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AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)

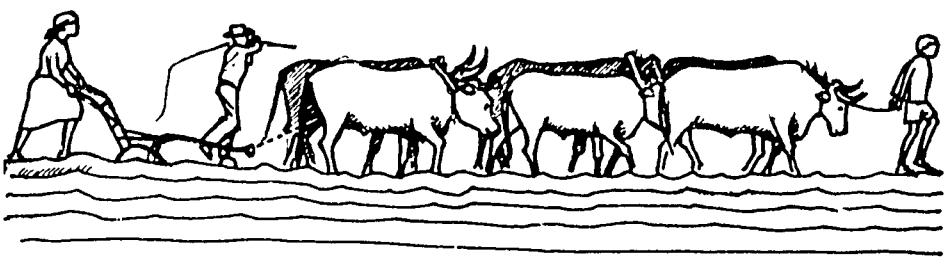
A STUDY OF THE TRADITIONAL USE OF GOATS AND THEIR PRODUCTS, THE TUTUME AGRICULTURAL DISTRICT, 1989-1990

BY

T. R. THEDFORD, K. M. KELEMOGILE, AND F. D. WORKMAN,

ATIP WORKING PAPER

ATIP WP-36



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DEPARTMENT OF AGRIC. RESEARCH
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ATIP WORKING PAPERS CONSIST OF METHODOLOGICAL AND EMPIRICAL MATERIAL WHICH HAS BEEN REVIEWED INTERNALLY BY ATIP BUT DO NOT NECESSARILY REFLECT THE VIEWS OF THE DEPARTMENT OF AGRICULTURAL RESEARCH, MINISTRY OF AGRICULTURE, BOTSWANA

PREFACE

ATIP working papers are prepared and circulated to make ATIP research findings easily available to Government of Botswana personnel and researchers interested in Botswana farming systems. This working paper has been reviewed internally by ATIP staff and by the Chief Animal Production Research Officer, DAR, Dr. L. Setshwaelo.

This paper presents information from a researcher managed and implemented (RMRI) study to establish the production parameters, labour requirements, usage, and value of goat milk and other products when produced in the traditional manner. Information was also collected on slaughter for home use and sale of goats for cash. The number of animals reported dead and those killed by predators was also explored. This study was conducted on 20 farms in the villages of Matobo, Mathangwane, and Marapong in the Tutume Agricultural District during 1989 and 1990.

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A STUDY OF THE TRADITIONAL USE OF GOATS AND THEIR PRODUCTS TUTUME AGRICULTURAL DISTRICT, 1989-1990

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ABSTRACT

This paper presents information on the traditional use of goats at the village level. Information is presented on the production of milk and milk products, the way they are used, number of sales and animals slaughtered by each farmer in the study villages. Mean production, numbers involved, losses, and times required in management procedures are also recorded.

INTRODUCTION

Goat production is a major industry in Botswana. The 1988 issue of ***Botswana Agricultural Statistics,*** indicates that the total goat population numbered 1,690,800 and are owned by 64,780 farmers. These animals are kept as a source of milk, meat, savings, and cash. The number of goats in the country is currently increasing by about 15 per cent, per year.

Many communal grazing areas, especially near villages, are currently being over utilized with resulting depletion of grazing and browsing potential. Further and continued expansion of the national goat herd is likely to add to environmental damage, especially in those areas relatively near the population centres.

Better utilization of the current national goat herd -- by increasing milk production, improving the nutritional level for kids (which should decrease kid mortality), and earlier utilization of animals as meat animals -- should promote a more sustainable industry and reduce the risk of environmental damage.

OBJECTIVE

The objective of this RMRI study was to gain additional knowledge of the traditional methods of goat use at the village level.

JUSTIFICATION

To enable change or expansion of a technology to occur, it is first important to gain an understanding of the basic procedures and traditional uses of the old technology. The traditional methods of handling and milking goats, utilizing the animals for meat or as a source of cash needed to be ascertained so that a comparison could be made between the presently practiced procedures and those of a proposed introduction of new management skills and production techniques. To be successful, a new technology must offer considerable advantage in the production of products or cash, reduction in work load, or an acceptable combination of all three.

