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Assessment of the Reproductive Performance and Post Weaning Growth of Crossbred Goat in Derived Guinea Savanna Zone

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Abstract: In Abakaliki and Nigeria in general, goats are kept primarily for meat yield, so production traits of interest are the number of young weaned per breeding female per year and their growth rate. The assessment of the reproductive performance and growth of cross bred local (RSG × F_1) an adapted breeds of goats in Nigeria provide vital information to understanding its productive potentials. Reproduction data of 1,1304 kids from 510 does were collected for 9 years in the Small Ruminants Research and Multiplication u\nit of the Department of Animal Production, Enugu State University, of Science and Technology, Abakaliki Campus, Nigeria. The reproductive performance evaluated included prolificacy, fertility, kidding, post-weaning growth, mortality and gestation length. Growth traits studied were birth and 72 weeks of live weights and average daily gains. Statistical analysis showed significant effects ($p<0.05$) due to season of rearing with early and late rainy displaying superior values over other seasons on live weights. Sex of kids and types of birth had significant effects ($p>0.05$) on birth and 72 weeks live weights with males, singles and twins displaying superiority over females and triplets kids, respectively. Average daily gains were significantly affected by sex, type of birth and season of rearing. The overall mean for gestation days was 131.21±0.73 and was affected by season, sex and type of birth. Single birth males, early and late rainy seasons recoded more number of days of gestation than others. Conclusively the crossbred Nigeria Red Sokoto goats (RSG × F_1) have high reproductive performance under certain season of rearing with the males having higher meat yield potentials.

Key words: Growth rate, gestation length, reproductive rate, crossbred goats

INTRODUCTION

Ruminant farming in the south eastern Nigeria (derived savanna ecozone) is mainly for meat, economic empowerment and provision of organic manure for maintenance of soil fertility (Otuma, 2005, 2007). They are found in the hands of small holders and their contribution to farming and income is very great (Otuma, 2004, 2005; Adu, 1978). The Red Sokoto goats (RSG) that are the parents of RSG×F_1 are also called Maradi are predominant local goats of the desert ecozone of the Northern region of Nigeria. The most dominant husbandry management systems for them are the free rearing with occasional suppllementation at night. The production traits of major interest for the farmers are they number of young weaned per breeding doe per year and their growth rates. High reproduction rate are essential factor of profit in meat goat production (Ezekwe and Lovin, 1996) and is determined by the number of progeny kidded in a given period of time (Greyling, 2000). The RSG×F_1 is a slave to their ecological environment and are relatively slow growing in the southern part of the country (new environment) (Otuma, 2006).

The biological productivity depends on the fundamental and physiological processes of reproduction, growth and death. The extents of reproductive performance also depend on the extent of interaction of genetic and environmental factors that has to be exploited. There is the need however, to assess the influence of seasons on various reproductive traits on their performances and post-weaning growth rates of these adapted crossbreds outside its ecological origin.

The objectives of this research are: to find out the reproductive performance of the adapted crossbred of Red Sokoto goat in derived guinea savannah, assess the effect of sex, type of birth and season on the post-weaned growth rates of the animals.

MATERIALS AND METHODS

Location of the study: The sswork covered the period from 1995-2005 located at the small Ruminant and Multiplication Unit, in the Department of Animal Production/Fisheries, Enugu State University of science and Technology, in then Abakaliki campus. Abakaliki is

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situated between 10°-15° North latitudes and 87° and 142° east longitudes. The temperature stays within a constant range of 30-31°C daily.

Animal management: The flock was raised under semi-intensive system. At daytime between 10-3 pm daily, the animals were grazed on cultivated and natural pastures of the University paddock. They were later boused and fed on supplementary feed at 500 g $head^{-1}$ day^{-1}. The health care packages are dipping, deworming and vaccination against pestites des petits ruminants (Pp:R). Water and mineral licks were given ad-libitum.

Controlled mating was adopted into 4 breeding periods in a year, early rainy (April-June), Late rainy (July-September). Early dry (October-December) Late dry (January-March).

Kids and dams were individually ear-tagged according to season of birth and rearing, type of birth and sex of kids. All kids were weighed at birth and thereafter weekly until 72 weeks of age using Avery Scale Product. The kids were weaned at 13 weeks and managed separately. The RSG×F_1 breeds are the F_2 back cross between Red Sokoto goats (RSG) of desert Northern ecological; zone and the West African Dwarf goat breed of Rainforest ecozone of Nigeria.

