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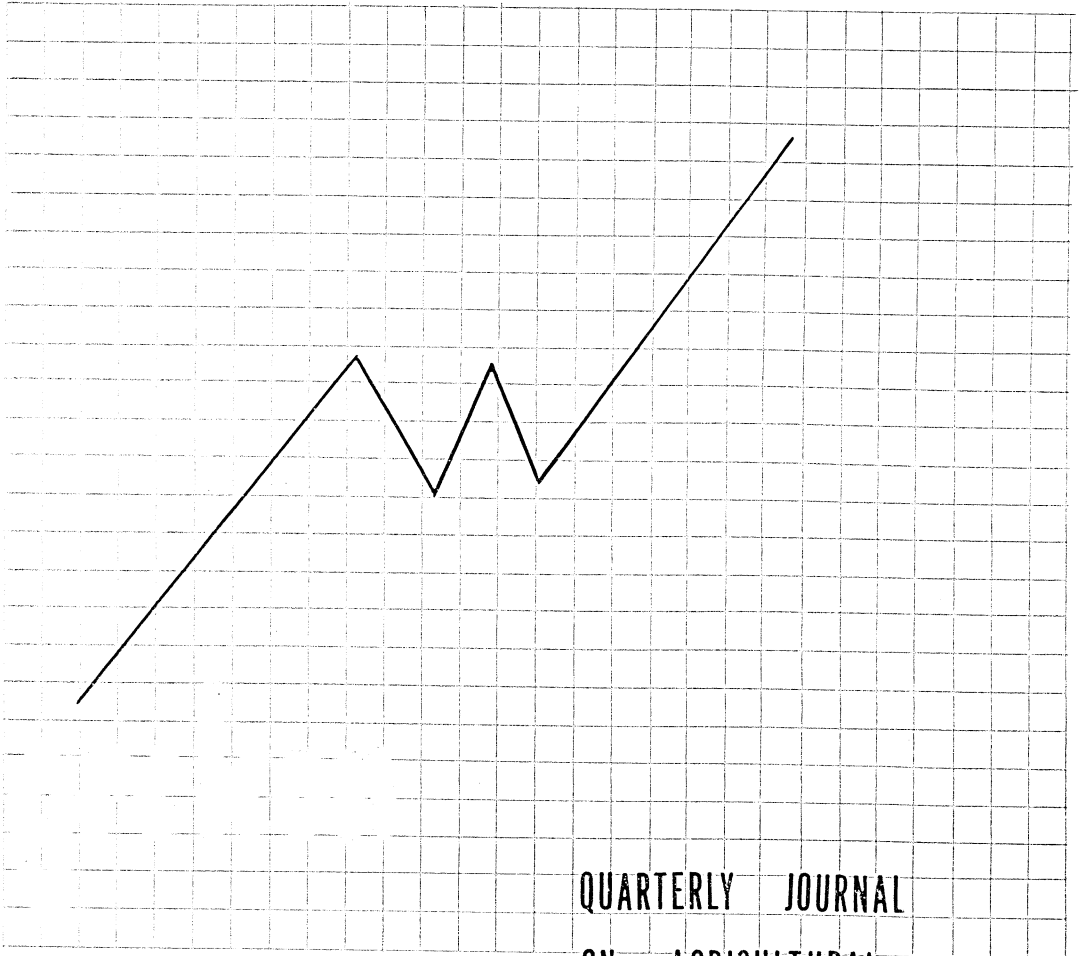
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Deserving articles in the field of agricultural economics, for publication in this journal, will be welcomed.

These articles should have a maximum length of 10 folio pages (including tables, graphs, etc.), typed in double spacing. All contributions should be submitted in triplicate (preferably in both languages) to the editors, c.o. Department of Agricultural Economics and Marketing, Pretoria, and should be received by the editors at least one month prior to publication date.

