

THE CATTLE WEALTH OF INDIA.

*(Peasants' Plight: Salvation lies in
Co-operation.)*

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A Treatise for improving the Economic condition of the peasantry through a systematic process of developing the Cattle Breeding and Dairy Farming Industry, based on the model of Denmark and to be worked out on "Co-operative" lines.

By

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THE CATTLE WEALTH OF INDIA.

In this small book, the Author has, besides making a general survey of the present plight of the Indian peasantry, endeavoured to make constructive suggestions for their amelioration. The trade depression and the economic slump prevailing in India and the world over for the last few years, have adversely hit them hard. Since the Great War, Nature has conspired with circumstances in bringing about their deterioration and decline.

Indeed, it is true, as Indian and European writers alike have often expressed, that India's salvation lies in a thoroughly re-organized country-side. The problem is a gigantic one and calls for Herculean efforts. The first and foremost item in the rural development programme is the work for the economic improvement of the peasantry on which will depend all the rest.

It is an undeniable fact that agriculture has ceased to be a paying profession. In foreign countries, mainly due to artificial means, the lands (are made to) yield crops to their maximum capacity. We are not moving with the times; the result being that in India the lands are losing their productive capacity more and more.

Agriculture does not mean the cultivation of food crops alone. It includes and must include other items like cattle-breeding, dairy-farming, fruit-culture, apiculture, poultry and a host of others. In this brochure, the writer is mainly concerned with the problem of cattle-breeding and dairy-farming. If pursued properly this one factor alone can, elevate the economic condition of the peasant class. The Author has spared no pains in unearthing much material that has not so far seen the light of the day and has not hesitated to utter some home truths. His statements and criticisms are very well authenticated. Though small in size, the book is not wanting in information. I am sure this will be of

immense help not only to rural workers but to all students of Indian economics, of industry and commerce, to the officers of Government Departments of Agriculture and Co-operation.

India is rich in several things. Not only has she mines and minerals, industrial raw products like cotton and jute, and food crops like wheat and rice, but she is also rich in her cattle wealth. As Col. Olver, Animal Husbandry Expert to the Government of India observes: "The farm live-stock of India amounts to approximately 300 million - the annual value of their products, including labour is not less than Rs. 1250 crores and even exceeds that of cash crops. Dairy products alone are worth over Rs. 500 crores". It is the villages that contain the bulk of our cattle, while pathetic is the condition of the village-folk. How paradoxical it is! Poverty in the midst of plenty! There must be some wrong somewhere. It is up to us to detect it, and to rectify it.

Cattle breeding, both as a profession and as an industry, is in a thoroughly disorganized state. In fact, so far it has not been organized at all. Setting up this industry on a sound and solid basis means the betterment of the peasantry and elevation of their status economically and socially. The milk supply in our cities today, is not only deficient in quantity but also hygienically very unhealthy. Those who consume impure milk must suffer from *Mal-nutrition* and other diseases. Unless there is a liberal supply of pure and healthy milk, there can be no improvement in the health of our people. The whole system of cattle breeding, dairying, storing of milk, transporting, distributing etc. needs to be revised and put on a scientific basis. On this rests the fate of our sinking peasantry, the health and manliness of our people, in a way, the future of the country itself.

How is this to be brought about? It is easy to speak of reform but difficult to effect it. To undertake this task would require a big sacrifice on the part of the educated people. But the key to success lies in Co-operation. This is the central theme of this book. Two whole chapters have been devoted to it, and

they deserve a careful perusal. The detailed account on the working of the Co-operative institutions of Denmark by the application of which the Danish people emerged out of economic depression is of special value.

If we look to the history of Denmark and the conditions existing some 50 years back, we will find them in as unsatisfactory a state as they are in India today. The peasants were sunk neck-deep in debt. The price of their agricultural commodities had gone down, and the whole economic structure was in a tottering state. The process they applied for their elevation was paying more and better attention to cattle breeding and for systematically carrying this out, they applied the principles of Co-operation which some of their leaders had learned from England. New agricultural tools were introduced. Greater attention was paid to the improvement of cattle; dairy farms were established, milk marketing centres were organized, and all this on Co-operative basis. The result was that in a very short time the country was full of co-operative organizations. As though by magic the economic condition of the people changed. The following paragraph from the Report of the Department of Agriculture of the United States of America would be of interest to our readers:—

“From a depressed position of peasant agriculturists which threatened the welfare and prosperity of the whole nation, Denmark stands today as the world's foremost agricultural country in the scientific organization of her production and marketing. Her people, rural as well as urban, appear contented and prosperous. Neither extreme wealth nor extreme poverty exists. The farmers are now the owners of the tracts of land they cultivate. They rank foremost among the nations in the application of scientific method in agriculture, use fertilizers and relative crop production. Their intensive application of democratic co-operative principles has made Denmark famous the world over.”

When such a poor and backward country like Denmark

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could effect in such a short time such vast improvements in the economic condition of her peasants, there is no reason why similar improvements cannot be brought over here if identical methods are used.

With these observations the book is commended to our countrymen and others interested in improving the lot of the millions living in the rural areas, in the hope that interested readers will find in these pages wholesome food for reflection and incentive for taking necessary steps for achieving the great object in view.

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M. L. C., *Raja Bahadur*
Ex-Minister of
Education and Industries (U.P.)



The Indian Peasant.

"It is the Indian poor, the Indian peasant, the patient humble silent millions, the 80% who subsist by agriculture, who know very little of politics, but who profit or suffer by their results, and whom men's eyes, even the eyes of their own countrymen forget, to whom I refer. We see him not in splendour and in opulence, he reads no newspaper, for, as a rule he cannot read at all; he has no politics, but he is the bone and sinew of the country; by the sweat of his brow the soil is tilled, from his labour comes one-fourth of the national income. . . . he should be the first and final object of every Viceroy's regard".

Thus observed Lord Curzon, Ex-Viceroy and Governor General of India. This is no piece of peroration, but a bare statement of facts.

Ask the peasant his tale. In this vast country where agriculture is the mainstay for more than 75% of the population, he is verily the wealth and valour of the land. The beginning and the end of every movement, social, economic or political, should be wholly and essentially for his welfare. He is the "bone and sinew" of the body politic of this vast continent.

If Lord Curzon was right in his remarks half a century back, his words are truer today. Poor crops, poor prices and poor markets - the Indian peasants' condition is deteriorating. The price of agricultural commodities - the product of his sweated labour - is falling, and the market atmosphere is gloomy and dark. Nature, conspiring with circumstances plays havoc, and too often compels him to take up the

bowl. Groaning under a heavy load of debt, he wanders helplessly in the streets of industrial centres. Tilling the soil under unfavourable conditions, his wages are hardly equivalent to his labour, and not unoften he finds himself driven to a corner without the requisite amount for paying the landlord's dues, and the Government's tax. "Since the War", says a recent writer, "the financial situation has been disquieting. Budgets have been balanced only with great difficulty. The chief source of Indian revenue is still the land; owing to the fall of prices, the agriculturist is finding it increasingly hard to pay his assessment, and remissions have had to be made".

To understand the real situation, it is necessary that we must analyse the problem in all its aspects.

Sir Fredrick Sykes, Ex-Governor of Bombay, describing the village problems of India says :—

"In England some four-fifths of the population are town dwellers.

In India on the other hand, six-sevenths live in villages.

In England almost 58 percent make their living by industry, and only 8 percent by agriculture.

In India over 80 per cent of her 360,000,000 are agriculturists, while less than 10 per cent are employed in industry.

The Indian village, cut off from the world, was in the old days an almost entirely self-contained community.

It had hereditary officers, the village head-man, accountant, the priest and the watchman, its smiths and carpenters, its scavengers and menials. Payment was in kind, not in cash. Disputes were settled by the *Panchayat* or jury of village elders, guided by custom and tradition.

He grows his crops with the object of supplying his needs first and then meeting the demands of the Government and the

moneylender. The idea of "cash crops", i. e. crops which are grown for export - is still novel to him. Holdings owing to the Hindu joint family system are in most areas, well below the economic minimum from a Western point of view.

At present only 5 per cent of the area under the plough is sown with crops which are to be sold, and the fall in prices makes it unprofitable to increase the percentage. Emigration, once a promising outlet has ceased, and there is a tendency for emigrants to be repatriated.

Then there is the question of industrialisation. India, it has been said, must aim at "economic sufficiency". But even if all the goods now imported were made locally from indigenous materials, it would not radically affect the problem; the mills and factories could only absorb a fraction of the surplus of the rural population".

Sir Fredrick's remedy to eradicate the evil is also worth studying. He emphasises:

"If we are to arrive at the root of the matter, we must start at the right end - that is, the social and economic welfare of the village".

"The basis of work", he explains, "must be a campaign against the inefficiency of rural life, due largely to religious and social prejudice, ignorance and apathy".

"One of the most pressing social problems is indebtedness which hangs like a millstone round the ryots' neck. There is no remedy in the absence of a radical change in the peasant's mental outlook. To this must be added a determined attack on the wasteful and uneconomic methods of agriculture".

The problem of Rural Reconstruction to day is receiving far more attention than it ever used to. Among all classes of people there is decidedly a changed outlook as to the immediate necessity of tackling the problem. The air is full of "...Year Plans"

and all sorts of suggestions for Reconstruction. Politicians and Economists alike are much worried over this issue. But the task is "so great" as Sir Fredrick mentions "that it requires the mobilisation of all possible resources and the exertion of the fullest possible efforts".*

There can not be any difference of opinion between the Government and the oppositionists on the fundamentals of Rural Reconstruction. The Government as well as their critics want to help and aid the peasantry. They want to ameliorate the wretched condition prevailing in the villages. All alike want that illiteracy from the land must be liquidated; the economic status of the masses must be elevated and efforts made to increase their purchasing power. The question of the growing unemployment and under-employment is another factor that is vexing both. Nobody is against industrialisation, or against the use of valuable raw materials that are being wasted today.

Our peasants are proverbially poor. Their little wealth now consists of a small plot of land, a simple wooden plough, and some ordinary tools and implements, a pair of bullocks and some cattle. Day and night they toil hard, from one year's end to another, but still they are starving, and are always in distress. Their principal capital is their labour power. They are of course willing to work hard, and all testify to their industrious habits; but agriculture is not a paying profession. A stage is coming, if it has not come already, when they have to look to something else, to some other occupation or trade. Something immediate must be done to protect them.

Till of late the peasants were accused of hoarding their wealth in silver and gold. They were again condemned for their fondness of ornaments and jewels, and of lavishing a lot on ceremonies and festivals, but that is all gone now, and there is nothing left for hoarding—the ornaments have been pledged or melted, and sold away to meet the day to day expenses. Today there is nothing left for hoarding. People are even immersed in

* *Daily Telegraph*, London.

debt. Their credit is low. They cannot even get a loan, for the money-lender knows that he cannot get back what he gives. This is the real position. His earthly belongings are no more than a plot of land, a plough and some cattle. And it is with this equipment that we must start the *reconstruction*, the reconstruction of the peasant community, of the seven lakhs of Indian villages. It may all appear to be too fantastic an idea and too ambitious a scheme. But still if we are to take it up in right earnest, and tackle it in the proper way, we shall succeed in our mission. "Where there is a will, there is a way."

Cattle Wealth.

From this general survey, let us come to details. Our capital, the capital left with our peasantry, lies partly but essentially in their "Cattle wealth". Their numerical strength is really great though from the qualitative point of view our case is weak. India has, says Mr. N. C. Mehta, Vice-President of the Imperial Council of Agricultural Research, the largest cattle population in the world. It is estimated that it amounts to over 180 millions, or equivalent to about a third of the total cattle population of the world, as against the 65 millions of Soviet Russia, 58 millions of the United States of America and about 7 millions of Great Britain.

"From the point of view of output of milk, India is second only to the United States, and despite the fact that she produces four times more milk than Great Britain, five times more than Denmark, six times more than Australia, and seven times more than New Zealand, she suffers from a chronic deficiency of milk and milk products simply because she has still to learn the rudiments of scientific management of cattle and milk production."

The following statement prepared and published by the Government of India shows the number of cattle we have in this country :—

Live Stock Statistics.*

Cows	...	12,130,038
Bullocks	...	10,617,680
Bulls	...	1,848,398
Young Stock	...	9,233,202
Cow Buffaloes		4,689,672
Male Buffaloes	...	1,019,942
Buffalo Calves	...	3,675,207
Sheep	...	16,259,039
Goats	...	12,380,914
Horses	...	190,809
Mares	...	258,167

Of this, 11 per cent. belong to the United Provinces, 19 per cent to Bengal, 14 per cent to Madras, 12 per cent to Bihar and Orissa, 9 per cent to Central Provinces, 7 per cent to the Bombay Presidency, including Sind, 22 per cent to the Punjab, and the rest to other parts.

According to the Fourth Census of Live Stock in India carried out in 1937, it was found that there were in British India (excluding Bengal, Bihar and Orisa) 113 million heads of bovine cattle, made up roughly of 84 million heads of oxen and 29 million heads of buffaloes. The total figure for this Census is over 5 millions, or about 5% higher than that recorded at the preceding Census.

It is interesting to note here for purposes of comparison the figures for Live Stock (cattle only) in some of the more important foreign countries as recorded in the latest Census, which in Great Britain, Australia, New Zealand and Argentine took place in 1934, and the rest in 1935. The figures are as follows, and are given in the nearest millions. Great Britain and Northern Ireland 9, France 15½, Netherlands 2½, Germany 19, United States of America 60½, Canada 9, Australia 14, New Zealand 4½, Argentine 31.

* Figures for 1935.

We can only boast of our numerical strength. They can not be counted for anything else. Our animals do not give as much milk as the cattle of other countries. A few years back our cattle were strong and sturdy, and were giving good quantities of milk. But of late they have deteriorated and lost the capacity to yield much milk. The causes of their decay are many. For years past they have been neglected. There is no proper feeding, tending or housing. They are to find their food themselves and have often to quench their thirst from the public gutters. Their owners only tie them round, squeeze out their teats to the last drop of milk and let them wander about. With the growth of population, pasture ground for the cattle have been gradually encroached upon and the acreage left for grazing is quickly diminishing. Every inch of available land is being brought under the plough and the animals have to go far to find anything worth nibbling. The Royal Agricultural Commission saw the danger lying ahead, and recommended: "After an extensive survey of the possibilities of the extension of grazing land, we are of opinion that no large additions to the existing grazing areas are possible and effort should therefore, be concentrated to increasing the productivity of the land already growing grass. The scope for such efforts is very great."

With all this it is a strange fact that the production and consumption of milk in India is very great, and the demand steadily growing. It is no doubt true that the yield of individual animals is small but the aggregate quantity is considerable.

Even to this day the volume of trade in this commodity is running to several crores of rupees a year. If in this disorganised way there should exist such a large volume of business, we would not be wrong when asserting that by a proper scientific organisation it can be increased at least five-fold. It has been estimated that in the City of Bombay, the daily supply of milk is over 3,00,000 lbs. at the rate of 3 or 4 annas per pound. In Calcutta the quantity of milk consumed annually amounts to over a crore of rupees. In Madras, Lahore and other Presidency capitals,

the volume of business done in milk ranges from 75 to 80 lakhs annually. There are at least 20 small towns and over 100 smaller places where the aggregate trade ranges from 10,000 to 50,000 rupees a year. In addition to these there are hundreds of urban and rural centres where the trade exists in a smaller or bigger degree. Thus, the milk trade in India is important and represents an outlay of huge capital* scattered all over the country, though apparently we have only unhealthy cattle, impoverished milkmen, dirty and insanitary milk shops. Is it not really strange? The whole problem seems to be shrouded in mystery.

The method by which we mean reconstructing the villages and improving the economic condition of the peasantry is through a scientific system of cattle breeding and dairy farming. How it is to be done and on what lines we are to proceed will be explained in detail in another chapter. We emphasise that our organisations should be on co-operative lines and we have devoted two full chapters for explaining the working of the Co-operative Institutions of Denmark, a country which resembles India in more respects than one. Denmark was exactly like India a few years back. Her people were suffering from all kinds of privations but by a well-planned and thought-out co-operative effort, she was able to raise herself so quickly to the great astonishment of all other nations. Hence we would unhesitatingly recommend to our people to take up to similar methods and foster the cattle-breeding and dairy industry in India to achieve immediate results, with judicious and equitable benefit to one and all, to the villager and to the townsman, to the illiterate and to the educated alike.

Today there are few institutions in India that can be called Dairies. The so-called dairies we have in this country—we have too many of them here, and every milk-shop man claims the right

* A high authority had recently valued the contribution of the cattle industry to the national income at one thousand crores of rupees or nearly a half of the total income of the country. Milk and milk products had been valued by the same authority at about three hundred crores of rupees, which was equal to the value of the entire foreign trade of India. India's yearly output of hides and skin, which constitutes only a minor by-product of the cattle industry, was valued at 40 crores of rupees. (N. C. Mehta)

to style his shop a *dairy*—cannot be termed as such*. The “dairy-men” in India and those who do business in this name are mostly mere dealers of milk. They generally purchase milk from the village *gowalas* (milkmen) who treat it more as a caste profession than as a strict financial concern. Moreover, the capital invested by them is comparatively small and their ambition is also limited †.

According to several authorities, the milk sold by these people is by no means superior in quality nor conforming to the hygienic requirements. Notwithstanding the paraphernalia of sealed bottles, in an air-tight form, with a printed label affixed to it and so on, all these are mere eye-wash. They are a deception. The words of a Health Officer of a leading Municipality will bear testimony to this:

“The conditions of milk supply here (Delhi) are most unsatisfactory, and to this, as one cause may be ascribed the high rate of infant mortality. The matter is indeed one which requires immediate attention and no words could be too strong to describe the present condition of affairs. There is first absolutely no control of any sort over this most important article of diet. The cattle are kept in the most insanitary condition, crowded together in unfit, unventilated and undrained sheds, no care is taken of the receptacle for milk which are usually filthy and kept in filthy surroundings. Though want of a laboratory has prevented any samples being taken for analysis, it would not be rash to say that adulteration of milk is universal, and the quality of milk also suffers from the existence of European dairies which take practically the whole cream. Such conditions not only imply tainted milk supply, but also constitute themselves a menace to the general health

* There are practically no specialised dairy farms, the production of milk or *ghas* being subsidiary to small scale crop farming. In consequence of this, as well as of the poverty and lack of education of the cultivator, methods of milk production are crude and facilities for collection are primitive. This difficulty is intensified by lack of communications between villages and main roads, and by absence of suitable forms of transport. Moreover, there are also special difficulties connected with the climatic conditions in India. The average temperature is high, reaching figures well over 100° F. during the hot weather. Yet there is often a complete lack of water suitable for cooking, while flies and dust are abundant sources of contamination of the milk. In the monsoon period the village roads are frequently so badly flooded as to be unpassable. It may be mentioned too that the total output of milk per village is usually low, an average figure being less than 1,500 lb. per day.—Report on the Development of Cattle and Dairy Industries in India.

† Rai Bahadur G. K. Kelkar.

of the city. Bye-laws for the proper regulation of the cattle-sheds are an urgent and crying need, but even more desirable from the point of health of the cattle and of the general health of the city, would be to cause the greater part of the cattle to leave the city for the more healthy surroundings**.

There is no exaggeration here. The Health Officer is quite right in his remarks, that it is almost impossible to obtain genuine and unadulterated milk in the markets. Again, due to the ignorance and dirty habits of the people who handle it, the milk is never free from contamination of bacterial and other dangerous type of germs. And the dealers in their anxiety and greed to earn more, increase the quantity by adding water and other substances. These malpractices have a great bearing on the public health, especially in the case of infants and invalids who are easily affected †.

It has been calculated by competent authorities that the adulteration in India amounts to as high as 80% and sometimes even higher. In Bombay Municipality, to find out the degree of adulteration, an experiment extending to over 5 years was successfully worked out. Altogether 1363 samples were brought and examined in the Municipal Laboratory, and the analysis showed that out of 1363, only 282 were genuine and the rest 1081 were adulterated. The quantity of water usually added was found to range from 5 per cent to 80 per cent. In Calcutta the same is the case, and the adulteration has been found to range from 10 to 75 per cent. In Bangalore, Dr. Srinivasa Rao on his analysis of 51 samples brought from various parts of the city, found that 40 per cent. of them were adulterated with water ranging from 35 to 65 per cent. On a more minute examination he found that adulteration in buffaloes milk ranges so high as 78 per cent. In

* Dr. Sethna, Municipal Health Officer, Delhi Municipality.

† Apart from the detrimental reaction of adulteration on the sale of milk through distrust on the part of the consumer, this practice has the virtual effect of reducing the market for milk, since for every unit of water added an equivalent quantity of milk fails to be sold. Assuming that milk is on the average, adulterated to the extent of 10% of added water, the financial loss to the dairy industry amounts to over 10 crores of rupees. (nearly 10% of 107 crores) —Dr. Norman Wright.

Delhi and Lahore adulteration is reported to be a very common affair, but no correct statistics are available. As this matter concerns the health of the people, rigid regulations to ensure supply of pure milk should be enforced. We will have occasion to dilate on this aspect of the problem in greater detail shortly.

It is unfortunate that very few people in this country have seriously taken up to *dairying* as a business enterprise. Cattle breeding has been badly neglected, and where it exists on a small scale, is in a sad plight. Educated people with advanced ideas and business acumen have not been attracted to this line of business and the whole trade to-day is in the hands of illiterate people. They follow their old methods of breeding. They do not know, nor do they care to know, the use of the latest scientific appliances for improving the breed or increasing the quantity of milk in them. They do not know how to convert milk into other useful saleable commodities. Very few of them know even the art of preserving milk for a few more hours. It is in the villages we have the cattle and good production of milk. But where is the demand in the villages for the milk so produced? When there is no demand in the villages, and when facilities of transporting them to other areas are lacking, the producers would not be losers if they be in a position to convert them into other useful products like butter, cheese etc. But our people are quite ignorant of these things. What is the net result? On the one hand, the milk available in the country is not being properly made use of, while on the other we have to import from foreign countries lakhs of rupees worth of milk products, even the daily necessities like butter, cheese, cream, tinned and powdered milk, condensed milk* etc., which would very easily be prepared here. What a pity! How beneficial it would have been if the milk the villagers produce were fully utilised, and they be in a position to realise their full value! It is high time that we turn our attention to this question and put this industry on a sound basis. By a proper and scientific control and organization of the milk supply, we can, not only find suitable markets for the large quantity of milk that is produced in our

* See Appendix for the figures of imports of "Milk and Milk Products into India".

villages, but also turn the huge waste that is daily occurring with dire consequences, to profit and to the economic betterment of our people.

We have already said that despite the awful deterioration and several other unfavourable circumstances, we have still a very large number of cattle in this country. Why is it then that there is a general complaint of scarcity of milk in the cities? Again, why is it that the milk available in our cities is always adulterated? Again, why are they costlier than those sold in the markets of foreign countries? What is the reason for such a "costly" milk trade which is unable to support our improverished peasantry in their economic distress? If, as some critics might argue, there is plenty of milk available in the villages, why is it then, that we have to import lakhs of rupees worth of milk and milk products for our consumption from foreign countries? These are a few pertinent questions.

We have said again and again that it is the villages that contain the majority of our cattle that yield milk, but unfortunately in those areas there is no demand for them. The cultivators live in rural areas and with them they have the cattle. They are not and cannot be called "cattle breeders" in the real sense of the word. They do not rear cattle for selling milk. They possess some cattle for their agricultural work. Cattle breeding is not their chief profession. It cannot even be called a subsidiary occupation: nor do they engage in the work with any seriousness of making a living or profit out of it. They bring their milk to the markets only when they have no other alternative and when they are hard-pressed.

There are no facilities of transporting the milk available in rural parts, to cities and towns. Internal communication and transport facilities either by rail, road or by water is neither adequate nor proper, and due to this defect we are confronted with two difficulties. On the one hand, in cities and towns where there is a demand for milk, scarcity is felt and in the villages where the commodity is in plenty, there is no market for it, and the producers

are not in a position to dispose of their commodity and turn it into cash. We have already said how they are also not in a position of converting them into other marketable varieties, so much so there is a great wastage of this important article. In foreign countries, milk is brought to the cities from hundreds of miles in convenient and specially arranged trains, fitted with all appliances of preservation, etc. Unfortunately in this country, even if there be milk in a village just three or four miles away from a town in plenty, the people of the adjacent areas are invariably starved for want of the same commodity, simply because there are no proper transportation facilities.

To the same cause may be ascribed the high rates at which milk is sold in our markets. The milk available and those supplied by the dealers is of poor quality. They are too much adulterated and too much contaminated. The dirty and insanitary surroundings from where the milk comes to the cities and also the dirty habits of the people who handle it, constitute in no small measure, a menace to the general health of the public.

Having thus surveyed the defects and deficiencies, we may now proceed with the methods for their rectification. Rules and regulations and state supervision are very necessary here. Among other things we would suggest the following:—

1. Regulating the quality and price of the milk sold in the markets. This should be applicable for the milk produced in the city and those brought from the villages. This could be brought about by the registration of all milk producers, dealers, etc.

2. Prohibition of adulteration of every kind. The Government must fix a milk standard and strict conformation to this rule should be enforced. Defaulters should be penalised.

3. Strict adherence as to the sanitary control of production, transport and distribution. This could be enforced by means of licenses, permits and certificates, etc., to the persons concerned.

4. Occasional inspection and surprise visits by veterinary

Experts of all animals. The housing conditions and sanitary arrangements must be specified. The system of starting dairies and cattle farms, as a matter of fact, keeping animals in the heart of cities, where they cannot have proper sanitary arrangements, should be discouraged. There should be periodical examination of all persons who come in contact with milk either in production or distribution: sickly people often act as carriers of diseases like cholera, typhoid, tuberculosis, etc.

5. Giving more powers to Municipal and local authorities so as to set up an effective and prompt inspection of milk and to exercise a more effective sanitary and legal control of the public supply.

6. Persuading the Railway authorities to provide better facilities for the transportation of milk, like the fitting up of special carriages with refrigerators etc. Also, granting concession rates to the transport of milk from the villages to the cities, this being an article of diet.

In this connection the observations made by Mr. V. H. Gonehalli, late Assistant Registrar of Co-operative Societies in Bombay, are apposite :

“I would urge that the *gowalees* keeping milch cattle in a town should be induced to keep their cattle outside the towns, that the Municipality should provide them with stables outside, on a suitable site having water supply and grazing facilities, that the *gowalees* should be organised into a Co-operative Society, that the Society should grant them loans for purchasing animals and food stuffs for the members, that milking should be done in the presence of the Secretary of the Society, that the ordinary simple sanitary rules as regards the washing the udders of animals, the hands of milkers, and the utensils used in drawing, storing, transporting and distributing milk should be observed, and that the marketing of milk should be taken away from the individual producers and entrusted to the Managing Committee of the Society”.

