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SMALL-SCALE ENTERPRISES IN EMBU DISTRICT: BEER MAKING
MAIZE MILLING AND WATER CARTING

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General Introduction

The three types of enterprises to be discussed (beer making, maize milling and water carting) were originally studied as traditionally female tasks. In some cases they are still done by women. Only one case of beer being made at home was recorded, and less than 10 of maize being home ground. Water, however, was normally still carried by the women, and the water carts were mainly used by the shopkeepers and the asaris at the chief's camp. The paper describes the manufacture of local beer and gives estimated costs for beer making. Since only one of the bars visited admitted to keeping records the data is necessarily only approximate. An attempt is made to compare this small-scale manufacture with beer making at home. Maize mills are also described, and costed; the methods of producing maize flour at home and the labour involved are compared. Enterprises using water carts and donkeys are described and compared with both individually owned carts and the traditional method of female transport. The implications of the labour required and water used are briefly examined.

The data on beer making was collected on visits to 5 sugar-cane mills - one of which was a public one. Some small-scale mills were visited more than once; as there were evident mistakes in the data. Customers were approached at the public mills, and one beer making session was witnessed in the home of a sample family. This brewing was being done illogically and therefore the author was restricted in both the questions which could be asked and also the measurements taken.

The data on maize mills was collected from 5 mills, one of which was not working at the time of the visit (due to the lack of a latrine required by the health department). There was also another mill run by tractor power, working in Karigari but this was not regularly operated. None of the home milling sessions were actually witnessed, so the data used is taken from the recording sheets.

Eight water carting enterprises were studied, not all provided satisfactory data as the employees know very little about the costs of the enterprise, and the owners were away attending to the costs of the enterprise, and the owners were away attending to other business. Only three of the sample households owned a donkey cart, and these were normally worked by employees. Data on fetching water by the normal method was collected daily. Methods of water carting are a constant concern in the area, and government help is often requested. This will be looked at critically. This data is possibly biased as all questioning was done in January-February, and estimates of production made by the enterprisers are likely to apply only to that period.

Overall, the profitability of these small enterprises is examined and also their contribution to the rural economy as measured by the employment of labour and the increase value of farm produce e.g. sugar cane wrought by processing. The social benefits of the enterprises are also discussed.

The enterprises described in this paper would hardly be called enterprises at all in economic terms. They are even smaller than the category 'infinitesimal' used by Samuelson⁽¹⁾ in his classification of American businesses. Margaret Katzin⁽²⁾ suggests that a fairer definition for an entrepreneur in this sense would be "an independent, self-employed manager, who carried risk and claims the gains of an enterprise conducted with the object of obtaining money profits". She uses manager here not to infer a high degree of administrative or organisational skill, but rather the holding of responsibility for all decisions in the conduct of the business in which subordinates are responsible only for carrying out orders and performing routine tasks. Indigenous populations in East and Central Africa have not moved nearly so far towards an exchange economy as have those of West Africa and in pre-British times household self-sufficiency was the rule in East Africa. Normally the commercial classes are Asian or European, but in the smaller villages the shopkeepers and bar owners are African. In Embu the majority of the shopkeepers in the main part of the town were Asian, but in Karingari village they were local African farmers, who had left their wives running the farm, while they conducted their business enterprise in the village. Some of these shopkeepers and bar owners owned their shops but many rented them. The owners of these rented shops also tended to be local farmers, but they usually had employment in Embu or elsewhere,

(1) Samuelson, P.A. 1951: Economics. pp. 110-112

(2) M. Katzin - "The Role of the Small Entrepreneur" - in "Economic Transition in Africa." Harskovits and Harwitz.

and evidently either could earn more in this way than by running the shops themselves, or the risk was considerably less, making employment a better prospect. The owners who ran their own businesses tended to be men with little education so that the alternative employment open to them was definitely less attractive. They often appeared to be in a better financial position than the better educated with paid employment, but there is no quantitative evidence to support this. There tended to be confusion between gross and net profit and due to low standards of education, usually no proper accounts were kept. Household standards were generally lower in the case of the less educated but capital investment in numerous small businesses appeared to be higher.

Most of the businesses were in fact 'companies' - a type of business organisation found among the Bantu of Kavirondo, and the Baganda as well as the Kikuyu⁽³⁾. This not only meant that more people were involved in the organisation and running of the business and in the sharing of profits, but also that a smaller level of initial capital was necessary per person. It is interesting that most of the entrepreneurs owned more than one business, for instance the owner of one of the water carting businesses described was also the owner of the local maize mill. A few of the water carting businesses were evidently the first stages of a business career, and at least one was run by young men who had no farm of his own as yet. However, the initial capital needed although less than £20 in the first place for water carting, seemed to prevent the majority of small farmers entering the trade. Katzin shows in Nigeria that of 34 traders in Onitsha in 1960-61 the initial capital used in starting a business was less than £25 in 50% of the cases.⁽⁴⁾ As has already been mentioned the majority of the entrepreneurs were in fact local farmers, and the initial capital was in all probability either saved from farm profits or from previous employment.

