EFFECT OF DAM MATING WEIGHT, MONTH OF KIDDING AND SEX OF KIDS ON GROWTH CHARACTERISTICS OF RED SOKOTO KIDS

AKPA, G.N., ABUBAKAR, M.Y., NWAGU, B.I AND ALPHONSUS, C*

Department of Animal Science, Ahmadu Bello University, Zaria, Nigeria
*mcdyems@gmail.com or mcdyems32@yahoo.com

ABSTRACT
Birth weight, body weight (BW), height-at-withers (HW), body length (BL) and chest girth (CG) were measured on 1000 Red Sokoto kids which comprised of 570 males and 430 females. The goats belonged to small holder farmers in Kano State, Nigeria. Data were collected and analyzed using a fixed linear model procedure based on SAS (1999) to determined the effects of dam mating weight, month of kidding and sex, on the measured characteristic (BL, HW and CG) at 1,3,6 and 9 month of age. The effect of sex was significant (P<0.01) on the measured characteristics except BL and CG at 9 month of age. Month of kidding had significant effect (P<0.01) on birth weight and body weight at 1, 3, 6 and 9 months of age. The effect of month of kidding was significant (P<0.01) on HW, BL, and CG at 1 month of age, but not significant (P> 0.05) on the later ages except CG at 6 months of age. The effect of dam mating weight was significant (P<0.01; P<0.05) on all the measured characteristics except BL at 1 month of age, HW at 3 months of age, BL and CG at 9 months of age. Birth weight increased with increase in dam mating weight, this implies that dams with higher body weight at mating will give birth to heavier kids.

KEY WORDS: Goats, sources of variation, growth characteristics, Red Sokoto kids,

INTRODUCTION

The importance of goats in the livelihood of Africans and particularly in Nigeria cannot be over looked (Aganga and Mogenets, 1998). Goats play significant role in the economy, as a source of employment, food and income generation (APRU, 1994) especially to small scale farmers. Also, goats play very important role in the socio-economic life of the rural populace as well as increasing the level of animal protein production and supply in many developing countries. Globally, goat production provides 60% of its value as milk, 35% as meat and 5% as skin (Malau-Aduli, *et al.*, 2001). The world goat population was estimated to be 706 million with more than 90% from developing countries. Nigeria contributes about 34 million goats which represents 4% of the current world population (FAO, 2006). However, for goats to effectively contribute to the socio- economic needs of the Africans, the growth and reproductive potential must be genetically evaluated and improved upon (Zahraddeen *et al*., 2008). Growth which is the sum total of increase in size of different structural body components as noted by (Ibe and Nwakalor (1987), is measured from gain in both body weight and linear body measurements. Growth as reflected by body weight could change with age which is of important in goat production. However, the slow growth performance of goats has been linked to factors such as inadequate nutrition (Malau- Aduli *et al.*, 2001), monthly and seasonal variation in vegetation (Nsoso *et al*., 2003), age of the goats (Akpa *et al.*, 1998), pest and diseases in the area (Butswat, 2005), breed of the goats (Zahraddeen *et al.*, 2006) and sex (Nsoso *et al.*, 2003). Based on the above factors, this study examined the effects of sex, month of kidding and dam mating weight on birth weight, body weight and linear body measurements in small holder goat production in Nigeria.

MATERIALS AND METHOD

The study was carried out in two villages (Saunawa and Amarzakawa) in Kano State, Nigeria. Kano State is located within the Sudan Guinea Savannah Zone of Nigeria, on Latitude 11^{o} 59; Longitude 8^{o} 34', and altitude 486.5m above the sea level. The mean annual rainfall is about 1293mm with minimum temperature of 14^{o}C in December and January, and maximum of 41^{o}C in April (IAR, 2005).

Animals and Management

A total of 1000 Red Sokoto kids which comprised of 570 males and 430 females were used for the study. The goats were managed under the small holder rural system. They were housed at night and released for grazing the following morning. The houses were opened side-ways to provide adequate ventilation. The roof was thatched and corn stalks were used to fence the houses. Supplementary feeding was provided for the animals, which was done in the morning (8.00 – 10.00 hours) before releasing them for grazing; and in the evening(1600-1800 hours) when they were kraaled. The groundnut haulms, beans pods, maize/ millets or sorghum offals were used as supplement feeds, while mineral blocks and water were provided. The kids were allowed to run with their dams throughout the study period,

while weaning was done by natural means. The records of dams mating weight and month of kidding were recorded during the study period for each doe.

Data Collection

The kids were identified according to sexes before taking the measurements. The weights of the kids were determined by means of weighing scale, while the body measurement was taken using tape and measuring stick. The body measurements include: body length (BL), height at withers (HW) and chest girth (CG). All the measurements except birth weight were taken at 1, 3, 6 and 9 months of age.

