit-cost figures likewise cannot be used in direct comparisons between enterprises having a different distribution of volume of business throughout the year. Businesses with an even distribution month by month are almost certain to have lower costs than those with a peak-load type distribution. Comparisons between enterprises with about the same seasonal distribution, however, may be highly valuable because showing differences in the degree of success attained by different enterprises in handling their seasonal-variation problem.

B. *Net income.*

In businesses operated for private profit, of the one-man unit, the partnership or the corporate type, cost is only one factor in success. The final test is net income, that is, the difference between expenses and receipts. Net income depends upon *profit per unit of product handled times number of units*. The two factors besides unit cost are therefore *selling price per unit* and *volume of business*. Cost analysis must therefore in all cases be supplemented by an analysis of these other two factors that measures variations in them and accounts for these variations; and the final step in the analysis must unite all of these three factors. The high unit costs of one enterprise may be more than offset by higher selling prices. Many merchandising establishments attempt to make a good income by heavy expenditures on selling at high prices; likewise do many manufacturers selling their

own products in whole or in part. Again, many enterprises emphasize large volume of sales and neglect to keep costs at a low figure by watching carefully for wastes. A thorough analysis will consider the inter-variations of these three factors, and take net income as the final measure of effectiveness of organization of enterprises operated for private profit.

Obviously if true unit costs are impossible to determine, as in the two situations outlined above, no such analysis of inter-variations is possible *except for comparisons between enterprises that all can be put in the same class or group*. A group consisting wholly of one-man units in which the proprietor devotes his full time to his business can be analysed in this way by leaving the contribution of the proprietor in profit per unit rather than cost per unit. Enterprises using the same amounts and proportions of family labor can be analyzed by similarly leaving the contribution of the family labor in profits per unit.

C. *Percentage return on investment.*

This can be used as a measure of effectiveness of organization in enterprises large enough to hire all their management. It has the advantage of taking some account directly of volume of business, since investment is likely to increase with volume of business. It will not serve as a satisfactory measure if either family labor or proprietor labor have to be evaluated in order to compute net income, except for comparisons between enterprises that can all be put in the same class in the use of such labor.

D. *Net return per unit of product.*

For cooperative selling enterprises, the measure of effectiveness must be the amount returned to the producer after the product is sold and expenses are paid. Net return per unit depends upon two factors, selling prices per unit and costs per unit, which are closely inter-related and must be analyzed accordingly.

Quality and amount of services as factors.

Much marketing-organization analysis is rendered difficult and unsatisfactory because the quality of the service or the amount of it is a factor in unit costs, unit profits and selling prices. If processing is included, the quality of the product itself may be involved—as it is in creameries and other like plants which combine a manufacturing process with the selling. In such cases, quality of the product processed enters into the selling price as well as the quality of the processing.

Methods of analysis.

In general, two methods may be followed in analyzing organization data, the *comparative method* and the *synthetic method*. A similar

classification is made for research in farm organization and these two methods are described and compared in the report in this series on *Research in Farm Management*.¹ In the comparative method, the variations in unit cost, net income, net returns per unit or whatever measures of effectiveness are used, are correlated with other factors likely to be associated with these measures, such as volume of sales or purchases, methods of sale, services provided, etc. In the synthetic method, the particular questions for which answers are sought are analyzed by estimating the effect on the net income of private businesses, and on the net return per unit of product of co-operative businesses, of various courses of action with respect to each question. Thus, questions as to whether to add a new line of supplies, or a new service for customers, can be answered by balancing the estimated additional receipts to be obtained against the estimated additional expenses to be incurred; and the question of whether to install a new type of processing equipment can be answered by balancing the estimated additional expense to the enterprise of operating the equipment over its life period against the estimated additional receipts. This method is called the *synthetic method* because it involves constructing business set-ups with various changes introduced in them. It is also sometimes called the *budget method*, because the procedure for estimating the relative advantage of the different set-ups is to construct estimated budgets to go with each set-up; and sometimes the *method of substitution*, because the essence of it is substituting new organization features for old and estimating the probable effect of the change.

It is to be presumed that the final purpose of all marketing-organization analysis is to assist agencies engaged in marketing activity to render their services to society more effectively.

One way of thus assisting such agencies may be to point out certain relationships, such as between volume of business and costs, profits and incomes, which are found to occur with considerable regularity, and expect them to benefit from getting in line with these, the assumption being that since a clear majority of businesses set up or operating in a given way obtains larger returns, any remaining enterprise is likely to obtain a larger return by changing to this set-up or plan of operation; or any new enterprise will do well to set itself up in this way, etc. *This is the way of promoting effectiveness involved in the use of the comparative method.*

The principal limitation of the method is that one can never be certain that any remaining enterprise really would benefit from the change. There may be some factor or several factors that cause the enterprise to be better off set up as it is. If correlation analysis could be carried to the point of discovering every detail of business set-up conducing to highest effectiveness in every situation existing within the group being studied, then a set of relationships could be

(1) See project B.

made up that would indicate to each enterprise how it should organize for greatest effectiveness. It would be a rather complex set of relationships in most cases, and a skilled interpreter would be needed to make the applications. The entrepreneur could seldom do it for himself. But correlation analysis cannot be carried to such detail in practice. Instead, it limits itself to a few of the major variables. Some of the more important variables can never be included because they cannot be measured. The most important group of these relate to the entrepreneurship and management personnel. The capacity and efficiency of the management are highly limiting factors.

This is illustrated most simply by the error commonly made of assuming that since large or moderately large stores commonly have lowest costs and highest net incomes, all storekeepers ought to run large or moderately large businesses. Not only are there management factors frequently acting as limitations in such cases, but often location factors in addition. As a matter of fact, location factors (that is, circumstances of the size of the area served, its transportation facilities, the type and character of those furnishing the business, and above all, the competition in the area) play a large role in determining set-up in most marketing-organization problems. Only a part of these circumstances can be reduced to quantitative terms and expressed as variables.

If enough business units could be included in the study, the method of grouping might be employed for a few of these, and separate relationships worked out within each group, or association or sub-sorting analysis combined with formal correlation;² but to include a sufficient number of businesses to take care even of the major groupings needed raises the cost of the project to impossible levels. Moreover, as pointed out below, commonly not enough enterprises are available even for the simplest sort of correlation analysis.

Another difficulty is that many of the variables are highly inter-correlated. Thus, managers of high capacity probably tend to be managing the larger businesses; and those of high efficiency tend to occupy the better locations. Part of the apparent correlation between volumes of business and costs will therefore be due to the high inter-correlation of size with capacity of management; and part of that between location and net income will be due to the inter-correlation between location and efficiency of management. The relationships established are therefore less significant than they appear to be.

The result of the foregoing is that the comparative method in practice works out only a few of the major relationships, and ordinarily falls far short of taking care of all the factors that determine effectiveness for any particular enterprise. All that the correlation analysis establishes is a general presumption that any

(2) See the discussion of association and elementary correlation analysis in *Research Method and Procedure in Agricultural Economics*.

enterprise would profit by getting roughly in line with the relationships observed. All sorts of particular circumstances connected with any enterprise, notably those associated with the capacity and efficiency of the management and with the location broadly defined as above, may indicate some set-up a little or a great deal divergent from that indicated by the few general relationships definitely segregated.

Moreover—and this is probably the most important aspect of these limitations of the comparative method—very little information is developed out of this type of study which will enable one to make the adjustments needed to fit the special circumstances connected with each individual enterprise. All that one can usually say is that these special circumstances must always be taken into account. But in what way? and to what extent? This is not determined in such analysis.

The *synthetic method*, in contrast to the foregoing, takes the particular conditions existing in any enterprise as the starting point, and attempts to estimate the effect of any promising changes that might be introduced into the midst of these particular conditions. The particular conditions existing all find themselves expressed in the budget of the enterprise as now operating. The analysis required is in three parts: first, securing the data and measures of relationships needed to estimate the effect of various changes; second, estimating the effect of these changes on the net incomes of each separate enterprise individually; third, generalizing from these results for the individual enterprises. These generalizations will indicate the usual probable effects of various types of changes, with measures of the degree of probability, with supplementary statements to cover all the important variants and the reason therefor. *This third stage is the one which gives scientific form to the results. It is a stage which is commonly overlooked by those critics of the synthetic method who say that it is valuable for use in extension work, in helping individual entrepreneurs to determine promising changes to introduce, but that it does not yield scientific conclusions.* It must also be added that the synthetic method is frequently carried only through its first two stages, and the critics thereby are furnished with a basis for their statements.

Of the three foregoing steps, the first is most difficult and subject to the largest limitations. The effects of changes are influenced by many variables the same as the relationships determined by the comparative method. But if this analysis is properly executed the different changes that may be introduced are isolated and considered one at a time, and all the important factors affecting the results are likewise isolated so far as possible. If some of them cannot be isolated, they are left as indeterminate and the conclusions are always stated as qualified by these indeterminate factors.

Let us suppose, as an example, that the change whose effect is to be estimated is the taking on of coal as a sideline by grain elevators. The procedure would be to make individual studies (a) of elevators handling coal as a sideline under all the important variant conditions prevailing in the area included in the project, (b) of individual elevators not handling coal as a sideline under as nearly as possible the same sets of conditions as the others, (c) of individual elevators which had recently taken on coal as a sideline, under as nearly as possible the same sets of conditions, collecting all the data concerning these elevators that could possibly have any bearing upon how carrying coal as a sideline would work out, and that would be needed in carrying the project through the two later stages in the synthetic method. No doubt the coal sideline is working out with varying degrees of failure and success in the different elevators now carrying it. Why these differences? What special circumstances account for them? The analysis at this point may on occasion take the form of simple correlation, at other times the form of grouping the elevators according to various significant bases, at times the form of case analysis as distinguished from statistical.³ No doubt one of the factors affecting success or failure will be the size of the sideline business in coal. In this case the results may be expressed as a regression line or curve. There will be elevators that do not fit in with any conclusions that can be stated, that particularly will depart widely from any regression curve or line that can be drawn. The results must never be presented in such a form as to obscure these divergencies. In the second stage of the analysis, estimating the effect of the proposed changes on individual elevators, the method employed will frequently be to select particular elevators most nearly like the one for which the effects are to be estimated, and attempt to arrive at the conclusion by the method of analogy.⁴ The analysis and presentation must leave the results of the study in such form that they can be used in analysis by analogy.

In manner roughly similar to the foregoing, the data and measures for the probable effects of any significant type of change can be worked out. The method to be used will vary with the nature of the change. Not only will elementary statistical methods need to be used, but in some cases highly formal correlation analysis, and in some cases the experimental method.⁵ Changes for which there is no previous experience to serve as a guide will commonly need to be given trial before their effects can be estimated with reasonable safety.

It may appear that such a procedure will be time-consuming and expensive. This is indeed true. *But each of the problems involved in*

(3) See discussion of Correlation Method in *Research Method and Procedure in Agricultural Economics*.

(4) See discussion of this method in *Research Method and Procedure in Agricultural Economics*.

(5) Also discussed in *Research Method and Procedure in Agricultural Economics*.

it is important in its own right. Managers of elevators probably need the information obtained from a number of such studies in order to guide them with respect to their management problems. Several projects of this type are outlined below.

*Cost analysis.**

Since much of present marketing-organization analysis takes the form of determining unit costs and applying the comparative method of analysis to them, it will be well to understand clearly the problem of cost determination. Let us take up our discussion in three parts: A, cost analysis with only one product handled; B, cost analysis with two or more products handled; C, process costs.

A. Only one product handled.

The assumption here is that the marketing agency is handling only one product, or that the other products are of such minor importance that they do not add to the overhead, as explained above; also that no problems of valuation of family and proprietor labor enter. Granted that these conditions are filled, there are still several considerations to note. First is that the unit cost of handling any product is made up of the sum of a series of multiplication products of rates of pay times quantities of the cost factors. There is one such product for rate of pay per hour of labor times quantity of labor used in handling a unit of the product. There is a similar product for rate per horsepower-hour or kilowatt-hour of power used times the number of such hours per unit of product handled; a similar product for equipment used, for each kind of supply used, for plant used, for advertising employed, etc. The sum of all these multiplication products is the cost of handling a unit of the product. Variations in unit costs may therefore be due either to variation in the physical quantities of any of these cost factors used, or to variations in the cost-rates or prices paid for them. These two variations are inversely correlated to the extent that more of any low-priced cost factor is used than of a high-priced cost factor. But

(6) Professor Spencer thinks this discussion of cost analysis may have the effect of keeping young research workers from undertaking cost analysis because of the difficulties which it points out. The writer does not believe that it will keep them from cost analysis of the useful sorts, but hopes that it will have some effect in lessening the amount of effort now spent in calculating total unit costs for marketing enterprises, and in turning more attention toward analyzing individual items of cost. Professor Spencer's comment is as follows:

"I should like to emphasize, however, the fact that in my opinion you have considerably overstated the difficulties involved in making satisfactory analysis of marketing costs. It is well to call attention to some of these difficulties in order that the investigator may eliminate as many as possible of the common errors which are likely to be made in calculating unit costs and process costs. On the other hand, it seems to me that it is unwise to discourage investigators from undertaking this type of market analysis to the extent you have done in your introduction to this group of projects. If good judgment is exercised in the method of analyzing and in the interpretation of the results of such analysis of marketing costs, I am convinced that these projects can be of great value."

there is never any uniformity about this correlation. The cost-rates reflect bargaining power as well as difference in quality of the cost factors. The significance of the foregoing is that unit costs expressed in monetary units, as they must be if they are combined unit costs (cost of all the cost factors combined), are a mixture of several elements, and not highly significant until broken into their component elements.

The second consideration is that cost-rates per hour for labor, and several other of the cost-rates commonly involved, are often closely correlated with several organization factors. Thus, as creameries increase their volume, they are able to use more and more low-priced labor to perform relatively unskilled operations, such as packing butter, cleaning, weighing and receiving, etc. Cost-rates therefore tend to decrease even though a higher-priced first buttermaker is employed.

A third point relates to the matter of classification of costs. The classifications developed by cost accountants have certain definite values for such analysis. In nearly all cases, they should constitute the general framework. But some of the costs will need to be handled in smaller classes if the results are to be helpful. In fact, many of the cost factors need to be handled item by item rather than in class combinations. Such an item as insurance, for example, is of little value if combined with other cost factors commonly grouped with it.

A fourth point is that the use to be made of the results must guide procedure at every step. Thus, in the matter of estimating cost of plant, if the use to be made of the results is the accounting one of calculating balance-sheet profits and losses, or in arriving at a price which will enable the enterprise to pay back all the money invested in it, with appropriate interest, the cost should be figured on the basis of interest on the present value of the depreciated plant. But if the use to be made of the cost figures is the statistical one of comparison between plants, or correlation of costs with related factors, the interest should be applied to the average annual value of the plant throughout its life, since otherwise the costs of old and new plants will not be properly comparable.

A fifth point is that statistically determined relationships between variations in unit costs and other factors cannot usually be taken as applying to individual enterprises. This is well illustrated by the Minnesota creamery analysis.⁷ For the 88 creameries studied, unit labor costs were 2.0 cents per pound for creameries handling 100,000 pounds annually, and 1.6 cents per pound for creameries handling 200,000 pounds annually. But if some creamery handling 100,000 pounds of butter had enlarged its volume to 200,000 pounds, the change in costs would have been very different. If the same labor force could have done the work and the operator required no increase

(7) See the chart on p. 15 of *Judging Creamery Efficiency*, Minnesota Bulletin No. 281.

in salary, the unit labor costs would have fallen almost to 1.0 cent per pound. If merely some additional labor needed to be employed for a few months at the peak-load period, the unit labor costs might have fallen to 1.2 cents. The statistical comparison arising from correlating volume and unit labor costs represents the actual creameries with such plants, labor forces and salaries as they had at the various levels of output.

Finally, it needs to be pointed out, at the risk of some repetition, that unit costs alone rarely give the complete and final answer to the questions involved in marketing organization. They may indicate that one business unit is handling its product at a higher unit cost than others, but they do not in themselves locate the causes of the high costs. One may be able to locate the causes by breaking up the unit costs into detailed items such as salesmen's salaries or traveling expenses, wrapping paper, accounting department expense, insurance, etc.; but the high expense for any one of these items may be more than repaid by higher receipts, and hence these cost items may contribute to a higher net income. Not until the final answer is obtained in terms of effect on net income is one to pass judgment on the wisdom of any particular expenditure, or say whether any cost is too high, or that the combined unit cost for any business unit is too high. Unit costs are therefore only a first approach to answering questions in marketing organization. They serve to indicate whether the costs of any particular business enterprise are high or low, and prepare the way for the real analysis which must follow.

B. *Two or more products handled.*

The first move of inexperienced workers on such problems as these will be to rush into allocation of costs between the products handled whenever they find enterprises handling two or more of them. For the period when the Bureau of Agricultural Economics had a Cost of Marketing Section, one of its workers proposed to distribute grain elevator costs in the Northwest among spring wheat, oats, barley, rye and flaxseed. The writer has experimented considerably with such methods as applied to grain elevators, livestock shipping associations, and livestock commission companies, and has arrived at the conclusion that nearly all work along this line is futile. Only arbitrary bases are available for allocating most of the costs of such enterprises among products, and since the results obtained cannot avoid being arbitrary also, they do not furnish answers to questions that can safely be accepted as guides to action. A grain elevator is built with a certain capacity to handle grain at the peak of the delivery season. Any grain that it gets at off-season periods either for handling or storage is likely to be welcome if it returns a trifle over the special costs involved. The different kinds of grain handled by an elevator have more or less differing delivery seasons; they thus stand in a *supplementary* relation to each other in the use of plant,

equipment, management, and labor—that is, they employ these cost factors in part at least when they are not fully needed by the other grains. The costs of elevators therefore cannot be distributed on any physical basis, such as per bushel, per hundredweight, or per day. If they are so distributed, they give indications contrary to the real interests of the elevator. Similarly, any physical or value basis for adjusting fees charged by livestock commission firms for selling different species of livestock, different sizes of cars, light cars *vs.* full cars, mixed cars *vs.* straight cars, carloads *vs.* truckloads, etc., that indicated fees contrary to what the management considered good business, would have to be condemned as faulty. It is virtually impossible to devise bases for such allocations that do not give more or less faulty indications.

Consequently other methods of analyzing the problems of enterprises handling two or more products are to be recommended in nearly all cases. Following are alternative methods that may be employed to much greater effect, the choice of method depending upon the problem:

- (1) Where two products only are involved, the ratio between them may be used as a variable in the analysis, as explained above. More than two products may conceivably be handled by multiple-correlation methods.
- (2) The enterprises may be classified according to proportion of different products handled, and unit-cost comparisons made only between plants in the same class. This calls for a good many enterprises, and there is likely to be considerable range within any group.
- (3) The synthetic method may be used to provide answers to most of the questions really needing answers. Since, as explained, unit costs themselves do not give the complete or final answers needed, it is just as well in many cases, perhaps in most, to go directly to the final answers by using the synthetic method throughout. If the grain elevator business is under analysis, the question to be answered may be the margin on flaxseed which will bring the largest net income. If it is too high, the flaxseed will go elsewhere; if it is too low, not even the special costs will be paid. Where between these extremes is the point of optimum return? Or the question may be one of storing grain between seasons, or of cleaning grain at the local elevator. Such questions lend themselves to answer by the synthetic method.

Two of these three methods can be used when family labor or other cost factors are employed which cannot be properly evaluated. Enterprises having the same amount of family labor can be put in the same group and comparisons be made only within the groups. Using the synthetic method, the family labor can be taken as a fixed element

in the budget, the objective being to maximize the return to it and the business combined.

C. Process cost analysis.

Unit costs may also be broken down according to the operations or processes involved in the work performed by an enterprise, or perhaps according to the services performed. Thus the whole creamery operation may be broken down into the following operations: receiving, babcock-testing, preparation for churn, churning, packing, cold storage, cleaning and general maintenance, and selling. The purpose of such a procedure is to make possible a closer comparison of different enterprises, or of the same enterprise from year to year. Two creameries having the same combined unit cost may have very different selling costs or receiving costs. Even the lowest cost enterprise may have high costs for one or more of the operations or services. The variations in creameries in receiving costs may be due to a number of factors, particularly the grade of personnel performing the operation, the hours per day during which cream is received, and the convenience of the location of the receiving room.

No doubt process cost analysis has definite values for enterprises when and where it is properly done. Frequently in small plants it is carried beyond the limits within which it yields significant results. If used in creamery labor cost analysis, it should not go beyond comparing the amounts of labor time per plant and per pound of butter devoted to each operation. Combining labor cost-rates with it produces fictitious results because correct labor rates cannot be determined except for labor especially hired for one operation. The operator-buttermaker's salary in a small creamery is based largely upon his skill in making butter and ability to contact pleasingly with patrons. But he may also perform such ordinary tasks as stoking the furnace, cleaning the floors, nailing boxes and packing butter, for which low-priced help is hired in large creameries. Applying an average rate to all the operations performed by the operator-buttermaker in a small creamery, or even to the first and second buttermakers in large creameries, produces process costs that have little significance. When professional cost accountants undertake such analysis, however, they usually insist in carrying out such procedures to the very last step so as to get a set of process costs that will combine to equal the total costs. This may be justified in large enterprises hiring one laborer for one operation only. At times, however, the distribution of the overhead has to be done so arbitrarily as to spoil the results for comparative purposes.

Types of projects.

Actual research in marketing organization is determined largely by the number and types of marketing agencies available for study. Comparison of the organization of mail-order houses could only be

done by the case method; there are too few of them for any statistical comparisons. The same is probably true of department stores. Some agencies exist in considerable numbers, but they differ so greatly that they can only be handled in groups, and there are not enough in any one group for establishing comparisons. This will be true of retail stores in many small cities, of commission firms in many commodity markets, and of jobbing and brokerage firms in many sections. As a matter of fact, the statistical method is largely limited to such agencies as grain elevators, creameries, livestock shippers and retail stores, since only these are found in blocks of a few score or more in most areas. This in itself definitely limits the use of the comparative method as above outlined.

Under the more usual circumstances, a smaller number of enterprises must be carefully selected and studied intensively by the case method. It is highly important, obviously, that researchers in this field should be skillful in using the case method. Unfortunately no very helpful presentation of this method is anywhere available. There is a brief discussion of it in *Research Method and Procedure in Agricultural Economics*.⁷ It will be at once apparent that the general framework of the method of analysis that will yield the most fruitful results where a few are studied intensively, following more closely the outlines of the synthetic method than of the comparative method.

Among the project discussions following are examples of both the statistical and the case method, and of the comparative and synthetic.

Distinction must also be made between projects of a comprehensive type which collect data for all parts of the enterprise and all aspects of its operations, and those which analyze some part of it, or seek an answer for a particular question or related set of questions. Examples of both types follow. The more detailed projects must include a certain amount of general background information. If the synthetic method is used, this information is approximately what is needed for a budget statement. The comprehensive types of projects are likely to include enough detail for proper analysis of detailed problems and to answer particular questions, only if the intensive case method is followed. If they are planned for statistical analysis, particularly if following lines of the comparative method, they provide descriptions of the broad general outlines of organization and variations in organization among the different enterprises, with a few of the major variables associated therewith. Such projects are valuable as a foundation for later more detailed studies.

Development of research in market organization.

The first thoroughgoing study in marketing organization made by agricultural economists in this country was the Minnesota study of 88 creameries started in the summer of 1920, the results of which were finally published in 1924 in Minnesota Technical Bulletin 26, *Eco-*

(7) Also see Project 37 in the report in this series on Farm Management.

conomic Aspects of Creamery Organization, by John D. Black and E. S. Guthrie,⁸ and later in form for creamery operators to use in Minnesota Bulletin 231, *Judging Creamery Efficiency*. The first bulletin is now out of print, but copies are available in most agricultural college libraries. The creameries were all cooperative except nine, and accordingly all were treated as if cooperative. Net return per pound of butterfat was taken as the measure of effectiveness, after making a rough allowance for differences in quality of cream delivered. The creameries receiving good cream averaged 3.8 cents more per pound for the butter than those receiving "sour and old" cream. Net return per pound of butterfat was treated as depending upon butter made per pound of butterfat (or "overrun"), cost of handling per pound of butter, and selling price per pound of butter. Each of these three components was analyzed separately. Labor costs were treated as based upon hours of labor per 1000 pounds of butter times rate of pay per hour. Equipment costs, building and site costs, and supply costs were similarly broken into their physical-input and cost-rate components; likewise the intermediate costs, power and cold storage. Then the physical components and cost-rates were each analyzed separately to discover the circumstances associated with their variations. Thus average cost-rates for labor were found to depend largely upon the size of business and degree of specialization among the personnel; and hours of labor per 1000 pounds of butter upon volume of output, types of labor employed, seasonality of cream receipts and convenience of plant arrangement. An attempt was also made to break the costs down into nine separate processes. The results of the process analysis are presented in brief summary form in the bulletin, but carefully qualified. To quote from the report (p. 82):

"In view of the inaccuracies in these figures, they must be taken as indicating only the general relationships between and within processes. For example, if a statement is made that power represented 34.3 per cent of churning cost, it must not be understood that it actually did, but rather that this result was obtained by the methods used in this analysis. It is impossible to repeat this statement everywhere it applies in the manuscript; hence it is made here with the hope that the reader will make the application as he goes along."

Finally at the end is included some analysis of the least-cost combination, the relation of unit cost to quality of product, the combination of grades of the cost factors, the most economical size of business, and location of the creamery. Since this bulletin is out of print, it may be worth while to quote the last few paragraphs from it:

(8) Dr. Guthrie was on leave of absence from the dairy department of Cornell University. Dr. Guthrie did all the field work for this study.

The variations in prices received for butter are probably about one fourth due to differences in plant and equipment, operators and their helpers, and other matters of organization and management. The differences in creamery costs are also due to differences in the organization and management. It has been the purpose of this bulletin to analyze the variations in prices paid for butterfat in so far as they are due to organization, and to some extent management, especially the economic aspects of organization and management.

The results of this analysis show the major factors responsible for these variations and indicate their relative importance wherever possible. Some of these factors are subject to immediate control, others to control much more slowly, others to control only when a new plant is built, or in many cases, only when the creamery service for the whole surrounding territory is reorganized along more economical lines. Operators and managers, boards of directors, and prospective establishers of creameries can expect to make use only at this rate of the data in this bulletin in controlling the various factors affecting their costs and quality of product.

This analysis is very far from being final. Scarcely a figure in it would not be somewhat different if another 88 creameries had been selected. It is not probable, however, that the important frequency distributions and ranges would be greatly changed, or any of the major conclusions.

The authors wish again to caution the readers against placing too much reliance upon the accuracy of particular data. The data were obtained by the survey method, and altho they have been rather carefully analyzed and tested, are sure to be biased in certain respects. Particular attention is again called to three major sources of error, as follows:

1. Charging all the work done by one employee at the same rate for all processes. Thus the manager's time is charged at the same rate whether he was receiving, testing, keeping records, or actually managing.

2. Allocating power costs on the basis of rated horsepower. This affects the accuracy of the process distribution, and also of the analysis of the factors affecting power costs. Undoubtedly, also, too much dependence was placed upon the data in Bulletin 747 of the United States Department of Agriculture in making the power analysis.

3. Basing interest charges upon depreciated costs of reproduction in place of upon one-half of cost of repro-

duction. The effect of this upon absolute cost as such is of minor consequence—it is the effect upon the analysis of factors determining cost that is the serious consideration.

It should be possible to make later studies on surer lines, now that the preliminary experimentation is done. After all, as was pointed out in the beginning, this bulletin is as much a study of methods of analysis as it is of creamery organization.

Later studies will need especially to consider a large number of details, examples of which are the following: ice machines *vs.* storing or buying ice; steam *vs.* electric power; whether to have storage for supplies on the first floor or in the attic; the relation of churn cost to size of churns, frequency of churning, etc.; the economies of handling certain types of sidelines. Especially does the whole power analysis need to be studied more closely. Properly to analyze problems of this nature will usually require more accurate data than can be obtained by survey methods. Studies of the type of this should, therefore, be supplemented by additional studies of other types. One type of study should include the taking of careful records for a year of about fifty creameries. Another should include a large proportion of the creameries of the state on only one problem at a time, such, perhaps, as the sideline problem, or the churn-cost problem.

The Minnesota Experiment Station presently undertook similar studies of local potato warehouses,⁹ local grain elevators,¹⁰ and live-stock commission firms. The last were never published because the Packer and Stockyards administration refused to cooperate by providing the additional data needed. The grain elevator study includes an unwise attempt at separating costs of handling different grains.

In the meantime, Cornell University had obtained its appropriation for marketing research, and its early projects were nearly all of the marketing organization type.¹¹

(9) *Economic Aspects of Local Potato Warehouse Organization*, Minnesota Technical Bulletin 28, 1925. John D. Black, Budd A. Hoyt and George M. Peterson.

(10) *Economic Aspects of Local Elevator Organization*, Minnesota Bulletin 251, 1929. Hutzler Metzger and H. B. Price.

(11) Rasmussen, M. P., *An Economic Study of the Marketing of New York Potatoes*, Cornell Bulletin 440, 1925.

Corbett, R. B., *An Economic Study of Certain Phases of Fruit Marketing in Western New York*, Cornell Bulletin 464, 1928.

Perregaux, E. A., *An Economic Study of Retail Feed Stores in New York State*, Cornell Bulletin 471, 1928.

Rasmussen, M. P., *Some Facts Concerning the Distribution of Fruits and Vegetables by Wholesalers and Jobbers in Large Terminal Markets*, Cornell Bulletin 494, 1929.

The Cost of Marketing section of the Bureau of Agricultural Economics started a number of studies of this type, most of which were never published in final form.¹² The methods were dominated largely by the cost-accounting point of view, too much attention being given to balance sheets and not enough to organization factors.¹³ The states in grain territory have since made a number of studies of elevator organization which are cited in connection with projects following.

PROJECT 19. Unit Cost Analysis for Country Milk Plants.

Objectives: To determine the unit costs, by cost elements, by processes, and combined, of country milk plants, and the more important factors associated with variations in the foregoing.

(By C. K. Tucker.)

(EDITOR'S NOTE: Country milk plants lend themselves particularly well to unit-cost analysis, fulfilling most of the requirements for it set up under "General Methodology" above—they handle one product only; they occur in sufficient numbers to make statistical comparisons possible; all the labor and management is hired; and records are available in central office files. However, they offer some of the same difficulties in determining process costs as are indicated above for creameries. A disadvantage from the standpoint of this report is that such plants perform practically no essentially marketing functions; their activities are all purely physical. The method of analysis outlined for the project, in so far as it is not simply cost accounting, is that designated above as the comparative method. This project like all the others is included not with the thought of thus stamping it with the approval of the Committee, but instead in order to give persons interested in marketing research a better understanding of its possibilities and limitations.)

The following project discussion is based upon the writer's experience in determining and analyzing the unit costs of 86 country milk plants located in the New York City milkshed, the results of which study were published in Cornell Bulletin 473 (1929). The discussion following is merely supplementary to this bulletin, to which the reader is referred for fuller details on many points.

There are three types of fluid milk plants, namely (1) raw milk plants, (2) pasteurizing plants and (3) bottling plants. The pasteurizing plants have the additional costs for labor and equipment for the pasteurizing process, in addition to the costs of receiving, cooling and canning the milk as it takes place in the raw milk

(12) Marshall, H. C., *Retail Marketing of Meats*; agencies of distribution, methods of merchandising, operating expenses and profits, United States Department of Agriculture Bulletin 1817, 1925.

Preliminary Reports by the Cost of Marketing Division of the Bureau of Agricultural Economics, United States Department of Agriculture, 1923:

Cost of Marketing Livestock in the Corn Belt.

Cost of Marketing Cattle in the Corn Belt.

Costs of Marketing Sheep in the Corn Belt.

Cost of Marketing Hogs.

(13) See "Costs and Margins in Marketing", John D. Black and H. B. Price, *The Annals*, January, 1925.

plants; and the bottling plants, the further additional labor and expensive equipment needed to do the bottling. Such a project as this may be limited to one of these types, or include all three. In the latter case, enough plants will need to be included to permit separate analysis for each group.

The data and information needed in such a study will usually be obtained from two main sources, namely, (1) the central offices of the organizations whose plants are included, (2) the individual plants. The records of the small milk dealers or independent plant operators are likely to be incomplete and sketchy. Hence the larger milk distributors and the farmers' cooperatives operating their own milk plants will be the chief sources of information. In a general way, the information obtained at the central offices will be of an accounting nature, such as valuations of the physical properties, rent, taxes, insurance, costs of labor and supplies, and receipts and dispositions of milk. At the country plant itself will be obtained the floor plans of the plants, and information on the use of labor, steam, water and supplies.

It follows from the above that the plants studied will need to be selected rather than taken at random. Such selecting will need to be preceded by a careful study of variations in significant conditions within the area. First of all, in order to avoid any bias in the results due to unusual operating methods and conditions, or to the use of any particular type of plant or equipment, the plants chosen should be distributed fairly evenly among the organizations in the region. Only plants which come under fairly uniform health regulations should be chosen. The plants selected should have a fairly even spread relative to the total receipts of milk for the year. This will be particularly desirable in studying the effect of the volume of milk handled on the handling costs per unit of product. The different plants may have a wide monthly variation in receipts during the year, as is the case in the summer dairy regions, or a considerably narrower variation as in the winter dairy regions. These differences must be adequately represented, probably by having about half the plants in each of these groups. There should be a sufficient number of such plants to give an adequate distribution for plants using artificial refrigeration and for those using natural ice; and similarly for plants shipping raw milk in tank cars and those not. Since cost-rates for labor and management are not to be separated from physical amounts of labor used, plants should not be chosen in localities where the scale of wages paid labor is considerably above the group taken as a whole. Also, plants which have a decidedly inefficient layout of buildings and equipment should not be included in the group unless it is desired to segregate them later on in the work for studying the effect of such a condition on costs of operation.

Before the actual work of assembling the data and information is begun, the whole plan of the field work and analysis should be worked

out, the methods of valuation of plant and equipment, the classifications of costs, the groupings to be established, the factors to be tested for their effect on costs, etc. Following this, the schedules for use in both the central offices and at the country plants should be drawn up and tested out in use; and likewise, the office sheets to be used as the final record of the data for each plant.

All figures obtained should apply for one complete year, and the records for all the plants should terminate on approximately the same date.

An important factor in the success of such a project is establishing and maintaining proper relations with the management of the milk distributing organizations. The purposes of the project should be made entirely clear, and the values explained without any exaggeration. It is of great importance to impress the management with the sincerity of the undertaking, and with the fact that all information received will be handled in such a way that when used for publication the source will not be divulged. The field men should plan their work so that it will come at a time of day that will interfere as little as possible with the activities of the plants.

