

Effect of Sex and Birth Type on Kid Performance of Sudanese Taggar Goats

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Abstract

The study was conducted in Taggar goats to evaluate the effect of two different levels of protein and energy in the rations on some reproductive and productive traits. Sixty two (62) kids of Taggar goats were allocated to sex and birth type in a complete randomized design according to live body weight. The results indicated that supplemented does secured higher litter size 1.50 and 1.33 compared to control group 1.2. Kidding rate was high in supplemented groups 100% compared with control group 93.8%. Body weight was heavier at time of kidding and weaning for supplemented does compared with control does. These results indicated that supplementation reduced body weight losses throughout the lactation period. The kidding interval for the supplemented does was shorter for does in group B (247.81±8.38 days) and group C (242.60±7.88 days) compared to does in control group (288.94±6.84 days). Similarly, the service period had been reduced in supplemented does than those in control group. Results from milk analysis indicated that higher protein, lactose and total solid content in supplemented does whereby fat content was higher in control group. The supplementation had reduced the incidence of abortion and mortality rates compared to the unsupplemented does. In conclusion the investigated environmental factors showed an impact on both reproductive and productive traits of the Taggar goats under rangeland farming system.

Key words: Taggar goats, production, reproduction, concentrate ration, dry land.

Introduction

Taggar goat is a meat goat, valuable livestock in South Kordofan state, adapted to certain areas and is indispensable for the local people (Bushara and Abu Nikhiala, 2012). The goat is being recognized as a significant food source, because does can convert feed dry matter into milk as efficiently as other ruminants. The population of goats in Sudan was estimated to be 42 million (M.A.R, 2007). More than 95% goats are being kept by the farmers living in the rural areas and goat keeping becomes an accessory source of income to the landless peasants in the rural community. Many of the landless and marginal farmers own 1-5 goats and contribute economically to the subsistence farmers in mixed farming systems. The major factor influencing the reproductive performance is the body weight of the doe. It is generally considered that does may be mated when they reached 50% of their adult body weight, and this weight can be attained at varying ages according to diet composition (Walkdem-Brown and Bocquier, 2000).

Growth traits are important factors influencing profitability in any meat producing enterprise. Rapid growth during the early period can minimize the cost of rearing and thus provide more profit to the farmer. The birth weight and early growth rate of animals are determined not only by genetic potential but also by maternal and environmental factors (Mandal *et al.*, 2006). Body weight and pre-weaning growth rate are often considered as early indicators of late growth and economic benefit and can affect body weight at puberty and first kidding (Portolano *et al.*, 2002; Hanford *et al.*, 2006). The type of birth (single or multiple) is considered as one of the most

important factors influencing birth weight and subsequent growth rate in goats (Das *et al.*, 1996; Kosum *et al.*, 2004). The present experiment was designed to study the effects of sex of kids and birth type on birth weight and body weight at weaning and examine the effects of birth type on body weight and age at puberty and first kidding on Taggar goat performance in western Sudan.

Materials and Methods

Study area

This study were conducted in Dalanj area (Longitudes 12.02° N, Latitudes 29.39°E) Southern Kordofan state, Sudan. The mean monthly temperature ranged from 25.8°C in July to 31.3°C in April. The mean maximum was about 39°C in the three months prior to the rainy season with high temperature in May. The average minimum temperature varied between 17°C in January to more than 20°C at the onset of the rains in May. Annual rainfall ranged from 500-800 mm and relative humidity of 35% which rose to 75% during the rainy season. Soil types varied from sandy (goz) in the north to heavy clays (vertisoil) and the lighter clay (gardoud) in the south (S.K.D.P, 2000).

Experimental animals

Sixty two (62) newly borne kids were used in this experiment. Kids were classified according to sex and number of kids born per doe (litter size) and birth type). All kids were ear tagged and treated with the necessary medication against endo-and ectoparasites (AGVET, USA 1.0 ml/50 kg body weight subcutaneously Ivomec super drench) and kept in separate enclosures constructed from iron bars and wire, and equipped with

feeders and water troughs. Inside each enclosure the animals were individually tethered at sufficient distance away from each other. All kids were allowed to suckle their mothers daily, and then turned to graze on pasture from 8.00 am to 6.00 pm. Live weights were recorded weekly from birth up to weaning and kids were fasted overnight before being weighed. Male kids were followed up to weaning age at three months, while the female kids were followed until the age at first kidding.

