Effects of body condition on the reproductive performance of Red Sokoto goats.

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Abstract

Effects of body condition on the litter size, birth weight and kids survival of Red Sokoto goat were examined using seventy eight does aged 1-3 years. The does were flushed by grazing on cultivated pastures in the morning, and when indoor, they were served 500gm of concentrate ration per head per day. Their body conditions were assessed. All does used in this study fell within body condition 1 with a mean body weight of 20.7kg and body condition 2 with a mean weight of 24.1kg on a condition scale where 1 is poor and 2 is fair. They were randomly assigned to six sire groups and mating lasted ten weeks. All does were reared as a group before and after parturition until the kids were weaned at 12 weeks. Does on condition score 2 had significantly higher litter size (1.74), reared more kids to weaning (0.68) and were superior to does on condition score 1 in overall productivity measured as number of kids weaned (89.21 vs. 45.85 %) or weight of kids weaned per doe kidding (4.92 vs. 2.40kg). Does on condition score 2 were twice as productive as does on condition score 1. The large difference in productivity would seem to justify investments in nutrition to breeding does prior to mating.

Key words: Body condition, litter size, birth weight, kids survival

Introduction

Red Sokoto goat is the most predominant small ruminant in Northern Nigeria. It is kept chiefly for meat, although the hide is valued for its high quality 'Morocco' leather. Under the extensive system of management in which the animals are usually kept, their level of nutrition at different times of the year closely parallels the seasonal variation in rainfall and temperature. The wet season lasts from June – September in northern

Nigeria and this is usually followed by 'harmattan' season, a period of cool, dry weather which lasts from mid-October to late January. The dry hot weather which lasts from February to May follows the harmattan. Herbage availability is highest during August – October and least during the dry season. Consequently, at the end of the dry season, animals are in very poor body conditions unless supplementary feeds are provided. It has been reported that ovulation

rate is positively related to body condition at mating and it also has a significant positive effect on lambing rates (Gunn, Doney and Russel, 1969).

At the time of this study at the National Animal Production Research Institute (NAPRI), Shika, small ruminants were usually bred once a year at the end of the dry season so that the kids were born during harmattan – a period they were noted to survive best and were also weaned (3 months after birth) to a period of good pasture growth. Prior to breeding, does were usually put in a rising body condition by grazing on cultivated pasture.

As over 90% of Red Sokoto goats are managed by the pastoral Fulani who neither cultivate pasture nor readily provide supplementary feeding to their animals, at breeding, does would vary in their body conditions depending on seasonal availability of pasture. This study reports on the relationship between body condition at mating and subsequent reproductive performance of doe, the viability and growth of its kids.

Materials and methods

This study was conducted at the National Animal Production Research Institute (NAPRI), Shika. 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 chiefly during the months of April to October. The mean maximum temperatures range from 27 – 35°C depending on season.

Seventy eight Red Sokoto does aged 1 – 3 years were flushed by grazing them on cultivated pastures of *Digitaria smutsii* and *Cynodon dactylon* everyday shortly after sunrise till 4 pm

for approximately 6 weeks. When indoor, the animals were served 500gm of concentrate per head per day. Thereafter, the animals were scored for body conditions according to Russel *et al.* (1969). Thirty-six of the does used in this study fell within body condition score 1 with an average weight of 20.70 ± 0.40 kg while forty-two of the does had body condition score 2 with a mean weight of 24.10 ± 0.45 kg on the condition score scale where 1 is poor and 2 is fair as defined below:

Condition 1: Animals whose spinous process are prominent and sharp, fingers pass easily under the ends, and it is possible to feel between each process; Mm longissimus dorsi shallow with virtually no subcutaneous fat cover.

Condition 2: Animals whose spinous process are prominent but smooth and individual process can be felt as fine corrugations; transverse smooth and rounded, and fingers can pass under ends with little pressure; Mm longissimus dorsi of moderate depth with little subcutaneous fat cover.

The does were randomly assigned to six sire groups for mating, randomisation being on the basis of weight, age and body condition score. They were observed in the morning (07-10.00 hrs) and in the evening (16.00-18.30 hrs) for incidence of heat by introducing the assigned buck into each pen. Any doe(s) that came on heat was separated and hand mated. Repeat breeding was allowed if such doe(s) remained on heat the subsequent days. Breeding lasted ten weeks, thereafter, the does were reared as a group from end of breeding to kidding. Kids were identified and weighed few hours after birth. Kids were reared with their dams on a concentrate ration containing 16% crude protein made of cotton seed cake, maize and brewers dried grains. They were also served 0.5 kg

Table 1: Anova of litter size, birth weight and survival

Source	<u>Birth weight</u>		<u>Litter size</u>		<u>Survival</u>	
	df	MS	df	MS	df	MS
Dam Age	2	0.01	2	0.05	2	0.01
Sire Group	5	0.27	5	0.03	5	0.23
Dam Score	1	0.17	1	0.58*	1	0.86*
Type of birth	1	0.19	—	—	1	0.84*
Sex	1	0.71	—	—	1	0.01
Pooled Interactions	34	0.16	25	0.26	34	0.24
Residual	43	0.21	24	0.24	43	0.27