On visiting each individual milk plant, the field man should make himself familiar with the layout of the buildings, checking each against the building inventory information obtained for it at the central office. A floor plan should be made of the entire unit showing the location of rooms and doors, of all dairy and operating equipment, and any other physical features which might later help to explain the reason for an unusual cost condition at the plant. The writer found that using cross-section paper ruled ten squares to the inch enabled him to lay out floor plans to scale rapidly, and without the use of a ruler or other instruments.

The most difficult part of the field work is obtaining the estimates needed for distributing labor and other costs between operations. This is well illustrated by the case of labor. Labor costs, as a rule, comprise at least forty per cent of the total cost of operating country milk plants, and are the most important of all the items of cost for most of the separate processes. The salaries received by each of the different employees must be distributed to the operations on which they work during each of their payroll periods (usually a month).¹

(1) EDITOR'S NOTE. The procedure here outlined charges to the milk handled each month the wage and salary bills of each month. This procedure would not serve in plants where labor is kept on the payroll when receipts are reduced so as to have it ready for the rush periods; and where salaries of managers and superintendents are paid on the basis of a whole year's receipts and not receipts month by month. (Dr. Tucker says that these conditions prevail only to a limited extent in country milk plants.) With labor and management so employed, the method here suggested would charge too much labor and management expense to the months of light receipts and too little to the months of heavy receipts. A better basis of distribution of such labor and management expense would therefore be according to the amount of milk handled rather than by the month.

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The operations on which any single employee usually works during the day depend upon three main factors, (1) the number of men employed or working that particular day, (2) the volume of milk received, and (3) the products made that day. The first two factors are somewhat interrelated; that is, often extra men are employed during the season of highest milk receipts (usually April, May, June and July). At this time, the regular men usually work on different operations than they do during the remainder of the year. Therefore whenever the work of the regular men in the plant is altered very much, or men taken on or laid off, a new labor distribution record must be obtained for this new period. Quite invariably, the sum of the number of hours spent daily by any one man on the various operations will not equal the total hours of labor for the day as credited to him on the plant payroll. This will occur because (1) a man quite often will be carrying on two or more operations at the same time, and it is difficult for the plant superintendent to judge just how much of the man's time to charge to each, and (2) because some of the dairy organizations pay their employees a fixed rate per day of a set number of hours. They therefore have a definite payroll charge per hour, and do not pay for any overtime work. By the same token, in the season when milk receipts are light, the men may have completed their work for the day before they have worked their set number of hours.

The order of approach on this problem should be (1) to decide with the help of the plant superintendent how many distribution records will need to be made, (2) to fill each record out for each individual on the payroll by obtaining the hours he works on each operation, (3) to check this over again with the superintendent, and (4) then to take up the matter of indirect uses of labor, such as on improvements to land, buildings and equipment, which occur only occasionally during the course of a month. The latter also applies to the Babcock-testing of milk and cream samples. These figures should be given in terms of hours per month.

A still more difficult task for the field man is to obtain a correct picture of the amount of steam, water and electricity used by the various operations and processes in each milk plant. Due to the impracticability of using meters of various kinds in a fairly large number of plants, there is no way to get this information except by estimates. When the plant superintendent is asked for help on this question, the field man should not start off, for example, by asking him how much steam the various operations use, but rather, which

(Continued from page 96)

A still more serious difficulty commonly met, but present only to a limited extent in country plants, and hence not provided for in the procedures outlined in this project discussion, is that pointed out under "General Methodology" above, namely, that in small plants men are frequently employed to do several kinds of work, but get their salaries or wages on the basis of their skill at the most important kind of work. Thus buttermakers receiving two hundred dollars a month may tend furnace and pack butter at times.

operation uses the most steam; then follow on down the line, getting the operations in mind according to the relative amounts used. By so doing, he has set up in the superintendent's mind the relative requirements of these various operations for steam. Then, by starting over again, the field man is more likely to be able to get the superintendent to thinking in terms of percentages or proportions.

The original records will show that the valuations of the plants and the equipment owned by various organizations differ according to the time of the last appraisal and the rate of depreciation applied thereafter. Since important items of operating costs, such as depreciation and interest, vary directly with valuation, it will be necessary to eliminate these artificial differences. This can be done by using the estimated current replacement values rather than the values as shown by the books of the organization.

For the purpose of the study, interest should be figured at an average rate for the community in which the plants are located, on the original cost of the land and on one-half the replacement value of land improvements, buildings and equipment. In this way, all plants are placed on a comparable basis—land improvements, buildings and equipment being depreciated one-half without regard to their actual age or condition.

Again, if comparable cost figures for all plants are to be worked out, the same depreciation rates should be applied to the valuations on similar types of buildings or equipment. The rates recently set up by the "International Association of Milk Dealers" may be used for this purpose, or rates may be calculated from the estimates made by the dairy organization officials, accountants and plant superintendents, as to the probable number of years of usefulness.

Taxes on the real property for the year, as obtained from the accounts, should be divided between land, buildings and possibly equipment in proportion to their valuation.

Charges for repairs and maintenance should include actual expenditures for material, wages and traveling expenses of outside labor and wages of the plant employees, for the time spent in repairing and maintaining the land, buildings or equipment.

Both the annual insurance premiums on fire insurance policies, and the reserves set aside by the organizations for fire losses not fully covered by insurance, should be included. Insurance should be distributed between buildings and equipment in proportion to their respective replacement values.

The direct labor cost is to include the wages of all plant employees with the exception of amounts distributed to land, buildings, and equipment for maintenance.

In general, the costs of supplies are to be charged to the operations or processes in which they are used.

Probably a large share of the milk plants chosen for the study will be operated by organizations having central administrative offices

for the executive and accounting staffs. There will also be district superintendents, veterinarians and dairy inspectors, and central laboratories for the bacteriological control of the milk supply. The determining of the proper share of the expense to charge to these various agencies is decidedly a difficult task, and the writer believes that such expense should be kept entirely separate from the costs actually incurred in the operations of the milk plants themselves.

The costs of operating such plants can be considered under three main classifications, namely, Elementary Costs, Intermediate Costs, and Process Costs. Under Elementary Costs are to be considered the cost figures taken directly from the records of the various organizations, with minor adjustments as described above. The elementary costs are subdivided into five main divisions: (1) land and buildings; (2) equipment; (3) direct labor; (4) supplies; and (5) miscellaneous. Under Intermediate Costs are given the costs of steam generation, ice-machine operation, water supply, and general cleaning. It will be necessary, as explained later, to segregate portions of the elementary costs under these headings before making a distribution of all costs to the processes more directly concerned with the handling of the milk. Under Process Costs are to be considered the costs of the various operations or processes taking place in the plants being studied. They will consist of their shares of the elementary and intermediate costs explained above. Examples of these operations or processes are receiving milk, washing milk cans, and cooling milk.

The analysis of factors associated with variations in each of these classes of costs may be illustrated by the following for land, buildings and equipment: The plants can be grouped according to whether the plants are owned or rented by their operators, according to whether located in village or country districts, and according to volume of receipts, and the average costs determined for each group. It is suggested that three size groups only be used so as surely to have enough plants in each to produce a stable average. The averages for the middle group ought to come very close to the averages for all the plants. The amount of the investment in land, in buildings, and in equipment, and the percentage which each is of the total, can also be worked out for all plants combined and for each of the groups. If desired, such items as interest and depreciation can be similarly treated.

For the determining of process costs, floor space will need to be distributed. Before this can be done, several other decisions need to be made. The first is, how shall the floor space used for necessary passageways and general work rooms be apportioned? The second, how shall the unused space in the plant be handled? Also, how shall allowance be made for differing valuations and thus differing land and building costs on various sections of the milk plant? The writer believes that passageways and general work rooms are best apportioned to the processes in the approximate proportion that the field

man, after seeing the plant in operation, considers fair. There are several important questions to be considered relative to the handling of unused space. Many plants now shipping fluid milk formerly made butter or cheese, or possibly shipped bottled milk, or were built with the idea of expanding the business. The milk plants built in recent years are likely to have less unused space than the older plants. The dairy organizations, however, have their money invested in these older plants, and it would seem proper to spread an allowance for the unused space in them² over the processes or operations using the plant during the year studied.

In apportioning land and building costs to processes in the New York study, the method of making allowances for the differing types of construction on various sections of the plant, was to reduce (or in a few cases increase) the square feet on the floor space in these sections in proportion as their valuation per square foot was to the valuation per square foot of the main plant.

It may be worth while to mention a few illustrative details of the labor cost analysis. The total labor cost, labor cost per unit of product, and the number of men employed, in relation to volume of milk handled are three of the most important relationships to be studied in the analysis of milk plant operations. To determine the effect of seasonal variations in receipts of milk on these relationships, unit labor costs may be calculated for the month of smallest receipts and the month of largest receipts;³ also the number of cans (or cwts.) of milk handled per day per man employed for these two months. Those actively engaged in the operation of country milk plants are much interested in labor costs, since they are not fixed items of costs as are building and equipment costs, but are more or less controllable through the efficient use of plant labor and through the volume of milk receipts.

In distributing labor costs to processes, the first step is to calculate the labor cost of each man for his work on land improvements, buildings or equipment (indirect labor). This is done by multiplying the hours thus spent by the rate of pay per hour calculated by dividing total wages by total hours. This amount deducted from his total labor cost gives his direct labor cost. This latter figure is then broken up to processes by use of the percentages that his labor on the various processes during the average day were of his total day's labor, less indirect labor.⁴ With the labor costs distributed as above, a table may be set up showing the distribution of the total labor costs to operations, the average amount per plant for the

(2) EDITOR'S NOTE. If replacement value were properly determined, it would represent the replacement value of only as much of a plant as would be built there now. The rest of the plant would be considered obsolescent and without value. On this basis, which seems entirely reasonable, the unused space would have no value unless held on reserve for a potential future use.

(3) See Footnote 1.

(4) See Footnote 1.

group, and the percentage that each processing or operating item is of the total.

The total cost of supplies and the cost per unit of product should be obtained for the group of plants as a whole, and the costs of the individual supply items should be spread to the processes or operations in which they are used on the basis of the information obtained when visiting the plants in question. Likewise water and electric power and light. The other miscellaneous costs (i.e., cost of telephone and telegraph services, travel expenses, etc.) should be distributed to processes or operations on some arbitrary bases, such as the square feet of floor space used by each operation, or the cost of labor used on each operation or process.

The segregation of intermediate costs should be made separately for each plant studied. In this part of the analysis, portions of all the major items of elementary costs go together to make up such items as the cost of generating steam, which in the last analysis must be charged to the processes or operations which use the same. This is also true for the water supply, the ice-machine operation, and the cleaning operations.

When each of the main groups of elementary costs for each milk plant has been distributed either directly to the processes on which it was expended, or indirectly to these processes through the intermediate costs using the same, the next step is the bringing together of these various cost groups to obtain the total operating cost by processes.

Estimated cost.

The cost of such a project as outlined above, covering in the neighborhood of 80 to 90 country milk plants located within a radius of approximately one hundred miles of a given point, is estimated at approximately \$6500, made up as follows:

Salaries of field men and supervisor of office work	\$3500
Clerical assistance	1500
Travel expenses	
Visiting country plants	1050
Visiting central offices of organizations	350
Miscellaneous expenses	100
Total	<hr/> \$6500

Other studies.

The Vermont Agricultural Experiment Station has published *Milk Receiving Station Operation in Vermont* (Bulletin 303, 1929) by O. M. Camburn, which is based on a study of 13 representative milk receiving stations in Vermont. Each station was visited at least once each month for a year, at which times details of operating methods and procedures were studied. This method of study tends to sub-

stitute accuracy as to details on a few milk plants for possibly slightly less accurate information on a larger number of plants. This makes the use of great care in the selection of the plants to be studied much more necessary than where a larger number are studied by the survey method.

Bartlett and Gregg have studied 52 country shipping stations located in Pennsylvania, and the results are reported in *Milk Marketing in Pennsylvania; Shipping Station Operations*, Pennsylvania Bulletin 219 (1928).

Comments (A. B. Cox).

Project 19 is too theoretical. I think by far the best approach to unit cost analysis is to work it out with representatives of the trade involved. Our policy in the Bureau of Business Research (University of Texas) along this line is invariably to go to the trade with a tentative proposal and to discuss with them the figures which they feel that they require in the operation of their own businesses. We find very frequently that some of the things we think would be interesting they find of no value.

It is clear from what I have said that our approach is from the standpoint of working with trade and industry and not of finding out something about them. The response and results of the two methods are very different.

PROJECT 20. Analysis of Business Statements.

Objectives: To determine for a group of business enterprises of a given type the characteristic relationships between the elements composing the operating statement and the balance sheet, the extent of variations in these relationships between different business units of the same type, and the extent to which some of the relationships are correlated with others.

(By Whiton Powell.)

(EDITOR'S NOTE. The annual balance sheets and operating statements of marketing enterprises have considerable research value which should not be overlooked. Experiment stations may find themselves making more headway by working extensively with such records than by spending limited resources collecting more detailed records from a few enterprises.)

The ratio relationships between various elements of the balance sheet and operating statement are important indications of the solvency of an enterprise, the economy with which it is operated and its profitableness. The managers and owners of business enterprises may obtain valuable assistance through comparison of the solvency, the economy of operation and the profitableness of their particular enterprises with typical figures from a representative group of enterprises of the same type. Such comparisons should indicate the

effectiveness of the various phases of the operations of their businesses more clearly than study of successive annual statements alone. The extent of variations between different enterprises in costs per unit of product handled indicates at least partly the savings possible to economical management. The extent to which costs are correlated with measures of the investments in various assets indicates the degree to which prudent control of such investments may affect the economy of operations.

This project is limited to business enterprises of a single homogeneous type, such as fruit packing associations, potato warehouses or retail feed stores. Care must be taken that all the business units included in the study carry on substantially similar operations if conclusions based upon comparisons between them are to be valid. For instance, it was found in a study of retail feed stores that the expenses of operation were sufficiently greater in the case of stores offering grinding service than in the case of stores conducting purely merchandising business to reduce somewhat the degree of certain relationships that appeared when the two classes of stores were treated separately.¹

Such a study may conveniently be applied to a given agricultural region, a state, a city, the units of a chain-store enterprise, or to local units of a federated or centralized cooperative association. The size of the area to be covered and the number of enterprises to be used as a basis for analysis is limited by the difficulty of obtaining satisfactory records, if it is not already limited by the number of existing enterprises of the type to be studied. For satisfactory analysis, it is desirable to have usable records for a group of seventy-five or more business units. Usable records covering from seventy-five to one hundred cases can probably be obtained by one investigator by personal visits to the places of business in a period of three months, if the area to be covered is limited to a few counties or cities and automobile transportation is available. A study of this size, if no further analysis is attempted, can probably be completed by the investigator and one clerk in a period of six months to one year.

The most convenient and satisfactory source of information is the central office of an enterprise operating a number of similar units, such as a chain-store system or a cooperative association made up of many local units. Data obtained from such sources generally have the advantages of being quite complete, prepared in comparable form and available in a single place. Another good source in some instances may be a commercial auditing firm which specializes in work for small businesses, such as grain elevators or creameries; or a cooperative auditing association which renders comparable service. Use of such a source of information has been made in a study of

(1) Whiton Powell, *Some Factors Affecting the Cost of Operations of Retail Feed Stores in New York State*, Cornell Bulletin 505, 1930.

grain elevators.² In most cases, however, since data are to be obtained from a number of independent business units, it is usually necessary for the investigator to make personal visits to the offices of each unit in order to obtain the information. It will not be possible to secure the use of the records of independent firms in many cases. Many proprietors are inclined to guard such information very closely. Moreover, business enterprises of the small size likely to be encountered in this project, seldom have either their balance sheets or their operating statements in a form even approximately satisfactory for use. Such statements may be worked up from the records of the enterprise, but this may often take more time than is available for the purpose. Income-tax reports often provide a valuable supplement to the financial information otherwise available. In almost every case, at least a few estimates by the management or by the investigator are necessary in order to complete the information. While the use of estimates made by the investigator is to be deplored, it is sometimes practically unavoidable for such items as depreciation. It is evident that any one undertaking such a project should have a thorough training in the elements of accounting technique.

Sampling is ordinarily impossible in such a project. It is necessary to use the records obtained from those who are willing to cooperate and who have the necessary financial records. In some cases, however, it can be determined whether the group of enterprises included is representative of the various conditions of doing business. For example, in some states official compilations are made of certain data for all enterprises of a given type in the state. Business directories occasionally contain similar data. When such information is available, the enterprises included in the study may be compared with those in the same territory as to volume of business or size of investment. Such sources, however, do not ordinarily provide sufficiently detailed information to give any indication whether the ratios discovered in the study are typical of all enterprises of that type. Actually, it may usually be presumed that such a study will be somewhat biased toward the more efficient enterprises, since they are more likely than the inefficient enterprises to be able to provide the necessary original data.

If a large number of units are under a single management, they are likely to reflect the peculiar characteristics of the particular management. If such a group of stores constitutes a more than proportionate share of the number from which data are obtained, their characteristics may unduly affect the figures that are accepted as typical. Similarly the temptation to include an unusually large number of cooperative enterprises in a study purporting to cover business units under all kinds of ownership might materially affect the validity of the conclusions.

(2) H. B. Price and C. M. Arthur, *Management Problems of Minnesota Elevators*, Minnesota Bulletin 224, 1926.

Some degree of internal check in the data from each business unit can be obtained by using an operating statement with both the preceding and following balance sheets. Under these circumstances, the operating statement, together with a little auxiliary data, should account for the changes in net worth from one balance sheet to another. Entire reliance cannot be placed upon this method, however, as very often some of the items on one or the other or both statements are the results of estimates. The authenticity of some of the figures can also be tested somewhat by comparison with other data concerning the same enterprise. For example, the expenses of maintenance of real estate may be compared with the investment in that asset, or the total salaries and wages may be compared with the total number of persons employed during the year.

Analysis of data.

The problems of classification of the data are those common to the preparation of financial statements in general, discussions of which may be found throughout the literature of accounting. These problems are relatively simple so far as they relate to the classification of balance sheet items, since enterprises of the size likely to be included in this study generally have simple financial structures. The real difficulty arises in the classification of expenses in a way to provide a basis for useful conclusions. Classification of expenses on a functional basis unquestionably is the most desirable for the purpose of subsequent analysis. Most small enterprises, however, are not departmentized on a functional basis. The same individuals at various times assist in all the normal functions of business, which makes the allocation of their salaries (usually constituting a major portion of the total costs) difficult and unsatisfactorily arbitrary. Other expenses are generally equally difficult to allocate to functions. Consequently, attempts at functional classification of expenses are likely to be based so largely on estimates as to render the conclusions reached in that way of doubtful validity.

In the absence of a satisfactory method of functional classification, resort may be had to the more customary classification according to the immediate object of the expenditures, such as salaries, rent, insurance, supplies, etc. This basis of classification has the merit of reasonably assured accuracy, but makes subsequent analysis somewhat more difficult. On the other hand, it is more easily understood and used by the managers and owners whose actions should be influenced by the report of the study.

(EDITOR'S NOTE. Nearly all of the current research projects undertaking to analyze marketing business units are concerned with local cooperatives, and commonly include other aspects than those covered in the foregoing projects. South Dakota, Missouri and Colorado are working upon farmers' elevators, Iowa and West Virginia upon livestock shipping associations, Kentucky upon strawberry marketing associations, California upon creameries, and Virginia upon tobacco warehouses.)

The measures required in this study are the generally accepted ones of accounting analysis, consisting particularly of the relationships between items on the operating statement and net sales, between items on the balance sheet and total assets, and between major asset items and net sales. While many other relationships may be calculated, care should be taken to avoid the application of undue refinements of analysis to data presumably containing many minor inaccuracies.

As the variations in costs determined in this project are to be related to measures of economy of operation, it is desirable to eliminate, so far as possible, variations caused purely by the form of organization and method of financing. This makes necessary the inclusion among costs, not only those normally recorded as expenses by the ordinary business enterprise, but also interest on the owners' investments and compensation for the owners' services. Failure to do so is likely to result in gross underestimation of the importance of economy in the use of capital, and, to a less extent, of labor.³

In the determination of typical figures, it is possible to work either in terms of dollars or in terms of ratios. Thus, in the case of the operating statement, one might average the dollar figures for all cases and translate the averages into ratios. On the other hand, the ratios might be determined for each case and then averaged to arrive at typical figures. It is believed that the latter is the proper method, as it weights each case equally, whereas the former method weights the cases in proportion to the size of the business. The averaging of individual ratios, however, occasionally encounters difficulty because of the appearance in a few cases of ratios of infinity. These circumstances ordinarily eliminate the use of several of the common types of averages and seem to point generally to the use of the median as the typical figure.

The extent of correlation between various ratios can probably best be demonstrated by comparison of group averages based on sub-classification of the data. In the absence of a larger number of cases than is likely to be available, the use of formal correlation

(3) EDITOR'S NOTE. On the other hand, as pointed out under "General Methodology" above, including an allowance for compensation for the owner's services, and for services of members of the family, if these allowances are based, as in the usual manner, upon prevailing salaries and wages for hired services, is likely to cause considerable over-estimation of the importance of economy of the use of such labor. The principles of economy of proprietor, family and hired labor are very different. To be sure it is important that such labor be economized as well as hired labor; but the criteria of such economy are different, and hence other measures are needed. The safest procedure, where enough enterprises are available, is to put all enterprises using the services of one proprietor in a group by themselves and compare them only with one another; and similarly to classify and analyze enterprises using family labor.

There is also a danger of overestimating buildings and equipment which have become more or less obsolescent and hence to over-emphasize economy in their use. Such capital goods are worth only the sum of their future uses discounted down to date.

methods is of doubtful value, although it has been applied experimentally in at least one study. In drawing conclusions from such relationships as may appear, the tendency for all phases of each enterprise to show effects of equally good or bad management must not be overlooked. There results an interrelationship between theoretically independent variables, with the possibility of overstating the influence of one or more of them. Consequently, extreme care should be taken in the interpretation of apparent relationships.

Other research.

Although a number of projects of this type have been reported by the business schools of various universities, only a little appears to have been done in the field of agricultural business. The reports in this field have generally been incidental to studies of the factors affecting costs, and have given little attention to the possibilities strictly within the range of this project. They are especially deficient in the analysis of relationships involving figures from the balance sheet, and in the establishment of standard relationships.

PROJECT 21. Efficiency of Turkey Plant Operation.

(By Gordon Sprague.)

(EDITOR'S NOTE. This project discussion is included as another example of the comprehensive type of marketing organization analysis. It deals with an enterprise which comes nearer to being a marketing enterprise than does a country milk plant. Only the general outlines of the project are indicated.)

For this part of the turkey marketing problem, it will be necessary to secure the cooperation of the operators of turkey dressing and packing plants, who must furnish certain basic information as to operating practices, and certain operating data which will be described below. Great care and consideration should be exercised in contacting these plant operators, and the plan should be carefully discussed in order that there will be no misunderstanding as to what is wanted. Otherwise the work will lose its best results because of the failure of data to bring out the desired results. The turkey season is the peak-load season for most dressing plants, and unless details are thoroughly developed in advance they are likely to be overlooked.

Turkeys are bought from producers either alive or dressed. Turkeys bought alive must be killed and dressed in the plant. Turkeys bought already dressed, and plant-dressed turkeys, must then be classified and graded.¹ A careful description of the different practices used in each of the different plants should be made, since these will later be found to be a very important part of the marketing problem. The practices involved are as follows:

(1) Government grades and classes for turkeys may be obtained from the Bureau of Agricultural Economics, Washington, D. C.

- (a) *Killing and bleeding the turkey.* Improper sticking and picking result in unsightly carcasses and low grades.
- (b) *Grading and classing.* A description of the various quality grades will be necessary in order that the standards used by each plant may be evaluated in the final summary. This will prove to be the most difficult part of the analysis, since many plants will be using different standards, and some method of converting these standards to a common basis must be devised in order properly to evaluate operating methods.
- (c) *Packing.* There will be considerable differences in the kinds of packages used and the methods of packing birds in the containers. Average price per pound for the turkeys in each package should be developed, average costs of containers and of the packing operation, and average prices per pound received for turkeys in each type of container.

Each packing plant should be requested to furnish data for each day's operations as to number of pounds of turkeys of each grade packed, for turkeys bought alive and plant-dressed turkeys separately, with reports as definite as can be obtained as to why part of the turkeys fell into the lower grades.

On the basis of percentages of total in each grade, the results of the plant dressing and farmer dressing can be compared and related to the reasons why turkeys are thrown into the lower grades. Several random samples from No. 2 and No. 3 grading should be reclassified on the basis of defects to establish the relative importance of these defects. The most common defects will be as follows: 1. Immaturity of birds, 2. Crooked breast or back, 3. Bruised flesh, 4. Improper bleeding, 5. Torn skin or broken bones, 6. Improper picking, 7. Poorly finished birds. Obviously some of these defects are due to producers' practices and some to killing and dressing operations. The result is loss in all cases and the nature of the defect will indicate the avenue of loss. Different plants will show considerable differences in dressing losses, and this will indicate the care used in operating the plant. The effects of these differences may be reflected in either prices paid to producers or profits or both.

Since turkeys are handled as a sideline by most poultry packers, and the turkey marketing season also coincides with the peak load of the operating plant, any formal analysis of cost designed to get combined unit costs and process costs will be largely futile. However, many of the individual items of cost can be analyzed on a money-cost basis. Since both physical inputs and rates of pay are likely to vary, these should be analyzed separately as well as combined. Analysis of some of the operations in terms of physical inputs will also be valuable.

Some plant operators sell their product on track, others sell at the markets, other contract their sales in advance, and some sell on con-

signment. Some plants store turkeys extensively. Most operators will feel that inquiry by any research agency into their price and sales policies is unjustified. If possible, however, answers to the following questions should be obtained by direct inquiry or by analysis:

1. On what basis is the price paid producers determined?
2. What is the sales policy of the organization?
3. What are the returns on each grade as compared with central market prices?
4. How closely do operating and transportation costs take up the spread between quoted market prices and prices paid producers?
5. What sales policy seems to yield the best returns over the season
 - (a) to the operator?
 - (b) to the producer?

Probably more headway with this type of enterprise will be made by intensive analysis of several small groups of plants, using the case method as outlined for Project 22, than by attempting to obtain enough records for statistical analysis by the comparative method.

PROJECT 22. Size and Volume of Business.

Objective: To determine the relation between size and volume of business and expense, cost and profit from some type of marketing business unit.

(By John D. Black and George M. Peterson.)

A project of this sort may be undertaken with two different uses of the results in mind, as follows: (a) to furnish information as to the factors determining most effective size, to use in planning new business units or in reorganizing old business units; (b) to help develop a fuller understanding of the principles relating to size of business units, especially with respect to various types of marketing business units.

The first of these uses is of immediate significance, and studies looking to such uses are likely to be made in particular areas. Size and location under such circumstances will be found closely related. The second of these uses will be of vastly more significance in the end, for the principles now commonly accepted need a great deal of supplementing and qualification, and probably contribute as much confusion as understanding to ordinary thinking on the subject. What careful analysis has been made of the problem is still largely in its qualitative stage, and much needs the testing and classification that comes with quantitative studies.

Hundreds, perhaps thousands, of studies have been made in which some so-called measure of business efficiency, such as unit cost or

some one unit cost (labor, power, etc.), unit profit or total profit, return on investments, etc., has been related to some measure of size of business, usually an output measure or some one input (such as acres of land). The results have usually taken the form of a table in which the business units have been grouped by sizes and the average cost or profit figured for each group. Such tables are of course very easy to construct. They are almost invariably included in any study that provides data for some measure of size and any related factors. They commonly show costs and profits increasing with size of business either clear to the top or to some point between the middle and the top. Unfortunately such presentations are misleading in more cases than not, especially if the relationship is expressed in terms of total profits or income. Considering them first in their application, no entrepreneur could safely conclude from such a table that he ought to enlarge his business. If he did, he would probably make a mistake more often than not. In their theoretical aspects, they fail to take into account a very large body of other relationships that are involved.

The state of thinking on this subject is well illustrated by the following incident: In 1921, Professor Theodore Macklin published a study of retail stores in Madison, Wisconsin, in which he concluded that most of the stores were too small for effective service and should be enlarged. A grocers' association, in a monthly journal published for its members, took exception to this statement and placed in parallel columns certain quotations from the reports of the Harvard Bureau of Business Research which pointed out that some small stores had as low costs as some large ones, and that there is no reason why a small store cannot be as efficiently managed as a large one. A letter of the writer to the Harvard Bureau of Business Research asked whether as large a proportion of the small ones as of the large ones had low costs, and also whether a storekeeper who could run a small store at low cost might not be wasting his talents in a small store, and whether differences in capacity and efficiency of storekeeper should not be taken into account in the analysis. The answer received failed entirely to recognize, or at least admit, any point to the questions. The statements being made today on this matter go very little beyond those made in these two instances in 1921.

It is apparent, therefore, that further progress with the problem of size of business requires the making of studies in which this particular factor is singled out for special attention. Even if the results are for immediate application, it would appear necessary in most cases to study the problem by itself, either as a separate project or a clearly defined section of a project. This does not mean, of course, that such an analysis will not include a careful relating of this problem to other aspects of business organization, nor that considerable data will not be needed for the business as a whole. It means

instead that most of the data now collected in the comprehensive types of studies will be needed, plus much more complete and carefully obtained data relating specifically to the problem of size. These studies will ordinarily be confined to one type of marketing agency; but as different agencies are studied, there will slowly emerge some generalization for all types of marketing agencies.

Since research in this problem on the level of intensity here indicated is still largely unknown, it will be well to try different methods, both the statistical and case methods, and both the comparative and synthetic methods, as these are distinguished above under "General Methodology."

Qualitative analysis.

This problem is one in which careful qualitative analysis must precede all attempts at quantitative analysis. The qualitative analysis will ordinarily be in two stages, first getting a clear understanding of the elements and relationships in the problem of size in general, and second, tying these up with the particular problem and type of enterprise in hand. This will mean, for example, thinking through the general problem of measures of size, and then considering carefully what measure of size is suited to the enterprise being studied.

The first stage in this will ordinarily involve studying all the available literature on the subject. The literature on measures of size should distinguish between fixed inputs, variable inputs, and outputs as measures of size, between increasing size by enlarging the fixed plant and by obtaining larger output from the same plant, and between physical and value measures of size.² From the literature on measures of size, one should proceed to the literature on measures of business effectiveness.³ This reading will make one aware that basic to all such analysis are the relation of inputs to outputs; the relationships involved in least-cost and highest-profit combinations of inputs; differences between individual proprietors or managers, locations, plants, etc., in efficiency and in capacity; relation to outputs and to profits of combinations of capacity and efficiency;⁴ the possibilities in the way of delegation of management, integration, etc.; the effects of prices of cost factors and of commodities handled upon optimum size; and the effects of such factors as location, competition, availability of supplies and market outlets; and hence want

(2) See J. D. Black, *Production Economics*, pp. 538-542, for a beginning. Then read discussions of this subject in treatises on business organization, and examine research studies to discover what type of measure was used.

(3) For a beginning, see discussion of this under "General Methodology" above.

(4) Dr. Peterson would prefer here to use some terms more definite than capacity and efficiency.

to explore the literature relating to all these.⁵ This list of factors affecting size includes the external as well as the internal. It will be evident from this reading that some of the elements entering into the problem cannot be reduced to quantitative expression. These will have to be handled by grouping procedures, or by the method of ranking in studies using the comparative method. The synthetic and case methods offer more possibilities in the handling of such elements.

Case Study.

No doubt case studies are what will be most needed in the early work on this project. Unfortunately few research workers in marketing are familiar with this method, and, as pointed out earlier,⁶ only very inadequate discussions of it are available. Much of the early use of this method can therefore be expected not to be very productive. The general line of case procedure that would seem most promising in this instance might be something like the following: select carefully three sets of about five enterprises each at three different size levels, one being about at the lower quartile, another near the upper quartile, and the third near the median size, the whole fifteen being free from any abnormal or particularly out-of-the-ordinary characteristics, but the five at each size differing considerably and according to a deliberately chosen plan with respect to certain commonly prevailing major variables such as degree of business success, apparent degree of attention to detail, quality of commodities handled, type of operating organization, layout of work, size of plant, size of personnel, etc.; and then study these fifteen enterprises in detail, first with a view to observing similarities and differences within the five at each size level, and then the similarities and differences between those at the different size levels. The enterprises at any one size level need not have exactly the same volume of business; but the range should not be over ten percent. Any similarities and differences that can be reduced to definite measures or reasonable estimates, such as the various expense items, hours of labor, hours devoted to management, amounts of supplies used, inventories, turn-over, wages and salaries paid, prices paid for supplies, etc., should be so handled. But fully as important will be a

(5) See Projects 8 and 27 in the report in this series on Farm Management. As indicated above, a beginning can be made in this reading by working through the relevant part either of J. D. Black's *Production Economics*, or A. G. and J. D. Black's *Production Organization*. The discussion is more complete in the former, but subject to more qualifications. In particular, one should choose the statement of the principles relating to combinations of capacity and efficiency that is given in the latter. The relevant chapters are in Parts II, III, and IV of the first treatise, and in Part II of the second. Other literature worth exploring is cited in the bibliographies at the ends of chapters in *Production Economics*. Recent discussions of significance are those by Professors Willard Thorp and Melvin Copeland in *Survey of Recent Economic Changes*, prepared under the auspices of the National Bureau of Economic Research (McGraw-Hill Book Company, 1929).

(6) See page 84 above.

characterization of the enterprise, including its management and personnel especially, but also plant and equipment, that will be difficult or impossible to express in quantities. Balance sheets and operating statements should of course be worked out for each enterprise, and as much of an internal analysis as possible made of the operations. In some studies, a supervised year's record will need to be kept; in others, enough information will be obtained by making a careful cross-section examination at the outset, which should be continued long enough to give the researcher a basis for evaluating and characterizing the personnel and plant as well as to obtain the needed data; and following this initial examination with occasional half-days spent on the ground during the year, and a final examination at the end of the year which will include the closing inventory. Whichever plan is followed, there must be enough time spent in the midst of actual operations to make the researcher satisfied that he understands pretty well *why the enterprise obtains the results that it does*.

The analysis will partly take the form of an accounting analysis of the business and an operating statement for each enterprise, and a statistical analysis of the operating data for enterprises. Unit costs ought to be worked out for the original expense items rather than by accounting classifications. If the enterprise handles a number of products, there will be no purpose in attempting a formal allocation of costs between them. The costs special to each product will of course be analyzed as original items of expense. Moreover, there may be definite values in determining the physical inputs of labor, supply items and the like for each product handled. Similarly there will be no purpose ordinarily in any formal process analysis, but items of expense and physical inputs associated clearly with any one operation may be well worth analyzing in detail.

