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CONTENTS

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CONTENTS

Factors affecting the growth and survival of Matebele goat kids in a semi-arid environment under smallholder management

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Performance of 631 kids belonging to seven smallholder farmers in southern Zimbabwe was monitored over a two-year period. Least square mean liveweights at 14, 150 and 360 days (d) of growth were 4.3 $\pm$ 0.04, 11.5 $\pm$ 0.11 and 19.9 $\pm$ 0.19 kg, respectively. Exit rate between birth and 150 days was 35 percent. Liveweight at all the three stages of growth and preweaning exit rates varied significantly ($p<0.001$) between birth months and between flocks ($p<0.001$). Preweaning growth rates tended to be relatively faster for kids born between September and January (dry to early wet seasons) but were depressed post-weaning as a result of dry season feed shortages. Consequently, kids born in September-January tended to weigh less at 360 days compared to kids born in February-July. Male kids and singles were significantly heavier ($p<0.001$) at all ages than female kids and twins, respectively. Age of the doe significantly affected kid weight at 150 d, with kids born to does of 1 to 2 years of age being 13-25 percent lighter ($p<0.01$) than kids born to older does. Exit rates were highest (33 percent) in July, the month where maximum births occur. Exit rates were significantly higher ($p<0.001$) in year 1 (52 $\pm$ 0.22 percent) than in year 2 (48 $\pm$ 0.31 percent). Kid survival was not influenced by age of the doe, sex or birth type of the kids. It is concluded that growth and survival of Matebele kids could be improved through strategic management of seasonal effects and better understanding of local management.

Keywords: goats, mortality, growth, semi-arid, smallholder.

Introduction

Traditional goat husbandry systems found in the arid and semi-arid regions of the world usually involve few inputs or interventions. However, goats play an important role in food security in these systems as a source of cash through sales, and as a source of protein through home slaughters and, in some instances, consumption of milk. It is therefore important to quantify the effects of various non-genetic factors on the growth and survival of kids in order to minimize reproductive wastage due to low growth rates and mortality.

A mature Matebele goat is a relatively large animal, measuring about 65 cm at the withers and weighing more than 35 kg (Devendra and Burns, 1983). It is the dominant breed in southern Zimbabwe and is similar to the large meat-type of goats such as the Boer and the Nguni of South Africa, and the Tswana of Botswana (Animal Production Research Unit, 1986). These types of goats are common in the semi-arid areas where there are marked seasonal variations in rainfall and availability of forage for browsing and grazing. The study reported here investigated some of the non-genetic parameters which influence the productivity of such goats on communally grazed rangelands in a semi-arid environment.

Materials and Methods

A detailed account of the study area and the survey methodology has been given by Sibanda *et al*, (1998). The survey was carried out in the Guyu Communal area of the Gwanda district of southern Matebeleland, south-west Zimbabwe (longitude 28 E, 59'E 21 23'S). The area is approximately 765 m above sea level. There are three distinct seasons, a cold and dry winter (May to August), a hot and dry spring (September to Mid-November) and a hot and wet summer (Mid-November to April). The annual total rainfall varies between 300 and 500 mm, making crop production unreliable and causing the quality and quantity of feed to be very variable between and within years.

Seven households participated in the survey. Their goats were eartagged during the first week of July 1989 and the age of each goat was determined from the number of permanent incisors (Wilson and Durkin, 1984). Farmers were asked to record all entries and exits from their flocks. This information was collected at 2-weekly intervals when flocks were visited in order to weight all goats between the beginning of July 1989 and the end of June 1991. Analysis of variance was used to assess the effects of month of birth, year of birth, doe age, farmer and birth type and their interactions on liveweight of kids at 14, 150 and 360 days of age. The ages selected represented the earliest possible age after birth that farmers allowed us to handle the kids, weaning age and yearling age, respectively. Chi square analysis was used to establish association between the above factors and kid mortality at 30 and 150 days of age using probit procedures of SAS which are suitable for linear logistic modelling of binary data (Collet, 1991).