In Co-operation alone can we find the panacea for many of our ills. At minimum cost and with little labour, and with the aid of the co-operative machinery we stand to gain, and achieve maximum benefit. Individual peasants and the community as a whole will derive great advantages. The poor peasant will not, in the first place have to find a large sum of money for initial investment. On the contrary, he will even get money for the purchase of cattle and other things at a low rate of interest through the efforts of the Society, to be returned by easy instalments. There will be a Department of the Society whose function it will be to look to the purchase of cattle for the members at best market rates. In addition, he will be able to get all his requirements at very moderate prices and of a superior quality from the Stores kept by the Society, who would have purchased and stored them up at best rates during proper seasons. He would again get the best advice and instructions from the Experts kept by the Society and by the application of which he would be able to benefit himself in many ways. He would be able to increase the milk yield as also the milking-period of his animals. The standard of breeding will improve and the progeny will be excellent. The animals will be healthy and will have a longer lease of life. The Society will be in a position to obtain for the members plots of land in the vicinity for their stable, for growing fodder crops, and for utilising in the best manner possible, the stable manure which would otherwise have been wasted. With the assistance of the Society the members could easily send their dry-cattle into the interior for grazing during their dry period, instead of sending them to the butchers to be slaughtered as at present. The chief item, the marketing of milk would be undertaken by the Society and the expenses incurred in connection therewith would be very small as the Society would market them in bulk, employing modern methods of transportation etc. Instead of themselves individually carrying the milk to the cities and finding customers, they will now send their supplies to the *depots* kept by the Society. They will get better price as there will be no competition between the different dealers. They will be relieved of all responsibilities and can busy themselves with other activities. Whatever milk

remains after meeting the daily requirements, the Society will send it to the factory to be converted into other products like butter, cheese, casein, etc.

A good deal of propaganda in this direction is necessary. Both the Government and public institutions should co-operate and bring home to the people the benefit of modern methods of cattle breeding and dairy farming. Dairy and agricultural education in this country is meagre. People in their vanity consider themselves as Experts and refuse to take cognisance of the advice of those who after years of patient trouble and research suggest an orientation of things. Our Agricultural Schools and Colleges turn out several hundred students every year; but for lack of co-operation and want of initiation they are not in a position to do anything, and if they are not absorbed in Government Departments they are useless to anybody else*. The Experimental and Demonstrational Farms kept by the Government scare away the people who under the plea that they cannot afford to have such costly things, refuse even to study and make themselves acquainted with them. The pamphlets and leaflets which the Governments print and issue contain plenty of useful information. We would also add that local bodies like Municipal institutions, District Boards etc., should take more interest in these matters. They should encourage such habits in the people, arrange cattle-fairs, and award prizes to the best breeds, to give an impetus to the people to breed good cattle. Practical demonstrations of the working and advantages of the dairy farms from time to time will be of great benefit.

In this connection, the Committee on Dairying at the Agricultural Conference held in Coimbatore a few years back, recommended to the Government "for the impartation of free information and assistance to any one willing to embark on a dairy enterprise of any sort. This would take the form of free plans and specifications for all classes of dairy-buildings, free specifications and advices as to the purchase and erection of plant and advices as to

* The writer knows many instances of "misfits" in life, particularly of one who having spent five long years at the Imperial Dairy Institute, Bangalore, and being unable to find a suitable vocation deserving his talents, now working as an Assistant Salesman in a second-hand bookshop, in a small town.

the correct system of keeping dairy accounts, and of free information generally on all points connected with the establishment and working of dairy enterprise in any direction, so that one willing to invest money in the industry might be so guided as to ensure his organisation being planned in the best possible manner for profit earnings."

We need have no doubt in regard to the success of our scheme if we are to embark on them in good faith. In India there are better chances than in any other country for the expansion of this business: "no other country has the same possibilities of building up of an industry of so great a magnitude and one that will so mightily improve all other branches of industry or give so much to the State treasury for any amount spent upon it. India offers a field for enterprising men who have a bent for this line of farming second to none in the world but those embarking in the trade must be possessed of a sound intelligence, industrious habits and a reliable training in the best methods introduced"•.



M i l k.

India has in her animals vast undeveloped sources of wealth but India is not getting the best out of her live-stock.

Therefore Government and public opinion in co-operation should pay greater attention than hitherto in the improvement and exploitation of the animal side of Indian husbandry. For example, in every part of India efforts should be made to increase the average milk yield by nearly 70% between one lactation and the next by proper and less costly feeding.

The live stock yields annually far more than the mines and although we can put barbed wire-fences round the mines to guard against theft we cannot find a barrier, which will keep the worst stock-thieves out of our flocks and herds, namely the germs of diseases.

Khan Sahib N. D. Dhakmawala, G. B. V. C.

Milk is a universal article of human food. It forms an essential item of diet during the period of infancy and early childhood, and serves as an ideal substitute or supplement to the menu for invalids at all stages. Even to grown up adults, it is more of a necessity for retaining their health and vitality than a luxury. To-day invariably everybody is using it, in one form or another, in quantities small or large. The habit of taking tea, coffee or cocoa mixed with milk, and of using milk products like butter, ghee, cheese, dahi, etc. is common. Sweetmeats prepared out of milk or its products, too are very popular here than anywhere else, and are being consumed in large quantities by all classes of people.

Despite the fact that milk is such an important item of food people have not cared to study it in all its aspects. Many who regularly use it, do not at all seem to worry, or care to study any of the problems that are so intimately connected with it. They are easily satisfied if their milkmen supply them every morning and

evening a white fluid called milk or if their servants fetch them a white milk-like substance from the bazar. It is immaterial to many whether the thing so obtained is good or bad, pure or adulterated, genuine or contaminated, healthy or poisonous. They consume it, as a matter of course. Little do they trouble to think for a moment that being an important article of food, it must be pure, and that they must use only the best quality. Drinking bad milk very often leads to complicating diseases. Ninety per cent of the sickness is mainly caused by what people eat or drink.

Cattle are more easily susceptible to diseases. They are after all animals and do not know how to take care of themselves. Any one who drinks the milk or uses the products prepared out of the milk of such sickly animals is affected by the diseases which the former might be suffering from. People in this country do not care for the comforts of the animals and many a disease to which the milch cow has become a victim goes unnoticed and uncared for. Only when it has reached an incurable stage, its owner comes to know of it. Even then he is very indifferent. Veterinary hospitals are few and adequate facilities for the treatment of animals are lacking in this country. And even where they are available the indifference and apathy of the people are such that they do not make the best use of them. If by the contraction of certain diseases the milk in the cow suddenly dries up, or yields lesser, quantity or slightly changes its colour, people generally think that the cunning animal is purposely evading to give the milk; they then begin to mercilessly belabour it, and to force out the milk from its udder. The poor dumb creature unable to speak or express its feelings, sheds a tear or two, and falls down to the ground quite dead. Afterwards the man realises the folly of his hasty act, laments over what he has done and begins to realise why the animal failed to give the usual quantity of milk. But belated repentance is of no use.

The milk supply all the world over is chiefly obtained from the cows. Buffaloes are found only in India and they yield milk in large quantities. Sheep also give in small measures milk,

which is best for children and for medicinal purposes. Other animals like camel, donkey, horse, elephant, and reindeer are also believed to possess milk, but it is not generally used by human beings. The milk obtained from cows is the best. It contains more of vitamins than any other substance and is very nourishing. It has in it several properties that go to develop and strengthen the human body. It is very delicious and is liked by all.

From time immemorial milk has been recognised as a unique diet for all. We read in history that even three or four thousand years before the Birth of Christ, the plains of Central Asia, which is considered to be the common ancestral home of the people, both in the East and the West, the inhabitants were rearing cows as domestic animals for the supply of milk. Cattle were their chief wealth and the tribes carried their animals with them wherever they went. Milk was a life sustaining food for them and they depended in no small measure for their livelihood on the welfare of their herds and flocks. We find frequent references of this in the Old Testament. The Jews considered it not only as an integral item of food but as a sacred and precious thing. Abraham is known "to have given butter to the Angels in the Valley of Mamre, and ten cheeses were among the provisions which David was carrying to the army before he challenged and slew the Phillistine Giant Goliath." Again we find Zilph Carruthers mentioning that "the Roman soldiers first came to the British isles, it is more than likely that they carried cheese in their packs as part of their rations. It is certain that they found the savage warrior natives of the place were milk-drinkers" for "as a matter of fact" he writes, "all the tribes of Northern Europe in Roman times lived almost entirely upon the produce of their herds."

Coming nearer home we find that in India even in the Vedic period milk was very liberally consumed, and the welfare of the people chiefly depended on their possession of large herds of cattle. From the "Health Codes" left by them we find how milk and its products formed the chief basis of their subsistence; in fact they had recognized even in those very remote times the importance of

milk not only as a food product but they considered the cow as sacred as their mother, for according to them "she is the best source of supply of milk, as good as mother's milk but more in quantity."

Not in all places do cows and buffaloes thrive. In those regions where they cannot live, for example in the far and distant North, people use reindeer milk. In the Mediterranean coast, they use more of sheep milk. In Tibet Lama milk is more in use. In Russia mare's milk is somewhat popular, whereas in the deserts of Arabia, camel is the chief source of milk supply. However, it can safely be asserted that from earliest times to this day cow has excelled all other animals in producing good quantity as well as the highest quality of milk and its supremacy stands unrivalled to this day.

We have in the preceding paragraphs mentioned how milk, was known to human beings and how with the advance of civilization, its importance has been increasing, and how it is almost impossible for people now to live without milk. With the growing demand for it of late, there is great scarcity of milk particularly in the cities. The supply is insufficient and the distribution defective. It is much costlier than it was a few years back; also when it is compared to the supply available in foreign countries. The Committee appointed to consider the question of the Maintenance and Improvement of the existing Cattle Breeds of the Bombay Presidency in their Report assert that :-

"Milk in India today is anything from 2 to 6 times dearer than in any other country in the world."

Mr. Zal Kothawala, the Dairy Expert in his Note submitted to the Cattle Conference held at Bangalore mentions that the price at which milk is sold in Bombay is 13 times dearer than in the United States, and 12 times dearer than in the United Kingdom.

These facts were brought to the notice of the Government by the Members of the All India Cow Conference, Calcutta, in

their Memorial submitted to His Excellency the Viceroy, wherein they compared the level to which the price of milk has reached, out of all proportion to the all-round rise in the price of other commodities, with the relative rise of commodity rates in foreign countries. They state:

“That the rise in the price of milk and milk products has been out of all proportions to the current tendency to an all-round rise in the price of commodities, for while in the course of the last 60 years the price of food grains has risen 5 to 7 times, that of milk has risen more than 40 times. Further, while the price of most other commodities in England and in the U. S. A. is double and sometimes even 4 times that of the same in India, milk sells there at the same price as here and sometimes at a cheaper rate. In addition there has been an abnormal rise in the price of cattle as well. In Akbar's time cows giving 20 quarts of milk a day used to sell at Rs. 10; fifteen to twenty years ago such cows could be had for about Rs. 150; whereas they are hardly available now for Rs. 400 and similar has been the rise in the price of bulls and bullocks as well.”

There was a time, not very long ago, when every villager in this country owned his own cattle that provided him with plenty of milk, perhaps more than he needed, for himself and his family.

Conditions have now thoroughly changed. Our cattle which were once very strong and sturdy and were giving large quantities of milk have now deteriorated. We find in Akbar's time, as mentioned in the *Aini-Akbari*, “milch cattle used to give 20 quarts of milk a day, and draught cattle would walk faster than horses.” Things are quite different now. Their health is shattered, and their milking qualities diminished. The number of animals too have fallen considerably. And all this has tended to increase their cost. According to Shiv Datta, a good *Montgomery* cow yielding on an average 2300 lbs. of milk a year could be purchased in 1903 for less than Rs. 70, but now he gives the

high figures even with the payment of which he says, it is difficult to procure them.

In 1905	they could be had for about	Rs. 85.
In 1908	" "	" 100.
In 1911	" "	" 98.*
In 1914	" "	" 120.
In 1919	" "	" 200.
In 1921	" "	" 220.

The same is the case with buffaloes. A good *Murrah* buffalo yielding on an average 3500 lbs of milk a year could be had in 1903 for about Rs. 80, but in the subsequent years their rates have been going up by leaps and bounds.

In 1908	they could be had for	Rs. 110
In 1911	" "	" 100*
In 1914	" "	" 140
In 1919	" "	" 250
In 1921	" "	" 325

The population of this country has been steadily on the increase and the demand for milk has been proportionately growing, but unfortunately the number of cattle is small and their yield too is very low. These things have created an alarming state of affairs.

Mr. E. W. Oliver, M. R. V. S., F. Z. S., Superintendent of the Civil Veterinary Department, U. P., referred to the growing difficulty in obtaining sufficient milk in the following words:—

"Where should we get our milk supply in future? This important question needs consideration, for it is a well known fact that the milch cattle in India are deteriorating rapidly." He continues in the same strain dealing with the difficulty with which the Government's Military Department has been confronted: "The Government Military Dairies in India are experiencing

* Famine year.

much difficulty in obtaining good milch cattle notwithstanding that there are specialists devoting the whole of their time purchasing for this Department. They find it almost impossible to get even passable cows and the position is little better with regard to buffaloes. The difficulty increases every year."

Another authority Lt. Col. J. Maston, writing in the *Agricultural Journal of India*, deals with the same subject more comprehensively. He writes :-

"While we come to the other function of cattle, namely production of milk, the position is very serious indeed . . . the appalling shortage of milk in the cities is indeed the clearest proof of deficiency of milch cattle swarm. But as the position is now, however, it would not be so disquieting were it not that the evidence points to a very much worse state of affairs in future.

"Fifteen to twenty years ago milk was cheap and in sufficient supply for the demand . . . There must be thousands of Indian children at this moment whose parents need milk for them and are willing to pay a price which would return a good profit if the dairy industry were even moderately organised . . . The shortage is so great that the available supply meets the demand only after a degree of adulteration in the hands of the distributors, which practically cancels the value. At the same time the price of market milk has risen to a point at which the pure milk contained in it sells at almost incredible rates in some cities. The large demand and the higher prices ruling should have induced the required increase in supply. But they have not. Why? The proximate cause is that the districts which breed them, no longer put out a sufficient number of good dairy cattle to meet the demand."

The scarcity of milk and the people's low consumption or going even without it altogether, are responsible for the heavy infant mortality, and the high death-rate prevalent here. Several well-known Doctors have pointed to the same factor. To no other country in the world are the cattle so indispensable as to India which is predominantly an agricultural country. The

demand for milk from the people the majority of whom are vegetarians, is really great.*

“The need of having species for national prosperity”, as a writer puts it can in no way be minimised. “The bovine species is indispensable to agricultural India. It is the chief motive power to agriculture. It is essential to improve our motive forces and save them from the wanton, and deliberate extinction. For a vegetarian people nothing can take the place of milk and milk fats, in their dietary. The large mass of Indians do not eat animal fats and consequently for the fatty part of the daily ration, rich in the necessary vitamin principle, they must rely on butter fat alone. There is little wonder that the scarcity of these articles of food so vitally needed for the physical growth and health of the people that India has to pay the heaviest toll in infant mortality. †

See the children of to-day and compare them to those of a generation or two back. They are very much inferior, to their predecessors, in health and stamina. This is chiefly due to malnutrition, both in the childhood and thereafter. It is the scarcity and want of proper nourishment that are responsible for it—the insufficiency of milk and the want of nutritious substances which are badly needed for the growth of the human body. Sir William Cooper emphasizing the importance of milk to the growing children says: “One of the first national obligations is not only to secure our milk supply but to increase it and cheapen it; the war will to a considerable extent deplete the man power of the Empire. The surest way to replenish it,

* In India the *per capita* consumption of milk per year is only 7 to 8 gallons, while the figures for other countries are :—

Finland	83.8	Switzerland	76.4	Sweden	69.7
Norway	56.0	America	55.3	Canada	51.0
Czechoslovakia	45.8	Austria	45.0	Netherlands	42.7
New Zealand	37.8	Australia	37.1	England	30.8
Germany	27.3	France	25.0	Denmark	22.0

† One fifth of the children in British India die before they are of one year. As compared with other countries, out of every 100 children born alive 19.4 die in the first year of their life in India, 7.7 in England, 8.8 in France, and 10.8 in Germany. It has been estimated that over two million children die every year in India in their infancy, in addition a large number of still-born. The number of children who die before reaching youth is also great. Ten million children die between the ages 10 and 15. Hardly do we find 50 p.c. of the children born ever reaching even a youthful age.

is to provide an adequate supply of milk for the coming generation. Milk and products of milk are far and away the nourishing food for the young, for those who are destined to replenish the verile strength of the nation. No effort should therefore be spared to secure far more plentiful and cheaper supply than we had in pre-war days.....we want a plentiful milk supply—so plentiful that our young people may never suffer from a shortage of this natural body-building food”*.

The following statements showing (1) the Mortality of different countries and (2) average annual death-rate among children and others will reveal how appalling are the conditions prevailing in India: -

DEATH RATE IN DIFFERENT COUNTRIES

Name	Population	Death rate %
United Kingdom	45,407,307	14·6
Canada	7,250,000	15·12
Australia	5,500,000	10·5
New Zealand	1,200,000	9·5
Belgium	7,500,000	15·2
Cuba	2,600,000	11·2
Denmark	3,000,000	13·4
France	40,000,000	19·6
Germany	60,000,000	16·2
Netherlands	6,750,000	14·5
Switzerland	4,000,000	15·1
INDIA	315,000,000	309

AVERAGE DEATH RATE OF CHILDREN PER THOUSAND

Country	Under one year.	One to five years.	All persons.
England & Wales.	172	22	17
Scotland	145	22	17
Ireland	123	17	18
Denmark	136	11	15·5

*The Toiler and His Food.

Norway	102	12	15
Sweden	102	12	16
Holland	50	50	17
U. S. A.	58.8	58.8	...
New Zealand	32	...	9.5
Japan	...	31.99	20.9
INDIA	260.7	67.3	38.2

Commenting on these figures the members of the All India Cow Conference Association, Calcutta, in their Memorial to the Viceroy asserted:—

“That the mortality among infants in India is appalling, being nearly double to that of the United Kingdom, Denmark and Japan: about three times that of Norway and Sweden . . . of the 26 per cent of the deaths of infants under one year which take place in India, most are from preventible causes, especially from mal-nutrition, and it is evident that by cheapening the price of milk so as to bring it within the reach of the poorer classes more would be effected” as Colonel Mactaggart, Sanitary Commissioner of U. P. points out “towards reducing infantile mortality than the presence of any number of trained *Dhais* would accomplish. There can be little doubt that the want of a pure and abundant supply of milk is the primary cause of the heavy infant mortality prevalent in India.

“That the death rate amongst Indians is on the whole very much higher than that of any other civilised community, that of females between the age of 15 and 30, that is to say during their child bearing period, is still higher—appreciably higher than the death rate of men in the corresponding ages—and this is doubtless due mainly to the want of nourishing foods such as milk and ghee which they most require at this period of life.”

With the decrease of cattle in number their milk yield diminished and the supply failed to meet the demand. The number of cattle per hundred of population in India is only 59 while it is 74 in Denmark, 79 in the United States, 80 in Canada, 120 in Cape Colony, 150 in New Zealand, 259 in Australia, 323 in the Argentine Republic and 500 in Uruguay.

Cattle Position of India.

COUNTRY.	Number of Cows and buffaloes.	Percentage to total cattle.	Total cattle (bovines to nearest hundred thousand.)	Population to nearest hundred thousand.	No. of cattle per 100 population.	Population per square mile.	Cattle factor.	Cattle Index No.
1	2	3	4	5	6	7	8	9
			Thousand	Thousand				
1. Great Britain & Ireland	4,606,902	37	12,500	47,300	26	400	7	17
2. Denmark ...	1,310,893	52	2,500	3,400	82	206	41	100
3. France ...	7,169,670	53	13,500	39,100	34	184	19	46
4. Germany ...	8,206,170	50	16,400	62,500	26	345	8	19
5. Russia ...	18,200,000	55	33,100	132,000	25	19	131	319
6. Canada ...	3,745,804	38	4,800	9,400	104	3	3,468	845
7. United States ...	24,082,000	37	65,000	105,700	61	31	19	46
8. Argentine ...	3,291,000	9	36,600	9,500	385	7	5,500	340
9. Union of South Africa	2,263,778	37	6,100	6,900	88	12	733	178
10. Australia ...	2,419,809	17	14,200	5,900	240	2	12,000	2,926
11. New Zealand ...	1,116,828	37	3,000	1,200	250	12	2,083	508
12. Japan ...	53,750	3.8	1,400	61,000	23	233	10	24
13. BRITISH INDIA ...	372,000,000	24	146,500	247,000	59	240	24	58

(Journal of Animal Husbandry and Dairying in India—30)

The above statement reveals the lamentable fact that in India we have the smallest number of cattle (per head of population). Further, our cattle yield the smallest quantity of milk. The average production of dairy cows in the United States is 3412 pounds of milk per cow per year, in Holland 7585 pounds, in Switzerland 6950 pounds, and in Denmark 5666 pounds while in India it is hardly 1000 pounds. According to another estimate the average daily yield of milk per cattle per day is 2 pounds in India, as against 102 pounds in the United States and 20 pounds in the United Kingdom. Numerically also, as we have already seen the number of cattle is hardly sufficient even to supply (the barest requirements) to one eighth of the population, as calculated by Sir John Woodroffe, who says "taking the average yield of milk of the Indian cow to be 2 pints per head per day for 7 months, the milk that is produced by 50 million of milch cattle per day for the 254 million people comes to about 60 million pints per day, that is to say each individual gets less than one-fourth of a pint, whereas the need per individual is reckoned at 2 pints a day."

Mr. J. R. Blackwood, Director of Agriculture, Bengal, in his "Survey and Census of Cattle of Bengal" says that the average consumption of milk per head of the population works out to a figure from 20 to 40 seers approximately per annum" which comes to a little over .087 pint to about .175 pint per day.

The *per capita* consumption of milk per day in Bombay city is 3.1 ounces, while the corresponding figure for the United States is 20 ounces and for the United Kingdom 10 ounces.*

According to Shiva Datta, the average consumption of milk per day per head in Lahore is 0.21 lbs.

It is no wonder that in the light of the above facts the number of reported Tubercular cases among the people in India in 1902 was 38,435, and it rose to 1,00,192 in 1919, an increase of nearly 200 p. c. †

*Zal Kothawala's Note.

† Woodroffe Memorial.

In describing the poor milking qualities of our cattle, high rates of infant mortality, etc., we have not at all exaggerated matters but have only recorded mere statement of facts. How could we account for this deterioration when hardly 25 years ago, as older inhabitants of India could testify, cows used to give about 5 seers of milk per head per day on an average, while they now give hardly a seer. It is not the fault of the animals that they give a poor quantity of milk. As a rule Indian cattle, in fact, no cattle in the world, are born poor milkers, nor will they continue to remain as such, if properly reared. It is only due to sheer carelessness and neglect for years that their milk-yielding capacity has declined. The peasants of this country who own the majority of cattle are in a poor and impoverished state. They are not in a position to look to their own comforts. They cannot afford to spend any thing over their cattle, and until and unless they are fed well and looked after carefully, the animals are bound to suffer. But their present condition can never be an excuse for slaughtering them downright and making profits by the sale of their flesh, skins, bones, fat, blood, etc*. Nor have the owners of the cattle any excuse "for trying to put an end to the recurring rearing expenses and take to other lines of occupation." This we contend is a short-sighted policy. As a recent writer observes: "Cow and man form a link, both at a time to swim or to sink. The symbiotic relations existent between them are so sound and secure that no vagaries of materialism can disjoint them; they are so closely dovetailed together. They have biologically reciprocated with each other, that one varies directly with the other. They rise or fall together." Few people in this country care to find out the reasons why their cattle are such poor milkers. Fewer still have ever made any serious attempt to find out the

* A little honest and deeper study of the question from an Indian point of view, would reveal the fact that the manure value of so-called uneconomic cattle (alone) more than compensates for their board. In view of the economic arrangement of agriculture in India, cattle in all conditions are helpful. Yet even economically useful cows and agricultural cattle are indiscriminately slaughtered in over-whelming numbers. This serious drain on country's cattle wealth can effectively be checked only by suitable legislation. In all civilised countries there are laws preserving useful milch and agricultural cattle and even birds by penalising their slaughter. It is a pity, however, that such a legislation is not yet considered to be fit for introduction in our country, where its need is paramount, even inspite of the recommendation of Government Experts and the disastrous results suffered by the country—Lalubhai D. Jhaveri,
President—Bombay Humanitarian League.

ways and means of rectifying the evil and of improving matters. Except perhaps in Government Dairies, and in a very few of the privately owned ones, no attempt whatsoever has hitherto been made for properly breeding the cattle on modern scientific lines, of improving the indigenous breed or of increasing the quantity of milk in them. Of course, the labours of those who have cared to improve them have been rewarded with success* and we see no reason why their experiments cannot be carried out on a larger scale. The people, particularly the peasantry, should give up their age-long conservatism. They must move with the times lest they should lag behind and suffer.

Wonderful results were obtained by consistent research, and application of modern methods of breeding in the Indian cattle. Col. A. Olver, Animal Husbandry Expert of the Imperial Council of Agricultural Research points out how during the last 20 years Governmental measures have increased the milk yield in the animals. He says, "the yield to-day (taking the example of the Ferozepur farm) compared with similar figures from the United States and England is very favourable both for quality and fat content. In fact, the yield from Ferozepur herd have probably almost reached the highest satisfactory level of production, though it is true that in the past most attention has been paid to the breeding of work-cattle, while buffalo milk has been preferred on account of its very high content of butter fat, much can be done to improve the yield of the average herd of milch cattle in this country. Since milk with a fat content of about 6.5 p. c. can be bought regularly in India at the rate of annas 1.2 per seer as against milk in England at the rate of annas 2.4 per seer with a fat content of only about 3.7 p. c." The Colonel further points out that "the Dairy Industry of India could, if properly organised, compete satisfactorily with world prices and could enter world markets with profit in the future if effective government assistance were given on the lines adopted by its competitors."

*At the Pusa Institute by careful feeding, the average milk yield of the cows (*Sahiwal*) has been raised from 8 lbs. to 21 lbs. per day. (1937 Report)

Another important reason for the degeneration of our cattle is due to the removal of certain breeds from their original homes to other parts of the country, where the climatic and other conditions are totally different and unsuitable to them. This removal from their accustomed homes, from localities which are familiar and favourable, to new and unknown places heavily tell upon their health, and the milk-yield. They feel the enforced change very bitterly, and this in its turn leads to adverse results. There are particular areas which are best suited for rearing of all cattle. Again there are places which are suited only for rearing of a particular type of breed. If we are to take the animals accustomed to the hills to the valleys, we will find them failing. Their health will be shattered and their milk yield will also go down. Again if we are to take the cattle of the valleys to the hills we will find the same reaction. It has been ascertained that in certain cases their milk yielding capacity will go down to about 20 p. c.

