Factors affecting calving percentage in the four different ranching systems practiced by livestock farmers in the southern region of Botswana

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ABSTRACT
Productivity in the livestock industry in Botswana can only prosper, be viable, competitive and remain a major source of income and employment opportunity in the rural areas, if there is an increase in calving percentage through intensive use and efficient management of our land resources and our livestock. Findings from the survey conducted amongst a random sample of 132 livestock farmers on different types of ranches (communal, community, group/syndicate and individual) in the Southern Region of Botswana indicate that various perceptions and needs represent significant constraints in improving the poor management and put emphasis on increasing productivity to acceptable levels with minimum adverse effects on the environment. The incompatibility of increasing productivity to acceptable levels and the resulting ranch types and associated management possibilities with respondent's culturally conditioned needs, is probably the major obstacle.
Keywords: Calving percentage, ranch types, Knowledge, age, education and herd size.

INTRODUCTION
Productivity in the livestock industry in Botswana remains largely undeveloped. It is characterised by extensive farming in communal areas where calving percentage has remained as low as 50% compared to 60% in commercial areas (Ministry of Finance and Development Planning, 1997/98-2002/3).

Calving percentage is a key reproductive trait in the cattle business. For the livestock industry to prosper, be viable, competitive and remain a major source of income and employment opportunity in the rural areas, increased calving percentage is essential (Sigwele & Khupe, 1996).

This study investigates the efficiency criteria, of calving percentage and factors affecting calving percentage, in the context of different ranching systems (individual referring to a ranch owned by an individual farmer; group/syndicate referring to a ranch owned by more than two farmers on partnership base; community referring to a ranch owned by community members; and communal referring to an open grazing accessible to all farmers).

In the promotion of fencing, uncertainty exists concerning the optimum approach that will allow for proper implementation of sound management practices and that are acceptable to and reconcilable with the needs of the communities.

This paper specifically examined: whether age, education, or herd size has any influence on calving percentage; assess livestock farmers' knowledge about the calving percentage of their livestock; whether the knowledge about calving percentage is influenced by ranch type, age, education, or herd size; and whether ranch type (community, communal, individual and group/syndicate ranches) has any influence on calving percentage.

MATERIALS AND METHODS

The data on livestock farmers' knowledge about calving percentage; whether knowledge of calving percentage is influenced by ranch type, age, education, or herd size; whether ranch type has any influence on calving percentage; and whether age, education, or herd size had an influence on calving percentage was collected using a simple random sample design for data administered by one of the authors. With a view of minimising the influence of other external factors and interactions having little or no bearing on the investigation, livestock farmers were categorised as follows:

From the traditional farmers (members of a communal ranch), 60% of the farmers were selected randomly from the list provided by the extension agent, from the three villages (Lerolwane, Sekhutlane and Mabule) adjoining the community, group and individual ranches. Thus the total number of farmers selected from the three villages was sixty eight (68). As for the individual ranchers 50% of the farmers were also selected randomly from the list provided by the extension agent to provide a total number of 16 farmers. With regards to Group or syndicate ranches and Community ranch, all 27 and 21 members were included in the survey respectively. In all a sample of 132 livestock farmers was visited and asked questions.

Data collection

The survey was conducted from November 1996 to December 1996. Livestock farmers from individual, group/syndicate, community and communal ranches in the Southern Region of Botswana described above were interviewed using a structured questionnaire to collect the data for the study.

Statistic analysis

The Statistical Package for the Social Sciences (SPSS) was used for all statistical analyses.

RESULTS AND DISCUSSION

Knowledge About Calving Percentage Rate

Calving percentage is an aspect of major importance in beef cattle production in Botswana; probably the most important as far as profitability is concerned (Ministry of Agriculture, 1980). An increase in calving percentage can mean an increase in Botswana's export of beef even to the level that it covers imports of basic cereals.

According to Sigwele & Khupe (1996) the calving percentage is barely above 50 percent in the communal areas, where over 85 percent of cattle are found. In order to test whether respondents do know or understand what the calving percentage is, respondents were asked what their calving percentage was (Table 1). About 93 percent of the respondents indicated that they did not know what their calving percentage was, while only 7 percent indicated that they had an idea of what their calving percentage was. No single respondent knew what his communal ranch's calving percentage was because they did not stay full-time at their ranches. Even on the individual ranches where the percentage respondent having some knowledge of their calving percentage is the highest, only 19 percent have a vague idea of their calving percentages. The percentage on community ranches is 10 percent while only 3 percent of communal farmers have a vague idea of their calving

percentage. A reason for this poor knowledge may be the absentee (not staying full-time at the ranch) type of management, which is practised on all ranch types.

