LIVESTOCK PRODUCTION AND FOOD SUPPLY TRENDS IN BOTSWANA

JAAP ARNTZEN

Introduction

This paper describes trends in livestock development and food supply in Botswana. It deals firstly with a number of topics relevant to livestock production. Subsequently, links between livestock production and food supply are examined. Thereafter, constraints to livestock production are reviewed before a brief look at the future is given.

Number of Livestock

Table 1 shows numbers of cattle, goats, sheep and chicken in the past twenty years (1966-85). In general, there was a decline in the number of cattle but a rapid increase in the number of goats during the four years 1982-85 towards the end of the drought. Overall, livestock numbers have increased substantially since independence. This is especially true for cattle. The average growth rate in the period 1971-1981 has been 3.6 percent which is comparable to the human population growth rate (estimated to be between 3.4 and 3.7 percent). The drought has put a (temporary?) halt to the cattle population growth rate. It has caused 17 percent decrease over the period 1982-1985. Overall, Livestock development has been heavily influenced by government intervention through veterinary campaigns, breeding programmes, the Tribal Grazing Land Policy, etc.

Table 1: Development of Numbers of Cattle, Goats, Sheep and Chicken (In Thousands)

	Cattle	Goats	Sheep	Chicken
1966	1,237	308	151	n.a
1967	1,492	647	212	n.a
1968	1,688	703	231	n.a
1969	1,945	847	279	344*
1970	2,017	875	350	390*
1971	2,092	1,015	376	234*
1972	2,177	765	380	n.a
1973	2,138	1,200	400	295*
1974	2,249	1,350	420	n.a
1975	2,384	n.a	n.a	n.a
1976	2,512	1,400	420	n.a
1977	2,622	n.a	n.a	n.a
1978	2,880	616	108	n.a
1979	2,840	557	108	740
1980	2,911	638	149	833
1981	2,967	621	121	1,046
1982	2,979	636	140	1,146
1983	2,818	783	165	970
1984	2,685	889	167	709
1985	2,459	1,138	200	1,020

*These are likely to be underestimates. (n.a. not available)
Pigs have never exceeded 10,000 and have therefore been left out.

Sources: Agricultural Statistics 1977-1985; 69-73 (Chicken only)
McDonald, 1980.

Smallstock, particularly goats, are highly vulnerable to diseases most prevalent during wet periods, but also very drought resistant (as browsers). The latter is clearly illustrated by the 83 percent increase in the national herd of goats since 1981. Goats are suitable elements in a diversification strategy for livestock holders during drought.

Emphasis by government and the Botswana Meat Commision (BMC) on cattle (veterinary services and prices) has tended to result in comparative neglect of other livestock. Only recently(1984), BMC increased prices of goats substantially, and farmers responded quickly by selling 1,600 goats to BMC compared with only 1,000 in 1980(BMC Annual Report).

Management Forms

Livestock production takes place under tenurial arrangements: freehold, leasehold and communal tenure. Unfortunately, relevant Agricultural Statistics do not distinguish between leasehold and communal tenure. Statistics for these categories are usually jointly grouped under traditional management. Freehold tenure is labelled 'commercial'. Although it has been clearly established that large herds under traditional management reach similar productivity levels as freehold ranches (see Hubbard, 1982; Carl Bro Int, 1982), a distinction between the two can be used to illustrate differences in livestock holding strategies and production mix (see Tables 2).

Cattle are the most commonly held animals, ranking first and second in freehold and leasehold/communal holdings, respectively. Chicken are most common in communal areas. Some specialized, large freehold farms, however, hold 21 percent of the total number of chicken. Although goats rank third according to frequency of animals held under communal forms of tenure, their numbers in freehold ranches are small. Although sheep are similarly not common, freehold ranches own 13.6 percent of their total number. Freehold farms are far more

important than their small number (0.5 percent of total agricultural holdings) suggests.