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# The Effects of the Changes in the Structure of Wheat Farming on the Production Cost of Wheat

by A.B.C. Nel, Chief Professional Officer, and J.C. Strydom,  
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Since the cost survey for the three seasons 1947/48 to 1949/50, in the Swartland and Rûens regions, farm management in these two regions changed materially. These changes affected the cost structure of wheat production to a marked degree and, in order to determine the extent of this influence, an overall cost and management survey, covering the seasons of 1959/60 and 1960/61 for these two regions, was undertaken.

In this recent survey, the methods of survey and calculation, used in the 1947/48 to 1949/50 surveys, are largely adhered to; the results of the two surveys are therefore comparable.

The main changes in the farming structure are the following:-

## (a) Use of land

In the Swartland cultivation of especially lupines, and in the Rûens region especially lucerne, as rotational and fodder crops, increased substantially since the previous survey. This development not only influenced the carrying capacity of farming, but also contributed to a change in the system of rotation cropping. The area sown as against fallow land, etc. changed appreciably, as indicated in Table 1.

According to the latest survey, there are at present less "ouland" and fallow land for each morgen under wheat than was the case in the past. Land under cultivation rests therefore for shorter periods than before.

## (b) Number of Livestock

The cultivation of lupines and lucerne contributed to the fact that farmers were able to keep more livestock on their farms; notwithstanding the fact that the area of "old" and fallow lands decreased, and with that the grazing facilities on these lands. The number of large-stock units per farm, as indicated by the survey, were as shown in Table 2.

Table 1

	1947/48-1949/50 survey		1959/60-1960/61 survey	
	Area per farm	Percentage of total farm area	Area per farm	Percentage of total farm area
<u>Swartland:</u>	Morgen	%	Morgen	%
Wheat	204	29	220	28
Other crops	58	8	59	7
Lupines	0	0	123	15
Fallow land	240	35	171	22
"Ouland"	112	16	49	6
Lupines "ouland"	0	0	12	1
Total lands	614	88	634	79
Total farm area <sup>1)</sup>	694	100	803	100
<u>Rûens:</u>				
Wheat	178	22	197	23
Other crops	102	13	107	13
Lucerne	-	-	73	9
Fallow land	208	25	181	22
"Ouland"	95	12	38	5
Total lands	583	72	596	72
Total farm area	813	100	827	100

- 1) Since the previous survey, the western border of the region was changed by including "sandveld" farms, which are generally larger than other farms in the Swartland. This is the main reason why the farms, included in the latest survey, are on the average larger than those in the old survey.

Table 2

	Number of large-stock units per farm			
	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
Cattle	33	42	13	18
Sheep	54	112	71	117
Pigs	10	12	3	3
Draught animals	14	-	5	-

Expressed per 100 morgen farm, in order to eliminate the change in farm sizes, the number of sheep in the Swartland increased by 80 per cent and cattle by 18 per cent. In the Rûens region sheep numbers (per 100 morgen farm) increased by 64 per cent and cattle by 57 per cent. As a result of further mechanisation since the previous survey, the use of draught animals largely disappeared.

(c) Mechanisation

The increase in mechanisation in the two regions, since the previous survey, are shown by comparing the numbers of tractors, lorries and auto-combines per farm (see Table 3).

Table 3

	Average per farm			
	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
Motors	.96	1.08	.94	1.00
L.D.V. 1)	-	.60	-	.77
Lorries	.50	.56	.85	.74
Tractors	1.64	2.80	1.97	2.50
Auto-combines	.11	.88	.17	.78

1) In the previous study, light deliveries (L.D.V.) has been classified as motorcars, owing to their limited numbers.

Since the previous survey, the increase in mechanisation has mainly been in the harvesting process. This can be seen from the number of auto-combines, which increased by 700% in the Swartland and 360% in the Rûens. The increase in tractor numbers was 71% in the Swartland and 27% in the Rûens. The reason for the smaller increase in the numbers of tractors and combines in the Rûens is that, at the time of the previous study, the farming system in that part was further developed than in the Swartland.

(d) Labour

Despite the increase in mechanisation, the number of non-European labourers per farm in both regions increased since the previous survey. This is the result of an increase in the volume of production and general farming activities. European labourers, however, decreased, as can be seen from Table 4.