It is interesting to speculate, whether the accumulation of the initial capital is an outcome of business ability or good fortune. Certainly most of the people engaged in small enterprises also were successful farmers, but it was difficult to judge if this was a result of superior management, or a higher level of capital investment in the farm. The expression of the quality of entrepreneurship in these businesses is encouraging and further progress along similar lines should help to stimulate the rural economy. Further development of the exchange economy within a local area will aid finally in development of trade between larger groups and should increase the awareness of the subsistence sector of the economy to the benefits of an exchange economy.

(3) Leakey "The Economics of Kikuyu Life." East Africa Econ. Review. Vol. 3 p. 105-180.

(4) M. Katzin (see (2)).

2. Local Beer Enterprises

In this area the main constituent of the beer was sugar-cane juice. There is considerable variation in actual proportions of the different ingredients as shown in Table 1 and this does not only occur between different areas and different bars, but also in the same bar from day to day. There is also variation from area to area in taste preferences and also in the availability of the necessary ingredients. For instance in Nembure honey was sometimes added to the beer, whereas it was invariably added at Mwea. Also sugar-cane tended to be less available at Mwea, and so sugar instead of sugar cane juice was used. Home brewed beer varied even more in the proportions used and therefore in strength but it also, on occasions contained millet flour

Table 1 Types of Beer - ingredients

	Sugar cane juice gall.	Water gall.	Honey lb.	Sugar lb.
1. Without honey	69	31	-	-
2. With honey	67	33	16½	-
3. With sugar & honey	27	73	17	60
4. " " " "	10	90	25	87.5
5. With sugar cane only	57	43	-	-
6. " " " " Stronger type	67	33	-	-

N.B. Sometimes millet and/or sugar are used in types 5&6 but quantities vary. The measurement are mainly based on the debe and mutungi which are metal water containers holding 4 and 6 gallons respectively.

The process of manufacture was similar in all cases and the description following is of one session witnessed at Karingari. The machine for squashing the canes was usually situated outside the village so as to meet the health department regulations, as the sugar cane juice and squashed canes tended to attract the flies. It was raised off the ground far enough for either a debe or a mutungi to be placed beneath the spout. It consisted of four small solid metal drums turned by a handle from the top. The sugar cane was pushed through between the drums and a large wooden pole was fixed through top, so that several people could help in the turning of the machine. It took 4 men to push it, although the number varied, and the size and number of sugar canes being squashed affected the ease with which the mill was turned. Six men were involved altogether. One was almost fully occupied in feeding the machine with sugar cane, and another one in cleaning the canes before they were squashed. All the canes were supposed to be cleaned and this was done on a wooden table with a panga attached to the edge. The number of canes needed to fill one mutungi can vary considerably. Actual counts made of the size of cane currently being used showed that 36 canes produced 6 gallons.

However, sometimes as many as 42 were needed, and with the larger type of canes as few as 15. The time taken to produce 6 gall. was approximately 30 minutes. At Karingari canes were bought from local farmers, usually the women, who brought them to the mill each morning. At Mwea sugar canes were more difficult to obtain in large quantities and so they were usually brought by lorry. After the canes have been squeezed the juice is mixed with water and the fermenting agent^{*} is added. This fermenting agent looks rather like a loofa or sponge and grows locally, although the beer makers usually have to purchase their supplies due to the quantities needed. The amount of fermenting agent added varied with its size and quality and also with the time available for cooking. A lower quantity of fermenting agent could be used if the beer was allowed to cook for longer. The beer is then 'cooked' and bottled and can be ready for use the same day, if enough fermenting agent has been used. In cases where honey and/or sugar is used, this is added along with the water, before the fermenting process takes place. The beer can be very potent and it is said "2 bottles are enough to make you unconscious."

Most of these sugar cane mills are privately owned, but they are available for public use, and those people making beer at home pay the owner for the use of the mill. Home beer making was actually witnessed only in one case, but other people who made beer at home were questioned at the sugar cane mill. A license is needed before home made beer can be sold and in some areas a letter of permission from the local headman is required before it can be made even for home consumption. On the Rice Scheme at Mwea beer making was illegal, except in the case of the bars. Kiarukungu village, which was not part of the scheme, and therefore not affected by this regulation made beer for nearby scheme villages. Officially it was made only for home consumption, but in fact most of the income of Kiarukungu a landless village, was derived from the sale of beer. People from neighbouring scheme villages came to Kiarukungu drink beer, and usually there was at least one group of men drinking beer in the village each day. The same household did not make beer each time, and beer making took place once or twice a week depending on demand and on the state of the sugar cane and millet crop. Although these households were landless most had borrowed at least a small piece of land on which to grow food crops and also sugar cane. Since land suitable for growing sugar cane was not abundant in the area, some ordinary sugar was used in the beer instead of sugar cane juice. This was generally true of Mwea type of beer and has been remarked on before.