Some summarizing of the data by groups will be worth while, and some comparison of the group averages for the three different size levels; but this must be done very carefully, and too much reliance must not be placed on the actual figures. Five enterprises do not constitute an adequate sample. The major emphasis must be placed on conclusions not stated in definite numerical terms, obtained merely from looking at these three groups as wholes, and at differences and similarities between individual plants in the same or different groups. There will be more learned from comparing three poorly managed enterprises, or three somewhat over-staffed enterprises, or three with too large investments in plant and equipment, at the three different size levels, than in comparing the group averages at the different levels.

The part of the analysis which is neither accounting nor statistics will be carried on continuously during the process of assembling data and facts and in the periods of observation. This part of the analysis must undertake to cover all the remaining elements entering into and affecting size of business, both those pre-conceived as a result of the

preliminary qualitative analysis, and those which the observation itself suggests. Some of these elements can be reduced to terms of classifications or rankings. Possibly some of the devices being developed by psychologists and personnel analysis, particularly those emphasizing aptitude for particular tasks or occupations and command of specialized information, can be put to use in handling differences in capacity and efficiency of operators, managers and other hired employees. But others of these elements will probably have to be left expressed in the terms of ordinary description.

The analysis should keep constantly in the foreground two orders of questions for which answers are sought. These are:

- A. *What would happen to this particular enterprise if its volume of business increased or decreased?* How far could this increase go with the same plant and equipment, and how would expenses, receipts and related factors change with the increase in volume with the same plant and equipment? Likewise similar questions for the managerial staff and the staff of ordinary laborers. As the business increased beyond these points, what additions in plant, equipment, staff, etc., would take place, and how would expenses, receipts and profits be affected? The information needed to answer these questions may not all be available. This is one of the limitations of this mode of approach. But some of it can be obtained from other enterprises in the same size group, and the rest can mostly be obtained from the next larger size group if there is one. The same procedure can then be followed assuming decreases in volume and size of business. The analysis along these lines will be made more definite and conclusive if estimated balance sheets are set up to accompany each of the assumed changes in size. Thus the method of analysis here indicated is that described above as the *synthetic method*.
- B. *Why does this enterprise have this particular size?* What conditions or circumstances keep it from becoming larger, or smaller? All of the procedures above outlined can be brought to bear on these questions, and in addition certain important facts not previously mentioned, and also analysis relating (a) to the history of the enterprise, and any significant trends or fluctuations in its size and related factors, and (b) to the location and the area or community in which the enterprise is doing business, particularly the facts which affect competition for business.

Once these two orders of questions are fairly well answered, the researcher should have a fairly clear set of ideas as to what the possibilities and probabilities are in the matter of increase in volumes of business and in sizes of enterprises. It can safely be predicted that in most studies the conclusions will depart widely from the simple

naive statements commonly made on the basis of tables of average costs and income by size groups.

Part of the results of such a study are effectively presented in such forms as the following:

- (a) Balance sheets and operating statements of several actual enterprises selected from the three groups, accompanied by such other details as to procure a rather full and accurate picture of them, and by a carefully prepared comparative analysis.
- (b) In addition to the foregoing, a limited number of significant synthetic balance sheets and operating statements, with necessary interpretations.
- (c) Balance sheets and operating statements fabricated out of all five in each size group, designed to represent the modal for a true sample for enterprises of this size, as near as it can be surmised from the five studied.
- (d) Like (c) except that the ideal rather than the modal is attempted.

One man should do all the work on this project except the purely clerical. He will need the assistance at various stages of a psychologist of the right sort, and perhaps of an accountant. His most important qualifications are an understanding and appreciation of the case method, intelligence and imagination, and a personality that inspires confidence.

The most important contribution which the first projects of this type will make will be on the score of method rather than what they demonstrate about size of business. The first projects should therefore be undertaken in a spirit of experimentation. Many procedures ought to be tried besides those whose results are finally published. The major conclusion may be that the type of case set-up was wrong, and that a different one should be tried. In other cases, the conclusion will be to make another study much like the first one with another selection of enterprises to see how closely the results check; or to have some one other researcher make a similar study to see if he arrives at the same place. In other cases, a second study may be planned with enterprises selected at other size levels—such as still higher and still lower.

Survey study.

It is to be hoped that the case studies of this sort would also indicate the relative importance of the different variables in the problem, and develop measures for the more important ones, with the result that the foundation would be laid for studies including a statistical sample of such enterprises—when they exist in sufficient numbers and

uniformity to make this possible—in the analysis of which the comparative method could be used. There is great need for development of a statistical attack on the problem of size of business that yields conclusions that are valid and can safely be applied to particular enterprises.⁷ Obviously there will need to be measures for personnel factors as well as for plant, equipment, expenses, receipts and profits. The data collected should look forward to analysis in terms of the relation of unit costs, unit profits and volume of business to highest profit combination, and the relation of all these to capacity and efficiency elements. It must distinguish carefully between the effect of larger volume with the same plant and staff and the regression lines obtained in sample correlations of volume of business and costs and income. The analysis should be directed at answering the same two orders of questions as listed under A and B above. The synthetic method will therefore be needed to supplement the comparative. The detail of unit-cost and process-cost analysis included under Project 1 above can be largely, if not altogether, omitted.

Once an adequate methodology for analysis of volume and size has been developed, it should be possible to include the major features of it in many surveys of the more comprehensive type and obtain really significant conclusions.

The marketing units to be included in such a survey study must not only be handling the same commodity or commodities, but should be nearly comparable in other respects. For example, they should be rendering similar services. The size of the project will vary according to the type of marketing units studied, the number included in the sample, and the period of time involved. The sample should include enough plants or units of each size to be fairly representative throughout the entire range of volume; and similarly for other important variables. The period of time should be long enough to cover a cycle if volume varies and plants are established to handle peak loads. A year in most cases will constitute the unit of time. However, a month or a three-month period may be sufficient time for analysis of retail stores with rather constant volume.

The interpretations of data should indicate changes in costs due to inability to add factors in fractional units. A store with a volume too large for one clerk and too small for two clerks may find difficulty in hiring part-time help. If the same store delivers and has more volume than one truck can handle but not enough for two, it may be losing money while either larger or smaller units are operating at a profit. The relation of volume to costs and profits does not necessarily form a smooth curve but very often an irregular curve rising rapidly and then falling.

(7) See discussion of the comparative method above under "General Methodology."

PROJECT 23. Organization of Personnel.

Objectives: To determine the combination of skilled and common laborers, managers, foremen and helpers, bookkeepers, and of amounts and grades of such labor, that will be most economical for a given type of marketing enterprise with various conditions of output, with various volumes of business, etc.

(By Budd A. Holt.)

Labor is ordinarily the largest item of expense for a marketing enterprise. Economizing in its use is therefore one of the effective means of reducing costs and increasing profits. Labor expense may be saved by using labor-saving equipment, by convenient lay-out of plant, by carefully laying out the work to be done and employing the right combination of types of labor, and by using the right amounts and grades of it. The first two of these are discussed in other projects following. Substituting equipment for labor is of course economical only up to a point which may be called the least-cost (or really highest-profit) combination of labor and equipment; and labor expense may be inversely correlated with amount and quality of service rendered, and with quality of product if processing is involved.

Personnel organization offers more possibilities of good and bad in a large enterprise than in a small one; but enterprises as small as creameries present these opportunities also, as is illustrated by the study briefly outlined above of 88 Minnesota creameries, made by J. D. Black and E. S. Guthrie.¹ The ordinary range in labor and management expense was from \$8.80 to \$27.50 per 1000 pounds of butter made and sold; and these 88 creameries used 13 different personnel combinations made up as follows:

- (a) 1 buttermaker-manager-secretary-bookkeeper.
- (b) 1 buttermaker-manager and 1 secretary-bookkeeper.
- (c) Same as (a) with 1 part-time helper in addition.
- (d) Same as (a) with 1 full-time helper in addition.
- (e) 1 buttermaker and 1 manager-secretary-bookkeeper.
- (f) Same as (b) with 1 part-time helper in addition.
- (g) 1 buttermaker-manager, 1 secretary, 1 bookkeeper.
- (h) 1 buttermaker-manager, 1 secretary, 1 half-time helper.
- (i) Same as (e) with part-time helper in addition.
- (j) 1 buttermaker-manager-secretary, 1 bookkeeper, 1 full-time helper, and 1 part-time helper.
- (k) 1 buttermaker-manager, 1 secretary-bookkeeper, and 2 full-time helpers.

(1) Minnesota Technical Bulletin 26, *Economic Aspects of Creamery Organization*.

- (l) 1 buttermaker, 1 manager, 1 secretary-bookkeeper, and 1 full-time helper.
- (m) 1 buttermaker, 1 manager, 1 secretary, 1 bookkeeper, and 3 or more full-time helpers.

In most cases the secretary-bookkeepers, the secretaries, and the bookkeepers are employed only part-time, and this is true of some of the managers. The helpers range all the way from boys of 15 years of age to young men helping as apprentices, to beginning buttermakers, to experienced mature buttermakers. Obviously a major factor in these variations in combinations is volume of business, but by no means all of it. The creameries with a separate manager in the (e) group sold less butter than those without such managers in the (f), (g), (h), (j) and (k) groups—only half as much in some cases. Some creameries with full-time helpers handled less butter than some with a part-time helper. Those in the (c) group handled only 7000 pounds more butter than those in the (b) group.

Methods of analysis.

One procedure to follow with such a problem, if enough fairly similar units are available, is to conduct a survey and make a comparative analysis of the data, as was done in the creamery study cited, but collect more detailed information than in this case and attempt to get closer to really significant and useful results. This creamery study devotes 18 pages to a discussion of labor and management costs alone and presents 13 tables and 4 charts, and yet Professor Black has always maintained that a creamery manager, or an extension worker trying to assist a creamery manager, would not be able to determine from data there presented what changes to make to obtain more economical use of labor in his creamery. To be sure, the tables and charts presented would enable him to judge whether his labor costs were high or low for creameries with his volume of sales, and likewise whether his rate of pay per hour and hours per 1000 pounds of butter were out of line, and whether his organization was abnormal in two or three sorts of ways; but they would not enable him to estimate the probable effects in his situation of specific changes that might be contemplated. It is probable that more complete data of the needed sorts would have yielded more useful analytical results.²

But in general it would appear that a procedure more resembling the case method would be more fruitful, a procedure about as follows: Having made enough of a preliminary survey to determine the major features in the organization of the enterprises being studied, including the principal variables, select a small group of enterprises with about the same volume of business and very similar in certain other essential respects, but differing in the organization of personnel in clearly recognized ways, and collect all the data concerning these

(2) Dr. Cox believes that any results from a survey and statistical analysis of such a problem as here outlined would be almost useless.

enterprises bearing in any way on how each form of personnel organization operates, and the results obtained by it, and then analyze with a view to segregating and measuring the effects and explaining why these effects are obtained. Do the same as the foregoing for two or three other volume groups, and for groups representing other major differences between enterprises. Present the results in the form of tables and charts from which estimates can be made that will fit all except the abnormal situations found in the territory in which the study is made; and probably also in the form of a number of synthetic set-ups representing the more important or typical set-ups in the territory. The synthetic method may be used in estimating the effects of some of the changes proposed.⁹

If quality of service or product is important for the enterprises being studied in this way, measures of this, or at least careful grading or ranking, will be necessary, and differences between enterprises in this respect will need to be considered in making up the groupings. Quality differences in the raw materials and products handled, and in the personnel employed, will need to be similarly treated. In the Minnesota creamery survey study, it was possible only to correlate labor input measured in value terms (supposedly representing both quality and quantity) with quality of product, after eliminating the effect of volume of output and quality of the raw product; and the results were not significant (p. 100).

The case study of such a problem may even take the form of a sort of continuous project in which the results of the analysis are followed up with efforts to get promising changes introduced, and the effects of these changes are observed. Such a project therefore becomes somewhat experimental in its methods. It also in a way combines extension with research. To succeed with such methods it is necessary first to obtain the confidence of the creamery operators. It is relatively easy to interest creameries in comparisons of results for different creameries. Comparisons of labor costs, however, are difficult. Creamery managers or operators are quick to defend this element of their business and one cannot expect to work effectively with creamery boards of directors without first winning the confidence of the managers. But after the right sort of contacts have been established with a group of creameries with somewhat similar volumes of business, effective comparisons and analyses of costs can be made. It is well to begin by developing the differences in costs and pointing out their significance to the patrons and their effect on the ability of the creamery to meet competition and secure volume of business. The comparisons of costs should include particular attention to wide differences and gradually develop the causes of these differences. The number of salaried employees and their salary rates must receive first consideration because all differences in costs would be due to the product of these two factors.

(3) See page 89 above for discussion of synthetic method.

After these various possible explanations have been examined it is time to consider their relative importance and to seek methods of overcoming them where possible. One working with a number of creameries will be able gradually to spot weaknesses in the methods and labor set-up and get the needed changes introduced and tried out. The answers to many problems will be more or less unconsciously observed while others will require more specific investigation. Too frequently the cause of high labor costs will be the employment of a high salaried manager who does not want to do any work; or there may be wide differences in the efficiencies of employees. One working closely with a group of creamery managers can soon detect differences in the management and employees that can not be otherwise determined.

The foregoing may look to some more like an extension project than a research project. In part this is true, but certain kinds of service research must go hand in hand with extension and must be done by the same person. In fact, much of it is of such a nature that one does not know when one is doing research or extension. If the object is to get action in accord with the results of research, the research must be made only when the problem has been definitely confronted and when the results of the research are anxiously sought. This means the breaking up of research into very small tasks, perhaps frequently so small that one is not conscious that there has been any research.

Obviously a study following this second procedure could with advantage follow projects of the type of the creamery study above referred to, or of the type of Nos. 1 and 2 above.

PROJECT 24. Economy of Labor-Saving Equipment.

(By J. D. Black.)

The discussion of methodology in Project 23 can be applied directly to this project. Comprehensive survey projects such as the Minnesota projects on creameries and potato warehouses,¹ and the Cornell project on milk plants,² have treated equipment as a whole, and hence have not gone much beyond relating total equipment costs to volume of output. What is needed is analysis in which separate items of equipment are taken one at a time with a view to answering specific questions, such as the number and sizes of churns to use, or type of power equipment,³ or whether using a given item of equip-

(1) Minnesota Technical Bulletins 26 and 28, pp. 60-66 and 27-35, respectively.

(2) See Project 1.

(3) See p. 68 Minnesota Technical Bulletin 26.

ment, such as a wagon-dump scales or a conveyor, is more economical than labor, under a given set of conditions.⁴ Price of equipment and wages of the labor saved must be taken into account; also any possible difference in quality of product resulting.

Labor and equipment expense must of course be combined in some way to determine total effect; but this does not necessarily mean adding them in value terms to make combined unit costs.

The usual procedure is to attempt a unit-cost analysis of the process or operation using the equipment, and compare such unit costs for those using and those not using it. Calculating costs of any important item of equipment on an annual and unit basis is of course well worth while, and the results can be used in various helpful ways. But the unit labor process costs for combining with equipment costs cannot be thus used safely in any case where one laborer is employed for two or more tasks representing different degrees of skill (and thus paid for at different rates when hired separately) or where use of family or proprietor labor is involved.⁵ *A safer procedure is to determine how much the labor bill of the enterprise as a whole is reduced by using this item of equipment, and combine this with extra annual equipment costs involved, and any other possible related items of expense such as extra annual power consumption, extra supplies, and loss or gain in quality, and draw from this an estimate of the net saving if any for the enterprise as a whole. In the final statement of conclusion, any effects extending over more than one year must be taken into account. Obviously in order to make such estimates, more complete and accurate information will be needed than usually obtained in comprehensive surveys. Effects should be estimated for enterprises not using the equipment at present.*

PROJECT 25. Type of Plant to Construct.

(By Budd A. Holt.)

Extensive analyses of building costs using the comparative method are found in such studies as those cited in Projects 23 and 24. They are subject to many of the same limitations as those for labor and equipment, when considered from the standpoint of providing answers to the types of questions that actually arise when a board of directors sits to confer and decide upon building plans.

The annual expense and unit costs of buildings can of course be rather definitely computed after the buildings are scrapped, if a complete record of expenditures has been kept. A forecast of future

(4) Of 71 potato warehouses studied, only 37 had wagon-dump scales and only 16 had conveyors.

(5) See "General Methodology" above, page 77.

expenses, and hence of total expenses for the whole period, can be made with more than usual assurance of safety in forecasting, while the plant is still in use and only partly depreciated. This, of course, is all that the figures of annual building costs compiled by accountants represent—they are only forecasts. The unit costs derived by dividing these by one year's volume of business are of course even more forecasts. They have in them the further assumption that the volume of business handled through the building will remain the same throughout its life.

But obviously these forecasts do not fit the situation when a new building is being planned. In that case, a forecast must be made before the building begins to be used, of its life, upkeep and replacements, and the volume of business it will handle, as well as of the construction costs themselves. All forms of obsolescence must be anticipated. There are some significant inter-relations involved, such as between type of building and volume of business attracted.

Clearly any conclusion that is arrived at will not be much more than a guess; but a good guess is better than taking a blind chance or following one's inclinations.

Any research that may be undertaken relative to building plans should start with a decision as to what information a research agency can provide that will help a board of directors in making a better decision. First, one would say "comparative building costs". These, of course, change so rapidly that they need almost to be collected new for each building project. Second, estimates of life, depreciation, maintenance. Third, information as to the territory served as a basis for estimating future business. No doubt a research agency can furnish some help along these lines. The same will be true in the matter of trends in the industry as a whole. Information as to these and other related factors, a research agency can assemble and put together into a sort of prospectus for any building project, which centers its attention on comparing different types of construction and building plans. But not much of this information is of the sort that can be collected in advance and kept in storage waiting for use. Some of it, however, can be carried over from one building project to the next.

The other contribution that a research agency can make is to study the past experiences of enterprises which followed different policies with a view to pointing out the mistakes that were made and why, and the consequences thereof. These mistakes can then be used as warnings in the planning of new enterprises. In the case of cooperative enterprises, farmer members are particularly in need of the lessons of past experience, and reports of such studies have educational value.

It will now be evident that the analyses of building costs commonly made in unit-cost studies and the like have no clear idea of the uses to be made of the results. They have too much concern merely with getting costs.

PROJECT 26. Lay-out of Plant.

Objective: To determine the most economical lay-out for a country milk plant. (Joint with Engineering.)

(By Leland Spencer.)

(EDITOR'S NOTE. In this project, the research involved in analysis of plant lay-out is discussed in terms of country milk plants merely taken as an example.)

The objective of such a study, stated more specifically, is to determine what type of lay-out, and what specific features as to arrangement of plant, dimensions of rooms, height of platforms and the like usually result in most economical operation.

The details of the most economical lay-out of a plant differ according to circumstances as to slope of the land, location and elevation of railroad siding and highway, volume of milk to be handled, type of power used, facilities for sewage disposal, source of water supply, and method of transportation of milk, whether by rail or by truck, and whether in bottles, in cans or in tanks. Type and capacity of equipment are so closely related to lay-out of the plant that both must be considered along with it. It should be ascertained, for example, how much labor or time is saved by the use of conveyors, by divided *vs.* single compartment weigh-cans, by automatic *vs.* non-automatic can-washers and the like.

For most purposes, a sufficient test of most economical lay-out is the operating cost per unit of product handled. However, since the lay-out of the plant is only one of many factors which influence the efficiency of operations, differences due to other factors than lay-out must be eliminated in various ways by selecting the plants to be studied, by holding these other factors constant in a statistical analysis, or by limiting the study to certain operations within plants in which lay-out is the predominant influence. In the study by Tucker, cited in Project 1, volume per plant had such a predominant influence on costs that the effects of other factors such as lay-out were obscured.

In general, differences in money costs of labor will serve as a measure of differences in physical effort required for the various operations in a milk plant, if, as Tucker explains, the same wage level exists throughout the area. However, since this is not always true, and more especially because it is important to know why even money costs vary, special attention should be given to physical measures of efficiency, such as hours of labor required to put 100 cans of milk through a given operation, and to the factors associated with them, such as the height to which cans must be lifted, the number of steps from weigh-can to milk sheet and sample bottles.

The general procedure followed in such a study should be to collect a large amount of detailed information concerning the arrangement of existing plants together with data as to the effect of such arrange-

ment on physical effort, on money costs, and on the quality of the product. The data collected in such a study should, in so far as possible, be in such form, and should cover such a number of plants similar as to operations, volume, and method of shipment, that adequate statistical analysis may be made. To cover adequately the seasonal differences in volume of milk and in operating conditions, the study must extend over a period of one year. Office records of operating costs, investment in buildings and equipment and the like should be supplemented by the investigator's personal observations made at the plants. Camburn's studies of Vermont milk plants indicate that four visits a year to each plant are sufficient to obtain accurate estimates of the use of labor.¹

Careful measurements should be made, including height of platforms, distance from receiving door to weigh-can, height of dump rail, distance from can-filler to shipping platform and the like. Data also should be gathered as to the number of milk cans that can be stored on the receiving and can delivery conveyors. This may affect the time that dairymen are required to wait at the plant; also the amount of labor required in the receiving room. The convenience of the ice house may be measured by the average distance in feet that cakes of ice are carried or trucked to the shipping platform or other point where used.

Provision for the use of gravity in running milk through the plant is of some importance. Data should be gathered to show the relative advantage or disadvantage of gravity *vs.* pumps in respect both to cost and to quality of product.

The following publications report results of other recent studies of country milk plants, all of which give some attention to lay-out:

Tucker, C. K., *The Cost of Handling Fluid Milk and Cream in Country Plants*. Cornell University Agricultural Experimental Station, Bulletin 473, 1929.

Camburn, O. M., *Milk Receiving Station Operation in Vermont*. Vermont Agricultural Experimental Station Bulletin 808, 1929.

Clement, C. E., Le Ferre, P. E., Bain, J. B., and Grant, F. M., *Effect of Milk Plant Arrangement and Methods of Operation on Labor Requirements*. United States Department of Agriculture Technical Bulletin 153, 1929.

PROJECT 27. Location.

Objective: To determine the most advantageous locations for marketing units, country elevators being taken as an example.

(By R. M. Green.)

Analysis of location of country warehouses, packing plants or other receiving units may be useful in the following situations:

(1) EDITOR'S NOTE. It would seem probable that some significant details of plant lay-out will be difficult to reduce to statistical terms, and that these may need to be handled by plant-to-plant comparisons based on detailed study of lay-out plans by the case method and on a certain amount of job analysis of the sort developed by scientific management specialists.

1. When a new marketing agency such as a milk distributor, a central cooperative or some other central marketing agency is organizing and establishing its receiving service.
2. When one of these agencies is expanding its business into new territory.
3. When one of these marketing agencies is mapping out a long-time plan for reorganizing its receiving services as opportunity arises.
4. When appraisals of country warehouses as a basis for settlements or purchase by other agencies—as, for example, when local cooperatives are absorbed by a central cooperative.
5. When a research agency such as an experiment station undertakes mapping out such a plan as a basis for its extension work in a territory with unfederated or independent units or competing systems.

Analysis of location is as much needed when an old plant is to be purchased as when a new one is to be built. Cooperatives have greatly overpaid for old warehouses in many cases in recent years.

A good many studies of grain elevators, creameries, potato warehouses such as cited under Projects 19 and 20 above have given some attention to location as a factor in marketing organization;¹ likewise studies of special problems in which hauling distance is an important factor, such as local storing of grain, local shipments of grain, and experimental drying of grain at local points. The majority of these studies, however, have emphasized internal operating problems without a very full appraisal of the effects of differences in external or environmental factors. This has sometimes led to assumptions that differences observed were wholly a matter of differences in efficiency of management when such was not the case.

This project can be confined to one country or other local unit or can be expanded to consider a number of stations along a certain railroad or tributary to certain terminals, depending upon the interests of the organizations or other clientele being served.

Since location and size are closely related, this project and Project 22 have much in common, and some of the qualitative analysis outlined for Project 22 applies to both.

The analysis in this project will proceed by the following steps:

- A. Determine by the case method the advantages and disadvantages that a series of local points have from the standpoint of making possible the performance of marketing services at low costs. This will involve determining:

(1) Minnesota Technical Bulletin 26, *Economic Aspects of Creamery Organization*, discusses some of the principles involved and gives illustrative data (pp. 102-9); likewise the companion study on potato warehouses, No. 28 (pp. 72-6). Projects 2 and 3 above discuss some aspects of the problem and cite references to pertinent literature.

- a. By study of local transportation and trade centers the territory tributary to the location being studied.
 - b. Whether the territory tributary to the location will furnish volume enough to permit of economical operation, considering particularly:
 - (i) Production for the market in the market area.
 - (ii) Competition for supplies of grain.
 - (iii) Variability of supplies and effects on costs.
 - c. To what extent transportation costs to the location are a limiting factor.
 - d. To what extent transportation costs out are a limiting factor as to possible outlets for products.
 - e. To what extent volume, terms, and costs of local financing are a limiting factor.
 - f. To what extent there is need at the location for storage service, by a study of available storage space, car service, and farm practice as to storage.
 - g. To what extent there is a demand for processing services such as drying, conditioning, and mixing, by a study of moisture content and condition of local wheat at harvest time over a period of years.
 - h. The number and extent of possible sales outlets for products.
- B. Determine by a study of seasonal inter-market, cash-future, and premium spreads between local markets and terminal markets the advantage of locations from the standpoint of seasonal price differentials.**
- C. Determine whether local conditions as to taxes, power supply, and other external factors will make for high operating costs in spite of management.**

Such a project is to a considerable extent a synthesis of a number of localized economic investigations. It should therefore seek the cooperation of state and federal agencies that may have collected some of the data desired for other purposes but without reference to its local significance. The data will be collected by transcript from railroad records, from local price files, from official records, from assessors' rolls, and from records of local elevators. Some will need to be collected by a survey study of the elevators.

The form which the report of such a study will take will depend upon which of the five uses listed above is involved. If a report is wanted upon a single location, it will take the form of a sort of an appraisal which brings together all the pertinent data, digests it, and

renders a judgment as to probable volume of business, costs, margins, and profits, and reasonable investment based on this. If the project involves selecting desirable locations, it will present similar analysis and conclusions for the locations seeming to offer the best opportunities and for a good many points that seem almost as good. From these reports, maps may be worked out to serve as long-time reorganization plans.

PROJECT 28. Sideline Enterprises.

Objective: To determine the economy of taking on a sideline or supplementary enterprise, e.g., ice cream by a creamery, or coal by an elevator.

(By P. L. Miller.)

This project is concerned with the economy of supplementary enterprises of local marketing agencies without distinction of type or form of company. It is confined to the economy of taking on such an enterprise, which involves determining its relation to the business as a whole in terms of expenses and revenues. Limited in this way, the project will not involve the special problem of the cooperatives, arising out of their characteristic policy of doing business at cost, which take on supplementary enterprises. Such problems introduce considerations more appropriately investigated in special studies of the administration of cooperative associations. These are dealt with in a separate report of this series on Agricultural Co-operation.

Two cases must be considered under sidelines or supplementary enterprises: First, when such enterprises are entirely supplementary, that is, carried with no additions to management, plant, equipment and other overhead items; second, when such enterprises are partly supplementary in the use of the overhead and other factors, and partly not; that is, some but not all of the management is done by the same staff as handles the main business; or the same labor does part of it, but some extra labor has to be hired; and similarly with plant or equipment. Small enterprises usually come under the first description.

Given the first case, it is possible to follow an accounting type of analysis. This will include three determinations, as follows: First, what is the *gross income* from the enterprise? In the case of a purely merchandising enterprise, as coal in an elevator business, the gross income is the difference between sales and the cost of goods sold. In the case of a processing enterprise, such as ice cream making in a creamery, the gross income is the difference between sales and the value of raw material based upon its highest alternative use. If the enterprise is the performing of a service of some kind, as feed grinding by an elevator company, gross income is total income from

the service charges. The second determination is, what is the amount of the direct expenses to the enterprise? Answers to the first two questions pave the way for answering the third and crucial question, what is the net contribution (profit) from the sideline enterprise to the business as a whole? The net contribution from a supplementary enterprise is simply the difference between the merchandising or manufacturing margin (sales less cost of goods bought) and the direct expenses.

Care must be exercised to distinguish sharply between net revenue in this sense of net contribution from the sideline enterprise and net profit in the sense of returns remaining after a predetermined proportion of overhead expense, in addition to direct expenses, has been allocated to the enterprise.

Given the second case, with overhead and/or other cost factors partly supplementary and partly not, it is not always possible to render a strict accounting statement as above outlined, since in many cases one can not state how much management would be employed if the sideline enterprise were not included, or even in some cases what plant or equipment would be provided. This situation maintains wherever the sideline is of such importance that the business would never have been started except that the sideline was available to provide the necessary volume, or would not keep going now except for the sideline. In such cases, for several items in the strict accounting statement as above outlined, there must be substituted for it a statement using the best possible estimate of the *additional expense* to the enterprise as a whole for overhead, labor, plant, etc., because of the sideline, instead of actual direct expenses; and similarly of the *additional receipts* of the enterprise as a whole. One way to judge what these additional expenses and receipts are is to refer back to a time when these additional expenses began to be incurred because of the sideline business. Another way is to make comparison with enterprises not carrying these sidelines. In many cases it will be possible only to use one's best judgment as to which or what parts of the present expenses would be saved if the sideline were dropped, or would have been avoided if it had never been started (as in the case of building and equipment provided especially for the sideline enterprise).

Variations in the profitableness of the enterprise among a group of companies will result from variations in the items described above. This project will include not only an investigation of the profitableness of the supplementary enterprise in question among a representative group of companies, but also an analysis of the factors and conditions related to such variations as may be found.

The data for determining the economy of taking on a new enterprise may best be determined from an investigation of conditions and results secured in organizations having experience with it. Two types of investigations are required. One type consists of a thorough investigation of a few well selected cases, making available a history of

the results secured and the whole experience with the enterprise. The other type consists of a cross-section view of the enterprise among a representative group of companies, based upon data from enough companies to comprise an adequate sample covering one year's operations.

The data required for both types of investigation consist of: (1) the receipts and direct expenses of the sideline enterprise of each company, (2) the financial statement or statements of each company, and (3) statistics of operations, including data concerning volume or extent of business or operations, and the utilization of all the input factors.

The data as outlined above will be tabulated and arrayed so as to reveal (1) the relationships among the elements of the sideline enterprise itself, gross profits, direct expenses, and net returns, and (2) the relation between these elements of the sideline enterprise and the circumstances and conditions of the business that appear to condition its success.

This statement only outlines in a general way a project for determining the economy of supplementary enterprises. It would apply as well to a study of such enterprises in a large wholesale or terminal agency as in the example chosen; as well in a private enterprise as in a cooperative enterprise. Such a general statement does not supply all of the specific considerations that should be made a part of a project drawn to fit a study of a particular side-line enterprise in a particular type of business.

PROJECT 29. Operating Set-up—Departmentization, etc.

Objective: To determine the most effective departmentization and other operating set-up of rather large marketing units of various types, including integrated and other types of combinations.

(By P. L. Slagsvold and M. H. Saunderson.)

"Departmentization" is here understood to mean business operating structure.¹ This is differentiated from personnel organization. The departmentizing may be on a functional, commodity, or geographical basis, or a combination of these.

For the purpose of adequate analysis, it is necessary at the outset to recognize several types or classes of large marketing units, such as:

1. Large organizations operating in a single locality but handling many different commodities.
2. Large integrated organizations, such as line elevator systems.
3. Organizations handling only one commodity but whose operations cover a wide territory.

(1) See, Black and Black, *Production Organization*, Chap. XIV.

4. Combinations of (1) and (3).

The first type mentioned is likely to be departmentized upon a *commodity* basis; the second upon a *functional* basis; and the third upon a *geographical* basis. The ideal set-up will depend, however, upon both internal and external conditions affecting particular organizations.

In each of these four major types, the problem will be concerned with (a) defining existing departmentization and other operating set-up, (b) noting variations in such set-up and determining the effect of such variations, and (c) deducing from (a) and (b) the principles applying to departmentization and operating set-up for each group. The study may point the way to a different type of operating organization than any now in existence, in which case experimental analysis would be necessary before final principles could be laid down. Much of the analysis will be qualitative in view of the difficulty of eliminating some unmeasurable factors, such as quality of management, influence of location, etc.

The criteria of effectiveness will have to be arrived at largely inductively and will be mostly qualitative in nature. This will be true of such things as the closeness of the tie-up between the policy-determining board and the executive officers, or the coordination of the different departments or divisions, or the effectiveness with which lines of authority radiate down through the organization from the head executives, or the opportunity which executives have to check results against plans and the extent to which work is planned on the basis of a policy. Some sorts of quantitative measures, however, may be tried out for some of the foregoing: for example, such a measure as the dispatch with which a given order or piece of work is carried out, or the regularity with which it is done, or the quality of internal operating statistics that are placed before the executive officers.

The procedure for such a project is clearly evident. It must consist of an intensive analysis of a small number from each group mentioned above. Organization set-up, departmentizing, routing and execution of orders, functions and power of officials and foremen, volume of business, and other pertinent information will be analyzed in order to outline the organization and operating pattern for each unit studied, and to obtain some measure of the operating efficiency for each. Financial and operating records will need to be analyzed in connection with organization and production data in order to obtain additional measures of efficiency. Effectiveness of physical organization as indicated by coordination developed, dispatch in handling internal and external problems, and in bargaining advantages, must in the final analysis be tested objectively by operating records.

In studying certain types of marketing units it may be desirable to have cooperation of efficiency engineers to test organization

efficiency. The study will need to be made by a person who thoroughly understands the problems involved.

The steps in the foregoing analysis will be roughly as follows:

1. Grouping of marketing units which are substantially similar in organization set-up.²
2. Detailed analysis of each unit in each group, relating differences in organization set-up to special factors whenever possible so as to arrive at the particular factors accounting for greatest efficiency.
3. Working out effects of changes in set-up, using the method of substitution, or synthetic method.
4. If a sufficiently large number of units are analyzed, certain principles of business organization as applied to marketing units may be derived. It must be recognized, however, that the "best" type of internal organization for marketing units may vary to an extent which precludes many positive generalizations. For example, while the general principles would be the same for both private and cooperative enterprises, it is probable that the latter are subject to special problems which necessitate special analysis. The location of the marketing institution may give rise to special problems which would make a particular type of organization preferable to some other. The need for dispatch in handling orders, consignments, reports, etc., will depend also upon the competitive situation. Any analysis is subject, therefore, to limitations in application unless it be made inclusive in scope.

PROJECT 30. Financial Structure.

Objective: To determine the most effective form of corporate organization and other financial structure for rather large marketing enterprises of various types. (Joint with Agricultural Credit.)

GROUP E

Projects Relating to Business Unit Operations.

The projects in this group deal with specific operations, functions or services of marketing business units. They are therefore narrow in their scope and call for detailed data and intensive analysis. It must be said of all of them, however, that enough information for the enterprise as a whole should be assembled and analyzed to furnish the needed background for particular operations.