Statistical analysis

The data were statistically analyzed according to complete randomized design using SPSS v.14.0 software package.

Duncan's Multiple Range Tests (DMRT) was also used to test means differences.

Results and Discussion

Kid birth and weaning weights

Birth type exerted a significant ($p < 0.05$) effect on birth weight of kids. Kids born as single were heavier ($p < 0.05$) than twins and triplets, twins were heavier ($p < 0.05$) than triplets (Table 1). Twinning rate was found to be 38.1% whereas triplet rate was 9.5% (Figure 1). The single rate was highest (52.4%). Also sex of kid had highly significant ($p < 0.01$) effect on birth weight. Male kids were heavier than female kids.

Table 1: Effect of birth type and sex of kid on birth and weaning weights of Taggar goats

Parameter	Birth weight		Weaning weight	
	N	Mean±se	N	Mean±se
<u>Birth type</u>				
Single	32	2.10±0.06 ^a	27	8.63±0.24
Twin	24	2.02±0.05 ^{bc}	22	8.11±0.26
Triplet	6	1.79±0.16 ^b	5	7.41±0.51
<u>Sex of kid</u>				
Male	32	2.21±0.06 ^a	30	8.38±0.28 ^a
Female	30	1.92±0.05 ^b	24	7.12±0.26 ^b

^{abc}Means in the same column with different superscripts are significant at $p < 0.05$

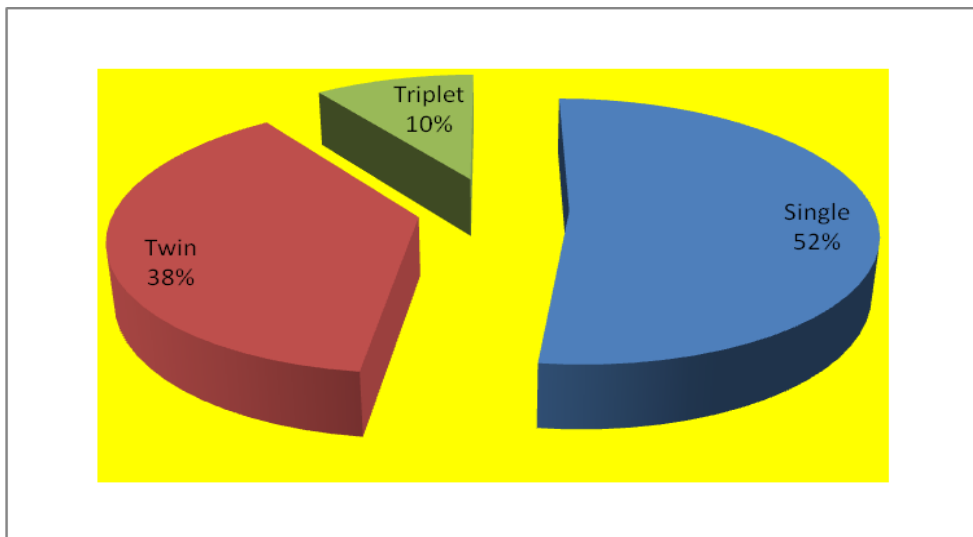


Figure 1. Percentage of kids born by birth types

Weaning weight was not significantly ($p < 0.01$) affected by birth type where the highest weight was found in single born kids (8.63 ± 0.24 kg, $p < 0.01$) followed by twins (8.11 ± 0.26 kg, $p < 0.05$) than triplet kids (7.41 ± 0.51 kg) (Table 1).

The pre-weaning weight gain exerted a significant ($p < 0.05$) effect on birth

type. Single born kids recorded high body weight gain compared to twins, while twins showed high body gain than triplets. The daily weight gain after weaning was non-significantly ($p > 0.05$) affected by litter size (Table 2).

