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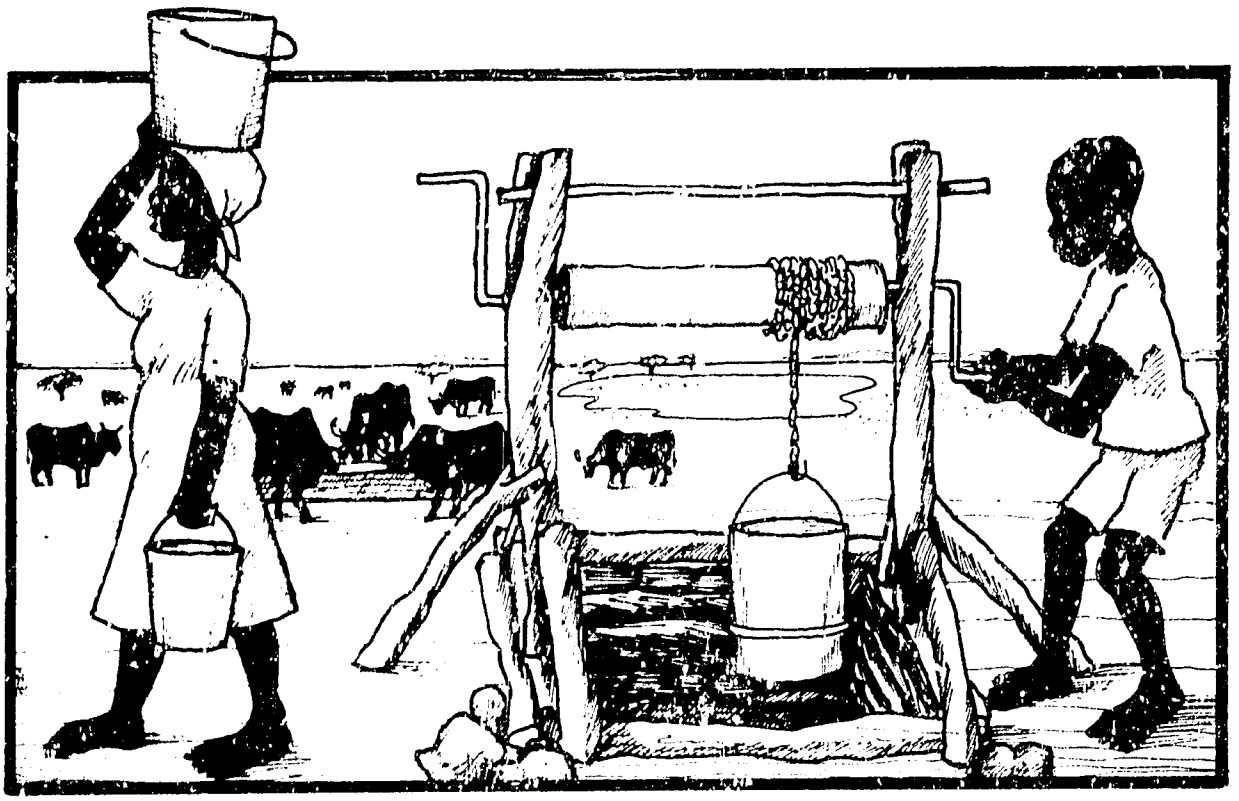
WOMEN'S AGRICULTURE IN A CATTLE ECONOMY



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Women's Agriculture in a Cattle Economy

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TABLE OF CONTENTS

	Page
List of Tables and Figures	i
Introduction	1
Previous Research	2
Access to Livestock and Draft Power	3
Access to Labour	7
Quality	7
Reliability	7
Quantity	8
Other Findings	9
Data From the Water Points Survey	10
Access to Livestock and Draft Power	10
Access to Labour	16
Access to Extension Staff	18
Perceptions of Constraints to Production	19
Policy Issues	21
Arguments For Getting Women out of Agriculture	21
Arguments For Keeping Women in Agriculture	26
Bibliography	30

LIST OF TABLES AND FIGURES

		Page
Figure 1	Map of the Water Points Survey Areas	11
Table 1	Summary of Some Research Findings on Women in Agriculture in the Eastern Communal Area.	4
Table 2	Comparison of Livestock Ownership by Male and Female Headed Households	12
Table 3	Comparison of Plowing by Male and Female Headed Households, 1976-1978	13
Table 4	Summary of Plowing by Sex and Cattle Ownership 1976-1978	13
Table 5	Comparison of Plowing by Cattle Owners and Non-Cattle Owners by Sex, 1976-1978	13
Table 6	Comparison of Source of Draft Power for Male and Female Headed Households, 1976-1978	14
Table 7	Comparison of Livestock Sales by Male and Female-Headed Households.	16
Table 8	Comparison of Household Members' Time Spent Living at the Lands for Male and Female Headed Households	17
Table 9	Source of Labour Used for Plowing	17
Table 10	Comparison of the Proportion of Male and Female Headed Households Knowing the Name of Their Agricultural Demonstrator	18
Table 11	Comparison of the Proportion of Male and Female Headed Households Receiving Extension Advice	19

		Page
Table 12	Perceived Constraints to Agricultural Production	20
Table 13	Labour Force Growth: 1964-1971	24
Table 14	Male and Female Formal Sector Cash Employment (Botswana Citizens) 1967-1978	25

Women's Agriculture in a Cattle Economy[1]

Introduction

The large land expanses, climate, and ground water resources of Botswana make it ideally suited for cattle production. Beef is second only to minerals in importance as an export product. In short, agriculture in Botswana is nearly synonymous with the cattle industry. Arable agriculture, in contrast to the highly profitable cattle sector, is primarily a subsistence activity characterized by a high degree of risk.

No farmer in Botswana has an easy time of it. Only six percent of the country's soils are suitable for arable farming and the climate is hardly more hospitable. Sanford (1977:26-28) has calculated the "Best Guess" probability for moderate drought[2] is once every two years, and severe drought once every four or five years for three stations in the eastern communal area where 80 percent of the population lives and farms. Vierich (1979a:22)reports that during cycles of low rainfall years, an arable drought can be expected once every four years and once every five years during cycles of high rainfall.

Thus, simply from the standpoint of quantity of rainfall alone, the average farmer faces a serious problem once every five years. The problem is aggravated by the timing and distribution of rainfall. McGowan (1979):

1. The data used in this paper were collected as part of the Ministry of Agriculture Water Points Survey funded in part by USAID - Cornell University Cooperative Agreement. AID/DSAN-0006. The views are those of the author and do not necessarily reflect the views of the Ministry of Agriculture, Cornell University, or USAID. The writing of this paper benefited enormously from the advice of E.B. Egner and of E.M. Roe who compiled Tables 13 and 14.

   The helpful comments of C. Barnes, D. Jones, A-L. Klausen and J. Smith are also gratefully acknowledged. An earlier version of this paper was presented at the Ford Foundation Workshop on Women and Agricultural Production in Eastern and Southern Africa, Nairobi, April 1980. The published proceedings of that conference are forthcoming.

