An Economic Investigation of farms in the Maize Districts of the Orange Free State

Price 3d.

UNION OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

An Economic Investigation of Farms in the Maize Districts of the Orange Free State

Preliminary Report for Crop Season 1927-1928

BY

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Division of Economics and Markets
(Economic Series No. 12)

THE GOVERNMENT PRINTER, PRETORIA
1930

2519—18/3/30—1,700

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FOREWORD.

THE Division has commenced a systematic study of agricultural economic conditions in the maize triangle. It is obvious that the whole area cannot be covered by a single inquiry and various parts thereof will, therefore, have to await their turn. Moreover, fluctuations in climatic, economic, and other conditions render it necessary to spread such an inquiry over a period of at least two or three years. In this bulletin Dr. J. C. Neethling, to whom the inquiry has been entrusted, presents a review of his findings during the first year of the inquiry. It is hoped, in due course, to submit a more comprehensive report based on the work of several years. Although this report covers only a year's work and, therefore, only a portion of the triangle it is, nevertheless, considered sufficiently valuable to justify publication in bulletin form. It will give maize farmers a good insight into the work done by the Division and also help to pave the way for further reports and for investigation in other areas.

A. P. VAN DER POST,
Acting Chief, Division of Economics and Markets.

Pretoria, March, 1930.

Chapter I.

A DISCUSSION OF METHODS: CHOICE OF REGION.

Introduction.

General.

Maize is one of our most important agricultural products, not only as food for human beings and animals on the farm, but also as a product to be sold. Of the estimated value of the agricultural production of £75,000,000 for the crop year 1926–1927, it was found that the estimated value of maize was £10,802,809, or 14·4 per cent. of the total.* The only product which has been of greater importance than maize in the system of farming in South Africa is that from sheep farming. The total value of wool and skins alone was more than £19,000,000 in 1927.

Books have been written on the soil and climatic requirements of maize, on its production, and on its feeding value, but as yet no study has been made of its relative importance as an enterprise in the system of farming as a whole.

Parish, Principal of the School of Agriculture, Glen, started an investigation into the cost of production of maize in 1920 on certain chosen farms. In this study, which is at present being carried on by C. J. Uys of the Division of Agricultural Economics and Markets, the maize enterprise as such has been separated from the farming enterprise as a whole. Such an enterprise study fills an important place in agricultural economic research, but it does not bring out the real significance of such an enterprise in the farm organization.

Object of the Study.

The aim of the investigation is twofold. In the first place the relative importance of the maize enterprise to the farm organization as a whole must be shown for the area selected for the study. Moreover, an attempt will be made to determine the efficient combination of the various enterprises in the farm groups of different sizes. In the second place an attempt will be made to give suggestions for more efficient organization. To do this the various enterprises will be carefully analysed.

Method of Investigation.

There are two methods of study generally utilized in agricultural economic research, namely, the complete cost account, and the farm survey method.

The complete cost account method requires that a chosen number of farmers keep complete records of receipts and expenditure, and notes on the operation of the farm, or of one particular enterprise. This is the method used by Parish and Uys.

Such accounts are very accurate, but can only be kept by farmers who have been specially trained, and consequently only the most successful farmers are represented, while the general conditions of the area suffer neglect. Since these complete cost accounts are very difficult to keep and the officer making the analysis has to spend a great deal of time doing so, only a few farms in

* This is an estimate by W. A. Horrocks, of the Division of Economics and Markets.

each district can be included in the study. The results of such records cannot, therefore, be taken as representative of any given area. For the above reasons, the farm management survey method was used for the present study in preference to the cost accounting method.

In the survey method, an officer visits a number of farms and personally fills in a questionnaire previously drawn up by him. In this way, for the present investigation, 114 farms were visited, of which 109 are included in the analysis. In order to obtain successful results, the officer making the survey should be trained in agricultural economic research methods. He should have a general knowledge of farming conditions and the knack of working with the farmers.

It is not a question of simply drawing up forms, for filling them in requires careful questioning, since the terminology of the officer is often not understood by the farmer. If farmers are asked to make an estimate, it should be based on definite principles, not on mere guesswork. Furthermore, to obtain a good estimate, the ultimate result is arrived at by numerous subordinate (*not* leading or suggestive) questions. Wherever possible, the answers should be verified from notes made by the farmers. Because they have to fill in forms for the Revenue Department, the officer in the present study usually found carefully kept notes on receipts and expenditure.

The survey method is based on the law of averages, that is to say, if the chances for an estimate to be too high or too low are even, then an equal number of the estimates will be above and below the accurate figure, provided the number of cases included is large enough.

For this study, 109 records were taken—a large enough number for the law of averages to function well. The number of questions, also, put to the farmers was so large that where estimates were made, the above law was also applicable. The results of individual farms can, therefore, be considered fairly accurate; in any case so accurate as to place these farms on a comparable basis.

In South Africa, the major factor determining the success of farming during any given crop year is the precipitation. The deviations from one year to another are remarkably divergent. For that reason it is impossible to draw any definite conclusion from data obtained only for one or two years, and the idea is to visit the same farms for four or five consecutive years.

For the time being, this study is sub-divided as follows:—

In the first year, information was gathered as to the general regional conditions; in the second and third years, a comparative study, bringing out various factors making for the success or failure of different farming enterprises, will be made; while in the final year, these factors will be analysed in detail so that conclusions may be arrived at, and if possible definite results published.

It is clear, therefore, that this is only a preliminary report giving the object of the study, methods used, regional conditions, present farming conditions, sources of receipts and expenses and factors determining profits. Furthermore, the different enterprises in the farming business are discussed, and finally comparisons are made between the most successful and least successful farms. As maize is the most important enterprise in the visited area, it is discussed more fully than others. Let it again be emphasized that this is a preliminary report, and that as yet no technical analyses have been made.

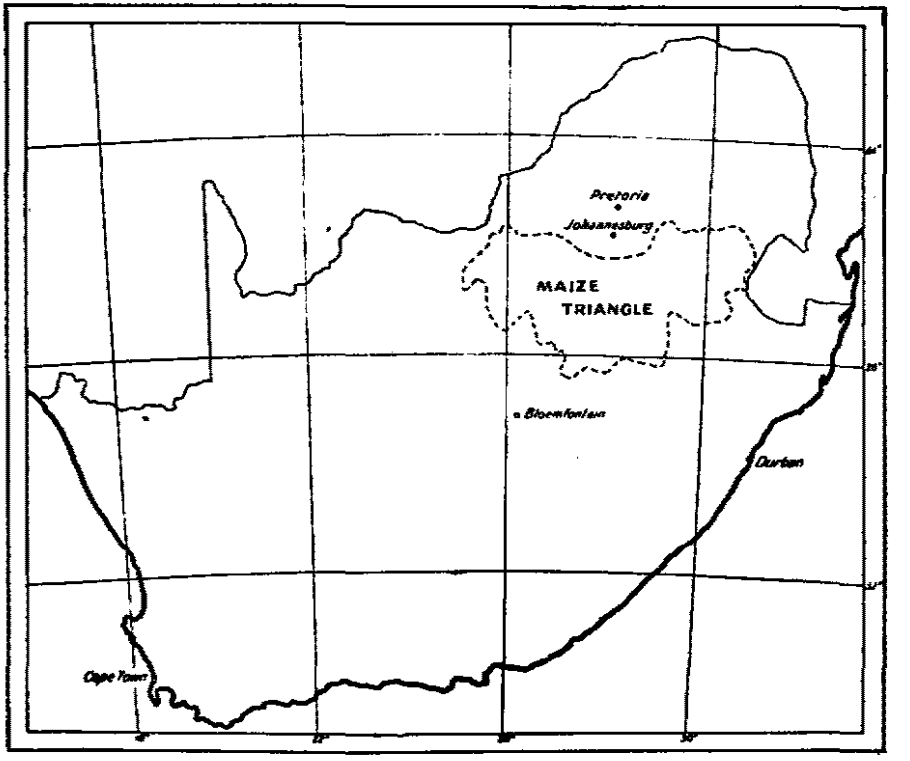
Choice of Region.

The Orange Free State and Transvaal are the two most important maize-producing Provinces in the Union. The region known as the "maize triangle"

includes the districts marked in Figure I. These districts lie in the Southern part of the Transvaal, and in the north-north-eastern* Orange Free State.

FIGURE I.

MOST IMPORTANT MAIZE DISTRICTS IN THE UNION.



The Transvaal and Orange Free State together produce 82·3 per cent. of the total maize produced in the Union on the farms of Europeans. Natal produces 12·2 per cent. and the Cape Province 5·5 per cent. of this total. See Table I.

TABLE I.

Percentage of the Maize Produced in the Different Provinces on the Farms of Europeans, 1918–27.

Provinces.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	Av.
Cape.....	8·8	4·5	5·8	5·9	5·9	5·5	5·4	3·5	5·8	4·1	5·5
Natal.....	9·6	12·7	15·4	12·6	11·4	9·1	14·6	7·7	14·6	14·1	12·2
Transvaal.....	38·7	47·8	41·9	41·9	39·3	34·0	44·8	36·6	46·4	37·7	40·9
Orange Free State..	43·4	35·5	37·4	39·6	43·4	51·4	34·2	52·2	33·2	44·1	41·4
TOTAL.....	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

* In the Handbook for Farming in South Africa, 1929, published by the Department of Agriculture, the same division is used.

The production in the Orange Free State is in a more concentrated area than in the Transvaal, even though the figures over a ten-year period show that these two Provinces produce an equal percentage of the total for the Union

TABLE II.

Percentage of Maize Produced in the Most Important Maize Districts of the Orange Free State, 1918–27.

