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Environmental factors affecting pre-weaning survival of Red Sokoto goats.

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Abstract

Effects of environmental factors viz, birth year, parity, sex, birth type and season of birth on preweaning survival of Red Sokoto goats (RSG) using production records kept between 1978 - 1985 at the National Animal Production Research Institute (NAPRI), Shika-Zaria were investigated. Birth year, parity and season of birth significantly ($P<0.05$) affected preweaning survival while birth type and sex of kid did not. The mean survival to weaning at 3 months was 72% and was highest in does with 4 or more parities (77%) and least in primiparous does (66%). Survival was significantly higher during harmattan and worst during the dry season. Losses were more concentrated in the 0-7 days of life in primiparous does during the dry season. Overall productivity of does and interactions between parity and birth type significantly affected survival. Breeding RSG does older than one year to kid preferably during 'harmattan' would improve preweaning survival of the kids.

Key words: Environmental factors, preweaning, survival, kids.

Introduction

FAO (1981) records showed that 96% of the 469 million goats in the world are found in developing countries. But in terms of productivity per animal, goat meat yield in developing countries is only 62% of what is produced in developed countries (World Bank, 1983). Nigeria with about 26 million head of goats holds 6% of world goat population and could not meet her animal protein needs from all livestock sources. The problem therefore is not inadequate number of animals but of low productivity arising from a complex of factors of which mortality holds sway. Various mortality rates in Nigeria breeds of goats have been reported. Adu *et al* (1979) observed 30.8% mortality in Red Sokoto goats (RSG) up to three months of age while Ojo (1981) reported 32.5% kid mortality in RSG before 4 months of age. Ngere *et al* (1984) reported 32.5% in West African dwarf (WAD) goats and 41.5% in RSG while Ademosun *et al* (1984) noted a preweaning mortality rate of 59.3% for a period of three seasons in WAD kids.

Therefore, mortality is a major constraint in small ruminant production in Nigeria, and preweaning kid mortality is a uniquely serious problem resulting in severe economic loss. Reduced mortal-

ity would stabilise the flock thus leading to increased productivity. This paper therefore reports on the effects of environmental factors viz: birth year, parity, sex, birth type and season of birth on the preweaning survival of RSG.

Materials and Methods

Data from the production records of Red Sokoto goat (RSG) at the National Animal Production Research Institute (NAPRI), Shika-Zaria, Nigeria between July, 1978 to October, 1985 were used for this study. Shika lies between latitudes 11 and 12°N and between longitudes 7 and 8°E at an altitude of 640m. The area falls within the Northern guinea savannah zone and receives an annual rainfall of approximately 1100mm. Mean maximum temperatures ranged from 27 to 35°C depending on season. The wet season lasts from June-September and this is followed by 'harmattan' season, a period of cool dry weather which starts from mid October to late January. The dry hot weather which lasts from February to May follows the harmattan.

Red Sokoto goat (RSG) was introduced to NAPRI in 1974. The animals were grazed during the day on semi-improved shrub savannah and later on cultivated pastures made of *Digitaria smutsii, Andropogon* spp, *Cynodon dactylon* and *Sporobolus pyramidalis*. Does were usually pasture mated and kidding was all year round until 1981 when this was replaced with hand mating. Kids were identified soon after birth but kids whose parents could not be traced from the records were excluded from the study. Kids were reared with their dams on a concentrate ration containing 16% crude protein, made of cotton seed cake, maize and brewers dry grains. They were also served 0.5 kg *Digitaria smutsii* per head per day until they were weaned at 12 weeks.

Analysis of variance was done to determine the effects of the environmental factors on kids survival. Survival was considered as a discrete variable with values of 1 for kids that survived and 0 for those that died. Parity ranged from 1 to 4 while birth type was either single or twin. Season of birth according to month of birth was classified as: dry (February - May), wet (June - September) or harmattan (October - January). Sex of kid is male or female. Linear and quadratic effects of birth weight on overall productivity given as total kids produced per dam for the period under study were considered as co-variates for kids survival in the above model. Comparison among means was made by the Duncan Multiple range test (Steel and Torrie, 1980).