DESIGN

Twenty farmers who raised goats and milked them for at least part of the year were selected as cooperators. These farmers had participated in previous ATIP studies and were considered representative of farmers within their respective villages. There were six farmers from each of the villages of Matobo and Mathangwane, and eight from the village of Marapong

A data collection form (Appendix A) was designed and the ATIP village enumerators visited each farm, about every six weeks during the study, to interview the farmer, measure milk production, and time their work. These data were then entered into a computer data base and the following information generated.

RESULTS

Each of the farmers in the three villages was sampled about every six weeks. A list of goats being milked (each had been previously ear tagged) was obtained. Time required to milk, and volume of milk produced were recorded. These farmers only milked once each day, in the morning.

In Matobo, 189 goats were milked over a one year period with a mean of 4.5 goats milked per farmer, per day. Each farmer produced 434 millilitres per day with an average production of 94 millilitres per head milked.

Farmers in Mathangwane milked 265 goats for a mean of 6.8 goats per farmer, and 205 millilitres of milk produced, per goat.

Marapong farmers milked the most number of goats. They milked 357 goats, with a mean of 4.8 head per farmer, producing 194 millilitres per head, per day.

These data are presented in Tables 1 and 2.

TABLE 1: NUMBER OF GOATS MILKED OVER THE OBSERVATION PERIOD

	MATOBO	MATHANGWANE	MARAPONG	TOTAL
Mean Number[a]	4.5	6.8	4.8	5.2
Total Number	189	265	357	811

a. Ranged from 0 to 28 animals.

TABLE 2: DAILY MILK PRODUCTION PER FARMER BY VILLAGE IN MILLILITRES

VILLAGES	TOTAL PRODUCTION	MEAN PER FARMER	RANGE OF PRODUCTION PER FARMER		MEAN PER GOAT PER PERIOD
			LOW	HIGH	
Matobo	18265	43	0	1200	94
Mathangwane	53125	136	0	5525	205
Marapong	70368	938	0	4550	194
TOTAL	141758	910	0	5525	165

A further breakdown of production data gave numbers milked and means by farmer (Table 3). Two farmers, Number 10 and Number 12, did not milk any goats throughout the year. The others varied, depending on the period of production, milking from 3 to 11 goats each period. Most farmers, however, milked about five goats over about seven periods, or 42 weeks. These were not always the same goats. About four to six weeks after the goats had kidded, those goats that were producing less than 50 millilitres per day were replaced with fresh goats. It is interesting to note that farmer Number 7 milked the highest minimum and maximum number of goats, the highest mean number, had the highest minimum, maximum and mean production per head, and had the highest mean per lactating doe. This farmer was

also the only one who sold milk products (madila) and the one who made P620.00 over a three month period from product sale.

TABLE 3: MILK PRODUCTION BY FARMERS

FARMER NUMBER	GOATS MILKED PER DAY			NUMBER REPORT PERIODS	ML MILK PRODUCED PER HERD/ALL PERIODS				MEAN PRODUCTION PER GOAT PER PERIOD
	MIN	MAX	MEAN		MINIMUM	MAXIMUM	MEAN	TOTAL	
1	6	10	8.6	3	200	1075	625	1875	67
2	0	8	4.0	8	0	950	513	4100	126
3	0	10	4.8	11	0	1200	485	5335	92
4	0	9	5.8	8	0	975	541	4330	92
5	0	6	3.4	5	0	600	310	1550	99
6	0	4	2.1	7	0	350	154	1075	71
7	10	27	16.6	7	2600	5525	4003	28025	261
8	0	28	11.0	7	0	5450	2125	14875	189
9	0	19	8.1	7	0	2150	989	6925	122
10	0	0	0.0	6	0	0	0	0	0
11	0	6	2.6	8	0	1950	484	3875	177
12	0	0	0.0	5	0	0	0	0	0
13	0	12	7.7	10	0	3300	1465	14650	181
14	0	9	5.1	10	0	2050	1005	10050	202
15	0	15	5.4	10	0	3250	940	9400	173
16	0	11	5.5	10	0	4550	1405	14050	237
17	2	7	3.6	9	50	1550	528	4750	144
18	0	3	1.0	6	0	600	167	1000	167
19	0	5	1.1	9	0	650	123	1108	128
20	3	13	6.8	10	500	2700	1479	14785	252