Data collection and analysis: Reproductive data of 11304 kids from 510 dams were collected and analysed for reproduction of does and growth performance of their kids. Data were analyzed according to analysis of variance using the general linear model Procedure of Statistical Product and service Solution Software (SPSS Inc, 1999). Duncan's mulitiple range and Turkey's significant difference test (Steel and Torrie, 1980) were used to separate significant differences. The fixed effects in the model are season of rearing/birth, sex and type of birth.

Prolificacy: No of kids born per does kidding.

Fertility: Percentage of does pregnant relative to does mated/served.

Kidding rate: Percentage of does kidding relative to does mated/served.

Post-weaning rate: Percentage of kids weaned relative to kids born.

Mortality rate: Percentage number of kids that died relative to the kids that survived to weaning.

RESULTS AND DISCUSSION

The general performance of the experimental does in the aspects of post-weaning rates, kidding rates, fertility and prolificacy rates evaluated per season periods were presented in Table 1. The general fertility of 85% was higher to the values obtained for other ruminants in Ghana by Tuah and Baah (1985), Baffour *et al.* (2007) and Devendra and Burns (1983). The overall kidding rate obtained in the work did not compare with the value of 29.05 kid/doe/year reported by Akhmad *et al.* (2003) for the kacang goats of Mozambique, while the post weaning rate was low compared with 66.2% for Ghananian ruminant (Baffour *et al.*, 2007). It is also quite close to those obtained by Anggraeni *et al.* (1995) and Sodiq (2000, 2001) for the Peranakan Etawah goat. Goat is favourably a preferred meat animals because of its high rate of reproduction as determined by the number of progeny delivered in a given time (Greyling, 2000). The overall prolificacy (2.45) and fertility values (85%) obtained from the flock were similar to 65% obtained by Devendra and Mcleroy (1988) for other tropical goats. The value is also close to those reported by Anggraeni *et al.* (1995) and Sodiq (2000, 2001) for the Peranakan Etawah goat. Ingo (1999), Bearden and Fuquay (2000) and Das (1993) showed that environmental factors excerted a significant effect on goat reproductive performance. The result demonstrated that the reproductive rate of goat does are significantly influenced by season of rearing ($p<0.05$). This research revealed that season of rearing significantly affected fertility, prolificacy and kidding rates Explanation for these results might be found on feeding habit of goats as browsers, utilizing leave shrubs, trunks of small trees. The high fertility and prolificacy recorded in those seasons could be associated with high quality and quantity of pastures available to the does during pregnancy. Awemu *et al.* (1999) attributed low reproductive rate of kacang and Peranakan Etawah does to the wide interval effects that existed between kiddings. However, comparable kidding rates were obtained in late rainy seasons than the other seasons. The means for birth, post-weaning weights at 72 weeks and post-weaning average daily gain of the kids are shown in Table 2. The overall values obtained for the growth traits at birth (1.84) are very low to the values (2.47) obtained for other tropical goats (Blended goats) in Tanzania by Das *et al.* (1994). Devendra and Mcleroy (1988) and Wilson *et al.* (1985) reported that birth weight of single ruminants is very vital since, it strongly correlate with post-weaning growth rate of adult weight. The overall for 72 weeks live weight was comparable to the values (46.1±01) reported March 21, 2008 by Das *et al.* (1994) on

Table 1: Reproductive performance of RSG × F_1 (F_2 backcross) goats

Season of rearing	No of does males	No of does kidding	No of kids born	No of kids post weaned	Prolificacy (%)	Fertility (%)	Kidding rates(%)	Post weaning rate (%)
Early rain	120	101	268	230	2.65	84	84	86
Late rainy	130	119	300	260	2.52	92	92	87
Early dry	120	102	249	210	2.44	78	78	84
Late dry	140	120	261	200	2.18	86	86	77
Total	510	412	1130	900	2.45	85	85	84

Table 2: Means±SE for average daily gains (g) from birth to 72 weeks (kg) for RSG × F_1 goats

Month	Season	Birth weights	72 weights	Average daily gains
April-June	Early rainy	1.74±0.92^{b}	25.87±0.89^{b}	47.01±0.02^{b}
July-Sept.	Late rainy	1.89±0.76^{b}	26.10±0.77^{b}	48.04±0.05^{b}
Oct.-Dec.	Early dry	1.54±0.66^{a}	22.17±0.56^{a}	40.09±0.04^{a}
Jan.-March	Late dry	1.53±0.75^{a}	20.67±0.75^{a}	38.04±0.064
	Sex			
	Male	1.87±0.61^{b}	26. 91±0.72$_{b}$	49.68±0.22^{b}
		1.68±0.71^{a}	23.62±0.79^{a}	43.53±0.16^{a}
	Type of birth			
	Single	1.71±0.73^{b}	25.28±0.69^{b}	46.92±0.08^{b}
	Twin	1.54±0.88^{b}	22.10±0.77^{a}	42.55±0.22^{a}
	Triplet	1.48±0.87^{a}	20.18±0.85^{a}	37.10±0.04^{a}
	Overall	1.84±0.77	23.66±0.75	43.66±0.10