Districts.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	Av.
Kroonstad	18·9	22·5	15·8	16·7	19·2	16·1	8·0	17·5	11·1	9·2	15·8
Bethlehem	8·5	8·5	12·2	12·4	10·8	9·5	13·0	4·8	5·6	6·1	9·1
Frankfort	6·9	6·7	10·3	12·8	9·8	9·9	13·4	6·6	6·9	8·9	8·9
Seneka	10·6	6·5	9·3	5·0	7·5	8·2	13·2	9·1	8·0	10·9	8·6
Heilbron	8·0	7·8	9·6	10·5	8·8	8·9	6·9	7·9	8·0	7·2	8·4
Lindley	5·7	5·4	7·3	7·8	6·8	6·5	6·4	6·1	6·1	7·2	6·6
Reitz	—	—	—	—	—	—	—	6·7	6·6	8·2	7·2
Other	42·3	42·2	35·5	34·8	37·1	41·8	41·0	42·4	49·5	43·2	35·9
TOTAL	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

This table shows that 64·1 per cent. of the maize was produced by seven districts in the Orange Free State. The statement is, as said before, for farms of Europeans. In the four districts: Kroonstad, Bethlehem, Lindley, and Reitz, an average of 38·2 per cent. was produced.

The seven districts mentioned in Table II all lie in the north-north-eastern portion of the Orange Free State.

The seven most important maize districts of the Transvaal produce 65 per cent. of the total for that Province (see Table III).

TABLE III.

Percentage Maize Produced in the Most Important Maize Districts of the Transvaal, 1918–27.

Districts.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	Av.
Bethal	6·6	10·8	10·2	17·0	11·4	14·2	15·8	10·8	14·4	13·0	12·3
Standerton	6·7	8·6	7·5	12·6	9·4	12·4	12·3	10·2	13·7	14·5	10·8
Heidelberg	8·9	8·9	7·0	10·2	10·6	13·0	10·5	7·2	8·5	9·7	9·7
Potchefstroom	18·9	15·2	14·0	10·1	15·8	12·9	3·0	3·4	2·3	1·9	9·7
Lichtenburg	13·9	12·8	11·0	7·2	9·5	5·0	3·5	11·6	4·5	5·3	8·5
Middelburg	8·7	8·5	10·6	10·0	9·4	8·4	15·4	3·4	4·4	4·0	8·3
Pretoria	6·6	5·8	6·4	5·8	4·2	5·4	5·0	4·8	6·8	6·0	5·7
Other	29·7	29·4	33·1	27·1	29·7	28·7	35·0	45·6	45·4	45·6	35·0
TOTAL	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

In the Orange Free State, all the important maize districts are concentrated in the north-north-eastern part of the Province, but in the Transvaal the maize districts are spread throughout the Province. Three lie in the

eastern high veld, two in the south-western part of the Province, one in the north-eastern, and one in the central part. The three Transvaal districts comparable with the four most important in the Orange Free State are Bethal, Standerton and Heidelberg. These three districts produce 32·8 per cent. of the total for the Transvaal.

The Orange Free State, with its more concentrated maize area, has, therefore, been chosen in preference to the Transvaal for a first investigation of maize farms.

FIGURE II.

Region Visited by Officer.

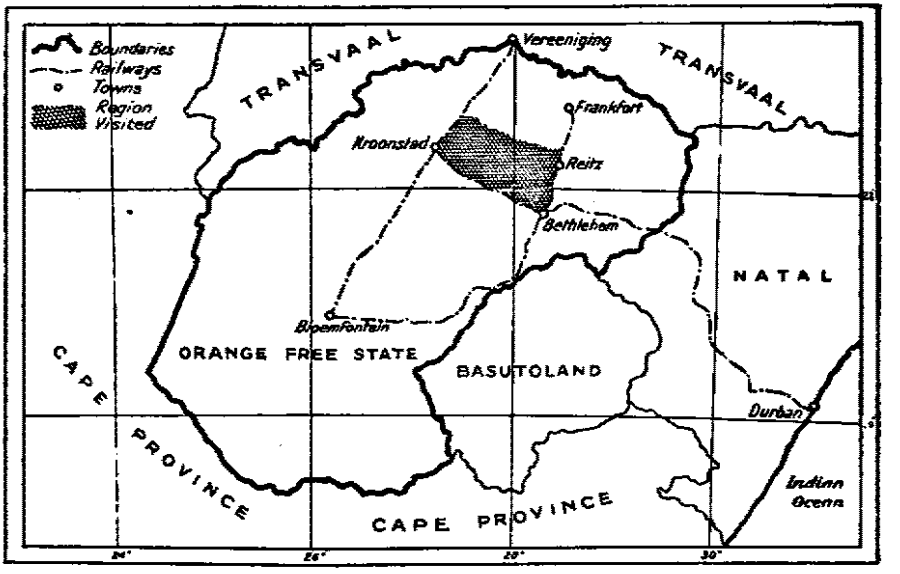


Figure II illustrates the area included in the study.

The idea was to choose farms in a region where uniform conditions prevail For that reason the 114 farms visited are not spread over the whole area, but are concentrated in adjacent parts of the four districts. The boundaries for the chosen area are the railway lines from Vereeniging to Kroonstad, to Bethlehem, to Frankfort.

Uniformity of the Region.

In making a comparative study of a group of farms, it is important to determine whether they produce under similar conditions.

In the first place, climatic conditions must be compared. Precipitation for the districts Bethlehem, Kroonstad, and Lindley is given in Table IV. Reitz has only recently been declared a Magisterial District.

Large portions of Bethlehem and Lindley have been included in the new district, and the precipitation figures for these districts can be taken as representative of Reitz—especially of the portion included in the study.

TABLE IV.

Precipitation for Crop Years October to September, 1917–28, in the Districts Bethlehem, Kroonstad and Lindley.

Years.	Bethlehem.	Kroonstad.	Lindley.	Average.
1917–18	27·52	28·53	24·57	23·54
1918–19	20·99	18·17	18·93	19·30
1919–20	21·14	22·04	19·72	20·97
1920–21	21·78	25·06	19·96	22·23
1921–22	23·38	21·23	24·62	23·06
1922–23	28·82	22·39	21·87	24·19
1923–24	19·65	18·01	16·12	17·93
1924–25	35·18	29·31	26·04	23·51
1925–26	20·54	14·75	18·70	18·00
1926–27	24·21	19·96	24·52	22·81
1927–28	22·47	18·68	12·12	17·42
AVERAGE OF ALL YEARS	25·05	21·67	22·81	23·03

There is an average difference of almost 3·5 inches of rainfall between Kroonstad and Bethlehem, if the whole area of the districts is considered. This is mainly because the districts are so large that the distance from the eastern boundary of Bethlehem and Reitz to the western boundary of Kroonstad is responsible for the difference in precipitation. The area included in the survey, however, is much more concentrated and smaller; moreover, it lies in the centre of the four districts. Therefore it can be accepted with safety that the deviations in precipitation shown in Table IV must be reduced considerably. A small area in Kroonstad district, close to the town, and included in this study, has a much lower precipitation than the rest of the district, and is, therefore, partly responsible for the 3·5 inches difference between Kroonstad and Bethlehem.

This drier region is marked in the railway map shown in Figure III.

The districts of Lindley and Reitz have a more rolling topography than Kroonstad, but this difference is not so large as to necessitate a new type of farming. It is deplorable that no soil survey of the Orange Free State has as yet been made. The geological data are not of much value, so that only a few general remarks will be ventured here.

On the whole the soil is fairly uniform for the region visited. For the larger part it consists of a fairly deep, greyish, sandy loam while the subsoil is a reddish clay. The drainage, however, is good. A kind of black clay, very similar to that found in the Transvaal highveld, appears in patches in the northern part of the visited area.

To sum up the precipitation, topography and general soil conditions, it can be said that the area included in the study is very uniform.

CHOICE OF FARMS.

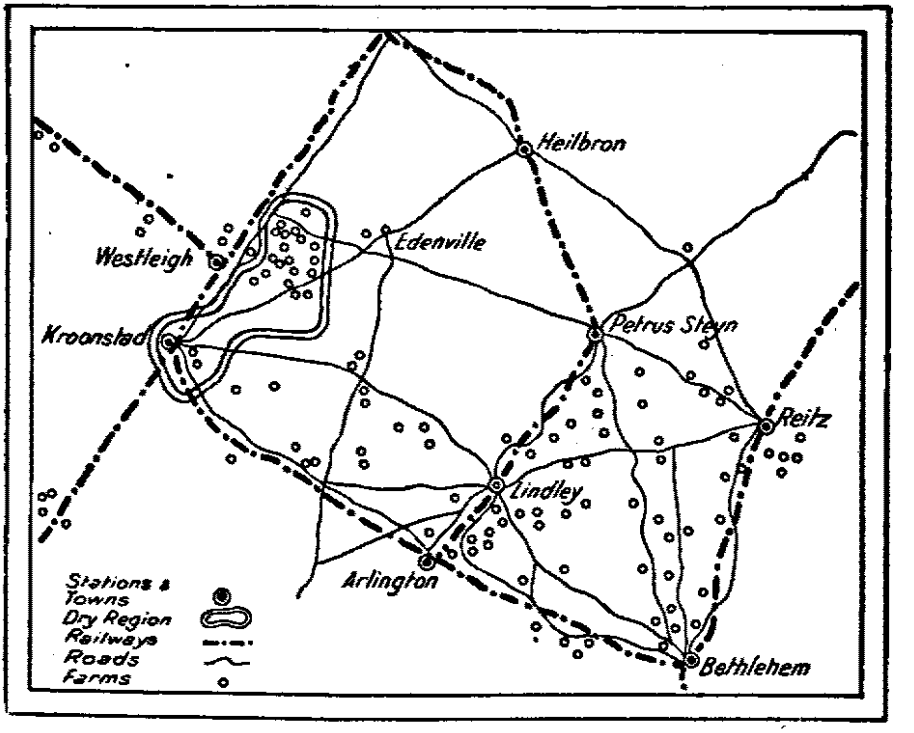
The individual farms included in the study were chosen at random. The only two requirements were—

(1) that the farms should produce maize; and
(2) that they should be at least 100 morgen in size.