Results and Discussion

The mean survival rates adjusted for non-orthogonality among the independent variables are shown in Table 1. The mean survival rate to weaning at 3 months was 72%. In the first month there was 14% kid loss while in the second and third months the losses were 11% and 3% respectively. In the first month, losses were concentrated between 0 - 7 days of life. Therefore, birth to 7 days of life appears the most critical in the preweaning survival of RSG kids. This agrees with 0 - 15 days reported for goats among Masai tribe in south-central Kenya (Wilson *et al* 1985). Differences between year of birth accounted for 28% of the variation in kids survival and it is the single most important factor affecting preweaning survival of RSG kids. The highest survival of 97% was observed in 1982 while 1978 had the least survival of 51%, Table 1. Similar yearly variations have been observed in: Damascus goats, Mavrogenis *et al.* (1984); Changthang Pashima goats of Ladakh, Darokhan and Tamar (1983) and in Fouta Djallon goat of Nigeria (Osuagwuh and Akpokodje, 1984). Fall *et al.* (1982) reported year-of-birth effects which varied from 15 to 54% in Djallonke lamb survival in Senegal. Yearly variations in feed and forage availability, physical environmental conditions and other management

Table 1: Adjusted mean survival rate of Red Sokoto goat at weaning.

Overall mean		**0.72**
	N	Adjusted mean
Year of birth:		
1978	53	0.51[e]
1979	76	0.93[f]
1980	121	0.84[d]
1981	102	0.64[ab]
1982	25	0.97[f]
1983	141	0.60[a]
1984	126	0.74[c]
1985	82	0.70[bc]
Parity:		
1	168	0.66[a]
2	127	0.68[a]
3	195	0.74[b]
4	236	0.77[b]
Birth type:		
Single	280	0.71
Twin	446	0.72
Sex of kid:		
Male	360	0.69
Female	366	0.75
Season of birth:		
Dry	275	0.65[a]
Wet	227	0.76[b]
Harmattan	224	0.77[b]

[a,b,c,d,e,f]: Values within each subclass with different letters differ significantly ($P<0.05$).

factors have been reported for differences in survival between years, (Malik *et al.*, 1980).

Season of birth was next to year of birth among factors affecting RSG survival. Kids survival was significantly ($P<0.05$) high during harmattan and poor during dry season. This was so because kids born in the dry season usually passed through a period of inadequate nutrient supply arising from poor pasture growth due to drought and were weaned (3 months later) during wet season. Heavy losses attributable to high incidence of helminthiasis, catarrh, foot-rot and *pestes des petits ruminants* have been reported at this time of the year (Hill, 1964; Majiyagbe, 1985). Similar losses of 23.8% during short dry (December -

January) or 31.4% during long dry (March - June) seasons have been reported in Kenya goats (Wilson *et al* 1984). There was no significant (P>0.05) difference in the mean survival of kids born during wet and harmattan seasons contrary to the findings of Asiedu (1983). Lack of significant differences between harmattan and wet season born kids could possibly be due to reduced population of internal parasite as a result of drought preceeding the wet season born kids, although there was no post mortem records for animals used in this study.

Kid survival increased from parity 1 to 4 which agrees with Wilson *et al* (1985). Dams with 3 or more parities were 8 - 11% superior in kids survival to dams having either 1 or 2 kiddings. However, the observed difference in kids survival is small compared with reported 34% advantage in lamb survival for ewes with 2 or more lambings compared with ewes having first lambing (Fall *et al*., 1982). High mortality in kids nursed by primiparous dams was traceable to poor milk yield or poor mothering ability due to inexperience of dams (Osuagwuh and Akpokodje, 1981).
Birth type had no significant effect on survival. Similarly, sex difference was not significant although males experienced higher mortality in this study. Laster and Gregory (1973) reported that because of superior birth weight, males usually experienced higher mortality than females before birth as a result of dystocia. But in this study data on perinatal mortality were not available and were therefore not considered.

Linear and quadratic effects of birth weight had no significant effect on preweaning kid survival, but the overall productivity of doe significantly (P<0.01) affected preweaning survival. Hence, there was a significant (P<0.01) linear relationship between kid survival and total kids produced per dam. Also, interactions between parity and birth type significantly (P<0.05) affected kids survival. Hence as parity increased from 2 to 4 survival of kids was less among twins than singles, but in primiparous does, the relationship was the opposite.

Conclusion

Although RSG is a fertile and prolific breed, under NAPRI system of management, survival rate to weaning was 72%. Besides, highest loss occurred between 0 - 7 days especially in primiparous does and during the dry season. But under the traditional system of management where RSG is largely kept in Nigeria, losses will be considerable. Hence profitability under such a system of management will be highly sensitive to survival rate. Increased survival rate will therefore stimulate investment in small ruminant production. That disease is still a major problem in ruminant survival is well documented (Jagun, 1985). From this study, breeding of does older than one year of age to kid preferably during 'harmattan' is recommended for improved preweaning survival of kids.

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