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Reproductive performance of Red Sokoto Goats from a semi-intensive management system in semi-arid zone, Nigeria

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ABSTRACT

On-farm data were collected to evaluate reproductive performance of Red Sokoto does reared under small-holder agro-pastoral production system within metropolitan Kano, semi-arid, Nigeria. The effects of age of dams, parity, litter size(s) and sex of kid(s) on pre-weaning growth rate were investigated. Data was obtained from semi-intensively managed herds of twenty four households for a period of six months. Pregnant does were ear tagged and age determined through dentition. Upon kidding, litter size, parity of dam and sex of kid(s) were recorded. Subsequently, daily liveweight changes of kids was monitored and recorded. Results obtained revealed average weight at birth to be 3.18 kg and 2.87 kg for female and male kids with average daily weight gain of 0.11 and 0.13 kg, respectively. Result also showed that male kids gained higher liveweight from 21st day to weaning and single or twin births had higher liveweight changes relative to triplets. Does at third parity produced kids with higher weight gain. From the results of this study, it is concluded that male kids at 21 days of age (single or twin) or dam at third parity or three years of age be selected for a sound breeding programme.
Keywords: *agro-pastoral, goats, parity, reproductive, semi-intensive*

I. INTRODUCTION

Small ruminants form an integral part of the economic and ecological niche in small-holder farming systems due to their high prolificacy and ability to thrive on a wide range of feed resources. They have potential capacity for higher levels of production but currently low that is dismal and not commensurate with their potential production (Devendra, 2001). Numerous studies on small ruminants in developing countries have also buttressed their importance to the livelihood of farmers (Braker, Udo and Webb 2002; Solomon *et al.* 2005). In the tropics however, these specie of livestock have low productivity partly due to slow growth rate which had been attributed to poor nutrition, managerial factors and non-genetic factors such as age and parity of dam, sex and type of birth as reported by Gbangboche *et al.* (2006). Selection of genetically superior individuals as parent stock to future generation is hindered by non-genetic factors which tend to mask the actual breeding values of the selected individuals. It therefore becomes imperative to identify those non-genetic factors with a view to seeking appropriate ways for accurate estimation of breeding values (Dadi *et al.* 2008). Thus, the aim of this study was to evaluate the effects of some non-genetic factors on pre-weaning growth and reproductive performances of Red Sokoto goats managed semi-intensively in the semi-arid zone of Nigeria.

II. METHODS AND MATERIAL

Sampling Technique

Twenty four households were selected purposively based upon possession of minimum of five pregnant

does per household and willingness of farmers to participate in monitoring activities. Pilot testing was undertaken prior to commencement of the study using trained enumerators.

Data Collection

Data was collected with the aid of the structured questionnaires. Variables that were monitored and recorded included reproductive performance (parity, litter size and sex of kids), productive (age of dam, birth weight of kid, weaning weight and live-weight changes). Age of the dam was determined by dentition. Within 24 hours of kidding, the date of birth and birth weight were recorded. Also, litter size, sex of kids and parity of dam was recorded. Weights were measured and recorded weekly using spring balance scale (50 kg capacity) and weaning weight was recorded on the 90^{th} day after birth (3months).

Statistical Analysis

Data collected were analyzed using least square procedures of the General Linear Model procedure of Statistical Analysis System (SAS, 2000).
The model used for reproductive performances was:

$$Ywt = \mu + Pi + Lt + Sx + Et; \quad \text{(1)}$$

where:
Pi = parity (i= 1, 2, 3, 4)
Lt = litter size ((Single -1, Twins – 2, Triplets - 3)
Sx = sex of kids (Male – 1, Female - 2)
Et = error term.

While productive performance was measured using:

$$Ywt = \mu + Ad + Bwt + Wwt + Lwt + Et \quad \text{(2)}$$

where:
Ad = age of dam (years)
Bwt = birth weight of kid(s), (kg)
Wwt = weaning weight (Kg)
Lwt = live weight changes (Kg)
Et = error term.
There was no interaction between fixed effects and thus, dropped from the model. Trend of the variables were computed using linear regression (SAS, 2000).