Results

All the interactions studied were not statistically significant (p>0.05) and were thus dropped from final models computed. The mean (se) weight of kids at 14 days of age was 4.4 (0.04) kg and doe age had no significant effect (p>0.05) on kid weight at 14 days (Table 1). In general, the weights of kids born during the period June to November (the dry season) were lighter at 14 days than

Table 1: Mean liveweights (kg) of Matebele goat kids at 14, 150 and 360 d of age.

	Age in days		
	14	150	360
n	305	305	187
Overall Mean	4.4	11.6	19.9
Birth month	***	***	***
January	4.1	11.8	13.8
February	3.8	8.7	17.7
March	4.7	8.6	21.0
April	4.6	8.2	19.3
May	5.1	11.2	-
June	3.2	8.2	18.6
July	3.9	9.4	21.3
August	4.0	11.3	18.3
September	3.9	11.9	16.1
October	3.9	12.1	18.4
November	2.9	12.1	15.0
December	4.6	15.8	-
Farmer	***	***	***
A	4.0	9.9	14.4
B	4.2	11.6	20.2
C	4.6	12.0	23.9
D	4.0	10.6	15.6
E	3.8	11.0	18.5
F	3.5	8.5	14.9
G	4.3	11.6	18.20
Birth type	***	***	***
Single	4.3	11.8	18.8
Twin	3.8	9.7	17.1
Doe Age (years)	NS	**	NS
>4	4.1	11.7	18.8
3-4	4.1	12.0	19.3
2-3	4.1	10.5	17.6
1-2	3.8	8.9	16.2
Birth year	*	*	*
1	4.5	11.5	18.5
2	3.6	10.0	17.5
Sex	*	***	*
Female	3.9	10.2	17.5
Male	4.2	11.3	18.4
Average s.e.	0.04	0.12	0.20

*,** and *** effect significant at p<05, p<0.01 and p<0.001, respectively.
NS — Effect not significant (p>0.05)

kids born during the other seasons ($p<0.001$). The kids born during the first year of the survey were heavier at 14 days than kids born in the second year ($p<0.001$). Single-born kids were heavier than twin-born kids ($P<0.001$), while male kids were slightly heavier than female kids ($p<0.05$).

The mean (se) liveweight of kids at 150 days was 11.5 (0.11 kg). However, the kids born from August through to January were generally heavier at 150 days of age than the kids born during the other months ($p<0.001$), while the kids born in the first year were heavier than kids born in second year of the survey ($p<0.001$). There was a significant difference of almost 3 kg between weights of kids belonging to farmer C and those of farmer F ($p<0.001$). Single-born kids were 2 kg heavier than twin-born kids of the same age ($p<0.001$) while males were 1 kg heavier than females ($p<0.001$). Primiparous does had the lightest kids at this stage (150 d) which were 3 kg lighter than the kids of mature does ($p<0.001$).

Month of birth, farmer, birth type and sex of kids were found to have a significant effect ($p<0.05$) on live weight at 360 days (Table 1). The mean (se) liveweight at 360 days was 19.9 (0.20) kg. The kids born in January (during the wet season) had the lowest weights at 360 d, while kids born in July (during the dry season) when the majority of kids were born, were the heaviest. Again there were substantial differences between farmers ($p<0.001$). The kids in the best flock weighed 66 percent more than those in the worst flock. The difference between single and twin-born kids was significant ($p<0.001$) and was a little less than 2 kg. Males kids were heavier by about 1 kg than female kids ($p<0.05$).

In the first year 45 and 52 percent of kids born had exited the flocks by 30 and 150 days age respectively, while in year 2 comparative exits were 55 and 48 percent. Birth type, sex of kid and doe age did not affect exits ($X^2>0.05$).

Month of birth, farmer and birth year significantly affected exit of kids from the flock by age 30 ($p<0.05$) and 150 days ($p<0.01$) (Table 2). The majority (66 percent) of the kids which had exited by 30 days of age were born in the dry months of July, August, September and October. This pattern was maintained in the exits at 150 d, where kids born in these months accounted for 70 percent of the exits (Figure 1). The percentage of kids exiting the flocks differed by as much as 36.3 percentage points between farmers (Figure 2).