Table 2: Livestock Under Freehold and Communal/Leasehold Tenure (Ranked According to Frequency of Animals Held)

Communal/ Leasehold (99.5% of total farms)	Frequency of animals kept	%of national Herd/flock	Freehold Farms (5% of Farms	Frequency or animals kept	%of national herd/flock
1. Chicken	75	78.8	1.Cattle	87	14.2
2. Cattle	71	85.8	2.Horses	51	22.5
3. Goats	62	97.3	3.Goats	51	2.7
4. Donkeys	33	99.0	4.Sheep	49	13.6
5. Sheep	15	86.4	5.Chicken	36	21.2
6. Horses	7	77.5	6.Donkeys	33	1.0
7. Pigs	6	90.3	7.Pigs	8	9.7

Source: Agricultural Statistics (1984).

Table 3 shows a stronger market orientation among freehold farmers compared to the average "traditional" farmer, especially with respect to cattle. Sales are considerably higher before and during the drought (1981 and 1985, respectively). Freehold farmers play an important role in cattle trading as evident from the relatively high purchase rate.

The different sets of farmers responded differently to the recent drought. Freehold farmers reduced cattle number by increasing net offtake by nine percent compared to only 1.5

Table 3: Some Management Indicators of Livestock

	Communal/leasehold		Freehold	
	1981	1985	1981	1985
Cattle				
Sales rate	7.8	9.6	23.7	30.9
Home slaughter rate	0.8	2.3	0.8	2.4
Purchase rate	1.3	1.6	12.7	10.9
Goats				
Sales rate	20.0	3.1	1.3	6.8
Home slaughter rate	30.7	5.2	1.8	8.6
Purchase rate	8.5	2.5	0.7	3.4
Sheep				
Sales rate	5.7		3.7	
Home slaughter rate	4.8		15.5	
Purchase rate	1.7		7.5	

Note: No data available for chicken.

Source: Agricultural Statistics, 1985. (See also McDonald, 1980)

percent for the average communal-based traditional farmer. Somewhat surprisingly, in view of the extra cash needs, the average traditional farmers seems to have built up sizeable goat herds. It will be interesting to establish after the present drought whether this is a form of drought adaptation or a structural diversification of the livestock sector. Either way, it is important to direct governmental assistance to the actual needs of livestock farmers.

Spatial Distribution of Livestock

Although most of the livestock are kept in the eastern part of Botswana, more than half of the cattle are kept in Central and

North East district (see Table 4). A small proportion of the cattle are kept in the western part of the country (Ghanzi and Kgalagadi). Relatively more goats and particularly sheep are kept in Kgalagadi District. Livestock holding in small districts such as Kgatleng and South East is limited due to grazing land shortage. This has tended to lead to smaller herds (Gulbrandse, 1984; Arntzen, 1985). The spatial distribution of non-freehold livestock over districts has been stable since 1978 (Arntzen and Veenendaal, 1986).

Table 4: Spatial Distribution of Livestock (1981)

	% of Cattle	% of Goats	% of Sheep	% of Farm Holdings
Southern District	13.3	17.6	25.1	17.2
South East	0.9	2.0	1.4	3.1
Kweneng	10.1	11.3	10.7	12.7
Kgatleng	4.4	4.8	2.9	6.1
Central/North East	53.7	37.8	25.8	44.9
Ngamiland	14.2	18.6	5.0	12.4
Chobe	0.2	0.2	0	0.8
Ghanzi	1.7	2.3	1.4	1.1
Kgalagadi	2.4	5.5	14.3	1.8

Source: Agricultural Statistics, 1981

Cooke (1985) argues that there has been a penetration of cattle into the western parts of the country. This penetration has been facilitated by the drilling of deep boreholes and improved veterinary services in Kgalagadi. While borehole drilling, has just managed to keep up with extra livestock numbers, it has not helped to alleviate existing overgrazing conditions (Sandford, 1978). In stead, overgrazing has spread with the increasing spread of borehole drilling.

Participation in Livestock Holding

In this section we examine the frequency and extent of involvement of regional population groups in livestock holding. Table 5 shows participation of agricultural holdings in livestock production for different regions of the country. Many households effectively do not seem to have agricultural holdings. Of the 135,634 rural households counted during the 1981 population census, only 84,200 (see Agricultural Statistics) had agricultural holdings. In other words, 62 percent of rural households had agricultural holdings. The percentage of households without cattle was as high as 47 percent in 1981 which is similar to the 45 percent reported by the Rural Incomes Distribution Survey in 1974/75. Overall, participation in livestock production has no doubt decreased over the years (Colclough and McCarthy, 1980:113).