III. RESULTS AND DISCUSSION

Influence of Sex on Pre-weaning Liveweight Changes

Liveweight changes of kids as influenced by sex is presented in Figure 1. Female kids recorded higher weight at birth relative to the males (3.18kg against 2.87kg). However, at 21^{st} day of birth, the males gained and maintained higher weight throughout the study period. The increase in weight gain was linear in both sexes which are described by regression equation in Figure 1: Male (y) =0.938x + 2.367 (r^2 = 0.996); Female (y) =0.837x + 2.550 (r^2 = 0.997). Their daily weight gain were 0.13kg and 0.11kg for male and female kids respectively.

Influence of Doe's Parity on Liveweight Changes of Red Sokoto Kids

The relationship between liveweight and age of kids as influenced by parity is presented in Figure 2. Result revealed that kids obtained from does at third parity had significantly higher birth weight (3.41 kg), this was followed by kids obtained at second parity (3.10 kg) then from the first and fourth. This trend was maintained throughout the study period. The average daily weight gains observed were 0.09, 0.13, 0.14 and 0.06 kg from the first parity to the fourth respectively. However at 84 days of age, kids obtained at third parity attained 15.03 kg in weight. Kids obtained at first and fourth parity had significantly ($P< 0.05$) lower birth weight and weight gain throughout the study period.

Influence of Age of Does on Liveweight Changes of Red Sokoto Kids

Liveweight changes of kids as influenced by age of does is presented in Figure 3. Results obtained showed does that kid at three years of age produced kids with significantly ($P<0.05$) higher liveweight (3.22 kg). The liveweight changes showed similar increasing trend for all ages of does from the 7^{th} day to the 84^{th} day. However, kids obtained from does that were one and five years of age recorded significantly ($P<0.05$) lower liveweight changes.

Influence of Litter Size on Liveweight Changes of Red Sokoto kids

Figure 4 presents the influence of litter size on liveweight changes of kids. Result revealed that kids obtained from single and twin birth had significantly ($P<0.05$) higher liveweight changes. Kids from triple births gave lower liveweight changes (Figure 4).

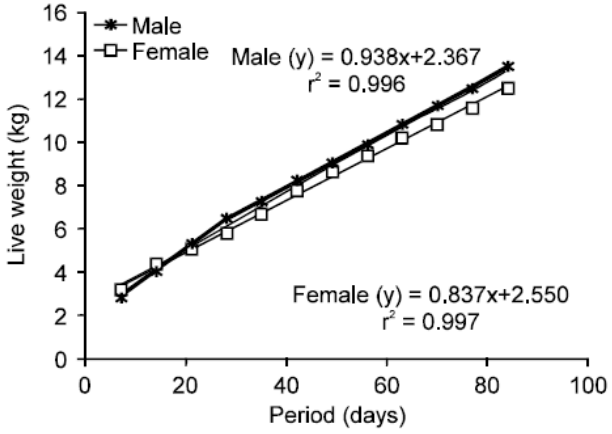

Figure 1: Pre-weaning Liveweight Changes of Red Sokoto Kids as influenced by sex managed semi-intensively in a semi-arid Zone, Nigeria

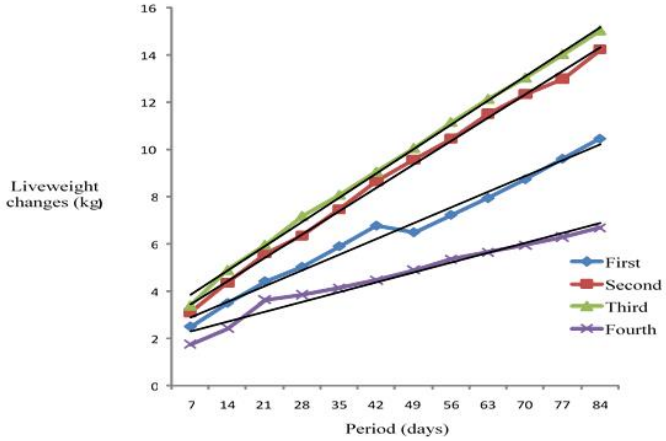

Figure 2: Changes in Liveweight of Red Sokoto Kids as influenced by parity of Does managed semi-intensively in a semi-arid Zone, Nigeria