The Memorialists of the All India Cow Conference in their Address to the Viceroy made the following representation :-

“The export of cattle from one Province to another also produces baneful results, for such cattle take a long time to acclimatize, the yield of milk and capacity for labour visibly diminish, their calves seldom survive and in the course of a year or two their existence is brought to a close while yet in their prime in the slaughter house. People are thus deprived of their useful service which would otherwise have been available for a term of 10 or 12 years and the cattle resources are being wastefully exhausted.”

With this evil of transporting cattle from one place to another, the indiscriminate mixture of different breeds is also responsible for the decay of the cattle, as it causes and spreads diseases contracted by the animal during its migration.

With this we must also take the heavy toll, the supplying and exporting thousands of cattle to the cities which eventually fall into the hands of the butchers as soon as they go dry. This

butchering business is the greatest evil that prevails. It causes the quick diminution of the best breeds of our cattle.

Mr. William Smith, the Imperial Dairy Expert observed: "In Calcutta and Bombay practically the total fresh milk supply of the city is produced from cows fed, housed and milked right within the city limits. These cattle are purchased in the prime of life and generally with their second half at heel, they are milked for one lactation period only, say 9 months and then immediately slaughtered to make room for another cow just calved, which of course shares the same fate as her predecessor and so the pernicious system goes on . . . within the last 15 years it may be taken that the cow-feeding system of milk production in our largest cities has caused the slaughter of not less than 2,50,000 young cows and female buffaloes."

This continuous and ever-increasing slaughter of milch cattle in our cities accounts to a very great extent for the diminution in the number of good milch cattle in India. Invariably most of the cows and buffaloes when gone dry are straightaway sold to butchers for whatever amounts they would fetch, instead of sending them to the country-side for grazing. This evil is being accelerated ten-fold by the great demand of skin and hide from foreign countries*. Unfortunately our cattle being poor milkers it is more profitable (at least that is what the people think) to trade on their skins after killing them than by rearing them and selling their milk. This is particularly the case when the trouble of feeding and rearing during the dry period is considered. The dry period of our cattle is very much longer than in foreign countries. In India the milking period is hardly from five to seven months, whereas the period of dryness from one calving to another often extends to from 2 to 3 years. This accounts for the statement of the Chief Veterinary Inspector of Bombay that hardly 25 p. c. of the dry cattle are sent to the interior for grazing while 75 p. c. are sent to the butchers.

*18 crores of rupees worth of hides and skin are exported out of India every year (and India stands third in the world's market). Hides worth 13 crores of rupees indicate that cattle worth 33 crores of rupees are slaughtered, and their perforce value (calculating their dairy, manual and agricultural products may amount to Rs. 100 crores.)

Mr. R. C. Wood, Director of Agriculture, Madras, in a Note on the subject says: "most of these cows (brought to Madras) go to the slaughter house as soon as they run dry and their calves are allowed to die of neglect."

As for Calcutta, Majors D. J. Meagher and R. E. Vaughan say . . . "At the end of the cold weather, when the cows are beginning to run dry and the sale of milk tends to decrease, they are sold to the butchers for slaughtering to avoid the expense of feeding through the summer months in a place where pasturage is scarce and stall rents high . . ."

According to the Government Report on Cattle and Dairying in the Punjab, "the valuable breed of milch cattle in Montgomery is drawn upon to such an extent that it is in danger of extinction."

Animals in India are not so much slaughtered for their flesh as many are inclined to think. The percentage of those who eat beef is rather small. It has been found very harmful to health, and responsible for several diseases. To quote the *Lancet*, the well known British Medical Journal:—

"The number of people poisoned by meat in a year, quite apart from the uric acid of xanthine it contains, is probably considerable and for one who knows what he has been poisoned by and whose case gets into papers, there are probably scores that go unrecorded...

The full evil effects of meat as a food will never be visible in their entirety till whole nation living on uric acid free food, with another similar nation still living as we do today. No meat eater has had or will ever have as fine blood or as free a circulation as well or any may have by living on bread and fruit, and this is no problem in abstract science, but a fact visible to the eyes of all . . .

It may be difficult to find any scientific reason why mankind should regularly include animal flesh in his diet."

Sir Henry Thompson, M. S., F. R. C. S., the well known Medical authority opines :

"It is vulgar error to regard meat in any form as necessary to life". While this statement is amply proved by the fact that more than three fourths of human race never eat flesh, it is difficult to understand how a civilisation can call itself Christian or human or even rational while its main article of food is not only unnecessary but one that involves so much degradation to the producer, disease to the consumer and untold suffering and cruelty to the victims".

A peep into history will tell us that it is only during recent years that the people of this country have taken up to meat eating. During the Hindu period cow was held with great veneration and sanctity. Even by Muslim rulers, the slaughter of cows was discouraged and often prohibited by State regulations.

In his interesting book "Cow Protection under Muslim Rule" Dr. Sayed Mohamed, Ph.D., tells us how the Muslim kings discouraged the slaughter of milch cattle, prohibiting them and imposing heavy taxes on them. We read "From the very inception of Muslim rule a special tax was imposed on butchers for the slaughter of cows to the extent of 12 '*Jetal*' per cow. During the reign of Feroz Shah butchers complained against this tax and the king abolished it . . . this tax therefore continued for two hundred years after the establishment of Muslim rule in India right upto the time of Feroz Shah Tughlak . . . Historians state that Farhat-ul-Mulk did not allow the slaughter of cows. Again Sultan Nasir-ud-Din Khushroo totally stopped the killing of cows in his territories. It also seems that the *Jazia* tax which had been discontinued by Feroz Shah, was re-imposed after his reign because it is recorded in books of history that Akbar abrogated this tax. Akbar ordered a total prohibition of the killing of

cows and the tax was no longer found necessary and probably it was on that it was discontinued.*

Dr. H. H. Mann recently observed :— “I think very strongly that the slaughter of milch animals in Bombay and other large cities is endangering the future supply of milking animals and tending to deplete the best milking strains in the country and that the matter demands early and vigorous action.”

Another reason for the extinction of good breeds of our cattle is due to our exporting them to foreign countries. Some of our best dairy animals are being exported to Argentine, Uganda, Japan, Burmah, Phillippines and other countries, but no statistics are available as to the exact number thus exported from India. †

The following questions addressd by the Chairman of the Royal Commission on Agriculture in India to Mr. Rodolph Anstead,

*Reproducing several passages from a facsimile copy of the Will of Babar, now in possession of the Bhopal Durbar, the Doctor quotes :—

“Oh son, the kingdom of India is full of different religions. Praised be the God that He bestowed upon thee its sovereignty. It is incumbent on thee to wipe all religious prejudices off the tablet of the heart; administer justice according to the ways of every religion. **AVOID ESPECIALLY THE SACRIFICE OF THE COW** by which thou canst capture the hearts of the peoples of India; and subjects of this country may be bound up with royal obligations.”

Ain-I-Akbari gives the personal attitude of Akbar towards this question :—

“It describes that His Majesty had a great disinclination for flesh, and he frequently says, ‘Providence has prepared variety of food for man, but through ignorance and gluttony, he destroys living creatures, and makes his body a tomb for beasts. If I were not a king, I would leave off eating flesh at once, and now it is my intention to quit it by degrees.’ For sometime he abstained from flesh on Fridays; then on Sundays; and now on the days of the eclipses of the sun and of the moon, and the day between two Sufyanehs; and the Mondays of the month Rajeb, and the festival of the month Teer, together with the whole of the month Fervirdeen, and the month of his birth (Ahan). It was ordered that Sufyaneh should last as many days as he was years old.

From a Firman given by him guaranteeing the “Rights of Worship to Jains,” we read :—

“No one can kill an animal on those mountains of Shantrunjaya in the Palitana State in Kathiawar.”

The second Edict of the Emperor Jehangir confirmed the Edict of Akbar and was on similar terms.

Emperor Shahjehan not only followed the footsteps of his predecessors but emphasized “that every year a new order shall not be demanded but that those whom it concerns shall not swerve from what is here commanded”.

According to *Islamic Gorakshan*, later Mughal sovereigns of India such as Muhammad Shah and Shah Alam prohibited cow slaughter.

(*Travels in the Mogul Empire, Bernier*)

† Dr. Joshi.

Director of Agriculture, Madras and the answers given by that Officer are very instructive in this connection :—

Q. Is there a demand from overseas for the indigenous cattle of this Presidency ?

A. There is a big demand for *ongoles*.

Q. Where ?

A. They go to Ceylon, they go to Malaya and they have even gone as far away as South America.

Q. Have they gone to Brazil ?

A. Yes, and that demand was so great that we had to stop the export of these cattle. It is forbidden now.

Another reason for the deterioration of our breeds is the gross neglect of the calves and the poor care taken of the animals during the period of pregnancy and of dryness*. Mr. W. Reeves

*The practice of feeding a dry cow is an insurance against next year's low yield, and nothing else. The great majority of dairy farmers seem to think that when a cow is dry she does not need any special attention in feeding. This is a big mistake, because it is just as important to feed a good cow when she is dry as it is to feed her what she needs when in milk. The conclusion arrived at after many conversations with dairy farmers is that the dry cow, not being revenue-producing, is looked upon as a nuisance among the cows in milk; and also that a dry cow costs money to feed and maintain. They evidently do not appreciate the fact that nothing on four legs is nearer perpetual motion than the cow, either milking or dry. It must be thoroughly understood that the dry cow is doing three very important things for herself, her owner, and the dairy-industry, building up of the calf's body, storing up fresh tissue within her own body to draw upon when she freshens, and maintaining her own health. It is quite certain that water and dry grass will not do these things, and if a cow gets nothing else than water and dry grass the flow of milk when she freshens will soon diminish, and likewise the profits. In a newly freshened cow the supply of milk is fairly good; when without any apparent reason the supply slackens off instead of keeping up for some months, you have silent evidence that she was not given the feed she should have had when dry. It must be thoroughly understood that the cow builds up her worn out body tissues, builds up flesh, blood, and bone of her unborn calf, and also makes the milk she gives from the feed that is given to her. If a cow is a heavy milker she makes great demands on the reserved nutrients and minerals she stored in her body, and these can only be placed there by feeding. During the time she is dry she uses the food she eats for body building and development of her unborn calf, but if you neglect to feed her during the dry period, it is the cow that goes short, but not the calf. In consequence, the cow calves in poor condition, and has no reserves to draw upon. It can be seen from this that the cow that is fed while dry lays up a reserve store of flesh and she has that to draw upon for some weeks after freshening. This will enable her to come to her full flow at about the time the cow that was not fed when dry begins to go off in her milk. The dry cow should be looked upon as a prospective milker and not as a nuisance. But is she? Where good pasturage is obtainable light feeding only is necessary, but on no account should she be allowed to approach the period of exhausting labour in a low or indifferent condition.

in an interesting contribution on the subject observes: "The destruction of the calves to avoid cost of rearing is a diabolical practice of the *gowalees* of this country. It is an everyday sight in Bombay to see cart loads of dead calves being removed from the public buyers. This wanton destruction of valuable stock is a disaster and degradation to the country and would not be permitted in any other civilized country in the world."

There is a general complaint about the shortage of fodder available for the cattle and this is also ascribed to be one of the reasons for the deterioration of our breeds. "The fodder question is taking a serious turn practically everywhere in India," observed Sir Charles Elliot "The scantier the fodder, the weaker the stock. No one can doubt that if matter does not change for good, in very near future, the Agriculture would immediately suffer."

The pressure on land is so heavy that our land has to bear the burden of 61 cattle with 100 human souls. Or in other words every 100 acres of our land has to maintain 67 heads of cattle, along with men between 70 to 80 in number.*

Taking the concrete example of a single Province, viz. Bengal, we find the land available for grazing was so much over-crowded that as many as 69 animals struggled for existence on one acre of grazing land in Faridpur, 55 in Noakhali, 45 in Howrah, 40 in Bogra, 35 in Tippera, and Rangpur, and 30 in Twenty-Four-Parganas. The density of population of these parts is about 646 per sq. mile (in some places it was as great as 3228) and every conceivable space is being utilised for the production of crops for the consumption of human beings. Of a total cropped area of about 31 million acres, only one million acre was under fodder crops (1933). How striking it is when it is contrasted with the conditions prevailing in foreign countries! Even in Great Britain which is considered to be a much industrially advanced country, there are over 31 million acres as permanent grass and pasture lands for 8 million cattle; in addition they have about 6 million acres under

* Zal R. Kothawala.

mangolds, alfalfa, swedes, and other fodder crops. The stable fodder crop in Bengal is paddy straw which covers about 23 million acres. Even if the whole of the straw were made available for the cattle as food, the supply would be insufficient for the barest requirement. It works out at about two seers per day whereas the normal consumption would be about 5 seers. In other Provinces the case is still worse.*

Not merely is the available acreage inadequate for our needs, but the cost of grazing is indeed exorbitant, and uneconomic. Sir S. T. Kambli Ex-Minister of Bombay voiced the view of the ryots when he declared at the Cattle Conference held in Delhi: (1937) "There is wide-spread discontent in the Bombay Presidency as to the rates charged by way of grazing". He demanded a reduction in the grazing rates asserting "we should see to the capacity of the agriculturist to pay the same". †

Mahatma Gandhi took quite a rational view of things when he declared: "I have in my possession startling authentic figures showing the annual slaughter of cattle and deaths from natural causes. According to the live-stock census of 1935 about 80% die naturally and 20 per cent are slaughtered. The percentage of natural deaths, however, varies according to locality. *Where grazing conditions are good and cultivation careful, deaths fall as low as 7%, and in famine zones they rise to 30%.* In the Bombay Presidency (British) it is estimated that there were, in 1935, 74.5 lakhs of cattle. Of these 9 lakhs died naturally against 2 lakhs by slaughter i. e. 12 per cent against 3 per cent The cow must die at the hands of the butcher, unless we learn the art of increasing her capacity of milk-giving, unless we improve her stock and make her male progeny more useful for the field and carrying burdens, unless we make scientific use of all her excreta as manure and unless, when she and hers die, we are prepared to make the wisest use of her hide, bone, flesh, entrails, etc."

*Cattle Census. † The Provincial Governments exact annually huge sums under the head—Grazing—Madras gets 6 lakhs, Bombay 5 lakhs, U. P. 1½ lakhs, Bengal 20,000, Burmah 18,000. There is a move now among some of them to reduce the grazing charges, and it is a welcome gesture.

The following statement will clear matters further :-
PASTURE FOR GRAZING.

Name of the Country	Total Million acres	Arable land in Million acres	Natural Pastures	Uncultivated productive lands.	Total	Relation of total to grazing	Relation of arable to grazing	Cattle in Millions	Grazing area per head of cattle in acres
Great Britain and Ireland	74.8	19.0	40.6	—	40.6	1.85:1	0.5:1	11.7	8.6
Germany	118.7	52.1	18.4	4.3	22.7	5:1	2.3:1	107.2	0.21
New Zealand	64.3	17.3	24.7	—	24.7	2.6:1	1.6:1	8.1	8.0
Japan	91.7	16.8	.1	8.7	8.8	10.4:1	2:1	1.8	6.7
U. S. A.	1903.0	503.	70.0	100 135 578	883.0	2:1	1.6:1	65.8	12.
BRITISH INDIA	621.0	272.0	—	114.0	114.0	5.4:1	2.3:1	145.0	.78
BOMBAY	78.1	42.7	—	7.0	7.0	11:1	6:1	9.9	.97

Commenting on these figures, the Committee appointed to consider the maintenance and improvement of the existing breeds of cattle in the Bombay presidency, in their report, remarks: "In the U. S. A. there are twelve acres of grazing land per head of live stock whereas in India there is only an area of .78 acre. This condition, as it stands is very unsatisfactory, but when one remembers that such large areas are necessary in temperate and sub-tropical countries where the growth of grass is encouraged not only by the climate but also by public and government enterprises, it stands to reason that more land per head of live stock is essential in a tropical country like India, where practically nothing has been done to improve the quality and capacity of these lands."



Cattle Breeding and Dairy Farming.

The farm live-stock of India amount to approximately 900 million, excluding poultry and pigs, and are more numerous than in any other country. The annual value of their products including labour is not less than Rs. 1253 crores* and even exceeds that of cash crops. Dairy products alone are worth over 500 crores at current prices and are of special importance to the proper development and health of the people of India. Moreover, mixed farming with a balanced out-turn of animal and vegetable products, is the sheet anchor which saves agricultural markets from even more violent price fluctuations than now occur and by which fertility is held in the soil from generation to generation.

—Col. A. Oliver, C. B., C. M. G., Animal Husbandry Expert
to the Government of India.

Having made a general survey of the importance of milk, and the existing unscientific production, improper distribution, high cost and other unsatisfactory factors, let us now enter into specific details of organising cattle breeding and dairy farming on modern lines.

The first thing to which we should turn our attention when proposing to start a cattle breeding station is with regard to the selection of the site where the station is to be established. In selecting a place we must see, in the first instance, whether there is enough of grazing ground, and a sufficient supply of fresh water in the vicinity, and whether the climate suits the health of the cattle, and whether there are transportation facilities for the quick disposal of milk and its products. Establishing cattle breeding stations in the heart of cities is not advisable as explained previously. It will be rather expensive in the first place; secondly it will be difficult to find proper accommodation and other

* The Report of the Imperial Council of Agricultural Research (1933) "after careful calculation" puts this at Rs. 1540 crores.

requisite facilities for carrying on the business. The climatic conditions, the hustle and bustle of the crowded city surroundings, the congested and ill-ventilated areas, and the very urban atmosphere are disliked by the cattle. If forced to live in such surroundings, it will badly tell upon their health. It is always preferable to select the site for the establishment of farms in villages, and yet not very far from the cities. It must also be as near as possible to a railway station. We should in addition see that the soil near the farm is good, and suitable for the production of the right sort of fodder crops. This is a very important item, for a well-managed fodder farm can produce the best type of fodder throughout the year, say, at about half the cost it would entail to purchase them from outside. We must have also plenty of ensilage on hand, to feed the animals during the hot weather, when the green fodder would be generally scarce.

After satisfying all these preliminaries, we should take up the question of the selection of the breeds suitable to the soil, climate, and locality.* We have already said in an earlier connection that particular breeds are suitable for particular localities, and that cattle accustomed to live at one place when taken to another, fail. In India both cows and buffaloes are bred for dairy purposes, though in foreign countries they depend upon cows alone. Buffaloes are found only in India and they yield richer and comparatively a larger quantity of milk. Usually cows' milk contains from 4 to 6 per cent of butter fat and 12 to 14 per cent of solids, whereas the buffaloes' milk has 6 to 8 per cent of butter fat and 14 to 16 per cent of solids. Not the least part of the success of a dairy will depend on the man who is at the helm of affairs. The dairyman should have an inherent love for his work, should be smart, intelligent and gifted with business capacity. He should be one who must have received a special training suited to his

*We would very much wish that we take up in hand the "Milk Marketing" question first, (than that of separately organising or establishing Cattle Breeding Stations), the peasants retaining the animals with themselves. Few Dairies in the West have any cattle of their own. They get milk from individual farmers or from "Cattle" centres, and they thus cater the needs of their customers.

By this process a greater area can be covered, and more and better service rendered to the peasants by finding a market for their produce.

profession and acquired efficiency not only in breeding and managing the milch cattle, but also in profitably handling and marketing the products.

Col. Olver, Animal Husbandry Expert to the Government of India, classifies the different breeds found in this country into four basic groups. They are:—

1. The large white cattle of the north ;
2. The very distinct Mysore type of the South with characteristic formation of head and horns ;
3. The highly peculiar *Gir* cattle of Kathiawar and the west of India ;
4. The small black, red or dun cattle which are met with from north to south, and east to west of India, mainly in hilly tracts and forest areas.*

Describing the characteristics of the individual breeds, the same Author proceeds:—

1. *Amritmahal Breed*: This is one of the best known draught breeds of India. Its home is in Mysore State, where government herds of selected cattle are still maintained which have been in existence since they were formed by former rulers of Mysore to breed draught cattle for their campaigns. They are not big animals but are very fiery, active cattle, and are famous for their powers of endurance. They were largely used by the Duke of Wellington, then Sir Arthur Wellesley in his campaigns. They are much valued as draught cattle in Mysore State and in the surrounding territories but the cows are poor milkers.

2. *Bhagnari Breed*: The home of the Bhagnari breed is the Bhag territory, north of Jacobabad in Baluchistan, and the adjoining areas of Sind The cattle of this breed are comparatively long, well-built animals, with well-arched ribs and plenty of bone, muscle and substance. The cows are reputed to be very

*Agriculture and Live-Stock in India Vol 1, Part 1, page 19.

†A brief survey of some of the important breeds of cattle in India.

fair milkers and selected animals have given quite good yields.

3. *Deoni Breed*: This breed is mainly confined to the north west and western portions of the Nizam's Dominions and appears to be allied to the *Dangi* cattle of Bombay Province. It is a valuable breed of medium size, the bullocks of which are good work animals for heavy cultivation while the cows are reported to be the best milkers in the Nizam's Dominions.

4. *Dhanni Breed*: They are moderate sized, compact breed of very active work-cattle of peculiar colouring which are bred in considerable numbers in the Attock, Rawalpindi and Jhelum areas of the Punjab, and in the North West Frontier Province They are not big animals but are very active and compact and are much prized as fast moving plough cattle but the cows are on the whole poor milkers.

5. *Gaolao Breeds*: This is the most important breed of the Central Provinces and is seen at its best in Wardha and Chindwara district. They are considered to be good milkers and the bullocks make useful work-cattle, if well developed.

6. *Gir Cattle*: Their home is the Gir forest of South Kathiawar but they are also found in Western Rajputana and Baroda and the northern sections of Bombay Province. They are good milkers as a whole . . the Bullocks if well developed are heavy powerful animals but are slow and lethargic in movement compared with some of the fast trotting cattle. Gir Cattle are reported to be the best beef-cattle of India.

7. *Hariana Cattle*: They are bred particularly in the Rohtak, Hissar, Karnal and Gurgaon Districts of the Punjab and in Delhi Province where every year large numbers are exported to Calcutta and other large cities for milk production but animals of the Hariana type are produced over a wide area to the South of this, particularly in the east of United Provinces, Alwar, Bharatpur areas, where like the pure Hariana they are valued as powerful work animals which at the same time are capable of producing a

fair amount of milk. Haryana bullocks are particularly good work animals for rapid ploughing and road transport.

8. *Kangayam Breed*: These cattle are bred in the south and south-east taluks of Coimbatore in Madras Presidency. They are exported in large numbers for work in South India and Ceylon and are strong, active work-animals particularly economical to maintain but the cows are generally poor milkers. They are of very good constitution and are said to last from 10 to 12 years in work.

9. *Kankrej Breed*: This is one of the most prized breeds of cattle in India. Its home is the country to the south-east of the Rann of Kutch extending from the south west corner of the Tharparkar district of Sind to Ahmedabad in Bombay Province and from Deesa in the east to Radhanpur State in the west, particularly along the Banas and Saraswati rivers. They are very highly prized as fast, powerful draught cattle and in the past were extensively exported to America and other countries for grading up the indigenous cattle. In this way Kankrej cattle have been largely instrumental in the formation of beef breeds in those countries which are better able to withstand tropical conditions than the indigenous stock of European origin.

10. *Krishna Valley Breeds*: The home of these powerful cattle is the black cotton soil of the water shed of the Krishna and the rivers in the southern portions of Bombay Province and Hyderabad State. The bullocks are very powerful animals useful for slow draught or heavy plough in black cotton soil, and the cows are as a rule fair milkers but the breed is not a well fixed one and considerable variation occurs due to more than one basic type having entered into its composition.

11. *Ongole Breed*: The cattle of the Ongole tract of the Madras Presidency are among the best known breeds of Indian cattle and are much valued for work and for milk production. In the past Ongole Cattle were exported to tropical America and other countries on an extensive scale mainly for improving the

local cattle by grading, and in some of these countries herds of pure-bred Ongole cattle are now maintained to provide sires for grading up the local stock of European origin. Like all Zebu cattle, their greater resistance to tick-borne disease and their capacity to thrive on scanty and dry fodder, has proved of great value in building up beef breeds able to thrive under tropical conditions and cattle with a proportion of Ongole blood are now very largely bred in such countries.

12. *Sahiwal or Montgomery Breed*: They are chiefly found in the Punjab. These are essentially milch cattle, and owing to their milking capacity they are largely exported to other areas for milk production It is reported to be a good beef breed. The bullocks are useful for slow work.

13. *Tharparkar Breed*: They are seen at their best in the States of Jodhpur, in the semi-desert tracts of south-west Sind, in Cutch and Jaisalmer. The cows of this breed have good milking capacity and the bullocks are good workers and desert-bred stock are particularly hardy, and economical to maintain, with fine bone, clean limbs, strong ankles and hard feet.

14. *Jaffarabadi Breed*: Jaffarabadi buffaloes are very massive animals which are seen in their purest form in the Gir forests of Kathiawar where they are bred in large numbers particularly for ghee production. They are very large animals and require large quantities of fodder, for the milk yield is high and the butter-fat content exceptionally so.

15. *Mehsana Breed*: Mehsana buffaloes are considered to be particularly valuable milch cattle because of their early maturity, persistence in milk and regularity in breeding. They are of medium size and economical to feed and are largely used for milk and ghee production in Bombay Province and Bombay city.

16. *Murrah or Delhi Breed*: The Murrah buffaloes of

the southern Punjab and Delhi are typical of a wide range of deep, massive milch buffaloes which, the small local variations are bred in large numbers in the north of India, particularly in the Punjab and Sind, for milk and ghee production. The area in which they are mostly bred extends from the northern United Provinces through south Punjab to Sind but Murrah buffaloes have been introduced in many other parts of India to improve the local stock.

Murrah buffaloes are at present probably the most efficient milk and butter-fat producers among Indian cattle but are not suitable for draught. They are used for milk and ghee production in almost all large cities throughout India and in rural areas in the north and west.

17. *Ellichpur or Nagpur Buffaloes*: These long-horned buffaloes of Central and South India represent a very indigenous type. Stone carvings exist in the Nizam's Dominions which show the typical Ellichpur type buffaloes being used as draught animals to move the immense stone pillars which were used in the building of temples 3,000 to 4,000 years ago. Buffaloes of this type are still bred in large numbers throughout Central and Southern India. They are largely used for draught purposes: the females are considered to be fair milkers.