(2) If only one or a very few units are to be analyzed, the procedure will be to analyze each unit more intensively, using the method of substitution to measure effects of hypothetical changes in organization.

PROJECT 31. Systems of Accounting.

Objective: To develop systems of accounting useful and capable of being used by owners or managers of a given type of marketing business unit.

(By M. P. Catherwood.)

The purpose of this project is to develop the principles to be followed in setting up an accounting system applicable to the individual units of a given type of marketing business. Most, if not all, of the differences between an accounting system for a cooperative business and one for a private business are in the direction of greater complexity of the system for the cooperative business. This is true largely because of the problems involved in representing correctly the financial interests of the individual members of the associations in produce marketed and in the ownership of the business. There are, however, many problems in the development of accounting systems which apply alike to cooperative and to private business units.

The development of accounting systems is of most importance from the standpoint of the individual businesses which adopt the system. Presumably no business will adopt the system unless the system is superior to the accounting methods in use. The influence of a good accounting system upon the efficiency of operation of a business is difficult to measure, but may be the difference between failure and success.

But developing accounting systems is also of value from the standpoint of making available fairly uniform records of business operations for further study. One who has attempted to collect information concerning small marketing units for the purpose of comparing efficiency realizes only too well the lack of accurate and comparable records.

Broadly speaking, accounting records make available information which (1) shows financial condition, (2) shows financial progress and (3) can be used to explain financial condition and progress and to make intelligent decisions concerning the future.

Accounting records as a basis for the correct statement of financial condition are of value as a guide to financial policy, as a measure of the equity of the owners, both individually and collectively, and as a basis for credit.

Accounting records used to indicate financial progress are of value as a guide in relation to such problems as the issuance of patronage dividends and certificates of indebtedness in the case of cooperatives. Such records for a private business measure the profits which have resulted from the operation of the business.

In addition, accounting records usefully interpreted, explain the financial position and the financial progress and make possible reasonable conclusions as to the proper method of procedure in the

future. This is one of the most important and one of the most neglected fields of accounting as far as the small marketing unit is concerned.

A proper accounting system will make available the greatest amount of valuable information with the minimum of time and expense. It is very difficult to measure the extent to which an accounting system approaches such an objective. The effectiveness of an accounting system is not measured by the financial returns of the business, although the accounting system is one of the important tools to be used in attaining a satisfactory return. The value of a good accounting system to an individual firm increases with the length of time the system is in use because of the comparisons that can be made with previous years, and because of a greater appreciation of its value as an aid to management. A good accounting system may be developed and never used, since its adoption depends to a large extent upon the demand of the individual concern. Even a system which has been developed and installed, and is working to the satisfaction of all concerned, may fail to make available all the information which should be available, or the methods used may be unnecessarily complex and time-consuming.

Even among businesses of one general type, will be found a number which fit very poorly into any uniform classification of accounts and uniform accounting system. It is difficult to evolve a uniform system which will provide satisfactorily for the keeping of accounting records and the interpretation of accounting information by those untrained in such work. If the individual business is a unit in a chain in which the intricate part of the accounting is done by experts and in which there is centralized management, a uniform system can easily be applied to a large number of units. This, however, does not eliminate the many problems involved in successfully evolving a ready-made suit of clothes in the form of an accounting system, which it is hoped will fit the needs of the various individual units of a type of marketing business.

Any usable system of accounting must take into consideration the training and ability of those who are to keep and use the records. Most of the persons having to do with the keeping and using of accounting records in small marketing enterprises have had very little formal training in accounting. There is of course a limit beyond which an accounting system cannot be simplified if it is to fulfill the object of making available the maximum of valuable information. The mistake most likely to occur in developing an accounting system is that of providing a system which would work admirably if kept by trained accountants, but which is too complex for those who are actually going to attempt to use it.¹

It is probably not advisable to attempt to develop an accounting

(1) This was well illustrated by Minnesota experience with creameries. The Division of Agricultural Economics for years gave short-course instruction in the use of a good double-entry system developed for creameries by the U. S.

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system unless it is likely to be adopted by as many as ten or twenty business units. If there is a prospective demand for such work on the part of only a few businesses, satisfactory results can probably be accomplished by giving attention to the individual problems of the concerns involved, although in the background of such a procedure there is a certain amount of conformity to a hazily conceived system. Such work with individual problems of marketing concerns is likely to turn out to be preliminary work in the development of an accounting system.

One person will need to be responsible for a project of this kind, and do most of the work on it. Unless this person is already very familiar with the operations and problems of the business considered, it will be necessary to visit a number of the business units to obtain first-hand information concerning the practices and problems. It will also usually be found necessary to install the system in a number of units, and to alter it in accordance with the unforeseen difficulties that are almost certain to be encountered. The testing of the system or of parts of it can often be carried along as part of the work of developing the system rather than as a subsequent testing of the finished product.

In developing an accounting system it is also often possible to obtain helpful information from those who have worked on a problem for a similar type of marketing enterprise, as well as from workers in other fields who are familiar with the specific problems and practices of the marketing unit. Some guidance can also be obtained from the systems of accounting and the discussions of accounting methods and practices for various marketing enterprises that have been published by the United States Department of Agriculture and by various state agricultural experiment stations. Satisfactory accounting

(Continued from page 133)

Department of Agriculture. During some of this time, schools were held out in the field as well as on the campus; and in addition many individual creameries were assisted in installing the system and making the first annual statements. But the number of creameries using the system showed little tendency to increase as the years went by. A majority of the short-course students never used it; or if they tried it, they got into difficulties and quit. Actually the system was used by few creameries except those employing a trained bookkeeper; and some of the bookkeepers for the larger creameries thought the system was inadequate, because it was made simple so that it could be used by ordinary operators or secretaries.

Apparently three types of systems were needed. First, a complete system such as would be used by the bookkeepers of large creameries. Second, a simplified double-entry system that ordinary small-town bookkeepers, knowing little about the creamery business, could use and be saved some trouble and mistakes at the start; and that some of the more intelligent secretaries would use also. Third, a system of records of receipts and expenses of cream bought, of butter made, etc., that could be summarized at the end of the year and that would give a complete accounting for all moneys received and expended; and from which an auditor could make up a balance sheet and operating statement if it were needed.

The Minnesota Dairy and Food Commission had introduced the third type of system, and believed that getting all the creameries to use even it was a sufficiently large undertaking. From the standpoint of usefulness, the third of these systems is the most important for country marketing enterprises such as creameries, grain elevators and livestock shipping associations. Such systems are sometimes designated as "single-entry." (J. D. Black.)

systems have been developed also by a number of cooperative and private businesses, and sometimes such systems are available for examination and use.

One would normally include early in such a study a survey of the methods already in use by a large number of concerns. This would indicate the records that are being kept (or not kept) and give some indication of how complex the system adopted can be, and of the problems which must be met. This is not to say that the system developed need bear any marked resemblance to the present practices. Such a procedure merely takes account of the fact that present practices reflect to some extent the needs of the business for certain information, as well as indicating some of the physical and mental obstacles in the way of a more complex system.²

PROJECT 32. Packaging.

Objective: To determine the economy of different forms and sizes of packages or wrappers, from the standpoint of shipment, handling in the central market, and retailer and consumer.

PROJECT 33. Shipping Practices.

Objective: To determine the best shipping practice for a product—preparation for shipment, type of package or container, loading in cars, care in transit, etc. (Joint with workers in commodity departments and in transportation.)

Two current examples of such a study will be published shortly by the Illinois Experiment Station in two bulletins by Lloyd and Newell of the Department of Horticulture, bearing the titles *Causes of Damage to Fruits and Vegetables During Shipment*, and *Studies of Air Circulation and Temperature Conditions in Refrigerated Carloads of Fruits*. One of these studies was carried on at the Chicago Produce Terminal and involved critical examination of 249 carloads of fruit and vegetables which were received at that unloading point during the month of July, 1931. The second publication is based on detailed studies of refrigerated carloads of Illinois fruits at

(2) The developing of a system different from those now commonly in use may be the essence of some projects. Thus the system in common use in creameries may provide only for charging the salary of the buttermaker month by month as actually paid, whereas it should be prorated according to cream receipts in order to keep the winter dairymen from paying more than their share of it in a territory where most of the farmers are summer dairymen; and similarly for building and equipment expense. What is needed in such a situation is a revision of the system that will enable the users of it to correct the evils of the old system. Such revised systems will ordinarily need to be tried out under various situations before being offered to the public. (J. D. Black.)

shipping point and in transit. These studies included careful observations of the direction of air currents in the refrigerator cars, and also the velocities of air movement at various points in the car while standing on track and while rolling. The relation of direction and velocity of air movement to refrigeration of the load is fully discussed. These two studies are obviously very largely technical in nature, the effects observed relating to the condition of the products shipped. Other studies might place more emphasis upon the relative economy of different practices.

Studies of shrinkage in transit, such as the Indiana projects conducted by Professor James R. Wiley of the Department of Animal Husbandry, are also of this same general type. Some of the studies of motor truck transportation mentioned under Project 34, particularly the Ohio and Iowa studies, have included effects on shrinkage also.

PROJECT 34. Choice of Transportation Agency.

Objective: To determine the most economical or advantageous transportation to use—railway, water, motor truck, etc. (Joint with Transportation.)

The only current studies coming under this project title are those comparing truck and rail shipment of livestock, such as made in Illinois by R. C. Ashby, in Missouri by Thomson and Fankhanel, and in Nebraska by Gramlich and Wendt. These studies mostly attempt to measure the relative advantage of shipping by rail and by truck in terms of costs per hundredweight. The Illinois and Nebraska studies stress effect on shrinkage and losses in shipment, as do the two studies listed under Project 33.

These three studies, and the two listed under Project 33, are only five out of at least ten studies now being made by experiment stations of motor transportation of farm products. The other projects, however, deal more with the effects of this new form of transportation upon marketing methods and practices. This is the major objective of the Kentucky, Wisconsin, Michigan, and Minnesota studies. Some of these other studies are including milk, fruits and vegetables and other products. The report in this series on Transportation of Farm Products includes a bibliography of studies of motor truck transportation.

PROJECT 35. Physical Handling in Storage.

Objective: To determine the best methods of packing in storage and care in storage. (Joint with a commodity department.)

The project of the Bureau of Agricultural Economics dealing with factors affecting quality of beans in storage may be taken as one type of example of such a project.

PROJECT 36. Grading.

Objective: To determine the most economical classification of a product such as eggs into grades or sizes.

Part One

(By G. H. Ward.)

The object of Part One of this project is to outline a method of determining what set or combination of the grades of eggs in use on the various markets to which Virginia eggs are shipped will secure the highest weighted average net price to the producers. This requires the determination of a weighted average net price to be secured by producers through marketing their eggs in seven different ways:

1. Selling locally on a "nest-run" basis.
2. Selling locally according to rudimentary grades.
3. Shipment of ungraded eggs to various northern markets.
4. Shipment of farm-graded eggs to various northern markets.
5. Delivery to a grading station for grading according to the set of grades in use on a particular market and shipment to that market.
6. Delivery to a grading station for grading according to United States grades and shipment to a specified market.
7. Delivery to a grading station for grading, and shipment of particular grades to the different markets paying the highest prices for such particular grades.

The comparison between the returns to be secured for eggs marketed according to these different methods needs to be made both for the eggs produced by the individual poultrymen and for the output of the grading stations which were established recently. This will help the individual poultryman to determine what is the most economical set of grades for him to use in selling his eggs for the highest returns. It will also assist the grading stations to determine what grades to use and on what markets to sell their output.

Data.

The following data are required:

1. *Types of eggs.* The various grading stations that can be included in the project all use the U. S. grades, and their grading reports for the past several months will provide data regarding the types of eggs being handled. These reports will show whether the study is to concern itself with fancy quality eggs or with an ordinary quality of product.

2. *Local prices.* Local prices must be collected for the territory served by the grading stations included in the study. The daily reports of the State Division of Markets on the price of eggs on the Richmond market are on file and can be used for the computation of Richmond prices. The prices of eggs in the towns where the other grading stations are located are generally reported in the local newspapers. Files of these are available either in libraries or in the publication office.

3. *Prices on distant markets.* A preliminary general survey of the markets for Virginia eggs will indicate that the eggs shipped out

of the state generally move north. This suggests that prices should be sought for such cities as Washington, Baltimore, Philadelphia, New York, and possibly a few other markets. Prices for the Washington, Baltimore, Philadelphia, and New York markets can be secured from the New York Food Marketing Research Council, or the Urner-Barry Company, which publishes the daily market quotations for New York.

Each station operator should be induced to make local sales of graded eggs and shipments of ungraded eggs, farm-graded eggs, and eggs graded in the station according to market standards, on the same day each week, so that prices for the different sales will be as nearly comparable as possible.

The jobber or other marketing agency receiving the eggs on the central markets where the graded eggs are being sold should be asked to make out a report on each shipment of eggs received showing whether the quality, uniformity, etc., are satisfactory, and if not, why not, and making suggestions as to how the pack can be improved to satisfy the trade better and bring a better price. This information will indicate the preference of the trade as to the way the eggs should be graded to bring the highest price. The prices received should be compared with the prices quoted for the various grades on the market. Such a comparison from time to time will indicate whether progress is being made in satisfying the trade preferences regarding the grading of the eggs.

A more accurate and reliable method of ascertaining the preference of the trade for eggs graded in various ways is an analysis according to the U. S. standards of the cases of eggs that sell for the highest price on the market in comparison with the cases of eggs from the grading stations. This analysis will show the percentages of the various U. S. grades of eggs in each pack of eggs graded according to market standards.

4. *Cost of transportation.* The grading stations have given considerable attention to securing satisfactory transportation to market at minimum cost. The rates they are paying on shipments to the various markets can be secured from their records.

5. *Costs of grading.* In making a thorough study of the comparative returns from eggs graded on the farm and in the grading stations, the grading stations will need to pack some eggs to meet the preferences of the dealers on the various markets. Each grading station taking part in the study should specialize in trying to satisfy some one market and keep a record of the time required for grading according to these specifications, as well as when grading according to U. S. grades. From such records can be obtained the data needed for determining differences in costs according to which set of grades or combination of sets is used. Similar data relating to the costs

of grading eggs on poultry farms are needed, but these will be unsatisfactory and difficult to get.¹

6. *Percentages falling into various grades.* The percentages of the eggs or numbers of dozens falling into the various grades can be secured from the grading reports of the grading stations. Several of the producers grading their own eggs can be induced to ship their eggs through the grading station. Part of each shipment of these farm-graded eggs can be graded at the station, and a report made out showing the proportion falling into the various grades:

7. *Percentages of each U. S. grade.* The percentages of the various U. S. grades used as the basis for all comparisons can also be secured from the records of the grading stations.

(1) The grading stations are presumably run only for one purpose of grading eggs, and all the labor and management is hired. Average annual costs of grading eggs can therefore be obtained simply by dividing total expenses for the year by the quantity of eggs graded. If grading cost is wanted by the month, week or day, the problem will be considerably different. The total yearly wage of the operator of the plant, and of any other person employed regularly on a yearly wage base, or at a wage by the month or day that is the same regardless of volume handled, can be reduced to an average annual rate per dozen, and this figure can be used in making up a total unit-cost figure by combining it with similarly calculated figures for plant and equipment costs, and with any additional costs, such as for extra labor, incurred at some periods of the year and not at others. But figures computed in this way will also misrepresent the situation, since at slack periods of the year there may be an abundance of time for more onerous grading practices that could not be afforded at rush periods. This, after all, is the most important consideration of all, since the comparative figures desired are for different grading procedures.

Therefore the method which will have to be followed will be to keep a record of the time required when using each set of grades, and of any other expenses involved, and then make an *estimate of the differences in annual expenses for the whole grading station according to the set of grades it might use.* The estimate will be worked out in terms of the number of employees for the year, and during part of the year, number of part-time workers, etc., that will be needed for each set of grades; similarly for any differences in space requirements, etc., that may possibly be involved. The *differences* between these estimates are all that is needed for the purposes of this project. The same procedure can be followed if combinations of sets of grades are being considered, first, on the assumption that this same combination is used at all times during the year, second, on the assumption that the combination varies according to a definite seasonal pattern adjusted to supplies of eggs and market conditions.

The analysis of costs of grading in poultry farms will need to follow the same general plan, but will have this further complication that much of the grading will be done by labor that is not hired or is not hired especially for this work. The only comparisons of cost differences that can be made in such cases are in terms of *estimated differences in total hours of labor used according to the different grading procedures that might be followed.* If one had an actual group of poultry farms under consideration, one might ascertain how many of the additional hours of labor required by one set or combination of sets of grades over another would have to be hired especially for it on each farm, and at what rate, or whether extra hired labor would be employed by the year, season or month, which combined this extra grading work with other farm work, and if so, how much extra was expended because of this. This would be real money cost difference. Obviously only on large poultry farms would there be any extra labor required because of following more onerous grading practices. (See "Unit Cost Analysis" under "General Methodology" above for further discussion of the cost problem involved.) (J. D. Black.)

Analysis of data.

The most economical set of grades will be determined very largely by the grades in use on the market or markets which pay the highest prices. The prices of eggs on a particular market are influenced by local conditions on that market, as well as by the more general forces of supply and demand influencing the prices of eggs for the country as a whole. The relation between the prices on different markets therefore varies from month to month and from season to season. It is therefore advisable to base the study on monthly average prices. In order to eliminate most of the influence of unusual factors on the prices in the different markets, it is advisable to compute an average price for each grade for each month of the year, using the monthly prices for the two years preceding the year of the study. The resulting figures may be regarded as approximate seasonal prices for the various grades on the different markets. These prices would indicate the comparative prices on the markets in the past and serve to indicate what markets are worthy of most serious attention, as well as provide a check upon the results of the actual shipments to the different markets for a current year.

There are several ways of computing the average prices of the various grades for each month. These different methods give approximately the same results. Usually a range in price is quoted for each grade. The lower figure in the range usually varies considerably more than the upper figure because of variations in quality. Market men therefore generally consider the top quotation to be a more accurate indication of the prices for the various grades than the average of the price range. There is also more interest in the average top quotation because shippers want to know how the prices they received compare with the top price. The grading stations very largely base their prices on the top quotation for the various grades, and hence the average of the top quotation is of more interest and value to them. The labor of computing the average monthly top quotation for the various grades can be greatly reduced by using the top quotation for each Wednesday of the month and averaging the Wednesday quotations for the month. Howe of New Jersey² has run correlations between average prices obtained by averaging the Wednesday prices and the average prices obtained by averaging the daily prices and finds the coefficient of correlation to be in the upper 90's, indicating that the average of the Wednesday quotations is sufficiently accurate for the purposes of this study.

After the average price for each month of the year has been computed for the different grades and tabulated for the various markets, both local and northern, the next step is to convert these averages to the f. o. b. basis for each of the five grading stations included in the study. Since shipments are being made to Washington, Baltimore, Philadelphia, New York City and Hartford, there are five sets of

(2) Unpublished study by Charles Howe, Agricultural Experiment Station.

such f. o. b. prices to compute. The f. o. b. price at each station also needs to be computed for the local sales. This can be done by subtracting from the monthly price for each grade on the different northern markets the cost of transportation from the grading station to the respective markets.

After the weighted average price received for each grade for the month has been computed, adjustments will need to be made for differences in the grading costs in order to secure the net price to the producer for each of the several grades. The next step is to weight these net prices for the different grades sold on each market by the number of dozen that could have been sold in each grade if the entire volume handled by the grading station had been graded according to each of the various sets of grades.⁸ The procedures just outlined indicate how to determine which set of grades among those in use locally and one each of the five different northern markets will bring the highest net returns for the output.

It still remains to outline a procedure for determining the value of the various U. S. grades when sold in combination with other U. S. grades in the different market grades. We can then determine what is the most economical set of grades to employ in selling eggs produced in Virginia on the various available markets.

For instance, it may develop that at certain periods of the year the highest price for U. S. Extras can be obtained for these eggs sold as U. S. Extras in New York City. However, the highest price for U. S. Standards may be secured when sold in combination with about 40 percent of U. S. Extras as Philadelphia Henneries. It may also happen that Washington at the same time will pay the highest price of the various cities for U. S. Mediums when combined with 35 percent of U. S. Standards and sold as Washington Smalls. In such an instance the most economical set of grades to use might well be a combination of U. S. Mediums and U. S. Standards to sell as Washington Smalls. This will be so if the lower price on the Standards so used is more than offset by the higher price secured for the Mediums. The balance of the U. S. Standards might be combined with enough U. S. Extras to sell as Philadelphia Henneries, leaving a residue of U. S. Extras for sale in New York at the highest price obtainable for that grade in any form. At such a time, then, the most economical set of grades to employ to secure the highest weighted average return for the output would be U. S. Extras, Philadelphia Henneries, Washington Smalls, and possibly U. S. Pullets and U. S. Trades. At another season of the year when New York has a larger supply of fancy quality eggs, it might be that the most economical set of grades would be Hartford Henneries, Washington Henneries, Philadelphia Standards, Washington Smalls, New York Pullets and Richmond Current Receipts.

(8) For eggs graded on poultry farms, this net price will have to be stated in many cases as so many cents per dozen *plus* (or *minus*) so many extra hours of grading labor. See Footnote 1.

As a matter of practice, however, it would not be economical to change very radically the set of grades used from time to time because of the trouble of training the graders to put up the proper pack to meet the market requirements.

The procedure to be used in determining the value of the various U. S. Grades when sold in combinations in market grades, will depend upon whether more than one sale of a grade, such as of Washington Henneries, from a Virginia grading station is made on a given market the same day. Suppose that 100 dozen sell for an average price of 40 cents per dozen and that the inspection of these eggs by the representative of the U. S. Department of Agriculture shows that 60 percent of these Henneries were U. S. Extras and the other 40 percent were U. S. Standards. Assume that another 100 dozen sell for an average price of 39.75 cents and grade out 55 percent U. S. Extras and 45 percent U. S. Standards. From this information we want to compute the value or price per dozen of the U. S. Extras and Standards in this mixture. Let X represent the price of Extras and Y the price of the Standards, the two prices sought. Then in the first mixture of 100 dozen we have 60 dozen Extras and 40 dozen Standards, and in the second, 55 and 45 dozen respectively. We can therefore set up the following equations:

$$\begin{array}{rcl}
 (1) & 60 X + 40 Y & = 100 \times 40.00 \\
 (2) & 55 X + 45 Y & = 100 \times 39.75 \\
 \text{Divide (1) by 40} & 1.50 X + Y & = 100.0 \\
 \text{Divide (2) by 45} & 1.22 X + Y & = 88.3 \\
 \hline
 \text{Subtract} & .28 X & = 11.7 \\
 & X & = 41.8 \\
 \text{Substituting in (1)} & 62.7 X + Y & = 100 \\
 & Y & = 37.3
 \end{array}$$

By this procedure we have determined that U. S. Extras sold in Washington Henneries are worth 41.8 cents per dozen and that U. S. Standards sold in this same grade are worth 37.3 cents per dozen. The procedure can be used to determine the value of other U. S. grades sold in other market grades wherever there are two sales on the same day.

When only one sale is made on a given day, a different procedure must be used. This procedure assumes that the differential in price between U. S. Extras and U. S. Standards, sold as such, also maintains when these two grades are combined and the combination sold as Washington Henneries. Assuming again that the 100 dozen Henneries sold for 40 cents and analyzed 60 percent Extras and 40 percent Standards, and further, that the difference between the market prices paid for U. S. Extras and for U. S. Standards sold

on that day was 4 cents, we can then set up the following equation:

$$\begin{aligned}60 X + 40 (X - 4) &= 100 \times 40 \\60 X + 40 X - 160 &= 4000 \\100 X &= 4160 \\X &= 41.6\end{aligned}$$

The price of the Standards is known to be 4 cents less than the Extras and is therefore 37.6 cents.

With these two methods it is possible to determine the value of the various U. S. grades sold on the various markets to which Virginia poultrymen and the grading stations ship eggs when sold as U. S. grades and as constituents in the different market grades. These data will then show on what market and in what grade the various U. S. grades of eggs can be sold for the highest price.

The price data thus obtained can be weighted by the number of dozen that could have been sold in each grade if the entire volume handled by the grading station had been packed into those grades selling for the highest prices on the various markets. The combination of grades which will yield the highest weighted average net price for the eggs handled by the grading station is the most economical set of grades to use.

Related studies already made.

A study of the prices of various grades of white eggs sold in different cities of New Jersey in comparison with prices paid for similar grades in New York City has been made by Charles Howe of the New Jersey Agricultural Experiment Station. The New York Food Marketing Research Council in 1928 made a study of the sources of supply of New York egg dealers and touched upon the matter of dealer preference for different classes and grades of eggs.

Part Two

(By J. D. Black.)

The foregoing analysis is worked out only in terms of grades *actually now in use* in different markets. The problem of grades may take the more fundamental form of determining whether some set of grades *not now in use* may be more economical than any now in use; or of setting up grades where none are now in use. This form of the problem is most likely to arise when public agencies set up grades and standards; or at least it should arise. But any private concern producing and selling a commodity lending itself to grading is confronted by the same general problem. For example, the large co-operative selling prunes must decide into how many size groups to sort its product in order to get the maximum return for its prunes year after year.

Where a set of grades is now in use, an important element in the problem is how well the grades are fixed in the minds of the trade, and

especially in the minds of the consumers. Where the grades are not fixed in the minds of the consumers, as is usually the case, a new set of grades can be introduced with little or no resistance from them. The resistance of the trade is likely to be the more important, and may have the effect of causing the new grades to sell at a disadvantage for a while; and this must be taken into account fully in estimating the advantage of a change. If, however, the new grades have definite points in their favor, the trade can be made to recognize this, and will cooperate in introducing them. Oftentimes the trade will be one of the best sources for suggestions as to needed changes.

The analytical work required for the problem is presented in Project 42 on "Government Grades" under two heads, an analysis of commodity differences from the standpoint of their determination as a matter of grading technique, and an analysis of these differences from the standpoint of buyer preference, the buyers considered being the dealers in the wholesale market, more or less on the assumption that dealer preferences reflect retailer and consumer preferences. Limiting the problem in this way leaves out of account the whole matter of the economy of different grades from the standpoint of the producer, and similarly from the standpoint of the consumer. The first of these omissions is discussed in a limited way in Project 37, and the second to some extent in Projects 12 and 14 above. What the consumer would prefer, if given a chance to express his preference, is as important a factor in the economy of grades as what the consumer now takes. What the consumer *would prefer* may of course be something entirely different from what the consumer *should prefer* according to standards that a home economist or moralist might set up. We are here interested only in the "would prefer." Analysis of the sort outlined in Projects 12, 13 and 14 partly covers this. Probably the only way to get farther with it is to conduct some retail selling experiments over a period long enough to give consumers a chance to discover what they prefer.

In the grades which have grown up in the trade, dealer preferences at least, and probably retailer preferences, have frequently been rather well represented. The government grades have tended to be based more largely on technical differences in commodities and grading technique, and to ignore market preferences. This has resulted at times in unnecessary resistance to government grades on the part of the trade.

PROJECT 37. Preparation for Market.

Objective: To determine the most economical methods of harvesting and preparation for market. (Joint with Farm Management.)

(By Frederick V. Waugh and Howard R. Tolley.)

As an example of a study of this type, the following outline presents part of the problem in terms of potatoes in Aroostook County, Maine.

A complete study would involve a series of investigations of such factors as the most profitable containers, sizes of potatoes, methods of cleaning, and methods and degrees of control of bruises, scab, and other defects. Each of these investigations might be carried out by methods similar to those outlined below, which refer specifically to the most profitable methods of control and the most profitable degree of control of cuts and bruises.

The specific objectives are: (a) To discover at what stages during the harvesting and storing of potatoes certain mechanical injuries occur and what proportion of such mechanical injuries are caused by each of the processes of digging, picking up, transporting, storing, grading, loading, etc.

(b) To determine the amount of variation in such injury caused by each operation and to discover causes for such variation. That is, to find the relation of types of machinery and methods of handling to mechanical injuries.

(c) To discover the relative inputs of labor and other cost factors of the various methods used in each process.

(d) By comparing results of such a field study with known facts about the relation of mechanical injuries to market prices, to determine what machinery and which handling practices are likely to be most profitable to a given producer.

Potatoes are handled many times before they are loaded on the car. A brief survey of the situation in Aroostook County, Maine, indicates that two studies should be made, one in the field and the other in the warehouse. In both the field and the warehouse, a variety of factors influences the degree of injury. Therefore it is necessary before the study is undertaken to discuss it with producers, storage house operators, production specialists and machinery experts in order to include the most important factors.

Data on the relation of mechanical injury to market prices are available in *Market Preferences and Premiums for Maine Potatoes*, Bulletin No. 2, Maine Development Commission, which shows a correlation of 0.938 between Boston wholesale prices and five quality factors, or a determination of 88 percent. Of this determination the percentage of bruises accounts for 41 percent, or almost one-half.

All data on amounts of injury caused by various operations in the field and in the storage house will be obtained by inspection.

It is suggested that the inspection work in the field and in the storage houses be done by the Maine Department of Agriculture. That Department will furnish a trained inspector who will use the standard inspection technique in determining the amounts of injury.

Such inspection might well be supplemented with experiments conducted by the Maine Agricultural Experiment Station.

The analysis of the data should be coordinated with the analysis of market demand studies. It is therefore suggested that the Maine

Agricultural Experiment Station and the New England Research Council on Marketing and Food Supply be jointly responsible for the analysis.

The cooperation of the agricultural engineering department of the University and of the larger agricultural machinery companies is also desirable in order that new machines and devices can be tested.

The data will be collected in the field and storage houses by a trained potato inspector. About fifty records for each type of machinery and for each method of handling will be necessary. A variety of soil conditions should be covered to indicate the efficiency of various machines and handling methods under different conditions.

The information collected in the field will cover the following points: date, owner, location, type of soil, moisture condition of soil, number and size of stones per square yard, method of payment for picking (piece work or time wages), number of pickers per digger, number of barrels picked per man per day, type and condition of containers, style of digger (horse-drawn or tractor-drawn, continuous-bed, rear-elevator, shake-elevator, padded tines, etc.), number and seriousness of defects found after digging and after loading in barrels.

The information collected in the warehouses will cover the following points: date, location and owner of house, grower of potatoes, distance of haul and type of road, type of conveyance (truck or wagon), method of handling before reshipment, type and condition of grader, use of pads, method of dumping into bin, number and seriousness of defects found on arrival, after grading, and out of bin or car.

The analysis can best be made by the use of punch-card equipment, which makes possible an easy grouping and subgrouping according to the various methods used. Averages for the subgroupings will indicate the relation of type of machinery and of practice to the degree of injury. The data are not well adapted to multiple correlation methods.

The next step in analysis is to estimate the costs involved in using the different types of machinery and following the different practices in common use. The discussion of the problems of cost analysis in the report in the series on Research in Farm Management will make clear that it will not ordinarily be possible to determine a one-figure harvesting process cost for each harvesting practice. The differences in machinery costs can be fairly well estimated, since the machinery involved is used only for potatoes. Differences in gasoline consumption can also be determined; and differences in cost of labor paid on a piece-work basis or paid by the day. But much of the man labor and horse labor employed is done by persons not hired especially for harvesting work, and some of it, being family labor, or proprietor labor, is not hired at all.¹ The tractors are not purchased especially for potato harvesting. The estimate to make instead of a one-

(1) See especially Projects 27 and 20.

figure harvesting process cost is the increase or decrease in the total annual expenses of the farm business as a whole caused by substituting one harvesting practice for another. The method of doing this is developed in the report on Farm Management.² This estimate can be balanced against the estimated receipts for the different qualities and conditions of potatoes turned out. Even the labor consumed in picking up stones may be involved. The effect of variation in size of the crop will need to be taken into account. Finally an analysis following the same general lines will have to be made of different warehouse procedures.³

We should note here that it is the premium paid the producer, not the premium in the central market, which determines the most profitable technique to use.

The market premiums for quality vary from year to year, and the most profitable production and marketing technique vary with the premiums. We cannot infer, therefore, that the method which was most profitable last year will be most profitable next year or five years from now. The study of market demand must be continuous. The study of field and storage house conditions will, however, yield conclusions of a more permanent nature, especially if supplemented from time to time by studies of new machinery or devices.

A full study of this problem involves a joint attack from the standpoints of market demand and of production technique. Only by such a joint attack is it possible to determine the most profitable qualities to produce and market. Such a study will present many complex problems of quality. The study here outlined covers the harvesting and warehousing part of the problem, and only one quality factor—that is, mechanical injuries.⁴

A project of this general nature concerns the effect of harvesting methods on the quality of rice. It is being conducted by the Bureau of Agricultural Economics.

Studies dealing merely with the warehouse handling of products could be included under the above project title; also the Bureau of Agricultural Economics projects on the bulk handling or the cleaning of grain.

PROJECT 38. Sales Policies.

Objective: To determine the relative advantage of different sales policies for a particular commodity, as to rate of selling, when to hold and when to sell, what price to hold for, etc. (Joint with Prices.)

(By E. M. Daggit.)

(EDITOR'S NOTE. The research method and procedure involved in a project directed at determining rate of selling, when to sell, etc., belongs in the report

(2) See also Project 8.

(3) See Footnote 1 of Project 86 for details of method.

(4) See Project 63 for further discussion of this problem.

in this series dealing with research in Prices of Farm Products more than in the report on research in Marketing. Consequently considerable portions of it will be merely sketched in, and the researcher should turn to the other report for the details.)

The general types of sales policies used by agricultural marketing agencies may be classified into the following four groups:

1. Selling the product as received or as soon thereafter as permitted by time required for grading, packing, etc.

2. Hedging as received, selling the actual product according to demand, at which time the hedges are bought in.

In conducting its sales according to either of the above plans, the marketing agency is acting as an ordinary merchant. It takes no material risk of price decline, and expects no profit from price appreciation. Its sole object is to merchandize the product more efficiently than the average private merchant, and thus return to its members a greater proportion of the final selling price.

3. Selling the product at the discretion of the agency, no hedging being done.

4. Selling the product at the discretion of the agency, hedging when considered advisable.

It is only in these last two groups that there is the possibility of profit through the wise distribution of sales according to the price outlook; hence it is only with these groups of marketing agencies that the project will be concerned.

A study in sales policies will vary greatly according to the type of commodity under consideration. The following types may be distinguished:

(1) Non-perishable commodities for which there is a broad world market, and for which a futures market is available for hedging purposes. (Cotton or wheat.)

(2) Non-perishable commodities having a rather limited market, with no futures market available. (Tobacco or rice.)

(3) Perishable commodities produced continuously throughout the season. (Butter, eggs or hogs.)

(4) Perishable commodities produced as a seasonal crop. (Potatoes or apples.)

For the first group, the possibilities of using the futures market in developing the best selling policy should properly be included within the scope of this project. Theoretically, cash wheat or cotton should be sold when it commands the highest premium over futures, and futures when the price is highest.