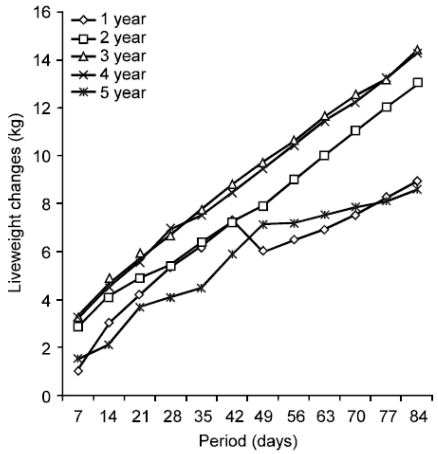

Figure 3: Weekly Liveweight Changes of Red Sokoto Kids as influenced by age of does managed semi-intensively in a semi-arid Zone, Nigeria.

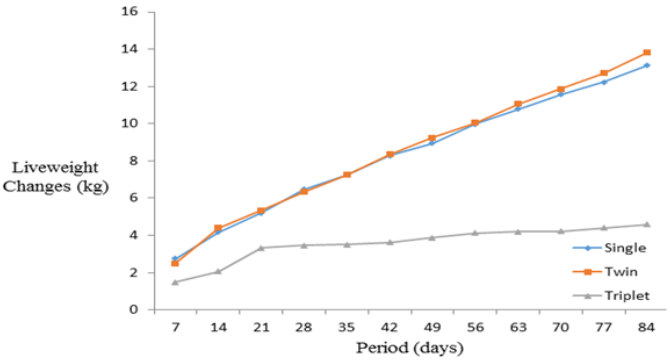

Figure 4: Influence of litter size on liveweight changes of Red Sokoto Kids managed semi-intensively in a semi-arid Zone, Nigeria.

DISCUSSION

Findings from the present study revealed that weight of kids (male or female) were statistically comparable. This observation is contrary to literature report by Nkungu, Kifaro and Mtenga (1995) and Zahraddeen, Butswat and Mbap (2008). The authors had observed male kids were superior to their female counterparts at birth. However, in the present study, the male kids gained consistently higher weight from the 21st day of birth till 84th day of age, which is in agreement with the report by Adamu and Arowolo (2002). The observed superiority in weight by male kids as against their female counter parts could be attributed to the presence of the hormone androgens implicated in high competitive ability and aggression at feeding according to Kiango (1989); Nkungu *et al*. (1995) and Hirschenhauser and Oliveira (2006). These attributes in male could translate to the consumption of more milk and feed and might explain why the males gained weight faster from the 21st day. Results of the present study is in conformity with Bemji *et al*. (2006) who reported that liveweight of kids increased with parity of does. High parity effect observed in the study with respect to daily weight gain of kids could be attributed to the corresponding increase in liveweight of does as parity increases to three before decline. Similar increases were noted by Bemji *et al*. (2006) which they attributed to the increase in weight of does and corresponding increase in weight of dam as parity increases. Daily weight gains of kids were in favour of both single and twin litter size irrespective of sex from birth to 84 days of age. This finding is in disagreement with an earlier study by Adamu and Arowolo (2002) that single male, single female, twin male and twin female kids were comparable in terms of daily weight gain from birth to 100 days of age. It is also contrary with the reports by Nkungu *et al*. (1995) that kids born single

gain weight faster relative to their twin counter parts from birth to 12 months of age. There was consistent daily weight gain in both single and twin kids which may be linked to pre-and-early post-natal nutrient availability from the dam. Akanno and Ibe (2006) stated that regression equation could be valuable in some rural African farm communities where sensitive weighing scales are not readily available or if available are expensive beyond the reach of the farmers. Thus, findings of this work is the development of equation that had high r^2 values between 81 to 99 for predicting kid liveweight changes based on sex of kid, parity of kid, age of dam and type of birth of the kids for semi-intensively managed goats in the semi-arid region of Nigeria.

IV. CONCLUSION

It is concluded that selection for stock improvement could be targeted at male kids for higher liveweight gain from 21st day to weaning; kids obtained from single and twin births had higher liveweight changes relative to triplets. It is thus recommended that does at third parity or of three years of age should be selected to give fast multiplier effect.

V. ACKNOWLEDGEMENT

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