2. During a moderate drought actual supply is between 85 and 100 percent of actual requirements. Severe drought occurs when the supply is between 60 and 85 percent of actual requirements. (When the supply falls below 60 percent of needs, the drought is disasterous, an occurrence expected roughly once every 50 years).

Annex 8:12) found that rainfall in any given month was independent of the rainfall in other months both within a given year and across years as well as being independent of rainfall in that month across years. The practical implication of this is that a farmer must make his/her decisions to plough and plant more or less on blind faith. Rains may be a golden opportunity or an invitation to disaster. There is no good way of predicting which.

Yet another problem is the seemingly capricious geographical distribution of rainfall. One field may receive heavy rains while a field a kilometer away parches. Farmers try to maintain fields in scattered locations as a strategy towards maximizing the possibility of at least one field receiving rain. Agriculture in short, is a very high risk occupation. An FAO study on agricultural constraints in Botswana found that even during the relatively good 1970/71 agricultural year, 18 percent of the households planting produced no crop (1974:41).

Jones (1977:5) states:

> "In all years there is a high incidence of crop failure. In 1971/72, a fairly good year, 9% of farmers who had planted sorghum and 27% of farmers who had planted maize failed to harvest anything. In 1972/73, a bad year, the acreage harvested was 68% of that planted".

Women farmers face the same risks as their male counterparts, plus a set of problems peculiar to their situation. Fortunately for them the Government of Botswana is unusual in having undertaken research on the involvement of women in agriculture (Bond, 1974) and in having established the post of Agricultural Officer/Women's Extension to address some of the problems identified. Thus women's agricultural problems have received some attention. However, the problems are far from solved. This paper briefly summarizes research findings on women in agriculture, presents some new supporting data, and discusses some policy issues.

Previous Research

The first work on women in agriculture in Botswana was done by Carol Bond in 1974. She found that women were responsible for and carried out many aspects of crop production and agricultural decision making and were often responsible for pigs, poultry and smallstock. Despite this heavy involvement, she found most extension contact was with men, biasing extension work towards the more productive male headed households.

Other studies, all done in the eastern communal area, have provided varying amounts of information of women farmers. Selected information from these studies is presented in Table 1.

An important question in considering the subject [illegible]en in agriculture is: how many of them are there? The proportion of female headed households in these studies varies from 20 to 43 percent, averaging around 30 percent. Part of the variation may stem from local differences in male migration. It may also represent a definitional problem.[3] Some studies define female headed households as those in which there is no male present whether the woman is married or not. Other studies define a household as male headed if there is a de jure male head even if he is rarely or never present. Still other studies differentiate between de facto female headed households in which there is a male present and those in which there is none because the presence of a male may change the kind and amount of labour available to the households. Unfortunately the definition used for female-headed households is not available for some of the studies in Table 1.

The previous research has consistently identified two problems faced by women involved in agriculture: access to draft power and access to labour.

Access to Livestock and Draft Power

The available research on women has shown that a large proportion of them (over 50 percent) own no cattle. And women who do own cattle own fewer than do men. Bond's data (1974:Table 3.3) show that 60 percent of the female household heads who owned cattle owned ten or fewer while only 42 percent of the men who owned cattle owned this few. (It is commonly believed that a herd of approximately 20 - 30 beasts is necessary to allow a farmer to field a span of six oxen.[4]) Sixty percent of the herds over 100 were held by men (31 percent of Bond's sample).

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3. See Kerven 1976b pages 1-3 for a thorough discussion of the problem of defining female headed households. Kerven presents case studies for each of six types of female headed households (urban and rural).

4. Vierich (1979a:v) places the critical herd size at 22. Cooper (1980:45) places it between 21 and 40 and states that ten is the minimum number which will allow a farmer to plow if he/she uses cows for draft power as well.

TABLE 1

Summary of Some Research Findings on Women in Agriculture in the Eastern Communal Area

Study	Survey Area	Year of Publication	Number of Households	Percent Female Headed Households (FHH)	Percent FHH with no cattle	Average FHH Cattle Holding	Average MHH Cattle Holding	Percent FHH with no small stock	Percent FHH Ploughing	Percent FHH Using Tractor	Average Acreage FHH	Average Acreage MHH
Bding and Sekgoma	Kweneng	1972	2398	21	57	4.2	7.2	34[a]	84			
Bding, Udo Sekgoma	Maryana	1972	279	33	64	3.4	7.3					
Syson	Shoshong	1972	238	20	50							
Syson	Shoshong	1973	229	21	54.2[b]							
Bond	Kgatleng Kweneng Southern	1974	204	42	53			38[d]	98	24	(3.9[e]) 5.6	9.6
FAO	Eastern Communal Areas	1974	954	30	73	5.6	23.5	47	66			
Kerven	Tsamaya Village NE District	1976	38		53	5	25					
Brown	Kgatleng	1978	215	39						50		
Izzard	Oodi Ramoutswa Kanye	1979	61[c]		43[d]			43[d]				
Kossoudji and Mueller	National	1979	1060	43		P407[e]	P1545[f]				5.4[g]	15.4[h]
Singh and Kelly	National	1980	1802	32.1	53.1							
Water Points Survey	Eastern Communal Area	1981	355	25	57			59	1976:66 1977:66 1978:46	1976:12 1977:14 1978:12		
Wikan	Letlhakeng Tutume	1981	160 160	43 43	70[i] 32[i]	90[j] 59[j]			35[k] 89[l] 80[k] 94[l]			

a. Goats

b. Has no cattle post

c. All female headed households

d. Owning no livestock

e. Value of cattle owned by female headed no male present household (see footnote 5)

f. Value of cattle owned by male headed male present households (see footnote 5)

g. Female headed no male present households

h. Male headed male present households

i. % Absent worker FHH with 5 or fewer cattle

j. % Non-absent worker FHH with 5 or fewer cattle

k. Absent worker FHH

l. Non-absent worker FHH

The four women holding herds of that size were widows and in general may be presumed to have inherited the bulk of their herd from their husbands.

Women also tend to have fewer small stock than men. The 1974 FAO study (p.33) showed an average herd size of 5.1 for female headed households compared to 8.4 for male headed households. The mean proportion of female headed households without smallstock reported in the 5 surveys in Table 1 was 44.2%. In no case did it fall below a third. Hence, women's lack of cattle may in some cases not even be marginally compensated by the ownership of smallstock.

The relative lack of livestock, particularly cattle, among female headed households, has implications for the households' use of draft power and possession of capital assets for conversion to cash.

The FAO Study (1974:7, 46-47) pointed out that 91 percent of those who ploughed used oxen or other cattle, and stated

> "Households which do not own draft animals plowed generally late and consequently needed smaller acreages. ... Households that used only their own draft power were the first to plow and plowed an average of 70% more per household that those who borrowed, exchanged or hired draft power".

Kooijman (1978:192) also found in Bakaa that households which were forced to hire or borrow a span of oxen generally ploughed late.

In short, households without draft animals (which includes all households with no cattle as well as some cattle-owning households) are less likely to be able to plough on a timely basis in an agricultural situation in which timeliness is critical because of rainfall patterns.