For the second group, the price analysis will be difficult owing to lack of suitable supply and price data. It may be necessary to base conclusions on a small amount of data.

For the third group, it will be more difficult to secure a proper measure of net profit, since the product is being produced and marketed continuously throughout the year. The suggestion is made that instead of determining the proper time of year to sell under various conditions of supply, etc., one determine the most profitable amount of lag between receipts and sales under these various conditions and at different parts of the season. In the case of butter and eggs, the possibilities in storing offer a problem somewhat similar to that of hedging in the first group. The limitations as to time that livestock may be held should also be kept in mind. For this group there are possibilities in carrying out studies on a weekly basis, using a period of not longer than ten years.

The fourth group should offer no special difficulties, except perhaps that of securing adequate price and supply data.

The point of view that distinguishes this project from those of price analysis is that it is concerned with the forecasting of profit possibilities rather than with the forecasting of price itself. It may, however, be considered as a study in the application of price research.

The results of the study will be not merely of academic interest, but should have a direct value in dollars and cents to any agricultural marketing organization. The lack of a careful appraisal of the probable results of various selling plans, based on the evidence of past experience, has doubtless been the cause of many failures among such organizations.

In analyzing possible sales policies, including the various policies now being used by agricultural marketing agencies, the efforts of the investigator should be directed constantly toward developing a sound, conservative sales plan, that will bring consistent profits in the majority of years, rather than toward a plan that may bring maximum profits in some years but finally bankrupt the agency in one or two unfortunate seasons.

In presenting the results of this study for use by a sales agency, provision should be made for directing the agency in the exact method of using the plan. The explanation should be sufficiently clear so that there can be no chance for misunderstanding. Provision should also be made for keeping the agency informed of changes in the various factors on which the sales policy is based.

Sources of data.

If this type of project is to realize its possibilities, it must eventually depend to a considerable extent upon the records of the marketing agency itself. If the marketing agencies involved have operated for five or ten years or more, their records should be analyzed for everything that can be obtained from them, and one of the valuable results of the project should be the organizing of a better system of records so that future analysis of them can be more effective.

But even though many useful data are obtained from such records, they will need always to be supplemented by data of a more public

character. Data on prices, supplies, etc., may be obtained most conveniently from the U. S. Department of Agriculture Yearbook and from special commodity bulletins published by that Department. Additional and current data may be obtained from the several commodity divisions in the Bureau of Agricultural Economics. Current data may be obtained from *Crops and Markets*, a monthly publication of the Bureau of Agricultural Economics; from *Foreign Crops and Markets*, published weekly by the Foreign Service Division of the same bureau; and from some of the leading financial magazines, such as the *New York Journal of Commerce*, the *Commercial and Financial Chronicle*, and the *Analyst*. If prices and supply data are desired on a weekly basis they may be obtained in many cases from published reports of brokerage houses dealing in commodities, as well as from the commodity divisions of the Bureau of Agricultural Economics. Certain supply data, usually on a monthly basis, are published by the Bureau of the Census.¹

Organization.

The term "marketing agency" as used in this discussion refers to any type of marketing enterprise selling farm products, whether operating in a local or a central market, and whether private or cooperative. The results of such a study will be equally valuable for all these types. Such a research project may be undertaken by any large marketing enterprise, private or cooperative, for itself; or a public or commercial agency may undertake it. Small marketing enterprises will of course need to have such research done for them, ordinarily by public agencies. The organization of the project will depend upon the agency it is to serve.

This project requires direction by some one familiar with the two fields of marketing and prices. His training should include practical experience in marketing, for it is difficult otherwise to understand the problems of the sales manager in choosing an effective marketing policy. Marketing experience should be emphasized in preference to experience in price analysis, but the investigator should have enough of the latter to recognize the value as well as the shortcomings of a given price study.

Analysis.

In the attack upon the present problem, two distinct steps are involved:

(1) The history of past price movements may be studied, with the object of determining which general selling plan would have been most effective in the past, and theoretically ought to be most effective in the future.

(2) The actual experiences of agricultural marketing agencies may be studied, particularly those that have been successful over a

(1) See Section A of the report on Prices in this series for further information on sources of data.

period of years, to determine which methods have actually proved in practice to have been effective.

The first method alone is inadequate because: (1) It takes no account of the influence of the sales agency's operations on the price movement. This is an important factor where the agency handles an appreciable proportion of the supply. (2) Unless the analysis is very skillfully made, too much importance may be given to price changes resulting from abnormal conditions.

On the other hand, the second method has the disadvantage that the results may be a reflection of the abilities of individual sales managers rather than of market possibilities. Since the object of this analysis is to develop methods that may be employed by marketing organizations for securing the highest average prices for their products, some combination of the two methods will be necessary in order to take into account both the theoretical and the applied sides of the problem.

The measure of profit or loss as used in this analysis should be defined in the case of private agencies as the net gain or loss of the enterprise on its total volume of business, and in the case of co-operative enterprises as the net price received by the member for his product, as compared with the price he could have received in the open market at the time of delivery to the agency.

One of the first steps will be to determine the "base price". This may be considered to be the "cost price", or the price with which the agency must compete in determining its selling policy. From a research standpoint, this may be considered to be the price of the basic grade of the commodity at a recognized central market, weighted by the average volume of farm marketings. In the case of cotton, for example, it may be taken as the average of monthly prices for Middling seven-eighths cotton at New Orleans, weighted by the average percentage of farm marketings each month. The average farm price published by the U. S. Department of Agriculture would not be suitable in this study, since it refers to prices during only a limited period each month, around the 15th.

Another step is to determine the cost to the marketing agency of carrying the commodity, since this must be deducted from the change in prices. It is not essential that the costs be determined with great exactness, so long as the trend during the season is approximately correct.

A question which will arise early in the analysis is whether monthly prices, weekly prices, or prices covering some other selected period should be used. On the whole, monthly prices have been found to offer most advantages for this type of analysis. This is the period selected by the Department of Agriculture for most of its commodity price series.

Having selected a basic grade for the commodity at a recognized central market, the procedure suggested is to go back over a period of

perhaps thirty years and calculate for each season the average "cost price". Next, by subtracting the approximate expenses of carrying the commodity, determine the "net" price for each month during each season. These net prices will form the basis for further analysis. This method of procedure is applicable to those commodities of which a single seasonal crop is produced, such as wheat, cotton, potatoes, or apples. For products such as butter, eggs, and livestock, a modification of this plan will be necessary.

To facilitate comparisons, the net prices may be converted into measures of profit and loss by subtracting the cost price for each season, or by expressing each monthly net price as a percentage of the cost price for the season. This method has advantages for certain types of analysis.

The net prices mentioned above may be analyzed by comparatively simple methods. More elaborate methods will be found discussed in the report on Prices. The first step may be to determine whether there is any average seasonal trend in the net prices. Theoretically there should not be. If there is, it may indicate that some cost factor has been omitted, such as shrinkage, as in corn, or deterioration of quality, as in butter. Next, the individual seasonal trends should be studied in detail to determine the causes of unusual fluctuations, whether due to changes in the supply in this country or abroad, variations in business conditions, market manipulation, unusual circumstances such as wars or stock market panics, etc. The seasons may then be grouped according to the factors associated with the important price movements and the similarity of movements observed. This will lead to the expectation of corresponding price movements in future years when the outstanding price factors are similar. Using this method, the Department of Agriculture has worked out charts showing the typical movement of cotton prices in years of large crops followed by large crops, large crops followed by small crops, small crops followed by large crops, and small crops followed by small crops. Other comparisons of this nature will readily occur to the analyst. Since the amount of the supply, or at least the probability that the supply will be of a given amount, is usually known before it has had its full influence in determining the seasonal price movement, such comparisons are often of much value.

To determine the factors responsible for the important price movements during the period studied, it will be necessary for the investigator to compile data on domestic and foreign supplies, business conditions, and other such influential factors. A great deal of research of a comparatively simple type will be necessary to determine, first which factors are most important, and second, which data expressing these factors show the closest relationship to future price movements. Consideration must be given to using data that will be easily accessible to the marketing agency, and that will require little or no elaboration. It is suggested that in the interest of simplicity, the number of series be limited to about four, or five at most.

The final step is to work out a marketing policy based on each important factor, and to determine the average results in applying this policy over the entire period studied. As an example, we may take the case of a wheat marketing policy based on the size of the crop in Argentina and Australia. A close relationship has been found between this price factor and the trend of price between fall and spring. In years of large crops in the Southern Hemisphere it has usually been unprofitable to hold wheat over the winter. A research study would indicate when the crop should be sold to bring the highest average price under such circumstances, assuming the approximate size of the crop to be known at a given date. Over the selected period of years, the average profits in following various selling policies based on this single factor could be calculated and compared and the most profitable policy selected. Additional studies of a similar nature, based on other price factors, would then be worked out. Finally, a general marketing policy would be decided upon, based on the composite of these several indications, and a measure of its success determined on the assumption that this policy had been followed over the entire period.

The method described above appears to offer the only possibility by which the average agricultural marketing agency may hope to come out ahead, over a period of years, in speculating on future price movements, unless it has a good research department, or an exceptionally able sales manager. This study of average seasonal trends after allowing for carrying costs, as suggested above, will dispel the idea that any fixed method of selling at a given time of the year will bring more than average prices. The only resource, then, is to base the selling policy for the season upon the characteristics of the season, with studies such as those suggested above to serve as a guide.

A suggestion may be made here that in years when the outlook is uncertain, the efforts of the sales agency should be centered on avoiding a loss rather than on making a profit. In such seasons the object should be to sell the product as soon as possible after it is received from the member, thus realizing as nearly as possible the "cost" price.

The foregoing assumes that the marketing agency is entirely free to choose the time of year in which to sell. In practice, this is far from being true. The larger the organization and the greater the proportion of the total supply handled, the more nearly will the marketing have to be distributed evenly throughout the season, or according to the seasonal demand. This is particularly true of those agencies handling perishable products, or products produced continuously throughout the year. The smaller organizations, also, must sell more or less regularly in order to maintain sales contacts, make necessary payments to members, etc. Finally, the risk in holding an undue proportion of the season's receipts in the hope of higher prices would make such a practice extremely unwise.

The research needed to provide for these aspects of selling policy will require that information be obtained from the sales managements of marketing enterprises by carefully conducted and systematic personal interviews relating to the following questions:

(1) What considerations, aside from price, are of most importance in determining the selling policy of the marketing agency?

(2) How much variation from the selling policy now being followed is possible or practicable?

(3) What selling policy has, in practice, been found most successful over a period of years?

The object of the first question is to determine the relative importance of the various factors other than price, which the agency must consider in deciding upon its selling policy, and hence to indicate the extent to which the selling policy is predetermined. A careful attempt should be made to arrange these factors in order of importance for each sales agency, and to learn the reasons for variations in importance as between different agencies. The second question is closely related to the first, and designed to get the opinion of the sales manager on the flexibility of his sales policy. The third question is intended as a means of getting practical ideas from sales managers on successful sales policies. The returns on this question should suggest new methods of approach to the problem of anticipating price movements, which may later be tested out statistically.

PROJECT 39. Directing Shipments.

Objective: To determine the most effective procedure for directing shipments to different markets.

(By E. A. Stokdyk.)

Two specific objectives are involved: (a) To determine the relation between the quantities which organizations attempting to direct shipments aimed to place in various markets within certain periods of time, and the quantities actually reaching these markets within the same periods of time. (b) To determine the reasons why these quantities correspond or fail to correspond and what improvements are required for efficient shipment-directing.

This project might well be based on a study of the shipment-directing programs of the California Fruit Growers' Exchange, the Pacific Egg Producers, the California Vineyardists' Association, the Del-Mar-Va Eastern Shore Association, the Gravenstein Apple Growers' Association, and the Imperial Valley Lettuce and Cantaloupe Clearing House Associations.

The project should test for those markets that are considered the most important and for the commodities handled by the organizations attempting shipment-directing. As here outlined, no attempt will be made to ascertain why or how these organizations determined

the quantities they aimed to place in the various markets, although this might well be included in such a project.

Several factors may affect the results of shipment-directing programs: (a) *Type of organization.* It may be found that a cooperative marketing agency is better adapted to direct shipments than a clearing-house association or vice versa. It may also be found that an informal and loose organization is better adapted than a formally incorporated organization or vice versa. (b) *Contractual relations and degree of control.* The authority to direct shipments granted the organization by its members may be specific and include penalties in case of failure on the part of members to abide by decisions of the organization; or it may fall much short of this. Contractual relations such as to create an artificial "car-shortage" will affect the results. Whether or not contractual relations call for a pooling of returns may also be important. (c) *The type of information available.* Information on actual loadings and billings is likely to serve better than information on car orders and "spotting" of empty cars. Records of shipments passing transit and diversion points should be valuable. Whether shippers furnish records of shipments, or the reports of public agencies are relied upon as sources of information concerning shipments, may be important. (d) *The methods of procedure.* Whether or not members of a shipment-directing organization are kept informed and are permitted to make diversions after shipments are started to market, and whether or not shipments are confined to f. o. b. sales, may have a bearing on results; as may also the type and adequacy of records kept by the organization.

Since a shipment-directing program aims to place definite quantities in specific markets within a given period of time, and since records of the Market News Service of the Bureau of Agricultural Economics report the quantities of various products received in the most important markets, it should be possible to determine the relation between these two quantities. This relation will for convenience be referred to as the results of shipment-directing programs. To make the two quantities correspond will be considered the objective of such programs and if these correspond closely the program will be considered successful, while if they fail to correspond closely the program will be considered unsuccessful.

The information needed for the above will be obtained from the following sources:

- (a) Records of organizations which have attempted shipment-directing.
- (b) The daily, weekly, monthly, and annual reports of the Market News Service of the Bureau of Agricultural Economics.
- (c) The contracts, constitution, and by-laws of shipment-directing organizations.
- (d) The management of such organizations.

Some of the organizations do not keep definite records of the number of carloads they aim to place in various markets, but aim to direct the same proportion of total shipments to each of the various markets at all times. Over a period of years one market is to receive approximately 20 percent of total shipments, another market 15 percent, etc. The shipment-directing organization aims to keep daily, weekly, or monthly receipts at the various markets at approximately these percentages. In such a case, it will be necessary to convert these percentages to definite amounts before the analysis in Objective (a) can be undertaken. This may introduce some errors. Weather conditions, transportation conditions and employment conditions may have caused the organization to deviate from its general procedure. After the amounts are thus determined they must be checked carefully with the management and with such records as are available to establish their validity and to ascertain whether or not they correspond with the intentions of the organization.

The information needed under Objective (b) will be obtained from the organizations and from the constitutions, by-laws, and contracts of organizations. Some of this information is likely to be biased because the management of each organization is likely to over-emphasize the strong points and minimize the weak points of the organization in conducting shipment-directing activities.

The unit of quantity will be the carload. The unit of time will be the period within which the organization attempting to direct shipments aims to make its activities effective. That is, if it is the aim to regulate daily the quantities placed on various markets, one day will be the unit of time, while if the aim is to regulate them a week at a time, or according to some other time unit, the week or other period will be the unit of time. The unit of "lag" in determining the relationships in Objective (a) will be the number of days that elapse between the time when shipments are forwarded to various markets and the time when shipments arrive on these markets.

The period to be covered in the study will be dependent upon the unit of time as defined above and the number of years these organizations have operated. If possible, the records of years when crops were small, medium and large should be analyzed separately.

The determination of the relationships under Objective (a) will be mechanical and will not involve methods with which statisticians are not already familiar. The determination of the reasons for variance in the relationships found under Objective (a) will involve the historical and case methods of analysis.

The usual cautions in interpreting the significance of correlation coefficients must be kept in mind. If the factors outlined above as affecting results are found to influence shipment-directing activities in the same direction consistently, it will be concluded that they explain the variance in relationships under Objective (a).

PROJECT 40. Hedging.

Objective: To determine the best hedging practice for a local elevator or other local unit. (Joint with Prices.)

(By A. H. Benton and H. B. Price.)

More specifically, the objectives are to determine:

- (1) The amount and character of hedging done,
- (2) The technique of hedging, and
- (3) The effectiveness of hedging as assurance against losses from changes in price.

The data secured and the analyses made have both direct and indirect values in giving the general public a better understanding of the role of hedging in local elevator management. They may serve officers and managers of local grain-handling units by giving them definite information on the results of hedging or the lack of it, as the case may be, both for the particular unit concerned as well as for other units. Such information furnishes facts that lead to a better understanding of the problems of the local grain-handling unit and a basis for wiser decisions on the part of those responsible for the best policy and operations. Such data give educators and legislative groups facts, not opinions, about the hedging practices and policies pursued by the units studied and the results of their hedging operations.

The following aspects of the problem will need to be studied:

(1) *Methods that managers of elevators use in hedging:* who does the hedging, central market commission merchant or manager of the local elevator; practices with respect to hedging purchases or sales of one grain by sale or purchase of futures of another grain; practices with respect to hedging amounts of grain that are less than the amount of a unit of futures; effect of trend in prices upon the practice of hedging; method of handling or keeping the "long and short" account.

(2) *Business practices which affect hedging,* as for example, (a) storing of grain for the owners of the elevators, or for others, acting as public warehousemen; (b) methods of sale, as for example, on commission, on tracks, or to arrive.

(3) *Gains and losses when hedging is done under different circumstances.* As individual purchases and sales of grain can not be matched in the records with sales or purchases of futures, it is necessary to analyze the profit and loss on cash grain and future tradings separately. This necessitates the preparation of separate profit and loss statements for each kind of trading and for each kind of grain.

A study of the hedging practices of local grain elevators may be limited to a small number of elevators selected from a certain repre-

sentative section of the state characterized by certain practices, or by the quality or kinds of grains handled; or even selected from several states with certain common characteristics, as, for example, from the hard spring wheat states of Montana, North Dakota, South Dakota, and Minnesota. If limited to a small number, a case type of analysis will necessarily be involved. Such a study may, however, include a larger group and lend itself to statistical analysis.

Such a grain-hedging study may be confined to one grain alone, such as wheat, or it may include all grains handled, such as oats, barley, rye, speltz and flax. In the second case, it would not only give the experience with respect to the different grains handled, but would show the total effect of hedging operations on the elevators or other units for the period under study.

The approaches to this study have been as follows: The first is from the standpoint of the theory of a hedge, of the assumption that the hedge gives protection against losses incident to price changes. The first step following this approach is to test the correctness of the theory by ascertaining whether changes in the price of a commodity are coincident with changes in the price of the futures of that commodity. The second step is to ascertain the conditions under which the changes are not coincident and thus cause hedging to fail to attain its objective. The third step is to discover the possible conditions under which the managements may realize less than a perfect hedge, even though the market may behave in such manner as to make possible a perfect hedge. The first step then consists of comparing cash and future prices; the second, of analyzing the reasons and conditions for deviations in cash and future prices; and the third, of discovering typical situations, or practices of the managements of local elevators in handling hedging, and relating these management situations to typical market price situations. This is the method that H. B. Price used in the study of hedging of Minnesota elevators.¹

The second approach is from the standpoint of management of a local elevator. Following this approach, one collects detailed information for all transactions relating to hedging during a given accounting period and analyzes the data to show the degree of effectiveness of the hedging. This is the method used by Kuhrt and Benton in the North Dakota studies and the one which is outlined in this project.

The first contributes as much to an understanding of the problem as does the second and it is much less expensive. The chief advantage of the second is that it provides case material, that is, information as to details of actual hedging practice and results that are difficult if not impossible to obtain unless one works closely with individual elevators. An ideal study would combine both approaches.

(1) Minnesota Bulletin 224.

Data needed.

The information collected should cover the following points:

- (1) Record of cash or stored purchases, giving date and quantity.
- (2) Record of dealing in contract grain, giving name of producer, date of contract, quantity contracted for, date of delivery, and quantity delivered.
- (3) Record of carlot sales, giving date, quantity, car number, and destination.
- (4) Record of local sales, giving date and quantity.
- (5) Record of hedging transactions based on "purchase and sale" statements, giving for each transaction: date of purchase, quantity, delivery month, price, loss; date of sale, quantity, delivery month, price, gain; tax, commission, interest (if any); net gain or loss.

The foregoing will obviously require opening and closing inventories of grain; and records of the daily volume of local and terminal purchases and sales of the different grains handled by the units under study. In the hard spring wheat area where hedging is widely practiced, it is customary for elevators to ship out and sell grain stored with them and cover the sale by a hedge. When the owners of the grain choose to sell, the elevator buys the grain and sells a futures contract. Obviously any study of hedging must consider storage practices. Hedging is also related to methods of handling grain, particularly to "to arrive" shipments, and "on track" sales, or sales made direct to users of grain, such as flour and feed mills. These two methods of sale may largely take the place of hedging operations in some areas, or in certain grain-handling units in areas where hedging is the customary practice. Data of "on track" and "to arrive" sales may therefore need to be analyzed.

Satisfactory and complete data for a hedging study as here outlined can be secured only from the original records of the unit or units under study. Few, if any, cooperative or independent units keep sufficiently detailed and inclusive records unless arrangements are made or special forms supplied. For example, few local elevators keep a complete record of grain contracted for and the amount and dates of delivery of grain on these contracts by farmers. A full record of hedging transactions, shipments, or local sales may be lacking. Other sources from which data may be secured are audit reports, reports of state and federal bodies, records of grain commission companies handling the accounts of the units being studied, reports of grain exchanges, and studies carried on by public and private investigators. Data from any of these sources must, however, have been secured in one form or another from the original

records of the local units if they are to be accurate and inclusive. In any case, they are likely to be incomplete, and useful only as supplementary to data obtained from records of elevator companies. Commission firms, however, will have good data, if they record the data which are used in preparing operating statements for both grain and futures trading.

In the hard spring wheat area the annual records for any year cannot be secured until the books are closed for the crop year. The "cut-off" date is usually in the latter part of May, in June, or the early part of July. The securing of the field records must be completed by about August 15th, since the new grain crop begins to come in about this date and the elevator managers become too busy to make the records and data available to field workers. Six to eight weeks is the limit of satisfactory field work under these conditions. The final audit report may be secured at a later date either from the elevator or by arrangement from the audit company employed by the elevator.

Since the time is limited in which field data can be secured with a minimum of inconvenience to the elevator managers, experience indicates that two men working together are better than one working alone. Data collected by trained field men with suitable forms are not likely to include important errors attributable to these men. The real difficulty is incompleteness of available records. If data are incorrect or incomplete it is not ordinarily possible for the field men to correct them or supplement them, or even to determine the relative amount of inaccuracy. They can secure only such data as have been kept by the operator of the local elevator or other unit. Deficiencies in the data appearing at the time of office tabulation are very difficult to handle. All too frequently entire records must be discarded, and this increases the expense of the study. For this reason in beginning a study it is highly desirable to make a careful preliminary analysis of one or more representative sets of records to find out whether all the data needed for a complete analysis have been provided for in the forms prepared. It may be advisable in some cases to introduce systems of record-keeping and to postpone the final analysis until suitable data have been accumulated.

Analysis.

The first two of the specific objectives suggested above involves a fairly simple type of descriptive analysis. The third is more difficult to deal with. To determine the effectiveness of the hedging done it is suggested that the analysis be directed at the following results:

(1) The results of the hedging operations as reflected in the grain trading losses or gains on each grain handled.

(2) The relation of these losses or gains to the amount and character of hedging done and to the price changes occurring.

(3) The results that have been secured (as reflected in grain trading losses or gains) if various grains purchased had been fully hedged at all times.

(4) The results in the event no hedging had been done at all.

The first of these results, the losses or gains on grain trading, is reported in the audit statement. The second point requires a comparison of the hedging done by the elevator with the terminal price fluctuations and trends, and the relating of these data to the gross grain trading gains or losses. The third result, relating to loss or gain arising from unhedged grain, calls for the daily "long and short" position and the daily price changes on the number of bushels that the elevator may have been "long or short", taking into consideration purchases and sales of both cash grain and future contracts. Assuming that "hedging" may be used as a method of overcoming speculation, then *not selling* sufficient futures contracts to cover cash grain bought, *not buying* sufficient futures contracts to cover stored grain shipped and sold, or *selling* more than a sufficient amount of futures contracts to cover cash grain purchased, constitutes speculation and unnecessary risk.

The fourth result, which relates to the gain or loss that an elevator might have suffered if no grain had been hedged, is somewhat more difficult to attain, inasmuch as an elevator would very likely not have handled its grain in the same way under a no-hedging policy. Calculations of gains or losses under a no-hedging policy must be predicated upon the assumption that the grain purchased and sold would have been purchased and sold on the same dates as was actually done. The loss or gain from dealing in the futures contracts for hedging purposes, disregarding the concurrent gain or loss on cash grain, represents the extent to which the speculative market was successfully used to offset the changes in actual price of grain between the dates of actual purchase of cash grain and the date of sale, or the sale of "stored grain" and the later purchase of this grain from the owners. In making this calculation, the commission charges and tax on futures bought and sold, and losses or gains from spreads between cash and future prices, must be taken into consideration. Losses or gains from the narrowing or widening of the margin between cash and future prices vary with the amount of cash grain on hand or the amount of stored grain shipped and sold. These factors should be weighed carefully in the analysis of hedging operations.

The differences in the financial outcome of complete hedging, no hedging, or partial hedging, will depend upon the price trends and price fluctuations which occur during the period under study, and the acumen or luck of the elevator manager in forecasting these price changes. If prices were continually advancing, no hedging would show an advantage. If prices were continually declining, hedg-

ing would be more profitable, as it would largely insure a normal trading margin to the elevator, and being "short" on the market would be even more profitable. A summary of the results obtained from these three possible hedging policies for a statistical sample of elevators over a representative period of years, would be needed to demonstrate the advantages or disadvantages of hedging in the grain trading operations of local elevators. But if the market position throughout the period is portrayed graphically and linked up with the grain and futures trading statements, the losses or gains from hedging transactions for the units studied can be taken as representative of the losses and gains of other units for the same period in the same area, operating in the same manner and handling similar volumes of the same kind of grains, and judgments formed that correspond with the actual situation with reasonable certitude.

Two men, after becoming acquainted with the records involved, can in two days secure the field data from an elevator handling 150,000 to 300,000 bushels of grain. The time required varies somewhat with the character of the records and the care with which they have been kept. Probably a third of the records taken will have to be discarded because incomplete. It will require two to three times as much office labor to tabulate the facts secured as it does field labor to secure them.

A study of hedging of the grain of local elevators would not be really complete without including the hedging done for local elevators by commission firms and other central marketing agencies. The data for such analysis are in the books and records of the central market agencies. The records would normally be complete and more accurate. The grain handled would be in units of larger denominations, representing the combined daily transactions of the various branches represented. A large volume of grain with a corresponding volume of futures would, therefore, require a smaller number of transactions than in a local elevator where each individual lot or truck load of grain purchased or sold must be reported separately.

Although much has been published upon the theory and practice of hedging of various commodities on speculative markets, and of grain in particular, few studies deal specifically with the actual hedging operations of country grain-handling units. *Hedging by Dealing in Grain Futures* by Hoffman is the best treatise in the field. Chapter 9, Volume I. of the *Report of the Grain Trade* (1920), by the Federal Trade Commission, gives a careful analysis of the amount and extent of hedging by country elevators and the reasons therefor. The Minnesota, North Dakota, Illinois and the Ohio experiment stations have published bulletins that analyze grain elevator hedging more or less. Duvel's studies made under the auspices of the Grain Futures Administration deal with certain aspects of the problem.

PROJECT 41. Advertising Methods.

Objective: To determine methods to use in advertising: to measure the results obtained, determine the best media to use, the amount of space, the type of advertisement, the most profitable degree of intensity in advertising in a given area, and whether to attempt to reach jobbers, retailers, or consumers.

(By Roland Vaile.)

In a price research project,¹ methods have been set up to study the effect of advertising in general upon the demand schedule of any particular commodity. In the present project, attention is directed to the comparative efficiency of various advertising techniques. This will involve:

- First, Comparisons between *kinds* of advertising: i. e., newspapers, magazines (general, farm or trade), direct mail, outdoor, radio broadcast, and so on.
- Second, Comparisons between *direction* of advertising: i. e., to jobbers, retailers, consumers, specific market areas, and so on.
- Third, Comparisons between *techniques* in advertising: i. e., copy, layout, typography, illustration color.
- Fourth, *Comparisons* between various degrees of emphasis on advertising versus direct selling.

Methods.

Four entirely distinct methods of testing the efficiency of advertising are available. Each of these methods may be used with respect to any of the four objectives set up. The methods are:

1. *The field-investigation method.* This consists mainly in obtaining from persons by personal interview or by questionnaire, statements regarding their opinions of, or reactions to, the advertisements being tested. The presumption underlying this method is that replies gathered from large numbers of individuals will give a reliable estimate of the influence of the specific advertisement on people's behavior.
2. *The historical method.* This involves an analysis of advertising trends as shown in actual usage. The presumption underlying this method is the pragmatic idea that the inefficient techniques are discarded for the efficient ones.
3. *The business-return method.* This really is two methods, or at least it permits of two methods of measurement. In the first place, advertisements which are actually used may suggest the sending of a coupon for further information or some similar device. Such advertisements may be tested as to their attention value, at least, by the number of replies received. In the second place, it is often possible to use test advertisements either the same advertisement in different market areas, or different advertisements in comparable market areas—for which a direct measure of sales stimulation may be found. This

(1) See the report in this series on Prices of Farm Products.

is the most pragmatic test of all, for it shows direct response of an actual clientele to a definite stimulus.

4. *The laboratory method.* This, again, is more than a single method. In the main, however, it involves working with small numbers of people, and also the elimination or sublimation of as many as possible of the distracting factors. Tests of advertisements may be made under more or less satisfactory laboratory control, by use of the order-of-merit method, the recall method, the recognition method, the association method, or the psychogalvanic method. The presumptions underlying this method are (a) that the limited numbers of persons tested are representative in their reactions, and (b) that their responses under test conditions are similar to their responses under the usual and more complex conditions of exposure to advertisements.

The sources of information will differ according to which of the methods outlined above is followed.

In the field-study, the number of interviews may vary from 100, if the study is limited to wholesalers, to 1000, or even 100,000, consumers, depending upon the geographic extent of the market area.

The field questionnaires will include the following inquiries:

- a. To what media is the subject exposed?
- b. To what extent is he exposed to each?
- c. The subject's own estimate of the influence of various media on his behavior.
- d. The recollection of advertisements of specific commodities. Where encountered? What details remembered?
- e. The recollection of specific advertisements selected by the interviewer as having appeared in various media. What details remembered?
- f. Actual purchases of commodities for which advertisements have been encountered.
- g. Actual purchases of commodities for which advertisements have not been encountered.

In the historical method the information will all be obtained from files of publications in which advertisements have appeared.

In the business-return method, cooperation between the actual advertiser and the investigator is essential. The record of returns can be obtained only from the business concern.

In the laboratory method the information will be obtained by the testers in the laboratory from members of the group with which they are working.

The research organization, also, will depend upon the method or methods of investigation.

For the field-type of study, a considerable staff of field workers will be needed, and they must be supplemented by a tabulating force. Field records can be taken at the rate of from 10 to 50 per day, depending upon the complexity of the schedule. This sort of work can often be undertaken best by commercial advertising agencies or by research departments in newspapers and magazines. This is

especially true if the study is to be made over a wide geographic area.

In the historical method a very small force is sufficient—the director of the study with one or two assistants can complete a considerable undertaking in a month's time.

The business-return method involves, first, a planning of the test advertisements and campaigns, and second, a tabulation of the results. The former requires the services of a balanced advertising force, while the latter requires a tabulating crew and possibly cooperation with the accounting division of the company being tested.

The laboratory method requires a director acquainted with the technique, one or two assistants, and a group of subjects to be tested. The latter will vary in number from 25 to 200 or more. Realism will be added to the study if a professional or commercial advertiser is a consultant concerning the details to be tested.

The data obtainable with any of these methods are not of sufficient accuracy or complexity to justify extensive statistical techniques. The data from the field study may be grouped into several classifications and averages obtained. It may be that Hollerith or some other listing machine can be used to advantage in this work. In the historic studies, percentages for advertisements carrying specific features at different dates will be the main techniques of measurement. The business-returns method will involve mere enumeration, or possibly, cost accounting. Both the field method and the laboratory method may use order-of-merit rankings, and the laboratory method may also employ rank correlation.

In the field study the principal method of testing validity of the sample will be the progressive tabulation of groups of returns until such time as no variations of consequence accompany the use of larger numbers. In the historic method, all issues of the publications tested may be used. Otherwise, empirical consideration should first be given to the factors which might prevent the issues chosen from being typical. These factors will include season of the year, general business conditions and unusual historic events. Then a trial-and-error test of the variations caused by these factors may be made by adding occasional months to those originally chosen and noting any change in the trend of percentages.

The principal errors likely to occur under the field method are inadequacy of sample, and bias. The former has already been discussed. Bias may arise through the conscious effort of the interviewer to influence replies, or through the unconscious effort of the the interviewed to say what he believes the interviewer wants to hear. Questions should be non-leading, and occasionally asked in two or more ways as a check. A common source of error in the business-return method when limited to coupon response is the mania for curio collecting. There is no satisfactory method of approximating this error. A principal error of the laboratory method is the possible lack of agreement between reactions under control conditions and

those under more usual conditions. Care should always be exercised to have the conditions as normal as possible or to perform the tests so that the subject does not know that he is being tested.

Analysis of data.

This project as here outlined is really a series of different projects, or at least, different methods of approach. Each method of approach will involve somewhat different analysis. For a complete study of the specific advertising program of a given concern, all of the four methods might be required. The details in the analysis will depend upon which of the four objectives set up is being studied at the moment. The *method* of analysis will be essentially the same in each case.

- a. Under the field method of approach, the analysis will include:
 1. Division of questionnaires into classes in accordance with probable buying habits. Those most generally useful are:
 - Race or religion (4 to 6 classes)
 - Age (probably 3 classes)
 - Sex (2 classes)
 - Occupation (varies, but generally 5 classes are sufficient)
 - Income (generally 4 classes are sufficient)
 2. Testing of the influence of advertising on each of these groups by:
 - Admitted degree of exposure to advertising (4 classes: none, little, medium, much)
 - Remembrance of advertising
 - Action as result of advertisingFor each of these groups a frequency distribution of response may be determined.
 3. Cross check of exposures to advertisements, as indicated by remembrance, and action.
- b. With the historical method the important part of the technique lies in the logical choice of detail to be tested. The method of analysis is almost self-evident. It will involve:
 1. The establishment of norms for some base year or period. For example, if it is found that 80 percent of advertisements for dairy products published in magazines in 1925 used color printing, that may be taken as a datum from which to figure the trend in use of color in magazine advertising of dairy products.
 2. The determination of variations from the established norms, as is typically done in time-series studies.
- c. Very little analysis is possible with the return-coupon method of testing advertisements. Enumerations may give light, however, on the following points:
 1. Comparison of returns from various advertisements.
 2. Comparison of returns from various media.
 3. Geographic distribution of advertising influence.
 4. Length of influence of specific advertising.
- d. In the laboratory method, again, it is difficult to set up a method of analysis, for the arrangement of the experiments will differ and will in a measure dictate the technique of analysis. In the main, however, a frequency distribution of the reactions of those tested will furnish the basis for interpretation of results.