* Fermenting agent is called 'Munatani' in Kiambu.

The ingredients for the home made beer were all prepared the day before the actual beer making took place. The millet has to be ground especially fine and this is either done at the water mill using the finest type of grinding or by hand at home, but the latter is a very laborious process. Even where going to the mill involves a long journey it is usually considered worth it, both for the reduction in effort involved and also for the improvement in quality of the beer. In the case witnessed, the mill normally used was a diesel one, which does not produce a fine enough flour for beer making, so a journey had been made to the nearest water mill which was working - some 8 miles away. Sugar cane had been taken in the other direction to the nearest sugar cane mill at Ngunbani. Water had been collected from the river $\frac{1}{2}$ mile away. Several trips had been made to the river, and more than one person had gone to the sugar cane mill to help in the transport of the canes and juice. The beer made at home is generally recognised as being less potent, although as has been said before there is a good deal of variation. However it is sold at the same price as the bar beer. In answer to questioning about this the general reply was that the less potent beer was preferred because it was possible to drink more of it, and to remain in a 'happy' state longer. It is also probable that the addition of millet produces a beer with a more acceptable flavour. The small entrepreneurs also gave taste as the reason for adding honey. The actual process of making the beer is fairly simple, and does not entail the use of very much labour on the actual day of production. However, the nature of the work requires that a lot of people should be present, and so, much of the labour involved is fulfilling a social rather than an economic need. The highest input of labour is in the preparation of the ingredients and although about 10 people were present on the actual day of beer making only 2 or 3 were actively involved. These were supervising the fermenting process once the initial mixing had been done. The hut where the cooking was being done was unbearably hot and this was considered one of the worse tasks. There was always plenty of labour available to help when necessary as very few of the village members had enough land to keep themselves occupied fully, so there were some women who spent most of their time helping the household which was making beer; paid for their services in beer.

Cost of Production

The mills visited have been costed separately in Appendices 1 and 2. Costs of sugar cane juice are shown in Table 2 (for four bars)

Table 2 Sugar cane juice costs

	NIMBURE		MWEA	
	I	II	III	IV
Sugar canes per gall/juice	2	6	4	5
Av. cost sugar cane (cents)	30	15	25	24
Range (cents)	10 - 30	10-20		
Cost per gall sugar cane juice	-/60	-/90	1/-	1/20

The variations in costs between the two areas do not show a significant difference, but the high price at mill II was caused by very high demand for sugar cane in that village (Karingari), there being two bars. Mill I was situated in an area where there was a smaller concentration of population, but this led to a smaller volume of trade, even though sugar cane costs were lower. Also because of lack of competition it was not necessary for bar I to add honey to its beer, and this in turn also led to higher profits. Honey was sometimes added, but the profit and loss accounts have been worked out for a situation where honey was not added.

Table 3 Cost of the fermenting agent

Costs	I	III	IV	Home
No. bought for 1/-	3	4	5	5
No. used per gall beer	4.2	6.3	8.8	5
Price per gall beer	1/39	1/57	1/75	1/-

The fermenting agent is one of the most expensive ingredients. The home brewer tended to use less and to 'cook' or ferment the beer for longer. The cost of fermenting agent saved by longer cooking was greater than the increased cost of the fuel, and it seemed strange that this was not done by the beer enterprises. The explanation may be quality terms. The cost of fuel was higher at Mwea than in Nembure and this does correspond to an increased use of fermenting agent. Table 3 above indicates the range of cost for the fermenting agent.

Most beer makers also own donkey carts, which fetch the water for making the beer. Mill II the donkey cart used for carting water was owned by one of the subsidiary members of the company, and it was considered as a separate business. Water in this case was charged at 20 cents a debe. Very little water was bought for domestic use in the neighbourhood of Mill I and the donkey cart was kept primarily for the beer mill. A few debes were sold to other traders at 10 cents each. At Mwea the charge was 15 cents a debe or 1/30 for 40 galls. So that all 4 mills can be compared the water carts will be treated as separate enterprises. However, it is worth noting that without the beer making enterprises there would be insufficient trade to support many of these water carts. Table 4 gives aggregate totals

of the cost of ingredients per gallon of beer for the four bars which were costed.

Table 4 Total Costs of Ingredients per gallon beer

Mill	Cost	
I	1/81	without honey
II	2/39	
III	2/72	
IV	2/82	
Home A	1/76	- without honey or millet
B	1/68	(Nembure type)

Honey is sold at 1/23 per lb. 106 lbs cost 130/-. Sugar has been charged at 7/- for 10 lb.

N.B. Home brewed beer at Mwea would probably cost between 2/- and 2/50 due to the higher prices of sugar cane. Water has been charged at local prices in all cases, also fermenting agent even when it was collected from 'bush'. This assumes that had the water and fermenting agent not been used for making beer they could have been sold and thus income is shown against the costs of beer making. This is not strictly true in the case of the water, as there is a very limited market for it.