The major reason for exits of kids by age 30 days was death within 48 hours of birth and this remained the single major cause of exits even at 150 days of age where it accounted for 26 percent of total exits (Figure 3). Animals that were "missing" accounted for the next highest loss (24 %) at 150 days of age while kids which died from unknown causes (often acute mortalities) were the third highest class of exits. Kids were not sold and only 1 kid was slaughtered by the age of 150 d. At 360 d, missing animals accounted for over one third of the exits. The various reasons for exits affected flocks differently (Figure 4). For example, "missing" animals accounted for 0 to almost 62 percent of exits across flocks whilst animals dying from

Table 2: Pro Probit procedure for exits at 30 and 150 d of age

		30		150	
Var	**df**	**Chi Square**	**Significance**	**Chi Square**	**Significance**
Intercept	1	7.12	0.008	13.23	0.0003
Farmer	6	13.94	0.030	53.18	0.0001
Birth type	1	–	–	0.42	0.517
Sex of kid	1	–	–	0.34	0.559
Birth month	11	27.32	0.004	69.22	0.0001
Birth year	1	7.21	0.007	12.84	0.0003

– = Not determinable

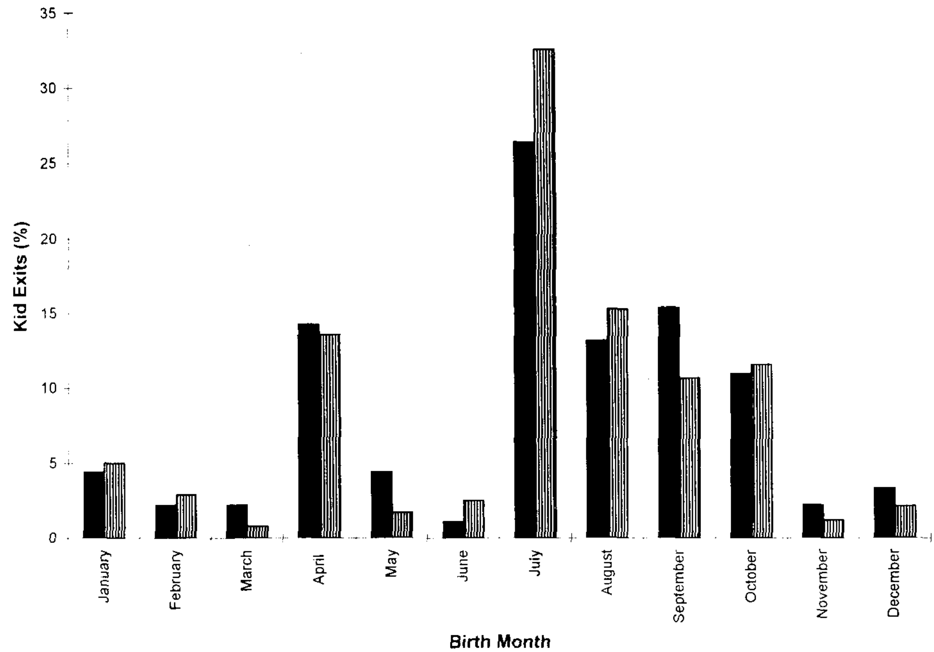

Figure 1: Effect of birth month on kids' exits (%) at 30 and 150 days of age.