Table 4

Type of labour	Number of labour units* per farm			
	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
European	0.49	0.28	0.39	0.13
Labourers (adult)	3.76	4.10	2.26	2.88
Piccanins	0.62	0.59	0.06	0.09
Seasonal labour	0.33	0.72	0.49	0.74
Natives		0.61	-	0.10

\* One labour unit = one labourer who worked for 300 days.

In general the number of labourers per farm in the Swartland is higher than in the Rûens, chiefly because the farming system in the Swartland consists of more enterprises than that in the Rûens. There was a substantial increase in the use of seasonal labour in both regions, most probably due to the increase in farming activities.

#### Financial results

Besides the changes in farm organisation, important farming practices such as fertilisation, cultivation and livestock feeding have also shown appreciable improvement. For instance, the yield of wheat per morgen increased from an average of 7.38 bags to 8.98 bags in the two regions.

The collective influence of all these factors is an increase in physical volume of production per farm of 45% in the Swartland and 32% in the Rûens.

The gross farm income as well as expenses increased substantially in both regions, as can be seen from Table 5.

Table 5

	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
	R	R	R	R
<u>Income from:</u>				
Wheat	5,948	9,580	4,814	9,472
Livestock	3,130	8,009	2,772	5,260
Other	512	1,277	1,256	1,062
Total income	9,590	18,866	8,842	15,794
Costs	5,490	12,528	4,484	8,812
Net farm income	4,100	6,338	4,358	6,982
Interest on capital (5%)	1,650	3,476	1,630	3,356
Operator's earnings	2,450	2,862	2,728	3,626

Notwithstanding rising farm costs, the net farm income increased materially. The capital investment per farm has more than doubled, so that operator's earnings (i.e. after 5% interest on capital has been subtracted) showed but a slight improvement.

The higher valuation of land was mainly responsible for the increase in capital, as is obvious from Table 6, indicating average capital investment per farm in land, improvements, implements and livestock.

Table 6

	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
	R	R	R	R
Land	17,024	37,746	17,924	42,142
Fixed improvements	6,620	12,034	5,834	7,882
Machinery and implements	5,310	11,538	5,560	10,826
Livestock	4,060	9,862	3,476	7,136
Total per farm	33,014	71,180	32,794	67,986

The cost of production of wheat

The average net production costs of wheat (including interest), according to the previous survey in the Swartland and Rûens, were R3.07 and R3.04 respectively. Similar figures for the latest survey are R3.96 and R3.83 for the Swartland and Rûens respectively. The following is a summary of the cost results as derived from the two surveys:-

Table 7

	Swartland		Rûens	
	1947/48- 1949/50	1959/60- 1960/61	1947/48- 1949/50	1959/60- 1960/61
	R. per bag	R. per bag	R. per bag	R. per bag
Gross cost	2.86	3.56	2.72	3.42
Less credits	.22	.17	.17	.16
Net cost	2.64	3.39	2.55	3.26
Interest on land	.43	.57	.49	.57
Net cost with interest on land	3.07	3.96	3.04	3.83
Yield per morgen (bags)	7.5	8.8	7.1	9.3

Notwithstanding notable increases in the prices of production requirements since the previous survey, the cost per bag in the Swartland and Rûens increased by only 89 and 79 cents, respectively. The cost per morgen increased from R23.09 to R34.66 in the Swartland, and from R21.51 to R35.54 in the Rûens.



The relative small cost increase can be attributed to a higher yield per morgen and changes in the farming structure, as already indicated.

In order to determine the influence of changes in the farming structure on the production costs of wheat, the results of both surveys have been adjusted to the same yield per morgen and to the same price level of production requirements. The yield per morgen, to which the costs have been adjusted, is the average yield for the past five years for the two regions. The results of this adjustment are shown in Table 8.

Table 8 Comparison of wheat production costs between the 1959/60-1960/61 survey and the 1947/48-1949/50 survey, adjusted to the 1962/63 cost level (averages for Swartland and Rûens).