Means with common letters in each column for each subclass for the same traits are not significantly different (p>0.05)

Table 3: Means±SE of gestation lengths (days) of RSG×F_1 goats

Season of rearing	Gestation length
Early rainy	148.04±0.18^{b}
Late rainy	150.05±0.01$_{b}$
Early dry	139.98±0.21^{a}
Late dry	140.10±0.31^{a}
Sex	
Male	154.01±0.01^{b}
Female	146.28±0.03^{a}
Type of birth	
Single	151.32±0.22^{b}
Twin	145.53±0.44$_{b}$
Triplet	141.21±0.46^{a}
Overall	131.21±0.78

Means with common letters in each column for each subclass for the same traits are not significantly different (p>0.05)

Blended goats and Wilson and Light (1986) for Malian goats. Season of rearing had significant (p<0.05) effect on both birth and 72 weeks live weights. Weights at early and late dry seasons had comparable values lower than the early and late rainy seasons (p<0.05). The live weights tend to decline as the dry season app:roaches. This could be associated with hormonal differences that exist between males, females that directly affected their overall average daily gain from birth to 72 weeks age. Sex, season of rearing and type of birth had significant effect (p<0.05) on average daily growth gain from birth to 72 weeks age. Early and late rainy seasons had comparable values superior to the values recorded by the dry seasons on average daily gain. The values obtained however, is lower than the 94.3 g, per day reported by Das and Sendalo (1990) for Blended kids at Malya. The values obtained in the present work were higher than the values reported by Reynolds (1989) for West African dwarf goats of Nigeria.

Sex also had significant effect on the live weights (p<0.05) of the animals from birth until 72 weeks with the males displaying heavier and faster growth than the females. This could be associated with hormonal differences that often exist between males and females that directly affected their growth patterns (Bell *et al*., 1970).

From Table 3, It can be observed that the best rearing seasons are the April-June and July-September, respectively (early and late rainy seasons), while the worst being late dry (January-March). The result achieved could be attributed to be differences in the different feeding behaviour of goats as browsers, which allows them to utilize leaves and husks of shrubs and small trees otherwise being less affected by gastro-intestinal parasites. The differences in seasonal live weights of the animals could also be because of variation in annual rainfall that in turn affected pasture quality and quantity for both the kids and their mother's through their milk (Peart, 1982). Type of birth had siginificant effect on live-weight. Eltawil *et al.* (1970) recorded similar report of live weights being affected by type of birth (p<0.05) for Navajo small ruminant They were progressive reduction in weights as the number of kids per birth increased (p>0.05). Das *et al.* (1994) made similar report on Blended goat and Otuma (2007) on Nigerian crossbred goats. This as explained by Robinson *et al.* (1977) was because, as the number of foetus in uterus increases, so the caruncles attached to each fetus decreases, thus reducing the feed supp:ly to the foetus and reduction in the kids/lambs weights. Multiple kids as reported by Morton and Banda who found no significant difference in the growth between single and twin birth kids fed on artificial milk could further attribute it to competition for mother's milk. Season of rearing, sex and type of birth had significant effects on gestation length (p<0.05). This implies that dams recorded more days of gestation than their counter part raised in dry seasons. The tendency of nurturing pregnancies to full maturity is higher in rainy seasons than the dry season suggesting the possibility of pro-abortion tendency during the dry season. The male kids' pregnancies also recorded more number of days than the females while the single and twin pregnancies had more comparable number of days higher than the triplets' kiddings. This could be because of physiological and nutritional competition is amongst the feotus/kids because of more feotus triplet's pregnancies.

CONCLUSION

The present result on the reproductive performance of Nigeria (RSG×F_1) goat does in terms of kidding rate was encouraging with the prolificacy being high. Post-weaning percentage was high as a result of improved nutrition during the early rainy season. The effect of season of rearing was significant ($p<0.05$) on the growth of the goats with early and late rainy season recording comparable values superior to the early and late dry seasons. In the same vain sex and type of birth had significant effects on the growth of the animals. As small ruminants are mainly reared by the traditional farmer it is vital that breeding programmes should be launched to synchronize with the seasons optimal for the productivity of the animal to avert the environmental constraints that acts against high productivity.

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