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EFFECT OF DAM PARITY ON MEASURES OF GROWTH IN RED SOKOTO GOATS AT 1, 3, 6, AND 9 MONTH OF AGE

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ABSTRACT
Data on measures of growth (birth weight, body weight (BW), height-at-withers (HW), body length (BL) and heart girth (HG)) were taken in 1000 Red Sokoto goat kids belonging to smallholder farmers in Kano and environs. The data collected were analyzed to determine the effect of dam parity on measures of growth of kids at 1, 3, 6, and 9 month of age. The result revealed that parity had significant effect (P<0.01- 0.05) on birth weight and bodyweight of kids at 1,3, 6 and 9, month of age. The effect of dam parity on the linear body measurements (HW,BL and CG) was significant (P<0.01- 0.05) at 1,3 and 6 month of age but not significant (P>0.05) at 9 month of age. Birth weight and bodyweight increased with parity up to the 5th parity and declined. Also kids of higher parity had larger body size (HW, BL, CG) than those of the lower parity. The significant effect of parity of dam on birth weight, body weight and linear body measurements in this study therefore, indicates that parity of dam is an important factor to consider in making appropriate selection and/ or culling decision in Red Sokoto goats

KEYWORDS: age, parity, birth weight, bodyweight, linear body measurements,

INTRODUCTION

Body growth is determined by genetic and non genetic factors. These combination, interact with environmental conditions such as climate, nutrition and management and intrinsic factors such as sex, parity, age, physiological status as well as other extrinsic factors such as maternal effect and random environmental factors to determine the ultimate phenotype of growth (Arango and Vanvleck, 2002). Linear body measurements taken on live animals have been widely used in research work as a simple means of recording certain aspect of animal growth and shape. Most linear measurements reflect primarily the length of the long bones of the animal. They indicate when taken sequentially over a period of time, the way in which the animals' body change in shape, and have been used as a predictor of both animal live weight and carcass composition (Lawrence and fowler, 1998). Linear measurement can be used in assessing growth rate, weight, feed utilization and carcass characteristic in farm animals (Brown,*et al.*, 1972).

Although the influence of parity on birth weight (Sacco *et al.*, 1991; Newman,*et al.*,1993) body weight (Awemu *et al.*,1999; Akpa *et al.*,2006) and linear body measurements (Akpa *et al.*, 1998; Alade *et al.*,2008) have been studied, there is however, a paucity of information on the effects of parity at different stages of the animal's growth. This information is very important in making appropriate selection and/ or culling decision.

Therefore, this study was designed to examine the effect of Dam parity on birth weight, body weight and linear body measurements of Red Sokoto goat kids at 1, 3, 6,and 9 months of age.

MATERIALS AND METHODS

Experimental site

The study was conducted under the smallholder production system in Kano and environs, located in the Sudan savannah zone of Nigeria on Latitude 11º 59' and Longitude 8º 34', and altitude 486.5m above sea level. The mean annual rainfall is 1293mm with minimum temperature (14ºC) in December and January, and maximum (41ºC) in April. (IAR, 2005)

Animals and Managements

A total of 1000 Red Sokoto kids which comprised of 570 males and 430 females were involved in this study, which lasted for 3 years (2005- 2008). The animals in each of the locations were identified using

necklace tags. They were managed under the small holder rural system. They were housed at night and released the next morning for grazing. The goat houses were made using corn stalk for fencing and thatched roof for protection against heat and rainfall. The houses were open sided for adequate ventilation. There was no organized health care provision in terms of vaccination and deworming. However, veterinary officers were called to treat the animals when cases of ill-health occur. Supplementary feeding of the animals was done in the morning before taking them out for grazing and in the evening before they were kraaled. They were supplemented with groundnut haulms, beans pods, maize/ millets or sorghum offal. Minerals blocks and water were also provided. The kids were allowed to run with their dams throughout the study period, and weaning was by natural means. The records and history of each flock was provided by the farmers. The records of parity of dam, month of mating and date of birth were kept during the research period. Parity of the dam was recorded as 1 to 7.