In Figure III, the situation of the farms in relation to towns, railways, and roads is given. It will be noticed that there is a fairly general distribution of farms throughout the four districts, except between Westleigh and Honingspruit, where too many are found in one small area. This concentration is chiefly due to the fact that there are a number of smaller farms in that particular region. Nearly all the farms are close to some town. These towns do not, however, provide large enough markets for the perishable products of the farms. The reason for this becomes clear when the Census figures for 1926 are studied, which show that Kroonstad had a European population of only

FIGURE III.

FARMS IN RELATION TO TOWNS, RAILWAYS AND ROADS.



5,281, Bethlehem 3,980, while Lindley and Reitz both had less than 2,000 inhabitants. These towns connect the farmers, however, with other large business centres—Kroonstad for instance is on the main Bloemfontein to Johannesburg line and only half a day's journey from either, while Bethlehem again is on the Bloemfontein to Durban main line.

Most of these farms are also close to railway stations or halts. Forty-five, that is, 41·3 per cent., of the 109 farms are within 6 miles of a station, while 88, that is, 80·8 per cent., are within 12 miles of the nearest station. The average distance of the farms to the nearest station is 8·4 miles. The farm farthest away is 22 miles from a station. See Table V.

Table V.

Distance of 109 Farms in the Orange Free State from the nearest Railway Station—Crop Year 1927–28.

Distance.		Number of Cases.	Per Cent of all Cases.
Distribution.	Average.		
1–3 miles	2·3 miles.	18	41·3 { 16·5 / 24·8 } 80·6
3·5–6 miles	4·9 ,,	27	
6·5–9 miles	7·9 ,,	26	23·9
9·5–12 miles	10·8 ,,	17	15·6
12·5–15 miles	13·3 ,,	6	5·5
15·5–18 miles	16·8 ,,	6	5·5
18·5 miles and over	20·2 ,,	9	8·2
1–22 miles	8·4 miles.	109	100·0

Although no attempt was made to select either the best or poorest farms, but to obtain a fair sample for the region, the average of the 109 farms actually visited was larger than the average size for the four districts. The average for the 109 farms, for instance, was 881 morgen, while the average size of 2,826 farms of 100 morgen or larger given in the Census figures (1927) was only 597 morgen. See Table VI.

Table VI.

Average Size of Farms in the Maize Districts of the Orange Free State of 100 Morgen or more, according to Farm Management Survey for the Crop Year 1927–28 and Census Figures for 1927.

Districts.	Survey.		Census.	
	Number of Cases.	Morgen per Farm.	Number of Cases.	Morgen per Farm.
Bethlehem	16	827	716	506
Kroonstad	41	996	698	719
Lindley	30	920	553	596
Reitz	22	665	859	466
Total	109	881	2,826	597

The fact that the farm area average of the survey is larger than that of the Census does not prove that larger farms were specially visited. In the Census figures there are 73 farms with an area of more than 2,000 morgen. It happened that 6 of the 73 farms were included in the survey, and they raise the average of the surveyed farms more than the 73 farms can raise that of the Census. The division of farms in size groups is given in Table VII.

Table VII.

Number of Farms in the Different Size Groups according to Census Figures for 1927 and Survey for the Crop Season 1927–28.

Group.	Bethlehem.		Kroonstad.		Lindley.		Reitz.		Total.	
	Census.	Survey.	Census.	Survey.	Census.	Survey.	Census.	Survey.	Census.	Survey.
101–500	411	3	427	11	300	7	475	14	1,613	35
501–1,000	216	9	293	15	184	15	137	6	830	45
1,001–2,000	77	4	139	12	54	6	40	1	310	23
2,001 and over	12	—	39	3	15	2	7	1	73	6
Total	716	16	898	41	553	30	659	22	2,826	109

If the average yield per morgen of the surveyed farms is compared with that of the Census figures, it appears that the surveyed farms are slightly better than those of the four districts as a whole. See Table VIII.

Table VIII.

Maize Yield per Morgen in Four Districts of the Orange Free State according to Survey and Census Figures for the Crop Year 1927–28.

Districts.	Number of Cases.	Survey.		Census.	
		Morgen in Maize.	Yield per Morgen.	Morgen in Maize.	Yield per Morgen.
Bethlehem	16	2,505	6·0	56,869	5·7
Kroonstad	41	8,635	9·4	121,948	5·8
Lindley	30	5,777	7·1	63,386	6·3
Reitz	22	3,810	6·9	76,905	5·8
Total	109	20,727	7·9	319,108	5·8

The average yield on 20,727 morgen of maize included in the survey was 7·9 bags per morgen, while the yield on 319,108 morgen included in the Census figures was 5·8 per morgen.

Kroonstad had the highest yield, namely, 9·4 bags per morgen; Bethlehem the lowest, with 6 bags per morgen.

Table V.

Distance of 109 Farms in the Orange Free State from the nearest Railway Station—Crop Year 1927–28.

Distance.		Number of Cases.	Per Cent of all Cases.
Distribution.	Average.		
1–3 miles	2·3 miles.	18	41·3 { 16·5 / 24·8 } 80·3
3·5–6 miles	4·9 ,,	27	
6·5–9 miles	7·9 ,,	26	
9·5–12 miles	10·8 ,,	17	15·6
12·5–15 miles	13·3 ,,	6	5·5
15·5–18 miles	16·8 ,,	6	5·5
18·5 miles and over	20·2 ,,	9	8·2
1–22 miles	8·4 miles.	109	100·0

Although no attempt was made to select either the best or poorest farms, but to obtain a fair sample for the region, the average of the 109 farms actually visited was larger than the average size for the four districts. The average for the 109 farms, for instance, was 881 morgen, while the average size of 2,826 farms of 100 morgen or larger given in the Census figures (1927) was only 597 morgen. See Table VI.

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Lindley	30	920	553	596
Reitz	22	855	659	466
Total	109	881	2,826	597

The fact that the farm area average of the survey is larger than that of the Census does not prove that larger farms were specially visited. In the Census figures there are 73 farms with an area of more than 2,000 morgen. It happened that 6 of the 73 farms were included in the survey, and they raise the average of the surveyed farms more than the 73 farms can raise that of the Census. The division of farms in size groups is given in Table VII.

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Group.	Bethlehem.		Kroonstad.		Lindley.		Reitz.		Total.	
	Census.	Survey.	Census.	Survey.	Census.	Survey.	Census.	Survey.	Census.	Survey.
101–500	411	3	427	11	300	7	475	14	1,613	35
501–1,000	216	9	293	15	184	15	137	6	830	45
1,001–2,000	77	4	139	12	54	6	40	1	310	23
2,001 and over	12	—	39	3	15	2	7	1	73	6
TOTAL	716	16	893	41	553	30	659	22	2,826	109

If the average yield per morgen of the surveyed farms is compared with that of the Census figures, it appears that the surveyed farms are slightly better than those of the four districts as a whole. See Table VIII.

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Chapter II.

THE FARM BUSINESS.

Size of Farm.

There are various measures by which the size of a farm can be determined, the most important of which are—

(*a*) the morgen per farm;
(*b*) capital invested in the business;
(*c*) number and value of live stock;
(*d*) number of labourers employed;
(*e*) number of work animals used on farm; and
(*f*) the total turnover.

(*a*) *Morgen per Farm.*—The system of farming in any region largely depends on the amount of land available. Where an extensive type of farming is followed, as, for instance, in the Orange Free State, it is essential that the farm be fairly large. The average size of the 109 farms was 880·5 morgen; of this, 190·2 morgen, or 21·6 per cent., was in maize, 90·2 morgen, or 10·2 per cent., was in other crops, while 582·9 morgen, or 66·2 per cent., was used for grazing. The remaining 17·2 morgen, or 2 per cent., is included in farmsteads, kraals, dams, orchards, and waste land. (See Table IX.)

Table IX.

Average Size of 109 Farms in the Maize Districts of the Orange Free State for the Crop Year 1927–28.

	Total Morgen of 109 Farms.	Morgen per Farm.	Per Cent. of Total Morgen.
Maize	20,727	190·2	21·6
Other Crops	9,839	90·2	10·2
Grazing	63,540	582·9	66·2
Farmsteads, etc.	1,873	17·2	2·0
TOTAL	95,979	880·5	100·0

An increase in size of farm evidently does not affect the type of farming in the districts to any great extent. The total morgen in maize, the number of animal units * kept, and the capital invested almost increase in direct proportion to the increase in number of morgen per farm—that is to say, it is a larger business of the same type, and not a new kind of farming. (See Table X.)

* The animal units are obtained as follows:—
(*a*) All cattle over a year equal to one animal unit.
(*b*) Two calves equal one animal unit.
(*c*) Seven grown sheep or fourteen lambs equal one unit.
(*d*) One horse equals one animal unit.
(*e*) Four pigs equal one animal unit.
(*f*) One hundred fowls or poultry equal one animal unit.

These units are then totalled.

The animal unit table given above is based on the feed used per animal per annum, and is used to compare the number of live stock kept on different farms.

Table X.

Relationship between Morgen per Farm and Capital, Morgen in Maize and Animal Units per Farm on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Size.	Number of Cases.	Average Morgen per Farm.	Average Capital.	Average Morgen in Maize.	Average Number of Animal Units.
			£		
100–399 morgen	28	268·7	3,528	85·4	161
400–699 morgen	23	547·0	6,909	135·3	135
700–999 morgen	20	844·6	10,311	163·2	170
1,000–1,299 morgen	17	1,033·5	12,440	205·4	198
1,300 morgen and over	21	1,971·9	22,308	404·3	206
Total	109	880·5	£10,494	190·2	172

The fact that the different groups of farms do not follow different systems of farming is also verified in Table XI. With an increase in the size of farms there is also an increase in the morgen in grazing, and if the relationship between the morgen in grazing and the different types of live stock is studied, it will be found that there is a fairly uniform increase in both. The only difference is that the smaller farms are more heavily stocked. Farms, having on an average 125 morgen of grazing, keep one animal unit for every 1·4 morgen; those with 497·3 morgen of grazing, an animal unit per 2·1 morgen, and farms with 1,339 morgen of grazing keep an animal unit per 3 morgen of grazing. On an average there are 2·5 morgen of grazing per animal unit. (See Table XI.)

