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REQUIREMENTS FOR CONTRIBUTIONS

Articles in the field of agricultural economics, suitable for publication in the journal, will be welcomed.

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X Kaffircorn Production and the Bantu Beer Industry y

by

A.P. SCHOLTZ and L.M.D. VORSTER,
Administration of the Maize Board

Like maize, kaffircorn (or grain sorghum as it is commonly known in the U.S.A.) is one of South Africa's traditional field crops. It is frequently planted by maize producers as a supplementary crop, since it is more drought-resistant than maize, and hence, should a drought occur, the farmer might still be able to reap a kaffircorn crop. There are, however, also certain areas where the soil structure is such that production of kaffircorn is preferred to that of maize.

Since kaffircorn is produced on a much smaller scale than maize and occupies, from both the human and animal foodstuff angles, an unfavourable competitive position vis-a-vis maize, it remains more or less in the background. Nevertheless, as a cash crop it is one of the most important alternatives in the maize producing areas and occupies a special place in the food and liquor industries. It is the most important raw material for the brewing of Bantu beer*, which is traditionally consumed by the Bantu as an alcoholic drink and a food.

* Bantu beer may briefly be described as a light alcoholic drink of the beer type, originally prepared from sprouted kaffircorn and ordinary kaffircorn meal and differing from "European" beer mainly in the following respects:

(i) The brewing process differs radically from that employed in making European types of beer. There are additional steps in the process to prepare it for the special lactic acid

PRODUCTION OF KAFFIRCORN

The past few years have seen a rapid increase in the production of kaffircorn in South Africa. The total production by Whites and by Bantu (on White farms and in Bantu reserves) is shown in Table 1. From these figures it will be clear that the increase in total production should be attributed to the increase in the production by Whites, since production by Bantu remained at a very even level, with the exception of a few seasons.

The increase in the production of kaffircorn is further reflected by the increase in the area planted to kaffircorn on the farms of Whites. In Table 2 the morgenage under kaffircorn, maize, wheat, sunflowers and groundnuts on farms of Whites in Area A is shown. This is the most important maize producing area.

The area under wheat, sunflowers and groundnuts varied considerably from 1952/53 to 1965/66, but generally shows a rising trend. The area under maize shows

fermentation which gives Bantu beer its characteristic properties. This process also affects the body and stability of the beer.

- (ii) It has a slightly sour taste resulting from the method of preparation.
- (iii) It is opaque and contains a great deal of solid matter and is therefore a rather thick drink showing the reddish colour of kaffircorn to a greater or lesser extent.

TABLE 1 - Production of kaffircorn,
1950/51 to 1965/66

Marketing season	By Whites	By Bantu	Total
	1,000 units of 200 lb		
1950/51	907	786	1,693
1951/52	966	762	1,728
1952/53	1,059	653	1,712
1953/54	2,067	1,334	3,401
1954/55	1,099	1,113	2,212
1955/56	635	913	1,548
1956/57	959	852	1,811
1957/58	1,576	1,024	2,600
1958/59	1,362	688	2,050
1959/60	1,852	1,012	2,864
1960/61	1,714	912	2,626
1961/62	2,588	1,105	3,693
1962/63	1,501	496	1,997
1963/64 ¹⁾	2,330	894	3,224
1964/65 ¹⁾	2,075	671	2,746
1965/66 ¹⁾	4,102	726	4,828

1) Preliminary.

a sustained increase during this period. Although the area under kaffircorn shows slight fluctuations, there was a considerable increase, particularly after 1955/56. Even if 1952/53 is taken as basis, the area under kaffircorn shows an increase of 91 per cent as against 72 per cent for maize and 52 per cent for groundnuts. Because of the dominating position occupied by maize as a field crop, the kaffircorn morgenage as a percentage of the total area planted to the five crops referred to, only increased from 5.6 to 6.7 per cent from 1952/53.

The production of kaffircorn as a cash crop is mainly undertaken in the Eastern Highveld, Northern Transvaal and Northern Free State.