Other running costs include labour, fuel, repairs to sugar mill, oil, license for mill, running costs of bar. Except for the license none of these costs apply to home production, and although it is possible to impute labour and fuel costs - this is unreal as they have little or no value on the open market. In all cases the bar and the land where the sugar cane mill stood was either owned by the beer maker or borrowed from a friend. This meant that no formal rent was paid, although in Bar I & II it is probable rent was paid in the form of beer. Rent for a bar per year is somewhere in the region of £ 1,440/- so presumable this rent could be obtained if the bar was hired out rather than used by the owner. Labour costs were as shown in Table 5 below.

Table 5 Monthly Labour Costs of Brewing & Selling Beer

	I	II	III	IV
No. of labourers	9	13	9	8
Total wages	450/-	1350/-	575/-	580/-
Average man	50/-	75/-	64/-	72/50

N.B. In bar II one of the employees was actually the manager paid 450/- a month, and since in the other 3 there was no paid manager, strict comparison would be 12 labourers receiving total wages of 900/-. The figures in Table 6 are calculated on this basis.

Table 6 Labour costs per gallon of beer per month
(made & sold)

	I	II	III	IV
Gall beer/month	1950	4500	4875	7000
Lab/gall beer cost	-.23	-.20	-.12	-.80

As can be seen in detail in Appendices 1 & 2 profits per gall of beer varied greatly. The results are summarized in Table 7 which includes figures for home production.

	Profits per gallon of beer				HOME PRODUCTION	
	I	II	III	IV	A	B
Gall. of beer	1950	4500	4875	7000	42	18
Profits	1558/47	1536/75	1,740/59	349/82	72/62	.3/79
Profit/gall.	-.80	-.35	-.36	-.05	1/73	-.21

In case A of home brewing, even after imputing labour, fuel and water costs to the accounts for home brewed beer they still appear to make more profit. Since these resources have little or no value on the market the actual profit is even higher. In case B less profit was made because of the lower price charged for the beer. This was probably necessary as no licence for selling beer existed. It appears that beer making at home, providing a license is obtained could be a very profitable enterprise. However, it appears at least in the Northern area to be done very seldom. Two reasons are possible, the first being that other work on the farm is in fact more demanding than the production of beer. In other words, profits to the beer making enterprise in terms of labour are lower than from farm work. This seems unlikely is apparent from other research carried out in the area, unless leisure is accorded a very high value or it may be that women, who used to brew beer, do not receive the returns from the activity. The other reason for the lack of home brewing is possibly a social one, i.e. returns in terms of social effects may be negative to the brewer, and although the over heads of a bar do not have to be paid, the social overheads of having drinking parties at the house, etc.

3. Maize Mills

There are two main sorts of maize mills, one run by diesel and the other by water. The water mills were introduced at the beginning of the century and the diesel sort more recently. Due to the topography of the country it was possible to site many water mills so that no household was very far from one. Diesel mills tended to be opened in areas where there was a fair concentration of population and no very accessible water mill as was the case in Kariagari. Once established water mills cost very little to run, although grinding time varies with the amount of water in the river, and therefore with the season. The original capital cost of the building and equipment have long since been forgotten, (and probably would have

already been written off by economists). The buildings are usually of stone and although parts of the approach channels are sometimes made of wood, most of the water works are concrete and earth, and appear to need the minimum of care. The actual mechanism of the mill consisted usually of three or four grinding stones and wheels and furrows which were made of wood. These needed quite a lot of repair and invariably one of the stones was out of action for repair of the top or bottom mechanism. Some mills were built all on one level whereas others were on two. In single level mills it was necessary to lift the grain up to the hopper and then the flour was collected from the foot, with the two-level mills the hoppers were at floor level and the flour was collected at the second level. It is interesting to note that the driving wheel is not vertical but horizontal. This means that there is no need for cogs to change the direction of the force and of course less to go wrong in the mechanism. The water is channelled onto the fins of the driving wheel by a wooden furrow, and water can be prevented from entering this furrow by a sluice gate. The water used to drive the mill is usually separated off from the main stream, and the pool above the sluice gates is a favourite place for washing clothes.

The site of diesel mills is technically unimportant. The actual engine is often working for only short periods of the day during periods of maize scarcity, which leads to high running costs due to the number of times the engine has to be started per customer. Time taken to mill one debe of maize depends partly on the age of the engine, and of course so do repair costs. In one case a tractor was being used to power a mill, but since this was operated only infrequently it was not possible to obtain data from it.