Table XI.

Relationship between Morgen in Grazing and Number of Cows, Number of Sheep, and Number of Animal Units on 109 *Farms in the Maize Districts in the Orange Free State—Crop Year* 1927–28.

Size, in Morgen.	Number of Cases.	Average Morgen in Grazing.	Average Number of Cows.	Average Number of Sheep.	Average Number of Animal Units.	Average Number of Morgen in Grazing per Animal Unit.
200 and less	25	125·0	11	238	90·2	1·4
201 to 400	25	321·9	22	406	169·0	1·9
401 to 600	19	497·2	24	696	234·0	2·1
601 to 800	17	713·2	27	832	255·0	2·8
801 and over	23	1,339·0	49	1,470	442·0	3·0
Total and Average	109	583·0	26	709	233·4	2·5

(*b*) *Capital per Farm.*—The average capital per farm was £10,494. Of this, £7,054, or 67·2 per cent., was invested in land, and £989, or 9·5 per cent., was in buildings and improvements, which means that 76·7 per cent. was fixed capital. The investment in live stock amounted to £1,950, or 18·6 per cent., while that in equipment was £465, or 4·4 per cent., of the total capital per farm. (See Table XII.)

Table XII.

Average Capital Invested per Farm on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927-28.

Item.	Average Capital Invested on 109 Farms.	Capital per Farm.	Per Cent. each Item is of Total Capital.
	£	£	
Land	768,919	7,054	67·2
Buildings and Equipment	108,912	999	9·5
Live Stock	212,556	1,950	18·6
Equipment	50,648	465	4·4
Feed and Supplies	2,828	26	0·3
TOTAL	£1,143,864	£10,494	100·0

From Table XIII it can be seen that the increase in capital per farm is directly caused by an increase per morgen and not of animal units per farm. The morgen increase from 232·8 morgen, where £2,822 is invested, to 2,163·9 morgen, where £26,783 is invested per farm. In these cases the animal units respectively increase from 152·4 to 210·5 per farm. The capital per morgen, therefore, remains constant, while the capital per animal unit increases. This is a further proof that the increase in morgen is the cause of the increase in capital per farm. (See Table XIII.)

Table XIII.

Relationship between Capital per Farm and Morgen and Animal Units per Farm on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927-28.

Capital.	Number of Cases.	Average Capital per Farm.	Average Morgen per Farm.	Capital Invested per Morgen.	Animal Units.	Capital Invested per Animal Unit.
		£		£		£
£4,000 and less	19	2,822	232·8	12·1	152·4	18·5
£4,001 to £7,000	24	5,827	481·7	12·1	156·4	37·2
£7,001 to £10,000	18	7,972	702·4	11·3	134·9	59·5
£10,001 to £13,000	21	11,212	993·7	11·3	210·6	53·4
£13,001 to £16,000	7	14,253	1,046·4	13·6	146·4	97·4
£16,001 to £19,000	7	17,639	1,575·7	11·2	213·2	82·7
£19,001 and over	13	26,783	2,163·9	12·4	210·5	127·2
AVERAGE AND TOTAL	109	£10,494	880·5	£11·9	171·8	£61·1

(c) *Live Stock per Farm.*—On an average 26 cows, 65 oxen, and 35 other cattle,* making a total of 126 cattle, were kept per farm. Then, there were 610 grown sheep and 198 lambs per farm. The capital invested in cattle amounted to £746 per farm—that is, 38·2 per cent. £1,113, or 51·7 per cent., of the total capital in live stock was invested in sheep.

The farmers were asked to evaluate the live stock according to ruling market prices. In this way, the individual farmers keeping studs or grades could determine the value of the live stock.

* Other cattle includes tollies, heifers, calves, and bulls.

Generally speaking, cattle were of a very poor type, for cows averaged £5. 19s. 2d., oxen £7. 0s. 5d., and other cattle £3. 13s. 2d., while sheep were of a better type, and averaged £1. 12s. 7d. for grown sheep and 12s. for lambs. Horses and mules were valued at £6. 14s. 2d., pigs at £2. 5s. 2d., and poultry at 1s. 3d. each. Details are given in Table XIV.

TABLE XIV.

Average Number and Value of Live Stock on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Kind of Live Stock.	Number per Farm.	Average Value per Head.	Total Value per Farm.	Per Cent. each of Total Value.
Cows	26	£5·96	£157	8·0
Oxen	65	7·02	460	23·6
Other Cattle	35	3·66	129	6·6
Grown Sheep	610	1·63	994	51·0
Lambs	198	0·60	119	6·1
Horses and Mules	8	6·71	56	2·9
Pigs	10	2·26	22	1·1
Poultry	97	1s. 3d.	13	0·7
TOTAL	—	—	£1,950	100 0

(*d*) *Number of Labourers and* (*e*) *Trek Oxen.*—Practically all the oxen found on farms were used for draught work. In two cases mules were employed and in five cases tractors were used.

The 65 oxen were employed to cultivate 190·2 morgen of maize and 90·2 morgen of other crops, that is to say, 40·6 morgen of maize and 19·6 morgen of other crops, or a total of 60·2 morgen were cultivated per span of 14 oxen.

In 46 cases of the 109 farms, Europeans were employed. Most of these labourers received, as wages, a share of the crop. As these conditions were an exception, the number of Europeans per farm cannot be taken as a measure of size. It has been decided to use only the number of natives per farm as such a measure. As extra labour was hired for harvesting and threshing only, it can be considered that it was in proportion to the size of the business. For that reason only the regular farm labour was used as a measure of size. There was an average of 9 natives per farm, which means that 21·2 morgen of maize and 10 of other crops, or a total of 31·2 morgen of crops, were cultivated per native. In addition, there were 3 cows, 7 oxen, and 90 sheep or 26 animal units per native. The relationship between labour cost and other factors will be dealt with in detail at a later stage of this report.

(*f*) *Total Turnover.*—The total turnover includes cash receipts from live stock and products, products used in the house and by labour, and increase of capital. In other words, the total turnover is what the farm produced expressed in terms of money. The average total turnover was £1,931·79. In the system of farming followed in the Orange Free State, the total turnover depends directly on the morgen in maize, the number of animal units, and the capital per farm, and can, therefore, not be utilized as a measure of size.

FARM RECEIPTS.

The cash farm receipts are given in Table XV. On an average the receipts amounted to £1,539·31 per farm. Maize contributed £730·25, or 47·4 per cent., while other crops brought in £70·06, or 5·1 per cent. Maize was the outstanding source of income from crops, while sheep and wool were outstanding as a source of income from live stock.

Receipts from sheep and wool amounted to £493·00, or 32·0 per cent., of the total receipts.

Cattle, milk, and butter contributed £169·00, or 11·0 per cent. (See Table XV.)

TABLE XV.

Cash Farm Receipts on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Item.	Average per Farm.	Per Cent. each Item is of Total.
Maize	£730·25	47·4
Other Crops	78·06	5·1
Sheep and Wool	493·00	32·0
Cattle, Milk and Butter	169·00	11·0
Other Live Stock	48·00	3·1
Miscellaneous	21·00	1·4
TOTAL	£1,539·31	100·0

It is clear that there was a very good balance between the different enterprises on the farms. Crops brought in 52·5 per cent., live stock 46·1 per cent., while miscellaneous receipts * amounted to 1·4 per cent. of the total. Besides £1,539·31 cash receipts per farm, there were other receipts contributed by the farm that should also be included; for example, the products used in the house and by labour. (See Table XVI.)

TABLE XVI.

Products Used in the House and by Labour on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Kind.	Value per Farm.	Percentage of Home Use.	Percentage of Farm Use.
Milk	£25·09	32·5	—
Butter	4·45	5·8	—
Eggs	7·68	9·9	—
Meat	37·57	48·6	—
Grain	2·50	3·2	—
TOTAL (Home Use)	£77·29	100·0	32·7
TOTAL (Use by Labour)	158·88	—	67·3
TOTAL (Used on Farm)	£236·18	—	100·0

The value of products used in the house amounted to £77·29. This does not, however, include the value of fruits and vegetables, except potatoes (which also would amount to several pounds per annum). Of the products used in the house, £37·57, or 48·6 per cent., was for meat, and £25·09, or 32·5 per cent., for milk. The value of products used on the farm was calculated at market value, less costs of marketing. It should, however, be noted that the valuations

* Miscellaneous receipts include those from old implements and bags sold, receipts for work done by the farmer or his natives away from the farm. It does not, however, include receipts from threshing machine or land rent or buildings hired out.

were made by the farmer and not by the enumerator. The £77·29 of products used in the house was 32·7 per cent. of the total farm use. Labour used products to the value of £158·88. The total products used in the house and by labour averaged £236·78.

Finally, the increase in capital should also be added, not only the increase in live stock, but also that of new capital invested in buildings and improvements. The average increase in capital per farm was £155·51. The total receipts per farm was, therefore, as follows:—

Cash receipts	£1,539·31
Products used in the house and by labour	256·20
Capital increase	155·51
TOTAL	£1,951·02

FARM EXPENSES.

The total expenses per farm were £809·90. Of this, labour, including unpaid family labour, amounted to £344·53, or 42·5 per cent.; machinery, £112·57, or 13·9 per cent. Of the machinery costs, £78·71 were for new machinery and £33·86 for repairs. The direct costs on maize were £96·49, or 11·9 per cent., of the total, made up as follows:—Bags and twine, £76·04; threshing bill, £18·10; and seed, £2·35.

The remaining expenses were divided among a large number of items as shown in Table XVII.

TABLE XVII.

Percentage of Each Item of Expense of the Total Expenses on 109 *Farms in the Orange Free State—Crop Year* 1927–28.