In addition, women who are unable to borrow a span of draft animals are forced to hire draft power including tractors. This is costly. Kerven (1979b:26) points out that while R.I.D. Survey data showed male and female-headed households to have nearly equal productivity, female headed households net profit was P7.91[5] per acre while male headed households' profit was P11.57[5] per acre. She quotes Lucas (1979:61):

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5. All figures were given in Rand in the original documents. The Republic of Botswana changed its currency to Pula in 1976. At the time the conversion rate of Rand to Pula was 1:1. The current value of the Pula is 1.26 U.S. dollars.

> It was stated that "output" per acre is just slightly higher in female households compared to male-headed households. But, after subtraction of purchased inputs (and particularly the greater expenditure on ploughing services) and inputed family labour costs, profit per "acre" is higher amongst male-headed households, as is net profit per "acre" despite the larger value of equipment possessed by male-headed households.

Thus female headed households' lack of draft power not only has a long term cost in lower production due to lack of timeliness and smaller acreages, but it also has an immediate cost in the form of cash outlay for ploughing.

This raises the second problem women face because they lack cattle. Cattle are savings on the hoof that can be sold to meet cash requirements. Because women farmers are more likely to hire draft power and labour, they have cash expenses in addition to normal household cash requirements which men are less likely to have. They are also less likely to have the means for meeting such expenses.

A number of studies (FAO, 1974:58), Eding and Sekgoma, 1972: 47; Syson, 1971: 21; R.I.D.S., 1974 (cited in Vierich, 1979a:66)have shown that most frequent means of raising cash to buy supplementary food is selling stock. Vierich's study (1979a:66)shows selling stock to be the second most frequent means after selling beer. Women, it has been shown, have little stock.

One might think that the lack of cattle might be compensated for by cash from remittances from household members employed as wage labourers elsewhere, particularly in the mines of the Republic of South Africa. However, women also have lower cash incomes than men. Syson (1972:38) found in Shoshong that 34 percent of the women compared to 21 percent of the men had an annual cash income under P50.[5] R.I.D.S.[6] data (Kossoudji and Mueller, 1979:3-4) show the mean household income of female headed households with no male present was P445[3] in 1974 compared to P1075 for male headed-male present households. If transfer income is included, the figures rise to P479 and P1085 respectively. Fifty-four percent of the female headed, no-male-present,

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6. The R.I.D.S. sample was a national sample including sandveld areas and major "villages". The residents of the major "villages" which have populations as high as 20,000 do not comprise a strictly rural sample. Hence some bias may be expected in these statistics.

households had an income of P395 or less in 1974, well below the Poverty Datum Line (the income calculated as necessary to maintain a minimum subsistence) of P555 for a family of five that year. In contrast, 31.4 percent of female headed households with a male present and 22.8 percent of male-headed/male-present households fell below the P395 level.

Thus, women who must, as it were, buy their way into agriculture are at a disadvantage even if they are recipients of remittances.

Access to Labour

Female headed households are generally considered to face a labour constraint. This contraint has three facets - quality, reliability and quantity.

Quality: A certain amount of male labour is considered to be necessary to the agricultural enterprise since men generally destump fields, inspan the draft animals and plough. Bond (1974:34) found that 81.6 percent of her sample considered ploughing to be suitable work only for men. Practice tends to follow attitudes. Bond (1974:16) found that in only 3.6 percent of the cases was a women the main person ploughing. The Activities Survey (Kerven, 1979a:23) showed that on the average women spent 1.32 percent of their time (ranging from 0.6 to 3.2 percent) on ploughing and planting compared to an average of 3.98 percent (ranging from 1.5 to 7.8 percent) for men. The FAO Study (1974:37) found 22 percent of male headed households required help from outside at ploughing time compared to 50 percent of female headed households.

While the physical strength of a male can be useful in dealing with a recalcitrant ox, it is not true that women cannot plough or manage oxen. They can and do. This author often saw two women ploughing in the North East District during the 1979/80 ploughing season. In the Southern District she has seen a woman ploughing with two spans (one of twelve oxen, one of twelve donkeys) with the aid of her sons. Solway (1979:38-39) reports that in at least one village in the sandveld women both plough and undertake cattle management. However, she notes that such activities are incompatible with pregnancy, carrying small children and the completion of household chores.

Reliability: Discussions with women indicate that many of them feel

that family labour is more reliable than hired labour. The hired herdboy has no incentive other than his generally low pay to pay strict attention to the herd. Indeed many women feel the probability is very high that a herdboy will steal their cattle. The hired ploughman is unlikely to take the same care on a client's field than he would on his own. Thus while women can buy their labour, they are not necessarily able to buy quality labour and thus their production may suffer.

Quantity: A certain minimum investment of time is necessary for reasonable yields. However women have a commitment of time in the form of domestic maintenance activities which their male counterparts do not have and this amount of time is substantial. Copperman (1978:16) found in four villages that women make 55 percent and girls 25 percent of all trips to fetch water from the standpipe. The Activities Study (Sheppard 1979:91-93) showed women in three villages spent an average of 40.4 percent of their time on household work compared to an average of 13.7 percent for men. (If collecting firewood, which can be a purely economic enterprise, is eliminated, the male figure drops to 12.6 percent).[7]

Thus women may not have enough time to do a good job of farming. When wood must be collected, water fetched, and food cooked, sometimes it is necessary (since it is less immediately urgent) to let some agricultural work go.

The absence of male labour has a high cost for famle-headed households (having no cattle) and other households which lack a surplus of male labour. Duggan (1975:8) points out that women hire ploughing services "at a higher price than do families who can exchange male labour for ploughing". Turner (1980) cites Lucas (1979) to the effect that female headed households pay five times as much as male headed households which exchange labour or use their own beasts. Thus the female headed household's lack of male labour not only has a cost, it has an excessively high cost. Again this is

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7. The R.I.D.S. (p.280) data show that men spend 30 percent of their time caring for cattle and 23% caring for smallstock compared to 4 percent and 7 percent respectively for women. Since most livestock in Botswana wander untended except during the cropping season, it seems unlikely that the men actually spent 53 percent of their time working with livestock. It is, however, suggestive of the additional work load placed on a female household head if she keeps livestock.

the segment of the population least able to meet such cash requirements.

Other Findings

Some studies have shown production by female headed households to be lower than for male headed households. Eding et al.(1972:263) found that female headed households in Manyana produced an average of 1.2 bags of sorghum per acre compared to 1.9 bags per acre for male headed households. Eding and Sekgome (1972:45) found that female headed households in South West Kweneng produced an average of 2.9 bags of sorghum compared to 4.7 for men. However, the R.I.D.S. data (Kerven, citing Lucas, 1979:26) shows that productivity between male and female headed households is almost equal.

Women are not only involved in agriculture as farmers, they are also labourers on the fields of others. People who are involved in majako, a system under which one gets part of the harvest in return for work done earlier, are primarly women except in the case of ploughing and destumping.[8] Sheppard (1979:24) found that nearly half the households in his survey areas involved in majako, were female headed. Further, if ploughing were excluded, 97 percent of those doing majako were women. These households often have a minimum of assets and are severely hurt when drought eliminates the opportunity for employment. In many senses these are probably the most vulnerable female headed households involved in agriculture. However, the counter-argument is made that those who work for the more efficient farmers are in times of stress more likely to get a crop than if they were ploughing for themselves.