The milk that was collected by farmers was used primarily in the home. Seventy-nine percent indicated they used the milk as fresh milk in the home. About 20 per cent let the milk sour and used it as madila. None sold fresh milk and the farmer, mentioned above, sold madila. His sales occurred during periods of high production. There appeared to be a high demand for madila as on several occasions vendors were observed in the villages with 20 litre containers of madila. They were invariably sold out within four or five hours of arrival. The source of this product is unknown.

Management practices, i.e., time spent milking, feeding, watering, kraaling and, where practiced, herding are presented in Table 4. All of the times given in the table were for all goats in the herd, except milking time. This was only for those animals actually being milked. Only three farmers practiced any supplemental feeding which took them less than 30 minutes per day. It is quite possible that they understood the term "supplemental feeding" to mean giving the goats mineral mixture and/or salt.

Watering time required less than 30 minutes per day for 52 percent of the respondents, and an additional 42 percent required less than one hour. Overall, 94 percent of farmers spent less than an hour a day watering all goats.

Kraaling goats took less than 30 minutes per day for 88 percent of the respondents. An additional nine percent required more than 30 minutes a day, but less than one hour.

Only 73 of the 156 farmer responses, or 47 percent of the time did farmers herd their goats. Those who herded did so from 1 to 10 hours per day, with a mean herding time of 6.4 hours per day.

Milking time required less than 30 minutes per day for 94 percent of the farmers. Of the 156 times farmers were timed during the milking procedure, it took them, on average, 7.15 minutes to milk all goats. The mean time per goat was 1.4 minutes. Village means for all

goats milked, and the average time it took to milk each goat were: Matobo, 4.26 minutes for all goats with a mean of 0.97 minutes per goat; Mathangwane farmers required, on average, 10.19 minutes to milk all goats, and 1.50 minutes per goat; and Marapong farmers required 7.19 minutes to milk their goats with a mean time, per head, of 1.64 minutes.

TABLE 4: TIME SPENT IN MANAGEMENT PRACTICES PER DAY

	LESS THAN 30 MIN		30-60 MINUTES		60-120 MINUTES		MORE THAN 2 HRS		TOTAL	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Milk Time	102	94	6	6	0	0	0	0	108	100
Feed Time	3	100	0	0	0	0	0	0	3	100
Water Time	57	52	46	42	5	5	2	1	110	100
Kraal Time	124	88	13	9	4	3	0	0	141	100

Herd Time 73 of 156 farmers (47%) herded their goats an average of 6.4 hours per day

Most of the does, 91 percent, were nursing kids in addition to being milked once per day for human use. Table 5 indicates the number and percentage of does nursing and not nursing kids in each of the three villages. This diversion of milk is thought to be one of the major causes of kid malnutrition and mortality that is commonly seen in the villages. Table 5 describes these facts more graphically.

Additional management data were gathered to try to better understand the traditional system of herd management. Very few goats were sold from the farms monitored. Table 6 indicates the total sold per village, percentage of total, and mean number sold per farmer.

TABLE 5. NURSING STATUS OF DOES BEING MILKED

	MATOBO		MATHANGWANE		MARAPONG		TOTAL	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Yes	115	76	225	94	212	99	552	91
No	36	24	14	6	2	1	52	9
TOTAL	151	100	239	100	214	100	604	100

TABLE 6 NUMBER OF GOATS SOLD PER VILLAGE

	MATOBO	MATHANGWANE	MARAPONG	TOTAL
Number	0	19	4	23
Percent	0	83	17	100
Mean/farm	0	0.49	0.05	0.15

No goats were sold in the village of Matobo, while 19 were sold in Mathangwane and only four in Marapong. Of those farmers who sold goats, seven of them sold only one goat, four sold two goats, and only two farmers sold four goats each. The mean price received for the 23 goats sold was P53.82. The range varied from P35.00 to P110.00 per head. No information was available as to body weight of marketed animals, as weighing is not performed. No data were collected as to age or sex, but it is customary to sell only the older castrated males.