Table 2: Effect of birth type and sex of kid on body weight gain of kids from birth to weaning

Parameter	N	Body weight gain/kg	Daily body weight gain/g
<u>Birth type</u>			
Single	27	6.53 ± 0.22	72.55 ± 2.49
Twin	22	6.09 ± 0.25	67.67 ± 2.77
Triplet	5	5.62 ± 0.48	62.44 ± 5.39
<u>Sex of kid</u>			
Male	30	6.17 ± 0.27^a	68.56 ± 2.97^a
Female	24	5.20 ± 0.25^b	57.78 ± 2.73^b

^{ab}Means in the same column with different superscripts are significant at $p < 0.05$

Sex affected significantly ($p < 0.05$) the weaning weight with males showing heavier weights compared to female kids (Table 2) and total gain up to weaning age. Male kids had the heaviest ($p < 0.05$) daily gain 68.56 ± 2.97 g/day compared with female kids of 57.78 ± 2.73 g/day.

Effect of birth type on body weight at puberty and first kidding

The results indicated that significant effect of birth type ($p < 0.01$) on the weight at puberty. Female kids born as single had heavier weight at puberty than twin and triplets. Weight at first kidding was not statistically affected by birth type, however, single born kids maintained heavier body weight compared to the both twin and triplet kids at weight of first kidding (Table 3).

Effect of birth type on age at puberty and at first kidding

The birth type exerted non significant effect on age at puberty and at first kidding. However, single born kids were relatively younger than both twin and triplet kids in these traits (Table 3).

Mortality rate among kids

Sex has exerted a significant ($p < 0.05$) effect on mortality rate. The results showed that female kids recorded higher mortality rate than male kids of 30 and 9.4 %, respectively (Table 4). The main reason for death could be attributed to low birth weight, respiratory disease and lost in rangeland. The overall mortality rate in the present study was 19.0%.

Table 3. Effect birth type on body weight and age at puberty and first kidding of Taggar goats

Birth type	N	Weight at puberty, kg	Weight at 1 st kidding, kg	Age at puberty (days)	Age at 1st kidding (days)
Single	10	14.16 ± 0.34^{ac}	20.03 ± 0.41	175.68 ± 12.86	358.10 ± 15.01
Twin	8	13.55 ± 0.29^a	19.68 ± 0.35	195.31 ± 9.94	384.86 ± 9.56
Triplet	3	11.62 ± 0.43^{bd}	19.02 ± 0.52	206.61 ± 8.19	387.81 ± 11.60

^{ab}Means in the same column with different superscripts are significant at $p < 0.05$

Table 5. Effect of sex of kid on mortality rate

Sex of kid	No. of kids	No. kids died	% Mortality rate
Male	33	3	9.4
Female	30	9	30

The results clearly demonstrated that single kids were heavier than twins and twins were heavier than triplets which were consistent with Song *et al.* (2000), Madibela *et al.* (2002) and Zeleke, (2007). The differences in birth weight according to birth type may be due to the small size and weight of the twins and triplets in the uterus. Results reported by Das *et al.* (1996) are in line with our results that birth weight decreased with increase in litter size, as the number of foetuses increase and the number of caruncles attached to each foetus decreases. According to that reducing feed supply to the foetus leads to a reduction in the birth weight of the lambs. This study showed that males were generally heavier than females at birth similar to Gubartalla *et al.* (2002), Madibela *et al.* (2002), Abu Nikhaila and El Hag (2003) and ELimam *et al.* (2007) results of Taggar goats. Heavy weight of male kids could be attributed to the anabolic effect of male sex hormones during pre-natal growth and uterine environment as in agreement Nieto *et al.* (2006).

The growth rate during the pre-weaning period was significantly affected by type of birth, which was slightly higher in single born kids compared to twins and triplets. The twin born kids were heavier at birth and maintained a higher growth rate up to weaning compared to triplet kids, Gubartalla *et al.* (2002) reported similar findings. The pre-weaning daily gain was higher for single kids compared with multiple births (twin and triplets kids), these results are consistent with Madibela *et al.* (2002), and Zeleke, (2007). Lyatuu *et al.* (1994) who also reported that after birth, single kids had an advantage over twins as twins had to compete for milk from their dams, single kids had sufficient milk for growth to weaning. Moreover Zeleke (2007) and Dadi *et al.* (2008) confirmed that the

type of birth exerted a significant influence on weaning weight.