Kind.	Average per Farm.	Per Cent. of Total.	Kind.	Average per Farm.	Per Cent. of Total.
Labour	£344·53	43·1	Grain bags and Twine	£76·04	9·5
New Buildings	30·55	3·8	Threshing (Maize)	18·10	2·3
Building Repairs	13·81	1·7	Threshing (other)	2·82	0·3
New Equipment	78·71	9·8	Seed (Maize)	2·35	0·3
Equipment Repairs	33·86	4·2	Seed (other)	12·46	1·6
Veld Hire	18·22	2·3	Transport	5·69	0·7
Feed and Supplies	8·44	1·1	Fertilizer	21·50	2·7
Wire and Fencing	39·90	5·0	Railage	5·28	0·7
Shearing	2·22	0·3	Commission	3·28	0·4
Wool Packs	4·04	0·5	Miscellaneous *	73·40	9·2
Feed Grinding	4·38	0·5	TOTAL	£799·39	100·0

It is clear that the most important item of expense is that of labour. Therefore it is important to analyse this item in greater detail. The expenses on labour are made up from European, native, and unpaid family labour.

Unpaid Family Labour: *Definition.*—If members of the farmer's family help with the work on the farm, they displace other labourers, and although in many cases they receive no remuneration, their labour should be rewarded by the farm. This is important because if such family labour (at ruling rates of pay for Europeans) cannot be paid for by the farm, the farm is inefficiently organized. In Table XVII the unpaid family labour has been included; now in Table XVIII complete labour costs will be found.

* Miscellaneous farm expenses include lesser items such as telephone, wheel tax, binding twine, nuts, etc., which are not of sufficient importance to be specified.

Table XVIII.

Expenses on Labour per Farm on 109 Farms in the Maize Districts of the Orange Free State Crop—Year 1927-28.

Kind.	Cash and Unpaid Family Labour.	Payment in Kind.			Total Value of Labour.	Per Cent. of Items of Total Value.
		Land.	Grazing.	Rations.		
European	£20·96	£47·08	£8·43	£13·44	£89·92	26·1
Native	56·41	64·57	55·84	32·27	209·10	60·7
Unpaid Family Labour	20·56	—	—	—	20·56	6·0
Extra Hired (Native)	24·90	—	—	—	24·90	7·2
Total	£122·83	£111·65	£64·27	£45·71	£344·47	100·0
Percentage Items of Total	31·6	34·5	19·8	14·1	100·0	—

European labour received £110·48, or 32·1 per cent., of the total. Of this amount, £89·92 was paid out in cash and £20·56 was for unpaid family labour. Regular farm help received £209·10, or 60·7 per cent., and extra hired labour (1) £24·9, or 7·2 per cent., of the total expenses on labour. If unpaid family labour is ignored, then £102·27, or 31·6 per cent., of labour costs was cash, £111·65, or 34·5 per cent., from the products (2) of land given to the labourers, and £64·27, or 19·8 per cent., from the value of grazing (3) of live stock of the natives.

Notes.

(1) Extra labour is practically only for help hired with the harvesting and and threshing of maize.

(2) The value of maize produced on the lands given to labourers is calculated at 10s. per bag, which amounts to market value less costs of marketing at approximately 1s. 3d. per bag. The products thus given to the natives by the farm are a cost to the farm on the one hand and a receipt on the other. Because the natives do most of the work on their lands themselves, the income to the farm from this source is calculated at 5s. per bag.

(3) The value of grazing is calculated at the ruling rates at which veld can be hired for the different classes of live stock.

Farm Profits.

Measures of Success.

In a study of this kind it is essential to devise certain measures by which the efficiency of the organization of farms is placed on a comparable basis. There are several measures of this kind, but the following three apparently prove themselves most popular:—

(*a*) *Net Farm Income.*—This is the difference between receipts and all direct expenses. Unpaid family labour and interest on capital are not included under direct expenses. Under the receipts are included only cash receipts, increase of capital, and products used by labour and in the house.

This is the measure by which the social income of the farmer and his family can be determined.

To the difference between the receipts and expenses the cash value of house rent is added and from this figure the interest on borrowed money is

deducted. In this way the standard of living of the different farmers can be compared. Their efficiency as farmers is, however, not comparable.

(*b*) *Operator and Capital Earnings.*—This is the difference between receipts, including products used on the farm, and all expenses, including unpaid family labour. Interest on capital, however, is not regarded as a cost.

Labour conditions are placed on a comparable basis by this measure. The amount arrived at in this way is what the farmer can earn with his particular capital. The efficiency of two farms of different sizes and with a different capital investment cannot be compared.

(*c*) *Operator's Earnings.*—This is the amount left after deducting all expenses, including unpaid family labour and interest on capital, from the total receipts, including products used on the farm.

This is the amount received by the farmer for his time as labourer and operator after all other factors of production, including capital, have been remunerated. It takes into consideration the different sizes of farms, and compares a small farm with a large one as regards the use of different factors. It is, therefore, the best measure known at present to compare different types of farms.

In this case interest on capital was taken at 5 per cent., because it was considered to be the most probable rate for a safe investment. The rate was arbitrarily determined and arguments may be advanced for a higher or a lower rate. The main object was to have a uniform rate of interest in order that the different farms could be compared, even though individual farms may have to pay more for the money they borrow.

The total turnover was £1,931·00, the expenses excluding unpaid family labour £1,013·35, thus the net farm income averaged £917·65. If the unpaid family labour of £20·56 is deducted from the net farm income, it gives an operator and capital income of £897·09, and then if 5 per cent. interest on £10,494, that is, £524·80, is deducted from £897·09, it gives an average operator's earnings of £372·29.

A summary is given in Table XIX.

TABLE XIX.

Summary of Receipts, Expenses, and Profits per Farm on 109 *Farms in the Maize District of the Orange Free State—Crop Year* 1927–28.

Items.		
Cash Receipts	£1,539·31	
Capital Increase	155·51	
Products used on Farm	236·18	
TOTAL RECEIPTS		£1,931·00
Farm Expenses	£778·81	
Live Stock Bought	234·54	
TOTAL EXPENSES		£1,013·35
Net Farm Income		£917·65
Value of Unpaid Labour		20·56
Operators and Capital Earnings		£897·09
Average Capital	£10,494	
Interest on Capital at 5 per cent		524·80
Operators Earnings		£372·29

Factors Influencing the Operator's Earnings.

We have now determined the various sources of receipts and expenditures, and arrived at the operator's earnings, but it is important to decide which factors affected the operator's earnings to the greatest extent during the crop year 1927–1928.

(*a*) *Size of Farm.*—As could be expected where an extensive type of farming is followed, there is a direct relationship between size and operator's earnings. Farms averaging 268·8 morgen had an average operator's earnings of £179·11, those averaging 844·6 morgen £248·65, while those averaging 1,971·9 morgen £887·95. Details in Table XX.

Table XX.

Relationship between Morgen per Farm and Average Net Farm Income and Operator's Earnings on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Morgen per Farm.	Number of Cases.	Average Morgen per Farm.	Average Net Farm Income.	Average Operator's Earnings.
100 to 399.....	28	268·8	£355·86	£179·11
400 to 699.....	23	547·0	597·17	253·83
700 to 999.....	20	844·6	764·05	248·65
1,000 to 1,299.....	17	1,033·5	1,008·24	346·35
1,300 morgen and over.....	21	1,971·9	2,003·24	887·95
Total.....	109	880·5	£898·90	£372·29

There is also a direct relationship between capital invested and net farm income. The net farm income increases from £285·42 to an average of £2,147·30 where the average capital increases from £2,822 to £26,783 respectively. The increase in operator's earnings is not so direct.

Where an average £17,639 was invested per farm, the operator's earnings amounted to £885·86, while with a capital of £26,783, the operator's earnings only came to £808·31. This may be due to over-capitalization. In such a case farms have reached their maximum efficiency and any further investment of capital will not be justified. It is impossible to say at the present stage of the study whether the farms are over-capitalized, for this can only be proved from facts gained in the subsequent years.

Table XXI.

Relationship between Capital per Farm and Net Farm Income and Operator's Earnings on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Capital per Farm.	Number of Cases.	Average Capital.	Average Net Farm Income.	Average Operator's Earnings.
£4,000 and less.....	19	£2,822	£285·42	£144·32
£4,001 to £7,000.....	24	5,827	542·08	250·75
£7,001 to £10,000.....	18	7,972	635·61	276·83
£10,001 to £13,000.....	21	11,212	993·57	410·19
£13,001 to £16,000.....	7	14,253	1,031·70	319·14
£16,001 to £19,000.....	7	17,639	1,767·70	885·86
£19,001 and over.....	13	26,783	2,147·30	808·31

(*b*) *Sources of Income.*—In addition to the size factor mentioned above (*a*), the operator's earnings may also be influenced by the relationship of the various enterprises. For that reason, the relationship between operator's earnings and the percentage of cash receipts from sheep and wool, cattle and maize, and operator's earnings has been calculated. Cattle contributed only 12·0 per cent. of the average cash receipts. The operator's earnings was the highest, namely, £696·75 where the receipts from cattle was 0·7 per cent., while it was only £156·31 where 30·6 per cent. of the income came from cattle. Apparently it did not pay to go in for cattle farming on a commercial scale. Details are given in Table XXII.

TABLE XXII.

Relationship between the Percentage of Cash Receipts from Cattle and Operator's Earnings on 109 *Farms in the Maize Districts of the Orange Free State—Crop—Year* 1927–28.

Per Cent. of Income from Cattle.	Number of Cases.	Average Per Cent.	Operator's Earnings.
2 per cent. and less	16	0·7	£696·75
2·1 to 6·0 per cent	19	4·0	301·89
6·1 to 10·0 per cent	22	8·3	446·95
10·1 to 14·0 per cent	14	11·9	365·00
14·1 to 18·0 per cent	11	16·1	431·18
18·1 to 22·0 per cent	11	19·8	137·18
22·1 per cent. and over	16	30·6	156·31
TOTAL	109	12·0	£372·29

There is a slight negative relationship between operator's earnings and percentage of receipts from sheep and wool. The operator's earnings was £433·89 where 3·8 per cent. was derived from this source, while it was £155·29 where 79·7 per cent. came from sheep and wool.