Another issue is a women's right to land. The following is quoted from a letter from the Agricultural Officer Women's Extention to a District Officer (Lands) and explains the findings of her conversation with the State Council in the Land Division of the Attorney General's Chamber, the Act referred to is the Tribal Land Act.

> "As the law is interpreted women in theory are equally entitled to land with men, in the act the term "tribesman" has no significance of gender and should be interpreted as tribesman or tribeswoman. However, a woman can only be allocated land in her own right if

8. For more detailed description of majako see Vierich 1979b and Vierich 1979a:43-47 .

she is legally single, i.e. unmarried, divorced or widowed. If she is married she is only entitled to it through her husband and not in her own right. I was told "a married women is a minor and has no rights"! If a married women is separated, i.e. living away from her husband, then her children have a right to be supported by their father be it only the right of the wife to plough "his" land. If he has left her and she remains in the matrimonial home, there is nothing to stop her continuing to plough his land although permission from the Tribal Court or Land Board should be sort.(sic). If she has left him or if he is living in the area and has another women to plough for him, the wife is still entitled to support for her children and she should seek advise (sic) from the Tribal Court, she may then be given some other land once the matter has been investigated." (McCarthy, 1976)

Data From the Water Points Survey

During the months of October and November 1979, a household survey was carried out by Batswana ennumerators in twelve villages and lands areas in the eastern communal areas of Botswana.[9] (See Figure 1). A random sample of 30 households was interviewed in each village, resulting in 355 usable interviews. Of these 90 were female headed households.[10] In the course of the survey which was focused on water use, some information on agriculture was collected. These data serve primarily to confirm previous findings on women and agriculture. The data were analysed using Hewlett Pachard 34C statistics applications with the exceptions of the F statistic on page 16 and Tables 7, 10 and 11 which were generated using the packages described in Nie et al. (1975).

Access to Livestock and Draft Power

Data comparing the ownership of livestock by male and female headed households are presented in Table 2. The proportion of female-headed households who own no cattle or no small stock is significantly greater than the proportion of male headed households. It will be noted that the proportion of all households with no cattle (29%) is considerably lower than the frequently quoted R.I.D.S. (p.111) figure of 45 percent. It is, however, consistent with the figure of 29% given in the Shoshong Income Expenditure and Wealth Study (Syson, 1972:10). It should be noted that any livestock figures should be regarded as inherently suspect as the extent of one's

9. Southern District: Mokotako, Ntlhantlhe; Kweneng District, Gamoduba, Lentsweletau; Kgatleng District; Matebele, Dikgonnye; Central District: Mmapashalala, Mosolotshane, Ramokgonami; Mmadinare (Phokoje Lands); Bobonong (Motongolong Lands); North East District: Makaleng.

10. Defining a household as female-headed is not unproblematic. In this case households in which there was no adult male present (wives of miners, single women, widows) or in which a woman was acknowledged to be the head by male respondents were classified as female headed. In cases in which a female respondent declared herself to be head even though her husband was present in the household 12 months of the year, it was decided to err on the side of the conservatism and declare the household male headed.

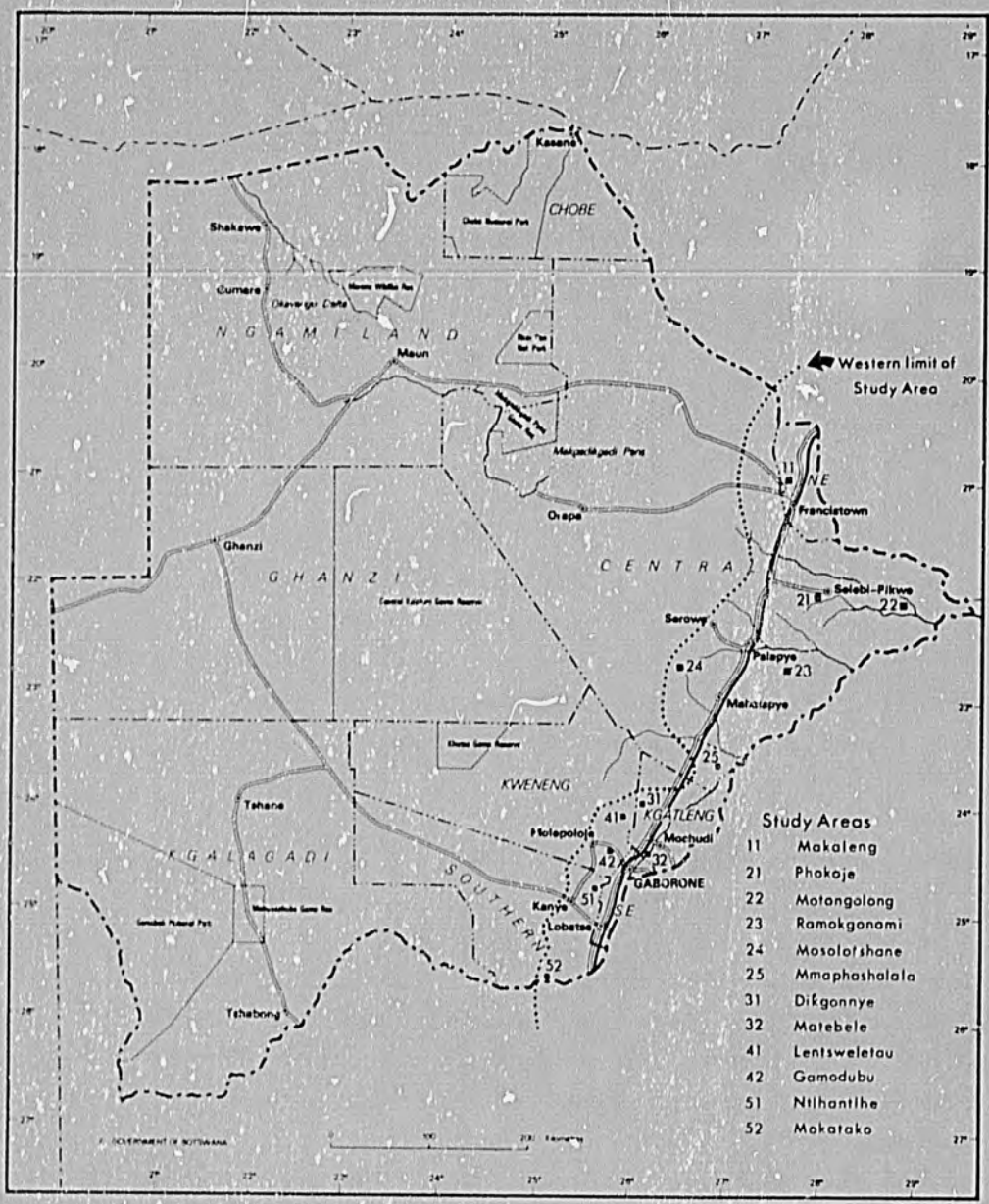

Figure 1 Water Point Survey Study Area

livestock holdings is an extremely sensitive subject.