And specially for the dairy trade, the popular and chief breeds and among whom selection could be made are the following:—

Among cows, 1. Sindhi, 2. Gir (Kathiawar), 3. Sahiwal or Montgomery, 4. Hansi, 5. Kankreji, 6. (a) Gujrati (b) other Gujrat breeds, 7. Deccani, 8. Nellore or Ongole (Madras), 9. Layalpur (Punjab), 10. Khillary cattle, 11. Mysore (Amrit Mahal), 12. Malva cattle, 13. Krishna Valley cattle, 14. Shahabad cattle (Bihar), 15. Cross Breeds (a) Poona Ayrshire and Sindhi (b) Bankipur Cross Breeds.

Among buffaloes. 1. Delhi or Murrah, 2. Surati (Gujrati) 3. Jaffrabadi (Kathiawar), 4. Deccani, 5. Mehsarad (Palanpur), 6. Varadi (Pandharpur).

These are a few of the best lot found in India. They are also good milkers. The following table will show their milking capacity and other particulars.

Breed of animals	Yield of milk per day of best animals		Average yield per year lbs.	Maximum per year lbs.
	Average lbs.	Maximum lbs.		
COWS				
Sindhi	12	18	1800	2700
Surati	9	12	1080	1620
Deccani	6	9	650	1050
Gujrathi (Kankrej)	9	11	1180	1595
„ (Pathan)	9	12	1080	1620
Gir	15	22	2250	3645
Kutchi	9	10	1080	1395
Layalpur (Punjab)	12	15	1620	2160
BUFFALOES				
Delhi	18	27	2970	5250
Surati	12	15	1620	2160
Jaffrabadi	22	30	4050	5400
Deccani	8	12	1100	1350
Mehasana (Palanpur)	18	21	2970	3570
Varadi (Pandharpur)	10	16	1080	1620

Note.—These approximate calculations are based upon inquiries made by the Veterinary Inspectors from various *gowalees* in Bombay but the figures are liable to variations under certain conditions.*

* 1 Bombay seer equals 24 Oz. equals 1-1/2 lbs.
Dr. Joshi—Milk Problem in Indian Cities.

Under the title "Whom to choose—Cow or Buffalo" Mr. D Jani discusses the question of the selection of Breeds for Dairy purposes—there is plenty of force in his argument though he is somewhat prejudiced against the buffalo and too much sentimental towards the cow. His "compares and contrasts" form an interesting reading:—

- | | |
|---|---|
| 1. Slender in size; Feeds 4/7th of the Buffalo. | 1. Massive; Feeds 7/4th of Cow. |
| 2. Feeding cost less. | 2. Decidedly more than Cow: and proportionately less profitable for the same investment. |
| 3. Puberty and Gestation earlier. | 3. Both belated. |
| 4. If bred to a Potent Pedigree Bull and fed well, both milk yield and oxen considerably improve. In a lactation they may yield up to 7-8 thousand lbs. of milk; every generation may add 500 lbs to average yield of the National herds. Pubertainties so high; the possibilities look dismal. | 4. Potentialities not so high; nor so responsive to breeding and feeding as the cow. |
| 5. Fat percentage in Milk though less, yet total fat yield is more on the whole, if fully developed. | 5. Cannot increase milk yield, hence total fat yield less. |
| 6. Dries later, and calves earlier; feedcost during dry period lighter. Young stock of both sex productive and useful. Personally productive for a longer period. Regular breeding. All the off-springs productive, and of economic usefulness. | 6. Abortions and miscarriages frequent; irregular in calving. Male stock use less, so more of <i>Homas</i> and economic loss more telling in the long run. Only the female calves productive till the cow deposes her and assumes her own position. |
| 7. Lacto-products more luscious, healthful, richer in vitamins, and more vitalising. | 7. Milk heavy, less easy of digestion, not so soothing, poorer in vitamins and other enzymic values. |
| 8. Young stock of both sexes useful and productive. | 8. Only the female calf useful, but that cannot improve on her Dam; male ones useless and hence the buffalo less useful and profitable. |
| 9. Supplies bullocks as Prop of Agriculture. | 9. Cannot withstand the rigors of the tropical climate; a hard job to live. |
| 10. Killing minimised, health, wealth and happiness secured. Agricultural prosperity rests on cow, her progeny and products. | 10. Killing doublefold—of the male off-springs of both. It does not so substantially contribute to agricultural prosperity. |
| 11. Substantially helpful in the all-round development of the country. | 11. Fatally hampers the growth of the cow. It mars the fate of the cow and farmer, and consequently of the land at large. |
| 12. A live monument of cultural unity, Barometer of Prosperity. | 12. Ugly and unsightly animal only used in India for Ghee Craze. |

Sir Arthur Olver, analyses the problem from a "financial" point of view in a Note that he submitted to the Cattle Conference. In this statement, drawn out after several years of practical experience and close study, he opines : " . . . A choice has to be made as to whether cows or she-buffaloes are to be maintained. Here again there is some diversity of opinion and the choice is likely ultimately to be governed by financial considerations; though there is another aspect to be considered. Where abundance of coarse fodder is available, and where the production of ghee is a major consideration, or where liquid milk is produced for sale—usually by unscrupulous and uncontrolled hawkers—the she-buffalo is at present commonly preferred. But investigation has shown that pure-bred cows of certain Indian breeds of cattle can, in a comparatively few years, be improved by proper feeding and management to a point where they can compete successfully with the buffalo in economy of milk or butter-fat production. In view therefore of the greater general utility of cows, as compared with buffaloes in that they produce better working animals as well as milk and of the important fact that cows' milk is a much better food, particularly for children than buffaloes' milk watered down to the same level of butter fat, the question whether cows should not be bred and as well fed and maintained as are she-buffaloes is one which merits careful study".

PROPERTIES OF GOOD CATTLE.

Great care should be taken in the selection of the dairy cattle. Rao Bahadur G. K. Kelkar mentions the following points:—

"There are good and inferior cows in all breeds and the value of a herd must always depend largely upon the owner selecting the right individuals in any given breed. The first consideration is the yield of milk. A superior dairy cow is one with a large capacity for using food above the maintenance requirement and one that uses this available food for milk production. Good feeding capacity is indicated by a long deep barrel, large muzzle and good constitution, the last of which is most readily indicated by clearness of eyes.

“ The function of a cow being the production of milk, the most important consideration is the udder. Milk is formed in the udder itself and is a product of the decomposition of gland cells in the udder.

“ Milk vein conveys blood to the udder. The greater the milk vein the larger the activity of mammary glands and the yield of milk. The *zigzag* vein near the udder shows finest milking capacity. The udder should be square in shape, neat and compact. It should not be fleshy and should shrink after milking. The teats should be of moderate size, well placed at the corners, so as to allow a proper grasp. Superior dairy cows are wedge shaped in form when viewed from behind. They are wider at the back and narrower in front. Great width across the loins allows plenty of room for the calf. The dairy cow should have a long body gradually rising from withers to croups.

“ Good quality is indicated by a loose pliable thick skin soft hair, clean bone and general absence of flesh on the shoulders or in the pelvic arch. Thighs should be thin especially on the inside in order to give room for a large udder. Flanks should be well up and rather thin. Forelegs should be rather short and near together and the hind wide apart. The milk cow should be of mild disposition.” *

In India unfortunately no heed is being paid to the selection of bulls in the cattle-breeding industry. People are under the impression that any bull roaming about in the street is sufficient for the purpose. Bulls are as important as if not more than the cows, in as much as their influence on the progeny is extensive. The custom prevailing in our villages to-day is by no means satisfactory. They let loose all sorts of animals in the grazing ground, cows, heifers, immature male stock and sickly beasts, so much so it is impossible to prevent the cows in season from being covered. It should be borne in mind that unless well developed mature bulls are used for breeding purposes, the calves are bound

* *Establishment and Management of Dairy Farms.*

to be puny and poor, and there may be great difference in the milk-yield also. In selecting a bull for a milking herd, we should go in for the offspring of a good milking cow, as good milking qualities are certainly hereditary. He should be again of a known pedigree, of a strong and well-built constitution, with a light and flexible body, active, and energetic. As bulls are generally used as beasts of burden, we should see that they have a good pulling power also, their shoulders well developed, their limbs clean, with good hind quarters and a levelled back, their feet hard and compact and free from cracks.

The following account of a "live" bull by Mr. B. N. Handa, of the Punjab Veterinary Service is interesting in this connection :-

"Standing in front one sees a head carried in a position considerably higher than the level of the back, the neck being strong, rising in a gentle curve to descend at the shoulder to the level of the back line. The forehead is broad between the eyes; the eyes are large, placid and expressive. The forelegs are wide apart, indicating sufficient lung and heart space, a matter of vital importance. The brisket or breast stands out well between the forelegs with broad muscular forearm and wide deep thighs, the bones somewhat flat and clean behind knees and hocks; and the feet full sized and well-shaped. The hocks be well-sprung, clean and strong—a most important feature in the formation of bullock's hind legs. The ribs should be wide and well rounded right up to the shoulders. The hump should be of a moderate size, with a straight back sloping from the croupe to the tail and the quarters should be big and strong. The tail should be fairly long, fine, and tapering. The best specimen have a small fine sheath and a moderate amount of dewlap. The animal should show a great deal of "blood" and should be handsome and active, of good height, free walker, fast trotter and of sufficient weight for moving heavy weights."*

It is needless to say that the milk production in the animal depends upon many factors. As said before, climatic conditions

* *Live-Stock at the Government Cattle Farm, Hissar.*

have got a lot to do with it. In dry and moderately hot climates cows seem to do best, while on the other hand, rainy season suits the buffaloes admirably. Extremes of heat and cold have a great effect on the quantity of milk yielded by the animals.

FEEDING OF ANIMALS

Feeding of animals is an important item and the dairy man should pay due attention to it. In the first instance, a heifer poorly fed is not likely to attain maturity quickly. A well-fed heifer will attain maturity quickly and will calve down at the age of three or three and a half instead of six or seven as may be the case with others. Improper feeding will again lead to irregular calving, and will produce only 3 or 4 calves during her life time instead of 7 or 8 as it will be in a well fed animal. Again, she will be in poor health and be liable to contract diseases more readily and cannot stand or survive them, whereas if kept well and fed properly she could withstand and survive the attacks.

Again by good feeding, the period of dryness can be reduced to the minimum. She will yield more of good milk and bring out healthier and stronger calves. Feeding is thus important not only from the point of view of increasing the milk-yield but also from the point of view of developing the body of the animal, for keeping fit its physical condition, for strengthening the foetus in the case of pregnant cows, for the proper growth of the calves and for making the draught bulls strong and sturdy.

The quantity and quality of milk, as said before, depends to a very great extent on the feeding of animals. A good supply of green grass will increase appreciably the quantity of milk but this will of course be at the cost of the quality, for succulent green fodders have a tendency to lower the percentage of solids in the milk. On the contrary, cattle fed on "*tour chuni* (husk of *cajanus indicus*) cotton seed, wheat bran and other substances, will yield a better quality of milk than those fed on food deficient in proteids and fats. Again experience has shown that in milk production

both quantity and quality are dependent upon the digestible food that stimulates the secretion of milk. It is essential that a large quantity of digestible proteids are supplied to them.

FOOD ARTICLES.

The food and fodders generally given to the animals can be broadly divided into two main groups 1. Bulky, 2. Concentrated. The former includes all coarse stuffs like green fodder and grass, jower and maize lucerne silage etc., also dry fodders like *bhusas* of wheat, barley, oats, hay and karbi of jowar; under the latter can be included stuffs in small bulk but which furnish a large amount of nutrients, such as grains, chunis, bhusis, bran, cotton-seed, oil-cakes. The feeding of the animals with concentrated food is very important as they contain nourishing matter. Seeds and grains should be properly crushed, well soaked in water and boiled and then only given. In addition to the two main groups, there are certain things that go by the name of "food adjuncts" or condiments and under this, come things like common salt, gur, sonf, ginger, huldi etc.

The chief constituents contained in the ration given to the animals are water, carbohydrates, oils, proteids, woody fibre and mineral matter. These are usually called proximate constituents, but the cattle are never satisfied until and unless their big barrels are filled in to the brim and for this coarse fodders are essential. Left to themselves they will find their own food and will fill them with anything and everything, and if unrestricted they will continue to roam about in the fields for weeks together. It is up to the dairyman therefore to select the best type of food for his cattle, so that he may get the best from them. He must also make it a point to give them oily and carbohydrate substances to create heat and vitality in their bodies. A liberal supply of these will also produce ample proteid matter to the glandular secretions. Food constituents containing mineral matter goes to build up the bony structure of the body of the animal and improves its general health. They must also be made to drink more water with condiments added to them, as they will enable

the quick dissolution of the soluble portion of the food in digestion.

It is instructive to know how much digestive matter the various stuffs generally given to the animals, contain to enable us to adopt the best of it and to profit by it.

The following table will give an idea :—

PERCENTAGE OF DIGESTIBLE CONSTITUENTS.

Stuff	% of dig. proteid.	% of dig. oil.	% of dig. carbohy.
Grass (Hay)	2.58	...	29.74
Lucerne	2.75	0.34	8.31
Cotton Seed	11.77	16.22	15.57
Wheat bran	9.28	2.60	43.64
Til cake	27.50	11.25	16.66

All authorities agree, that it is necessary, that animals should be regularly given digestible proteids. According to Armsby, a cow should get for every 1000 lbs. weight 0.5 lbs. of digestible proteids and 6.0 therms energy for maintenance and for every lb. of milk 0.05 lbs. digestible proteids and 0.3 therms energy, whereas Kellner contends that a dairy cow weighing 1000 lbs. should have 0.75 lbs of digestible carbohydrate equivalent and for every pound of milk 0.056 to 0.067 lbs. proteids and 0.24 lbs. to 0.27 lbs. of carbohydrate. The following table prepared by Kellner gives in a consolidated manner various kinds of food that are to be given to the cattle, to milch cows and working animals, as also to young calves. They include dry matter, and digestible substances like proteid, oil, and carbohydrates :—

FEEDING STANDARDS (Kellner)

For 1000 lbs. live weight.	Dry matter lbs.	Digestibles (lbs.)		
		Proteid	Fat or Oil	Carbohydrates.
Full grown at rest	15-21	0.7	0.1	7.5-9.5
Light work	20-25	1.3	0.3	10.6

Medium work		22-28	1.7	0.5	12.2
Heavy work		25-30	2.2	0.8	14.2
Cow giving milk	10 lbs.	22-27	1.2-1.6	0.3	9.8-10.2
"	20 "	25-29	1.9-2.3	0.5	11.5-12.8
"	30 "	27-33	2.6-3.0	0.6	12.9-14.7
"	40 "	27-34	3.3-3.8	0.8	13.9-15.3
Calf 2-3 months	150 lbs.	23	3.7	2.0	13.0
3-6 "	300 "	24	3.1	1.0	13.0
6-12 "	500 "	26	4.6	0.6	12.7
12-18 "	700 "	26	2.2	0.4	12.4
18-24 "	900 "	26	1.6	0.3	12.0

It is necessary that the dairyman must make the food more palatable by adding some condiments to it, so that it will help digestion and thus secrete digestive juices. Common salt is recommended to be the best. It creates greater thirst in the animal, and makes it to drink more water which in its turn helps the greater flow of milk. Gur is preferred by many, as it being a sweet substance, turns the whole thing very palatable, and the animal gulps the entire quantity to the last drop. Experts recommend that one *chhatak* per head per day of salt and 4 *chhataks* per head per day of gur can safely be given. Oils or ghee should also be occasionally given but not daily. This will keep their bowels clean. From four to six *chhataks* per head are sufficient. Haldi is recommended by some dairymen as a condiment, as according to them, it goes to purify the blood. Ginger and pepper help the digestion and improve the appetite: other condiment like *ajwain*, *zira*, *sonf* and *soya* seeds etc., also are prescribed for helping the digestion, and increasing the appetite.

Regularity in feeding is a most important factor. The owner should fix the time of feeding and he should strictly adhere to it. Again he should use considerable discretion in feeding as different animals require different food both in respect of quality as well as of quantity.

In well conducted farms and military dairies great pains are taken in regard to feeding the animals, with the result that they yield large quantities of milk, whereas in the villages people do not take any care of the animals nor do they give them any nourishing food, and we find them very weak, impoverished and shattered in health and yielding small quantities of milk.

But such animals can be easily improved and made to give good quantities of milk by a regulated breeding. Wonderful results were obtained by Col. A. Olver, in his researches. He gives the following example of what he achieved. In 1932-33, a dairy herd at the Imperial Institute of Veterinary Research, Muktesar, increased the average daily milk yield per cow from 8.15 lbs. to 14.6 lbs while the cost of production per lb. of milk was reduced approximately by 40%. In Madras an experiment in the same direction also proved successful. Generally an Ongole cow of Madras yields on an average about 2500 lbs. of milk in one lactation, but as a result of the experiments conducted at the Chintaladevi Livestock Research Station, 39 Ongole cows gave on an average in their last lactation 3378 lbs. of milk. Twelve of these animals gave over 4000 lbs milk in a single lactation: this is due to good feeding and breeding*.

About feeding the same Bulletin says:—

Your cow should be fed on an average maintenance ration of one and half lb. cake and one and half lb. rice bran per day plus 15 lbs. of dry fodder; this ration helps to build up waste tissue and muscle and provides energy for the cow to walk about. About six weeks before calving, increase it to 2 lbs. cake, and 2 lbs. rice bran; this helps to increase the milk yield after calving, the cow is able to stand the strain of calving better and a healthier calf is born. After calving increase the ration to 3 lbs. cake and 3 lbs. of rice bran and *dhal* husk mixed. After six months the ration can be reduced to 2 lbs. cake and 2 lbs. rice bran and gradually reduced to the maintenance ration

*Leaflet No. 70, Dept. of Agriculture, Madras 1930.

Feeding the cow on the above ration results in a better cow and calf, more milk, and a larger number of calves; also it produces manure of a much higher quality and this gives a bigger yield of crops."

According to another authority a cow should be fed well and regularly as the production of milk is an extra strain on the animal. A heavy milker must get more food than a poor one. An average cow requires about 3 to 4 lbs. of concentrated food daily for its bodily upkeep and about 3½ to 4 lbs. of concentrated food for every 10 lbs. of milk it gives.

Again excellent results were obtained by proper feeding and breeding the *Sindhi* herd principally bred on the West Coast. This is in fact one of the best dairy breeds in India and appears to do well in most parts of the country. It does not cost so much to maintain as some of the other breeds, and keeps its condition even on scanty rations. The average milk yield of the breed was about 2500 lbs. per lactation, but the experiment conducted on improved feeding and breeding revealed the following results :-

No. of lactations.	Highest lactations.	Average Yield: all lactations.	Average daily lbs.
4	8243·0	5701·4	14·6
4	6861·0	6083·0	18·2
4	5972·0	3814·3	9·6
2	4390·0	3935·5	12·6
2	3868·0	3734·0	12·1
2	3755·0	3390·0	12·5
1	5036·0	5036·0	14·0
1	5307·0	5307·3	14·3

We have said that the chief item of food to the milch cattle is fodder and grass. Grass is the main factor and the dairyman should secure extensive grounds of pasture lands where fodder can be grown under irrigation. It is necessary that a good supply of grass should be kept ready always at hand. In

addition to the grazing lands, it will be necessary to grow fodder crops on arable lands to supplement the supply of grass. About 100 acres of land will be required for a herd of 200 cattle. It is better that the dairyman should preserve the roughage in ensilage. Ensilage means any fodder crop preserved in a semi-green state by a controlled fermentation. The fodder in a silo should be kept air tight. It may be round, square or rectangular. They may be ordinary pits dug in the ground or made of brick, stone or concrete. Green fodder is rich in sugar. If a proper silage is made the sweetness can be retained to some extent or it can be turned into acids. The filling should be done systematically, leaving enough time between successive fillings so that the *silo* be filled rather slowly, with the result that a good degree of heat is germinated and the alcoholic fermentation is made and sweet silage is produced. Things like maize, sorghums etc should first be cut down before filling in the silo as in that case it will pack up and settle nicely sinking quickly and uniformly. Very little loss is entailed by such a process. The fodder preserved in silo is very much liked by the cattle.

Housing and tending :—Unfortunately in India little attention is paid to the housing problem of the cattle. Many of the sheds where the animals are housed have no ventilation, while the sanitary arrangements are poor. In the villages the shed of the cattle form a part of the human dwelling. The walls of the sheds are in every case plastered with cow dung cakes and the general conditions are far from satisfactory. The atmosphere in which the animals drag on their weary existence is not at all, and is far from being conducive to their well-being.

Dairy animals should be properly and comfortably housed. Improper and insanitary housing tend to ruin their health and bring down the milk yield. It may be found expensive to construct comfortable, sanitary and decent sheds for housing cattle, but a dairyman need not grudge these initial expenses, as it will pay him in the long run.

The site selected for the construction of sheds must be good, preferably a high level ground, with airy locality. Marshy surroundings, or places where water stagnates should never be selected. There should be plenty of fresh water for the cattle for drinking and washing purposes. There must be extensive grounds nearby so that they could graze and move about freely and can have sufficient exercise. They must be allowed to remain in the open air at least for a few hours every day. In the sheds each animal should have a floor space of 3' to 5' by 6' to 8'. The rope used must be a long one, for if the animal wants it must be so long as to enable it to move or lie down comfortably. There must be good ventilation inside the sheds. To ensure this in several cases sheds are constructed with no walls but only pillars. This will also provide ample sunshine. But walled sheds are more comfortable during the winter and cold seasons. In the case of non-walled sheds, during the winter and rainy seasons it will be necessary to erect temporary tatti walls to protect the animals from blasts of wind and to keep them warm. In the case of walled sheds there should be good many windows to ensure fresh air. To keep the animals in a fit condition, there must be at least 1000 cubic feet of air space reserved for each animal. Ordinarily a cow respires from 18 to 20 times per minute and at each respiration the air of the shed becomes more and more impure. The shed should be scientifically erected. The animals will have ample air if the following measurements are adhered to viz., breadth of pathway, drain, floor, food trough etc. at 3, 1½, 7, and 3 feet respectively, and the main height of the shed is 15 feet and the distance between the tying rings 5 feet.

Care should also be taken as to the construction of food troughs. If it is not done properly it is likely to result in wastage of food. The trough should be built of good brick and its inside portion plastered with portland cement and made water-tight. It must be constructed in a sloping manner so that it may be easily washed and kept clean.

It is also advisable to have sheds for calves set apart in the same premises. It is not desirable to house cows and calves in the same compartment. The same principles of cleanliness, ventilation etc., should be observed here also as in the case of cow-sheds.

Cleanliness :— Other factors like washing and grooming of the cattle are not at all being observed now-a-days. For instance the cattle are seldom washed, and their udders and teats which ought to be kept clean, are rarely cleaned. Generally, the milkman puts on dirty clothes. The vessels in which the milk is received, kept and delivered are not properly washed. The vessels often remain uncovered. The conditions of storage and distribution of milk is very primitive. The *gowalees* often cover and filter the milk with the same old dirty piece of cloth which they use for rubbing and removing dirt, as also for covering their vessels. During the distribution the milkmen measure out milk to the purchaser by means of a brass pot or coconut shell, dipped into the container along with their filthy fingers.

It is essential that we must pay great attention in keeping the animals clean and healthy: the insanitary and dirty way in which the milk is handled now forms the root cause of several common diseases (found in the animals) affecting those who consume it. The animals must be washed almost every day, at least at such intervals as may suit the particular season and locality. There cannot be a hard and fast rule for this, as in India the climatic conditions differ in different localities and also change too often. In hot parts they must be washed every day. In the cold climates, a wash a week might be sufficient. Buffaloes require daily cleaning as they are fond of rolling in muddy water. In washing, special care should be taken to see that their hoofs are properly cleaned. Brushes and towels should be used while cleaning. In addition, their body should be well groomed at least once a day. Proper and continuous brushing renders the circulation of blood adequate. Grooming will disclose any injuries that might have occasioned

in the body of the animal. "Experience has shown", asserts an authority on the subject, "that grooming increases the flow of milk from 4% to 8%". In certain other cases though grooming may not increase the yield of milk, it does improve its quality. It also lessens the growth of bacteria and generally improves the health of the animals.*

Care of sick animals:- Sick animals should be segregated. They can easily be distinguished by their uneasy and weary nature. They will not eat their usual ration nor drink any water. There will be some change in the excreta, which will be watery and will have a bad smell. The temperature of the body would have gone up considerably and this can be felt by touching their ears. Hot tears from their eyes and saliva from the mouth will be seen continually flowing. The hair in the body would stand erect. They may be grinding their teeth in an unusual way.

On such occasions, the dairyman should immediately summon a Veterinary Expert and seek his advice, and begin treatment according to his instructions. During the illness the animal should not be ill-treated in any way, but shown every kindness.

Diseases:- As already mentioned, due to various reasons cattle are susceptible to diseases, and they are often uncared for by their owners. Dirty sheds, low roofs, insufficient space, bad flooring, faulty provision for drainage, unbalanced diet, unscientific methods of feeding, the foul air which they breathe, the municipal dust bins from which they often steal a mouthful of filth, and inflated rubbish, the drain and the urinal from which they are at times forced to quench their thirst, are chiefly responsible for their deterioration. Specific diseases of cattle including tuberculosis, foot and mouth disease, anthrax, cow-pox, rabies etc. renders the milk infectious and directly transmit the evil to

* When the cow is freed of the ticks and other pests sucking her blood, she responds to it by increasing her milk flow upto 30%.

It is also mentioned that "in Germany a Scientist gave music while milking the animals, and they responded to such a genial treat so splendidly that there was a clear gain of 16% in milk yield".

human beings, through the agency of milk. The milk of such animals should therefore be regarded as highly dangerous.