The rapid progress in production may be attributed to three factors. Firstly, the present marketing scheme, under which a floor-price is in operation, has brought about greater stability and has greatly re-

TABLE 2 - Morgenage in "Area A" on White farms planted to kaffircorn, maize, wheat, sunflowers and groundnuts, 1952/53 to 1965/66

Marketing season	Kaffircorn	Maize	Wheat	Sunflowers	Groundnuts
	1,000 morgen				
1952/53	247	2,937	829	218	222
1953/54	330	3,350	781	116	176
1954/55	174	3,651	623	115	231
1955/56	86	3,771	656	118	290
1956/57	137	3,695	724	124	267
1957/58	190	3,775	900	153	320
1958/59	212	3,738	926	168	213
1959/60	217	4,003	652	225	289
1960/61	279	4,195	654	200	298
1961/62	283	4,054	718	221	344
1962/63	223	4,534	784	180	260
1963/64	316	4,704	804	203	365
1964/65	271	4,680	888	225	405
1965/66	472	5,055	1,011	220	338

duced the risk of serious price reductions to producers. A fixed price, at which the Maize Board - through its agents - is prepared to purchase kaffircorn from producers, is announced annually. Should producers not succeed in obtaining at least the floor-price from commercial buyers, they may sell to the Board. The quantities purchased by the Board normally represent the excess over domestic requirements and are sold for export.

A second important factor is the increased use of hybrid-seed varieties with a high yielding capacity. Yield per morgen on farms of Whites has since 1950/51 shown a sharp rise notwithstanding two successive years of drought (1964/65 and 1965/66). The average annual increase over the period of 15 years is 3.51 per cent.

A third factor is the fact that the producers' price of kaffircorn in relation to that of maize has been maintained at a very favourable level within the new framework of price stability. During the five seasons from 1960/61 to 1964/65 the floor-price for kaffircorn of the best grades was 35c to 60c per 200 lb in excess of the net producers' price for yellow maize. Bearing in mind that kaffircorn producers frequently obtain a premium of 10c to 20c on the floor-price when selling to the trade, the difference becomes considerably bigger. The basic difference has, however, during the past two seasons been substantially reduced, and for 1966/67 it amounts to only 5c per 200 lb.

MARKETING PROBLEMS

The considerable increase in production has created serious marketing problems, more particularly because the increased production is accounted for by Whites, with whom it is a cash crop. The production by Bantu is largely utilised for their own consumption, meaning that only insignificant quantities reach the market.

Kaffircorn is used mainly for human consumption, in contrast with the U.S.A. and other countries, where it is almost exclusively a feed grain.

TABLE 3 - Total domestic consumption* of kaffircorn, 1957/58 to 1965/66

Market- ing season	Consump- tion	Market- ing season	Consump- tion
	1,000 units of 200 lb		1,000 units of 200 lb
1957/58	1,926	1962/63	2,185
1958/59	2,207	1963/64	2,331
1959/60	1,979	1964/65	2,271
1960/61	2,297	1965/66	2,608
1961/62	2,088		

* Includes supplies taken up by the trade for local consumption, farm retentions and physical losses.

According to Table 3, consumption over the past nine seasons shows only a slight increase, and as will be indicated later, the bulk of consumption goes to the production of kaffircorn malt for the brewing of beer. This form of consumption is naturally more remunerative than any other and, owing to the dominating place occupied by it, caused the local price structure up to the present to be based on the use of kaffircorn for brewing purposes.

The result was that during the past few seasons the net realisation of the Maize Board on sales of kaffircorn for export, where it competes with other feed grains for stock feed, was always in excess of 80c per 200 lb below the realisation on yellow maize, for instance; during 1964/65, prices were, on the average, 40 cents per 200 lb (free alongside coastal elevator)

below those of yellow maize, while the producers' prices (i.e. the Board's purchase prices) were approximately 46 cents per 200 lb in excess of those for yellow maize.

This position gave rise to the introduction of a scheme during 1965/66, under which kaffircorn intended for export was made available on special terms to a number of manufacturers of animal feeds, to replace part of the yellow maize used in balanced rations. This was an experiment with the following objectives:

- (i) To establish whether balanced rations containing kaffircorn would encounter any serious consumer resistance;
- (ii) to enable manufacturers to determine a safe margin for the kaffircorn content of various rations as well as the cost of essential compensating additives; and
- (iii) to determine the net financial results on kaffircorn and yellow maize taken together.