Agricultural Statistics include mafisa'd' in and out livestock. Mafisa'd in cattle can be used by the holder for draught power and milk. Sometimes, the holder may receive a calf (Gulbrandsen, 1980). Livestock is, however, usually mafisa'd out to persons who already have livestock, and this usually concerns a small numbers of rural households. Furthermore, the mafisa system is more common for cattle than smallstock. The overall impact of the mafisa system on participation in livestock production is limited. The practice has also decreased in importance since the early 1970's (Agric Statistics, 1980, 1971; Gulbrandsen, 1980 and Opschoor, 1981).

Table 5: Participation of Agricultural Holdings In Livestock Production (1984)*

	% with chicken	% with cattle	% with goats	% with sheep
Southern	75.5	78.5	62.3	23.8
South East	87.0	43.5	47.8	13.0
Kweneng	75.5	74.5	72.4	15.3
Kgatleng	86.3	64.7	43.1	7.8
Central/North East	75.5	72.3	63.2	14.1
Ngamiland	61.5	68.1	56.0	8.8
Chobe	88.9	44.4	11.1	-
Ghanzi	66.7	66.7	77.8	22.2
Kgalagadi	61.1	66.7	83.3	27.8
Average	75	71	62	15

* A household with a set minimum agricultural involvement

Source: Agricultural Statistics, 1984.

Distribution of Livestock Among Holders

Livestock distribution is generally skewed (Oommen, 1983).

In 1981, the smallest 23 percent of cattle holders held three percent of the national herd whereas the nine percent of the largest cattle holders had 45 percent of the national herd. The current drought has increased the skewedness of cattle holding. Small herds prove to be more vulnerable to drought than large herds.

Chicken and goats are more equally distributed in communal areas than cattle and sheep. As a result, chicken and goats are a more common potential source of food than cattle and sheep. In Freehold areas, chicken distribution is very skewed because of the existence of specialized poultry farms. Cattle

distribution is more skewed than in communal areas. Goats and sheep are least skewedly distributed.

Domestic Food Production And Supply

Since independence, rapid population growth, urbanization, increased overall income levels have led to increased and more varied food consumption patterns, and to the emergence of commercial food supply systems for urban areas where most people are no longer involved in food production. While the country is generally self sufficient in meat production, domestic production of dairy products falls far short of consumption needs. In addition, data on meat production for local consumption is not well documented. Beef production is mostly for export purposes (+80 percent) whereas goats, sheep and chicken are primarily produced for domestic household consumption (goats: 90 percent, sheep: 60 percent, chicken: unknown but probably high). Table 6 shows production, trade and consumption of animal-based food items.

Meat

Beef production estimates are in the range of the country estimates by FAO (52,000 metric tonnes for 1984). Goats and sheep meat are peripheral compared with beef, and are hardly a subject of external trade. Domestic chicken production has significantly expanded and currently caters for 95 percent of domestic requirements and 80 percent of the urban market (NDP VI).

Imports of chicken (meat) have dropped drastically from 507 tonnes in 1980 to a mere 11 tonnes in 1984 (Department of Customs and Excise). As no drastic decrease in consumption is suspected, domestic production must have filled the gap remaining after imports. This would mean that local production of chicken is in the range of 500 tonnes.

Table 6: Production, Trade and Consumption Of Animal-Based Food Items (1984)

a) In volume (metric tonnes)

		(1) Locally Produced	(2) Imports	(3) Exports	(4)* Consumption
Meat	beef	58,000	41	29,019	29,022
	goats	1,900	0	7	1,893
	sheep	494	13	16	491
	chicken	209	11	2	218
	others	n.a	177	n.a	n.a
	Total	60,603	242	29,044	31,801 or 83gl/p/d
Milk		+27,800	7,249	0+35,000	or 0.091t/p/d
Eggs		2,147	113	0	2,260

b) In value (P.000**)

Meat	beef	120,073	96	60,076	60,093
	goats	257	0	1	256
	sheep	1,235	48	40	1,243
	chicken	439	32	5	466
	others	n.a	518	2,004	n.a
	Total	122,004	694	62,126	60,572
Milk		+18,785	5,251	12	+24,024
Eggs		3,420	180	0	3,600

* 4 = 1+ 2 - 3.