The cost of these projects will vary greatly. Field questionnaire work of the types suggested range between 10 cents and 50 cents per interview. Occasionally it may go higher for complicated questionnaires. Tabulation and analysis costs should not exceed 50 percent of collection costs. For the historic and coupon-return methods, the tabulation and analysis costs are the entire costs. The cost of the laboratory method will depend entirely on the elaborateness of the set-up.

A rather satisfactory summary of research in the testing of advertising appears in the Harvard Business Review for October 1930.

GROUP F

Projects Relating to Government Participation in Marketing.

The projects in this group relate to several out of a large number of marketing services that are rendered by the public agencies in the United States, and to one out of a number of regulatory undertakings in the field of marketing which have been assigned to the Federal Government.

PROJECT 42. Government Grades.

Objective: To determine the best set of grades for a farm product (potatoes, for example) based upon both economic and technical considerations.

(By Frederick V. Waugh and R. R. Pailthorpe.)

The formation and revision of grades and standards is a never-ending task. Both the quality of farm products and the preferences of the market for various qualities change from time to time. New inspection methods are developed, allowing the measurement of new factors and the more accurate determination of factors already recognized in the grades. It is important if the marketing process is to function smoothly that the grades and standards be so revised from time to time as to keep pace with these changes. Research is necessary as a basis for revision as well as for the initial formulation of the grades.

This study should be made continuously to cover a number of crop years. Variations in the quality and size of the crop and in the purchasing power of consumers may cause abrupt changes in market demand, and the grades set up as a result of one year's study may be unsatisfactory the following year. Grades must be made so as to give the best possible fit to different sizes and qualities of crops and different conditions of the market.

The study should also include a number of special studies of the larger potato markets (such as Chicago, New York and Boston).

This project is closely related to the projects in the report in this series on research in Prices of Farm Products which deal with the

relation between quality factors, prices, market grades and classes, and brands. It is also related to Projects 36 and 37 above, which should be read in conjunction with it, particularly Part Two of Project 36.

If we are to set up "the best set of grades" for potatoes, we must decide (a) what is to be the purpose of the grades and (b) what kind of grades are best suited to these purposes.

Let us assume for the purposes of this outline:

(1) That the grades to be determined are to be used primarily in the wholesale (carlot) markets as a basis for buying and selling potatoes and as a basis for market reporting.

(2) That the same set of grades is to be used in all producing sections of the country and in all wholesale markets in the country.

A good set of grades for these purposes must meet the following requirements:

(1) If the set of grades is to be useful as a basis for buying, selling, and quoting potatoes, the series of grade terms used (such as, Fancy, Number 1, Number 2, etc.) must define groups of qualities or characteristics representing different levels of demand on the wholesale market. That is, Fancy Grade should be so defined as to include only the qualities of potatoes commonly selling, or likely to sell, at a premium on the wholesale market; Number 1 Grade should include potatoes of the quality which can be sold readily at more than average prices but at lower prices than those received for Fancy stock; and each lower grade should be so defined as to include qualities selling at progressively lower prices.

(2) The grade limits should be narrow enough so that there will be little variation in prices of individual lots sold under the same grade terms at the same time and under the same conditions. (It should be recognized, of course, that there will be some variation in the quality of individual lots even with a complicated and detailed system of grades, and that prices for these individual lots will vary accordingly.)

(3) The grade specifications should not change drastically from year to year, but should be gradually adjusted to meet permanent changes in market demand.

(4) The minimum quality allowed in each grade should be stated wherever possible in definite quantitative terms which can be measured by mechanical devices, thus insuring comparability of judgment for different grades, different seasons, and different markets. It is recognized that the subjective judgment of the inspector can not be entirely eliminated, but the aim should be to reduce it as far as possible.

(5) The system of grades should be simple enough to be understood for practical purposes by growers, shippers, and city dealers.

The objective of this study is to determine what system of potato grades will be the most satisfactory for the above purposes.

Before starting active work on this project, a study should be made of all official grades and of the more important individual and association grades now in use, and of any grades that have developed in the trade. Differences between the specifications for these various grades will suggest specific problems to be covered in this project.

All available studies of market and consumer demand for potatoes should be studied and summarized.

Such a study should be headed up in some national research organization. Since the United States Bureau of Agricultural Economics has charge of the national standardization and inspection work on potatoes, that agency would appear to be in the best position to take charge of such a project.

Cooperating with the national agency, a number of agricultural experiment stations or other local agencies should make careful studies in a number of important markets. Such local studies, while they are not broad enough in themselves to provide a basis for national grades, can be so coordinated as to supply the national agency with useful facts.

Two groups of problems need to be studied in this project: first, inspection technique, or the method of determining quality; and second, market preferences, or the demand for various qualities. These groups of studies will be discussed separately

Inspection technique.

First, it will be necessary to determine the most accurate practical method of measuring each of the various qualities which may influence market demand for potatoes. This involves, for example, studies of mechanical sizing devices *vs* the sizing ring; the colorimeter *vs* the color chart, or *vs* some method of removing and measuring the amount of dirt as a measure of brightness; the use of the penetrometer in measuring condition; etc. The aim of such studies is to develop standard inspection technique which is accurate and which can be easily used in the field by inspectors. As an example of the method to be used, in connection with the use of the penetrometer to measure condition, a number of lots of potatoes should be held in storage under different temperature and moisture conditions. At periodic intervals samples of each lot should be subjected to the penetrometer test and the reading should be recorded. These samples should then be judged by potato dealers, or better, should be sold in the open market in order to determine at what point on the penetrometer scale, condition becomes poor enough to influence the buyer in his purchases. The cooking quality of each lot should also be determined by standard tests for boiling, baking and frying to discover at

what point on the penetrometer scale condition becomes poor enough to influence cooking quality.¹

In addition to the foregoing methods and devices for measuring various qualities, standard methods of sampling for the purpose of inspection must be established. A study of this question involves the measurement of the error resulting from different sizes of samples obtained in different ways. An inspector should take from twenty-five to one hundred 25-pound samples from each car studied. The samples should be subjected to the usual inspection process and a complete record kept of all grade factors and of the size and condition of each sample. From these data it will be possible to measure the standard deviation of each quality among the series of samples drawn from the same statistical universe. This procedure makes possible an accurate scientific statement of the quality of potatoes in each car with standard errors for each of the qualities, and with standard or probable errors associated with different sizes of samples. The degree of error due to the process of sampling will diminish at a decreasing rate as additional samples are taken, until if the entire carlot were inspected it would be zero. Since it is impractical to inspect the entire carload it should be recognized that some degree of sampling error is inevitable in the inspection process in the wholesale market. The purpose of this phase of the study should be, therefore, not to eliminate sampling errors, but to reduce the probability of erroneous reversals of grade to any standard which may be determined as satisfactory.

Market preferences and the demand for quality.

Research methods for measuring the preferences of the market for quality factors are covered in the above-cited projects in the report on research in Prices of Farm Products. Briefly, such projects involve the analysis of detailed inspection records and price records covering a large number of sales. A competent inspector should be placed in the wholesale potato market to make detailed records of the quality of a number of lots of potatoes and the prices paid by the wholesale receivers for each lot. Analysis by sub-classification and averaging, and by multiple or joint correlation methods, will indicate the relative importance of the various qualities influencing market demand and will provide an estimate of the average net influence of each factor on prices. Such average relationships between quality and prices may be considerably modified in the case of any one individual sale because of factors other than quality (for example, credit terms); but the object of the study is not a complete explanation of price variation. It is, rather, to estimate the average relationship between various qualities and market prices.

(1) Mechanical devices for measuring quality of certain staple farm products such as grain and cotton have been developed to a much greater extent than in the case of most fruits and vegetables. While such staples are perhaps more adaptable to mechanical measurement than are fruits and vegetables, continuous study of the possible use of such devices should be made for all farm products.

Such studies of market demand have been made for about ten fruits and vegetables and also for wheat, cotton, eggs and butter. While considerable progress has been made, if research of this kind is to be of greatest value in standardization work, it needs to be organized as larger and perhaps more expensive projects than most of those undertaken thus far. It will be necessary to study a number of markets over a series of years, and it is desirable that some research of this kind be carried on continuously.

It should not be assumed that the above described methods will provide all the information on market preferences which is needed as a basis for standardization work. The results of such studies should be carefully checked by surveys among the trade. These surveys will uncover many facts about market preferences that are not covered satisfactorily in the above type of analysis, and will suggest factors which from time to time need further study.²

(2) Dr. Warren C. Waite, in commenting upon this project discussion, suggested the need for considering the consumer in determining grades. Dr. Waugh's reply was as follows:

"I do not object to this at all and would like to see studies made of the possibility of developing consumer grades. It does not, however, seem to me likely in many cases that we should attempt to use the same grade classifications in all steps in the marketing process. For example, I think a wholesale grade for potatoes might differ considerably from the retail grade for potatoes. In outlining this project I have definitely limited it to a study to serve as a basis for establishing grades to be used in the wholesale market. I think it would complicate the outline considerably to attempt to cover all the studies which would be needed in establishing grades for several different purposes. Perhaps there might well be a separate project concerned with studies as a basis for establishing retail grades. Anyway, I think we will go much further on projects of this kind by limiting it to one thing or the other."

I do not feel that this entirely disposes of the issue. I admit that there may be reasons why dealers want a set of grades that reflects other things than consumer preferences, particularly with certain products; but with a good many products I believe that these are not valid reasons, and that the dealers would be able to use a set of grades based on consumer preference without any but temporary difficulties. I also am skeptical about the wisdom of having both wholesale and retail grades for most commodities, and if we do have them, it seems to me that the retail grades must take precedence and that the dealer grades must be adjusted to them. Much, of course, depends upon the commodity.

As I have pointed out in Project 36, I also do not think that we need to base our grades entirely on consumer preference as it is. As Dr. French has indicated in Project 12, consumers' preferences are often determined for them by what the retailer chooses to sell them, and he chooses to sell them what he can handle to his best advantage. Other consumer preferences have superficial bases, and are changed simply by offering them something different. In the matter of grades generally, consumers have fewer fixed preferences than ordinarily supposed. It would therefore seem feasible with many commodities to base grades on fundamental quality differences rather than on consumer preference as it now happens to be.

Dr. Waite also suggested that the proper sequence in making such a study was to determine consumer preference first. Dr. Waugh's reply follows:

"I cannot quite accept this suggestion, as it seems to me that we need to get a method of measuring the characteristics of these commodities before we can determine market preferences adequately. Of course, we do need some preliminary notions about the kind of characteristics which are likely to be important. This is already covered in the statement on preliminary analysis,
(Continued on page 172)

This project involves a series of studies of inspection technique and of market preferences. In order to form an adequate basis for a standardization program, these studies must be coordinated and analyzed to answer such questions as:

1. What qualities are most important in determining market preferences?
2. How can these qualities be measured accurately in ordinary inspection work?
3. How many grades are desirable and practical? (a) From the standpoint of the producer or shipper? (b) From the standpoint of the dealer?
4. What factors should be included in the grade requirements?
5. What should be the minimum for each of these factors for each grade?
6. What information in addition to the grade should be stated on certificates?
7. How shall the factor of size be related to grade?
8. Which grade factors shall be regarded as permanent and which as changeable?
9. For what separate varieties or types shall grades be established?^a

PROJECT 43. Price Quoting. (Joint with Prices.)

Developed as Project 4 in the report in this series on Prices of Farm Products.

PROJECT 44. Domestic Market News.

Objective: To determine the most efficient procedures for collecting and disseminating domestic market news for a commodity; also what news to disseminate.

(By Friederich Sohn and J. D. Black.)

This project should be limited to one commodity or to a group of closely related commodities; but since, for reasons of economy, the news services for various commodities are often carried on by

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although possibly the statement might be expanded a little. After a general survey of the market and a review of studies of market preferences, it seems to me that the job is first to determine the best methods of measuring the important characteristics of the commodity and then to find out the relationship between these characteristics and market prices." (J. D. Black.)

(8) Some recent studies which are more or less related to such a project as the foregoing are Dr. Roger Corbett's Rhode Island study of relative farm economy of selling by grades as against selling field-run, Dr. George Henning's Ohio study of the relation between dressing percentage and grade of livestock, and Dr. C. A. Brown's study of factors affecting grade of cream sold by Illinois dairy farmers. Project 4 on "Price Quoting" in the report in this series on Prices of Farm Products has analysis that is pertinent to this project.

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the same institution, the question of how the news service for a particular commodity fits into the whole system has to be raised.

A market news service should be designed to serve two purposes: first, to supply to those interested in current market information the data and interpretations they require; and second, to compile a record of market behavior which will afford a basis for further economic study. The tests of a good service are effectiveness, completeness, accuracy, promptness, and economy.

A project of this kind will be most helpful if worked out for some commodity now covered by a market news service. It will then be directed at determining how effective this service is, how prompt, etc., what its deficiencies are, and how it can be improved. Tests of effectiveness will need to be set up. These tests will include not only the extent to which the news reaches the persons to whom it is directed, but the uses they are able to make of it, and the results of these uses. It is entirely possible to disseminate all sorts of information about markets that does not help in any significant way. Such testing will reveal the shortcomings of the service and point the direction of needed changes.

Similar tests may be needed for promptness, accuracy, etc.

One method of approach to the foregoing problem will be to take an actual current operating period and to record exactly what news was sent out and to whom, and then shortly thereafter to interview a representative sample of these people and find out what they really learned from this news and what uses they made of it. This procedure will work out for news of the sort that is sent to a small number of large operators. Applied to news of the sort that farmers are supposed to get and use, it will mean first of all finding out how many and what sorts of farmers really got the news. What farmers do with it is worth finding out in as far as it can be done. Farmers are less likely to be able to specify uses made of market news than are large operators. Of course, it is impossible to make any market news services entirely satisfactory. For example, it may be physically impossible to obtain information as promptly as some would like it. But nevertheless it is important to know what deficiencies are most apparent to both classes of users, because some of these can be repaired shortly or in time.

(Continued from page 172)

(The Bureau of Agricultural Economics is carrying on a large program of research relative to grades and standards; and state departments of markets and agriculture are no less active in this field of effort, although their work is less of a research nature. The Bureau's projects cover almost all farm products, and most of the factors affecting grades. The majority of them are almost wholly technical in nature, dealing with such problems as measuring differences in quality, the relation between different quality factors, and the relation between quality factors and use. Those which are not wholly technical in nature place the larger emphasis on technique. Recently, however, a special committee has been working upon the problem with a view to broadening the approach to it.—EDITOR'S NOTE.)

The second step, following the same approach, will be to prosecute a similar study for another period that can be set in contrast with the foregoing in important respects; or for a market news service in a different section of the country or employing different methods, and perhaps for a different commodity even, and then compare the results obtained. This comparison should take into account the cost of the service and weigh cost against results.

A different method of approach is to prepare test samples of market news which have certain clearly marked characteristics, to send these out through the market news system of a particular section of the country, and then to observe the results as reflected in definite responses in the market place in such forms as increased shipments or the opposite, changes in types of produce shipped, etc. Of course, the responses thus secured must not be detrimental to those affected.

A third approach is to take particular parts of the whole market news process and make careful intensive studies of them one at a time. Thus price quoting might be one such part (See Project 43 above), or the make-up of news letters. This approach is better suited to a later stage in the project and should be followed in working out methods of supplying particular deficiencies that have been discovered.

A project of this kind may also be worked out for a commodity not now covered by a market news service in the territory. In that case, one would set about doing the following:

1. Find out what information is needed for judging the market situation of the commodity.
2. Discover from what sources the needed information and data can best be secured.
3. Study the methods of gathering the material—how to make a general statement on the basis of partly contradictory materials, and how to quote prices which can be used for statistical analysis.
4. Determine the most practical organization for collecting the news under a given set of circumstances—whether government or private agencies; how the functions should be divided between local market observers and central agency, etc.
5. Determine the best channels of distribution of the news and their comparative advantages and costs: To what extent local market observers should distribute the news directly, and to what extent a central clearing agency should do it; what different means of distribution, as telegraph, telephone, mimeographed and printed material, should be used under various circumstances.
6. Estimate the costs of various more or less comprehensive systems and weigh the expected improvements against the expected costs.

In general, the foregoing will be accomplished in two different ways, by a study of other market news services, and by study of the market for the commodity in question. The studies of market news services can be comprehensive in part, designed to determine the broad general features of such services and factors producing differences in them; but they will also need to be intensive as to many of the details that must be worked out for the commodity in question. The information concerning the commodity will have to be collected by interviews with market reporters, dealers, producers, processors, transport agencies and other people concerned with the commodity or the distribution of information concerning it. The first set-up of the news service will have to be considered as on trial, for the first year or two especially, and will need testing by the methods outlined in the first part of this discussion.

Before starting the field work on a project of this kind, the researcher should have a clear idea as to the factors affecting the prices of the commodity. He should also be familiar with the whole marketing machinery and its functioning. Only with such a background in mind can he decide what information is needed and from which agencies it can be secured.

The discussion in Project 45 will also be of value to those interested in this project.

PROJECT 45. Foreign Market News.

Objective: To determine the most efficient procedures for collecting and disseminating foreign crop and market news for a commodity, including the determination of what news to disseminate.

(By Asher Hobson.)

The methods of analysis for this project will roughly correspond with those outlined for Project 44. The differences will have to do mostly with the collecting part of the work. Less opportunity will be available for comparative studies of such services, and more will have to be done with the testing of existing services. There is abundant opportunity for analysis of the details of the work, particularly the work of collecting news. Much needs to be done in the way of interpreting the official information available in foreign countries and determining its import. Foreign news service can be made much more effective if supplemented by studies of market outlets as outlined in Section C of this report.

Nothing further will be said in this discussion about the actual details of research procedure. What follows is a discussion of the problem of operating a foreign news service.

The function of a foreign market news service is to keep buyers and sellers in this country currently informed as to the status of

competition and demand abroad. Increased world production of many agricultural commodities, together with improved transportation facilities has increased the intensity of international competition. Never has it been keener than at present. Hence, it is doubted that effective national production and marketing programs can be formulated today without thorough and timely information on world agricultural conditions and their prospective trends.

The essential processes involved in the collection in foreign countries of crop and market information, and the domestic dissemination of that information, are as follows:

1. *Classification of commodities according to the way in which their prices are influenced by international economic impacts.* Commodities to be covered regularly by a foreign crop and market news service should be chosen according to the extent to which their prices are influenced by foreign competition and demand. That wheat, cotton and wool should be covered needs no demonstration. All factors affecting production and consumption of wheat have a bearing on United States wheat prices. In the case of cotton, the most important foreign information relates to the demand in foreign countries rather than to production, although the latter has in recent seasons been of considerable importance as a price influence and must be considered in any comprehensive foreign news service on cotton. Although we import large quantities of wool and export practically none, the production, consumption, stocks and prices of wool in foreign countries have a definite bearing on wool prices in the United States. For this reason import commodities such as wool should be included. Potatoes afford an illustration of a commodity upon which no regular foreign news is required, since exports are insignificant and imports are restricted by quarantine regulations. Nevertheless, in seasons of relatively small crops there are considerable imports of Canadian potatoes upon which there is no quarantine, and in some seasons it is therefore necessary to have information on the Canadian potato crop and market situation. A well-rounded foreign crop and market news service should be sufficiently comprehensive and flexible to care for special situations as they arise.

2. *Determination of the kind and type of information needed in order to appraise accurately the competition and demand situation abroad*—such as acreage planted, crop conditions, prospective yields (before harvest), actual yield (after harvest), numbers and kinds of livestock, movement in international trade, prices in important markets, stocks and carryovers, and quality in relation to consumer preferences. It is essential also to determine the kind and type of background information necessary in order to interpret the significance of current data. This background material includes comparisons with past years and deviations from normal, generally measured by an average. General information on such topics as un-

employment, business activities and the financial situation for specific countries is helpful in attempting to appraise prospective demands for some commodities.

3. *Location of sources of available information.* In organizing a foreign crop and market news collecting agency, an important task is that of determining the amount and kind of information readily available through organized agencies—official and private. Practically all governments maintain some sort of machinery for collecting and disseminating agricultural statistics. The degree of thoroughness with which this work is performed varies greatly. Certain official international organizations maintain statistical services on production, movement and prices of agricultural products. The International Institute of Agriculture and the League of Nations are examples. Certain commercial firms such, as Broomhall for grain, issue extended market news services. In most cases a national agency attempting to collect, analyze and disseminate foreign crop and market news will utilize the services of existing agencies, and supplement them. In most cases, stocks, quality and conditions on arrival in ports and primary markets must be supplied by private contacts. Furthermore, that important but indefinite something that carries an index of the “feel of the market” must be secured generally by trained observers or through specifically instructed representatives.

4. *Analyzing the possibility of improving existing sources and creating new ones.* A few indications will illustrate the possibilities in this field. It is probable that any agency attempting to collect crop and market news in foreign countries will be dependent upon governments for basic data on such items as production, crop conditions, and movements in international trade. There is much room for the extension of these data and the improvement of their accuracy. The campaign for a world-wide agricultural census in 1930 taken on a uniform basis is a step in this direction. As yet, information on stocks and carryovers is meager. Ways and means should be devised for reporting by governments of these important price-influencing forces. Government economic statistics lack uniformity. The Diplomatic Economic Statistical Conference held by the League of Nations in 1928 was an attempt to improve this situation.

5. *Determining methods best adapted to placing without delay foreign crop and market news in the hands of those in position to act upon it in the disposal of the product in question.* Certain types of information on current market situations must be transmitted by cable if they are to play a part in current transactions. Prices, shipments en route, and quantities being offered on specific markets, crop estimates, and unusual weather conditions markedly influencing prospective yields, are of this class. Other information, such as imports and exports, general observations on production and marketing conditions, and stocks may await publication at regular and stated inter-

vals. Data for use of farmers and small merchants call for interpretations and may well appear in such publications as monthly crop reports and in outlook statements.

Another classification, based upon a grouping of the users of this news, must be formulated in the dissemination of crop and market news. National cooperative marketing groups and large private firms in position to interpret isolated facts can use to advantage such items as current prices in specific markets, crop estimates for specific and even restricted areas, and tonnages afloat to and from specific ports. Such firms find it to their advantage to be supplied by cable with uninterpreted data, while the smaller cooperatives and private marketing units prefer to wait interpretation of these data disseminated through publications appearing less frequently and at stated intervals. The manner of distribution and the form of release must in large measure be determined by the uses for which the information is intended.

PROJECT 46. Inspection.

Objective: To determine the most effective procedure in the inspection of a given farm product—where made available, methods, charges, etc.

PROJECT 47. A Public Regulatory Agency.

Objective: To describe the organization and functioning of a public agency, such as the Packers and Stockyards Administration.

(By M. R. Benedict.)

This project will undertake (a) to identify the specific objectives for which the agency was set up, (b) to appraise the adequacy of these as objectives, (c) to describe the agency and the methods by which it seeks to attain the objectives designated, and (d) to appraise its form of organization and methods as to their efficiency and suitability for attaining the ends sought.

The act creating such agencies is likely to be phrased rather broadly, since it is usually recognized that the needs can not be foreseen in detail. Those administering the act will therefore have found it necessary to make certain interpretations of it. One of the important phases of the study may therefore be an attempt to compare the interpretations made by the agency as to its functions with the interpretations in the minds of legislators who created it, and with other interpretations which might be given to the act. Consideration should also be given particularly to the correctness of the assumptions back of the legislation, and to the legislative changes which

should grow out of the correcting of any assumptions not supported by fact.

The other concern of chief importance is that of the effect the agency has had in (a) changing practices, (b) increasing or decreasing marketing expenses, (c) changing prices from what they would otherwise have been. The last may possibly be an estimate on the basis of figures before and after the change, but is more likely to require resort to a consensus of carefully weighed opinions. In considering the effects of such activities, careful attention should be given to long-time tendencies involving institutional changes. The effectiveness of most regulatory bodies grows up over a long period of years and to a considerable extent as a result of trial and error. Such a trend may be either in the direction of a more competent handling of the situation or a drift toward a less effective treatment, either through weakness of administration or form organization or because no real need exists.

GROUP G

Projects Relating to Marketing Institutions.

Project 48. A Produce Exchange.

Objective: To describe the organization and functioning of a certain produce exchange, trace its historical development, and indicate its present and probable future effect on the marketing of the products concerned.

(By M. R. Benedict.)

This will involve the following specific aims:

1. To make clear the set-up of the exchange, the functions it performs, and the mechanical procedure by which these functions are carried out.
2. To trace the development of the agency in arriving at its present form and methods, and to explain the reasons underlying the original setting up of the exchange, the various changes made, and the alternatives chosen at various stages in its development.
3. To analyse its effect in:
 - (a) Cheapening or shortening the process of making a transfer of commodities which would occur if the exchange did not exist.
 - (b) Causing exchange of commodities which would not occur if the agency did not exist.
 - (c) Altering the course of flow of the commodity.
 - (d) Stabilizing flow and lowering costs through organized assumption of risk.

- (e) Increasing costs through restrictions of action by its members, monopolization of certain functions, etc.
- (f) Inhibiting or facilitating developments, desirable or undesirable, which might grow out of the changing conditions in the industry served.

A number of studies of this general type have been made, though many if not all have stopped somewhat short of the full limit of the objectives indicated above. Some have described only the mechanical set-up and functioning. The propriety of the activities of the various exchanges has been frequently and bitterly challenged. Studies of this type should undertake to provide those parties directly affected, and the public, with an adequate and unbiased description, which will aid in the effective and harmonious use of desirable elements in the exchange's activities, which will point out defects in its organization and functioning and suggest how they may be overcome, which will indicate clearly the need for and limitations of regulatory activity, and which will in general promote constructive rather than destructive development in the marketing of the commodities concerned.

The scope of the project will usually be limited to the given exchange and its immediate trade territory. The study is, in fact, an excellent example of a fully developed case study of a single case. Nevertheless, parts of the study may necessitate consideration of the effect on other market centers, especially where activities either direct or indirect have influenced the routing of produce, the method of handling it at points of origin, etc. The period of time covered will usually be the whole history of the exchange and may include a short or long period prior to its establishment in order to make clear what its effects have been.

A produce exchange is created by those individuals engaged in certain specific activities, and its set-up, policies; and methods will probably be designed primarily to serve the interests of this particular group of individuals. This does not mean that its activities may not be in harmony with public interest or with the interests of the growers, transporters or consumers of the products handled. Nevertheless, it can not be assumed that such harmony of interest does exist, and though the exchange may be well on the positive side of the scale in the value of its activities as a whole, there may be some elements wherein the personal interests of its members will run counter to those of the public and of the other elements in the industry. The exchange's interpretation of its functions, motives, and effects can not therefore be accepted without going behind the more obvious features and attempting measurements which are bound to prove very elusive.

The most evident of these possible conflicts of interest is likely to be found in the scale of charges for services. This is ordinarily fixed by the exchange. It may represent both a protection against very

exorbitant charges and the maintenance of a charge that is higher than is needed to draw an adequate number of competent operators into the business. Light will be thrown on this by study of the nature of the restrictions placed on the acceptance of new members of the exchange and by study of the completeness of utilization of the time and facilities of the various members; also by consideration of the number of operators needed to provide a flexible freely-operating market. There is in some cases a tendency for the rates to be so fixed as to permit the less able and less aggressive members to continue in business. Out of this may grow a stimulus which draws into the business a larger number of individuals than is needed. Yet this fact may be obscured by an excessive division of the total volume of business in such a way that none of the members operates very efficiently. Only a study of the possible gains with larger-scale operations by the members and of the possibilities of securing such larger-scale handling will disclose the true situation in this respect.

Possibly a more important consideration lies in the extent to which the exchange serves to establish and maintain financial responsibility and honesty of dealing. Very undesirable practices can grow up even in more highly organized exchanges than those of the produce market. Such activities as the rendering of false bills of sale and of fictitious sales are difficult to detect. The handling of purchases and sales with a commission business offers considerable opportunity for preferential sales of owned merchandise, but such activity is hard to recognize and still more difficult to prove.

When the attempt is made to compare the expense of operation through the exchange with what it would be if the exchange did not exist, two rather different comparisons may be undertaken: one, a consideration of what costs would be if the distribution were more fully integrated so that large cooperatives or individual entrepreneurs handled distribution without an exchange intermediary between them and the consumers (for example, direct sales by cooperatives to chain stores); two, a consideration of what costs would be in a virtually unorganized industry with competitive handling by a large number of unorganized dealers. Both of these assumptions involve making comparisons which do not deal with the same kind and quality of services and therefore demand resort to very difficult types of estimate.

An attempt to predict probable future effects on the marketing of the product is of necessity highly speculative in nature. It may be possible to recognize certain trends and to extend them somewhat into the future, as, for example, any tendency for the exchange's method of operation to develop grading and control of quality, and possibly through these, control of quantity, or vice versa. The exchange may be a means of providing organized opposition to other types of development such as cooperative handling. Its effect may also be to change gradually the method of financing the marketing of the product.

The analysis will not be complete without some consideration of the influence the exchange may have exerted in promoting or retarding a change to a better physical set-up and location for the marketing activities. This may be limited to interpreting the nature and direction of its influence. In some cases, however, the investigator will wish to determine where and how the physical operations of the market could be more economically carried on. Such considerations may have been relatively little affected by the activities of the exchange, but relate so closely to other aspects of the problem that they may well be investigated at the same time.

Closely related to the preceding aspect of the problem is the question of the influence the exchange may have had in modifying freight-rate structures with a view to fostering certain routings, concentrations, etc. This is likely to be much less significant in the case of produce exchanges than of grain exchanges, where it has been a rather important factor.

The most important sources of historical information will be found in the official records of the exchange, in trade journals, and in the memories of older members of the exchange. Much of the other analysis indicated, involving somewhat hypothetical set-ups, can be only approximate. Such factual basis as can be secured for this will come chiefly from analyses of the records of the member and non-member firms. A comparison of price spreads with those in similar markets and with those of important cooperative handling agencies may be helpful in some cases. Some phases of the study will undoubtedly require rather extensive use of the interview method with market employees, exchange members, non-members, shippers, and other individuals. Some resort may be needed to the Interstate Commerce Commission for records of rate changes and how these came about.

The most significant units of measurement will probably be found to lie in costs per unit of product handled, which will need to be analyzed on the basis of the discussion under "General Methodology" in Group D. Prices received for given qualities may reflect significant variations in different ways of selling, but if so, these will be very difficult to identify.

The only sampling likely to enter in is the selection of representative member and non-member units, and in the selection of products and periods for which costs may be studied. No very definite general suggestion can be made in these connections except that considerable care should be exercised to see that these illustrate characteristic ranges. Representative averages are not likely to be very significant in this study. A good understanding of the range involved and of the reasons for the differences shown is more important. Some bias will have to be watched for and guarded against, especially in opinion statements both from members and non-members. Little can be said as to means of handling this, except the suggestion that ques-

tions be framed in several different ways with their bearing on certain rather controversial problems as carefully camouflaged as possible. Much must rest on the judgment and insight of the investigator. Errors in the exchange's official records will ordinarily be minor, but price quotations taken from other sources, especially those from the newspapers, will need to be carefully scrutinized and checked.

The method of analysis is that of the case method, which is briefly discussed in *Research Methods and Procedure in Agricultural Economics*. Each exchange occupies practically a world of its own. Its conditions may be materially different from those of other exchanges. It may handle different products, serve a different kind of clientele, have different physical locational relationships, etc. Nevertheless any study of this type will provide much useful information which will aid in understanding the operations of other exchanges.

An excellent study illustrating this type of project is to be found in E. G. Nourse's *The Chicago Produce Market* (Houghton Mifflin Co., 1918.) A treatment which is less in the nature of a specific study and more largely a generalization for all of the produce markets is to be found in *American Produce Markets* by H. E. Erdman (D. C. Heath and Co., 1928).

PROJECT 49. A Grain Exchange.

(By M. R. Benedict.)

Both the objectives and the procedure involved are very similar to those indicated for Project 53, except that the present project deals with a much more highly developed type of exchange. Much fuller and more accurate records are available, more complete historical study has been made, and certain additional functions are concerned.

There is need for a more thorough and careful analysis of the total cost of selling through these exchanges than any that has yet appeared. It is probable that the very low per-bushel costs published by the exchanges and used in most defensive books and articles do not present a true picture of the situation. Certainly the exaggerated charges of the evil doings of the exchanges as presented by their critics do not depict the situation in its true light. The grain trade as a whole must provide not only for the small one percent commission on sales of cash grain, but for commissions on purchases and sales of futures, for credit used, for interest on money invested, etc. All these expenditures are necessary to support the great pool of futures trading. This represents an extensive, highly organized, yet inexact form of price insurance. No one knows what its cost is nor on whom the cost chiefly falls. With the development in recent years of much more complete data on hedging, both at the grain exchanges and at the country elevators, a more fundamental analysis of these relationships should now be possible than could be made hereto-

fore. The possibilities of economies of operation in the present system of grain handling, of elimination of abuses, and the problem of the present organization versus an integrated system, will yet bear a more thoroughgoing analysis than they have so far had. Such a study will be an extensive undertaking, however, and should be attempted only by one thoroughly versed both in the methods of economic investigation and in the technique of the handling of grain and futures on the central exchanges.

Another aspect of this study which may well be developed has to do with the similarities and differences in reaction to given influences which are shown by markets of this type and by markets organized along other lines. The exchanges handling the major farm products represent a closer approach to the classical concept of a freely competitive market than is found in those marketing systems which have developed a greater degree of integration and a more definite control of supplies put on the market, different methods of making prices, and, possibly, more effective means of production control. Comparisons with less highly organized markets such as those for livestock or wool may also be desirable.

Such comparisons should throw some light on the possibilities and limitations of proposals for markedly different methods of handling the distribution of these products.

Scope.

The principal consideration will be the specific exchange and its patrons or users. This, however, can not be completely separated from other exchanges, since operators on those exchanges may hedge on this one, or vice versa. Consideration must also be given to the fact that the futures operations of the exchange do not relate solely to the grain actually handled on the exchange. For example, when a country mill buys from a country elevator and sells to a wholesale house, all parties concerned may hedge in the futures market and thus occasion six purchases and sales of futures contracts. Yet none of this grain may actually pass through the given market center. Relationships of this kind must be included and are considered to be within the scope of the project. Another aspect of the problem—namely, the possible effect of future trading on the prices of cash grain—is specifically omitted as being a more proper subject for treatment in the outline of research on Prices of Farm Products.