There are several methods of grinding maize at home. These include the use of two grinding stones, pounding log and pole, and a small hand grinding machine. Only three of the sample farms possessed a hand grinding machine, but these machines were lent to nearby farmers. The method involves much effort, and tended only to be used when the amount to be ground was extremely small, or when time was at a premium and the journey was unnecessary except for the mill visit. Presumably maize would be easier to grind in this type of mill than a harder grain like sorghum. The more traditional methods of hand grinding were not witnessed at all in the Nembura sample. However, the women at the Rice Scheme spent a large proportion of their time during the visiting period pounding rice. This was due to the fact that the rice mill was out of action. This is scheme policy during rice harvest, as an attempt to prevent black market sales of rice, but it means that the harvest period becomes a very difficult one for the womenfolk, who have all the labourers as well as normal family for whom to prepare food, and all the rice pounding has to be done by hand. The maize mill however, still functions. Some women used

the two stones method and some the pounding log and pole, and there was a difference of opinion as to the advantage of one of these methods over the other. Although grinding stones and pounding logs were present in some of the Nembure households there was no record of their use, and all the households made frequent visits to the local mill.

It is hard to compare the costs of using the water and diesel mills, instead of grinding at home, since there are no monetary costs attached to home grinding. Tables 8 and 9 show the difference in income and expenditure of the four mills visited.

Table 8 DIESEL MILLS
Monthly: Income and Expenditure

EXPENDITURE	Nembure		INCOME	Mwea	
Labour	60/-	400/-	Returns-slack	540/-	3003/-
Fuel - oil	72/-	240/-	Returns-busy	1080/-	4200/-
diesel	225/-	1450/-	Returns-average	810/-	3602/-
Tar for belt	00/-	180/-			
Repairs	50/-	150/-			
License	7/-	100/-			
Depreciation on mill	100/-	100/-			
Depreciation on buildings ⁽⁵⁾	33/-	33/-			
	547/-	2653/-			
Average profit	263/-	949/-			

Table 9 WATER MILLS
Monthly: Income and Expenditure

EXPENDITURE	Runyenjes Ndomba		INCOME	Runyenjes Momba	
Labour	50/-	30/-	Returns-slack	420/-	300/-
Oil	1/-	-	Returns-busy	840/-	900/-
Repairs	5/-	10/-	Returns-average	630/-	600/-
License	5/-	13/-			
Depreciation - mill ⁽⁶⁾	13/-	13/-			
Depreciation - buildings	33/-	33/-			
	107/-	99/-			
Profit (1)	313/-	201/-			
Profit (2)	733/-	801/-			
Average profit	523/-	501/-			

(5) Depreciation on the mill buildings was charged over 5 years for Nembure which was mud, and over 10 years for Mwea which was stone. The original cost of the Mwea building was estimated as double that of the one of Nembure.

(6) Both mills were built of stone, and depreciation was charged over 10 years.

The amount of milling done varied considerably from season to season and at the different mills. The range in profit is shown. A fairly comfortable margin seemed to exist in all cases. Initial capital is possibly the limiting factor to other entrepreneurs who wish to enter the market, as it would appear there was scope for competition and a lowered level of profit. This is particularly so in the case of water mills. Table 10 indicates these profit levels.

Table 10 Profit of Maize Milling

	Nembure	Mwca	Runyenjes	Ndomba
Debes milled	675	5145	900	990
Profit	262/67	914/83	522/95	500/84
Profit/debe	-/39	-/06	-/58	-/51
Charge/debe	1/20	-/70	-/70	-/70

Often the women had to travel long distances to a mill and distances up to 10 miles were recorded, visits taking as long as 8 hours. Actual records of mill visits are rather limited. This appears to be caused, because the women avoided going to mill during the visiting period of the research so as not to be out when contacted by enumerators. Table 11 illustrates the number of hours required for specifically recorded journeys to different types of mills.

Table 11 Labour used in Visiting the Mill

Amount Taken	Time there	Time for journey	Type of Mill	lbs/hr.	Comments
$\frac{3}{2}$ debe maize) $\frac{1}{2}$ debe wheat)	8 hrs	$2\frac{1}{2}$ hrs	Water	2.86	Specially fine flour needed
$\frac{1}{2}$ debe sorghum	$1\frac{3}{4}$ hrs	2 hrs	Diesel	5.87	Housemaid aged 12 wife paid employment.
18 lbs maize	1 hr.	$\frac{3}{4}$ hr.	Diesel	10.29	
35 lbs. maize	$\frac{1}{2}$ hr.	2 hrs	Diesel	14.00	
40 lb. maize	$2\frac{1}{2}$ hrs	$\frac{1}{2}$ hr.	Water	13.33	

For home milling the time spent was usually $\frac{3}{4}$ - 1 hr, just enough flour being ground for one meal. Sorghum appeared to take slightly longer than maize. Table 12 illustrates the time spent preparing flour in four of the households studied.

Table 12 Labour Use in Home Grinding

Time	No. of people eating	Crop Ground	Approximate amount (lbs.)	Owned Mill	Borrowed Mill	lb/hr
$\frac{3}{4}$	3	Sorghum	4- 6 lbs.	×	✓	6.67
1	2	Sorghum	4 lbs	×	✓	4.00
1	6	Maize	6 lbs	✓	—	6.00
1	8	Sorghum	6 lbs	×	✓	6.00

The only records of home grinding were made in the wet season. This was probably due to several factors, firstly that it was the busy season, and the women were short of time, and there being little to sell in market, the journey to the mill could not be combined with another activity. Also due to the shortage of food at that time of the year, there was very little maize to grind at any one time, and so a journey to the mill was not worthwhile.