From Table XXIII, however, it is clear that the operator's earnings are fairly large and constant in cases where 40 per cent. or less of the income was derived from sheep and wool, but much lower where a higher percentage came from that source. The most efficient balance seems to be 20 per cent. or less of the income from sheep and wool. As an average one-third of the cash receipts came from that source.

TABLE XXIII.

Relationship between the Percentage of Cash Receipts from Wool and Sheep and Operator's Earnings on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Per Cent. Income from Wool and Sheep.	Number of Cases.	Average Per Cent.	Operator's Earnings.
10 per cent. and less	9	3·8	£433·89
10·1 to 20·0 per cent	24	15·0	576·04
20·1 to 30·0 per cent	20	24·0	330·06
30·1 to 40·0 per cent	23	34·1	481·61
40·1 to 50·0 per cent	7	46·5	197·71
50·1 to 60·0 per cent	9	55·1	0·56
60·1 to 70·0 per cent	10	68·8	270·60
70 per cent. and over	7	79·7	155·29
TOTAL AVERAGE	109	33·7	£372·29

There exists a strong positive relationship between percentage income from maize and operator's earnings; for instance, where 6·3 per cent. of the income was derived from maize the operator's earnings was—£19·25, and where 52·3 per cent. came from maize it was £467·73, while the operator's earnings amounted to £912·92 where 81·1 per cent. came from maize. (Table XXIV.)

TABLE XXIV.

Relationship between Percentage of Cash Receipts from Maize and Operator's Earnings on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Per Cent. Income from Maize.	Number of Cases.	Average Per Cent.	Operator's Earnings.
14·9 per cent. and less	12	6·3	−£19·25
15·0 to 29·9 per cent.	18	22·3	+288·61
30·0 to 44·9 per cent.	21	38·0	160·05
45·0 to 59·9 per cent.	26	52·3	467·73
60.0 to 74·9 per cent.	19	66·7	425·00
75 per cent. and over	13	81·1	912·92

The operator's earnings was, therefore, influenced to the greatest extent by the size of the farm and the percentage of the cash receipts that came from the sale of maize.

The combined influence of these two factors is given in Table XXV.

TABLE XXV.

Relationship between Size of Farm, Percentage Cash Receipts from Maize and Operator's Earnings on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Size of Farm.		25 Per Cent. and Less.	25·1 to 50 Per Cent.	50·1 per Cent. and Over.
100–399 Morgen	Average Capital	£2,428	£3,395	£3,510
	Operator's Earnings	117·5	192·9	207·9
400–699 Morgen	Average Capital	£8,719	£7,126	£6,805
	Operator's Earnings	243·0	146·4	291·6
700–999 Morgen	Average Capital	£10,195	£8,900	£11,444
	Operator's Earnings	92·2	256·5	516·3
1,000 Morgen and Over	Average Capital	£18,179	£17,108	£17,512
	Operator's Earnings	240·4	165·4	1,442·6

It can be safely concluded that, whatever the size of the farm, an increase in the percentage of income from maize is accompanied by an increase in the operator's earnings—for example, where farms are between 100 and 399 morgen, the operator's earnings is £117·5 where 25 per cent. or less of the income is from maize, while it is £207·9 where 50·1 per cent. comes from that source. Then, again, where farms are 1,000 morgen and over, the operator's earnings is £240·4 with 25 per cent. and £1,442·6 with 50·1 per cent. and over from maize.

As a contrast it will be seen that if 25 per cent. and less of the income is from maize, then the operator's earnings undergoes but a slight change with an increase in the size of the farm, while there is a marked increase in the

operator's earnings with an increase in the size of the farms where 50·1 per cent. of the receipts are derived from maize. It is clear, therefore, that to make a success of extensive farming the business must be carried on on a large scale.

Chapter III.

ANALYSES OF ENTERPRISES.

The farm business as a whole was discussed in Chapter II. In this chapter the different enterprises of the farm will be studied. It should be remembered that the results are based on the findings of one year's figures, and the comparison of the relative profitableness of the different enterprises is only applicable to the crop year 1927–28. For that reason, too, the profits of the various live stock enterprises are only gross profits, as interest on capital, invested in the different enterprises, is not deducted.

Because the maize enterprise is the most important and will require a more detailed analysis, the other enterprises will first be dealt with briefly, starting with the least important type of live stock. Crops will then be dealt with in the same order.

Live Stock.

Table XVII showed that 46·1 per cent. of the total cash receipts per farm was derived from live stock. Sheep contributed 32·0 per cent., cattle 11·0 per cent. and all other live stock including horses, pigs, and poultry 3·1 per cent. of the total.

Horses.—Horses, mules, and donkeys are all dealt with under one heading, because there were only a few farms on which either mules or donkeys were found. Horse-breeding cannot be regarded as a definite enterprise on any of the farms visited. On an average, there were 8 horses per farm, valued at £55·79, that is to say, approximately £7 per horse. Even if purchases are not deducted from sales, the income from horses amounted to only £8·4 per farm. As the market is at present, horse-breeding is only profitable under exceptional conditions. It is quite probable that the number of horses kept would have been reduced still further if the farmers could find buyers.

Pigs.—Taking cash receipts only, pigs could be regarded as a more important enterprise than poultry, but they do not supply as much to the house as poultry.

On an average 10 pigs of all sizes valued at £2·226 each were found per farm. They produced £20·42 in cash, and supplied meat to the house valued at £2·06 per year, that is to say, a total of £22·48. (See Table XXVI.)

Table XXVI.

Number and Value of Receipts from Pigs on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Number of Pigs.		Value of Pigs.			
Total.	Per Farm.	Per Farm.	Slaughtered.	Sold.	Total Used on Farm and Sold.
1,073	10	£22·26	£2·06	£20·42	£22·48

A pig consumes approximately 4 bags of maize (or the equivalent of maize) from the day it is born until it is marketable.*

As maize prices were in 1928 the cost of feeding can be taken at £2.

As feeding costs are taken to be 80·0 per cent. of the total costs of raising pigs, the total cost will be £2·5 per pig. If this is deducted from the receipts it will leave a gross profit of £19·98 or £2 per pig per year.

Poultry.—All kinds of poultry, such as fowls, turkeys, geese and ducks, are included under this heading. The reason for this general heading is that fowls were practically the only important poultry found on the visited farms. In only two cases poultry was kept on a commercial scale.

In the following discussion it was therefore assumed that the treatment of poultry was that of the ordinary farm flock.

Table XXVII.

Number and Value of and Receipts from Poultry on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

No. of Poultry.	No. per Farm.	Value per Farm.	Receipts from Poultry per Farm.				
			Home Use.		Sales.		Total.
			Value of Eggs.	Value of Meat.	Value of Eggs.	Value of Meat.	Per Farm.
10,613	97	£12·51	£7·68	£1·26	£15·40	£3·99	£28·23

On an average, 97 head of poultry, valued at £12·51, were kept per farm. Poultry products produced per farm valued £28·23. Of this amount £7·68 was for eggs used in the house and £15·40 for eggs sold. On an average 187 dozen eggs were used in the house and 279 dozen sold. The average price received for eggs per annum was 1s. 2d.; but eggs used in the house was valued at 10d. per dozen. The average production per fowl per annum was 57 eggs. Under meat is included cockerels sold and slaughtered. This item amounted to £5·51. The 97 figure is the average derived by taking the number of grown fowls at the beginning and at the end of the year.

† If it is accepted that a fowl eats 2 ounces of maize or the equivalent of maize, then the grown fowls used 22 bags of maize during the year. At 10s. a bag this amounts to £11·0. Feed is regarded as about 80·0 per cent. of the cost of keeping poultry. The total costs, if incubation eggs and the raising of chickens are excluded, amounted to £13·75 per annum. This cost, deducted from the total value produced, will give an income on poultry of £14·5 for the 97 or £14·95 her hundred.

Cattle.—It would have been better if the cattle enterprise could have been sub-divided into dairy farming, trek oxen and slaughter oxen, but it was impossible to sub-divide the costs and consequently cattle are all dealt with under one heading. (See Table XXVIII.)

* The estimate of the cost of feeding a pig was made after an interview with an officer of the Division of Veterinary Services.

† The estimate of the costs were made after an interview with J. J. Jordaan, Principal Poultry Officer in the Department of Agriculture.

Table XXVIII.

Number and Value of and Receipts from Cattle on 109 *Farms in the Maize District of the Orange Free State—Crop Year* 1927–28.

Per Farm.	Slaughtered.	Sold.	Value of Live Stock Products.				Total Receipts.
			Home Use.		Sales.		
			Milk.	Butter.	Cream.	Butter.	
£566·92	£6·13	£136·63	£25·09	£4·45	£25·86	£8·70	£206·86

The total capital invested in cattle amounted to £566·92 per farm. Of this £368·12 was in oxen. The cash receipts from cattle were as follows:—£136·63 for cattle; £25·86 for cream and £8·70 for butter sold, that is to say, a total of £171·19. The value of products used by the house amounted to £35·67, of which £6·13 was for cattle slaughtered, £25·09 for milk and £4·45 for butter. The value of ox labour on maize alone was calculated to be £121·2. This was 82·8 per cent. of the total value of ox labour. The total value of ox labour was therefore calculated to be £146·38 and the total value of cattle and cattle products therefore amounted to £353·24.

* As the feed used cannot be accurately determined, it is very difficult to calculate the costs for the live stock enterprise. For oxen alone the costs amounted to 24s. for grazing and 18s. for feed, or a total of 42s. per head per annum. The total animal units in cattle was 120. If the basis of 42s. for feed as calculated for oxen is applied to this figure, then the total expenses will amount to £252·00.

The gross profit before deducting interest on capital will be £103·56.

Sheep.—In the area under discussion, sheep-farming and maize-growing go hand in hand. Sheep contributed 32·0 per cent. of the total cash receipts.

A total capital of £1,113·25 was invested in sheep. The total value produced by sheep was £521·55, made up as follows:—Sheep, £149·16; wool, £329·26; and skins sold, £15·01, while products used in the house amounted to £28·12. (See Table XXIX.)