Table 1 Distribution of respondents on different ranch types according to their knowledge of their calving percentage, 1996 (N=132)

Knowledge of calving percentage	Respondents per ranch type									
	Individual		Group		Community		Communal		Total	
	n=16	%	n=27	%	n=21	%	n=68	%	n=132	%
Does not know	13	81	25	93	19	90	66	97	123	93
Has an idea	3	19	2	7	2	10	2	3	9	7
Knows	-	-	-	-	-	-	-	-	-	-

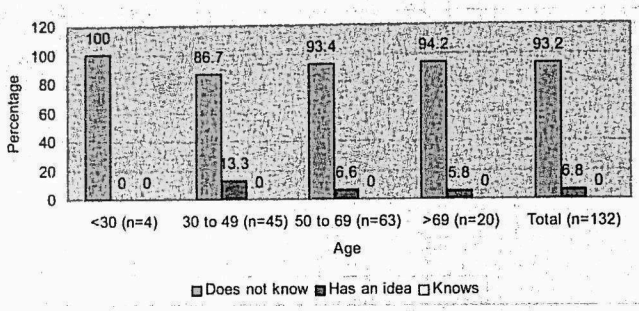

Figure 1:Respondents' knowledge about calving percentage based on age group

It is assumed that a farmer with knowledge about his/her calving percentage would be interested in a better position to observe the effect of improved techniques on his production and economic outcome.

The mean knowledge about calving percentage and management practices and efficiencies is as indicated in Table 2. The findings indicate that respondents with no knowledge about calving percentage did not perform better with regards to practise adoption than those with knowledge about calving percentage. In fact in many cases they perform better, but the differences are not statistically significant ($p > 0.01$).

The relationship between respondents' age and their knowledge regarding calving percentage is shown in Figure 1. These findings indicate that more farmers in the 30 – 49 year category had an idea about their calving percentage than in any other age category. This knowledge seems to decline somewhat with age. That is, from 13.3 percent for the 30 to 49 years category to 5.8 percent (70 years and older).

As far as the influence of education is concerned Table 3 indicates that the idea or knowledge concerning calving percentage is related to the level of education. That is, the correlation coefficient between education and knowledge about calving percentage is $r = 0.263$, which is highly significant at ($p = 0.002$). For example only 1.6 percent of the respondents with no formal education had an idea of the calving percent while this percentage increases in liner fashion to 20 percent in the case of respondents with more than 12 years of formal education.

The findings in Table 4 indicate that respondents with herds of more than 150 tend to have a better knowledge of calving percentage than those with smaller herds. The study found that there is no linear positive correlation between herd size and knowledge of calving percentage ($r = 0.149$; $p = 0.089$).

The study found that most of the respondents from all four grazing systems (individual, group, community and communal ranches) do not know or understand what the calving percentage of their stock is or represents. It is therefore, necessary for farmers to know their calving percentage as this can provide them with a measure of how they can raise their livestock productivity.

Table 2 Mean distribution of respondents' knowledge about calving percentage and management practices and efficiencies, 1996 (N=132)

Practices	Practice adoption about calving percentage	
	No knowledge (n = 123)	Some knowledge (n = 9)
Dip/spray for ticks	2.9	2.8
Hand dress for ticks	2.8	2.4
Internal parasite control	2.2	2.3
Animal castration	4.4	4.3
Dehorning	4.3	4.0
Artificial insemination	1.3	1.2
Breeding system	1.6	1.9

Table 3:Percentage distribution of respondents based on education and knowledge about calving percentage, 1996 (N=132)

Knowledge about calving	Respondents according to education categories									
	None		1-7 years		8-12 years		>12 years		Total	
	n=64	%	n=41	%	n=17	%	n=10	%	n=132	%
Does not know	63	98.4	37	90.2	15	88.2	8	80.0	123	93.2
Has an idea	1	1.6	4	9.8	2	11.8	2	20.0	9	6.8
Knows	-	-	-	-	-	-	-	-	-	-

Table 4:Percentage distribution of respondents based on herd size and knowledge of calving percentage, 1996

Knowledge about calving	Respondents per herd size													
	<20		20-50		51-100		101-150		151-300		>300		Total	
	n	%	n	%	N	%	n	%	n	%	n	%	n	%
Does not know	54	100	32	88.9	15	88.2	7	100	10	83.3	5	83.3	123	93.2
Has an idea	0	0	4	11.1	2	11.8	0	0	2	16.7	1	16.7	9	6.8
Knows	-	-	-		-	-	-		-	-	-	-	-	-

Calving Percentage Rate

A high calving percentage is one of the basic requirements of a profitable beef cattle operation. While many factors affect economic returns in a cow and calf enterprise, if there is no calf there is no

return (Ministry of Agriculture, 1980:112). The calculation of the calving percentage was based on the number of calves born per cows bred, and also served as an indication of the profitability of the cattle farming enterprise. The calculated calving percentages are shown in Table 5.

Even though, the Ministry of Finance and Development Planning (1997/98–2002/03) had indicated that calving percentage in communal areas is as low as 50% compared to 60% in commercial areas, the findings in Table 5 indicate that farmers have an average calving percentage of 55.9 percent. It is worth noting that the calving percentage of communal and community ranches is not lower than that of individual and group/syndicate ranch members. In fact, the average calving percentage of the individual ranch members is significantly less, namely 46.1 percent. Probable the reason for this is that on other ranches, viz., communal, community and syndicate ranches there are large numbers of un-castrated animals roaming around, thus resulting in an effective high bull/cow ratio.