** Local production valued at export prices

Sources: Calculations based on Agricultural Statistics and External Trade Statistics.

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Meat	beef	58,000	41	29,019	29,022
	goats	1,900	0	7	1,893
	sheep	494	13	16	491
	chicken	209	11	2	218
	others	n.a	177	n.a	n.a
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Table 7: Numbers of Slaughtered Cattle in the Period 1966-1984

	BMC	Others	Total
1984	239,000	51,600	290,600
1983	234,000	46,450	280,450
1982	237,000	34,600	271,600
1981	202,000	35,800	237,800
1980	226,000	86,000	312,783
1979	229,000	58,000	287,000
1978	149,346	70,000	219,346
1977	196,850	50,000	246,850
1976	211,987	50,000	261,987
1975	188,440	42,000	230,000
1974	186,041	38,000	224,041
1973	209,443	34,000	243,443
1972	156,510	40,000	196,510
1971	167,430	31,000	198,430
1970	128,199	26,000	154,199
1969	93,074	23,000	116,074
1968	103,776	20,000	123,776
1967	95,902	18,000	113,902
1966	148,654	17,000	165.654

Sources: BMC Annual Reports: Agricultural Statistics and Hubbard, 1983.

Table 8: Numbers of Slaughtered Goats in the Period 1966-1984

	BMC	Others	Total
1984	8,216	55,200	63,416
1983	4,127	43,400	47,527
1982	384	41,000	41,384
1981	296	51,400	51,696
1980	309	33,200	33,509
1979	416	35,300	35,716
1978	323	n.a	n.a.
1977	3,533	"	"
1976	5,137	"	"
1975	16,010	"	"
1974	42,756	"	"
1973	4,476	"	"
1972	14,838	"	"
1971	25,244	"	"
1970	26,359	"	"
1969	17,573	"	"
1968	19,853	"	"
1967	3,323	"	"
1966	538	"	"

n.a.= Not Available

Sources: BMC Annual Reports: Agricultural Statistics and Hubbard, 1983.

Table 9: Numbers of Slaughtered Sheep in the Period 1966-1984

	BMC	Others	Total
1984	7,965	8,500	16,465
1983	3,382	13,000	16,382
1982	264	9,300	9,564
1981	178	14,590	14,678
1980	198	33,200	33,398
1979	331	6,100	6,431
1978	440	n.a	n.a
1977	1,910	"	"
1976	2,990	"	"
1975	5,364	"	"
1974	14,989	"	"
1973	4,240	"	"
1972	8,096	"	"
1971	16,622	"	"
1970	7,427	"	"
1969	17,387	"	"
1968	12,543	"	"
1967	3,903	"	"
1966	2,812	"	"

n.a.= Not Available

Sources: BMC Annual Report, Agricultural Statistics and Hubbard, 1983.

Dairy Products

Rural milk production is mostly non-commercial. It is used as the primary diet for young children (Carl Bro Int, 1982). The Integrated Farming Pilot Project found that in Mathethe, Southern District, only 20 percent of the cows were milked. Milk production fluctuates considerably from season to season (0.5-1.6 liters per day). The Agricultural Technological Improvement Project found goats to be an important source of milk in the Tutume region providing an average 1.5 Liters per farmer per day with a mean daily production per goat of 284ml in 1986. The number of milking farmers fluctuated monthly between 35 and 85 percent (Gray, 1987).

Milk production is affected by drought. Drought conditions lead to lower calving rates and a lower average milk production per cow. Since milk in rural areas is used for household consumption needs only, we have assumed a proportinately lower milk production for large herds in communal holdings. The importation of milk remains important particularly for urban areas. Large amount of milk are imported in powder form (7,963 tonnes in 1984 compared with 6,217 fresh milk). Milk based products such as butter and cheese are almost entirely imported.

Distribution Of Animal Based Food

Income and cattle ownership are closely linked. Similarly, small stock and cattle ownership appear positively related (Litschauer and Kelly, 1981). Table 10 summarizes availability of meat and milk availability as well as income from holdings in different herdsize categories. Benefits in terms of milk and food availability are positively correlated to herdsize. Moreover, meat from home slaughter increases during a period of drought as the comparison between 1981 and 1984 illustrates. Milk availability increases among small herds, however, further studies are required before final conclusions can be made.