Data collection

The weight of the kids was taken (kg) using movable weighing scales, while the body dimensions were measured (cm) using flexible tape and measuring stick (Alphonsus *et al*.,2009). All the measurements except birth weight were taken at 1, 3, 6 and 9 month of age.

Statistical analysis

The data generated from the 1000 kids were analyzed to determine the effect of age and parity on the measured characteristics using general linear model procedure of SAS (1998). The means differences were tested by Duncan Multiple Range test (SAS, 1998). The model used is as follows:

$$Y_i = \mu + P_i + E_i$$

Where: Y_{ij} = estimates of a given measurable characteristics
μ = over all mean
P_j = effect of i^{th} parity of dam (i: 1,2….,7)
E_i = random error.

RESULTS

The effect of parity of dam on birth weight, bodyweight and linear body measurements at 1 month of age is presented in Table 1. Parity of dam had significant effect (P<0.01- 0.05) on birth weight, bodyweight and the linear body measurements (BL, HW and HG) of the kids. Birth weight and bodyweight increased with parity up to the 5^{th} parity. Also kids of the higher parity had larger body size (HW, BL, CG) than those of lower parity.

The effect of parity of dam on body weight and linear body measurements of kids at 3 month of age (Table 2) was significant (p<0.01 -0.05). At 3 month of age, body weight of kids of parity 1,2,3,4 and 5 were statistically the same, while kids of the 6^{th} parity had the highest body weight. The older dams' kids had larger body size (HW, BL, and CG) than kids of the younger dams.

Parity had significant (P<0.01- 0.05) effect on bodyweight and linear body measurements at 6 month of age except on HW (Table 3). The kids of the older dams were relatively heavier than those of the younger dams

Table 4 shows the effect of parity of dam on body weight and linear body measurements of kids at 9 months of age. Parity of dam continues to exert significant (P<0.05) influence on body weight of kids at 9 month of age, however, the effect of dam parity was not significant (P>0.05) on the body size characteristics (WH, BL and CG) of the kids at 9 month of age.

DISCUSSION

In this study, parity exerted significant influence on birth weight of the kids, with the concurrent increase in birthweight with parity up to the 5^{th} parity and declined, indicating that beyond the 5^{th} parity the birth weight of the kids might depreciate. This is in line with the report of Akpa *et al.* (2006) who reported significant effect of parity on birth weight of lambs. However, in their study the 4^{th} parity had the highest birth weight. Also Awemu *et al.* (1999) reported significant effect of parity on birth weight and body weight of lambs and kids. Parity of dam

continued to exert significant influence on the body weight of the kids at 1, 3, 6 and 9 month of age, with the kids of parity 5 maintaining their superiority in weight, probably due to their initial higher birth weight advantage. In all these ages (1-9 month), the body weight performance of the 5th parity kids were superior to that of their later counterparts; this suggests that culling of dam can be done in this breed after the 5th parity. Although authors like Osinowo *et al.* (1994), Ikwuegbu *et al.* (1995) and Awemu *et al.* (1999) also reported increase in body weight with parity, however, the highest bodyweight in their findings occurred at the 6th parity. Such differences might be due to variation in breeds and management. However, full reproductive capacity is not attained in any species at the first reproductive cycle (Lavasseur and Thibault, 1980), thus as parity increases does are expected to give birth to heavier kids. Therefore, available information on the parity level at which full reproductive efficiency is attained will help a lot in culling programme for dams of advanced parity.

The significant effect of parity on linear body measurements of kids at 1, 3, and 6 month of age was contrary to the findings of Alade *et al* (2008) who reported non significant effect of parity on HG at various ages of West African Dwarf (WAD) kids. Also Akpa *et al* (2006) observed non significant effect of parity on HW, DL and HG of Yankasa sheep from one to 72 weeks of age.