It is doubtful if detailed discussion of the analysis at this time will be very significant. The method will depend to some extent on the records found available, and on new aspects and lines of attack suggested by the material as the study progresses. The most significant first step appears to be an attempt to determine the entire cost of the operation of the exchange. This cost appears in two distinct forms, one more readily computed than the other, but neither a matter of easy determination:

1. The first relates to the total charges for all functions performed, the second to gains and losses incident to price changes. The first will include all commissions, on cash grain sold and bought and on futures contracts bought and sold, fees for inspections, etc. These may in turn be subdivided into those expenses involved in the physical handling of the grain, that is, commissions on cash grain sales and purchases, fees for inspections, etc.; and the charges incident to the futures trading of the market.

Most of this information on costs of physical handling can be obtained or computed from the records of the Grain Futures Administration and the reports of the exchanges. Nevertheless, some imputation and allocation of costs will be necessary. The commissions charged and paid represent actual costs, so far as the distribution of the final income from the product is concerned. They do not represent actual costs of conducting the business, so far as the various commission firms are concerned. Nor is it safe to infer that they represent costs to those member firms that are sellers or consumers. Supposedly these firms find it cheaper to maintain memberships and personnel on the market than to pay the regular commissions on their purchases and sales. Nevertheless, as a matter of practical procedure, it may be best to assume a payment of the regular charge on these transactions, and to credit such reductions as may be made in these to the economy of large-scale operation on the part of those firms that maintain their own seats and representatives on the exchange.

In considering the extent to which these costs are economically justifiable, two divergent lines of attack may be used: the one, a study of the internal economy of the exchange and of the units which make it up; the other, a study of possible alternative methods of handling. The first would not look upon the charges as costs, but would study the expenses of the individual firms partly with a view to seeing how the efficiency of given firms could be increased, and partly with a view to determining the actual costs of conducting the operations of the exchange, the charges necessary to the maintenance of efficient operation, and the earnings upon which the valuations of exchange seats are based. This phase of the study involves the difficult problem of allocating charges as between cash grain operations and those devoted to trading in futures. Also it presents probably insurmountable difficulty in obtaining necessary data.

The second line of attack represents an attempt to estimate the costs of undertaking to merchandise the grain without the agency of the exchange. From this view, the charges of the exchange firms represent costs of this as an alternative system of price-making and merchandising. Probably the most difficult element of such a study, assuming in this case that the exchange does not exist, is to find any means of price determination which affords an adequate basis for estimates. The customary assumption is that the price would be

higher than in the competitive market. To cause it to be higher, however, it would be necessary that very great knowledge and skill be used in handling such alternative machinery as might be developed. A tremendous concentration of grain without provision for production control may interfere with a needed freedom of flow and thus cause bargaining losses capable of offsetting possible physical economies.

A study of the actual costs of operation of the various firms and of the profits in operating the exchange probably could come about only as an official investigation. It is scarcely conceivable that the firms would voluntarily make available the information necessary for such a study. The other type of study is probably possible on the basis of published records, but involves a great deal of hypothetical judgment and estimate.

2. The second problem indicated is even more difficult than the first. This has to do with the social cost of maintaining future trading in the grain exchanges, and with those who contribute to this cost of carrying on such activities. In this case, also, the expense in the form of commissions can be fairly well determined if charges are accepted as costs. As in the previous case, these may be viewed as costs to the user of the services or may be further analyzed in terms of actual costs to the firms engaged in the business.

Much more difficult is the problem of arriving at any worthwhile estimate of the elements other than commissions. The speculators in futures represent a great price insurance pool which supposedly takes losses when prices decline below expectations, and gains when prices advance above expectations, in such a way that these losses and gains roughly offset each other, leaving a sufficient balance to compensate those engaged in the business for the use of their funds, for the risks assumed, and for the time and effort devoted to the business. There is reason to believe that in businesses where the prizes are large, although the risks (to individuals) are also great, the requisite input of capital and of effort may occur without the existence of any real net profit. It has, in fact, been estimated that in such lines of activity as that of prospecting for gold or oil, more money and effort have been invested than would be paid for if the net output were distributed among all of the searchers. If gains and losses of the professional speculators do not balance, two possible providers or recipients of the net difference may be found: first, those who use the futures market for hedging purposes; second, the non-professional speculators, commonly known as the "lambs". With regard to the first, it is generally recognized that there is no such thing as perfect protection through hedging, either for the seller or for the buyer of grain. Hedging is simply a means of reducing the risk. Hedgers are continually buying futures or selling futures and completing the transaction at a later date and at different prices. These losses and gains do not necessarily balance, and

the net loss to these hedgers, if it exists, may be the means of paying a part or all of the cost of such partial insurance against changes as the futures market provides. That part of the total volume of commissions charged for the transactions in futures which is paid directly by the hedgers is definitely recognized by them as a part of the cost of hedging protection. The other part, probably much larger in amount, must be borne in some such form as that we have just mentioned, unless we assume that the speculators simply run a large lottery, which pays out of individual losses not only the gains of individuals but the expenses of maintaining and operating the machine. The commission men who execute the orders and receive the stipulated fees are ordinarily not the individuals who are carrying the risks.

The second group indicated, the non-professional speculators, is the one frequently considered to carry at least the amount of the net gains of the professionals, on the assumption that these amateur operators lose more often than they gain. Granting that such may be the case, this does not lessen the social cost of the service. It simply changes the incidence of a part of that cost. Some case might be made out for the view that the maintenance of a futures market is hardly justified unless its services are warranted on the basis of support from the first two sources indicated: namely, fees charged the hedgers and net losses to hedgers on the futures bought and sold. If the lambs pay all or most of the cost, this represents a net drain on another social group not directly concerned with an effective machinery for the handling of grain.

The securing and treatment of data for this sort of analysis is far from simple. It is probable, however, that most of the information needed could now be drawn from the original records of the Grain Futures Administration except such as relates to the cost to the speculative firms of carrying on this phase of grain marketing. The last could be obtained only by access to the expense records of the individual firms. The most significant public question does not relate to this, however, but to the total expense to society of having this service available regardless of what portion of this expense may be profit to speculative firms and what part costs for use of funds, personnel, office space, etc.

Resort to records of the Grain Futures Administration will probably involve sampling both as to the records used and as to the period of time. Suggestions on this process are of little value at this time, as only careful study of the actual records will indicate what if any sampling process can be used. The records of one full year may be insufficient, since the speculators may make rather consistent gains or consistent losses in any given year. It is not unusual for the whole futures market to be rather sharply out of line with developments that occur later. In such cases the hedgers may be gainers on their futures deals so far as the year's operations are concerned, while in another year their operations may represent a net loss.

If the total cost of maintaining the futures market can be ascertained, it may be possible to reach a fair approximation of the part of this cost borne by selling hedgers, by means of an analysis, along the above lines, of records such as those which the United States Department of Agriculture, in cooperation with various states, has been collecting from country elevators.¹ Such data are not at present suitable as a sample, however, since they do not include enough information concerning the line and independent elevators. There is apparently no comparable body of data from the purchasing hedgers, and it seems doubtful if such data could be secured. The records of the Grain Futures Administration, therefore, appear to be almost the only feasible source of necessary raw data. Its records are now reaching a volume which should make possible more significant study of this problem than has previously been possible.

In comparing the present system of handling grain with possible alternative procedures, it may be necessary to consider the resources which cash grain commission firms devote to future operations from an additional-cost standpoint, since if futures trading were eliminated, expenses would be decreased only by the amount which these operations add to the total expense.

The literature covering various studies of this type is so voluminous that no effort will be made to list it here. In spite of its incompleteness, and a certain amount of evident bias, the study of James E. Boyle, *Speculation and the Chicago Board of Trade*, is probably the best one of this type so far made for the grain exchanges. Of course it does not go anywhere near as far as this project proposes to go. A considerable body of material, most of it not yet very fully analyzed, will be found in the following publications based chiefly on the records of the Grain Futures Administration.

Report of the Grain Futures Administration, 1924, and succeeding issues;
Senate Document 185, 69th Congress, first Session, *Fluctuations in Wheat Futures, 1926;*

United States Department of Agriculture Bulletin 1479, *Speculative Transactions in the 1926 May Wheat Future, 1927;*

United States Department of Agriculture Technical Bulletin 79, *Major Transactions in the 1926 December Wheat Future, 1928;*

Senate Document 264, 70th Congress, second Session, *Reports by Members of Grain Futures Exchanges, 1929;*

United States Department of Agriculture Technical Bulletin 199, *Trading in Corn Futures, 1930.*

- Such analysis as has been made in these reports is, however, from a different point of view than that suggested in this project,—namely, that of judging the effect on prices of given operations in futures. Great care is needed in the interpretation of the co-variations shown. The fact that price movements tended to be in accord with the interests of the largest operators may mean that these operations caused a part of such price movements, or it may mean that these operators were merely in a better position to recognize tendencies

(1) See Project 40 above.

which were working themselves out in the market. Probably the true explanation lies partly in each factor.

PROJECT 50. An Auction Market.

Objective: Same as Project 48 for an auction market.

(By M. R. Benedict.)

The more evident elements of this study will follow very much the same lines as those of Projects 48 and 49. The study should give a clear understanding of just how an auction market works. The distinctive features will deal with the question of why this system of selling was adopted, and how its effects differ from those of some other system of price-making and transfer of ownership. This virtually brings into comparison two or more different philosophies of selling. The sale of different lots of goods by different salesmen or organizations reflects a belief in some degree of advantage from superior bargaining ability. The use of the auction market, on the other hand, implies a belief that the important problem is to keep the products moving freely into consumption. The perishability of the product has no doubt had much to do with the adoption of the auction system, though it is used to some extent for non-perishable products as well as for fruits and vegetables.

A study of the reasons for the adoption of the system is not in itself sufficient. These decisions may have been reached on the basis of false assumptions. The first problem that presents itself is that of the comparative expense of selling by auction or selling by some other method. Direct and fairly dependable comparisons on this point can probably be made, since other methods of sale are fairly common. In the costs by each system should be included differences in spoilage, expenses for reshipment to other markets, demurrage or any similar charges which may result from a lack of free flow of the product.

The other most significant, and at the same time the most difficult comparison, is that of prices secured for given grades and amounts of the product. Such a comparison probably can not be made in a conclusive way. Possibly the nearest approach to it lies in a study of the results secured by some large agency such as the California Fruit Growers' Exchange, which has sold practically an identical product in similar markets by different methods.¹ In this case, however, consideration will have to be given to the volumes of the product moved onto these markets in relation to their size and buying power, not only volumes from the given agency but from all agencies combined. It may also be necessary to consider differences in the trend of volume of purchases in the markets compared and possible differ-

(1) Some valuable studies may also be presently made of the egg auctions now operating in some egg-producing areas.

ences in the competitive products on the markets at the times considered.

A third phase of such study may assume the auction as an accepted method of selling and proceed to consider the efficiency of its operations, and possible or probable improvements in its methods and organization for conducting that particular type of selling.

A current study of this type deals with the auction system of selling loose-leaf tobacco in Kentucky. It is under the leadership of Dr. H. B. Price.

PROJECT 51. Farmers' Public Markets.

Objective: To determine the importance of farmers' public produce markets, the type of market place, the layout, and the kind of equipment that is best adapted to present day markets; to ascertain who should own, control and operate such markets; and to determine the principles and business practices best suited to serve the interest of sellers and buyers.

(By F. P. Weaver.)

Such a project may be planned to cover one or more public produce markets. If time and funds are inadequate for a detailed study of several markets, a brief survey of a number of such markets, followed by a detailed study of a few is suggested as the best procedure to follow. The full significance of the results becomes evident when all the markets of a state or a similar area are included.

The cost is dependent to a large degree upon the size of the project. The most advantageous organization for the study of a number of markets is to have one experienced investigator in charge, with one enumerator for each market to work under and with the man in charge. The investigator should spend the major portion of the market season (June to November) in the field, and one enumerator should be on each market continuously during that period. On markets with a small volume of sales, say, less than half a million dollars annually, about four or five weekly periods, well scattered throughout the marketing season, should be adequate time for one investigator to gather data on the volume of business. The time required for summarization of the data depends on the number and size of the markets studied. Two clerks who are skilled in the use of calculating machines should be able to summarize and check in about one month the data from one market doing from \$2,000,000 to \$4,000,000 worth of business per year.

In this country the history of produce markets is tied up with the growth of villages into towns and cities, nearly all of which had at one time a market square or a market street where producers sold direct to consumers. Generally the town or city owned the market

place but did little to regulate the business carried on there. Many of the present market places owe their origin and layout to that type of market. These are poorly adapted, either by location or layout, for present day exchange of perishable produce from the large truck loads of producers and trucker-dealers to the trucks of grocers, jobbers and city peddlers who constitute the majority of the buyers. In the present study, therefore, some investigation of the history of the particular market, of changes in its surroundings and of changes in its clientele, will aid in analyzing the nature of the adjustments needed. Marked shifts in the locations of centers of population, of wholesale districts, and of retail sections have occurred especially with the development of automobile traffic and of new highways, railways, subways or bridges. Some consideration given to these will not only aid in correcting present maladjustments but may afford a basis for predicting probable future changes.

Market officials, city controllers and auditors, producers selling on the market, various groups of buyers, (such as grocers, hucksters, housewives, and jobbers and the commission men doing business on or near the market) are the main sources of data on volume and character of business, rules and regulations, income and expenses from operations, and practices followed on the markets. Data on potential produce available may be obtained from federal and state census reports as well as from crop and market news reports. The reports from the United States Bureau of Agricultural Economics show the movement of the leading perishable commodities by rail, and in some instances the movement by truck; but usually the railroads must be depended upon for additional information of this nature.

The amounts of produce unloaded by each of the railroads entering a city must be determined by getting the data from the railroads. The areas in which this produce originates should also be determined, as this is an important factor in determining the place in the city where markets should be located.

Data on volume of business, the character of produce handled, the area from which it comes, the principal classes of buyers, the amount and character of purchases by class, and the consuming area served should be obtained from the sellers and buyers on the market.¹

Records should be obtained from as many sellers and buyers as possible during the period or periods in which the field investigator is working on any particular market. A random sample consisting of about one-third of the sellers and buyers on the market should be sufficient to give a fairly accurate cross-section of any market. Where market officials keep records of the number of loads sold throughout the year, the average value and composition of the loads on which

(1) Blank forms for sellers and for four important classes of buyers are shown on pages 105 to 110 of the writer's *A Survey of Some Public Produce Markets in Up-state New York* published as Cornell Bulletin 525. Where buying by consumers is of great importance, a separate blank for that class should be used.

records are obtained may be applied to the remaining loads to obtain an estimate for the entire market.

Sales to each class of buyers, as reported by sellers, should be checked against purchases as reported by each of the groups of buyers. It would be very desirable to interview representative retail stores throughout the city in which the market is located, and obtain data as to their volume of business in perishable produce and the sources of their supply, the latter with particular reference to the use made of the public market. Where an appreciable proportion of the produce passing through the market is sold to householders, it would be desirable to learn by a reconnaissance survey in what sections of the city the homes are located in which this produce is consumed. These data would be very useful where a market is to be relocated.

Data on the volume and character of business conducted by commission houses should be recorded on suitable blank forms. Figures for sales to various groups of buyers can be checked against purchases by each group. The volume of business done by commission men in shipped-in produce should be checked against railroad data on unloads.

Counts may be made of the number of buyers' autos and trucks on the market per day at various seasons, and also the number on the market at one time at the peak hour. The length of time that buyers' cars remain on the market should be ascertained in order to determine traffic and parking requirements. A detailed description of the market area, its layout, the type and dimensions of sellers' stalls, buyers' aisles, driveways, parking areas, and the number, use and size of all buildings, should be obtained from the market officials and from observation, as well as a check on their adequacy as indicated by observation and by opinions of users.

Data on income and expenses from operating the market should be obtained from the market master or from the department of audits and control of the city government for municipally owned markets and from the proper officials where markets are owned by corporations or cooperative associations.

The produce sold on public produce markets covers such a wide range of commodities that no common physical measurement can be applied to all. The unit of measure to be used for any commodity in taking records should be that with which sellers and buyers are familiar. This varies on different markets.

Data on products sold should be summarized by commodities, by points of origin, such as townships or counties, by classes of buyers, and also by cross-classification of these groups. If others than producers sell on the market, the sales of producers and non-producers should be summarized separately.

Data from the various buying groups should be summarized by groups of commodities, such as fruits, berries, vegetables, poultry and eggs, dairy products, meats, etc. Analysis of sellers' data may

be made on the basis of county of origin, size of loads, distance produce was transported to market, volume of sales per individual seller, percentage sold at wholesale and at retail, and so forth.

The method of summarizing and analyzing is so self-evident from the character of the data that no fuller description is deemed necessary. Those desiring to obtain more complete suggestions can obtain them from the references listed below.

The importance of a public market in supplying produce to the consumers of the city will be indicated by the percentage of the produce used in the city which passes through the market as shown by the analysis of grocer records. Its importance to other consuming areas can also be shown by the summary of inter-city trucker records. Whether some agency with a wider interest than that of the city government has should have a part in the ownership and operation of such a market, will be indicated by the extent of the producing and consuming areas which it serves. The analysis of cost of construction and income and expenses will shed some light on whether the producers themselves could finance such a market. The interests of large vegetable gardeners as against those of small growers can be judged to some degree from the analysis on the basis of size of load. Analysis on the basis of distance traveled by sellers will show the importance to the market of producing areas located at various distances from the markets. The amount of parking space needed will be indicated by the number of buyers' rigs on the market at one time.

The importance of providing special space for such buyers as hucksters and inter-city truckers may be inferred from the extent and character of their buying.

The type of market layout that is most desirable may be inferred from the present layout and how it functions. The relation of the market to the commission houses is shown by the volume of business done in shipped-in produce in class proximity to the market, as well as by the extent of sales to these dealers on the market. The streets over which sellers and buyers reach the market, and the routes over which shipped-in produce reaches the city, will indicate where a market should be located so as to be most accessible and cause the least possible congestion on the busy streets of the city.

Another reference on public market surveys is: Hopper, Wilbert C., unpublished thesis, "An Economic Study of the Marketing of Certain Perishable Farm Products in Albany, New York", August, 1932, Cornell University. Dr. O. Ulrey is making a study of the farmer markets for fruits and vegetables in fourteen cities in Michigan. His methods are less intensive than those above outlined.

PROJECT 52. Comparative Analysis of the Livestock Markets of the United States.

GROUP H

General Projects by Commodities.

Projects that have as their objective the analysis of the marketing of a given commodity generally deal either with a major commodity in an exploratory way, or with a minor commodity in some of its important marketing aspects. Obviously, to go farther than this with an important commodity calls for the setting up of a series of projects or sub-projects relating to a particular commodity, of the sorts outlined in the foregoing sections of this report.

Other products that might be made subjects of such a commodity type of project are maple syrup, turkeys, pecans, and rice.

PROJECT 53. Marketing of Particular Commodities.

Objective: To analyze the marketing of some one commodity with respect to the more important of the foregoing phases of it.

A. Honey. (By H. B. Price.)

The particular aspects of the marketing of honey which will receive attention are probably the following:

(1) *Problems of production.* Where honey is produced; what shifts are taking place in location of production; relation of honey to organization of farms on which it is produced; methods of production which affect marketing, etc.

(2) *Problems relating to channels of distribution.* Steps in marketing; middlemen at the various steps; and the services rendered by different middlemen. Special attention will generally be given to the manner in which producers market honey, since a large proportion of it is sold directly to consumers. This practice is especially common among farmers who produce honey as a sideline and live near urban centers or on highways having heavy traffic.

(3) *Problems relating to market outlets.* The uses of honey; where it is consumed; relative importance of uses and markets; seasonality and other characteristics of consumption.

(4) *Special problems.*

- (a) *Packaging.* As honey is frequently sold directly to consumers by producers, the size and kind of container is important.
- (b) *Grading.* This is also important for a product sold in a consumer's package and branded and advertised. There is at the present time no generally recognized system of grades, with the result that there is much confusion in terminology relating to quality.
- (c) *Advertising.* Analysis needs to be made of prevailing

methods of branding and advertising and the relative merits of the different methods.

- (d) *Consumer preference.* Honey appears to be a product for which there are pronounced preferences among consumers. A study of price, package, flavor, color and other characteristics of honey that affect these preferences may provide valuable information for theoretical analysis of factors affecting prices and suggestions for selling plans. As the collection of data for this part of the study will be organized separately from the rest of the study and will not be dependent for analysis upon the data obtained in other sections; hence it may very properly be undertaken as an independent study.

Honey is a product well suited to the commodity approach. It is produced in relatively small quantities, generally as a sideline to other farming enterprises, and in widely scattered areas of the country. Probably in no section of the United States is the income from this source sufficiently large at the present time to warrant the development of a comprehensive research program that includes all or even several aspects of its marketing.

The chief significance of this study is that it contributes to a better understanding of the structure and functions of the marketing organization for honey. Ordinarily such projects cannot be used as the basis for a reorganization of the market, a purpose too often claimed for them, because the analysis is generally too incomplete. They should, however, be valuable in pointing out important problems, weaknesses and advantages of the marketing system and thus serve as a guide for further research.

Owing to the almost complete lack of published data on all aspects of honey marketing, reliance must be placed upon primary sources of information. These sources are producers, retail stores, various wholesale middlemen, and in the case of buyers' preferences, consumers. Satisfactory data may be obtained under ordinary circumstances by field men with suitable schedules.

As there are important differences in farmers' methods of marketing honey due to distance from market, amount of production, and relation of the bee enterprise to farm organization, it is advisable to stratify on these bases the farms that are included in the study. Wholesale dealers will need to be selected with a view to obtaining proportional representation of all types and methods.

This project may be large or small depending upon how complete it is desired to make the study. The most satisfactory arrangement is to study typical communities in representative producing areas. In most states, this will involve from three to five areas, depending upon how diverse the conditions of the industry are. Then if resources permit, a survey may be made of each of the principal urban

markets, or of representative urban markets. In a state like Minnesota with few large cities, only two or three cities need be included.

This study should be directed by a specialist in marketing organization, who should collaborate with a specialist in bee culture.

This study must be largely descriptive of marketing organization and marketing services, and the analysis must be made chiefly in terms of known principles of business organization and marketing. The analytical procedure will be largely of the sort designated as "qualitative description" in *Research Method and Procedure in Agricultural Economics*. The quantitative measures used will be limited largely to averages and dispersions.

Two studies of this subject have been made in recent years, one at the Minnesota Agricultural Experiment Station, the other at the New York Experiment Station. Both were made in cooperation with the Bureau of Agricultural Economics. The results of the Minnesota study are available in the unpublished thesis of Torstein Grinager at the University of Minnesota. The New York studies have been published by M. P. Rasmussen in the March, May, June and September issues of *Farm Economics*, Cornell University, 1928.

B. *Canning tomatoes.* (By S. H. DeVault and W. J. Hart.)

A project of this type may be organized on a local state or regional basis, the exact set-up depending on the extent and homogeneity of the producing area. If the conditions of production and marketing are very much alike in two or more adjacent states, as for example, in Maryland, Delaware and New Jersey, then it is very desirable to have the project organized on a regional basis. This makes it much easier to secure the much needed support of the canning trade.

Some phases of the project—for example, the factors affecting the quality of tomatoes for canning purposes—should extend over several years, and a three-year period is really needed for the major phases of it. This part of the study would be joint with production specialists in horticulture, soils and chemistry. This part of the project is on the border line between primary production and marketing, but the market researcher must have experimental evidence on the factors determining canning quality of tomatoes.

The content of such a project will vary according to the local situation and the purposes in view. As this project is here set up it will cover the following subjects:

(1) Structure of the market for this commodity from producer to consumer, agencies involved, methods of sale, charges, brands and labels, marketing practices, exports and imports and consumers' preferences.

(2) Storage and financing of the canned product—warehouse facilities, costs of operating terminal warehouses; extra costs of

providing storage at the factory under the United States Warehouse Act; use of credit and methods of financing canners.

(3) Factors affecting the canning quality of tomatoes.

(4) Standardization of grades for canning tomatoes so that the grower and the canner will have a basis of exchange which will be fair and equitable to both parties.

(5) Economic set-up and operating efficiency of canning factories. Some of the topics to be covered under this section are: Utilization of machinery, sources and rates of pay for labor, costs of canning tomatoes, combination of tomatoes and other products, volume packed in relation to cost, seasonality of canning and its effects on costs, yield per ton of raw stock and costs, control of production by canners, utilization of by-products, cooperative canning, net returns on investment, returns in one-line and in general-line factories, management and profits.

(6) Market information. The lack of fundamental market data results in disparities between futures and "spot" prices on canned tomatoes, which in turn bring about friction between canners and distributors. Making information on price determining factors available to farmers and canners should help them to adjust their production to changes in demand.

In outlining the structure of the market for canning tomatoes, there are many sources of information open to the investigator—farmers, canners, trade associations, trade publications, and members of the canning trade, including brokers, jobbers, wholesalers, commission men, etc. The records of canners furnish the best data to use in analyzing the operating efficiency of canneries. In the Maryland studies of the operation of canning factories, the state was divided into three main regions: namely, the Eastern Shore, Harford County, and Western Maryland.¹ In Harford County the soil is fertile and yields of tomatoes are high, but the factories are numerous and small. Only a small percentage of them pack other products in addition to tomatoes. In Western Maryland the factories are larger and the business more diversified. In the Eastern Shore area the soils are much lighter than in the other two regions, the season earlier, and the shipping of green-wrapped tomatoes is an important industry. In such a study, the size of the sample will be limited by quality of records kept by canners, time at the disposal of the field men, and the extent of cooperation from canners. The Maryland study included over one-fourth of all the tomato canneries in the state.

Data on the grading of cannery tomatoes and on the factors affecting their canning quality were obtained in Maryland by the experimental method. Results of some of the experiments have been

(1) Maryland Agricultural Experiment Station Bulletin 801.

published.² The Maryland Station has set up an experimental canning factory for the purpose of studying these problems. In these experiments, tomatoes grown on the University farm were graded as picked on the basis of the United States grades. The different grades were then canned separately and the number of cans of tomatoes per ton of raw stock calculated. In the absence of government grades, the canned product was then graded on the basis of a score-card worked out in conjunction with the Tri-State Packers' Association. Price differentials between the different grades of cannery tomatoes were established and the cost per ton to the canner for his raw stock was determined.

If the project covers more than one season it may be helpful to present the main findings at the end of the first year. For example, if canners have furnished considerable data, it may win their goodwill if some of the results are given to them before they are presented to the public. This also gives the research worker an opportunity to test the results before they are published in complete form. Results of experiments on canning quality of raw stock are always of interest to canners. The trade journals are suitable organs for putting such information before the public.

Perhaps the Indiana Agricultural Experiment Station has made the most extensive study of quality factors. Indiana Station Bulletin 317, *Grading Tomatoes for Quality* (by F. C. Gaylord and Harry M. Cleaver) reports the results of these experiments for 1927. These Indiana studies are being continued. The data in Indiana have been obtained from a selected group of canneries in a cooperative study with canners. A similar study is reported in General Bulletin 474 of the Pennsylvania Department of Agriculture.

C. *Other products.*

Current studies that may be put under this project title are Dr. H. B. Price's current study of the marketing of sorghum molasses, a Michigan study of the marketing of beans, and an Indiana study, also by Gaylord and Cleaver, of the marketing of sweet potatoes. Probably under this head also should be included a number of the projects of the Bureau of Agricultural Economics, such as those dealing with wholesale and retail livestock and meat marketing.

PROJECT 54. General Systems of Marketing for a Product.

Objective: To determine the relative advantages and disadvantages of two or more competing systems of marketing for a product.

A project of this type will commonly cover a large part of the ground of such a project as No. 53, but it will organize its approach

(2) The reader is referred to an article in *Canning Trade Journal*, Volume 51, No. 84, April 8, 1929, entitled "Results of Tomato Variety Testing—What it Means," by Dr. F. W. Geise.

and determine emphasis on facts according to some specific objective such as determining the status and outlook for direct buying of hogs, as in A, or comparing six different systems for handling grain from the farm to the mill, as in Project B. These projects are for the most part merely outlined as to scope and content in the discussions following. The methodology involved is nearly all analyzed in projects already presented.

A. *Direct Marketing of Hogs as Represented by Sales Direct to Packers.* (By H. B. Price, R. C. Ashby and C. G. Randell.)

(EDITOR'S NOTE. This outline was prepared by a special committee of three, with Dr. H. B. Price as chairman, created by the Purnell Conference of Research Workers in Livestock Marketing at a meeting held in Chicago in 1928; and was distributed in mimeograph form. It has seemed to the Special Advisory Committee in charge of this report on Research in Marketing that the work of this committee should be given permanent record in this report. It is a series of projects constituting a *program of research* rather than a single project, the projects being listed in their order of precedence. No discussion of method is included. Thus far only a limited amount of research has followed the development of this program, principally owing to failure to provide leadership for it. However, the Wyoming and Iowa stations are conducting studies in direct buying, the North Dakota and Iowa stations are working on seasonal movements of livestock, and no less than nine stations are working on some phase or other of motor trucking of livestock.)

I. *Survey of present situation.*

(This part provides for a survey and not for detailed studies.)

Since the effects of direct marketing of hogs are far-reaching, a comprehensive survey should first be undertaken. Following are some of the principal lines of investigation:

A. *Analysis of importance of direct marketing.*

1. Percent of hogs purchased direct by packers in principal hog producing sections.
 - a. By states.
 - b. By counties.
2. Increase from year to year.

B. *Types of packers buying direct.*

1. By size.
2. By location.
3. Other important characteristics affecting the practice of direct buying.

C. *Agencies marketing direct to packers.*

1. Type of agencies and relative importance of each type.
 - a. Livestock producers.
 - b. Cooperative associations.
 - (1) County association.
 - (2) Local associations.
 - c. Private agencies.
 - (1) Independent shippers.
 - (2) Agents of packing houses.

D. *Marketing practices, especially affected by direct marketing.*

1. Shrink.
 - a. Extent and basis of allowing shrinkage by buyers.

- b. Extent to which shippers understand factors affecting shrinkage and amount of shrink.
 - 2. Loss from death and cripples.
 - a. Practice of paying for losses from these sources.
 - b. Do shippers know the factors affecting deaths and cripples and understand the significance of varying practices of paying for dead and crippled animals?
 - 3. Weights.
 - a. Facilities available for weighing.
 - b. Maintenance of weighing facilities.
 - c. Who does weighing?
 - d. Supervision of weighing, if any.
 - 4. Market information.
 - a. Source of information in direct selling.
 - b. Character of information.
 - c. Method of obtaining information.
 - d. Frequency of receiving information.
 - 5. Grades.
 - a. Does shipper grade or sort hogs?
 - b. If so, on what basis is grading done?
 - c. Which grades are sold direct, and in what proportion?
 - 6. Methods of soliciting shipments.
 - a. Correspondence.
 - b. Price currents.
 - c. Telephone.
 - d. Personal representative.
 - (1) Types.
 - (2) Responsibility.
- E. *Effect of direct marketing upon success of livestock shipping associations.*
 - 1. Historical analysis of number and location of livestock shipping associations together with collection of such general information as will give reasons for changes.
 - 2. Regional analysis with reference to direct buying points.
- F. *Effect of direct marketing upon competition.*
 - 1. Local markets.
 - a. Number of buyers.
 - b. Type of buyers.
 - c. Markets to which buyers ship.
 - 2. Central markets.
 - a. Extent of order buying.
 - b. Analysis of purchases made in central markets by packers who buy direct, to determine to what extent they compete in central market for same classes and grades of hogs as they buy direct.
 - c. Analysis of receipts of hogs at principal terminal markets, by classes and grades, to ascertain any significant trends in the volume of different classes and grades that may affect the breadth of the market or competition for hogs.
- G. *Concentration points and reload stations.*
 - 1. Number.
 - 2. Location.
 - 3. Volume of business by species.
 - 4. Ownership of livestock yards.
 - 5. Types of buyers.
 - 6. Markets to which livestock shipped.

II. *Changes in packing industry.*

A. *Decentralization and relocation of packing industry.*

1. Extent of changes.
2. Labor supply as a factor causing decentralization.
 - a. Trends in labor market.
 - b. Importance of farm population as source of labor supply in packing plants outside of terminal markets.
3. Economics of plant operation in different sizes of plants.
 - a. Cost of operation.
 - b. By-products development.
4. Possible specialization in and differentiation of the functions of slaughtering and packing.

B. *Trends in demand for meats.*

C. *Accessibility of supply of hogs of type required.*

D. *Buying advantage in local markets.*

E. *Economies in buying direct.*

1. Freight.
2. Feed.
3. Handling charges.
4. Selling fees.
5. Risk or shrinkage.

F. *Statistical analysis of changes in redistribution and relocation of hog and human population with a view to determining whether this relationship is an important cause for changes in the location of the packing industry.*

G. *Relation of development of cooperative packing companies to changes in location of packing industry and tendency to direct buying by packers.*

III. *Analysis of freight-rate structure for livestock products.*

Changes in the freight-rate structure for livestock or changes in the relationship between livestock and meat products may be responsible, at least in part, for the decentralization of the packing industry and its relocation. It may also be a cause of the development of concentration points. A careful study should be made of this problem by a specialist in transportation. The study should include such aspects as:

- A. *Changes in rate classification.*
- B. *Shipping privileges, as feeding and resting in transit.*
- C. *Relation between rates on livestock and meat products.*

IV. *Shrinkage in livestock marketing.*

With the development of motor truck transportation as an important mode of marketing, and with direct marketing introducing new practices in calculating shrink, our present information on this subject is very inadequate. A thoroughgoing study needs to be made of it, which should include such factors as the following:

A. *Method of transportation.*

1. Motor truck.
2. Railroad.

- B. *Length of haul.*
 - C. *Condition, class and grade of livestock.*
 - D. *Shipping conditions.*
 - 1. Weather.
 - 2. Condition of roads.
 - 3. Mixed *vs.* straight lots by species.
 - E. *"Fill", due to feeding, watering and resting.*
- V. *Losses from deaths and injury in transportation.*

Recent changes in livestock marketing methods, mentioned in IV, also cause data on losses from death and injury of livestock during shipping to be out-of-date. A study of these losses and factors affecting them, as well as of the amount of the losses, is needed because of the importance of such information to shippers in determining the best methods of marketing. Factors very similar to those mentioned in IV need to be considered in this study.