Slaughter of goats for home usage was also explored (Table 7).

TABLE 7: NUMBER OF GOATS SLAUGHTERED FOR HOME USAGE

	MATOBO	MATHANGWANE	MARAPONG	TOTAL
Number	11	10	4	25
Percent	44	40	16	100

A total of only 25 goats were slaughtered during this year. The number and distribution of these is seen in Table 7. Nineteen of the farmers killed only one goat, while three farmers killed two goats each during the observation period. Both of these farmers had previously killed one goat. These three farmers accounted for nine of the 25 slaughtered goats or 36 percent of all animals slaughtered. No farmer killed more than three goats during the data collection period.

It must be remembered that it is very common for villagers to eat the meat of ruminants that have died of disease. Each farmer was asked about the number of goats that had died during each reporting period. A total of 57 animals died. Table 8 gives a breakdown by village and mean per farmer on death losses. These were reported as deaths by any cause, not just those from disease. However, predator kills were not included in this total.

TABLE 8 REPORTED DEATHS OTHER THAN PREDATOR CAUSED

	MATOBO	MATHANGWANE	MARAPONG	TOTAL
Number	18	27	12	57
Percent	32	47	21	100
Mean/farm	0.43	0.71	0.16	0.37

Information was also collected on predation of goats. The primary predator, usually of kids, was the jackal, 10 cases. Dogs and a donkey were each responsible for one death while in seven cases the predator was unknown (Table 9).

TABLE 9 PREDATOR ATTACKS

	MATOBO	MATHANGWANE	MARAPONG	TOTAL
Jackal	4	4	2	10
Dog	0	0	1	1
Unknown	6	0	1	7
Donkey	0	0	1	1
TOTAL	10	4	5	19

In an effort to relate goat production data previously collected by the project (Gray, 1987; Gray and Baathodi, 1988), the following comparisons are made (Table 10). Data collection techniques and timing differed considerably between data sets. The 1986 and 1987 milk production data were collected on a daily basis, recorded by the farmer, and measured to the nearest 100 millilitres. The 1989-1990 data were collected once every six weeks by a trained enumerator and measured to the nearest 25 millilitres. The farmers sampled were the same, but there was considerable variation in rainfall which would reflect forage condition.

Even though differences exist between this set of data and that collected in 1986 and 1987, there are some general conclusions that can be drawn that are supported by all three sets of data. These are:

(a). Very few goats are milked, per farmer.
(b). Production per farm is very low.
(c). Production per goat is very low.
(d). Consumptive offtake from the farms is very low with sales and slaughter being nearly equal.
(e). Death losses however, almost equal the combined offtake for sale and slaughter for home use.

TABLE 10: DATA FROM THREE SEPARATE COLLECTIONS

	1986 STUDY[a]	1987 STUDY[b]	1989-1990 STUDY[c]
Mean Number Milked	6.3	7.1[d]	5.2
Mean Production per Farm	1800ml	1400ml[d]	910ml
Mean Production per Goat	284ml	198ml[d]	165ml
Goat Sales per Farm	25[e]	49	23
Goat Slaughter per Farm	12[e]	33	25
Goat Deaths per Farm	19[e]	73	57
Three Village Mean Rainfall	447mm	405mm	425mm

a. Gray, 1987.
b Gray and Bauthodi, 1988.
c. Thedford, Kelemogile and Worman, 1990
d. Data collected from January to May.
e Data collected from May to December.

CONCLUSIONS

The traditional system of managing goats involved the keeping of goats for multiple purposes. They served as a source of meat, which was usually from goats that had died, and on special occasions goats were slaughtered for feasts. Some of the goats were milked once per day, and most of these were nursing kids. The milk that was collected was mostly used fresh in the household that produced it. Surplus was soured into madila and most commonly used in the household that produced it. Only one farmer marketed this surplus even though there appeared to be a readily available market for the product.

Similarly, very few goats were sold for cash even though they were a readily available source of cash, and there appeared to be an abundant supply of buyers.

The amount of labour inputs, required in the traditional system, varied depending on whether the goats were herded or not.