Table XXIX.

Value of Sheep and Sheep Products Used on Farm and Sold on 109 *Farms in the Maize Districts of the Orange Free State—Crop Year* 1927–28.

Value per Farm.	Cash Receipts.			Value of Sheep Slaughtered.	Total Value Received from Sheep.
	Sheep.	Wool.	Skins.		
£1,113·25	£149·16	£329·26	£15·01	£28·12	£521·55

Grazing of sheep was valued at £1·0 per hundred per month, and as there were 610 grown sheep per farm, the total cost of grazing amounted to £73·2 per annum. In addition to the grazing, sheep were fed on oats and maize lands. The value of the maize lands is calculated at £1. 10s. per hundred per month for two months, that is, £18·0, while the value of oats was calculated

* *N.B.*—These costs are an approximation, and not derived from accurate data.

at £2·0 per morgen for 19 morgen, that is, £38·0. The total feed value, therefore, amounts to £129·2. Wool packs cost £4·04 per farm. If all other costs, including shearing and transporting of wool and the hire of a herd boy, are taken at £15·0 per farm per annum (which is perhaps a little too high), then the total expenses will amount to £148·24. The gross profit on sheep per farm amounts to £373·31.

Summary of Live Stock.—Without deducting interest on capital and purchases of live stock, and before including the increase in live stock, the gross profits of the different live stock enterprises were as follows:—

Poultry, £14·95; pigs, £19·98; cattle, £103·56, and sheep, £373·31. Poultry shows the smallest profit, but if capital invested were taken into account this enterprise will not compare so unfavourably with the others. As subordinate sidelines both poultry and pigs would be very useful on nearly all, but especially on the smaller farms. They would form sources of monthly incomes which ought to prove very valuable to the farmer and his family to tide them over the long months of waiting for the income from the chief enterprises, namely, maize and wool. They may prove very useful sidelines, but not necessarily useful commercial enterprises.

Crops.

Table XV showed that crops contributed 52·5 per cent. of the total cash receipts. If we analyse crops, however, it is seen that practically all the cash receipts from crops are contributed by maize and that the rest are grown chiefly for feed for sheep.

Maize occupied 75·8 per cent. of the total morgen in crops, oats 9·8 per cent. and teff 6·2 per cent. Maize, however, contributed 90·8 per cent. of the total cash receipts while oats contributed only 1·5 per cent. and teff 0·9 per cent.

Excluding vegetables and fruit, there are twelve principal and a few minor crops, such as sunflower seed, artichokes, saltbush, etc. From only seven of the twelve major crops cash was received, namely, from maize, wheat, oats, potatoes, teff, kaffir corn and cowpeas. These facts are only mentioned in order to bring out the importance of the maize enterprise. (See Table XXX.)

Table XXX.

Percentage of Total Receipts from Crops Derived from Different Kinds of Crops on 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Crop.	Morgen per Farm.	Per Cent. of Total.	Value.	Per Cent. of Total.
Maize	190·2	75·8	£729·30	90·8
Wheat	8·1	3·2	36·78	4·6
Oats	24·7	9·8	11·77	1·5
Potatoes	0·4	0·2	9·74	1·2
Teff	15·6	6·2	7·03	0·9
Kaffir Corn	0·4	0·2	2·13	0·3
Cowpeas	1·9	0·8	0·99	0·1
Rye	3·6	1·4	0·21	—
Hay	2·4	1·0	—	—
Manna	1·0	0·4	0·21	—
Barley	0·7	0·3	—	—
Lucerne	0·4	0·1	—	—
Fruit and Vegetables	1·3	0·5	5·21	0·6
Other Crops	0·3	0·1	—	—
Total	251·0	100·0	£803·37	100·0

Because crops other than maize formed such a small source of cash receipts and also because they did not play a part in any definite system of crop rotation, no attempt was made to determine their profitableness and no detailed analysis will be made of them. Only a few of the most important will be mentioned here.

Wheat.—Wheat, the second highest contributor in cash receipts, was mainly grown in Bethlehem and Reitz districts. This shows that as the precipitation east of Kroonstad increases slightly, there is a slight change in the system of farming. As there were on an average only 8·1 morgen per farm in wheat and only £36·78 was received from it, no importance can be attached to this crop.

Oats.—Even though only £11·77 was received in cash from this crop, still it was of much greater importance to the system of farming followed in the region than wheat. Oats is mainly used to carry lambing ewes during the latter part of the winter. In years of early rainfall, the ewes are taken from the oats and placed on the veld at an early date, and a crop of oats is reaped. The greatest value of oats, therefore, is not in the form of cash, but as a feed.

Potatoes.—Only a few farms, mostly in Lindley and Reitz districts, grow potatoes on a commercial scale, and even there it only plays a minor part.

Kaffir Corn.—This crop occupies on an average less than half a morgen per farm and it is unnecessary to discuss it.

Feed Crops.—The other crops such as teff, rye, manna, hay, and lucerne were almost exclusively grown for feed.

Maize.

Maize, the main enterprise, contributed 47·4 per cent. of the total cash receipts (see Table XV) or 90·8 per cent. of the cash received from crops (Table XXX). There were 190·2 morgen in maize per farm. From this it is clear that maize is easily the most important enterprise.

Table XXIV showed that maize exercised a great influence on operator's earnings. For that reason a more detailed analysis is made of this enterprise under the headings of production and marketing.

*Production.**

The average morgen in maize per farm was 190·2 and the total production was 1,516 bags, an average of 8·0 bags per morgen per farm.

The total costs of producing 1,516 bags of maize per farm was £594·2 or 7s. 10d per bag, and the cost per morgen was £3·12s. The profit on maize per farm was £373·2, that is, 4s. 11d. per bag or £1·97 per morgen of maize.

The cost of production is made up of various items, of which the most important are £121·2, or 20·1 per cent. for ox labour, £116·9 or 19·7 per cent. for human labour, £92·8 or 15·6 per cent. for land rent, £89·8 or 15·1 per cent. for equipment and £75·0 or 12·6 per cent. for bags.

These items are of such great importance that they will be discussed in detail.

* For the analysis of the business as a whole 109 cases were included—for the maize enterprise complete details were received from 107 farms only. The figures in regard to morgen in maize and total yield will, therefore, not agree accurately with those in the preceding tables.

Table XXXI.

Summary of Expenses on and Receipts from Maize per Farm on 107 Farms in the Maize Districts of the Orange Free State—Crop Year 1927-28.

Expenses			Receipts.		
Item.	Amount.	Per Cent. of Total.	Item.	Amount.	Per Cent. of Total.
Labour—General	£116·9	19·7	Maize Sold	737·4	75·2
Labour—Harvesting	23·9	4·0	Maize Used	124·0	12·6
Threshing	18·0	3·0	Bags Sold	1·5	0·2
Seed	12·4	2·1	Stalks	90·0	9·3
Bags	75·0	12·6	Miscellaneous	14·5	1·5
Twine	0·9	0·2			
Fertilizer	15·3	2·6			
Transport	6·0	1·0			
Ox Labour	121·2	20·4			
Equipment	89·8	15·1			
Land Rent	92·8	15·6			
Miscellaneous	22·0	3·7			
TOTAL	£594·2	100·0	TOTAL	£967·4	100·0
Gain per Farm	£373·2		Cost per Bag	7/10	
Morgen per Farm	190·2		Gain per Morgen	£1·97	
Bags Produced	1,516		Gain per Bag	4/11	
Cost per Morgen	£3·128		Yield per Morgen	8·2 bags.	

*Human Labour.**—Human labour is made up as follows:—The average cost of labour given in Table XVIII is divided by the number of days of labour available to obtain the rate per diem. The available days of labour, again, are obtained by multiplying the number of labourers employed on the farm during the year by 300. This is done because it is accepted that each labourer should be able to do 300 days of work per annum. The rate is then multiplied by the number of days worked on maize. Details of the days worked are given in Table XXXII. Each step in the production of maize was obtained to make this calculation.

Table XXXII.

Work on Maize on 97† Farms in the Maize Districts of the Orange Free State—Crop Year 1927-28.

Items.	Man Work Units.		Items.	Man Work Units.	
	Per Farm.	Per Morgen.		Per Farm.	Per Morgen.
Ploughing	191·7	1·02	Harrowing (after Planting)	71·0	0·36
Discing	13·7	0·07	Weeding	94·1	0·50
Harrowing (before Planting)	5·6	0·03	Cultivating	137·2	0·74
Cultivating	3·1	0·02	Harvesting and Carting out	662·9	3·66
Fertilizing	2·3	0·01	Threshing	82·0	0·44
Planting	53·5	0·28	Transporting	60·9	0·33
			TOTAL (Man Work Units)	1,400·0	7·46

* The time of the farmer as operator is not included under the costs of labour. Where he did manual labour the costs are included at the rate of European labour for the region.

† Only 97 records have complete labour figures.

The total number of days spent on the cultivation of maize was 7·46, of which harvesting and carting out occupied most of the time, namely, 3·66 days per morgen. It took 1·02 man work units to plough a morgen. More time, therefore, was spent in harvesting, threshing and marketing than on the cultivation beforehand. Therefore it is of great importance to give attention to the economical use of labour as far as the gathering of the crop is concerned.

Ox Labour.—The value of grazing, of feed, depreciation and interest on capital invested in oxen, are added to obtain the value of ox labour. First of all the total labour on all crops was found, and then the portion that maize was of this total was calculated, and multiplied with the costs. The total costs of ox labour was £146·37, of which 82·8 per cent. was spent on maize.

Equipment.—The value of new implements, repairs, depreciation and interest at 5 per cent. on capital invested in equipment, were added to obtain the cost of equipment. The percentage to be borne by maize was calculated on the basis of ox labour.

Rent of Land.—Some people maintain that rent of land should not be included as a cost in the production of a crop, but since it has been accepted that the farm should pay 5 per cent. interest on capital (if it is to be considered a success) it is absolutely essential that each enterprise should contribute its part of the interest. If rent of land is not included as a cost the total costs per morgen will be £2·636 instead of £3·128, or 6s. 7d. instead of 7s. 10d. per bag.