Table 2 Comparison of Livestock Ownership by Male and Female Headed Households

	Percent of All Households	Male Headed Households (N=265)		Female Headed Households (N=90)	
		Number	Percent	Number	Percent
Owns no cattle ***	29%	51	19%	51	57%
Owns no smallstock ***	41%	91	34%	53	59%

*** x^2 significant at .001 level (that is, female headed households are far more likely to own no cattle than male headed households)

In terms of access to draft power, female headed households have been shown above to be disadvantaged relative to male-headed households. Fifty percent of this survey's female headed households had no cattle at all. How many of the remaining 50 percent can muster a typical span of six oxen is questionable given the evidence on herd size presented above in Table 1.

The data on ploughing and source of draft power, for 1976-1978 presented in Tables 3 - 6 demonstrate both the importance of cattle ownership and the difficult position of women in regard to ploughing.

As can be seen in Table 3 women were significantly less likely to plough in all three years. It is, however, interesting that in 1978/79 season, generally considered to be an arable drought, the number of male-headed households not ploughing doubled, while the number of female headed households increased by only 58 percent. This may reflect the fact that in a bad year many of the men can find other rewarding activities, e.g. wage employment, or can sell some cattle for subsistence needs, whereas the women have no alternative but to plough even when the chances of getting a crop are minimal. It may also reflect the rate of agriculture in an integrated strategy of survival which includes remittances, mining, small scale production and so on. As Kerven (1981) points out, even when the returns

Table 3 Comparison of Ploughing by Male and Female Headed Households, 1976-1978

	Percent of all Households	Male Headed Households (N=265)		Female Headed Households (N=90)	
		Number	Percent	Number	Percent
Did not plough 1976***	21%	43	16%	31	34%
Did not plough 1977**	23	50	19	31	34
Did not plough 1978*	42	101	38	49	54

Table 4 Summary of Ploughing by Sex and Cattle Ownership 1976-1978

Year	Sex	Percent of those who ploughed who own cattle[a]	Percent of those with cattle who ploughed	Percent of those with no cattle who ploughed
1976	Females(N=64)	56%	92%	55%
	Males (N=222)	89.2%	97%	47%
1977	Females(N=64)	56%	92%	54%
	Males (N=215)	89.8%	94.6%	43.1%
1978	Females(N=41)	56.1%	58.9%	35.2%
	Males (N=164)	39.1%	71%	35.2%

[a] In 1979 43 percent of the women and 81 percent of the men owned cattle.

Table 5 Comparison of Ploughing by Cattle Owners and Non Cattle Owners by Sex, 1976-1978

	Ploughed 1967			Ploughed 1977			Ploughed 1978		
	Males	Females	x^2	Males	Females	x^2	Males	Females	x^2
Cattle Owners	198	36	0.03	193	36	0.09	146	23	0.26
No cattle	24	28	0.31	22	28	0.72	18	18	0.00
x^2	9.67**	4.58*		10.74**	4.58*		6.86**	2.87	

* x^2 significant at .05 level
** x^2 significant at .01 level
*** x^2 significant at .001 level

Table 6 Comparison of Source of Draft Pwoer for Male and Female Headed Households 1976-78

Source of Draft	Percent of all Households[a]	Male Headed Households		Female Headed Households	
		Number	Percent[a]	Number	Percent[a]
Used a tractor 1976	15%	33	15%	7	12%
Used a tractor 1977	18	32	15	8	14
Used a tractor 1978	13	22	13	5	12
Used hired/borrowed oxen[b] 1976***	15	22	10	21	36
Used hired/borrowed oxen[b] 1977***	16	25	12	20	34
Used hired/borrowed oxen[b] 1978**	10	11	7	9	22
Used own oxen[b] 1976*	72	173	78	30	51
Used own oxen[b] 1977*	70	165	77	28	47
Used own oxen[b] 1978	76	130	79	25	61

a All percentages based on the actual number ploughing that year

b "Oxen" includes all forms of animal draft

*** x^2 significant at .001 level

** x^2 significant at .01 level

* x^2 significant at .05 level

Sums to more than 100% because some farmers used more than one kind of draft power.

to agriculture are small, it is undertaken in order to keep the balance of this strategy tipped towards survival.

The importance of cattle ownership in determining who can plough becomes very clear in Tables 4 and 5. Table 4 shows that a disproportionate number of those who ploughed were cattle owners. It also shows that a much higher proportion of those owning cattle ploughed than those owning no cattle. This is supported in Table 5 which shows that there is a statistically significant difference in ploughing behaviour by cattle ownership but not by sex.

Men and women who owned cattle were equally likely to plough. Men and women

who did not own cattle were equally likely to plough. Cattle owners were significantly more likely to plough than non-cattle owners. The lower likelihood of women to plough demonstrated in Table 3 is a function of their lack of cattle, not of their sex.

Women's lack of access to their own draft power leads them to use different means of ploughing than men as can be seen in Table 6. There was no significant difference in the use of tractors. This would suggest that a similarly small percentage of both types of households saw the advantage/ necessity of tractor draft and were able to raise the funds to use it. Unfortunately the ability to hire a tractor does not tell us much about the viability of the farming enterprise as money for tractor hire may come from remittances.

There is a highly significant difference in the use of hired or borrowed draft. Female headed households are far more likely to use hired or borrowed animal draft. As was pointed out above, the implications of this is that they are also less likely to be timely in their ploughing. Men, who are more likely to use their own draft animals, have a better chance of ploughing on time.

The use of hired draft (either animal or tractor) power by female headed households suggests that their lack of cattle may not be totally due to lack of money, but also reflects their lack of labour. For example, many women hire tractors not because they cannot afford to buy oxen but because they do not have the labour to look after them (Egner, 1980).

The necessity of hiring draft power reduces the net profit of female headed households as was discussed above. However, the use of hired draft may represent a conscious choice between the costs of owning and hiring draft animals. A woman who owns her own team saves the cost of hiring at ploughing time but must either hire labour year round to tend her herd or keep her children out of school to do the herding. The long run cost of hiring may well be less than owning.

As noted above, selling livestock is an important way of getting access to capital. The data in Table 7 shows that women are significantly less likely to earn money in this fashion.

Table 7 Comparison of Livestock Sales by Male and Female Headed Households

	Male Headed Households (N=319)	Female Headed Households (N=128)
Percent who Earn Money From Livestock Sales	57.7	34.4
Percent Who Do Not Earn Money From Livestock Sales	42.3	65.6

x^2 significant at .001 level
This table includes households from three additional sites: Maisve, Tobela, and Mahibitswana.

Access to Labour

Female headed households had a significantly smaller mean family size of 6.8 than the male headed households whose mean family size was 8.3 (F significant at .001 level). The data presented in Tables 8, 9 and 10 provide evidence for labour constraint faced by female headed households.

The data in Table 8 are based on an inventory of where every member of the household over the age of 15 spent each month from November 1978 to October 1979. The table is composed of all households in which at least one member spent one month or more at the lands. It makes the possibly dubious assumption that a person living at the lands is available as an agricultural labourer.