*P<0.05

Table 2: Least square means (LSM) of litter size, birth weight and survival

Subclass	<u>Birth weight</u>		<u>Litter size</u>		<u>Survival</u>	
	No.	LSM	No.	LSM	No.	LSM*
Dam Age	88	1.71	58	1.61	88	0.53
1	15	1.72	12	1.64	15	0.56
2	21	1.73	16	1.55	21	0.54
3	32	1.70	30	1.65	32	0.51
Sire Group						
1	17	1.89	12	1.62	17	0.31
2	19	1.63	12	1.60	19	0.53
3	12	1.67	8	1.71	12	0.66
4	12	1.49	7	1.65	12	0.61
5	12	1.88	8	1.56	12	0.47
6	16	1.75	11	1.55	16	0.63
Dam Score						
1	20	1.78	16	1.49 ^a	20	0.39 ^a
2	68	1.65	42	1.74 ^b	68	0.68 ^b
Type of birth						
Single	20	1.77	—	—	20	0.66 ^a
Twin	68	1.66	—	—	68	0.41 ^b
Sex						
Male	40	1.81	—	—	40	0.55
Female	48	1.62	—	—	48	0.52

*Values within each subclass with different superscripts differ significantly (P<0.05)

Table 3: Mean values of reproductive traits

Traits	Body Conditions	
	1	2
No. of does kidding	16	42
Litter size	1.49 ^a	1.74 ^b
Birth weight	1.78 ^a	1.65 ^b
Survival	0.39 ^a	0.68 ^b
Measures of productivity		
No. of kids weaned/100 does exposed	45.85 ^a	89.21 ^b
Weight of kids weaned/doe exposed (kg)	2.40 ^a	4.92 ^b
Weight of kids weaned/doe kidding (kg)	3.05 ^a	6.53 ^b
12 th week weight (kg)	5.25 ^a	5.52 ^b

Litter size was adjusted for dam age while birth weight, survival and 12th week weight were adjusted for dam age, type of birth and sex of kid.

Traits with different superscript along the same row differ significantly ($P < 0.05$).

Digitaria smutsii per head per day. Kids were weighed once a week until they were weaned at 12 weeks. Least square procedures (Harvey, 1960) were used to determine the effects of the various factors on litter size, birth weight and kids survival.

Results

Dam age and sire group had no significant effects on birth weight, litter size and kid survival, Table 1. The least square mean (LSM) litter size was 1.61, Table 2. Does with condition score 2 had a significantly ($P < 0.05$) higher litter size. But body condition did not significantly influence birth weight.

Overall kids survival to weaning at 12 weeks was 53%. Kids from does with condition score 2 survived significantly ($P < 0.05$) better than kids from does with condition score 1 while singles survived significantly better than twins, Table 2. Kids survival was more critical between 0 – 6 weeks of life during which 50% of kids from does

with condition score 1 were lost compared with 12.5% loss in does with condition score 2.

The 12 weeks weight of kids was similar in both groups, Table 3. However, does with condition score 2 were significantly ($P < 0.05$) superior to does with condition score 1 in overall productivity measured either as number of kids or weight of kids weaned per doe exposed, Table 3.

Discussion

The overall mean litter size of 1.61 obtained in this study agrees with 1.5 – 1.7 previously reported for this breed, (Adu *et al.*, 1979). Bradford (1968) reported within breed difference between sires in litter size contrary to the finding in this study. He however noted that such occurrences were rare and within small numbers of sires and in most cases between exceptional individuals.

The overall kids survival to weaning (53%) showed a considerable improvement over previous mortality reports of 61%, Molokwu and

Igono (1978) and 69.3%, Adu *et al.* (1979) possibly because of improved management. Superiority of does with condition score 2 in overall survival could be attributed to the initial difference in premating weight amongst other reasons. Does with condition score 2 had a mean weight of 24.10kg compared with 20.7kg in score 1. Malik *et al.* (1980) reported that weight of does at kidding influenced her kids birth weight and milk yield positively which in turn affected kids survival. But a 50% loss in 0 – 6 weeks of life in does with condition score 1 underscore the importance of proper management at this stage of growth. Poor mothering ability often mediated through inadequate milk release consequent on marked seasonal variation in quality and quantity of forage supply had been reported for a similar loss in lambs (Taiwo and Buvanendran, 1985). While it may be difficult to say these factors were responsible for the high death of kids, but more often than not, they are the initial causal factors. For example, studies showed that starving or underfed kids are highly susceptible to cold and disease (Osuagwuh and Akpokodje, 1984). Not only that, cold predisposes to such killing diseases like pneumonia and peste des petit ruminants (PPR) (Osuagwuh and Akpokodje, 1981).

Although the weight of kids was similar in both groups, but as does in score 2 had a higher litter size and also weaned a greater proportion of kids in terms of overall productivity measured as weight of kids weaned per does exposed, they were more than twice as productive as does in score 1.

The results show clearly the importance of body condition at mating on the overall productivity of Red Sokoto does. Although data on relative cost of feed inputs prior to mating versus returns in terms of overall productivity are not available, the large difference in productivity would seem

to justify investments in nutrition to breeding does prior to mating.

Seasonal or general under nourishment is a major problem in Nigerian livestock. And since over 90% of Red Sokoto goats are in the hands of pastoral Fulani, there is an urgent need for livestock management interventions such as planned breeding or fodder conservation to take advantage of high prolificacy of Red Sokoto does. Under livestock system research unit of NAPRI, Keripe *et al.* (1991) amply demonstrated the cultivation and preservation of the forage varieties of cowpea and groundnut for dry season feeding with encouraging results among the semi – sedentary pastoral Fulani of Giwa districts of Kaduna State. Similar project can be extended to other ecological zones of Nigeria to improve the productivity of Red Sokoto does.

Besides, body condition score can effectively replace the use of weight as a criterion for choosing animals of good reproductive potential under field conditions where there are no weighing scale. It is a reliable method in experienced hands. The repeatability of scores by the same recorder in NAPRI is in the range of 0.8 – 0.9, hence its high and reliable practical value.

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