During the pre-weaning period sex of kid significantly affected birth weight and subsequent growth rate. Male kids were heavier at birth than female kids and tended to have a higher average daily gain. The study revealed that male kids gained more than females, and were heavier than female for subsequent growth rate and grew faster than female kids. These results are in agreement with Abu Nikhaila and EL Hag (2003), Zeleke, (2007) and Dadi *et al.* (2008) who reported that the male kids exhibited higher live weights than female kids. The high weight gain for the male kids may be due to the effect of male sex hormones and the aggressive nature of male during suckling and feeding. These variations in weaning weight may be due to breed differences and management particularly in the time or (age) at weaning. The type of birth significantly affected the body weight at puberty, single born kids exhibited high body weight (14.16 ± 0.34 kg) compared with twin kids (13.55 ± 0.29 kg). The lowest body weight was recorded in triplets (11.62 ± 0.43 kg); this variation in body weight may be due to that single born kids grow faster than both twin and triplets. Single kids had access to their dam's milk with no competition as in the case of twin and triplets. The single born kids exhibited puberty at earlier ages compared to twin and triplet born kids. However, twin born kids had shorter days to puberty than triplets, similar to the results obtained by Zeshmarani *et al.* (2007) for Assam goats of 259 ± 2.5 , 265 ± 2.4 and 269 ± 3.66 days for single, twin and triplets kids, respectively, and this may be due the slow growth of twin and triplet kids and to the competition between the kids for the mother's milk. The differences in age at puberty may be due to

availability and quality of feed, the rainy season which promotes growth rate and hence an early age of sexual maturity.

The single born female kids exhibited higher body weight at kidding compared to triplet born female kids. The insignificant superiority of single born female in this study may be related to the lack of competition between single and multiple births for the mother's milk and other available nutritional resources whereby single born kids are always at an advantage compared to multiple births. The birth type also lends itself as a potential effector on age at first kidding. Single born females kidded for the first time at a younger age (10.9 months) when compared with twin and triplet born mates at 11.9 and 11.5 months, respectively. The differences between these ages however did not secure a statistical significant ($p > 0.05$). This result is comparable with the findings cited by Marai *et al.* (2000) and Zeshmarani *et al.* (2007) who documented the effect of birth type on age at first kidding in Assam goat as they postulated that single born females gave their first kid at a younger age in comparison with twin and triplet born mates. The longer ages reported by these authors reflected breed as well as other environmental factors involved between the two studies.

Generally the effects of birth type on birth weight, weaning weight, and hence age at sexual maturity and age at first kidding seem to exert their role indirectly through nutrition. Likewise single born kids had the advantage of a non competition situation for the already meager quotation of the mother's milk. A litter size with more than one kid will widen the gap between kids' needs and the actual milk produced by the dam thus leading to a superior performance of singles compared to twins

and triplets. The overall abortion rate obtained in the present study was 13.04%. Different abortion rates were reported in the literature, the difference between the studies can be attributed to several factors including breed, season of birth, nutrition, health care, environmental factors and level of management. Marai *et al.* (2000) reported low abortion rate of 1.4% in their study. One or more of the prementioned factors could contribute to the difference between the two studies. The overall mortality rate in this study was 19% from which 14.7% occurred during the pre-weaning period and 4.3% during the post-weaning, the major causes of mortality among the born kids were caused by respiratory infections and low birth weights. Ikwuegbu *et al.* (1996) reported mortality rate of 14.5%, while other authors postulated higher values in the same breed of Taggar goats as 26.45% (ELimam *et al.*, 2007). On the other hand, Mtenga *et al.* (1994) found that pre-weaning mortality accounted for 40.6% while postulated mortality rates were 25.7%. It was observed that most of mortalities occurred among the females kids (30%) compared to males (9.3%). High mortality rate among female may be attributed to the low birth weight of female kids. These results confirm that sex significantly affect kids mortality.

Conclusions

In conclusion, supplementation improved reproductive and productive traits of Taggar goats under grazing condition. However, animals lost live weight without supplementation under the same feeding regime. Therefore, supplementation of grazing goats with concentrate ration may be suggested to optimize growth performance. Further studies with different levels of concentrate supplementation may

be conducted using a large number of animals for a longer period to get more detailed information related to reproductive performance.

Acknowledgments

This study was funded by Dalanj University, Sudan. The authors wish to thank EL-Obeid Research Station and Agricultural Research Corporation for providing chemical analysis.

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