Common among the diseases that are found in the Indian milch cattle are foot and mouth diseases and renderpest. Foot and mouth diseases visit the cattle almost every year, particularly towards the spring and harvesting seasons. They originate from those areas where large movements of livestock take place either for summer grazing or on the occasion of cattle fairs. The milk of such cattle affected by this disease becomes thin, a little slimy, and will show sediments after standing for sometime and might coagulate on boiling. It is indigestible and will produce headache, nausea, vomiting, diarrhoea and vesicles may appear on the lips, mouth, nose etc. Renderpest is commonly known as cattle plague. Its first symptoms are high fever (the temperature goes up to 106° or more) dullness, a starving coat, shivering, a dry muzzle and loss of appetite. There will be increased oozing of saliva out of the mouth mixed with air bubbles and sometimes blood. The fever reaches its height in a couple of days and rapidly drops with the onset of the diarrhoea: towards the termination of the disease, the staring look of the sunken eyes, purulent secretion from the eyes, dirty nasal discharge foamy saliva in the corners of the mouth, difficult and groaning respiration, frequent thin fluid discharges and repulsive odour emanating from the body furnish a characteristic picture of the diseased animal. The completely exhausted animal usually dies after a long death-agony.* To immune cattle of renderpest in Government veterinary hospitals, vaccination work has been undertaken on a large scale and the results obtained are encouraging. Mastitis (Mammitis) or garget is another common disease that affects the udder of the cattle. Those that contrive this immediately lose their entire quarter or even two thirds of milk. The milk also slightly changes its colour (yellow to light brown) and a microscopic examination of the sediment will reveal leucocytosis puss cells and other substances. The milk will

*P. T. Saunders

have a bad smell and a saltish taste. The specific gravity in most cases will be very low. Ordinarily when the cattle contrive this disease the milk in them dries up or it turns into a poisonous substance. Epidemics of sore throat with cervical adenitis, colic diarrhoea and fever found particularly in children are chiefly due to the consumption of milk of cows suffering from mastitis. Cow-pox is a disease which manifests itself by vesicles and scabs on the cow's teats and portions of these undoubtedly fall into the milk during the process of milking. The disease is closely related to small pox of man. Milk from such cows should be regarded as dangerous and excluded. Anthrax is a most dangerous type of animal disease and when affected by this the secretion of milk in them suddenly falls off. According to investigations made by Mr. Johnson, the milk of cows affected by anthrax frequently contains virulent bacilli which endangers human health. Medical authorities assert that cases of ricket in children, gastric-intestinal troubles, dysentery etc. are directly and indirectly due to their taking the milk of such animals.

In most of the cases the animals attacked by these diseases are soon found dead. To quote Saunders again, "In cattle and buffaloes, sheep and goats, the disease usually runs such a rapid course that the affected animals are not seen to be ill but are found dead. It is not uncommon to hear that a healthy animal went out for grazing in the morning and was found dead in the fields in the evenings or that one came back from grazing in the evening looking quite well and was found dead in the morning".

Diarrhoeal diseases as we have already said is an important factor contributing to the infant mortality in India and they alone carry away 7 to 10 P. C. of our children. The impure milk of our cities contains 93.0% of Bacilli and other objectionable organisms, yielding counts from one to three hundred million of microbes per c. c. and containing bacilli of the colon group in a dilution of 1:1,00,000 of a c. c. Bad milk not only affects the infants but elders as well who as a result of it, suffer from

malnutrition and progressive debility and gradually succumb to diseases such as tuberculosis* etc.



*The Royal Commission on Tuberculosis (1911) established that man is notably susceptible to consumption communicated from the cow.

"The evidence which we have accumulated goes to demonstrate that a considerable amount of tuberculosis of childhood is to be ascribed to infection of the bovine type transmitted to children in meals consisting largely of the milk of the cow..."

"The Bovine tubercle bacilli are apt to be abundantly present in milk sold to the public when there is tuberculous disease of the udder of the cow from which it was obtained. This fact is, we believe, generally recognized though not adequately guarded against. But these bacilli may also be present in the milk of the tuberculous cows presenting no evidence whatever of disease of the udder."

Milk and its Products.

"The people who have achieved,
Who have become large, strong, vigorous people,
Who have reduced their infant mortality,
Who have the best trades in the world,
Who have an appreciation for art, literature and music,
Who have progressed in science, and every activity of human intellect,
Are the people who have used liberal amounts of milk and its products.

Dr. E. V. McCollum.

Milk is a chemical compound in which are dissolved several matters best suited for the development of human body and sound health. To quote the British Medical Journal "milk has been held to be the best simple food containing as it does, all the ingredients of a balanced diet. It is rich in vitamins and its high calcium content is in a readily usable form. For sucklings of the same species, it furnishes a complete dietary; in the growing children it promotes nutrition whether consumed by itself or as an ingredient of other foods. For adults too, it is beneficial though to a limited extent. For all ages of life it has been generally agreed that the milk is in varying degrees, beneficial." The chief elements contained in milk are butter-fat, albuminoids, milk-sugar, proteids and mineral matters. The butter fat which is the chief component is made up of various fats which have different properties. The chief fats are stearin, palmitin, olein, myristin, butyric, caprylic, capric and lauric. These substances are found in milk in minute globules. The mineral matter of milk contains potash, soda, lime-magnesia, iron oxide and certain

others, and these are present in the form of salts. Besides these, milk contains (according to Blyth) some air having 19.13% oxygen, 3.27% carbon-di-oxide and 77.60% nitrogen, leucocytes and lactic bacteria.

Milk of the Indian cattle differs in its chemical composition to that of the milk of foreign breeds. Also the milk available in different parts of the country varies in its composition. The chemical composition in the milk will depend on the climatic conditions and the nature of food consumed by the animals. As this chapter is devoted to the manufacture of various milk products, and as these are principally made out of the "fat" contents of milk, it is necessary that we enumerate in detail their properties, composition etc.

The result of analysis of various samples of milk, (both of buffaloes and cows) carried out by Experts, revealed the following* :—

ANALYSIS OF BUFFALO MILK (BOMBAY)

No.	Specific gravity at 60°	Total solids % by actual weighing	Fat % Gerbers	Non-fatty solids %	Proteids % Kjeldahl's method	Lactose
1	1.032	15.92	6.5	9.42	3.83	4.29
10	1.027	17.82	9.4	8.42	3.00	4.12
20	1.034	21.16	10.5	10.66	3.97	5.09
30	1.029	20.52	11.0	9.52	3.75	4.47
40	1.032	19.06	9.0	10.06	3.92	4.84
50	1.030	19.06	9.3	9.76	9.76	3.92
<hr/>						
Average of 50 samples	1.0308	18.40	8.6	9.8	3.89	4.52

* The figures were obtained from an analysis of 60 different samples of various breeds in Bombay, by Dr. Joshi, the Municipal Health Officer.

ANALYSIS OF COW MILK (BOMBAY)

No. of samples examined	Specific gravi- ty at 60° F.	Total solids %	Fat %	Non-fatty solids %	Remarks
5	1·027	15·05	5·52	9·53	These samples were obtained from different breeds of cows in- cluding <i>Sindhi, Gir, Surati</i> etc.
2	1·030	17·22	7·75	9·47	
8	1·032	14·13	5·23	8·90	
12	1·030	15·29	6·33	8·96	
3	1·030	13·10	4·40	8·70	
18	1·030	14·35	5·39	8·96	The same analytical method was used as in the case of buffalo milk.
2	1·030	15·10	5·95	9·15	
50	1·029	14·89	5·79	9·10	

The following results were obtained by Messrs. Dutta and Ghose on analysing Calcutta Milk.*

Substance.	Buffalo milk.	Cow milk.
Water %	81·5	86·23
Total solids	18·7	12·84
Fat %	8·57	3·34
Non-fatty solids %	10·75	9·1
Proteids (Casein %)	4·66	4·4
Sugar %	4·86	4·4
Ash %	0·74	0·75

The following is the composition of milk available in Lucknow (U. P.)

	Buffalo milk.	Cow milk.
Specific gravity at 15·5 C	1·0309	1·0302
Fat %	7·29	5·48
Total solids	16·43	14·26
Ash %	0·74	0·70

Samples of milk from 58 cows of Mysore breed were analysed by Dr. Srinivasa Rao of Bangalore and the following results were obtained:—

Specific gravity.	Total solids.	Ash.	Fat.	Proteids.	Lactose.	Water.
1·027	13·11%	0·69%	4·58	3·81	4·03	86·89

Cleanliness: We have again and again emphasised the necessity of cleanliness in the handling of milk in all its stages. Its importance is such, that we make no apology for reverting to it again.

Let us now begin from the very milking process. Milking should be done in a neat and clean manner. In the first instance the body of the animal, especially the udder and the adjacent parts must be clean. The milker should have clean hands and clean clothes. The milking operation should not be conducted from the same shed where the animal is tied. The sheds are usually dirty, hence the animal must be taken to another place where there is no fear of the milk getting contaminated by the dirty surroundings. The pots in which the milk is to be drawn should be well cleaned with hot water. The milking should be done at fixed and regular intervals, twice or three times daily. As more and richer milk can be obtained from three milkings a day, this practice should be adopted but in the case of animals that yield smaller quantities of milk, milking twice a day is sufficient. But in either case it is essential that the milking should be done at regular hours. The milking should always be done with dry hands. The teats should be held tightly by the whole hand and well squeezed first by the thumb and first finger and then by other fingers in turn, so that it will have a strong flow. Each time a fresh grip is taken, the hand should be put up as high as possible so that the udder may be subjected to an action similar to that of a 'calf drinking'. The milking process should be swift and the milker should not remove his hands from the teats until the last drop has been drawn out. The first two or

three streams from each teat should be discarded. The last drawn milk is the richest and this should not be left out. If all the milk in the animal is not drawn, it is bad from several points of view. Firstly, the yield will gradually diminish. Secondly, this negligence is likely to cause serious consequences such as shortening the period of lactation, setting up inflammation etc., to that part of the body of the animal. This is specially the case where the calves are weaned and not allowed to suck the mother directly at the end of the milking.

Since the invention of the milking machine, a controversy has been going on as to whether it is advantageous to have the milking done by the machine or by the hand. On the one hand it has been found difficult to get good hand milkers, the task being considered a monotonous one. It is complained that they take little interest in the work and this in its turn tells upon the milk-yield, whereas the milking machine can be expected to produce better results. The principal advantage claimed by the adoption of machines is that a large number of cows can be milked in a short time. Again the milk thus drawn out will be free from the odours and bacteria, and will be cleaner. The machine can be worked by steam, gas, olive-oil or electric power. A man can run three to four machines at a time. Hand milkers, it has been found in several instances, consciously or unconsciously scratch the teats of the animals while milking and injure it. Of course, in applying and conducting the milking operation by the machine, certain amount of skill is required and if it is not properly handled, it may even prove to be harmful.* As the Indian peasants are poor and illiterate, and as they generally have only small number of cattle, we need not insist that they should go in for the machines. But for dairies possessing a number of cattle, it is to their own interest that they install milking machines to do this work.

*To his great horror the writer once witnessed the milking operation in a certain Military Dairy where the machine was found producing Red blood instead of white milk. It must have been either due to defective adjustment of the machine, or absence of milk in the animal. Any way blood continued to be drawn out, and only when a good quantity of it had been removed, could it be detected, and the "milking" discontinued.

Again the custom of allowing the calves to drink milk directly from their mothers as is done in India is not a wholesome one. It has been found from experience that it is one of the reasons why the period of dryness is longer in India than in other countries, where this practice is not followed. In addition to this, the calves drink away a large quantity of milk. In foreign countries the calves are not allowed to drink milk directly from their mothers. They of course feed the young animal with milk but they give it only "separated" milk. Usually the calves are weaned away from their mothers after four or five days of their birth. In India there is a religious sentiment for this as well, and it is considered a sin to deprive the calf of her mother's milk but in other countries they consider it a costly food. They usually give skimmed milk, which they contend is a good substitute. To quote Jorden who explains how the young animals should be brought up and could be brought up admirably by feeding them with separated milk: "An admirable mixture" he says "is prepared by cooking the flax-seed meal in water in the proportion of 1 to 6 by volume and adding a small amount of this (the equivalent of 3 or 4 table spoons of drymeal) to 18 to 20 pounds of warm skimmed milk which may serve as a day's ration. The quantity of meal should be gradually increased up to 1 pound a day inside of a few weeks". To suit the Indian conditions linseed gruel is suggested in the place of flax-seed, which experts contend would make up the fat. Later on they may be given only separated milk and linseed gruel in the proportion of 2 lbs to 1 oz. After this period they may be fed on a mixed ration consisting of 10 lbs of *chuni* 10 lbs cotton seed meal and 10 lbs wheat bran for every 40 calves or $\frac{3}{4}$ lb of this mixture per calf per day. when the calf is six months old, it may be given a small quantity of grass in addition to the concentrated food until it is a year old. Care must be taken not to feed them in excess.

The milk as it comes out from the udder of the animal will be very warm and, as is known to everybody, milk is frequently a carrier of bacterial germs, the dairy man

should see that the milk is well preserved. Warm milk is easily susceptible to the quick growth of bacteria. The most favourable temperature for its growth is about 95° F. If the temperature is lowered to 40° F and the milk kept under clean and sanitary conditions, away from the cow-shed and from any offensive odours they can be kept in a good condition for a longer period. Milk should not be kept in the shed or in the vicinity of it for any length of time at all. If it is left there it will have a bad flavour and might be contaminated. This is the reason why generally the milk store rooms and other departments of the dairy are constructed away from the sheds. The milk drawn out from the animal should in no case be left carelessly, for the development of bacterial germs at such a time will be quick. As soon as the milk is drawn out, it must be removed to the store room and first be strained by means of a piece of clean cloth or any patent strainer. Milk generally contains bacterial germs,† though all of them are not dangerous to human life, but as far as possible their growth must be checked.

If the distance to the market be long and if it would take some hours before the milk reaches the consumer it must be subjected to a special treatment so that it may not be spoiled. For preserving it, generally, chemicals like formal-dehyde and boric acid are used but their use produces harmful effects on the consumer, hence the application of such methods are not wholesome. There are other ways by which milk can be kept good. These consist of in what is called (1) Pasteurization and (2) Sterilization. Sterilization is to be made only when the milk has to be kept for a number of days. Pasteurized milk can be kept in good condition for more than 12 hours. Pasteurization* means simply the heating of milk to a temperature below that of boiling point for a short period of time followed by rapid cooling. It must

†Milk may contain about 24 kinds of bacteria, if left long to contagion and infection. But nature has provided in milk and butter-milk lactic acid bacteria as the most benigned bacteria in the world. They may form 5 to 10 lacs in one c. c. of milk and 5 to 10 crores in the same amount of sour milk. If these products are kept free from exposure these friendly bacteria thrive in large numbers and kill almost all of the 120 kinds of probable bacteria - the intestinal flora in the human system - Dr. Kellong.

* Pasteurization: the name is taken from *Pasteur* the great French bacteriologist.

first be boiled at least for 20 minutes at a temperature of 140° F. and for 3 minutes at 158° F. For the cooling treatment the apparatus generally used is the refrigerator or cooler. It must be brought down to a temperature of 50° or 60° F. It will be impossible for bacterial germs to grow then. To work the refrigerator a large quantity of ice will be necessary but in the case of big dairies, where they have to cool down large quantities of milk every day, they generally use carbon-di-oxide or ammonic refrigerators. The refrigerator should not take a long time and the whole process should be completed within 15 or 20 minutes. The cost of pasteurization is not great and will be roughly three pies per quart (two and half pounds) or three pies per seer and a quarter. Pasteurized milk is just as digestible and nutritious as raw milk. It makes no difference in taste or colour and can safely be used for drinking or for tea or for any other purpose. Pasteurization when properly done affords protection from pathogenic germs and reduces the infantile mortality due to intestinal diseases.

Sterilization is applied when the milk is to be carried to longer distances. By this process even the microscopic elements in it, (that are dangerous to health), are destroyed. There are several ways of sterilizing milk. It must be heated to a temperature of 120° C. for about 15 minutes or it should be boiled for half an hour for three successive days. By this latter process, some of the casein is coagulated and the milk has an undesirable cooked flavour. Another method of sterilising it, is through special sterilizing bottles, which should have spring stoppers, lined with rubber washers. The chief thing in this is the steam operation. The process is somewhat like this. The bottles are first filled, not to the brim but two-thirds with the milk that is to be sterilized. There are special bottles for this purpose. The stoppers are not put in a tight manner but are kept quite loose and the closing caps are just adjusted so that it may not slip back. The bottles are afterwards put into the sterilizer. Its lids are now fixed and the steam is gradually directed and let in. The temperature is raised slowly higher and

higher, till it reaches say 23° or 26° F and maintained in this manner for at least half an hour. It is then cooled down. Great care must be taken to see that the whole operation is carried out diligently as improper handling is bound to lead to trouble. The bottles might crack and may even cause injury to others.

MILK PRODUCTS.

Let us now briefly consider the various products that can be manufactured out of milk. We have already explained the composition of milk and how it is made up of different components of which fat forms the chief part. The fat portion of the milk is known as cream. If we are to keep milk for several hours, we will find its fat contents rising up and collecting at the top, forming a thick layer. This is of course lighter than milk and also slightly different in colour—it will have an yellowish appearance. If we are to chemically analyse it, we will find it to contain from 25 to 65 p. c. of butter-fat and other components like casein, albumin, milk-sugar, mineral matter and other substances.

This cream which is very rich can be removed or separated even from fresh milk through centrifugal force. In dairies where they have large quantities of milk, and where they cannot dispose them of as such, they convert it into cream, so that it can be shaped into other saleable commodities. The instrument that separates cream from milk is known as Separator. Several types of separators are available in the market and in selecting one, ease of cleaning, swift of running and durability should be considered. The mechanism should not be an intricate one, simplicity combined with efficiency should be the essential factor to be aimed at. The cream separator, according to an author is just as important as the selection of a cow itself, and the proverb that "only the best is good enough" should be the criterion. The machine selected should be easy to turn, and one capable of removing all the butter fat from the milk. Even if its initial cost be somewhat higher than that of an ordinary one, it will in the end prove

to have been a good investment, if the best variety is chosen. The value of butter fat lost by faulty separation with an inferior separator would in a few months equal the cost of a good machine itself.

The sooner the separation of the cream from the milk takes place after milking, the better. 15 to 20 minutes is quite enough for this process.

Approximately 1 lb. of cream is obtained from 6 to 8 lbs. of buffaloe milk and from 10 to 12 lbs. of cow milk.

The following table shows the quantity of milk "utilized" in India, for the manufacture of different commodities :—

Product.	Quantity of milk used in production.	Percentage of total production.
Ghee	3,63,700	97·2%
"Country" butter	9,036,000	2·5%
"Creamery" butter	1,304,000	0·30%

Commenting on this Mr. Norman Smith observes :—

"According to the Provincial Marketing Surveys, it was found that roughly one third of the milk produced is sold as liquid milk. Of the manufactured products, the output of ghee is far in excess of that of the remaining products, accounting for 75 p.c. of the milk utilised for manufacture. It is significant that the quantity of milk used for ghee production is substantially greater than that sold for liquid consumption...butter accounts for only 2 per cent of the manufactured products...and nine tenths of this so called "country butter" which is used almost entirely as a basis for production of ghee in the house hold. Only one-tenth is "Creamery" butter, which therefore occupies a position of almost negligible importance in Indian dairying".

Butter. Butter is made out of the cream. When the cream undergoes a process of severe agitation, the separate and scattered particles of fat globules are made to gather round and

unite into a mass, a ball-like round thing, large enough to be easily removed from the butter milk.

Generally it will be found that 1 lb. of butter could be obtained from 12 to 14 lbs. of buffaloe milk and from 20 to 24 lbs. of cow milk. The standard of course is bound to change according climatic and other conditions.

The cream can be churned either sweet or sour. If it is churned sweet it should be kept cool until the day following the separation, and should it have become too cold, it is to be heated up to a suitable churning temperature. If the cream is churned immediately after separation without a period of cooling, the butter fat will become soft and difficult to handle, and the quantity too would be reduced. When churning sweet cream, more butter fat will remain in the cream and consequently there will be a smaller yield of butter as compared with the churning of sour cream. Butter made from sour or ripened cream keeps longer and has a better flavour. In large dairies it is therefore usual to ripen the cream before churning.

Again before churning, it is advisable to allow the cream to "stand" for sometime in order to ripen or become slightly acidic; and during this process it should be occasionally stirred to ensure uniform development of lactic acid to keep the fat and acid thoroughly mixed. The ripening temperature of the cream is 58° - 68°F and the end of the operation is ascertained by its forming a somewhat thick, even mass. The gas from it should be slightly acidic but should be fresh and agreeable. If the odour is too acidic the ripening has gone too far; if the mass still smells sweet like fresh cream, the ripening is not complete. Well ripened cream is churned more quickly and economically than fresh cream.

The starter must be added when its temperature is 60° F. In large and well conducted dairies, they make the starter in their own laboratory which is cultured in sterilized milk. But this is not necessary in small concerns or in individual cases,

If good fresh butter-milk is available from the previous day's churning, this may be used as a starter. If the cream is perfectly sweet and is at a temperature of about 60°F., about 7 to 8% of starter should be added, but if the cream already contains a certain amount of acidity in it, or is at a higher temperature, the starter must be reduced proportionately or even omitted altogether.

Cream requires plenty of air and aeration whilst ripening, and must on no account be kept in a closed vessel; it should be covered over with a gauze lid or muslin, for the purpose of keeping off dirt and flies. It should not be placed in the sunlight but rather in a darkened room, provided that the latter has ample ventilation and the air is fresh.

Colouring. If colouring matter is to be added, it should be done just before the churning. It is necessary to obtain a uniform coloured butter all the year round and hence it is essential that some colouring matter be used. Only the best variety should be chosen and this may be added to the cream when the latter has been put into the churn. The amount of butter colouring to be used should be reckoned on the quantity of milk from which the cream has been taken, and having regard to the shade which the market requires. The same percentage of colouring should be used every day so as to maintain butter of a uniform shade. The substances generally used for colouring are *annatto* seed and olive oil. It is done like this. 3 oz. of *annatto* seed are taken and put in 3 oz. of olive oil and kept for 30 hours. When the seeds have sufficiently swollen 2 oz. of oil is added and the seeds are then pounded when a semi-liquid mass is formed. It is then strained. Again to the residue is added 3 oz. of oil and the process is repeated, till the proportion of *annatto* seed colour comes to 3 oz. of seed to 8 oz. of oil. It is then ready for use.*

The churning then begins. It should be done at the rate of 40 to 45 revolutions per minute. It should be continued till

Nowadays ready-made colouring matter is available in the market in the name of *lactone* and it costs Rs. 6 to Rs. 7 per tin of one gallon.

the butter "breaks" or the fat globules gather together in small grains. Then small quantity of water of the temperature of the cream is added and the churning continued. Brine should be added at a temperature of 40°F. and after this the churning should be suspended for a few minutes. The butter milk should then be drawn off and replaced by fresh cold water. The butter should then be transferred with a scoop on to the butter worker and the roller worked sufficiently to expel all the surplus water. Then salt is to be added in the proportion of half an ounce to a pound or to the neighbourhood of 3 to 4 % of the weight of butter. Salt gives flavour to the butter, also causes the surplus moisture to be drained off, intensifies the colour and lastly acts as a preservative.

When it has been well worked out and salted, it should be made into small, neat looking packets according to the market requirements — particular care should be taken to make the packing etc. look attractive so that both by quality and appearance, good sales might be effected. As far as circumstances would permit butter should be kept and transported in cool clean atmosphere. It should not be exposed too much to strong smells of any kind nor should it be placed in close proximity to other substances.

Indian method of butter making. In India people do not consume butter in such large quantities as in foreign countries. Of course good deal of ghee is consumed and ghee is only clarified butter. According to scientists and from health point of view butter is more useful than ghee as the former contains better properties than the latter, hence people must be encouraged to go in for it. Indian butter is generally not very superior, or hygienic in its aspects. Particularly the butter produced in villages is of a poor standard. It cannot be preserved in good condition even for a couple of days, though we find foreign butter retaining its qualities for a period of 25 years or more. These may be due to various reasons. Firstly, they do not prepare

it scientifically. The village-folk do it according to the time old manner. They think that as they have to convert it into ghee, they need not worry much about it. Again they do not add any preservatives. We are only explaining the position prevailing in the villages. There may be few well conducted institutions, who may be able to produce better type of things that can well stand in comparasion with foreign manufactures. The preparation of the villagers is entirely unscientific and unbusinesslike. They boil their spare quantity of milk in their homes in an earthen pot on ordinary hearths, using cowdung cakes as fuel. The fire in the hearth burns very slowly, and they burn out large quantity of cakes, which is a very valuable and costly thing as manure. In the evening also the animals are milked and the extra milk is added to the morning's collection, and is likewise boiled for several hours. Just before retiring for the day the house-wife removes the vessel from the hearth, adds some starter, and turns it into *Dahi*. In the morning it is taken out for churning, if the quantity is sufficient enough it is churned then and there, or they accumulate three or four days stock, when they churn it by means of a wooden churn. The *Dahi* may or may not have at all been well formed. Again it may not have been properly ripened, for all these depend upon the temperature at the time of adding the starter and the time the milk has taken to change itself. By practical experience many a housewife would be able to produce excellent *Dahi*. Any how suffice it to say, things are not being systematically done, and this is chiefly because they consider that they are not intended for commercial purposes. For several hours the *Dahi* is churned and butter is taken out. The butter thus obtained differs much in colour, effect, taste, smell and other qualities to what it ought to be. It is often not a solid substance at all, and considerable difficulty is experienced in collecting and storing it. They do not add any colour or preservatives. This butter when it is accumulated in a sufficiently large quantity, is melted and ghee is made. Ghee made from fresh butter in an Indian village can be kept for 5 to 6 months without deterioration. One and one-fourth pound of butter is required to produce a pound of ghee - that is, butter

yields about 80 per cent of ghee. And then they sell it in the markets. What prices do they get? very poor amount. If they had merely sold their milk, they would have earned double the amount for the same substance.* A good deal of labour and trouble would have been saved, a large quantity of valuable manure would have been left behind for cultivation.

The demand for good butter is on the increase. Its preparation through mechanical process is economical, feasible and profitable. Though for individual farmers it may be difficult to run or start a dairy factory, several of them can join together and embark on a co-operative dairy products manufacturing enterprise.

Coming to the question of ghee, the quantity consumed in India is really great. The following note of Mr. W. Smith, Imperial Dairy Expert, submitted to the Royal Commission of Agriculture, is valuable in this connection:—

“The value of ghee produced in India cannot be below Rs. 1,00,00,00,000 per year and it is no exaggeration to say that the existing systems of ghee manufacture are crude, wasteful and filthy. These methods are not only wasteful in the out-turn of ghee which they give from a given quantity of milk but they are doubly wasteful in that they make no provision for the proper utilization of the by-products of ghee manufacture, namely separated or butter milk. In many of the districts where ghee is made in enormous quantities by *jungly* tribes who own large herds of buffaloes, the butter milk is simply thrown away in the flush season. The butter milk contains more than half the nutritious constituents of the milk in a highly digestible form, and the present value of dried separated milk in India at the ports is about Rs. 700 per ton. It is certain that under present conditions India deliberately wastes a sum of not less than Rs. 5,00,00,000 per year in failing to make proper use of the by-products in the

*As calculated by Mr. Norman Smith, valued at say 9 as. per lb. (retail prices) ghee gives a cash return of Rs. 3-6-0 per 100 lbs. of milk, while the same quantity of milk sold liquid at 1 anna per lb. would fetch Rs. 6-4-0 or roughly twice the sum realised for ghee.

manufacture of ghee and if to this sum, is added another Rs. 3,00,00,000 per annum as representing the actual loss in ghee out-turn due to crude methods of manufacture, we have the truly colossal loss to the wealth of India of Rs. 8,00,00,000 per annum due wholly to want of technical knowledge and organising ability on the part of those engaged in the ghee industry.