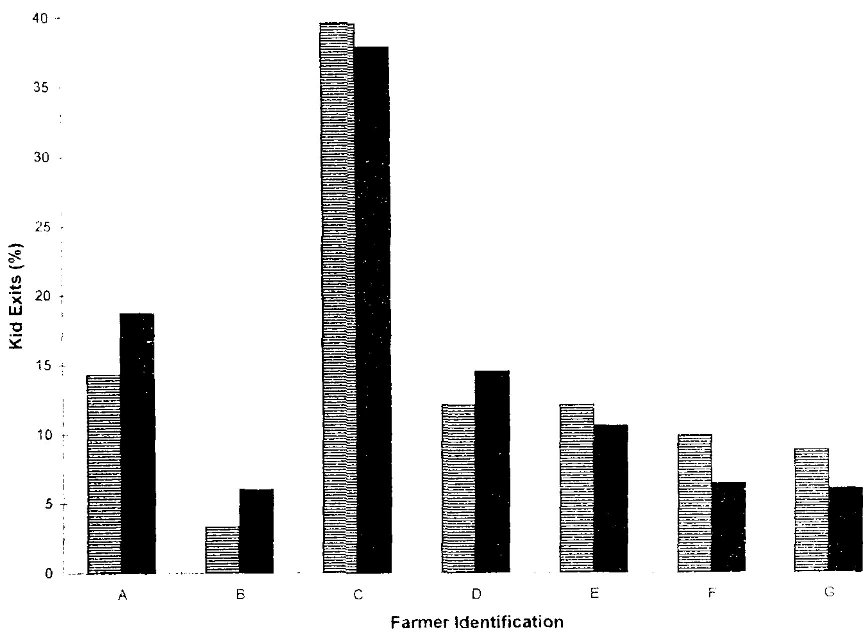

Figure 2: Effect of farmer on kids' exits (5) at 30 and 150 days.

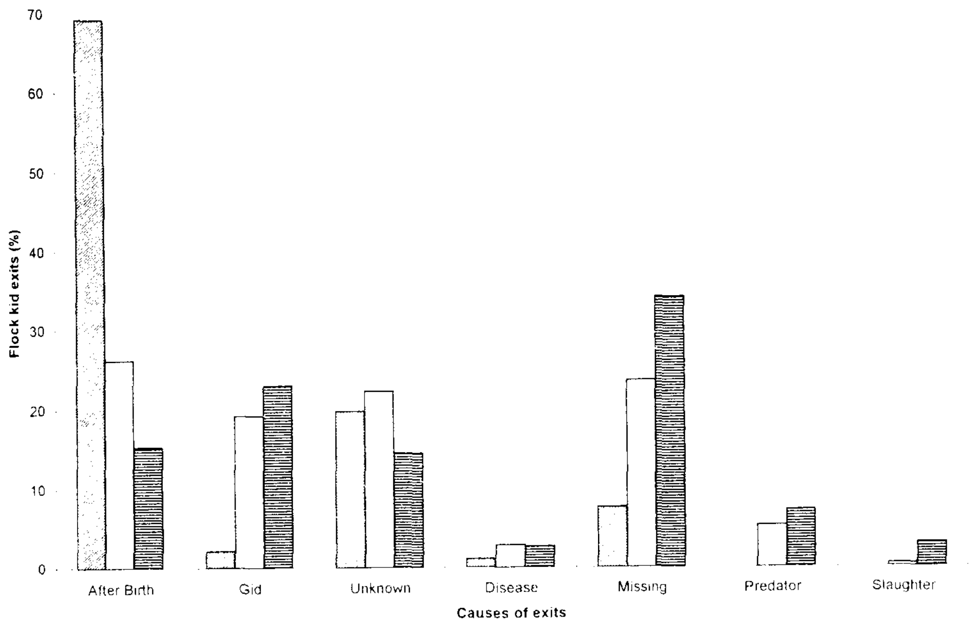

Figure 3: Causes of exits (%) from flocks at 30, 150 and 360 days of age.