Statistical Analysis

The data generated from the 1000 kids were analysed to determine the effects of sex, month of kidding and dam mating weight on the measured characteristics using general linear model procedure of SAS (SAS, 1999). The means differences were tested by Duncan Multiple Range test (SAS, 1999).

The model used for statistical study is as follows:

$Y_{ijk} = \mu + S_i + M_j + W_k + E_{ijk}$

Where: Y_{ijk} = estimates of a given measurable characteristics; μ = over all mean; S_i = effect of i^{th} sex; M_j = effect of j^{th} month of kidding; W_k = effect of k^{th} dams mating weight; E_{ijk} = random error.

RESULTS

Based on this study, the effect of sex on birth weight, body weight and linear body measurements at different ages on Red Sokoto kids are shown in Table 1. Sex had significant effect ($P<0.01$) on all the characteristics measured except for the 9 months body length (BL) and chest girth (CG) which revealed non-significant effect ($P>0.05$). The males were consistently heavier and bigger in size than the females from birth to 9 months of age, although the differences in BL and CG as noted in this study at 9 months of age showed non significant ($P>0.05$).

Table 1: Effect of sex on birth weight, body weight and body measurements at different ages in Red Sokoto kids.

Traits	N	Male	Female	LOS
Birth weight (kg)	1000	1.96±0.01a	1.89±0.01b	**
One month weight (kg)	1000	4.8±0.02a	4.40±0.02b	**
" " HW(cm)	1000	34.5±0.08a	33.8±0.08b	**
" " BL (cm)	1000	34.5± 0.14a	33.00±0.14b	**
" " CG (cm)	1000	37.7±0.09a	35.8±0.09b	**
Three month weight (kg)	1000	8.00±0.02a	7.8±0.02b	**
" " HW(cm)	1000	40.6±0.10a	39.9±0.11b	**
" " BL (cm)	1000	42.8±0.11a	43.4±0.12b	**
" " CG (cm)	1000	45.7±0.12a	43.2±0.02b	**
Six month weight (kg)	1000	10.7±0.02a	10.3±0.20b	**
" " HW(cm)	1000	45.6±0.20a	45.5±0.09b	**
" " BL (cm)	1000	46.8±0.09a	48.0±0.09b	**
" " CG (cm)	1000	50.1±0.09a	48.0±0.09b	**
Nine month weight (kg)	1000	13.3±0.02a	12.8±0.02b	**
" " HW(cm)	1000	50.8±0.10a	48.5±0.10b	**
" " BL (cm)	1000	54.8±2.08	51.2±2.08	Ns
" " CG (cm)	1000	57.4±1.97	54.7±1.97	ns

** $p<0.01$, ns= not significant, HW=height-at withers, BL= body length, CG= chest girth

The study also revealed that, the month of kidding had significant effect ($P<0.01$) on body weight of the kids from birth to 9 months of age as shown in Table 2. However, the effect of month of kidding on linear body measurements (HW, BL and CG**)** was significant ($P<0.01$) only at 1 month of age, but not at later ages. The May-born-kids (MBK) were superior in weight and size than those of Apri-born-kids (ABK). It was noted that as the kids grew the differences in size reduced. However, the MBK sustained their superiority in weight up to 9 months of age.

The Table 3 shows the effect of dam mating weight (DMwt) on birth weight, body weight and linear body measurements at 1 and 3 months of age. The DMwt was significant ($P<0.01$; $P< 0.05$) on all the traits studied, except for the BL at 1 month and HW at 3 months of age. It was noted that, the body weight of the kids increased with increase in DMwt, which implies that dams with higher body weight at mating gave birth to heavier kids.

Table 2: Effect of month of kidding on birth weight, body weight, and Body measurement at different ages in Red Sokoto kids

Traits	N	April born kids (ABK)	May born kids (MBK)	LOS
Birth weight (kg)	1000	1.9±0.01[b]	2.09±0.01[a]	**
One month weight (kg)	1000	4.5±0.02[b]	4.60±0.02[a]	**
" " HW(cm)	1000	33.6±0.09[b]	34.3±0.09[a]	**
" " BL (cm)	1000	33.5± 0.15[b]	34.00±0.15[a]	**
" " CG (cm)	1000	36.2±0.11[b]	37.0±0.09[a]	**
Three month weight (kg)	1000	7.60±0.02[b]	7.9±0.03[a]	**
" " HW(cm)	1000	40.1±0.11	40.2±0.11	ns
" " BL (cm)	1000	41.1±0.12	41.0±0.12	ns
" " CG (cm)	1000	44.9±0.13	44.7±0.12	ns
Six month weight (kg)	1000	10.5±0.02[b]	10.7±0.20[a]	**
" " HW(cm)	1000	44.9±0.13	44.±0.09[b]	ns
" " BL (cm)	1000	46.4±0.10	46.3±0.09	ns
" " CG (cm)	1000	48.1±0.11[b]	49.7±0.09[a]	**
Nine month weight (kg)	1000	12.6±0.02[b]	13.5±0.03[a]	**
" " HW(cm)	1000	49.9±0.12	49.8±0.10[b]	ns
" " BL (cm)	1000	50.8±2.02	50.2±2.08	ns
" " CG (cm)	1000	54.7±1.97	55.2±1.90	ns