The importance of ghee industry alone (one branch of the dairy industry) is certainly of equal magnitude to that of the steel industry in India, and yet the Government of India are paying yearly in bounties to one steel manufacturing company more than the total cost of the Imperial Agricultural Department.*

One important fact that we would like to mention here is with regard to ghee-making as a "*cottage industry*." "While one hears a great deal about the necessity of reviving cottage industries, it is strange that the industry of ghee production (which is also essentially a cottage industry) should hardly ever have been mentioned in that connection. Ghee production is easily the important industry, and fortunately still immune from the attacks of organized industries either indigenous or alien and continues to maintain its existence on the stable foundations of national taste nurtured for untold centuries".

A rosy picture it is ! But the future is gloomy and dark : "Adulteration of ghee is now-a-days so universal that it is almost impossible especially in urban areas to procure pure butter-ghee at almost any price....the problem of adulteration is to be seriously considered and a solution found both in the interest of national health as well as of this premier cottage industry of the country". The adulterant substance is quickly driving out the pure product from the markets. This aspect of the problem needs serious consideration.

Mr. N. C. Mehta, Vice-Chairman of the Imperial Council of Agricultural Research, observes: "It is hardly a matter of credit to their capacity for organization that a product of such universal

* Report of the Royal Commission of Agriculture in India.

use should have no definite standards or grades and that the marketing of it should be completely chaotic. The importance of marketing pure ghee had been long realised and legislation already existed in most parts of the country with a view to prevent adulteration, but in the absence of well defined grades and standards the ineffectiveness of legislation was only to be expected".*

And due to adulteration and other mal-practices, the export of ghee has fallen, and its price gone down by several units. During 1924 to 1929 ghee amounting to roughly 38,000 cwt. or 53,000 maunds were sold for export from India according to the sea-borne trade. But between 1929 to 1935 there has been a fall of about 33% in the quantity exported. At the same time the value per maund of ghee fell from Rs. 70 to Rs. 41. The total value of exported ghee showed therefore an even greater fall from Rs. 38 lakhs to Rs. 14 lakhs or 63%. The cause of this fall is said to be due to deterioration in quality.†

Cheese. This is a popular product of milk but this is generally prepared out of *stale* milk. In order to bring about the coagulation, rennet (which is an extract from the stomach of the calves, and which is the principal material required for the coagulation of milk in cheese making) is used. Annatto seed colour is also added. The coagulated mass is cut into pieces and the whey containing milk-sugar and ash constituent is separated by draining and by pressure. Then the curd is milled into fine pieces, salt is added, the whey further separated, and the mass is made into blocks by pressing it into moulds, and stored up for

*The chief fats used for adulteration are *banaspaline*, *charbini* and certain vegetable oils such as groundnut-oil, coconut-oil and cotton-seed-oil...The potential capacity of the factories that produce this, is stated to be 33,000 tons per year...it is the opinion of some of the manufacturers that about 90 per cent of the total supplies (or 23,500 tons) are used for the adulteration of ghee. Figures for the production of other Indian vegetable oils available for the adulteration of ghee cannot be gauged with any accuracy. It can be estimated at 15,000 tons. This would bring the total amount of available adulterants to just under 50,000 tons or 1,400,000 maunds. The annual production of ghee is estimated at 23,000,000 maunds. . . If the adulteration could be checked, this additional income could be added to the wealth of the countryside, with consequent advantage to the rural population. It may be mentioned that *banaspaline* can be purchased at from Rs. 10 to Rs. 12 per maund and *charbini* at from Rs. 6 to Rs. 12 per maund, as compared with Rs. 25 to Rs. 40 per maund for ghee. Adulteration is therefore a very paying proposition for the dishonest merchants." —Norman Smith.

† *Ibid*

curing. Animal rennet can be substituted by vegetable rennet. Recently an Expert† mentioned that “vegetable rennet prepared by steeping powdered berries of *withaia* coagulance (*kahnaj* or *panirband*) 6 oz. in 2 lbs of water to which 3 oz. of salt have been added and then strained : 1 oz. of this solution is said to be sufficient to coagulate 1 lb of milk.”

Casein. Casein is used more for industrial purposes than for domestic consumption. Milk contains good quantity of *casein* in addition to other substances. After the separation of the “butter-fat” or the fat contents from the “whole milk” little use is made of “skimmed” or separated milk. The separated milk contains casein in an insoluble form; from this 3 to 3.2% of casein can be extracted.* Separated milk is first precipitated by means of acids. Sulphurous acid is most commonly used for this purpose. For the treatment of 25 gallons of milk, about 4 oz. of sulphur is needed, when it is burnt, the gasy sulphurous acid can be introduced into the milk through a spray as it is being stirred. The acid can also be added to the milk through water saturated in it. Casein now settles down at the bottom. It should then be washed well till all the lactine disappear completely.

Industrial uses of casein. Casein forms the basic material for many of the modern industries. According to an author “a number of pharmaceutical preparations like plasmon, sanatogen, notrose, and eucasin chiefly contain casein, and used for strengthening and building the nervous system.” For industrial purposes also, it is being used in several ways. It is made to form a substitute for celluloid which is so dangerously inflammable. Mixed with formaldehyde, it can be turned into plastic, and transparent substances of great cohesive power and is capable of being dyed into any desired colour, polished and moulded into any shape. It is the so called artificial horn or galalith and in electro-technics, it is used as an insulating material. Artificial tortoise-shell, artificial amber and ivory employed in making sun-goggles, watch-cases, umbrella

*It is reported that its price exceeds Rs. 70/- per ton : during the past three years, its price has averaged Re. 260/- per ton and has not fallen below Rs. 117/- per ton.

† Mollisor.

handles, toys, mirror-backs, combs, frames of all sorts and covering cases, are all products of casein. Photographic plates and films are likewise made of casein. It is also used for the manufacture of super-calendared paper, wall paper, photographic paper and several varieties of coloured paper with glazed surface and is capable of being immersed in water for any length of time. The soft lather of soap is due to casein. Glue used in varnishing becomes damp-proof owing to the presence of casein in it. Paints and varnishes and specially coloured varnishes acquire great covering capacity with the addition of casein. It furnishes the dressing material for linen industry and the artists canvas is impregnated with it. Casein is also used for refining wines and liquors.

Lactine. There is about 5 P. C. of lactine in milk. It is a costlier product and is valued ten times to that of casein. It contains the most easily digestible form of sugar and hence forms an excellent article of food for infants and invalids. People suffering from diabetes and intestinal disorders are prescribed lactine owing to its being free from the harmful effects of ordinary sugar. Lactic acid used in the technics of bacteriology is made from pure lactine by fermentation.

Other major products of milk include powdered-milk, condensed-milk, malted-milk, and several varieties that are generally found in our markets but all imported from foreign countries.

The minor products are khowa, colostrum, curd, butter-milk, skimmed milk etc. Most of these are produced in our villages where there is no demand for milk. Khowa (desiccated milk) is prepared from whole milk from which cream might have been partially removed. Milk is put in a shallow pan and boiled till most of the water evaporates. When the substance is sufficiently thick it is taken out and allowed to cool. It is then cut out into pieces, round or square, and sold by confectioners who add a little sugar and sell them as *peddys* or *burphies*. About 12 lbs. of milk is required to produce one pound of khowa but when the whole

milk is fresh and unadulterated, it requires only 4 lbs to produce one pound of *khowa*. *Colostrum* is also prepared in the same way as *khowa*, the only difference being that milk calved three or four days previously - is used for this purpose. This milk is mixed with ordinary milk, one and half times its own weight, added to a quantity of sugar, and boiled over a slow fire. When it has completely coagulated and become a thick mass, it is taken out and made to cool. It is then cut into pieces and sold as *kharawas*.

Whey, skim-milk and butter-milk are those portions that remain when butter fat or cream is completely removed from milk. It is also used for feeding animals.

In the foregoing paragraphs we have dealt with the primary products of milk, (those obtained from live-animals); but the secondary or subsidiary things got from dead-animals too are important and cannot be ignored. Among the useful articles that should be accounted for under this head, are leather (hide and skin) used in the manufacture of boots and shoes and for machinery belting, fats and tallow for preparing soap and candles, bones, horn and hoofs used as fertilisers, insulars, etc.

The Hides Cess Inquiry Committee in their Report made following observation:—

“In point of importance this entire industry (the hide and skin trade and the Indian leather-making, leather working and allied industries) is one of the most important phases of India's economic life. Its annual gross value runs into many—as many as forty to fifty crores of rupees. It not only gives employment to a large number of men but—and this is an important fact to be kept in view—is a factor in the economic well-being of millions of India's depressed classes. Any action taken for its improvement will automatically though perhaps gradually, help to better their lot.”

Next in importance to hide and skin come bone and blood. There are about 20 bone-crushing mills and the total business done

amount to (1) 12,000 *candies* of disintegrated, (2) 1000 *candies* of whole-bones, (3) 15,000 *candies* of bone-meal totalling 3,00,000 *candies* and amounting in value to about a crore of rupees. In addition to crushing, they are also used for the manufacture of buttons, handles, pen-knives, spoons, combs, scientific accessories, shoe-horns, etc. Fat and tallow are used in abundance in the soap and candle industry, and for making glycerine, gelatin, glue rennin, pepsin and others. Animal charcoal (made from their blood) is used, rather it is the chief article used in bleaching and deodorizing. They are also an indispensable material for the preparation of liquid-fuel-bone-oil and black varnish. A good portion of these things are exported to foreign countries but are imported back in a finished form.

The following two statements are important in this connection:—

IMPORT OF DAIRY PRODUCTS

In spite of 20% Duty, we imported the following Dairy Products from foreign countries:—

	1931	1934
Milk food for infants and invalids	Rs. 25,75,681	Rs. 28,764,000
Butter	" 4,89,944	" 6,23,654
Cheese	" 6,91,570	" 8,43,392
Ghee	" 1,28,936	" 1,31,557
Milk condensed, preserved including milk-cream and powdered milk	60,55,519	78,54,783

IMPORT OF LEATHER GOODS (Duty 25%)

Commodity	Gr. Britain	Foreign Countries.
Machine straps (Leather made)	Rs. 26,65,000	Rs. 3,98,000
Boots and shoes	" 16,70,000	" 21,40,000
Leather	" 1,17,000	" 30,94,000
Leather ware	" 42,00,000	" 68,35,000
Fat and Stearin	" 6,33,000	" 31,03,000

The importance of "Live-Stock By-products Industry" to Great Britain was explained by Mr. G. R. White in a Paper he submitted to the Royal Statistical Society some years back, wherein he said that "Live-Stock by-products alone fetched £ 121,000,000 in 1924, while the by-products industries extended to £ 97,000,000. The total output was, 10,000,000 more than the total value of all the live-stock sold for slaughter in the United Kingdom and was more than twice the value of the output of the ship-building or chemical industries in the same year."

If this be so in the case of the United Kingdom, how much more should it be in the case of India where we have got a greater number of animals ? (one fifth of the cattle population of the world !)



India and Denmark.

In no other country in the world save India are cattle a burden on the land or its people. One may say that in such countries there is no such thing as superfluous cattle. By judicious management India's cattle need not become a burden on the land. . . . cattle at the present moment go to the slaughter houses because of our criminal negligence and want of proper knowledge. *The saving of an enormous number of cattle is more a problem of economics than religion* ; and there is no conflict between them. A religion which is in conflict with fundamental economics is bad.

From the Western countries we can learn a great deal about cattle economics ...

Mahatma Gandhi.

"None can even glance at the ramshackle huts, the miserable squalor, the hopeless poverty of the Indian village, without shuddering at the vastness of the task before us. The most amazing ignorance and superstition, the most crushing pessimism, the most pathetic trust in God to set things right, hold the village in their clutches.

"The villager has three outstanding needs; food for his ill-clad body, not always assured when cereal crops do not repay the farmer's labour; a desire for his own uplift, which long ages of poverty and apathy have crushed out from his mind; and the knowledge of the value of co-operation with his neighbours, which can only come with education and the spread of better means of contact.

"India certainly cannot prosper while her 72% villagers lag behind. There is no short cut to freedom and to greatness; the only path leads through such quiet unromantic service of the petty farmer and his labourers.

“There is much the patriot can do to uplift the peasant; first of all, he can help to raise the economic burden of his penury, saving him from the need to seek the money-lender's aid. By himself setting an example, he can encourage some subsidiary occupation, that will bring a few extra daily pice in the slack seasons of the field. By using his personal influence, he can often help to bring the tenants and his landlord into friendly co-operation and so avoid misunderstandings; he can also try to lessen the waste of money on useless litigation over land disputes. By his own example he may be able to bring the advantages of scientific and collective farming vividly before his neighbours. He can do much towards the slow reform of diet, even within the limitations of the village pockets and to discourage the usual extravagance at feasts and marriages. Then he can implant a desire for education and economic betterment, overcoming the apathy of centuries by his own enthusiasm; in the evening through the reading aloud of daily papers and discussion of the village needs; following this with songs and music he can do much to introduce that living social relationship which must precede the growth of real co-operation.”

This is the observation of Mr. Duncan Greenlees, an Irish friend of India.

One may wonder why in describing the agricultural conditions of India and the prospects of Cattle Breeding and of the Dairy Industry, we should deal at great length with the history, Land reforms, Co-operative Organisations, educational problems etc. of a distant country like Denmark. Denmark is not the only place where cattle breeding in an extensive scale exists and where the dairy produce is exported to foreign markets. Canada, Australia, Scotland, France and several others are there who do the same sort of business and are engaged in similar pursuits. Why we have, selected Denmark in preference to others will be explained in the following paragraphs.

The conditions of Denmark compare favourably with those of India in several respects. There exists a very close resemblance

between these two ancient lands. The position of Denmark a few years ago compares to that in which unfortunately India finds herself placed today. The economic condition of the Danish people some fifty years back was as poor as, if not poorer than, that of the people of India at the present time. She was (and perhaps still is) predominantly an agricultural country. Her peasantry were impoverished and sunk deep in debt. The value of their agricultural commodities had gone down considerably, and they were hard hit. They had neglected their cattle. Some of their leaders suggested that they could improve their economic position by taking up to Cattle Breeding. Gradually several Associations and Co-operative Societies sprang up and the people at large began to pay more attention to Cattle Breeding. As though by magic, the economic condition of the people began to change. In a very short time they were able to raise themselves economically and socially to a proud position in the world. Her peasants, when engaged in the production of agricultural commodities, were not able to make a living by their occupation. A similar crisis has now arisen in India. Our peasants are in a bad plight. Prices have gone down to a very low degree and agriculture is no longer a paying profession. Complaints of over-production are heard everywhere, and all clamour for 'restriction' of jute, wheat, cotton, rubber and coffee cultivations.

Our cattle are in a neglected state. The Danish peasants took up to the breeding of cattle seriously only when driven by despair. Our peasants have also now to look to something else, to keep them going on, and when we have with us a vast, and so far untouched wealth of cattle, we can well recommend and emulate Denmark's example. The peasants of Denmark first resorted to it as a subsidiary occupation. They had few bad cattle left with them and along with their cultivation they pursued this side industry. And in a very short time they found that cattle breeding was a much more paying occupation than the production of agricultural commodities.

Similar is the condition of our peasants today. Most of

our villagers possess some cattle and a few acres of land, sufficient to enable them to grow fodder and other things for their cattle. No doubt the Indian peasant is very poor. He has little capital and can ill-afford to spend much on costly dairy enterprises. And without some initial capital, it is impossible for him to improve the breed or go in for new cattle, land, tools or machinery, for extending his business. Danish peasants were poorer than Indians. They had no lands of their own. It took them several years to acquire land. At least in India the majority of our peasants have their plots of land. This is a distinct advantage. Danish people found that co-operation alone could save them. Therefore they hung together and formed co-operative societies and started cattle breeding and dairy institutions. Their government helped them a lot, financially and otherwise. They set aside huge sums for loans to enable the people to purchase cattle, land, buildings, plant, machinery, etc., for starting dairies and cattle breeding stations. The co-operative agencies helped them, even those who were penniless to have lands and buildings of their own, to possess cattle, tools and appliances and carry on the work. Although India has a large number of co-operative institutions working for several years past, our people have not fully realised their importance, the educated and enlightened people not being an exception. There are very few Cattle Breeding or dairy associations organised on co-operative basis here. It was the co-operative organisations that raised the standard life and of living of the Danish people. It is that thing that saved them from sinking. Why should it not be so in India, we ask? Surely co-operative organisations can improve the lot of the peasantry. Only an attempt in the right direction is wanting.

Denmark's prosperity can be traced through the co-operative machinery.* Through the co-operative spirit, every member, rich

*If Danish agriculture was able to meet the competition from overseas so quickly, and in fact make use of the imports of cheaper foreign feeding stuffs as the basis of a profitable refining of the produce on turning to animal husbandry, which led agriculture up to greater economic potentiality than the production of grain could have brought about, even when prices were favourable, it was only possible by means of the co-operative system, which was in fact extended precisely for the purpose of carrying through the reorganization of agriculture's forms of production demanded by the crisis. Since then the co-operative system has steadily been developed, and now Danish farms, from the largest to the smallest, are organised in co-operative societies and establishments that stretch over sales and purchases and so to say every branch of production in agriculture itself.—*Denmark 1937.*

or poor, high or low, stands to enjoy the same privilege as the other. The domination of a few profit-mongers was not there at all. Service and self-sacrifice were their ideals. In countries like Australia, Scotland, Canada and France, there exist big farms where cattle breeding on an extensive scale is carried on. But they are not based upon co-operative principles. They are mostly private or proprietary concerns, owned by a few individuals with a desire to make profits and to benefit none but themselves. Only rich people with substantial capital can have anything to do with such concerns. Poor people have no opportunity of joining hands with them. This is the chief reason why we do not advocate the example of these countries, and commend the working of Danish model to our people. Here the farms and dairies, almost all, are run on co-operative lines, and there is every facility for people to work in harmony. A farmer can be a member whether he has five or five thousand cows. Members possess the same privilege and stand to gain the same proportionate profits.

Co-operative institutions are primarily meant for elevating the condition of the poor. Denmark made very good use of it and she is to-day reaping the fruits of her labours. We can very well adopt the same methods which she adopted and improve our position likewise.

The evolution of Denmark in this connection, can be read with profit. Denmark is a small country lying in the north western part of Europe. In size she is only half that of Scotland or Ireland, the area of the land being about 15,000 sq. miles. She is not a thickly populated country. Her population is only 3 millions.

She occupies a geographical position of $54\frac{1}{2}^{\circ}$ in the North Latitude. Situated as she is between the North Sea and the Baltic, she enjoys a favourable islandic, healthy and agreeable climate, comparatively mild in winter and cold in summer with little, if any, extreme changes in the temperature. There is no complaint of a severe winter or of an unbearable summer.

The difference in temperature usually is only 15° to 20° C. The annual rainfall is approximately 25 inches and occurs in seasons favourable to the agricultural production.

The soil though not very fertile, by scientific process has been improved. The plan of crop production is very uniform. The people of Denmark pay considerable attention for the production of not only ordinary agricultural commodities but also root-crops, sugar beat, etc , for their cattle.

Denmark is commonly known as the "Dairy Farm of Europe", as to a great extent, all European countries depend upon her for their dairy products.

Like India, Denmark is predominantly an agricultural country. Her peasants, till the middle of the last century, were in as backward and poor a condition as the Indian peasants are to-day. They engaged themselves only in field work, in the production of agricultural commodities and neglected their live-stock, especially the milch cattle. But as they found that the land yields were going down and that there was no demand for their products in foreign countries, they had to take to something else. The rearing of cattle was begun: in the beginning it did not show any profits, but in course of time the situation improved. It began to yield very good returns. Now Denmark has the richest agriculturists in the world. Although they have taken to the rearing of cattle and the manufacture of milk-products, like butter, cheese etc., they have not entirely given up their agriculture and farming. They carry it also side by side, although they have found the former to be a more lucrative profession than the latter. They have felt great difficulty and realised that without keeping a farm and doing some cultivation it is not profitable for them to have their cattle-breeding and find food for their animals. Both of them are inter-dependent; it is easy and feasible for the peasants to engage in cultivation and to take up dairying as a subsidiary one.

The Danish Ground Law. To understand the real

significance that led to the prosperity of the Danish people in the wake of the dairy business, we must in the first place acquaint ourselves with the history of the country, her people, the land reforms, the co-operative activities, the governments grants-in-aid, their educational environments, etc., as these contributed to their quick development. Although for our present purpose, it suffices if we are to trace her history from 1848, since King Fredrick came to the throne of his father King Christian on June 20, 1848, it would be helpful to make a retrospective survey of the two previous centuries. In the history of Denmark the Revolution of 1660 is very important, as an autocratic type of government was then set up which lasted till 1848. Throughout the middle ages, Denmark remained predominantly a country of peasant-proprietors. The King was only a figure-head. The whole administration was in the hands of the land-lords who had their way in all the things they wanted.

Before the year 1849, the peasants of Denmark were subjected to several exactions and restrictions, both from the Government and from the land owners. But when King Fredrick VII came to the throne in 1848, he promised liberal government and better conditions for the peasantry.

The country was divided into what was called "*manors*" which were units at once of landlord and of cultivator. Each manor had its Lord. The Princes, the nobles, and the churchmen had many manors while many landlords had only one. The cultivated land of each manor was divided into two parts. The "*Demesne*" (Hovedgaard) cultivated directly for the Lord's benefit by himself or his bailiff, and the rest commonly, the larger part, divided among more or less servile tenants (*Bondergaard*). The Lords *Demesne* was cultivated by the compulsory services of the tenants, each of which working for two or three days in a week or more in harvest time. Tillage was the centre of the whole organisation: the arable land was divided into a number of great stretches of hundreds of acres commonly known as *fields* and usually three in number so as to permit of

the compulsory sequence over three years of winter-corn, spring-corn, and fallow.

In each Manor all or almost all the arable holdings of the tenants were roughly of the same size and were composed not of compact and enclosed fields in the modern sense of the word "field" but of an acre or half-acre strips scattered over the three great unenclosed or "open-fields." Under the tenants there were the '*Gaardsmoend*' and below them were the lowest and the far inferior class with little or no land attached to their cottages. They were known as "*Hersmoend*."*

We all know that for a century beginning from 1760 to 1860 throughout Europe, there were great agitations in different countries for what is called the "liberation of the peasantry". This movement was directed towards the transferring of land to the peasants cultivating it, from the owners to the tillers. Denmark could not stand aloof. A "Constitutional Revolution" took place here also and from an autocratic type of administration, she emerged into a Parliamentary Government.

Although *serfdom* was officially abolished and with it the bondage of the peasantry in 1702, a greater bondage was forged for them soon afterwards by the government, of course, at the instance of the landed aristocracy in power, notorious in history as "*Stavusbans*." The excuse given for the imposition of the new penalty was that "they had seen with concern the peasants abusing their new legal freedom, and in abandoning agriculture and leaving the country districts". It was now ordained by the Government "that all men between the ages of 14 and 35 are to be entered on *militia* rolls." It was further enacted that the Manorial Lord is to enter such names as he pleased and no peasant is to leave the estate on which he was born, as long as his Lord has work for him to do unless he has passed his time in the army. These restrictions were worse, yet after a few years, another enactment was made which virtually tied them down to their masters. By the new legislation it was decreed "that no country soldier (and every

*Agriculture and Co-operation in Denmark.

peasant was considered, and had to work as a soldier) shall settle himself down elsewhere than upon the Estate where he was enrolled and where he is bound to take up a holding”.

For a time these enactments proved to be disastrous, but things soon brightened up owing to the gradual liberation of the peasants and their enhanced freedom. This took two forms. The first one was in the shape of the withdrawal of the peasant holdings from the common fields and their consolidation into larger units and their liberation from the compulsory sequence of cultivation. The second was the granting of freedom from the heavy obligations to labour upon their lord's *demesnes*. The Royal Estates in North Zealand gave the lead in the liberation of the “tied down” peasants in 1784-1790. Again in 1791 a measure of greater security of tenure for the peasants came to be enacted—by this it was ordered that a peasant holding could be leased either :

1. For the life time of a peasant and his wife.
2. For two or more lives or for a fixed period of not less than 50 years. This enactment working in conjunction with other restrictions on the proprietary powers of the landlords gave the peasant cultivators a greater tenure of security.

For a time things were moving very slowly. But after 1848 with the accession of King Frederick, things began to change rather rapidly. The Parliamentary elections and the system of government were also thoroughly reformed.

Under the new Danish Ground Law (1849,) Denmark has a hereditary limited Monarchy, the executive work being vested in the King, while the Legislature is exercised conjointly by the King and the *Rigsdag* (Diet Parliament). The King is irresponsible and his person inviolable. He wields his power through responsible Ministers, who constitute the Council of State over which he presides. The King's signature is valid only when accompanied by that of a responsible Minister.

The Rigsdag which meets every year and sits for at least two months is composed of two Houses, the *Folketing* and the *Landsting*.

The right of voting to the Folketing is free to every Burgher who has attained the age of 30 and is of good reputation unless he is in private service without a household estate of his own. Every citizen is eligible for election at the age of 25. The elections are direct and valid for 3 years. The right of electing to the Landsting is possessed by every one who has the same right to the Folketing. The elections here are indirect, electors being first chosen who in their turn, name the members of the Landsting. Every citizen who has attained the age of 40 is qualified for election to the Landsting, but must enjoy an income of not less than 1200 *rigsdaler*, (about £ 35), or during the year preceding should have paid an income-tax of at least 200 *rigsdaler* (about £ 22); the elections to the Landsting are valid for 8 years.

All laws require the sanction of the Rigsdag.

In the land tenure system also several changes were made. The following will give an idea as to the changed conditions;

1. *Lease for a fixed number of years*: According to this, the lease holds good for as many years (sometimes twice as many as) there are fields in the farm. The lease includes all live stock and dead stock of the farm. At the expiration of the lease the tenant must pay for every decrease in the value of the farm implements, buildings, etc., and the landlord should pay for any increase. The widow of a deceased tenant may remain in possession of the lease as long as she remains a widow. A second husband or the heirs of the tenant can claim no right in the lease.

2. *Fixed land*: Another form of land tenure is called "Fixed land." In this case, the land must not be less than 12½ acres or more than 150 acres in extent. A certain sum must be

paid down, and also a certain annual amount as rent but this lease is never from year to year.