VI. *Study of national order buying agency.*

The National Order Buying Company is the only large cooperative livestock marketing association that specializes in selling hogs direct to packers. It was organized by livestock producers in Ohio to take charge of sales of hogs made direct to packers and was called the Eastern States Company. Recently this company has been reorganized to operate as a national cooperative livestock brokerage agency and has been re-named National Order Buying Company. An analysis of the organization and operation of this firm should help to point out the possibilities, as well as the limitations of large-scale direct marketing of hogs by a cooperative organization. Such considerations should be taken into account as:

- A. *Type of organization including.*
 - 1. Financial organization.
 - 2. Legal structure.
 - 3. Relation to other associations and livestock producers.
- B. *Business setup.*
 - 1. Management organization.
 - 2. Methods of operation.
 - 3. Costs of operation.
 - 4. Income.
- C. *Accomplishments.*
 - 1. Volume and type of business.
 - 2. Development of markets.
 - 3. Basis of sale—dressing percentage.
 - 4. Grading and sorting of hogs.
 - 5. Effect upon quality of livestock produced.
 - 6. Prices paid for livestock.

VII. *Organization of concentration point markets.*

- A. *Factors affecting location of concentration point.*
 - 1. Transportation.
 - a. Rates in

- (1) Assembling.
 - (2) Shipping.
 - b. Transportation privileges.
 - c. Highway development.
 - 2. Production of livestock.
 - a. Density of livestock production.
 - b. Character of livestock production.
 - c. Analysis of market area with respect to rural organization, highway system, etc.
- B. *Methods of marketing livestock.***
- 1. Sorting and grading.
 - 2. Shipments.
 - a. By classes and grades of livestock.
 - b. By market destination.
 - 3. Purchase of livestock.
 - a. Information, source of, for determining prices offered.
 - b. Grading and sorting practices.
 - c. Allowance for shrink or dead and crippled animals.
 - d. Weights.
 - (1) Facilities for weighing.
 - (2) Supervision.
 - 4. Assembling.
 - a. Methods of soliciting.
 - b. Concentration by
 - (1) Truck—who does the trucking.
 - (2) Freight.
 - 5. Obtaining and developing market outlets.

VIII. *Prices of hogs in relation to direct marketing.*

The possible effects of direct marketing on prices received by producers for livestock are sufficiently important to merit serious consideration by research workers in livestock marketing. Some possible research projects are:

- A. Relation between day-to-day fluctuations in hog prices at terminal markets and the proportion of receipts at those markets which are direct shipment to packers.
- B. Relation between day-to-day fluctuations in hog prices at terminal markets and the quantity of dressed hogs received by packers in those markets from interior plants.
- C. Comparative price advantage of marketing direct to packers and through regular channels. Some very valuable results may be obtained from such a study, providing a comparable basis for prices can be established. The poor standardization and grading is likely to vitiate any research on this problem unless better grading of livestock is obtained than now exists in marketing hogs.
- D. Effect of direct marketing on the level of hog prices. Much interest has properly been indicated in this aspect of direct marketing, but it seems very doubtful whether any significant conclusions can be established by a statistical approach to the problem because of the inadequacy of data for statistical analysis. Much information that

has a bearing on the problem will of course be obtained in connection with other research projects, and ultimately a better understanding will be obtained of the probable general effects of direct marketing on hog prices. For the present at least, such conclusions must probably be based on deduction rather than induction.

IX. *Accounting practice and procedure of livestock shippers.*

X. *Organization and management problems of cooperative shipping associations.*

(County associations, and local associations.) A very thoroughgoing analysis of the organization problems and business practices of local cooperative livestock marketing associations must be completed before the effects of direct marketing on the local cooperative livestock marketing organization can be finally determined and the possibilities of adapting the cooperative marketing system to direct selling can be ascertained. This is well illustrated in the practice of pooling. Price pooling is becoming more common among local cooperatives because of the sorting and grading that is required for direct marketing. This practice presents a very difficult problem because of the unsatisfactory grade standards for hogs. What we need to know is how local managers are handling it, and what are the possibilities of developing it on a large scale. These changes in marketing also call for methods of pooling expense that will distribute expenses of marketing equitably and with satisfaction to livestock producers.

This study should be divided into two major types of projects:

A. *Management problems including such aspects as:*

1. Pooling.
2. Grading.
3. Accounting.
4. Sinking funds.

B. *Business setup, including:*

1. Financial organization.
2. Economic organization.
 - a. Costs of operation.
 - b. Income.
 - c. Prices paid farmers for livestock.

XI. *Organization and management problems of cooperative livestock commission associations.*

Cooperative commission associations may be obliged to adapt their organization and methods of marketing to the recent developments in direct marketing of livestock, if they are to give the greatest possible service to their members—provided, of course, that direct marketing is the result of fundamental economic changes in the livestock and meat industry. An analysis of their methods of operation and business organization

will assist members of such associations to effect such adjustments as seem desirable or necessary. |

XII. *Auction sales.*

Auction sales of livestock have developed, at least in certain sections of the country, as a part of the movement for more direct marketing of livestock. Where this relationship exists between auctions and direct marketing, a thoroughgoing analysis of this method of marketing may be made advantageously as pointing out the possibilities, limitations and effect upon livestock prices of the auction method of sale.

XIII. *Marketing direct to primary, intermediate or secondary markets by farmers.*

This type of direct marketing is found near central markets, concentration points and packing plants, and is characterized by direct sale by farmers either to a middleman in these markets or to a packing house without the intervention of a middleman in the local markets. Some of the chief problems peculiar to this recent development in livestock marketing which should be studied are:

- A. *Motor truck transportation.*
 - 1. Cost of shipping by truck *vs.* railroad.
 - 2. Service of shipping by truck *vs.* railroad.
 - 3. Possibilities of shipping by cooperative motor truck associations.
- B. *Shrinkage, and losses from death and injury.*
 - 1. This involves comparison of truck and railroad transportation.
- C. *Types of dealers in these market areas and their methods of operation.*
- D. *Basis of sale.*
 - 1. Market information, nature of, and how secured.
 - 2. Facilities for receiving and handling livestock in the market.
- E. *Costs of marketing.*

B. *A Comparative Study of Wheat Marketing Systems.*

(By R. M. Green.)

The object of this study is to compare the functioning and efficiency of six different wheat systems, as follows:

- (a) Single-unit local cooperative elevators consigning to independent commission companies,
- (b) Cooperative line elevators,
- (c) Federated cooperative elevators with their own terminal commission company,
- (d) Single-unit, independent local elevators consigning to independent commission companies,
- (e) Commercial-line elevators, and
- (f) Mill line elevators.

The terminal commission company mentioned under (c) may handle wheat under consignment only, may handle consignments and also buy and sell, or may handle consignments, buy and sell and also do a storage business.

Such a project as this would indicate the elements of strength and weakness in the competing marketing systems, and show why the six of them stay in operation in place of giving way to one or two of them. The project should also show how the various systems can be improved, and supply a more comprehensive basis than now exists for public policy in supporting particular systems or in equalizing opportunities between systems.

The comparison of the six systems will be made in terms of:

- (a) Country elevator and commission house costs.
- (b) Prices per bushel received by wheat growers, including patronage refunds. This will need to take account of the grade and character of the product handled and type of outlets used.
- (c) Financial ratios with respect to working capital, fixed capital, and capitalization.
- (d) Financial returns on investment.
- (e) Losses or gains in patronage or membership, and volume of business handled relative to the size of plant.

The data will have to be secured from complete annual audits and books of account of the various concerns, and from lists of membership of patrons.

The analysis of the data should be by market areas to a large extent. These areas should be compact enough to largely avoid freight differences, local quality differences, and distinctly different local outlets. The problems involved are of such a nature as to lend themselves more readily to case study than to pattern forms of statistical analysis, though the latter will find a place in dealing with some phases of the study. The results should be compared with those of other studies already made, or any other available data indicating cost of service and value of service rendered. The studies that may be consulted are those cited in earlier projects, Price and Arthur (Minnesota 224), Metzger and Price (Minnesota 251), Benton and Peightal (North Dakota 206), and Green and Ballow (Kansas 246). In addition, a number of useful reports have been issued by the United States Department of Agriculture and the Federal Trade Commission. Special mention should be made of *Report of Federal Trade Commission on Grain Trade*, Vol. IV, "Costs and Margins." The article by Black and Price on "Cost and Margins in Marketing" in the *Annals*, January 1925, has pertinent discussion.

PROJECT 55. Historical Development of the Marketing of a Product.

(By H. B. Price.)

A study of the history of marketing of a given commodity should endeavor to show the development of the various parts of the marketing system and the institutions involved, both as these are related to each other and as they are related to external economic forces. To be complete the study should include an historical analysis of channels of distribution; of types of middlemen, and their organization, functions, and problems; of location of markets, and shifts in location, and changes in the importance and location of markets with respect to production and consuming areas; of market institutions, including exchanges, trade associations, public regulatory and service agencies, and other institutions that render special marketing service; and of external forces such as farmer movements, legislation, public investigation, transportation, communication and the like. Such studies should improve our understanding of the structure and function of market organization by pointing out the origins, evolution, and causal factors in the growth of the marketing system of the commodity. They should thus provide a more rational basis for market analysis and a better background for a research program in studies dealing with present problems of marketing.

The records and original documents of individual marketing concerns, of produce exchanges and other related agencies frequently furnish the best data for these historical studies. Trade papers and to a lesser extent newspapers of the period under consideration also are valuable, although not such authentic sources of information. Hearings and debates held in connection with proposed legislation, as well as the records of the research, supervising and regulatory bodies may also be fruitful sources of historical evidence.

Any project that attempts to deal with so many aspects of marketing organization should ordinarily be organized on the basis of a series of sub-projects for study of the various important institutions and problems. This organization is especially recommended for such products as grain, cotton, wool or livestock, which have highly developed marketing organizations with a long history behind them. A high degree of division of labor among the different research agencies, depending upon their accessibility to markets, sources of data and personnel, is also desirable in order to avoid duplication of effort and to achieve the best results.

Relatively few historical studies of agricultural marketing organization have been made. The few have been made chiefly by research workers in history, and consequently nearly all of them emphasize the historical aspects to the neglect of economic analysis. Probably the best as well as the most complete historical analysis is available in the marketing of grain. The best single study in this field is Usher's *History of the Grain Trade in France*. Another significant

work is *The Evolution of English Corn Market from the Twelfth to the Eighteenth Century* by Gras. *Fifty Years of Farmers' Elevators in Iowa* by Nourse, and *Grain Growers' Co-operation in Western Canada* by Patton, represent historical studies of certain types of marketing agencies, while the *History of the Chicago Board of Trade* by Taylor is a study of a market institution. *The History of the English Corn Laws* by Nicholson is a study of one of the external factors affecting the evolution of the grain market. *The Development of the Twin Cities (Minneapolis and St. Paul) as a Metropolitan Market* by Hartsough discusses some interesting historical features of the grain trade from the standpoint of metropolitan economy. *The Report of the Federal Trade Commission on the Grain Trade, Vols. I to V*, also contains some historical data on the American grain trade.

GROUP I

Miscellaneous Projects

Several of the projects in this group deal with plans for reorganizing a marketing system as a whole; and the others with problems involving coordination of marketing and production or marketing and financing. They are all treated sketchily, since the fundamental analysis involved is largely covered in other projects in this report or in other reports in this series.

PROJECT 56. Adequacy of Warehouse Facilities.

Objective: To determine the adequacy of warehouse facilities for a particular product and to outline a plan for their improvement if needed.

(By R. M. Green.)

Specifically the objects of this study are to be: To determine the quantity of storage space available on farms, at local stations, and at sub-terminals and terminals; to compare the sizes of the crops to be marketed with the available storage space in various positions, taking into account the rate of marketing, existing practices with regard to storing and merchandising, and car service available; and finally, to determine where additional storage space is needed and how much is needed.

It is important that this project cover a whole state, or better still, that it cover the whole area producing and interested in the storage of a common product. The period of time covered by the records must be sufficient to show the effects of ordinary ranges in production and in harvesting, marketing and transportation conditions, or must give careful consideration to the effects these variations would have.

Work along this line has been done by the Kansas Experiment Station in particular and the Cooperative Marketing Division while it was in the United States Department of Agriculture. Some of the earlier studies of the Kansas Station are now obsolete because of the changed situation in western Kansas. Furthermore, any studies now going on will need to be carried on for several years in order to catch and mark significant regional changes that are taking place.

Such a project as this should be particularly helpful to the Farm Board in making facility loans, to cooperative or other organizations contemplating assumption of the storage function, to those interested in constructing storage facilities, and to railroad officials in estimating car requirements.

The amount of storage space needed at each point in the channel of flow depends both on the size of the crop and on the methods and policies in marketing. This means that first consideration will need to be given to the timing of flow, to variations in this, and to probable or possible changes in such timing as are indicated by trends in the industry and by possible changes in the methods of selling. Storage facilities should provide a sufficient unused margin to allow for such interruptions to movement (due to car shortages, embargoes, etc.) as are likely to occur. Where these are infrequent, the advantage of having storage space available will be more than offset by the extra cost of providing and maintaining such additional space.

While the processes here under consideration are mainly those of physical movement, the relative amounts of storage space needed at different points may be considerably affected by non-physical elements in the situation. Most prominent among these will be the question as to whether storage is to be provided by professional grain brokers, supposedly at a profit, or by farmers, either through cooperative associations or through individual action. Assuming the risk of price change represents a different function from that of physical storage. If this risk function is to be assumed by others than farmers, it is pretty certain to be associated with storage at terminals rather than at local shipping points or on farms. Relative cost, broadly defined, will have to be the criteria of advantage. But such costs will not be readily determined. In some areas, farm storage space may have to be adequate, even in the ordinary process of marketing, to provide for the entire crop. The only expense of carrying grain a longer time in such areas lies in price risk, interest, and deterioration. No added labor or physical plant is involved. Even the additional costs just indicated may be partly offset by the advantage of hauling to market in slack seasons. On the other hand, two other non-physical elements are likely to affect the situation, one the greater expense and difficulty of securing loans on grain so held, the other the relation of place of storage to so-called "visible sup-

ply".¹ If grain stored on farms affects prices less than grain at terminals, this may offset certain higher costs of financing farm storage. Probably, however, visible supply affects the technical day-to-day position of the market more than it does the general level of prices for the year. Where ownership can be held without borrowing, the place of storage will not affect significantly the credit phase of cost of carrying, but borrowing is usually necessary. Some consideration may well be given also to possible disadvantages in having grain out of position for favorable sale on short notice.

If study of the advisability of holding programs is left for projects in price analysis, and the present study confined to physical relationships, but with full recognition of the non-physical elements involved, the most practical procedure would seem to be as follows:

- (a) Determine the present rates and variations in rates of flow and appraise storage facilities in relation to these.
- (b) Discover any expected changes in these in the light of present trends.
- (c) Determine the adequacy of facilities under an assumption that farm storage is advisable.
- (d) Same as (c) under an assumption that terminal storage is advisable.
- (e) Same as (c) with a combination of farm and terminal storage.

Such an analysis will require:

- (a) A survey or census of farm storage space by counties or townships, a complete census of local storage space by stations, and a complete census of sub-terminal and terminal storage space.
- (b) Data as to the number of cars required to haul the grain in excess of farm and local station storage space and the actual number of cars moving from stations in the county and the total number of grain cars lying idle on the railroad division during the first month or two of new crop movement.
- (c) Data as to receipts at terminals with storage capacity in order to get the average turnover and to determine whether terminals are over or under-built; and at the same time, by comparing receipts with wheat marketed from tributary counties, to determine the possibility of furnishing increased storage space in the event of increases in receipts.
- (d) Data similar to that in (c) for sub-terminals.

Data are to be secured on farm storage from survey samples in most areas, but from more complete censuses in states where annual censuses are taken by assessors, etc. Data on the other storage

(1) See the report in this series on Prices of Farm Products for analysis of this problem.

space are to be secured from railroads through the various Shipper^{row} Advisory Boards and from reports secured by federal statisticians of the Crop Reporting service. Shipment data will have to be obtained from railroad records. Crop data can be secured from the usual sources. To secure such data, it will be necessary to have the cooperation of the United States Department of Agriculture, Shippers' Advisory Boards, State Boards of Agriculture, and the railroads. The project is impossible without the support of the agencies which have the power and means to supply the rather complete coverage of territory that this type of study requires.

A current project in warehousing for apples, conducted by Mr. Chester Hampson for the Washington Experiment Station, relates to certain aspects of the foregoing project statement. More nearly like the project outlined is that of the Bureau of Agricultural Economics dealing with wheat storage facilities in the hard winter and spring wheat region.

PROJECT 57. Territorial Specialization in Marketing Operations.

Objective: To determine the most economical point in the movement of a product to market at which to perform certain operations, such as storing of grain, cleaning of grain, compressing of cotton, packaging for the retail trade, or concentrating of butter or livestock into earlot shipments.

(By J. D. Black.)

This type of project may be looked upon as an extension of studies of marketing channels and market structures (Projects 1 and 3), adding to them certain specific determinations of relative economy calling for actual analysis instead of mere description. Its relation to the projects in Group D is that it involves inter-unit relationships instead of mere intra-unit relationships. If we can assume that studies of these other types have been made for the commodity in question, the remaining steps will be about as follows:

A. A sort of intensive "job analysis" of the particular operation being considered, as it is now being performed by business units of different types in different types of markets. This should include not only a detailed description of the operation itself, but a careful statement, both qualitative and quantitative in character, of how it fits into the other operations of the business unit, and of all the supplementary, complementary and joint-product relationships involved. No doubt the survey method can be used to advantage in getting the general pattern of the foregoing, particularly the major variations between different types of marketing units; but the survey will need to be supplemented by case studies of selected types of units. If the number of units available for analysis is few, all of these will need case analysis.

B. A determination by the synthetic or budget method, of the effect on the expenses, receipts and net income (or returns to producer in the case of cooperatives) of each of the types of business units in each type of market, of adding this particular operation if it is not now performed, or dropping it if it is now being performed. The data and information needed for these determinations will have to be obtained from the survey and case studies, particularly the latter, outlined under A above. The units for which such determinations are made must be carefully selected so as to represent the most commonly prevailing sets of conditions and ranges in the major variables. The magnitude of the operation added will need to be determined on the basis of volume of business likely to be available.

C. Extension of the results of B to all the marketing units in the universe studied. This will call for estimating for each marketing unit in the area, or for a representative sample of them if they are numerous, the economy of taking on or dropping the operation, using the results of B as a basis for estimating the gains or losses, and the information of A as a basis for estimating the number to which each gain or loss applies. From this, it should be possible to decide which units in the area can perform the operation to best advantage.

In practice, certain operations may be carried on most advantageously in combination with certain others. In this case, the whole set of related operations must be considered as a unit.

Differences in transportation costs and storage costs according to where the processing is done will be an important element in the results. These must be charged to the costs of some business unit, ordinarily to the one commonly buying the product. The same will be true of any interest payments on product in storage.

The scope of such a project will ordinarily be some major marketing area for the product; but it can be extended to the whole country in case this comprehends a number of marketing areas.

PROJECT 58. Extent of Integration of Marketing Operations.

Objective: To determine how far toward the consumer to carry the selling of a product—to the wholesale receiver, to the jobber, to the retailer, or to the consumer; or if the approach is from the other end, how far toward the producer to carry the buying.

(By J. D. Black.)

The special feature of this type of project will be (a) case studies of enterprises carrying selling (or buying) to different stages in the marketing process, these studies being pointed at determining the effects on the enterprise—on organization, management, volume of business, expenses, receipts, net incomes or returns to producers, etc.—of each step forward or backward in the integration develop-

ment; and (b) application of these results to enterprises not now organized on an integrated basis, with due consideration for all the differences in conditions.

The conclusions reached can not be very positive, and a period of trial will be needed to test them—a period long enough to correct for unusual conditions of the market, mistakes in management, etc. If no enterprises are now thus integrated, the only basis for judgment will be analysis of the organization and management of the separate types of enterprises proposed to be integrated, and forecasts as to how these will be affected by integration measures.

PROJECT 59. Plans for Improvement of Marketing Facilities.

Objective: To develop and plan for improved marketing facilities for an area, either in producing or consuming territory.

PROJECT 60. Attitudes of Producers toward Marketing Agencies.

Objective: To determine and explain the attitudes of farmers toward existing marketing agencies or institutions. (Joint with Rural Social Psychology.)

This project requires command of the technique of attitude analysis that has been developed in recent years by social psychologists, and which is discussed in the report in this series on research in Rural Social Psychology. Therefore no attempt will be made to treat it here. A project of similar type is developed rather fully by Dr. C. C. Zimmerman in the report in this series on research in Public Finance as it Relates to Agriculture (Project 43).

The first project on farmers' attitudes toward marketing agencies used carried out in this country was made by Zimmerman and Blom of Minnesota in 1925.¹ The emphasis in this case was fully as to what the farmers knew about their marketing agencies and in- as upon their attitudes toward them; and probably this should be continued in future projects. This study, in Agriculture, not able to use some of the techniques of attitude measurement have since been developed, and is open to serious criticism. Since 1925 a number of studies have been made which have included some effort to ascertain marketing attitudes, since if these in connection with membership relations studies of efficient, since if these of this work has been superficial and inconclusive of the advantages of

(1) Minnesota Technical Bulletin 48, *The Marketing of Lenders May Simply Farmers* (1926).

(2) See the report in this series on Research in Analysis.

altogether upon direct questioning of the farmers as to their opinions on a variety of related subjects, and some studies have used the even more dubious procedure of questioning them as to their reasons for their attitudes.

**PROJECT 61. Credit Needs of Marketing Enterprises.
(Joint with Credit and Cooperation.)**

PROJECT 62. Effects of Financial Control on Marketing.
Objective: To determine the effects of financial control through furnishing production credit upon the marketing of a product, such as orchard fruit, or grain, or cotton. (Joint with Credit and with Cooperation.)¹

(By O. B. Jesness and E. C. Johnson.)

The aim of this project is to study the relationship between the production credit extended to the grower, and control over the sale of the product thus financed, and to ascertain how this affects marketing. The project should show the extent to which credit is used to control the time of sale and the flow of products through certain marketing channels. It should discover whether or not growers are employing the forms of credit best suited to their needs, and if not should develop the basis for changes.

The project should cover adequately one commodity in an area having substantially uniform problems. How extensive that area will be depends on the commodity. Where very limited resources are available, the study probably will secure information on only the major issues. Where more funds and help are available, the study can be refined accordingly.

Consideration needs to be given, first of all, to the extent, type, and source of production credit for the product in the area studied. After determining what agencies provide the credit, the nature of their contracts with producers and their methods of exerting influence will need analysis. When market agencies, including merchants, extend credit for production, it is not uncommon for them to require that the farmer sell his products to them. Not infrequently banks and other loaning agencies have interests in particular selling agencies either as institutions or through their officers and stockholders. This situation may lead to pressure for sale through given channels or to refusal to make necessary title assignments in connection with cooperative or other special methods of selling.

The period of the loan is often such that it is necessary for the producer to sell the product as soon as it is ready for the market.

(1) The furnishing of credit to local marketing enterprises, such as to grain elevators in the Northwest, may also furnish a basis for control of marketing operations.

The consequences are that he may be forced to sell at a time when prices are comparatively low. This also may represent a strong factor in forcing into the marketing chain a dealer group which carries the product to the time when it will pass into consumption. Such enforced specialization is, of course, not necessarily to the farmer's disadvantage. A study of the period of the loans is very important, but in addition to this it will be necessary to learn the extent to which renewals are possible. If growers can renew production loans on the strength of security such as warehouse receipts, or if releases to cooperative associations are freely made, they can hold their products for longer periods.

Study of the relation of financial control to the development of cooperative marketing requires investigation not only of the extent to which growers are unable to join cooperative marketing associations because of their contracts with credit agencies, but also of the personal influence of a non-contractual nature which may be exerted by the representatives of credit agencies.

Probably the most significant source of data for the project is the farmer himself. The use of pressure or influence in this connection will not usually be revealed by bank records. Attitudes and policies may appear, however, from conferences with lending institutions, such as the intermediate credit banks, commercial banks, merchants, warehouses, commission men and buyers. Information secured from farmers will ordinarily be best obtained by carefully planned surveys, since rather wide variations in attitude and interpretation of attitude are likely to be found.² Definite schedules should be employed in order that adequate and comparable information of a specific nature may be obtained. The type of schedule will vary with the commodity, the local conditions and the exhaustiveness of the survey. In general it will obtain information regarding the amounts of the loans, their bases, security, interest rate, length, collection, control over sale, losses suffered, experiences, problems arising, etc. The sample used should represent the various types of agencies, the various forms of loans, and the various sections of the area studied. Sufficient cases should be obtained to give reasonable assurance that the results are representative and give a true picture of the existing situation. (See section on "Surveys" in *Research Method and Procedure in Agricultural Economics*.)

The analysis of the data should go behind the apparent relationships of cause and effect and appraise the information obtained as to when and how farmers would sell if allowed to follow their own judgments. Even this may not be wholly sufficient, since if these judgments are based on incorrect knowledge of the advantages of given methods and times of selling, the influence of lenders may simply

(2) See Project 60 for comments on attitude analysis.

be holding farmers to a selling system to which they would return even if they did adopt another temporarily.³

PROJECT 63. Market Grades and Quality and Economy of Production. (Joint with Farm Management.)

Objective: To determine the most economical grades or varieties or qualities to produce and market.

(By J. D. Black and Gordon Sprague.)

This project is the same type as No. 37 except that it carries the tie-up between production and marketing clear back to the initial production, to the choice of varieties to plant and selection and treatment of seed, and includes all the cultural practices that may determine the grade and quality of product offered for the market. The methods will be much the same as those outlined for No. 37.

A project of this kind could be carried out most advantageously with a product such as asparagus, for which Dr. F. V. Waugh has already determined the relations between amount of green on the stalk and size of stock and price in certain New England markets.¹ The remaining step is to determine the extra costs involved in producing the additional green and size, which is of course a farm management problem. Projects 7, 8, 8A, and 20 in the report in this series on that subject will be of most help. In some cases, analysis of production on farms producing a range in grade and quality will provide the needed data, and careful analysis will determine the additional costs involved. These will need to be in physical units first and foremost. Those which represent supplies bought in the market can be reduced to money terms. Those which represent labor can be reduced to money terms only if the labor is hired, and hired for this particular work or similar work.

The final results on many farms will have to be expressed in such terms as the following:

Asparagus 3/16 inch or more in diameter has sold for an average of \$.40 more per crate during the past 3 years, or 20 percent more. The additional out-of-pocket costs for fertilizer, etc., were \$.15 more per crate. The closer sorting required reduced the number of crates per acre of the first quality of asparagus by 10 percent. This was equivalent to \$.22 more per crate. But the additional crates of second quality asparagus reduced this \$.22 to \$.17. No additional labor was hired because of this, but the family helpers and the regular hired labor put in an average of 12 minutes extra per crate because of the reduction in output

(3) As an example of this type of project, see *Pre-season Advances of Credit by New York Dealers to Growers and Shippers of Vegetables* by E. R. French and J. W. Spaulding, mimeograph release, Bureau of Agricultural Economics, 1932.

(1) See the Price report in this series for the projects on the relation of quality factors to prices.

per acre and 10 minutes extra labor because of closer sorting. Thus there are \$.32 of additional money costs plus 22 minutes extra labor of the regular labor force, for which, however, nothing was paid, to be balanced against an additional \$.40 per crate. The extra labor per crate because of reduced output means that the part of the wages of the hired labor which was spent on asparagus work was divided between fewer crates, and represents a real addition to labor costs per crate. But the amount of this cannot be definitely determined because the hired labor was employed for the whole season at an average rate per month.²

On some farms, extra sorting labor would be hired for the sorting, and a definite figure for the extra cost of this could be determined. It is probable that the foregoing results would be more understandable if expressed in the form of two operating statements, one for the farm producing the extra-size asparagus and the other not. In many cases, it will be necessary to work out semi-experimental set-ups with different growers and keep the needed records for a few years. The farms selected for any particular set-up will be those already conforming to it as closely as possible.

Another product needing this type of research is cotton. Recently the Cotton Division of the Bureau of Agricultural Economics has been devoting considerable attention to the relation between uses and length of staple and other factors.³ This needs to be followed by studies of the farm economy of producing cotton of varying staple lengths, etc.

A product of a different type which may be made the subject of such a project is turkeys. Extension agents are constantly exhorting turkey producers to improve quality. It is usually reasonable to assume that the improvement of quality will increase gross sales value. It is never safe to assume that improvement of quality, with attendant increased costs, is a way of increasing the net income of the producers.

The production data needed will relate to prices paid for poults or hatching eggs and to amounts of feed fed, and certain other matters of care and feeding that affect quality and grade. Except on commercial turkey farms, it will be possible to reduce only the two specifically named to a money cost basis. The information needed for this part of the analysis will be obtained best by visiting a sample of farms in a producing area just after the hatching season and again at the close of the marketing season. The additional sales information needed can be obtained from the turkey buyers for the most part. Most turkey buyers will furnish a statement of the standards by which they grade their turkey receipts. Given these

(2) See Project 27 in the Farm Management report.

(3) See the paper by Dr. B. Youngblood in the *Journal of Farm Economics*, October 1929, "Analysis of the Relation of Quality to Price of Cotton."

standards, the other necessary data are usually available from the ordinary account sales furnished by the buyer.

The steps in the analysis of the data would be as follows:

First separate all farms which report sales of live turkeys from those which report sales of dressed turkeys.

Second, compare grades received with methods of production to show which methods produced which grades.

Third, compare prices received with expenses to see which methods yielded the greatest net income, balancing money costs against money receipts, and expressing unpaid labor only in physical units.

Fourth, compare sales of dressed turkeys to local buyers with sales made by producers to central market receivers, where the producer bears the risk of shipment to the central market. Adjustments in basic market price will be necessary in order to compare price changes due to differences in date of sale. The following comparisons should be made for each separately:

- (a) Proportion of turkeys falling in each quality grade.
- (b) Total returns for each quality grade.
- (c) Net returns to producers on each grade.

Fifth, compare grades received for live turkeys at dressing plants with grades received by farmers for dressed turkeys to see the proportion falling in the different grades by the different methods of selling.

Sixth, compare net returns to turkey producers from turkeys sold alive with turkeys sold dressed to see how well producers are paid for their labor in dressing their own turkeys.

Seventh, classify the causes for which turkeys are made "under-grade" to see what proportion of the causes are due to methods of production and what proportion are due to turkey-dressing practices.

PROJECT 64. Orderly Marketing as Related to Orderly Production.

Objective: To develop a program for the orderly production and marketing of strawberries grown for a local market. (Joint with Farm Management and Prices.)

(By Orville Hall.)

This project should undertake to determine:

- (a) The extent of the market for the locally grown berries,
- (b) The nature of the competition with these berries,
- (c) The possibilities of extending the use of such local produce and the methods by which such extension can be brought about,

The elasticity of strawberry production in the area, and approximately the volume and price at which production

and consumption are likely to be in somewhat stable equilibrium over a period of years

The project has several divisions, the most important of which is the farm management analysis. This will be supplemented by an analysis of daily market prices and supplies and expenses of marketing. The survey will be made of farms supplying the given market to determine: labor, material, and other inputs used in the production of strawberries; the relation of strawberries to the entire farm organization; the possibilities of expansion or contraction of the strawberry acreage on surveyed farms and the probable effect on farm incomes of varying prices for strawberries; limiting factors in strawberry production on farms growing the crop; and acreage of growers as influenced by high and low prices both of strawberries and of other crops which these farms produce. The outcome of the strawberry enterprise will be emphasized. The final form which this analysis should take is a sort of composite supply schedule showing the amounts that will be produced at different prices.

The prices and crop movement data will be obtained from dealers, farm marketing organizations, and retailers. It will relate to the approximate volume which the market can move at different prices. Competing areas will be dealt with by an analysis of rail and truck receipts from each section and prices paid for their fruit in the given market. In short, competition of other areas which supply shipped-in-berries will be estimated through their shipments in response to high and low prices, both within a particular year and also from season to season.¹ Fruits competing with strawberries will be considered in relation to their bearing on the demand for strawberries at different parts of the demand curve.

Data will be obtained on margins going to wholesalers, jobbers, retailers, and hucksters in handling home-grown berries. Services performed by the present marketing agencies will be studied. This will lead to an analysis of how the given market can be supplied with berries most regularly and most economically throughout the home-grown strawberry marketing season. This will involve, essentially, the relating of the composite supply and the demand schedule to each other. The possibilities of developing a market preference for home-grown berries should be considered as a way of shifting the demand curve and securing orderly production and marketing at a higher level of production.

PROJECT 65. Applicability of Future Trading.

Objective: To determine the applicability of future trading to particular products, such as potatoes, apples, peanuts, etc.

(By W. C. Waite.)

The question at issue in this type of project will probably be

(1) See Project 6 in the Farm Management report in this series.

whether or not a particular market should initiate future trading in a new commodity, and whether the present time is a favorable one for beginning such an enterprise. The prerequisites for future trading have been pretty generally agreed upon in qualitative terms. They are briefly:

(1) That the commodity must be readily subject to grading, so that competent officials will grade the same lot essentially the same;

(2) That there must be considerable volume of trading. This must also mean that there is a large supply of the commodity available, so that sellers may be reasonably sure of opportunities to purchase before the time set for delivery on the future contract.

Additional desirable characteristics, which are not as essential as the foregoing are:

(3) That the commodity have a considerable durability, to permit storage for future delivery without appreciable deterioration; and

(4) That there be considerable fluctuation in the price of the commodity.

The research project will endeavor to supply an adequate quantitative statement on these points. The procedures to be followed have largely been outlined in the projects discussed earlier, although some special emphasis on particular phases is necessitated by the peculiarities of the special problem.

The suitability of the existing grading of the product, or the feasibility of instituting more desirable grades from the viewpoint of future trading, would be determined by the methods suggested in Project 42, "To determine the best set of grades for a farm product, based upon both economic and technical considerations." Some special attention would need to be paid to the amounts of the various selected grades ordinarily available on the market, and their variation during the season from year to year. An adequate supply of the delivery grade of the future contract is essential to prevent "corners" in the product.

Special emphasis will also need to be placed upon the nature of the processing or marketing requirements of the industry and the duration of ownership of the product and risks incident to price fluctuation. The probability of the use of the futures market will increase if processing or growing requires considerable time, or if considerable storage operations are necessary. It will also be desirable to examine the markets for other commodities now providing futures trading to determine the proportion of merchandising or processing operations in which the futures market would probably be used. Some light on the probable activity in a futures market for these products may thus be gained through analogy. It will also be important to examine the attitudes toward future trading of those operating in the market and their possible use of the institution in the operation of their particular enterprises.

Such a project will not be complete without consideration of the *needs* for future trading. This can be learned from an historical study of price fluctuations for the product in question, pointed at discovering the periods during which *prices would have been kept more in line if there had been a short interest in the market*. But one will want to study similarly the course of prices of products having a futures market to see if the presence of a short interest really has kept prices more in line. This analysis will need to distinguish between day-to-day, month-to-month, and season-to-season fluctuations.

PROJECT 66. Regulation of Marketing Agencies.

Objective: To determine the feasibility of specific control measures in marketing—such as legislation regulating commission farms. (Joint with Agricultural Policy.)