	1962/63	1962/63	Difference
	Basis: 1947/48- 1949/50	Basis: 1959/60- 1960/61	
	Cents per bag	Cents per bag	Cents per bag
1. Labour:-			
White	21.93	10.30	- 11.63
Non-white (regular)	34.33	27.56	- 6.77
Seasonal labour	5.67	3.21	- 2.46
2. Non-power machines	53.39	37.68	- 15.71
3. Tractor	67.15	67.35	+ 0.20
4. Lorry	11.54	11.52	- 0.02
5. Light delivery	-	11.01	+ 11.01
6. Motorcar	12.17	7.05	- 5.12
7. Auto-combine	8.14	25.49	+ 17.35
8. Fixed improvements	9.33	11.27	+ 1.94
9. Cost of seed	34.25	38.56	+ 4.31
10. Screening (seed)	1.31	1.68	+ 0.37
11. Fertilising costs	64.08	64.08	-
12. Weed spraying	5.42	5.42	-
13. Harvesting cost	3.94	0.65	- 3.29
14. Bags	26.25	26.25	-
15. Twine	2.67	1.27	- 1.40
16. Transport (hired)	5.12	2.05	- 3.07
17. Insurance	2.22	2.19	- 0.03
18. Commission	12.50	12.50	-
19. Draught animals	20.47	0.68	- 19.79
20. Other	5.64	7.23	+ 1.59
Gross cost	407.52	375.00	- 32.52
Less credits	16.46	17.12	+ 0.66
Net cost	391.06	357.88	- 33.18
Interest on land	36.86	57.36	20.50
Net cost and interest	427.92	415.24	- 12.68
Average yield (bags) per morgen over five years		8.97	

### Remarks on the most important cost changes

The incorporation of lupines and lucerne with the farming organisation, as well as extension of the livestock branch, resulted in additional activities through which a better utilisation of labour, tractive power and implements has been achieved. Consequently, the item Non-European labour per bag of wheat decreased, in spite of an increase in the total number of labourers per farm. Furthermore, the number of European labourers per farm decreased notably. In the case of the item tractor, the cost per bag revealed little change, although the total number of tractors per farm increased.

Apart from the better utilisation of non-power machines, items such as threshing machines and ordinary harvesters, classified previously under this heading, disappeared - as a result of mechanisation of the harvesting process in respect of wheat. The cost of non-power machinery per bag shows therefore a substantial decrease on the previous study.

The mechanisation of the harvesting process of wheat resulted in an increase in the item auto-harvester, while the cost of threshing (consisting of hiring of threshing machines) has nearly disappeared.

Mechanisation of the production process resulted also in the elimination of draught animals; this cost item, therefore, shows a considerable decrease.

Increase in the item seed costs is mainly due to the fact that the rate of seeding has increased since the time of the previous survey. According to the latest survey, the average rate of seeding in the two regions was 1.6 morgen per bag, as against 1.8 morgen per bag previously.

The items fertilisation and weed spraying were brought up to date for several years before the new survey, with the aid of information from supplementary surveys in these two regions. In the case of fertilisation costs, fertilisation practices as regards quantities and types administered were yearly taken into account. For these two items, therefore, no change is shown.

The result of all these structural changes since the previous survey is a decrease in the gross costs of 32.52 cents per bag of wheat. As a result of an increase in land values, however, interest increased by 20.50 cents per bag. With grazing credits at more or less the same figure as in the previous survey, the net cost per bag, interest on land included, has decreased by 12.68 cents per bag.

According to the new survey, the value of land under cultivation increased by 66 per cent, while interest on land (according to Table 8) increased by 55 per cent. The difference is ascribed to the decrease in "ouland", and consequently shortening of the period on which interest against wheat is calculated.

Everything considered, it may be stated that, during the period between the two surveys, wheat production in these two regions has achieved a substantial higher level of efficiency - with higher yields per morgen and lower unit costs.