The mills seem to be used by all women without exception even though the charge for their use seems to be high compared with costs. Taking the last three figures of Table 9 (which seem to be the least biased) the saving in time of visiting a mill is approximately 6.8 lbs/hr. (in other words home grinding takes just over twice as long as mill grinding.) This figure would increase as the amount to be milled increased, but has an upper limit in the amount the women can carry.

On average home grinding gives a saving of 21 cents per hour over a water mill, and 42 cents over a diesel mill. (of the higher priced variety). Since the local wage rate for unskilled work is 2/- per 6-8 hr. day, it does not seem unreasonable that the women should value her time as worth more than 21 cents/hour. However in the case of the diesel mill, it seems less worth her while to use the mill, and this may account for the tractor driven mill which appeared in the area presumably operating at lower charges. Quality considerations may also have affected the widespread adoption of the use of mills, although again diesel mills do not produce as good a quality of flour as the water mills. Other factors are the reduction in physical effort - transporting not being considered particularly burdensome - and also that visits to the maize mill can seldom be considered in isolation, as the journey would often have to be undertaken whether or not the mill was being visited. Also the time waiting for the milling to be done may be used in visiting the market or clinic, and in fact, the reduction in time, if the mill was not visited becomes almost negligible. This is only taking into account the economic advantages of using the mill, and not the social. When the women do have time to wait at the mill it becomes an enjoyable social gathering for them. This applies to the water mills far more than to the diesel mills, and thus the advantages of using the mills rather than

grinding at home are reinforced by leisure preferences.

4. Water Carting

Water carting for profit was done by three methods, namely using a donkey cart, using a donkey with boxes, and by women. The first two methods were those normally used, and the last served to augment the income of some women who had very little land, but was not a very regular occupation. The carts either used large drums for water or sometimes the customers supplied their own debs. The donkeys with boxes used two or four, each carrying a dobe. These were used quite a lot in Karingari as the nearest well or water pipe was down a steep path which was too narrow for carts. Most of the water fetched in this way was used by the bars and shopkeepers in the village. A cart also supplied water to the as'aris at the chiefs camp.

None of the farms used the box method of water transport, but 3 had donkey carts, 2 large rain water tanks, and several had smaller tanks, which reduced water carting in the rainy season. The farm donkey carts were also used for transporting coffee, firewood and manure and the other carts were also hired out for other purposes on occasions, as water carting did not occupy them all day. The commonest method by far of water carting was the traditional method, using a mutungi, and head strap. A 'mutungi' holds 60 lb or about 6 gallons. Often a very steep climb was involved in fetching water, even if the distance was not very great, and a donkey cart would not be a practical proposition unless a new path was made. One farm had in fact done this, and was using bullocks with the cart not donkeys. Due to the pattern of land distribution as a result of consolidation no farm was very far from a water supply.

Tables 13 and 14 show accounts for the water carting business questioned.

Table 13 WATER CARTING (Donkeys & Boxes)
Monthly: Income and Expenditure

Expenditure	Gith mu Karingari		Income	
	Gith mu	Karingari	Gith mu	Karingari
Labour	60/-	60/-		
Licence (7)	-	-	Returns - bar	23/-
Feed costs - donkey	13/-	5/-	outsiders	3/-
Hire costs donkey	-	15/-	Total returns	26/-
Repair costs boxes	10/-	1/-		90/-
Depreciation donkey (8)	4/-	-		90/- (10)
boxes	1/-	8/-		
Total	<u>88/-</u>	<u>89/-</u>		
Profit		1/-		
Loss	62/- (9)			

- (7) Feed costs were estimated as the opportunity cost of the land grazed by the donkey. In fact in many cases the donkeys were using waste land.
- (8) A original cost of the donkey was charged equally to each year the donkey was predicted to work.
- (10) Since fetching the water only takes about 5 hrs/day, the man is better off running this business than working for someone else for 60/- a month (if he gets a job). He also has scope to increase his trade, and perhaps to use the donkey for other purposes.
- (9) This loss can easily be charged against the bar profits, other work done by the cart does not bring in much extra money perhaps 5/- or so per 3 months, and thus the driver is not fully occupied, and it is perhaps unfair to charge his all wages to the water carting, when he spends a considerable amount of time working in the bar. Water carting took him 2-2½ hrs. a day.