A quantity of 465,000 bags was made available for this purpose and the results were so satisfactory that this arrangement was extended during 1966/67. The loss on the kaffircorn used for mixing was 31.3 cents per 200 lb or 57.1 per cent less than on kaffircorn exported. By comparison it may be stated that the Board exported yellow maize during 1965/66 at an average profit of R1.00 per 200 lb.

The normal local consumption for the 1965/66 season thus amounted to 2,143,000 bags (2,608,000 less 465,000) which was only 217,000 bags above the quantity consumed nine years ago and 17,000 bags below the average consumption during the past nine years.

The quantity of kaffircorn supplied to the trade consisted largely of stocks required for the production of malt and meal by malt manufacturers and millers, respectively.

Table 4 reflects the degree to which the disposal of kaffircorn in the domestic market depends on these processors.

TABLE 4 - Kaffircorn processed by malt manufacturers and millers, products produced and quantity of kaffircorn supplied to the trade

Marketing season	Processed by melt manufacturers and millers A	Products produced		Quantity supplied to trade B	Column A as a percentage of column B
		Malt	Meal		
	1,000 units of 200 lb				
1957/58	1,373	1,176	84	- 1)	-
1958/59	1,476	1,247	88	- 1)	-
1959/60	1,350	1,177	112	1,510	89.4
1960/61	1,516	1,264	131	1,620	93.6
1961/62	1,501	1,239	131	1,565	95.9
1962/63	1,522	1,270	119	1,594	95.5
1963/64	1,603	1,377	83	1,677	95.6
1964/65	1,699	1,468	92	1,904	89.2
1965/66	1,766	1,504	115	1,960 2)	90.2

1) Not available.

2) After deducting 465,000 bags supplied to feed manufacturers to replace yellow maize.

Up to 1962/63 the local demand for malt, although profitable for the industry, remained very static and the quantities manufactured showed only slight deviations from the average of 1,229,000 bags. From 1962/63 it increased by 18.4 per cent but this increase is not sufficient to reduce future surpluses materially.

According to present indications the production of kaffircorn will increase still further, and a rapid widening of the gap between production and consumption may be expected. Since that part of the crop which has to be exported at less favourable prices will probably increase to a figure well beyond fifty per cent, a lower price structure for producers is inevitable. On numerous occasions the Maize Board has drawn the attention of producers to this future development.

THE BANTU BEER INDUSTRY

Bantu beer is a traditional drink of the Bantu, and large quantities are consumed in urban as well as rural areas.

Bantu beer as drink and "food"

It is generally stated that the beer is a food as well as a drink to the Bantu. While it is true that this beer is important in the diet of the Bantu, it must be remembered that its popularity is due to its being an alcoholic drink.

It has been established that Bantu beer contains between 4 and 6 per cent solids, about half of which is starch. The average protein content is 0.6 per cent, but of more importance is the fact that its average thiamine, riboflavin and nicotinic acid content amounts on average to 32, 36 and 189 micrograms per 100 ml of beer, respectively. This beer may thus be described as one of the most nourishing alcoholic beverages. In this respect it has always served as an important enrichment of the daily diet of the Bantu, particularly because the consumption of protein-rich food is comparatively low on account of

unfavourable price and income relationships.

Availability of Bantu beer in urban areas

In the Bantu homelands and in rural areas the beer is mainly brewed at home and the production of kaffircorn by the Bantu is largely intended for beer making; very little of the grain being marketed. It is impossible to make a reliable estimate of the quantity of beer produced, but it is known that about 70 per cent of the malt produced is sold in these areas. In urban and municipal areas, on the other hand, beer is largely produced commercially.

This commercial brewing can be traced to the urbanisation of the Bantu which followed the discovery of gold and diamonds towards the end of the last century.

Their traditional way of life was disrupted through migration and continuous contact with the foreign way of living of the Whites and the changed patterns of consumption characteristic of a money economy. The liquor of the Whites was freely available and drunkenness and crime assumed serious proportions. Conditions deteriorated to such an extent that in 1902 the supply of White liquor to the Bantu was prohibited. This immediately led to a flourishing illicit trade in liquor which resulted in various commissions being appointed by the Government to seek a solution to the problem.