The following is a sketch of the average farmer who owned goats.

The average farmer milked just over 5 (5.2) goats, once each day. Ninety-one percent of these goats were also nursing kids. The production of milk for human consumption was 165

millilitres per goat, per day. Eighty percent of this milk was used fresh, and 20 percent as soured madila. The goats produced milk about 70 percent of the year, or for about 8.5 months. This production required only 7.15 minutes per day to milk the goats, and less than one hour per day to feed, water and kraal all of the animals in their herd. If they herded the goats, and less that half did, an additional 6.4 hours per day was required. The farmer slaughtered only one goat during the year for home use, and sold only 0.15 of a goat, or about one goat every 6 years, on the open market. The money received per year for this part of a goat was only P8.07. If sour milk were sold, the farmer would realize P31.00 for it. Over the year four goats died, one of which was killed by predators and not eaten by the family.

The following information provides some understanding as to what these data mean from an economic perspective. Labour, if valued at the GOB minimum wage of P9.60 per eight hour day, was worth P1.20 per hour. Milk as fresh fluid milk was valued at P1.00 per litre. Madila was valued the same as fresh milk. Thus, the following revenue could have been received from the goat herd during the year:

Milk: 165 millilitres x 5.2 does = 858 millilitres x 255.5 days = 219 l. @ P1/l.	=	P219.00
Sale of Goats: 0.15 goat @ P53.82/goat	=	8.07
Slaughtered Goat: 1 goat @ P53.82/goat	=	53.82
Dead goats (used as family meat): 3 goats @ P53.82/goat	=	161.46
Total income value of average herd (25.5 head)	=	P442.35

There were usually no cash inputs into a goat herd. Occasionally a deworming compound was purchased; more commonly only liquid paraffin was purchased to attempt to control external and internal parasites. This was a complete waste of time and money as liquid paraffin is ineffective and can, if given in great enough quantity, actually be harmful. Herding, if it were done, was carried out whether the goats were being milked or not. If the goats were to be milked, the only added expense, which was a time expense only was 7.15 minutes, per day to milk the 5.2 does in production. They were milked for 255.5 days per year which required a total of 30.45 hours per year. If this were multiplied by the minimum wage, the cost of milking was P36.54 per year.

There appears to be a cash value incentive to milk goats since the actual added expense was P36.54 per year, and the value of the product was P219.00. This means an average return of P35.09 per doe milked per year.

There appeared to be a demand for madila in the villages as evidenced by one of the farmers having sold surplus milk in this manner over a 3 month period. Also vendors were commonly seen in the villages selling madila (P0.50 per cup full), and always seemed to have sold out of their supply within a half day. This would equate to nearly P2.00 per litre for the madila, and no volume was lost in the souring or madila making process.

One concern identified in this study relates to the milking of does for human consumption while they are still nursing the kids. At the production level observed in this trial, it is probable that the kids will suffer growth problems because of this milk offtake. The mean production produced by these does (165 millilitres milked once each day, in the morning) was equal to the morning production potential for the day, i.e., 64 percent of the total day's production (Thedford, Kelemogile and Worman, 1990). The remaining 93 millilitres per day was not enough milk to even maintain the growth of a kid, much less provide growth at the optimum level. Kids require a milk intake of a minimum of nine percent of their body weight to adequately gain weight (Lu, Potchoiba and Teh, 1984). This would translate into 225 millilitres for a 2.5 kilogramme kid. They should receive this amount for at least eight

weeks, and preferably up to 12 weeks. The practice of milking these does while they are nursing kids is very likely one of the major reasons for kid malnutrition and death losses suffered during the nursing period. This situation would be further exacerbated if it were not for the fact that farmers tend not to milk the does until the kids are four to six weeks old. The kids should be consuming some solid food, providing it is available, by this time and not quite be so dependent on their dams milk.

Finally, the data obtained suggests that the average Tswana doe seen in the villages was not a very good milk producer. There were some animals which produced better than the average, and these could be utilized for dual production purposes, but the goats at the lower end of the production scale should never be used. Increased selection of the Tswana doe could result in greater production, but they must be purposively selected and not left up to chance, which is what occurs presently.

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