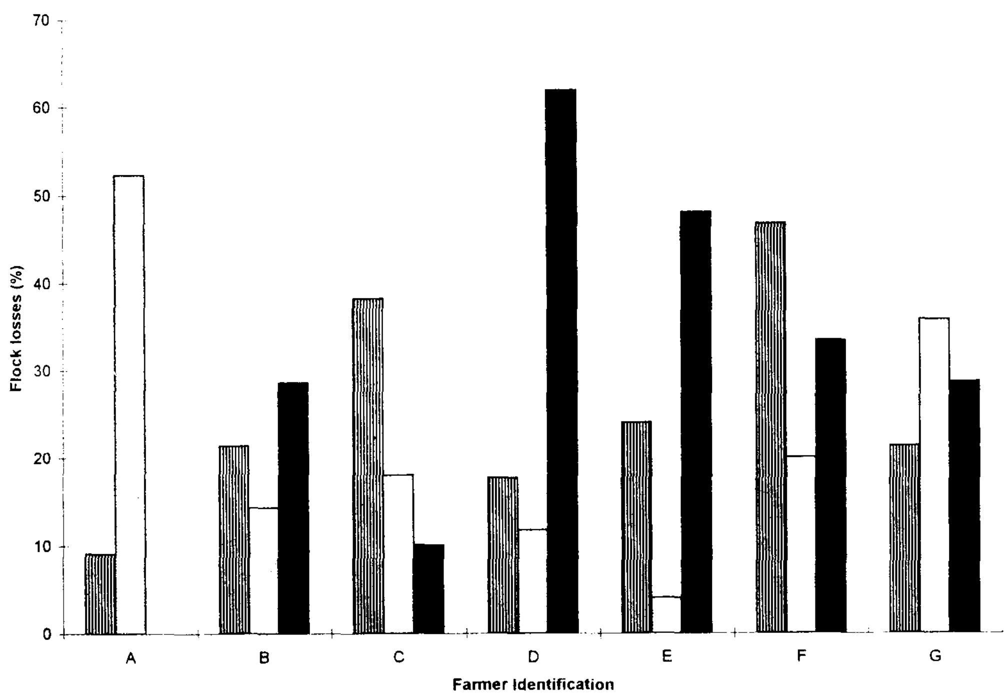

Figure 4: Flock losses due to management by farmer.

unknown causes accounted for 4 to 52 percent exits.

Discussion

The overall mean liveweights at 150 and 360 days of age reported here are much lower than those reported for the same breed under station management by Tawonezvi and Ward (1987), Sibanda and Ndlovu (1990) and Sibanda *et al*, (1997). This probably reflects the negative effect of environmental stresses due to feed shortages and disease challenges faced by goats under extensive systems. The kids born in the wet months of February, March and April had high 14 days weights but low 150 days weights, but gained rapidly between 150 and 360 days (Table 1). This could be related to the fact that the last 90 days of the period 14 to 150 days is during the dry season when feed quality is poor and quantities are low. However, these animals are old enough to benefit from the new "flush green" in spring (as browse trees develop new foliage) and in summer due to new grass and thus the rapid compensatory growth. Taken in isolation this would seem to lend support to the theory of "breeding in best season" (Wilson *et al*, 1985). However, consideration of kids born in August — October indicates that these kids were heavier at weaning (150 d) and slightly lighter at 360 days than those born in February-April. Thus the current farmer practice of breeding all year round seems the best strategy as it allows for stabilized overall flock productivity.

The effect of farmer on liveweights at different ages resulted in almost 66 percent increases in best flock compared to worst flock and reflects, dissimilarities in management techniques and resources between farmers. It is proposed that detailed documentation of practices of "best" farmers and packaging these as extension messages would have a bigger effect on improved productivity than current extension efforts that emphasize technologies borrowed from large scale commercial farming or from temperate environments. The effect of farmer management is also reflected on the contribution of different causes of kid exits to individual flocks. Management related causes like "missing" animals and animals "suddenly dying of unknown causes" are virtually non-existent in some flocks.

The overall exit-rate of 35 percent by the age 360 days observed in this study is comparable to the results from studies on traditionally managed goat flocks in the region (Hale, 1986; Ndlovu and Simela, 1996). The major contributor to exits up to 150 days age was death within 48 hours of birth. This phenomenon has been reported for other extensively managed goat systems elsewhere (Adu *et al.*, 1979; Osuagwuh and Akpokodje, 1981; and Riera, 1982). A possible reason for this loss is lack of attention to kids peri-parturient. In the farming system surveyed, pregnant does are not isolated as they approach parturition. Any kids born weak do not get assistance in accessing the udder and may fail to suckle within 6 hours of birth (the critical period for maximum absorption of colostrum). Thus there is scope to improve flock productivity in these systems through better management of the peri-parturient doe and its offspring.

Conclusion

The growth of Matebele goat kids is influenced by month of birth, farmer management practices and type of birth. The exits from flocks was mainly due to deaths within 48 hours of birth and missing animals, both are management factors amenable to control by farmers. More studies are needed to elucidate farmer strategies that enable some farmers to have low levels of exits from their flocks.

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