The table shows a clear significant difference in the amount of male labour available to male and female headed households. Male headed households had an average of 5.56 more months of male labour available to them each year. Male headed households also command more available total family labour - on the average, 5.97 additional months. While female headed households tend to be smaller and hence need less total production for subsistence, they still cannot meet their labour need from their own households for ploughing as can be seen in Table 9. Significantly fewer females than male headed households use only family labour for ploughing. Conversely, significantly more female than male headed households use only hired labour for ploughing. Thirty two percent of the female headed households used some hire labour

Table 8 Comparison of Household Members' Living Time Spent at the Lands for Male and Female Headed Households

	Mean Months(Male)	Mean Months(Female)	Total Months
Female Headed Households (N=39)[a]	10.76	15.63	26.39
Male Headed Households (N=142)[a]	16.32	16.04	32.36
t	-2.23*	-0.18	-1.41

* Significant at the .05 level

[a] The N is smaller than the total sample size for the following reasons: In some villages, e.g. Makaleng, the lands are contiguous to the village. Farmers walk out to their field each day, returning to the village each evening. Even when they are working on the lands, they live in the village. Therefore these households were eliminated from this calculation. Because of the 1978 arable drought, other households did not plough and therefore never went to the lands during that season. They too were eliminated from the sample.

Table 9 Source of Labour Used for Ploughing

	Percent of all Households	Male Headed Households		Female Headed Households	
		Number	Percent	Number	Percent
Uses only Family Labour for ploughing**	60%	177	67%	36	40%
Uses only Hired Labour for ploughing*	14	31	12	19	21
Uses both Family and Hired Labour for ploughing	11	28	11	10	11
Uses Labour Exchange[a]	1	0	0	2	2

[a] x^2 not calculated
** x^2 significant at .01 level
* x^2 significant at .05 level

for ploughing. Again it is not only the quantity but the quality of the available labour which poses the problem for female headed households. Not only is the male headed household bigger but it is a more complete social unit in terms of the kind of labour it has available. As described above, the female headed household's necessity for hiring labour can have high production and social costs for the household.

Access to Extension Staff

Access to extention staff means not only access to information but access to government subsidies, grants, and loans through the National Development Bank, the Arable Lands Development Programme and so on.

Two measures of access were used - whether the respondent knew the agricultural demonstrator's name and whether the respondent had ever got advice from the A.D.

As shown in Table 10 there was no statistically significant difference between the proportion of male and female head household heads who knew the name of their A.D. although fewer of the women knew the name. (The sample size is reduced in this case as sites with no AD were eliminated from the analysis).

Table 10 Comparison of the Proportions of Male and Female Headed Households Knowing the Name of Their Agricultural Demonstrator

	Male Headed Households (N=227)	Female Headed Households (N=90)
Percent who knew name of AD	74.9	65.6
Percent Who Did Not Know AD's Name	25.1	34.4

x^2 not significant

Table 11, however, shows that female headed households were significantly less likely to receive advice from the AD. Nearly three times the proportion of males [illegible] received advice in the previous three months as females. Less than a fifth the females as compared to over a third of the

males had ever received advice at all.

Table 11 Comparison of the Proportion of Male and Female Headed Households Receiving Extension Advice

	Male Headed Households N=226	Female Headed Households N=90
Percent Who Never Received Advice	64.6	81.1
Percent Who Last Received Advice Before 1979	10.6	4.4
Percent Who Last Received Advice January - June 1979	4.4	2.2
Percent Who Last Received Advice July - December 1979	5.8	6.7
Percent Who Received Advice January - March 1980	14.6	5.6

x^2 significant at .05 level

Perceptions of Constraints to Production

Respondents were asked what were the biggest problems which kept them from growing more crops. These data are presented in Table 12.

Rainfall, to no one's astonishment, was the most frequently named problem by all households. Both sexes likewise complained about poor land. However, male and female headed households differed significantly in the proportion experiencing these problems: lack of labour, lack of draft animals and lack of seed. In all cases significantly more women experienced the problem than did men.

The perceived problems of lack of labour and lack of draft power simply offer additional support to the arguments made above.

The question of seed is a bit more complicated. As shown in above, women tend to plough less land than men and thus have lower total production. In

years following an arable drought, such as occurred in the 1978 season, this production might not be sufficient to allow the saving of seed. Hence women might be expected to suffer more from seed shortage. Sheppard (1979: 96) found in Kweneng and South East Districts that saved seed is the most frequent seed source followed by the Cooperative supply. (Bond (1974: Table 6.11) found only a quarter of her sample saved seed, the rest buying it.

Table 12 Perceived Constraints to Agricultural Production

Constraint	Percent of all Households	Male Headed Households		Female Headed Households	
		Number	Percent	Number	Percent
Lack of Rain	79%	214	81%	66	73%
Poor Land	25	61	23	26	29
Lack of Seed*	15	33	12	22	24
Lack of Draft Animals**	12	22	8	19	21
Lack of Labour***	10	18	7	18	20
Lack of Land	14	33	12	17	19
Lack of Implements	6	14	5	9	10
Weak Draft Animals	6	18	7	5	6
Low Prices[a]	1	3	1	-	-

a x^2 not calculated
* x^2 significant at .05 level
** x^2 significant at .01 level
*** x^2 significant at .001 level

The FAO Study (1974:62) found lack of seed to be the second most important constraint cited by households, "especially for households with production deficiences in the previous year". Again the asset-poor female headed household is in a disadvantaged psotion for buying seed. This is particularly important as the increasing use of hybrids will require the purchase of seed each season. It is interesting to note, given the lower acreages for female headed households, that nearly a fifth of the female-headed households

cited lack of land as a constraint.

Policy Issues

One effort of the Botswana Government to address the problems of women farmers has been the creation of post of Agricultural Officer for Women's Extension and the conscious recruiting of female extension staff. This programme is described in Bettles (1980). This programme is a step towards getting agricultural information to women farmers and countering the male bias in the extension service described by Bond. It does not, however, solve the two linked problems of female farmers; access to draft power and access to agricultural labour. Nor does it change the precarious nature of arable agriculture in Botswana. The Arable Lands Development Programme (ALDEP), the government's major policy initiative in agriculture acknowledges the special problems of the female farmer (ALDEP Preparation Team:1979) but to date has not developed an integrated package to deal with her problems.

A major policy issue facing agricultural policy makers is: should the government try to address the problems identified above and assist women and other marginal farmers, or should it make a deliberate attempt to get male and female marginal producers out of agriculture.

Arguments For Getting Women Out of Agriculture

Arable agriculture in Botswana does not pay. Lipton (1978b:187) calculated a return to agriculture of less than P20 per hectare, requiring farmers to plough a staggering 33 hectares in order to make the minimum wage for a government worker.[11] The FAO Study (1974:50) found that 91 percent of households infrequently or never produced enough food. One might reasonably ask why any one in her right mind would be involved in an enterprise which is almost guaranteed to yield nothing once every four or five years and to fail to provide subsistence most of the remaining years. The steps necessary to break the binds affecting women farmers may well not be practical. There are two ways of breaking the draft pwer bind: Providing animal draft through one means or another or providing a tractor hire service.

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11. The FAO Study (1979:9) found that the average household planted 4.6 hectares or only 14 percent of Lipton's necessary hectarage.