TABLE (14)

WATER CARTING (Donkey and cart business)

Monthly: Income and Expenditure

	EXPENDITURE							INCOME					
	(a) Karn.	(b) Nem.	(c) Kim.I	Kim.II	Kim.III	Kim.IV		(a) Karn.	(b) Nem.	(c) Kim.I	Kim.II	Kim.III	Kim.IV
Labour	60/-	50/-	60/-	50/-	75/- ^{(60/-} 15/-	60/-	Returns from						
Donkey feed costs ⁽⁷⁾	13/-	25/-	25/-	13/-	25/-	13/-	water	(11b) 126/-	(12) 120/-	78/-	105/-	(15) 324/-	376/-
Cart repair costs	1/-	(14)	4/-	(14)	3/-	5/-	maize			12/-			
Licence	1/-		3/-	5/-	30/-	-	s/c			40/-			
Depreciation ^(5b)													
donkey	1/-	3/-	1/-	2/-	4/-	1/-							
" cart ^(11a)	11/-	8/-	9/-	10/-	6/-	6/-							
Total	87/-	86/-	102/-	80/-	143/-	85/-		126/-	120/-	120/-	105/-	324/-	376/-
Profit	39/-	34/-	18/-	25/-	181/-	281/-							

(a) Karingari

(b) Nembure

(c) Kimbinbi

The running costs are fairly low, and profit depends on the volume of trade. Since increasing business seems to be of primary importance, the price per debe seems high. None of the businesses fetched water for a farm, and this did not seem to be considered as a reasonable opening for increasing trade. Since, on the average a woman can fetch 6 gallons in 24 mins., and she saves 20 cents by performing the job herself, in 1 hr. she saves 50 cents. This implies that unless the cost per debe or mutungi ⁽¹⁶⁾ falls it is not worth using the services of a cart. At 10 cents a mutungi (or 6.7 cents a debe) her saving would be 25 cents/hour, and on the basis of the widespread use of maize mills at this saving, water ceters charging at this level ought to produce a demand for their services by the wives. However this figure does not take into consideration the other factors connected with the use of mill (e.g. all time cannot be charged against the mill visit and social benefits derived from using the mill). However, there does appear to be a good case for each farm or group of farm owing their own carts, as these can be used for much of the transport needed. Also one household possessed a machine for planting beans, which was pulled by a donkey. Since once the cart is owned the cost per debe fetched is very low it would probably mean that the farm household would use more water and that livestock would not be restricted on their intake. One household which obtained a donkey cart during the visiting period increased their consumption of water by four times, and there appeared to be a general desire to use more water than was actually fetched. ⁽¹⁷⁾

Table 15 Costs of Home Owned Donkey Cart

Donkey feed costs ⁽¹⁸⁾	15/-
Cart repair costs ⁽¹⁹⁾	negligible
Depreciation - donkey ⁽²⁰⁾	2/-
" cart ⁽²¹⁾	5/-
	20/-

(16) Debe water container holding 4 gall., mutungi, water container holding 6 galls.

(17) R.D.R. 44 - J. Wills - A Study of the Time Allocation by Rural Women and their Place in Decision making - preliminary findings from Embu District.

(18) See footnote (7)

(19) Most cart owners estimated repair costs as being less than 50 cents per month.

(20) See footnote (8).

(21) This was an estimated figure taken from the depreciation figures for enterprise carts, with allowance made for the lower amount of work done by a farm cart.

If over 200 mutungis were needed per month (or 7 mutungis/day) it would be worth the household owning its own cart, without giving any value to other benefits arising from possessing a cart. All the households using this much water did own carts. If, however, the farm acreage was not fully utilised then the opportunity cost of the land allowed for the donkey, would be less than 15/- a month, and could even be nil. In which case a much lower demand for water would still constitute a viable case for a self owned cart.

Conclusions

Small entrepreneurs could occupy an even more important place in the rural economy in the future. Already in beer making and maize milling, small entrepreneurs have practically claimed all the market, and these occupations are very rarely practised at home. The beer making charge seems to be for social rather than economic reasons, but in the case of maize milling economic concerns do seem to be the influencing factor. On the other hand economics seem to be the reason behind water carting still being carried out by the women. The beer making enterprises tended to be making rather variable profits, which although positive could easily become negative at a change of fortune. Since it appears that far too much money for the rapid progress of the farming, is spent on beer, possibly in the future less money will be channelled in the direction of the bars. This means that there is little scope for further expansion of this enterprise. That is unless the rising incomes of the population caused by improved farming, also lead to an increased demand for beer. However, in some ways the desire to have money to spend in the bar has helped to improve the farming and certainly increasing desire for consumer goods will be the main driving force behind development of the agriculture. Beer making does provide employment for surplus rural labour, and also an increased market for sugar canes, which would otherwise have a much lower value. Many of the women sold their sugar cane crop, and this was a source of income, which they were free to spend as they chose. The market was local, and there was no need for a journey to Embu, which would be necessary if cabbages instead of sugar cane had been grown. (Demand for cabbages in Karingari market was very limited). The social aspects of home brewing have been mentioned. However, whether there are social benefits from entrepreneur production of beer to the community in general is doubtful.