To meet the urban Bantu's need for drink, local authorities were permitted by law in 1923 to make provision for the supply of Bantu beer to Bantu by allowing home brewing, or by brewing it themselves and making it available to the Bantu. Several years passed, however, before local authorities undertook brewing of beer. During 1937 the law was amended to provide for third parties to produce the beer and sell it, and only then did the municipalities take active steps. In Johannesburg the first beer-hall was opened in 1938.

Arising from the Report of the Malan Commission (1961) the Liquor Act was amended in 1962 whereby licensed liquor dealers were permitted to extend the sale of all types of liquor to the Bantu. During the same year the Bantu Beer Act (Act No. 63 of 1962) was passed, comprising a revision and consolidation of previous legislation relating to the production and sale of Bantu beer in urban areas.

In accordance with the Bantu Beer Act, as amended by Act No.42 of 1964, local authorities as well as certain employers may produce and sell the beer, while individuals may, in certain circumstances, brew the beer for home consumption but not for sale. The Act provides that the Minister of Bantu Administration and Development may, at the request of a local authority, grant to it the sole right to produce, sell and supply the beer within the whole or part of its urban area. Where such a right is granted, no private person may make beer for his own consumption. The Act also provides that the Minister may grant to employers who employ 25 or more Bantu, permission to brew beer and supply it to their employees free of charge.

A local authority or employer may, however, not produce beer for sale with an

absolute alcohol content of more than 3 per cent by weight, and a local authority may only brew beer and sell or supply it on premises approved by the Minister.

The output of Bantu beer by local authorities

In the urban areas, local authorities are the main manufacturers and suppliers of the beer, and within the areas controlled by them they may obtain a complete monopoly.

Table 5 shows the annual production of Bantu beer by local authorities from 1953/54. In the interpretation of this information it must be remembered that certain employers also brew beer and that home brewing is permitted (either expressly or by connivance) in some urban areas. The table does not therefore reflect the total quantity produced.

Since 1956/57, total production has increased at an average rate of 14.7 per cent and it is interesting to note that since 1962/63, when White liquor was made available to the Bantu, production has increased by 34,926,619 gallons, i.e. by

TABLE 5 - Total production of Bantu beer by local authorities and estimated production per head of the Bantu population in these urban areas

Year	Total production	Index of total production	Production per head of the ur- ban Bantu popu- lation	Index of pro- duction per head
	Gallons		Gallons	
1956/57	34,760,300	100.0	24.2	100.0
1957/58	40,522,000	116.6	24.4	100.8
1958/59	43,959,500	126.5	23.2	95.9
1959/60	48,655,100	140.0	22.7	93.8
1960/61	54,668,800	157.2	25.2	104.1
1961/62	60,728,000	174.7	27.5	113.6
1962/63	69,103,000	198.8	29.1	120.2
1963/64	87,451,659	251.6	35.7	147.5
1964/65	104,029,619	299.2	41.1	169.8

50.4 per cent. The number of local authorities manufacturing beer remained unchanged during this period, namely 55.

Since the index of total production by far exceeds that of consumption per capita, the large increase in production (Table 5) should be attributed mainly to increased consumption as a result of a larger number of local authorities manufacturing beer, and the population increase in those urban areas where beer is manufactured. The rise in the per capita index of the urban Bantu population would also seem to indicate that home brewing (where it is permitted) is declining and is being replaced by commercial manufacture.

Of the total output of 104,029,619 gallons, more than half, namely 53,933,635 gallons, was produced by the Municipalities of Johannesburg (26,136,584 gallons), Pretoria (16,367,250 gallons) and Durban (11,429,801 gallons).

In Table 6 the production of Bantu beer by local authorities during 1964/65 is shown for the four Provinces and South West Africa.

TABLE 6 - Production of Bantu beer by local authorities in different areas, 1964/65

Area	Gallons	Per cent
Transvaal	79,761,149	76.67
Natal	14,320,996	13.77
O.F.S.	2,575,782	2.48
Cape	2,302,336	2.21
S.W.A.	94,510	0.09
	99,054,773	95.22
Peri-urban areas	4,974,846	4.78
Total	104,029,619	100.00

The commercial Bantu beer industry is therefore established mainly in the Transvaal and to a lesser extent in Natal.