Provision of draft animals would be a rather dubious proposition if it were restricted to oxen. According to the ALDEP Preparation team (Purcell, 1978:3), "Given that the communal areas in and around lands and villages are already heavily grazed and in places certainly overgrazed, any scheme to increase the supply of animal draft is likely to worsen the grazing situation." It should be emphasised that the animals held by people with small herds for ploughing are likely to be held at the lands where they are used,hence contributing to a concentration of stock. Such small holders are unable to afford a cattle post and unless they can find (and pay) someone to look after their herd, must keep them where they stay. Even those who can afford to hire a herder may be reluctant to do so because of the problem of theft.

The ALDEP proposal for dealing with the grazing problem is donkey draft. A donkey's grazing requirement is said to be only 60 to 70 percent that of an ox. Donkeys are the predominant form of draft animals in at least one area (Bobirwa) of Botswana. However, donkeys suffer in comparison with oxen since they cannot be sold for meat at the end of their working life.

A final and critical difficulty with the ALDEP animal draft proposal is that even at the subsidised rate, the package is too expensive for most female headed households.[12] The annual loan repayment in the donkey scheme which is cheaper than the oxen scheme is P43-56 (ALDEP Circular No. 2 of 1981):2). The annual loan repayment for an IS 12 plough (of which there are 9 available per agricultural district) would be approximately P18. (ALDEP Circular No. 1 of 1981:8).

It will be recalled that in 1974 R.I.D.S. showed an average income including remittances of P479 for female headed households with no male present. It should be also remembered that the Poverty Datum Line was P555 that year. Thus,depending on the package she chose, the average female headed household would have to commit between 9 and 15 percent of an income already below the poverty datum line to loan repayment. Even assuming that incomes have increased over the intervening seven years, it is unlikely that the average woman will be able to take advantage of these schemes.

A second problem is that land devoted to grazing (including grazing of

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12. C. Kerven brought these figures to my attention.

draft animals) is land which is then excluded from arable production. While some grazing land is unsuitable for arable production, some is quite suitable. Conflicts in interest between cattle owners and cultivators over arable land used for grazing have already surfaced in discussions before the Ngwato Land Board (Willet, 1980) and have been reported by Guldbrandsen (1980) in Southern District. This problem was also found at several Water Points Survey sites. As long as both the cattle and human populations continue to grow (and with the EEC price subsidy there is every incentive for the cattle population to grow), it can be expected that the frequency of such disputes will increase

While the use of tractors eliminates the grazing problem and the necessity of labour for herding, a tractor hire service would present comparable difficulties. Tractor hire services elsewhere in Africa (Tanzania and Uganda, for example) have been plagued with organizational and management difficulties which have ultimately led to their demise. In additional argument against such a scheme is that is is said to be 'uneconomic'. Figures from the Ministry of Agriculture indicate that to cover operating costs of a tractor hire service, farmers would have to increase their yields 25 percent. If they were to cover the original costs, the necessary increase would be 66 percent (Fox, 1980). Few farmers could afford unsubsidized tractor hire under such conditions. Further the dependence of tractor power on increasingly expensive diesel which comes through the Republic of South Africa is rather perilous.

It is sometimes said that the labour bind might be solved by establishing minimum rural wages in the hope that this would make staying in the village a more attractive option for male labour. However, this would price labour even further out of the reach of most women producers and/or reduce their generally minimal profit even more. Labour legislation might adversely affect women who depend on working as labourers for their income.[13] if it were strictly enforced, driving out in-kind arrangements, it would price them out of the market. Or it could be so attractive that men would replace them as labourers.

The answer may not be to try to prop up the existing structure. Another

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13. Szawelski (1978:62) showed that minimum wage legislation adversely affected female unskilled employment in urban areas of Botswana.

approach might be to expand existing rural and urban employment opportunities and try to establish a different economic base altogether. The data presented in Tables 13 and 14 provide some insight into the changes already taking place.

Table 13 Labour Force Growth: 1964-1971

Sex	Family Agriculture Only			Cash Employment			No Economic Activity 1971
	1964	1971	% change 64/71	1964	1971	% change 64/71	
Male	100.450	92.024	- 8.4%	25.030	39.056[a]	+56.0%	33.127
Female	118.580	139.058	+17.3%	6.630	12,352[a]	+86.3%	57.909

Sources: 1972 Manpower Report, Table 1.3
1971 Report on the Census, Table 15.1

Figures compiled according to a different format that than used for the Employment Survey Table 11.

It would appear from the data presented in Table 13 that subsistence agriculture is increasingly becoming a female occupation as men move out of it. However, it also shows a significant shift of women into cash employment at a rate ever faster than that of men. The figures in Table 14 show cash employment in all sectors other than freehold agriculture has substantially increased for both men and women, but again, faster for women that for men between 1967-1978.

Kjaer-Olsen's study (1980:5,11) of 69 small producers and brewers in three villages found that 58 percent of these were women and that 39 percent of these were from female headed households.

These data would suggest that an economic transformation is already taking place, that subsistence agriculture is increasingly becoming the preserve of those who have nothing else to do.

While the trend may well be toward cash employment, the establishment of an alternative rural economic base would be no easy matter. Most ready suggestions are based on an expansion of what already exists. For

TABLE 14[a]

MALE AND FEMALE FORMAL SECTOR CASH EMPLOYMENT (BOTSWANA CITIZENS) 1967-1978

SELECTED SECTORS	1967/68 LABOUR CENSUS			1971 EMPLOYMENT SURVEY			1973 EMPLOYMENT SURVEY			1977 EMPLOYMENT SURVEY			1978 EMPLOYMENT SURVEY[b]			% 1967/68-1978	
	M	F	M:F	M	F	M:F	M	F	M:F	M	F	M:F	M	F	M:F	M	F
Agriculture	6987	555	12.6:1	3273	863	3.8:1	4352	1291	3.4:1	3880	330	11.8:1	4620	540	8.6:1	-33.9	- 2.7
Mining and Quarrying	712	1	712 :1	3033	101	30 :1	3046	75	40.6:1	4750	170	27.9:1	3590	190	18.9:1	404.2	1890.0
Construction	1341	13	103.2:1	1956	52	37.6:1	6969	147	47.4:1	6350	120	52.9:1	8590	210	40.9:1	540.6	1515.4
Commerce	4200	902	4.7:1	5371	1531	3.5:1	5022	1512	3.3:1	6070	3600	1.7:1	6760	3940	1.7:1	61.0	336.8
Electricity and Water	138	2	69 :1	2060	102	20.2:1	274	6	45.7:1	860	20	43. :1	1090	20	54.5:1	689.9	900.0
Manufacturing	1073	43	25 :1				2008	196	10.2:1	3320	640	5.2:1	3600	570	6.3:1	235.5	1225.6
Finance	52	10	5.2:1	975	70	13.9:1	730	152	4.8:1	1430	630	2.3:1	1670	600	2.8:1	3111.5	5900.0
Education	655	736	.89 :1				1083	1593	.68 :1	1760	3370	.52 :1	1720	3530	.49 :1	162.6	379.6
Central Government (incl. Ind. Class)	4292	155	27.7:1							11770	2630	4.5:1	12840	2860	4.5:1	199.2	1745.2
Local Government	812	144	5.6:1				1361	346	3.9:1	2640	630	4.2:1	3285	990	3.3:1	303.9	587.5
GRAND TOTAL	22172	3173	7 :1	29254	5156	5.7:1	27771	5900	4.7:1	45610	12070	3.5:1				(1967/77) 105.7	(1967/77) 305.6

a. Some classifications have had to be reconstructed from the original reports. In particular, all figures from the 1967/68 Labour Census are approximate. Grand total figures are for all sectors, not just for those listed above.

b. These 1978 estimates were obtained from the Botswana Government's Central Statistics Office.