Bags.—The cost of bags depends on the size of the crop and no further discussion of this important item will take place here.

Other Costs.—The items mentioned above amount to 83·4 per cent. of the total costs of producing maize. The rest, namely, 16·6 per cent., are made up of various other items shown in Table XXXI.

Receipts.

Stalks.—The only item that needs to be explained here is stalks. The value of stalks as feed for live stock is calculated here, and the time of grazing in stalks multiplied by the value per head per mensem. This gives the total value.

Profits.

The profits per farm were £373·2, the profit per morgen, if rent on land is included, was £1·97 and that per bag 4s. 11d.

The profits, of course, depend on various factors such as the following:—

Yield per Morgen.—This is the factor that has the largest influence on profit per morgen or per bag. The relation between yield per morgen and profit is shown in Table XXXIII.

TABLE XXXIII.

Relationship between Yield per Morgen and Profit per Morgen on 107 Farms in Maize Districts of the Orange Free State—Crop Year 1927–28.

Yield per Morgen.	No. of Cases.	Average Yield per Morgen.	Total Cost per Morgen.	Profit per Morgen.
		Bags.		
3·9 bags and less	12	2·7	£2·58	— £0·30
4·0 to 5·4 bags	19	4·8	2·80	+ 0·54
5·5 to 6·9 bags	11	6·2	2·63	1·19
7·0 to 8·4 bags	19	7·8	3·19	1·89
8·5 to 9·9 bags	13	9·1	3·69	2·12
10·0 to 11·4 bags	10	10·4	4·72	0·62
11·5 to 12·9 bags	9	12·1	3·54	3·66
13 bags and over	14	14·3	4·84	4·24

Since the cost of labour during harvesting and threshing, the threshing bill and bags together make up 19·6 per cent. of the total cost of producing maize, the fact that the total costs increase with an increase in yield, is self evident. The profits per morgen, however, increase more than the costs. Where the average yield was 2·7 bags, there was a loss of £0·30 per morgen: where the yield was 7·8 bags there was a profit of £1·89 per morgen and where the yield was 14·8 bags the profit was £4·24 per morgen.

Table XXXIV shows that high costs per bag are accompanied by a low yield per morgen and a small profit per bag.

TABLE XXXIV.

Relationship between Cost per Bag and Yield per Morgen and Profit per Bag on 107 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

Cost per Bag.	No. of Cases.	Average Cost per Bag.	Average Yield per Morgen.	Profit per Bag.
£0·28 and less	9	£0·25	11·3	£0·36
£0·29 to £0·32	15	0·31	10·1	0·31
£0·33 to £0·37	19	0·35	11·2	0·27
£0·38 to £0·42	17	0·39	9·0	0·23
£0·43 to £0·47	8	0·45	7·6	0·26
£0·48 to £0·52	12	0·51	5·7	0·16
£0·53 to £0·57	6	0·56	5·8	0·15
£0·58 to £0·62	8	0·61	5·0	— 0·02
£0·63 and over	13	1·06	4·3	0·18

It will be noticed that where the cost per bag was £0·25 (5s.), the yield per morgen averaged 11·3 bags, which gave a profit of £0·36 (7s. 2d.); with the cost per bag £0·51 (10s. 2d.), the yield per morgen was 5·7 bags and the profit £0·16 (3s. 2d), while with costs of £1·06 (£1. 1s. 2d.), the yield per morgen was only 4·3 bags.

Since a large part of the costs of cultivation of maize, as, for example, ploughing, planting, cultivating, seed, fertilizing, rent of land, etc., remain the same, it is clear that a larger production per morgen will reduce cost per unit. In addition to the factor mentioned above the profit per bag depends on the price per bag.

Marketing.

The idea here is to discuss which part of the yield was sold from the farm and which part through co-operative channels and not to analyse the various methods of marketing and their advantages.

Table XXXV shows that 6·8 per cent. of the total production was used on the farm and 10·2 per cent. by labour, which gives a total of 17·0 per cent., so that 83·0 per cent. of the production was sold.

The total number of bags of maize sold by the 109 farms was 136,763. Of this number 36,723 bags, or 26·9 per cent., was sold through co-operative societies and 100,040 bags, or 73·1 per cent., to private dealers. For the crop year 1927–1928 the farmers who sold through co-operative societies received 12s. 1d. net per bag while the others received 11s. 6d. Certainly not all the farmers who sold through private dealers received less, but it shows clearly that for that particular year members of the co-operative societies gained.

TABLE XXXV.

Maize Used on the Farm and Sold from 109 Farms in the Maize Districts of the Orange Free State—Crop Year 1927–28.

	Total Yield.	Farm Use.	Labour Use.	Sold.	Price.	Total Value.	Per Cent. Marketed in Different Ways.
Through Co-operative Societies..	44,237	2,880	4,634	36,723	12/1	£22,180·7	26·9
Non-Co-operative	120,519	8,299	12,180	100,040	11/6	57,454·1	73·1
TOTAL.....	164,756	11,179	16,814	136,763	—	£79,634·8	100·0
Per cent total marketed and used	100·0	6·8	10·2	83·0	—	—	—

CHAPTER IV.

COMPARISON BETWEEN SUCCESSFUL AND UNSUCCESSFUL FARMS WITH ALL FARMS.

In the former chapters the figures are based on the averages for all farms. The individual farm was not discussed, but in this chapter we wish to give the farmers, who so courteously helped the officers by taking part in the investigation, a chance to compare their own businesses with the averages of the ten most and ten least successful farms and with the median of 109 farms. In this way they will be able to measure the success of their own enterprises.

SUCCESSFUL AND UNSUCCESSFUL FARMS.

The average figures of the ten most and ten least successful farms, the figures for the median case and also the average for all farms will be found in Table XXXVI. The *Operator's Earnings* of the successful farms was £1,861, that for all farms £372, and for the least successful minus £339.

Although the most successful farms were twice as large as the least successful ones, the low operator's earnings cannot be due solely to this factor, because it was found that the average for all farms was only 63 morgen more than that of the unsuccessful farms while the operator's earnings was £711 more for the average of all farms than for the unsuccessful group.

The main cause of success seems to be the relationship between the percentage of the cash receipts from maize, sheep and wool, and cattle. The successful farms, for instance, received 63·7 per cent. of their cash receipts from maize, 23·5 per cent. from sheep and wool and 4·5 per cent. from cattle; the average of all farms received 45·5 per cent. from maize, 33·7 from sheep and wool and 12 per cent. from cattle; while the least successful farms show 29·6 per cent. from maize, 42·8 per cent. from sheep and wool, and 11·9 per cent. from cattle.

It is clear, therefore, that for the year of this study, a large percentage of receipts from maize go hand in hand with a larger operator's earnings. Compare this with Table XXV, page 26.

The percentage of the cash receipts from maize, again, was influenced by the morgen in maize and the yield per morgen. The ten most successful farms had 505 morgen in maize and produced 10·7 bags per morgen. The least successful farms had only 152 morgen in maize and produced 5 bags per morgen. On account of the larger unit and the better yield the cost of production per bag was much lower, namely, 5s. 11d. for the successful than for the unsuccessful farms, whose cost averaged 16s. per bag. The cost of production per morgen did not show a great difference for the successful and

unsuccessful farms. In other words, the total cost of production remains approximately constant whatever the size of the crop. The farms with a high yield consequently divide the costs by a greater number of units which result in a lower cost per unit.

TABLE XXXVI.

Comparison between 10 Farms with the Largest and the 10 Farms with the Smallest Operator's Earnings and the Average for 109 Farms.

Items.	Average of most Successful Farms.	Average of least Successful Farms.	Average of 109 Farms.	Median of 109 Farms.
Morgen per Farm	1,623	818	880	752
Morgen in Maize	505	152	190	139
Morgen in Grazing	982	566	583	459
Number of Oxen	122	48	28	45
Number of Cows	32	27	18	19
Number of Grown Sheep	1,188	565	709	561
Number of Pigs	11	7	10	4
Number of Poultry	87	107	97	85
Number of Animal Units	405	198	233	199
Capital per Farm	£17,714	£10,188	£10,194	£7,932
Cash Receipts	£4,013	£946	£1,530	£1,127
Cash Expenses	£1,588	£713	£799	£598
Operator's Earnings	£1,861	— £339	£372	£243
Per Cent. Receipts from Maize	63·7	29·6	45·5	46·9
Per Cent. Receipts from Sheep	23·5	42·8	33·7	30·7
Per Cent. Receipts from Cattle	4·5	11·9	12·0	9·7
Yield per Morgen	10·7	5·0	8·0	7·8
Man Work Units per Morgen	3·6	7·7	7·5	7·0
Cost per Morgen Maize	£3·026	£3·606	£3·381	£3·060
Gain per Morgen	£3·729	£1·19	£1·97	£1·78
Cost per Bag	5/11	16/0	7/10	8/0
Gain per Bag	6/11½	0/7	4/11	4/7

FACTORS OF ALL FARMS.

The figures of the 109 farms included in the study are given in Appendix I. The factors which were considered to be of influencing importance are arranged in descending order of size.

For each of the individual farmers, who took part in the investigation, the report will be sent with his special figures marked. By this means he will be able to compare his own business conditions with that of other farms. For example, it will be important to range high up in the following factors, namely:—

(*a*) Morgen per farm;
(*b*) morgen in maize;
(*c*) total receipts;
(*d*) percentage income from maize; and
(*e*) yield per morgen of maize;

while he should be low in—

(1) total expenses;
(2) per cent. income from cattle;
(3) man work units per morgen in maize; and
(4) total production costs per morgen.

The factors mentioned above will cause a high operator's earnings and a large profit per morgen and per bag. In addition to the above-named factors, it appears that a small number of oxen and cows also favourably affect operator's earnings.

It should be stressed that these figures are for one year, which happened to be unfavourable, only. If any individual's figures are unfavourable, he should note in what respects the mentioned factors are too high or too low, and satisfy himself as to the cause.