3. "*Faeste*" lands: Another old system of land tenure in Denmark is called the "*Faeste*" and is of three kinds. They are:-

(a) The Simple "*Faeste*" is a lease for 50 years.

(b) "*Life Faeste*" is limited by the lives of the tenant and his wife.

(c) "*Arve Faeste*" may be either perpetual or governed by the rule of primogeniture or the failure of the heir.

4. *Lands given as Gratis*, or as free gift in appreciation of services rendered to the State are known as "*Selvejergaard*". It carries ownership without restriction, except that of the usual taxation.

Old Land Taxes. Formerly the land in Denmark was taxed on the basis of what is known as "*hard-corn*" which was a measure of the yield from the land. It was fixed at 72,000 sq. alen = 28,369 sq. metres of the best soil rated at 24 as the equivalent of *hard-corn*. A soil assumed to give half of the net profits of the best soil was rated at 12, and 56,733 sq. metres of such soil would therefore be equal to a *hard-corn*. Similarly the poorest agricultural soil rated at 1 would have 24 times more area in a "*hard-corn*" than that of the best soil rated at 24.

Present Taxation. At present "*Hard-corn*" is no longer the basis of calculating taxes. The State has now adopted the system of collecting "*Real Estate Taxes*" supplemented by an *Income-Tax* and *Property-Tax* on the basis of a periodical valuation of the property.

The basis for the *Real Estate Tax* is the value in the open market of the real estate excluding stock, plant, machinery and other working materials but including buildings and immovables.

The annual tax to the State is 1·1 *krona* per 1000 kr. either of the valuation proper or in certain cases according to a reduction made under fixed rules. Thus small pieces of land and properties owned by the labouring class are practically untaxed.

Valuations for the imposition of taxes used to be made once in 10 years. Afterwards it was changed to every five years and now to every third year. The valuations depend upon the market value of the property, land, building etc.

The peasantry had after years of trouble and suffering achieved some power and they now demanded that the "Peasants Tribunals" should have a greater share over the future development of their country. The "Peasants Friends" the Political Party of the peasants which had come into existence in 1848 was carrying on a good deal of agitation for the better conditions and for the economic elevation of the peasant class. At one stage they even went to the extent of demanding the total abolition of all ancient rights and privileges of the landlords, contenting that they were not doing anything, tilling or cultivating the land themselves. They insisted that none should possess more land for himself than what was required for his use, as it tended the exploitation of the poor working class. They complained that thousands of farmers who were willing to cultivate and labour, were starving simply because they were landless, as all lands had been monopolised by the land-owners. They raised a cry for immediate expropriation of the lands, a spontaneous deprivation of the landlords of all their possessions and of giving them straight away to the peasants. The peasants were now well organized and wielded considerable influence, both in the country and in the Parliament. To what direct action or unconstitutional methods, these war-like class-conscious Danes would have resorted to, had not they scored a victory at every step, nobody could tell. Surely things would have led to a crisis. But fortunately they had their way in every thing. The very people who for centuries were oppressing and exploiting the peasantry now came forward as though voluntarily to dispose of their titles and "for obtaining lands for the peasants." "The Land

Owners' Society", the Association of the land-owners which had sprung up to safeguard and protect the interests of the landowning class, now found their position very embarrassing, and had to pretend that they were also working in the direction of "promoting the interests of the peasants and for acquiring them lands for cultivation." The truth about this sudden change of heart is not far to seek. They had clearly foreseen the rising storm, like that of a French Revolution breaking out in their own country, a relentless class-war against the landed aristocracy. They feared and they had every reason to fear, that any how they were going to lose their lands and properties, titles and hereditary rights which they had been enjoying for long and their possessions were going to be confiscated and taken possession of by the cultivators, the real tillers who were landless, and who were making their living by the sweat of their brow. Therefore these clever calculating people made a pretence of such benevolence and kindness in quietly disposing of their lands as early as possible, and their paper titles and traditional claims for whatever amounts they fetched.

An Act was rushed through the Parliament bringing about the desired changes—the landlords eagerly supporting it, as it contained a provision for "giving substantial motives" to the landlords to dispose of their rights but without surrendering to them either so large a monetary compensation as would cripple the new owners by heavy redemption payments or transferring to them anything like a large proportion of the land.

By another enactment the Parliament stopped "all new creations in the land settlement" (Fideicomisse.) This was a very important measure and by this the possessions of such settled estates were practically made life or permanent tenants. It was further provided by another enactment passed in 1854 that "such possessors could part with their peasant farms and could keep for themselves 8. to 12 p. c. of the redemption price." As the existing restrictions prevented their taking advantage of their position to add to the peasant farms to their own *demesne* or to

increase services or rents or to add farm to farm, the offer was sufficiently attractive to induce most of them (big landlords) to make easy bargains with the peasants who were anxious to own lands and in this way many more peasants were turned into independent proprietors.

The peasants were assisted to buy off the manorial claims by the Co-operative Credit Unions which had now come to be established in large numbers in different parts of the country. Under the Public Control and Audit Act, it was authorized to advance money to purchasers of land on mortgaging them. In addition to this an improvement had also come about in the long prevailed slump in the trade of Danish grains in foreign markets. There was now a great demand for them (1850-1880) and the peasants could receive better rates. Not only did the Free Trade policy between Germany and Sweden and also in no small measure due to England's repealing the notorious Corn Law in 1846, there was a good demand for Danish wheat. The cultivators could now easily raise some money for purchasing lands by selling their wheat and other crops which they were accumulating, instead of remaining as mere tenants or tillers.

From the year 1899 we find the Danish Government itself actively encouraging by granting State Loans and quickly making them Small Holders.

The Danish Government ungrudgingly set aside huge sums of money year after year for granting State Loans and in the shape of subsidies to the peasants to acquire for them lands, and buildings, cattle and live-stock, tools and farm implements, which other governments could well copy.

It is interesting to see in detail how and to what extent the Danish Government were willing to go in this direction. It was on March 24 th, 1899, that the law regarding the Small-Holders was first passed. Its chief object was to improve the condition of the farm labourers by giving them an easier access to the land and

making them the owners of the land they tilled. This law has since been revised several times and changed into "Law on the Establishment of Small Holdings." It was put into immediate operation. They sanctioned a sum of 10,000,000 *krona* to be distributed in five years or to be used as loans to farmers for the establishment of small holdings. They had laid down that the loan value of the property which they intended to own, that is to say, the value of the land, buildings, livestock, inventory etc., should not exceed 4,000 kr. The loan seeker must have at least a sum with him which must correspond to 1/10 of the loan value of the property while the State Loan was to form the 9/10. This loan was to be repaid by easy instalments on very favourable conditions. The interest charged on them was only 3 p. c. As long as the outstanding debt to the State was not reduced to one half of the original loan value of property no other mortgage could be placed on the property, nor could it be confiscated or attached for the personal debts of the owner without the permission of the Minister of Agriculture. Again in 1904 another sum of 15,000,000 kr. was granted to be distributed over five years. The loan value of the properties was also raised from 4000 kr. to 5000 *krona*. Again in 1909 a still bigger sum (as the demands from the people were on the increase) 20,000,000 kr. was sanctioned to be distributed in five years. This time the privilege of taking loans was extended to unmarried women also. The loan value of the property was raised to 6,500 kr. and in exceptional cases even to 8,000 and the owners of small holdings under the laws of 1899 and 1904 were granted the privilege of seeking supplementary loans for enlarging their farms, and for national improvement of the soil, repealing the provisions containing second mortgages, executions and arrests.

The Law of 1909 was followed by another in 1914 by which the government sanctioned a further sum of 5,000,000 kr. annually for three years for the establishment of new small holdings, while the loan value was increased to 8,000 kr., in exceptional cases up to 10,000. This law was again superseded

by a law of 1917 which determined that the minimum size of the holdings acquired under the law should not be less than 2 *Ha* medium good soil.

Similar laws were again passed in 1921 and 1922 and these contained few fundamental changes from the previous ones. There was one notable feature in the regulation of 1921. Out of grants sanctioned, a sum of 12,000,000 kr. was ordered to be specifically set aside to be given away to the peasantry as a direct contribution—as a free award. The government felt that the cost of building, construction, etc., had gone a bit higher and found that the peasants required more financial assistance. A free contribution scheme was at once inaugurated. The size of the loan value and the part of the State grant to be given as loan and as contribution was now to be decided by the Minister of Agriculture after conferring with the Committee on Finances of the Parliament. The Government further decreed that as hitherto the loan need not be repaid within the first five years. They extended the period of repayment according to the ability and convenience of the borrower but in this case the rate of interest was raised to five and a half per cent per annum.

In 1922 the loan value set aside was 22,000,000 kr., 30% of which was to be given as direct contribution and 60% as loan, and for 1923 the loan amount sanctioned was 20,000,000 kr., with 15% to be given as direct contribution and 75% as loan.

In addition to all this, two special laws were passed in 1919 for acquiring land for poor people who had absolutely nothing with them to invest. By the first Act it was determined that most of the land belonging to *parsonages* should be sold away and converted into small holdings. The second one deals with the transition of feudal lords family estates of tenants, in truth to be considered as exempted property. The owners of the above could take possession of them as exempted property, provided a certain sum was paid to the State and one-third of the land now exempted is placed at the disposal of the State at a compensation fixed by the law for the

establishment of small holdings. The sum thus paid to the State treasury shall be treated as a special fund (Land Fund) for the acquirement of land or for loans to small holders. Yet by a third Regulation of the same year, called the "Law on the Terms for the Sale of Property in Public Possession," private speculation in any form or of any kind was prevented. This law determines that the land owned by the State shall be parcelled out into lots preferably of such a size that each lot, when under cultivation can support a family without extra help.

The buyer pays no cash for the purchase, but only interest on the land which is determined at the periodical valuations, but at each re-valuation any increase in value of the land accruing from the labour of the small holder, or the capital invested in the improvements, is disregarded.

For the construction of farm buildings, the State grants to the people a loan corresponding to nine-tenths of the cost of the building, a farm house for a small-holder complete in every respect. The first 6000 kr. of this building-loan is payable with four and a half per cent interest. No interest is due on the remainder but after three years, the entire sum must be repaid at the rate of one per cent per annum.

By the law of March 29, 1924 some modifications were made in the law of 1919—the sum, on which interest was to be paid was increased from 6,000 kr. to 8,000 and no instalment on the loan is to be due for the first five years. The purchaser receives a deed for his property and except for the few restrictions under the law, has the full rights of possession. However, if he wishes to transfer the property to another, not to his natural heir, the State reserves for itself priority of right to purchase in order to counteract speculation on them.

During the four years 1920–23 under the Land Legislation Act of 1919, 1837 small-hold farms were established: 623 plots on parsonage land and 1205 on land owned by the State for most part land derived from the Feudal properties and family estates.

Furthermore, a supplement to the already existing small holdings, 1030 plots were parcelled out, the average size of the newly granted holdings being about 7 *ha*. A loan of about 24,500,000 *kr*. was granted for buildings.*

Several public and private associations had come into existence to help the peasants in getting loans and for obtaining lands. The Government backed them up and legalized their activities by legislation. An Act for granting loans and public funds to associations wishing to purchase large Estates for parcelling them out and enabling the peasants to have small holdings of their own, was passed. This enactment first came into existence in 1906 and has since been renewed several times. The Government placed at the disposal of the local Land Distributing Societies large sums of money, and in addition made liberal annual grants to enable them to pursue their noble work.

One more significant act of the Danish Government must be mentioned here. It ordained that any Danish peasant not under 25 or over 50 who did not possess sufficient money to acquire land on his own account, and who had worked as an agricultural labourer for five years preceding his application, could acquire $2\frac{2}{3}$ to 16 acres of land, fully stocked valued at about 6000 *kr.*† from the Government. He has simply to produce a testimonial of good character, to become a small holder, the Government helping him, taking the character of the man as security.

The Danish peasants to their credit it must be admitted, take only 7 or 8 acres of land which is sufficient for a small family to lead a happy life. They do not keep more land than what they actually need.

N. B. The Danish farms range in size from 24. 7 to 148.2 acres middle size, and 1.36 to 24.7 acres small size, comprising 66% and 13.6% respectively of her total agricultural land area.

During the 19th century the number of free-holdings in

* Danish Government Report (Agricultural Department).

† 1 *Krona* = 13.25 *annas*.

Denmark doubled. In the year 1800 they totalled about 91,000, and in 1916 the figure was something like 1,84,000, that means that over 90% of the total holdings in Denmark are free-holdings. This notable change has taken place through an increase of the medium-sized farms.

Free holdings with land.	YEARS				
	1800	1850	1885	1905	1916
Above 10 ha	1,800	1,878	2,041	2,093	1,953
From 12-100 ha	53,000	67,800	73,000	74,600	76,000
Under 12 ha	20,000	60,000	80,000	90,000	1,06,000
	(Total area of land in 1916.)				
Above 100 ha	...	...	...	357,000 ha.	
From 12-100 ha	...	...	...	2,069,000 „	
Under 12 ha	...	...	...	816,000 „	
	one ha (hectare) = about 2½ acres.				

About 94% of Danish farmers own the lands they cultivate.



Co-operation-the one cure.

"The Soul of India is composed of 360 millions of people who spend their lives between the Himalayas and the Cape Comorin. Upon the quality and blending together into one harmonious whole of these millions, of all sorts and conditions of men, depends the strength and security of India and the Empire.

"When we cast our eyes over India today, what do we see? We see the soul of India divided and unable to rise, crushed under a load of debt.

"The disease from which the soul and body of India is suffering is pernicious financial anæmia. It is a disease of long standing and may destroy India before many years are over, if it is not itself destroyed. The disease has grown insidiously since the days of Adam Smith until there is now a dead weight of*...several hundred crores lying on the soul of India, which is sick unto death. When will the dead weight be lifted? How can India move forward with her feet shackled as they are?

"India is perishing not for want of politics but for want of pice. India's problem is where to find the pice to feed both soul and body. She will find it nowhere else than in the co-operatively organised and monetized labour of her people.

"Nothing but the Co-operative Movement cuts across class and social distinctions and solves all communal problems. Nothing but Co-operative Credit will give every man his chance whether Brahmin or Harijan, Moslem or Christian — to stand upon his feet and work out his own salvation according to his natural endowments."

— *Sir Daniel Hamilton.*

Necessity is the mother of invention, as the adage goes.

We have seen in the previous chapter how till the middle of the 18th century Denmark was a poor crop producing country, with her people mainly depending upon the land produce as their chief source of subsistence. For a time they used to export their surplus production to foreign markets but as the demand for the Danish cereals decreased, the prices fell, and agricultural profession became burdensome. Depression was felt keenly among all classes of people and they in despair decided to give it up and take to any other line to avoid a breakdown. They neglected

* The rural indebtedness alone is estimated at 1,200 crores of rupees.

their live stock especially the milch cattle, as they themselves were poor and starving and were not in a position to spend anything on them. If only money is to be spent over the animals, they could be improved and made to yield large quantities of milk. And only if the animals yielded more milk could their owners be in a better financial position. We have also seen in the previous chapter how for a long time the peasants possessed no lands of their own and had to remain as farm labourers. They were virtually tied down to the fields of their masters by the rigorous laws of the Government and had to work for the feudal lords.

But things began to change after the middle of the 18th century and with the country split into a number of small holdings, the general economic conditions of the peasantry also began to improve. Now they possessed their own lands and could well toil hard for their own benefit. They were their own masters. The autocratic government had been overthrown and the administrative machinery taken into their own hands. The government existed for helping the people, not for oppressing them. The peasants were granted substantial loans, advances and free gifts of cash money for purchasing live-stock, erecting buildings, and for starting dairy farms. They were now easily able to elevate themselves and lead a frugal life. And with their economic improvement, coupled with the educational facilities given to their children, they advanced intellectually and morally. The people of Denmark even from remote times had the spirit of unity. And with the advance of time, they could chalk out new things for their own prosperity and for the common benefit of the community at large. They extended their operations of cattle-breeding on an intensive scale.

The division of the entire country into several small holdings considerably facilitated their work. And their dairy farming based upon co-operative principles saved them from the usual competition and enabled them to extend their business very quickly. Not only were they in a position to strengthen their business in their own country without any dissensions or

competition, but they were able to export their articles and capture foreign markets as well. There is no exaggeration in the statement generally made that the Co-operative Movement has enabled the Danish farmers to face the modern world markets as one collective body of sellers rather than as 2,05,000 individual farmers.

The first Co-operative Dairy was started in Denmark in 1889. The attempt proved to be an instantaneous success and this gave an impetus and created better confidence in the minds of the people to form into similar organisations throughout the country. In a very short time hundreds of Co-operative Societies had been formed and the different smaller units formed themselves into Federations and the bigger units also merged into a gigantic national organisation, so much so that the whole country virtually became a single unit or like a big dairy farm with several branches and local agencies.

The movement has got a romantic history behind it. It is said that in the eighties of the last century, a Danish Clergyman, Pastor Sonne of Thisted in North Jutland, visited England where he studied the Co-operative Movement. Going back to his place, he began to do propaganda in favour of the new movement. In 1869 the first Danish Co-operative Society was formed.

Sonne published a book in 1867 in which he explained the working of the movement. He confessed that he had borrowed his ideas from England, and especially from the doctrines of the Rochdale Pioneers that "early, mute protest against the effects of the Industrial Revolution" on the working classes of Great Britain.

"We have" he wrote "in every detail modelled our Society on the English Society; we have not ventured any deviation from the rules which in England have proved by many years of experience to be right. To God, we are only human beings, the division into classes prevailing in human societies seem, unreasonable and unjust; that some few have the privilege of letting others toil, and reaping the profits themselves, while others are bound in poverty, is hard injustice. There is a lawful common right giving

every human being the right to work and to help himself to the best of his abilities.

Man can only develop his abilities in Society with others. Progress has only been made in the same degree as man has realised his dependence on his fellowmen and co-operated with them.*

Thus had Denmark emerged from a poor country into one of the richest agricultural countries in the world. Their organisations and methods of working are so perfect that they have virtually revolutionized the social and economic outlook of the people. "From a depressed position of peasant agriculturists" the United States of America, Department of Agriculture, remarked "which threatened the welfare and prosperity of the whole nation, Denmark stands today as the world's foremost agricultural country in the scientific organisation of her production and marketing. Her people, rural as well as urban appear contented and prosperous. Neither extreme wealth nor extreme poverty exists. The farmers are now owners of the tracts of land they cultivate. They rank foremost among the nations in the application of scientific methods in agriculture, use fertilisers and relative crop productions. Their intensive development of animal husbandry stands highest. Their extensive application of democratic Co-operative Principles has made Denmark famous the world over."†

The prosperity which Denmark enjoys today is doubtless due to the co-operative system of manufacturing and distributing her agricultural and dairy products. The activities of the farmer beginning from the time of his purchasing land or procuring money on credit from Banks or Societies for the purchase of cattle and terminating with the disposal of their dairy products in the distant foreign markets, are guided by the same co-operative principle.

The spirit of co-operation has really taken very deep and

* *Contemporary Review*

† Agricultural Bulletin. (U. S. A)

firm root in the soil. Principles of co-operation have been applied to all branches of agriculture and industry. The guiding spirit of all ventures, whether purchase or sale, is based upon scientific co-operation. There are today in Denmark hundreds of co-operative institutions: there are societies for helping the peasants in getting money for acquiring lands and for the purchase of live-stock: there are again societies for acquiring seeds, manure, implements of agriculture, food-stuffs, etc., required for themselves and for their cattle, and for all other daily necessities and luxuries of life. The Co-operative Purchase and Sales Stores have proved very beneficial. All their requirements, however big or small, are indented through these Societies and as the Society purchases things in large quantities they could obtain them at the lowest rates and on the most favourable terms. And in the same way for the disposal of their commodities they have their own agencies and through these, they are in a position to dispose of every particle of farm produce at the best rates obtainable which would not be possible if the small farmers were to conduct their sales themselves individually. These things only demonstrate, to quote an Author, "the Danish axiom of 1 plus 1 is more than the arithmetical sum of 2." We can well understand that articles when purchased or sold in large quantities are always profitable, where bargaining is possible and the best terms obtainable.

These co-operative institutions are managed entirely by the members themselves. They have adopted this method so that it may best serve the interests of all concerned in quite a just, equitable and fair manner. The members of Co-operative Unions, particularly those relating to agriculture and dairying, often combine and work in co-operation and thus carry on the work of both manufacturer as well as distributor. This enables them to do away with the middleman who generally consumes all the profits. And by this arrangement not only do they stand to gain the maximum benefit but even the consumers are benefitted as they also get things at moderate rates.*

* For a detailed account of the Co-operative Movement in Denmark refer "*Co-operators & Rural Uplift*" by the same Author.

The Danish people have thoroughly mastered the principles of co-operation and have been applying them in all their walks of life. Little wonder that co-operation has fully triumphed. Why not ? For "it is after all" as Wolff says "a simple economic instrument exceedingly useful in appropriate circumstances for a great variety of purposes. It is just a simple combination of forces among a number of persons more or less similarly situated and having a common object in view for attaining that object. It enables them to make themselves rich by removing obstacles and creating facilities for individual efforts. Whenever two shoulders are placed against a wheel, they can make that wheel move faster and more smoothly than each shoulder pushing by itself. When 10 sovereigns are laid out in common, it will purchase more than the same gold pieces expended separately, it may be relied upon to indicate its efficacy. Beyond this, it will stimulate intellect, raise educational and business status, making the trade honest, find new openings for successful enterprise and teach the value of mutual consideration and mutual help."

Co-operation offers a means of profitably inviting forces for economical working, improving the quality of produce and increasing the output, and saving much of the expenses which individual workers have to incur. It enables them to obtain better value for their produce, facilitates sales, creates and steadies markets which is not otherwise possible for individuals within certain limits, it will do away with the middle man and abolish the unnecessary toll levied by him upon commodities on their passage to the consumer. It does not lead to exploitation of any kind. It is not business but common work and active combination among different persons, engaged in like concerns. It aims not at profit but at common service.

Co-operation binds persons and their common interests unlike Joint Stock business with subscribed capital. In Co-operation generally one can have only one vote which is the immutable rule and no dividend upon share capital, beyond the accepted market rate for money. In Joint Stock Companies the capital is

fixed, the shares are transferable and the membership is limited while in co-operative unions the capital is variable, the shares are not transferable and the membership is unlimited. The Societies' doors are always open to new comers and there is no "degenerating into a ring". Joint Stock Companies are a combination of the strong to exploit the weak, while co-operative unions represent the combination of the weak with a view to becoming strong. The main feature of co-operation is the spirit of unselfishness and loyalty that prevades it. Co-operation would never be a success in the absence of this spirit.*

The farmers of Denmark have a marvellous system of Co-operation. They have established their institutions on such sound and scientific grounds that their work has been lightened. The peasant members of these institutions need not even take the trouble of going to the dairy office for giving their daily supplies of milk. They can be busy and engage themselves in other activities. As the Agricultural Tribunal observes: "The co-operative machinery removes from the Danish peasant almost the whole of the commercial responsibility of all calling and allows him to give his attention entirely to the work of production." The carts belonging to the co-operative unions go round both in the morning as well as in the evening and fetch all the milk from their members. Each member's products are assembled and are classified according to the quality and grades by the Association. The Union then executes all orders from their customers for pure or whole milk and transports the rest to the nearest factory or depot belonging to the Union where they are very efficiently and economically handled. They are turned into butter, cheese, or cream as the case may be and are disposed off as the joint property to the best advantage of the members. After deducting the proportionate expenses of the union from the quantity of milk supplied, the value of the products based upon the classification of the cream or fat contents in them is credited to the members' account. A partial payment is made immediately on delivery of the products and the balance is remitted to them at the close of

*Ibid

3, 6 or 12 months. The amount which the members receive depend upon the quality and price fixed by the Committee of Dairy Experts every week. 92% of the skimmed milk or buttermilk is returned to the member for his household use or for feeding his pigs. If he does not require them the Union sells it away at the best market rate on his behalf and the amount is credited to his account. Thus by this process one can see how considerable economy is effected and how the members stand to achieve the maximum benefit. Another great advantage derived by this spirit of co-operation is that even for a small and isolated farmer, a ready market is brought to his doors and he is enabled to dispose of his small quantity of surplus milk over what is required for his household purpose, being sold at the same rates as one obtainable for large quantities.

When the movement was first inaugurated, a section of farmers could not appreciate the value of Co-operation and were not willing to work jointly with others. Some of them viewed the enterprise of these men with suspicion. But after a time when they realised how the new method was working successfully, they found their fears groundless. They saw how even the small and scattered farmers were able to sell their products with the same ease and with equal profits like the big farmers, and this tempted them to join the existing Unions or form themselves into new ones. Thus the number of Farmers' Associations which was only 250 in 1885, increased to 5000 in 1920. Now it must have gone up again by a few more thousands. The volume of business handled during the same period has grown from 10,000,000 *krona* to nearly 1,500,000,000 *krona*.

THE UNIONS AT WORK.

A brief account of the Co-operative Societies will not be out of place here. When a Co-operative farm or dairy society is to be started, 10 or 12 of the interested persons will meet and discuss how they should proceed. They will then make arrangements with a Bank or Co-operative Credit Society

for a loan to meet the initial expenses. The Companies they form are generally unlimited liability companies and usually procure money for the purchase of cows etc., by mortgaging so to say their joint and several properties. As a rule they do not raise any share capital. In some cases the members contribute only a sum of 3 to 5 *kronas* as a fee for membership which is also refunded when the members leave the Union. This is the case particularly with regard to Co-operative Dairies, where the capital required is not huge. The interest on the working capital borrowed from the Bank or Credit Society varies from 3 to 5 per cent per annum and this is adjusted on the joint and several security of the members. Then a Board of Directors of seven or nine persons is elected and they assume the business control and supervision of the farm or factory on behalf of the members. Gradually several other farmers who have cows and who are anxious to sell their milk also join them as members, agreeing to supply the Union with milk. The technical management of the creamery and its business transactions are delegated to a competent, well-trained Dairy Specialist who arranges for the necessary personal and other equipments with the Board's approval.

Thus we see that the whole process from the beginning is based on the "intelligent membership of those who possess a very rational understanding as to the meaning, responsibility and value of Co-operation." One very important thing to be noted in connection with the working of the co-operative societies in Denmark is that there are no statutes, governmental or otherwise providing for the formation of these Associations. They are "unlimited voluntary Associations formed in accordance with what may be called the Common Law principles. Each has certain papers which state its purpose, and define the method of operation and the rights, and liberties of its members. These papers are analogous to the constitution and by-laws of an unincorporated association. They constitute only contracts or agreements between the Association and its members and between the various members. The liability of the members of these Associations is limited, as for instance the liability of members of partnership concerns for

the debts incurred in the partnership business. The members are responsible and will have to pay only debts to such an extent according to their interest in the concern, in the event of the Association being unable to meet them, but in practice this rarely occurs. The number of co-operative institutions that fail in Denmark is very small.