Sources: Report of the 1967/68 Labour Census of Botswana, Table III. 1971 Employment Survey, Table 1. 1973 Employment Survey, Table 1, 1977 Employment Survey, Table 4.

example, Lipton (1978a:100) points out that "most genuinely Batswana industrial enterprises are small carpenters, tanners, thatchers, etc., in rural areas". He proposes a simple training skills improvement programme. Women could easily be included. Egner and Klausen (1980:24) point out the potential for a number of small enterprises based on gathering natural products, collection of wild plants, mopane worms, semi-precious stones and so on. Crafts destined for the expatriate and export market - baskets from Ngamiland, weavings from Oodi or Serowe, pottery from Thamaga, handprinted cloth in Mochudi - have provided reasonable incomes for women in some of the larger villages. (See Vd Wall Bake, 1979, for a description and economic analysis of one such enterprise). These undertakings would, however, provide employment for only a small proportion of women, sometimes (as in some forms of gathering) only on a seasonal basis.

Kjaer Olsen's (1980:64) litany of the problems of small rural producers includes lack of capital, lack of cash circulating in the rural areas, marketing problems, competition with mass-produced goods, suspicion and fear of government officials, credit: default of payment, difficulties in obtaining raw products, difficulties in establishing the value of goods produced, and minimal returns on good products. She remarks:

> "It is little wonder that producers find it difficult to survive on their cottage industries alone and look towards agriculture and livestock as a more secure means of livelihood."

Actually getting large numbers of marginal producers out of agriculture would require a more far reaching employment creation programme than is likely in the forseeable future. Such an approach, however, would have two virtues. It would provide poor arable farmers with an increased and more reliable income and possibly a less arduous existence. It would encourage the substitution of locally made products and local skills for those currently provided from outside.

Arguments for Keeping Women in Agriculture

Every bag of cereal produced in Botswana is one less bag that has to be imported from elsewhere. Although the ready avilability of cheap imported cereal grains is probably a present benefit to the consumer, dependence on a place such as South Africa for such a basic commodity is not desirable.

There are not enough jobs in the urban sector to provide places for most

women. Lipton (1978a:iii) estimates 35-36,000 new jobs per year for the next ten years are necessary to generate full employment. Places for rural women are unlikely to be a priority. They are probably better off in agriculture where they can at least earn something. Further, they have the opportunity of increasing the value of their crop through brewing. To this end, it might be well to consider a system of transfer payments to assist women to stay in agriculture. It should be noted that the data presented above showed that cattle ownership is a particularly important variable affecting participation in agriculture. Any programme should, of course, address the male headed households who fall into similar circumstances - that is all marginal producers. These payments would be made with the full understanding that arable agriculture does not pay but on the conviction that it is a national good to have agricultural producers including women. That is, for political reasons it is desirable that agricultural production be maximized. And that it is desirable to pay people to stay "down on the farm" rather than to have them become part of an impoverished urban mass. As urban jobs become available, the level of subsidy would be changed. Such subsidies would be no different from the subsidies paid to farmers in the United States and in most nations of Western Europe.

Such transfer payments could be of three types: a fully subsidized tractor hire service (if the organizational difficulties of such a service would be reduced to an acceptable level); subsidized wages for farm labour; a crop insurance scheme which guarantees an income to anyone who plants - either cost covering or a net income floor.

The attraction of such proposals is that Botswana has money with which to try to buy its way out of its difficulties. When the Jwaneng Diamond Mine, comes on line, the government will net large amounts of money estimated as high as P200 million per year. Transfer payments into arable agriculture is certainly one way of seeing that the rural population benefits from this national resource.

Yet another important reason to help women stay in agriculture is that to drive them out would be to disenfranchise them of the one asset they do possess; their land, which can only grow in value as cattle prices rise and new agricultural techniques make land more productive.

Land has traditionally been considered to be plentiful in Botswana. And indeed it is. An area the size of France supports only 800,000 people. But as noted above, little of that is arable land. The 1974 FAO study (p57-58) declared "lack of land is not a major constraint to agricultural production", but went on to note the matter cannot be easily laid to rest. Since then there is increasing evidence that a shortage of favourable land is developing in premium areas. Government officers in some areas report the acquisition of large tracts of arable land constituting in effect a land grab in preparation for a later shortage.

Given the improbability of an effective programme of non-agricultural rural employment, and the likelihood of an increasing land shortage, to remove women from the land would be to transform them from marginal and sub-marginal producers to a landless peasantry. Landless peasants have never fared well anywhere in the world. There is no reason to think that Botswana would be an exception.

On the land women have access to at least one means of production. The question then becomes how to help them to utilize it in a way that assures them an adequate reliable income.

One possibility is to create packages of agricultural crops and practices which reduce the necessity of using the biggest constraints - draft and labour. This approach has been considered before in Botswana and everything from silkworms to saffron has been suggested. The Integrated Farming Pilot Project has undertaken apparently successful experiments with beekeeping. Vegetable gardening (which has unfortunately large water requirements) has frequently been suggested. Lipton (1978a:83) suggested irrigation projects as a means of providing employment for women in the slack season. Consideration should be given to what constitutes the most appropriate crop. Maize for example is attractive because it has lower labour requirements for bird scaring than sorghum which is a much lower risk crop. The trade offs need to be carefully considered. Special ploughs suitable for women in use in other countries might be investigated.

What this implies is that the agricultural research effort should continue to move off the research station. Increased numbers of trials should be carried out in the villages on farmers' fields. More important a system of

farmer-directed research should be undertaken.[14] Such a programme begins with a thorough investigation of existing agronomic practices and their rationale. Research problems are then framed with the farmers and the trials carried out with their assistance in their fields. Such a programme utilizes the local knowledge (crucial in a place such as Botswana where researchers are often expatriates from climatically temperate countries). In this way a package responsive to the special problems of the producers can be evolved. Such packages are more likely to be adopted because the farmers had a hand in developing them and know them to work. The approach also allows the indentification of structural problems thus broadening the focus of the research from mere biological and agronomic manipulation.

Other measures, often viewed as social welfare rather than production programmes could be taken. For example, provision of water at the lands on the same convenient basis as is provided in villages would reduce the amount of time women spend fetching water and allow them should they so choose, to utilize this time for agricultural work.

The point then, is not to make the women farmer in Botswana a replica of her male counterpart. Rather it is to create a programme which either eliminates or accommodates the special constraints she faces and allows her to be an independent productive member of rural society.

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14. See Gostyla and Whyte (1980) and Walton (1981) for descriptions of farmer directed farming systems research.

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