Distribution of Bantu beer produced by local authorities

The Bantu Beer Act provides that municipalities manufacturing beer may not deliver it beyond their boundaries, but those municipalities which do not have their own installations may have stocks supplied to them by other municipalities.

For distribution purposes, local authorities provide beer-halls and sales depots and also sell through licensed liquor stores. No special license is required to sell Bantu beer, but no licensed liquor dealer may sell Bantu beer which has not been manufactured by a local authority.

Only about 12 to 13 per cent of the beer produced by local authorities is sold in small containers. Of this, about 63 per cent is sold by licensed liquor dealers and about 24 per cent is sold through municipal depots and in beer-halls, while the balance is supplied to other local authorities, the mines and industries. The bulk of the output, that is about 87 per cent, is sold for consumption in beer-halls and beer-gardens.

Various small containers are used, such as plastic bags, cartons, milk bottles and plastic bottles. Although most local authorities use plastic bags, retailers experience considerable difficulty because of leakage and breakages. The cost of packing varies with the kind of container used, and considerable research has been undertaken to find an inexpensive and suitable container. The beer cannot be bottled in ordinary beer bottles, the crown-corks blow off.

The Minister may fix the maximum selling prices of Bantu beer produced by local authorities. Beer for consumption on

the premises as well as for off-sales is sold in beer-halls and beer-gardens at 20 cents per gallon, while local authorities sell packed beer at 25 cents per gallon. The retail price in licensed liquor stores is at present 40 cents per gallon.

According to a survey made by the Maize Board during 1963, in the Pretoria and Witwatersrand areas, there was an average of 14,057 Bantu for each distribution point in these areas. Only four municipalities had fewer than 10,000 Bantu per distribution point. Notwithstanding the large number of individuals per distribution point, the beer is readily obtainable since sales are permitted from 8 a.m. to 10 p.m. although the main selling time is from 10 a.m. to 7 p.m. The Bantu Beer Act provides that all profits on beer shall be paid into a Bantu Beer Account, the money to be used for the general benefit of the Bantu, such as the provision of services, appropriations intended to improve facilities for social intercourse or recreation or the promotion of the general social welfare of the urban Bantu. Profits may also be used to provide housing.

Although substantial profits are made by local authorities who have efficient facilities for the production and distribution of the beer, this should be seen as a form of taxation rather than as profit-seeking.

Research into production process

The main solids for the manufacture of Bantu beer may be divided into malt and grain. The grain serves as a source of starch while the malt, traditionally made from kaffircorn, converts the starch into sugar and by further fermentation into alcohol. Originally the grain ingredient consisted largely of unmalted kaffircorn meal, but lately this has been replaced to an increasing extent by maize in the form of brewers' grits. Although there are certain technical reasons for this, a very important reason for this change is that brewers' grits is cheaper than kaffircorn meal.

This switch is reflected in Table 7 from which it will be evident that the ratio of kaffircorn meal to maize products declined from 1.59 in 1953/54 to 0.29 in 1961/62 and that the ratio of total kaffircorn products to maize products declined during this period from 4.9 to 1.10. This means that in 1953/54 about one and a half times more kaffircorn meal than maize products was used, while in 1961/62 about three times more maize products than kaffircorn meal were used.

During 1953/54 about five times more kaffircorn products than maize products were used while during 1961/62 the quantities were about equal.

TABLE 7 - Ratios of kaffircorn meal to maize products and of total kaffircorn products to maize products in Bantu beer

Ratio	1953/ 54	1954/ 55	1955/ 56	1956/ 57	1957/ 58	1958/ 59	1959/ 60	1960/ 61	1961/ 62
Kaffircorn meal to maize products	1.59	1.32	0.42	0.48	0.37	0.18	0.27	0.32	0.29
Kaffircorn products to maize products	4.9	4.0	2.0	1.8	1.7	1.2	1.2	1.2	1.1

The effect of these changes is a reduction in the nutritional value of Bantu beer, since the vitamin content of brewers' grits is lower than that of kaffircorn. It also means that local consumption of kaffircorn is curtailed.