Table 10: Meat and Milk Availability per herdsize by holding (1981-1984)

a) Cattle

Herdsize	Number of Agriculture (X000)		Meat from home slaugh (Gr/Per/day)		Milk Availability (mlt/pers/day		Net Income Holding* (P)
	1981	1984	1981	1984	1981	1984	1984
0	26.5	23	0	0	0	0	0
1 - 10	13.4	17	7	25	89	244	82
11 - 20	14.0	12	16	56	188	298	161
41 - 100	10.3	10	44	48	433	672	611
100+	5.3	4.7	86	198	306	148	2,093
Total with Cattle	57.7	57.7	31	62	200	203	424
Commercial	.3	.3	1366	2149	1695	1265	55,835

b) Goats

0	34.6	30.8	0	0	0	0	0
1 - 10	28.2	21.1	5	8	22	22	P-2
11- 20	12.3	13.9	11	14	52	50	P-1
21 - 40	5.6	10.6	21	21	19	30	P13
40+	1.8	4.0	31	30	26	10	P29
Total w/ Goats	46.9	49.6	9	14		33	P4
Commercial	.2	.2	132	205	19	41	P320

*Sales Minus Purchase

Sources: Agricultural Statistics 1981, 1984.

Income is measured simply as sales minus purchases (without assessment of expenditures) and is generally positively correlated to herdsize (also found by the Livestock Management Survey). Income from livestock can be used to supplement income losses incurred from elsewhere due to, for example, drought (Kgathi and Opschoor, 1981). This fact probably explains the relatively high income from cattle in small cattle herds. In contrast, investments seem to be channelled to the building up of larger herds of goats.

Constraints on Livestock Development

The country and its people face a number of socio-economic and environmental constraints in developing livestock related resources. Low and erratic rainfall in combination with soil characteristics make large parts of the country to be unsuited for extensive forms of grazing. Carrying capacity estimates range from 12 - 16ha/Lsu in the eastern hardveld to 16 - 20 ha/Lsu in the western sandveld. Flexibility and mobility are important adaptation mechanisms which have, however, lost relevance due to increased land pressure. Despite the large size of the country, the prevailing environmental conditions and other land use activities set long term limits.

Land has become a scarce resource, particularly in small districts. Expansion of livestock can no longer take place unless at the expense of other activities such as hunting and gathering. Over utilization of grazing throughout the country, reduces herd performance (see Livestock Management Survey) and endangers long term perspectives of livestock. Under such circumstances, grazing has become the most serious constraint which is difficult to ease. Droughts reduce carrying capacity and most seriously affect herds of less than 20 head (Carl Bro Int, 1982). As a result, the distribution of cattle becomes more skewed as small herd owners lose or sell their cattle with very little chances of being able to ever rebuilt their herds. In addition, land pressure has increased the tendency towards privatization of groundwater sources and surrounding grazing to

the detriment of the small holders who have to keep herds in more congested mixed farming areas (Peters, 1983; Arntzen, 1985). Expansion into the less congested western parts of Botswana is only affordable for large cattle owners.

Future Implications

It is obviously not possible to indicate where the livestock sector will be in another 20 years. There are too many uncertainties and factors which are (partly) beyond government control (e.g. access to export facilities and the regional political situation). In addition, the direction of government intervention cannot easily be predicted in detail. However, it appears possible to predict what may happen if no drastic changes occur. The anticipated contribution of rapid population growth will in principle increase livestock numbers (as there are few alternatives). Consequently, environmental and socio-economic constraints will be more felt. Land may become more degraded, more economic inputs will be needed for livestock production (e.g. fodder, labour) and access to production assets such as waterpoints will be vital. As these requirements cannot be met by small livestock holders, the result will be an increased drop out rate of small livestock holders and an increasingly skewed distribution of cattle. Goats could play the role of "poor man's cattle" more than at present, but they are not able to replace cattle as draught power. In general, rural income distribution is likely to become more skewed unless the 'drop-outs' from livestock production will find alternative income sources.

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