Maize mills appeared to be making a considerable amount of profit, and the scope for entry into the enterprise would seem widespread. However, the initial costs of setting up a mill are high, and presumably the existing mills could soon lower their prices at the appearance of competition. The new mills would then have difficulty in competing with those already established. The appearance of the tractor mill in Karingari might provide the answer to this problem, if the existing mills could be made

to lower their prices permanently. This tractor mill could be used in several districts to lower mill charges. Since the money for milling comes from the women in nearly every case, a saving here ought to allow more women to use fertilizer on the food crops, or to buy better food for the family. This could act to stimulate the rural economy in several ways, although the amount of money involved is only small. As yet maize is only ground for home consumption and not often for sale by the individual farmer, so although the value to the household is increased by the processing of this crop, this has been extended only in a small way to the marketing of maize. This is probably due to the poorer keeping quality of maize flour over maize grain. Social benefits have already been dealt with; the reduction in physical effort and the chance to mix socially at the mill are the main ones.

Water is always regarded as a big problem in the area, as is firewood (though the latter is more of a problem and the former less at Mwea). There is constant demand that the government should do something about it. It appears that a fairly simple solution is the introduction of donkey carts on a wider scale. As has been shown at present water consumption and price levels these would be uneconomic on many farms, if used solely for water carting. However if desired water consumption is four times as high as that normally fetched (as it was in the case of one farm) then it would only be uneconomic for 3 farms out of 26 at the desired level of water consumption. If these carts were also used in helping with the problem of firewood this would increase their desirability, and further uses in transport and semi-mechanisation of farm operations would have the same effect.

Since quantitative data is extremely difficult to gather, most farmers not having any sense of size and weight, the data must be treated as approximate. Also the seasonal variations in all three enterprises are large, and records made at one time of year for the whole year are subject to error. Beer making varied considerably in quantity depending on the amount of money available in the district, and increased dramatically at coffee pay-out times. Maize milling depended on the seasons and the abundance of harvest, and water carting on the rain; as most people had small tanks in the village. The bars made further profits by selling 'Tusker' but this has been omitted from the paper, as it decreased rather than increased the scope for local development of enterprises. Further study of the effect of further increases in these types of enterprise is necessary, and with regard to the relief to the female labour force, it would be necessary to examine the alternative uses of time and their productivity.

The author wishes to thank Mr. Malcolm Hall for his comments and criticism of the paper.

APPENDIX I

BEER MAKING
Monthly: Income

	<u>EXPENDITURE</u>			
	Nembure		Mwea	
	I Githumu	II Karingari	III Ngumbani	IV Kimbumbi
Labour	450/-	900/-	575/-	580/-
Sugar cane juice	810/-	2,700/-	1,235/-	840/-
Water	15/-	75/-	107/-	236/-
Fermenting Agent	2,708/-	7,065/-	7,654/-	12,250/-
Honey	-	975/-	996/-	2,146/-
Sugar	-	-	2,048/-	4,288/-
Fuel	55/-	-	80/-	120/-
Repair to mill	38/-	15/-	15/-	15/-
Oil	4/-	2/-	3/-	3/-
Licence	4/-	4/-	4/-	4/-
Water for bar (a)	20/-	40/-	30/-	30/-
Paraffin for bar (b)	12/-	12/-	12/-	12/-
Depreciation mill (c)	22/-	22/-	22/-	22/-
" bar (d)	104/-	104/-	104/-	104/-
Total	4,392/-	11,914/-	12,885/-	20,650/-
Profits	1,558/-	1,586/-	1,740/-	350
Profits if allowance made for beer drunk by employees (e)	918/-	866/-	1,200/-	-30/-
Profits after further allowance for food for employees (f)	553/-	386/-	840/-	-350/-

(a) 200 dekes per month allowed

(b) Based on estimates from one bar

(c) Machine costs around 1520/- depreciation charged
equally over 5 years.(d) Estimated cost of bar 25,000/-, depreciation charged
equally over 10 years

(e) 4 bottles per day allowed per head

(f) 40/- per month allowed per head.

INTERPRISES
and Expenditure

	<u>INCOME</u>			
	Nembure		Mwea	
	i	II	III	IV
	Githumu	Karingari	Ngumbani	Kimbumbi
Returns from Beer	5850/-	13,500/-	14,625/-	21,000/-

APPENDIX II

HOME BREWED BEER
per session
INCOME & EXPENDITURE

	<u>INCOME</u>			<u>EXPENDITURE</u>	
	<u>A</u>	<u>B</u>		<u>A</u>	<u>B</u>
Labour self employed	4/-	2/-	Returns from Beer	(e) 168/-	(f) 43/-
Sugar cane juice	32/-	12/-			
	(a)	(a)			
Water	-	-			
Fermenting Agent	42/-	18/-			
Fuel (b)	2/-	2/-			
License	10/-	(c)			
Charge for mill (d)	4/-	2/-			
Total	94/-	40/-			
Profit	73/-	3/-			

- (a) Less than 50 cents.
- (b) one load charged.
- (c) operating without licence.
- (d) 50 cents per debe.
- (e) 42 gallons made.
- (f) 18 gallons made.

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