Since the local sales of kaffircorn are based largely on its use in the Bantu beer industry, the Maize Board takes a serious view of this development and has made a grant of R53,000 for research in this connection. This research will be undertaken over a period of three years and will focus specifically on the processing and preparation of kaffircorn as a grain additive in the brewing of the beer and also on determining which kaffircorn varieties are most suitable.

The technical aspects of production are of such significance that a Bantu beer research unit has been established by the Council for Scientific and Industrial Research. Local authorities also contribute funds to finance these activities.

Unfavourable differences in the quality of the beer brewed, by various undertakings, which are not conducive to larger sales, are being investigated with a view to standardising the product.

FUTURE CONSUMPTION

In spite of current attempts to encourage local consumption of kaffircorn as a feed grain, it will probably take a long time for this form of consumption to become as important as consumption in the form of malt. On account of the Government subsidy on maize sold for local consumption, the wholesale selling price of the Board for yellow maize is at present 48c per bag lower than the floor-price of kaffircorn. To this difference must be added the trade's margin for handling, storage etc. of kaffircorn. Based on a price difference of only 48c the price

of kaffircorn is about 16 per cent more than that of yellow maize, whilst the feeding value is generally taken at 5 to 10 per cent below that of yellow maize (depending upon the kind of livestock for which the feed is used). Unless steps can be taken to bring the general price levels of yellow maize and kaffircorn into line, animal consumption of kaffircorn will largely be confined to the quantities utilised under the special mixing scheme. As far as consumption for malting purposes is concerned future increases will depend on the increase in the Bantu population. At present the Bantu population is estimated by the Bureau of Statistics at 12.2 million and with a growth rate of 2.29 per cent per year it may be expected to reach 18.5 million by 1985.

It is unlikely, however, that the consumption of Bantu beer (and also the consumption of kaffircorn as a raw material) will increase in proportion to the population. Although the consumption of White alcoholic liquor apparently had no material effect on the consumption of Bantu beer in the first few years after having been made freely available to non-Whites, it can be expected that as Bantu incomes improve, the Bantu will show a greater preference for White liquor.

Also, it does not stand to reason that the tendency to replace kaffircorn products by maize products as a source of starch in commercial brewing will be arrested or reversed. To the extent that home brewing is further replaced by commercial brewing, the proportion of kaffircorn products per gallon brewed will decline (in home brewing much more kaffircorn is used).

The conclusion is that a substantial increase in local consumption of kaffircorn in the foreseeable future is unlikely and that the disparity between production and consumption is more likely to increase than decrease.

CONCLUSION

Although kaffircorn is for some producers an important cash crop along with maize, the rapidly rising production trend portends serious difficulties in disposing of future crops.

The normal domestic use of kaffircorn, which to a large extent is based on the production of Bantu beer, will, as in the past, not keep pace with production, and increased export surpluses are likely.

Because of less favourable export realizations for kaffircorn in comparison with maize, it is clearly not in the national interest to base the price structure of this grain solely on its use for the production of malt. Steps will have to be taken to bring the general price level into line with that of yellow maize. Such an approach will assist in limiting production to those areas where

kaffircorn is actually better adapted to the physical conditions than maize, at the same time establishing a healthier competitive basis between the two products as feed grains.

This will also constitute the best opportunity for a steady development of the kaffircorn industry.

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CONSIDERATION OF WEATHER IN FARM-ENTERPRISE PLANNING

"Agriculturalists are interested in weather for many different reasons. Farmers are interested in the production risk and the effect of bad weather on income. Agronomists are interested in the production risk and the effect of bad weather on income. Agronomists are interested in the stresses plants must survive. Statisticians are interested in improving the accuracy of forecasts of crop production. Insurance firms are interested in the likelihood of losses. Conservationists are interested in erosion and stream-flow problems. These are a few examples; there are many others. My interest is in the relationship of weather to total farm output, and thus to the planning and operation of farm programs. In developing our research and in making it more useful in farm program planning, I am sure that we will have to give greater "consideration" to weather than in the past. A more comprehensive system of weather indexes, covering at a minimum major crops and broad regions, will be a basic requirement for the research program we envision."

- M.L. Upchurch, U.S. Department of Agriculture.