Another reason for the similarity of calving percentage on the different ranch types is one given by Tsimako (1991), namely that, management standards on individual ranches have not noticeably changed for the better compared to those applied under the cattle post system. In other words there is no difference in management between the individual ranch farmers and communal farmers with regards to knowledge about calving percentage of their stock.

The mean calving percentages of the different age categories of farmers (Figure 2) show no clear tendency (r = -0,095) except that the youngest farmers (less than 30 years of age) tend to have the highest calving percentage, namely 72.6 percent, compared to the 50 to 57 percent of the other categories. A reason for the higher calving percentage of the younger farmers may be the one indicated by Gulbradsen, (1980) namely that young man, especially from the working class, usually aim to have a large herd.

Table 5: Distribution of respondents according to calving percentage and ranch type, 1996

Calving percentage	Respondents per ranch type								Total	
	Individual ranch		Syndicate ranch		Community ranch		Communal ranch			
	n = 16	%	n = 27	%	n = 21	%	n = 68	%	N = 132	%
<10	1	6.2	1	3.7	4	19.1	12	17.7	18	13.6
10 - 25	3	18.8	4	14.8	2	9.5	4	5.9	13	9.8
26 - 40	3	18.8	4	14.8	5	23.8	13	19.1	25	18.9
41 - 55	3	18.8	2	7.4	2	9.5	7	10.3	14	10.6
56 - 70	4	25.0	5	18.6	2	9.5	13	19.1	24	18.2
> 70	2	12.4	11	40.7	6	28.6	19	27.9	38	28.9
Mean		46.1		58.8		51.0		58.8		55.9

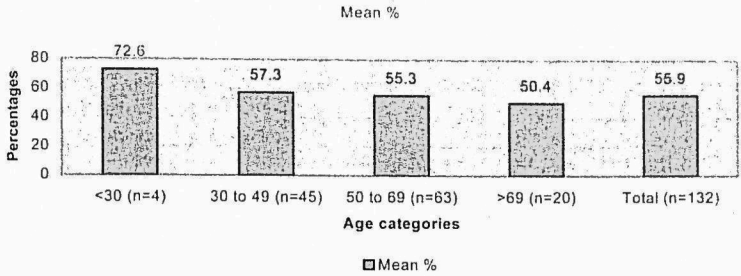

Figure: 2 Respondents' mean calving percentage according to age group, 1996

As far as the influence of education is concerned Table 6 indicates that the calving percentage is not related to the level of education). For example, the mean calving percentage of respondents with no formal education is 60 percent while that in the more educated groups is even less (50.3 and 59.7 percent. The frequency distribution in Table 6 shows a similar pattern.

The relationship between respondents' herd size and their calving percentage indicate an average of 56 percent (Table 7). With the exception of the biggest herds (more than 300 head) there is a tendency for calving percentages to decrease with increasing herd size ($r = -0.253$; $p = .006$). The reason for the decrease in calving percentages is that of low bull/cow ratio. On the contrary, with the exception of the biggest herds (more than 300 head) there is a tendency for calving percentages to increase with decreasing herd size. The reason for the higher calving percentage in the smaller herds is that they usually keep more bulls and large numbers of un-castrated animals roaming around.

Table 6:Percentage distribution of respondents according to education and calving percentage, 1996

Calving %	Respondents according to education categories							
	None		1-7 years		> 7 years		Total	
	N	%	n	%	n	%	N	%
< 25	7	13.0	7	14.9	2	13.3	16	13.8
26-49	13	24.0	16	34.0	2	13.3	31	26.7
50-100	34	63.0	24	51.1	11	73.4	69	59.5
Mean		60.0		50.3		59.7		56.0

Table 7:Percentage distribution of respondents' calving percent based on herd size, 1996

Herd size	Respondents' calving percentage						Mean
	< 25		26 - 49		50 - 100		
	N	%	n	%	n	%	
< 20	3	7.0	11	25.6	29	67.4	64.2
20 – 50	3	8.8	12	35.3	19	55.9	53.3
51 – 100	5	31.3	3	18.8	8	50.0	49.4
101 – 150	2	28.6	1	14.3	4	57.1	47.7
151 – 300	3	27.3	4	36.4	4	36.4	43.5
> 300	-	-	1	16.7	5	83.3	61.0
Total	16	13.7	32	27.3	69	59.0	55.9

CONCLUSION AND RECOMMENDATIONS

Results revealed that the majority of respondents did not know or have an idea of what their calving percentage was. It appears that management between the community, group and individual ranching farmers and communal ranching farmers with regard to knowledge about calving percentage of their stock does not differ in any way.

The need for offering training or workshops focusing on educating livestock farmers on the importance of increasing calving percentage and off-take as well as the reduction of stock mortality should be emphasised. In addition, creation of more attractive investments alternatives, and the improvement of marketing facilities and infrastructure should be explored.

Livestock farmers should be encouraged to accept ownership of development and be empowered to come up with and implement solutions that are based on consensus and general acceptance (to be empathetic and thus participative in the true sense of the word). These could include raising the grazing fees to market related levels, ultimately aimed at a more equitable sharing or redistribution of the benefits that accrue from community owned resources.

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