CONCLUSSION

The significant effect of parity of dam on birth weight, body weight and linear body measurements in this study therefore, indicates that parity of dam is an important factor to consider in making appropriate selection and/ or culling decision in Red Sokoto goats

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Table1. Effect of parity of dam on birth weight, bodyweight and body measurement at one month of age in Red Sokoto kids

Parity	N	BW(kg)	Body weight(kg)	HW(cm)	BL(cm)	CG(cm)
1	11	1.7^{d}	4.4^{c}	33.5^{d}	33.6^{b}	35.9^{dc}
2	12	1.9^{b}	4.3^{c}	33.8^{cd}	33.1^{b}	35.7^{d}
3	22	1.9^{b}	4.6^{b}	34.1^{bcd}	33.7^{b}	37.2^{ab}
4	21	2.0^{a}	4.8^{a}	34.8^{b}	34.4^{b}	37.2^{ab}
5	29	2.0^{a}	4.9^{a}	34.0^{bc}	33.8^{b}	37.6^{b}
6	5	1.9^{b}	4.7^{ab}	34.6^{bc}	34.5^{b}	36.9^{c}
7	2	1.9^{b}	4.7^{ab}	35.8^{a}	36.3^{a}	38.3^{a}
LOS		*	**	**	*	**
SEM		0.01	0.02	0.08	0.15	0.10

* P<0.05, ** P<0.01; BW: birth weight, HW:height at withers, BL: body length, CG: chest girth, N: number of animals, NS: not significant, LOS: level of significance

Table 2. Effects of parity of dam on birth weight, bodyweight and measurement at three month of age in Red Sokoto kids

Parity	N	Body weight(kg)	HW(cm)	BL(cm)	CG(cm)
1	23	7.4^{b}	40.0^{abc}	40.3^{b}	43.6^{bc}
2	39	7.4^{b}	40.0^{c}	40.3^{b}	43.3^{c}
3	66	7.6^{b}	40.4^{ab}	40.7^{ab}	44.5^{bc}
4	63	7.7^{b}	40.8^{a}	41.4^{ab}	45.0^{ab}
5	78	7.9^{b}	40.2^{ab}	41.9^{a}	46.1^{a}
6	3	8.3^{a}	39.9^{abc}	41.2^{ab}	44.5^{bc}
7	6	7.8^{ab}	39.3^{bc}	40.8^{ab}	44.8^{abc}
LOS		*	**	**	**
SEM		0.02	0.10	0.12	0.12

* P<0.05, ** P<0.01;BW: birth weight, HW:height at withers, BL: body length, CG: chest girth, N: number of animals, NS: not significant, LOS: level of significance

Table 3.Effects of parity of dam on birth weight, bodyweight and measurement at 6 month of age in Red Sokoto kids

Parity	N	Body weight(kg)	HW(cm)	BL(cm)	CG(cm)
1	30	10.4^{bc}	44.8	46.2^{b}	50.0^{ab}
2	27	10.3^{c}	43.6	45.8^{ab}	48.1^{b}
3	54	10.5^{b}	44.5	45.6^{ab}	48.9^{ab}
4	54	10.6^{b}	44.3	46.5^{ab}	49.5^{ab}
5	75	10.8^{a}	45.4	46.7^{a}	49.7^{a}
6	3	10.7^{ab}	43.3	46.0^{b}	50.0^{a}
7	6	10.7^{ab}	43.2	4.8^{ab}	50.3^{a}
LOS		**	ns	**	**
SEM		0.02	0.21	0.09	0.11

* P<0.05, ** P<0.01; BW: birth weight, HW:height at withers, BL: body length, CG: chest girth, N: number of animals, NS: not significant, LOS: level of significance

Table 4 Effects of age and parity of dam on birth weight, bodyweight and measurement at nine month of age in Red Sokoto kids

Parity	N	Body weight(kg)	HW(cm)	BL(cm)	CG(cm)
1	30	12.5bc	49.5	50.8	54.0
2	27	12.4c	49.1	50.6	53.2
3	54	12.6b	49.1	50.5	53.6
4	51	12.7b	50.4	51.0	53.6
5	75	13.0a	51.5	52.2	54.0
6	3	12.4c	48.5	50.0	53.4
7	6	12.4c	48.3	49.5	53.1
LOS		*	ns	ns	ns
SEM		0.02	0.11	2.08	1.98

* P<0.01, BW: birth weight, HW:height at withers, BL: body length, CG: chest girth, N: number of animals, NS: not significant, LOS: level of significance

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