In the case of creameries and local producing associations, the liability of each member for the debts of the association is limited, that is to say, a creditor of the association in the event of his failure to obtain payment could recover the entire amount from a particular member. As between the members of the Association an equitable contribution in such an event would be required from each member. The creameries or other local commodity associations generally (perhaps almost always) dispose of their products through a sales organisation which will also be a co-operative body. In such cases the liability of the creameries or the other local commodity associations for the debts of the sales organisation is limited to a certain fixed amount. Thus there is a close connection between the local and central co-operative institutions. According to practice, and constitutional procedure, these co-operative bodies settle such disputes and disagreements, as might arise either between individuals or between Associations, either mutually or through Boards of Arbitration. They would not rush to the law courts and spend thousands on litigation. Of course third parties go to the courts of law, but these again are rare.

In case of, and for the working of bigger enterprises where a good sum of capital is required, this is generally obtained by members who are the members of different cattle-breeding or dairy-farming associations. Those who have no ready capital generally pledge or mortgage their movable and immovable properties to the credit society or co-operative banks. This is also the plan adopted by the local associations when they have not enough of ready capital. The individual members in such a contingency either sign the necessary documents themselves or authorise the

local Board of Directors to sign for them as provided for by the Articles of Association and by-laws and then these documents are collected and forwarded to the central associations to be used by them for obtaining the necessary funds, for carrying on the work.

Due to the unity and systematic working of the Co-operative Movement, the Danish people as a whole, derive several advantages, which ordinarily, individual farmers in the absence of this, cannot even dream of. In fact, as said before every activity of the farmer has got a co-operative backing for it. Such societies exist not only for the sale or purchase of articles required by them but the societies also help them in all their other thousand callings. These societies have their own doctors, medical advisers, veterinary specialists, technical experts, research scholars, etc., attached to them, whose duty it is, to guide and give assistance whenever the members experience any difficulty. Research scholars could be seen busy in their laboratories finding how best economy could be achieved; how the animals could be made to yield more milk, what particular kind of food-stuffs should be given to them so that the milk would contain more of butter-fat etc. These people take great care, even to very minute details, connected with animals and the milk industry: One will be surprised to find these Specialists advising the dairymen as to how to look after the animals and even how to milk them. Often these useful hints are written in bold letters on card-boards or wooden planks, and pasted or suspended on the walls in conspicuous places in the cattle breeding and dairy farming stations.

The following is a typical example :—

1. *The cow is a living machine.*

(a) Kindly treatment entails less labour and gives more milk.

2. *Good work improves the living machine.*

- (a) Milk clean: clean milking develops the udder and with this increases the quantity of milk and
- (b) You receive richer milk.
- (c) Remember that the milk last drawn is by far the most valuable.

3. Clean milking.

- (a) You should wear tidy and clean clothes.
- (b) Have the milk-pail clean as well as the cream can.
- (c) Thoroughly clean the udder by rubbing it with a piece of linen.
- (d) Wash the udder thoroughly before milking.
- (e) Let the udder be quite dry before you begin milking.

4. Carry out the work properly.

- (a) Milk with dry hands.
- (b) Seize the teats with the whole hand.
- (c) Keep a gentle pressure on the udders.
- (d) Milk as fast as you can and never cease working until the milk is wholly drawn.
- (e) Do not strain the teat beyond its natural length.
- (f) Remember the value of the last drops.

5. Healthy state of udder.

- (a) If there be soreness or bumps in the udder or teats, stoppage in the milk canal, or unnaturally coloured milk, do not mix the milk with any other and do not send it to the creamery.

6. Milking times.

- (a) Begin milking always at fixed times.
- (b) Milk the same cow in the same order.

7. Regard the excellent work as one of honour.

Farmer mark this well :—

- (1) Clean the cows.
- (2) Have good air in the stables.
- (3) Allow the light to freely come in.*

Education. A few words about the educational system of Denmark will be of interest to our readers. It is the wonderful system of practical education, imparted to the children of Denmark, that has brought about a revolutionary change in the political and economic sphere of the country in a short time, in less than half of a century.

In the beginning of the second half of the last century a number of schools called the Folk High Schools were started. They had as their object "the providing of education for the young adult men and women of the peasant class." As is rightly claimed, "it is these High Schools that produced the leaders of New Denmark, for these institutions had recognized the importance of agricultural education side by side with others, like literary and technical ones to the members of the peasant class."† In these schools not only education was given free but even books, slates, pencils etc., were given gratis to poor and deserving students. In the educational curriculum great stress was and is being laid on the practical side of agriculture (and on other allied subjects). Farmers' children are allowed to remain half the day at home to learn the farm-work from their parents, but during the other half they must attend the schools. Thus the home and school education enable them to be proficient both in the theory and practice of agriculture.

The teachers in Denmark, quite unlike those of other countries, are allowed great latitude both as regards the subject, as also the method of inculcating knowledge to their pupil. There are no hard and fast rules governing them.

* Agriculture and Co-operation in Denmark.

† *Village Education* by the same Author deals with Danish System of Education in a detailed manner.

The teachers do not favour any particular stereotyped curricula, or methods of imparting information. They are allowed full freedom and can depend upon their own individuality and the tenacity of their pupils, instead of sticking steadfast to a strict curriculum prepared by the authorities. Once or twice a week, the students are to be taken out to the fields, gardens, museums, dairy farms and cattle-breeding stations, to give full facilities for a free play of their faculties of observation, to watch and witness and study things from the objects seen on the spot. The teaching is always practical, while there is no cramming.

There are several special Agricultural and Technical schools conducted both during day and at night, set up for the benefit of the people, the latter particularly for the use of those who have to work during the day, and who could spare time only in the night. In the schools students are trained up as practical workmen for running agricultural farms, cattle-breeding stations, creamery factories and the like, quite independently. These schools possess their own farms, herd of cattle, dairy machinery, and all other necessary appliances. The students are made to plough and plant, feed and milk, and independently prepare butter, cream, cheese, etc.

As a result of such a beneficial system of practical education, young lads and lasses, as soon as they come out of the schools, are well equipped to meet the practical requirements of life. They are enabled to straightaway take any independent business in life and procure an easy and honourable living directly as they leave their studies. Another noteworthy factor is that their examinations are easy to get through. In fact, in several cases on subjects like agriculture, cattle-breeding, etc., there are no tardy examinations at all. This wholesome measure attracts a large number of persons, even men of old age who are glad to have the opportunity of learning something in a College without going through the ordeal of an examination and of the humiliation they will have to face, if they are not to master and demonstrate petty details on unnecessary subjects which are of little practical use to them in actual life.

The following observation on the origin and growth of these High Schools made by H. Hertee sums up the position in a nutshell : " These schools awakened in young men and women a yearning for knowledge and a desire to work. The character of the pupils was strengthened and they left the schools with a much enlarged outlook on life. To satisfy its yearning for knowledge a current of youth flowed from the High Schools to the Agricultural Schools and when it afterwards passed out into life, it did so with a strong feeling of fellowship and a desire to work for common progress. Youth thus gained some of the qualifications necessary to the success of a Co-operative Movement."

We have already narrated in detail how the Danish Government helps the people by giving them financial assistance affording facilities for the purchase of land, cattle, etc. They have in addition made arrangements for the quick transport of their products from one place to another, both by rail and by steamer. They have made arrangements for regular weekly steamship sailings for the transport of Danish butter and other products on a definite weekly schedule to the distant ports of foreign countries. They have also raised tariff barriers, giving protection to their industry so that it shall not be crushed by foreign competition.

The Government also gives to the manufacturers of dairy products, certificates, marks of recognition as to the genuineness of the quality, holding themselves responsible for the article advertised and supplied. For the butter trade for example, they have given the name of "Lur Brand". Those who want to affix this name on their casks, have to conform to certain conditions imposed on them by the Government. They must have pasturised and heated the milk at least to 170 F. The butter that has been packed up should not contain more than 16% of water. There should be no adulteration of any extraneous matter except salt and colouring substance. The Government maintains a laboratory where samples of various dairies, that are privileged to use this name are frequently brought and examined. Those who go against

the Government's regulation and resort to malpractices are severely dealt with. One is naturally surprised to learn that even an ordinary egg supplied by a Danish exporter, on which will be printed the name of the party or a number, and if it is found to be spoiled or useless and for which the exporter be responsible, and if the authorities are to be intimidated (and they always welcome such intimations) sufficient compensation will be given and the party responsible for it, detected and taken to task. The Government machinery is efficient, and is always on the alert to protect its goodwill and reputation.

Thus we could see how the once impoverished peasantry of Denmark were able to bring about radical changes in the social and economic structure of their society in a short time. May we appeal to the people of this country also, to emulate the noble example set up by the Danish pioneers? Can we look up to our educated youths to give a lead to the ignorant and impoverished poor inhabiting our rural parts? Not only should our Graduates in Agriculture but every individual, young or old, collegian or school-boy, should feel and share the responsibility in inaugurating and successfully working out this great campaign. They must bear in mind the value of, and the dignity of labour and carry it home to every thinking man, woman or child, "that the wielding of a spade and driving of a water-lever in one's own interest, is not less honourable than scratching a few lines with goose-quills on foolscap paper", as the late Maharaja of Travancore would aptly put it. They, our educated youngmen, must look to the countryside as their future sphere of action. They should mix and mingle, identifying themselves with the humblest of the humble, poorest of the poor, lowest of the lowly and be their real friend guide and philosopher. Right type of rural development work, organised and conducted, not on sentimental or emotional lines, but on sound and scientific principles, as in Denmark, can find suitable and profitable openings for a good number of youngmen who are to-day idle and are virtually in the streets in quest of work. Knowledge is money, and organization the channel leading

towards its achievement. By organizing and establishing co-operative unions, by fostering rural industries like cattle breeding dairy farming, and a host of others which can successfully be undertaken, by the starting of schools, hospitals and other socio-economic institutions, not only will we be able to revolutionise our country-side but revolutionise the people as a whole, who to-day are in despair and show them the way to salvation.



By the same Author.*

Price 8 Annas only.

Co-operators and Rural Uplift.

[A Paper submitted to the 13th Session of the World
Co-operators' Conference, Paris (1937)]

Thus observed His Late Majesty King George the Fifth :

"If the system of Co-operation can be introduced and utilised to the full, I foresee a great and glorious future for the agricultural interests of this country".

Co-operation alone can save India ; it alone can help the peasant in his distress ; it alone can save him from the shackles of the money-lender ; it alone can increase his income and procure better prices for his produce ; in a word it is the only weapon which he can wield with advantage for a thousand and one purpose.

Co-operators are the Pioneers of the Rural Development movement ; no doubt, even now they are there in the forefront, but they are looked upon by the people as "Official" Co-operators. They are under the impression that it is a purely official affair, set up and run with a "motive" behind. This fallacy is to be shattered. People must be made conscious of the right aspects, uses and benefits of Co-operation.

CONTENTS.

India, a land of villages—Socio-Economic conditions—present agricultural situation—low yield of the soil—poverty of the people—trade depression and the economic slump—land tenures: old and new—Zamindar and the Moneylender—Taxation: direct and indirect—Indebtedness of the peasantry—findings of the Central Banking Inquiry Committee—Debt redemption—the Bhawnagar scheme—raising the level of prices—cheap, short and long term credit to the cultivator—Land Mortgage Banks—Co-operative Banks—The Reserve Bank and its Rural Credit Department—how Banks in other countries help their cultivators—Agriculture: progress achieved in the West by Scientific devices—India's backwardness—intensification of Agriculture—Irrigation, manure, seeds, tools and implements—enforced period of idleness of the Indian cultivator—allied agricultural and subsidiary industries—Cottage and rural industries—importance of marketing—Senior Marketing Officer's Survey—Health, Sanitation and Education—Co-operation—its defective growth in India—scope for development—its gigantic potentialities—the example of Denmark—Statistics.

See Reviews next page.

**In reproducing substantial portions from the "Paper", the
Commercial Gazette of Calcutta, in its Special Banking
and Insurance number, made the following
Editorial observation :—**

"The following is an extract from a "Paper" entitled "Co-operators and Rural Uplift" submitted by Prof. Maniam to the 13th Session of the World Co-operators' Conference held recently in Paris. The Thesis covers about 100 pages of first class material and is a brilliant Survey of the economic conditions of India, with particular reference to rural matters. The Author is considered an authority on the subject and has over a dozen volumes to his credit.....(Ed. C. G.)

Extracts from Times of India :—

Prof. Maniam ..in his latest work traces the history and development of *Co-operation* in India in all its aspects. Though small in size it contains a volume of information, and gives a good account on many salient points. Says the Professor :

"The success attained by the Co-operative Movement in Europe led the Government to believe that the desired change in the condition of the people could only be brought about through the system of co-operation. Accordingly, the Government of Lord Curzon, adopted the Co-operative Credit Societies Act X of 1904. Co-operative Societies began to be started with the object of supplying cheap credit to the village people to enable them to free themselves from the clutches of moneylenders and for inculcating in them habits of thrift, self-help and mutual help."

"His Late Majesty, King George V had immense faith in the potentialities of the movement for the good of the people and this was expressed in an unforgettable manner in the address to the people and Princes of India at the time of the celebration of his Coronation at the Durbar held at Delhi in 1911. His Majesty observed: "if the system of Co-operation can be introduced and utilized to the full, I foresee a great and glorious future for the agricultural interests of this country."

"This gave a fillip to the movement, and whereas there were only 5321 Co-operative Societies with a membership of 3,05,058 in India in the year 1910, the year of His Late Majesty's accession to the Throne, the number rose to 1,05,262 societies with a membership of 42,82,884 and a working capital of Rs. 95,83,98,000 in the year 1935 the year of the Silver Jubilee of his reign."

No doubt if one is to take the progress of the movement Province by Province, it will be found that in some places that are predominantly agricultural, and that are the strong-holds of the moneylender the movement is confronted with serious obstacles. But even here "Co-operation has not failed, and it will not fail". As Professor Mukerjee observes, "Co-operation in India to-day is in retreat. It is retreating to consolidate its position, to repair its losses and to reinforce its strength. It is only manoeuvring for a position. Co-operation will not capitulate to the Mahajan for peace. Whatever might be the fortunes of war, Co-operation is sure to win the last battle against the Mahajan. Co-operation may bend, but it will not break. Co-operation may stoop, but God willing, it will stoop to conquer".

Patt & Co., Publishers & Booksellers, Cawnpore.

By the same Author.

Price 8 Annas only.

VILLAGE EDUCATION.

[*A tentative scheme of "Self-supporting" Education for the masses in India, based on the American and Danish models*]

...I have read it with great interest and have no hesitation in saying that it contains many remarkable ideas. *Prof. Seshadri.*

...Besides dealing with the requirements of education in Rural India, the writer makes a comparative study of the systems of education in foreign countries and finds that the Danish system, which he deals at considerable length, suits Indian conditions best... The brochure is suggestive and the plea earnest. *Twentieth Century.*

...In this brochure the Author has thrown luminous lights on some aspects of rural education and has addressed it to those of the voluntary workers who are willing to contribute their mite towards the success of the movement.. and exhorts the sincere co-operation of students leaving their college careers to take up the cause of the unhappy and backward village folk, and by example and precept make them a worthy national unit. *The Indian Journal of Education.*

India is a land of villages and the need of the hour is not only to see that the villagers, steeped at present in ignorance, should receive training in the three R's, but taught how to make the village folk happy, by reforming and elevating them socially and economically. In *Village Education*, Mr. E. V. S Maniam, tackles this pressing problem by suggesting various measures: such as a planned scheme of rural elementary education, rural training and practical agricultural knowledge.....The brochure is a useful guide to workers in Indian villages for the amelioration of our rural brethren.

The Hindustan Review.

In this excellent treatise Professor Maniam, the well-known Economist in a masterly way analyses the pros and cons, the reasons and results of Denmark's progress and prosperity, comparing the state of today with the conditions prevailing some fifty years back...

It is the wonderful system of practical knowledge imparted through these institutions, voluntarily started and run by the people themselves, that so quickly changed the Old Denmark to the New...

These days, when there is so much of political chaos and economic unrest, it would be in the interest of India to take up some of the measures to which the Danes resorted. Denmark is a living example before us of what a nation can achieve, if it has the will and determination to achieve it, with or without any *help* from Government quarters.

Hindustan Times.

Patt & Co., Publishers & Booksellers, Cawnpore.

Second Edition.

Price Three Rupees.

THE CATTLE WEALTH OF INDIA

In connection with the All India Cattle Show now being held in Delhi (in the Irwin Amphitheatre under the auspices of the Government of India) Messrs. Patt & Co., the enterprising Publishers of Cawnpore have brought out a booklet of about 150 Pages (9x6½") entitled the "Cattle Wealth of India". Great stress is laid herein for improving the breeds and developing the animal husbandry resources of the country with economic advantage to our peasant brethren. (The Author) suggests the adoption of the Co-operative Plan for achieving this and gives the details of the working of the Co-operative machinery in Denmark in the last two chapters. (The National Call)

From the Western countries we can learn a great deal about Cattle economics..... ..

Mahatma Gandhi.

My friends, if you would help India, help the cultivator, and one of the best ways to help the cultivator, is to improve the breed of cattle all over the country.

Lord Linlithgow.

With reference to your letter of the 7th July 1938., I am to request you to kindly forward 25 (twenty-five) copies of the book "The Cattle Wealth of India" by Mr. E. V. S. Maniam, addressed to "The Private Secretary to His Highness the Maharaja Manikya Bahadur of Tripura, P. O. Agartala, Tripura State (Rly. Station Akhaura, A. B. Railway):

The Private Secretary to His Highness is being advised to take delivery of the consignment when it arrives.

Shillong.

Sd. Chief Secretary to H. H. The
Maharaja Manikya Bahadur of Tripura.

...I have pleasure to place orders with you for 50 copies of the book entitled "The Cattle Wealth of India". Please mail them to my address and recover the price by Bill.

Porbandar.

Sd. Dewan, Porbandar State.

I request you to please supply 10 copies of the book entitled the Cattle Wealth of India by V. P. P. to my address as early as possible.

Balangir P. O.

Sd. Chief Minister.
Patna State.

With reference to your letter dated 10-7-1938 addressed to the Private Secretary to H. H. the Maharaja Saheb and forwarded to this Office for due disposal, I have to request you to please arrange to supply me with 50 copies of the book the "Cattle Wealth of India" per V. P. P.

Baroda.

Sd. Dy. Director of Veterinary and
Animal Husbandry Services,
Baroda.

Reference your letter dated 1st Aug. 1938., ten copies of the publication entitled the "Cattle Wealth of India" mentioned therein may please be supplied per registered parcel.

Fort Ramnagar.

Sd. Chief Secretary,
Benares State.

In reply to your letter of the 5th inst. addressed to Shri Raja Sahib Bahadur I have the pleasure to inform you that he will be glad if you send to my address five copies of your publication entitled "The Cattle Wealth of India" per V. P. P.

Solan.

Sd. Minister, Baghat State.

I have to acknowledge receipt of your letter dated 30th June 1938, addressed to His (late) Highness Raja of Sawantwadi and to request you to supply me with six copies of the book "Cattle Wealth of India" by V. P. P.

Sawantwadi.

Sd. Dewan, Sawantwadi State.

Please send ten copies of "The Cattle Wealth of India" per V. P. P. to my address.

Rajpipla.

Sd. Dewan, Rajpipla State.

Reference to your letter dated 2-7-38 to the address of the Ruler, please send five copies of "The Cattle Wealth of India" by Value Payable Post to my address as early as possible.

Baudh Raj P. O.

Sd. Dewan, Baudh State.

Please expedite despatch of five copies of "The Cattle Wealth of India" to my address at an early date.

Narsinghpur.

Sd. Asst. Dewan in charge,
Narsinghpur State.

With reference to your letter dated the 11th July, I have to request you to kindly supply ten copies of the book "The Cattle Wealth of India" for distribution in the State".

Cambay.

Sd. Asst. Private Secretary
& A. D. C. to H. H. The Nawab
Sahib Bahadur of Cambay.

Patt & Co., Publishers & Booksellers, Cawnpore.

ग्राम सुधार प्रवेशिका

(AN INTRODUCTION TO RURAL UPLIFT)

सुविख्यात हिन्दी लेखक श्री रामचन्द्र श्रीवास्तव, एम० ए०, एल० एल० बी०,
साहित्य-रत्न द्वारा अनुवादित। मूल लेखक अर्थशास्त्र विद्वान,
श्रीयुत् ई० वी० एस० मनियम]

लेखक को कृषि प्रधान प्रदेश संयुक्त प्रान्त के हृदय, (गांवों) में पूर्णतया प्रविष्ट होने का सौभाग्य प्राप्त हुआ है। वह ऐसे दुर्गम स्थानों में घूमा है जहां चीं चीं घड़ घड़ करती मन्द गति वाली बेलगाड़ियों की ही गुजर हो सकती है, जो कदम २ पर सवारों को घकों का स्वाद चखाती है। लेखक को गाड़ियों की धूल घकड़ और गन्दगी से भरे स्थानों में होकर और बरसात में कीचड़ पानी से भरे स्थानों में होकर पैदल चल कर स्थिति का अध्ययन करना पड़ा है। वह ग्राम निवासियों के साथ हिल मिल कर रहा है और उनके सादा परन्तु प्रेमपूर्ण सत्कार का आदी बना है।

× × ×

हमारे देश की अधिकांश जनता ग्रामों में रहती है अर्थात् १०० में ८० मनुष्य गांवों में और शेष २० शहरों में बसते हैं। देश की अधिकतर सुख सुविधा के लिये जो धन व्यय किया जाता है उसका मुख्य श्रोत प्रामीण जनता की गाढ़ा कमाई ही है। हमारे गांव निवासी भाइयों की जीविका का प्रधान आधार कृषि ही है। वे घोर तपस्या करके इतना अन्नदान करने हैं कि उसमें सारे देश का पेट पालन होता है परन्तु फिर भी हमारे अन्नदाता किसान लोग निर्धनता पूर्वक जीवन बिताते और घोर कष्ट सहते हैं। अभी उनमें शिक्षा का प्रचार नहीं है उन्हें कोई भी दरा धमका कर अपना स्वार्थ साधन कर सकता है। यहां तक कि किसानों की दशा अनुकम्पनीय हो गई है। हर्ष की बात है कि अब इनके सुधार की ओर देश के नेताओं का ध्यान विशेष रूप से आकृष्ट हुआ है। सरकार ने भी इस क्षेत्र में अपना पग बढ़ाया है और अब जगह जगह ग्राम सुधार की आवाज सुनाई दे रही है। प्रस्तुत पुस्तक 'ग्राम सुधार प्रवेशिका' भी इसीलिये रक्खी गई है। यह पुस्तक 'An Introduction to Rural Uplift' नाम से अंग्रेजी में प्रकाशित हुई है इसके मूल लेखक श्रीयुत् ई० वी० एस० मनियम महाशय हैं जिन्होंने ग्राम सुधार समस्या का विशेष रूप से अध्ययन किया है। ऐसी पुस्तक का हिन्दी में अनुवाद कर मेरे मित्र श्रीयुत् रामचन्द्र जो 'चन्द्र' एम० ए०, एल० एल० बी०, साहित्य रत्न ने सचमुच बड़ा उपयोगी कार्य किया है। मेरी हार्दिक अभिलाषा है कि यह पुस्तक अधिकाधिक पढ़ी जाय और पाठक इसमें जिनकी हुई कार्य विधि को क्रियात्मक रूप देकर देश की अकिंचित सेवा कर सकें।

हरिशंकर शर्मा 'कविरत्न'

सम्पादक 'प्रभाकर' आगरा ।

‘राजनीतिक’ ।

इस प्रकार का विषय आम सुधार तथा समाज है। प्रत्येक के विशेष परिच्छेद कवि, मामीसहित तथा स्वातंत्र्यन दूरपाईं विषयी पर अच्छी प्रकारा जाले है। आम विद्या, मान्य पुस्तकालय, अणु संवेदन संप्रयोग आदि विषयी पर विस्तृत रूप से लिखा गया है इस विषय में विशेषज्ञ तथा सरकारी विद्या से बहुत सहायता ली गई है। शैली सरल तथा सुन्दर है।

‘सांस्कृतिक प्रचार’, कानपुर ।

पुस्तक का विषय इसका नाम ही संकेत होता है। इधर कुछ दिनों से आम सुधार की आवाज सारे देश में गूँज रही है और इस सम्बन्ध में कुछ साहित्य भी प्रकाशित होने लगा है। भारत का समाज (व्यस मायो) में है। इसलिये मायो का सुधार हुए बिना देश का उद्धार होना कठिन है। यह आम सुधार का कार्य किस प्रकार करना चाहिये इसकी रूप रेखा क्या हो, इस विषय पर इस पुस्तक में विवेक प्रकाश करा गया है। आम सुधार से आम जनता को अधिक लाभकारी को इस पुस्तक से बहुत कुछ सहायता मिल सकती है। अतएव उन्हें एक बार इस आरम्भ पुस्तक का अध्ययन करना चाहिये। इसलिये इसकी उपयोगिता में संदेह नहीं।

‘सैनिक’, आगरा ।

देश में जब से आकाशवाणी आम सुधार आन्दोलन शुरू हुआ है, तब से इस विचार प्रकट किये हुए हैं।लेखक ने इस विषय पर प्रकाश जाल कर है। आज किसान और देहातियों की दशा सुधारने के सम्बन्ध में लेखक ने अपने सरकारी विद्या तथा परवर्ती से दवाले देकर कई शान्तर्य प्राप्त और आंकड़ें भी दिये मान्य में कराया गया है। इस सम्बन्ध में आने विस्तार व्यक्तियों के लेख, दशा, उनकी आर्थिक और सामाजिक स्थिति, विविध कठिनाया आदि का विस्तृत उद्घाटन (An Intro-duction to Rural Uplift) लिखा है। इसमें भारत के देहातियों की वर्तमान स्थानीय हो करणा चाहिये। अग्रज मान्यम ने यह पुस्तक आर्षवी में (An Intro-duction to Rural Uplift) लिखा है। इसमें भारत के देहातियों की वर्तमान स्थिति के बारे में काफी विस्तृत और विस्तृत दशा में जो समाज प्रयत्न करने हैं उनकी कार्य मासिक अवस्था के बारे में भी वही परासनीय और उत्साह प्रिय मार्गस होने लगी है। किन्तु अभी इस सम्बन्ध का साहित्य बहुत सीमित है, तब से इस सम्बन्ध में अच्छी और सहा साहित्य प्रकाशित करने की आवश्यकता भी दिनों-दिनों बढ़ने लगी है। आम सुधार आन्दोलन शुरू हुआ है, तब से इस