** p<0.01, ns= not significant, HW=height-at withers, BL= body length, CG= chest girth

Table 3 Effect of dam mating weight (DMwt) on birth weight, body weight and measurements at one and three months of age in Red Sokoto kids.

DMwt group	N	Birth weight(kg)	BW1 (kg)	HW1 (cm)	BL1 (cm)	CG1 (cm)	BW3 (kg)	HW3 (cm)	BL3 (cm)	CG3 (cm)
1	33	1.8[c]	4.1[c]	33.6[b]	33.7	36.0[c]	7.2[c]	40.2	40.6[bc]	43.9[c]
2	69	1.9[b]	4.4[c]	33.9[b]	33.6	36.6[bc]	7.5[bc]	39.8	40.3[c]	44.1[bc]
3	99	1.9[b]	4.6[b]	34.1[a]	33.9	36.9[b]	7.7[bc]	40.4	41.1[bc]	44.8[ab]
4	84	1.8[c]	4.7[b]	34.4[a]	34.3	37.1[b]	8.5[a]	40.1	41.5[ab]	45.5[a]
5	15	2.0[a]	4.9[a]	34.2[a]	32.8	38.1[a]	7.8[b]	40.4	42.3[a]	45.5[a]
LOS		*	**	*	ns	**	*	ns	**	**
SEM		**0.01**	**0.02**	**0.09**	**0.15**	**0.11**	**0.23**	**0.11**	**0.12**	**0.13**

* P<0.05, **<0.01, ns- not significant, DMwt-dam mating weight, BW-body weight, HW-height-at-withers,BL-body length,CG-chest girth, LOS- level of significance

The effect of DMwt was significant (P<0.01) at 6 months body weight and linear body measurements (HW, BL and CG) as well as in the 9 months body weight and HW, but showed non significant (P>0.05) at 9 months on BL and CG as in Table 4.

Table 4 Effect of dam mating weight (DMwt) on body weight and measurement at six and nine months of age in Red Sokoto kids

DMwt group	N	Bw6 (kg)	HW6(cm)	BL6(cm)	CG6(cm)	Bw9(kg)	HW9(cm)	BL9(cm)	CG9(cm)
1	33	10.2^{c}	44.3^{b}	46.0^{bc}	49.0^{bc}	12.5^{c}	49.2^{c}	51.0	53.4
2	69	10.4^{b}	44.6^{b}	45.7^{c}	48.5^{c}	14.2^{a}	49.5^{c}	50.8	53.5
3	99	10.5^{b}	44.2^{b}	46.2^{bc}	49.3^{bc}	12.6^{c}	50.6^{b}	56.2	59.6
4	84	10.6^{b}	45.0^{b}	46.6^{b}	49.6^{b}	12.7^{c}	50.3^{b}	50.7	53.8
5	15	10.8^{a}	46.7^{a}	48.3^{a}	51.2^{a}	13.2^{b}	53.0^{a}	52.0	55.5
LOS		**	**	**	**	**	0.12	ns	ns
SEM		**0.01**	**0.09**	**0.15**	**0.11**	**0.02**	**0.12**	**2.09**	**1.98**

* P<0.05, **<0.01, ns- not significant, DMwt-dam mating weight, BW-body weight, HW-height-at-withers,BL-body length,CG-chest girth,LOS- level of significance

DISCUSSION

The marked sex differences in live weight increases have been reported in goats by Akpa *et a.,* (1998). In this study, the mean values for male and female kid body weight and linear body measurements increased in a similar manner from birth to 9 months of age. Although increase in the measurements with age is expected as the animal is developing, this study indicates that, the best development was noted at the pre-weaning which was almost twice between weaning and 9 month of age (Ndlova and Simele, 1996). This suggests that, the size of the goats at maturity will depend on the developmental rate and the relationship between various body measurements (BL, HW and CG) at pre-weaning ages (Orheruata and Olutogun, 1994).

The observed increase in body weight and body dimension from birth to 3months of age, closely agreed with the result published by Taure and Meyer (1990), Bratte *et al* (1999) and Akpa *et al* (2006) who studied with rams. It is also consistent with the earlier observation as noted in West African dwarf goats (Ozoje and Herbert, 1997). In line with the present study Ndlova and Simele, (1996) observed that increase in the growth rate up to a certain stage declines with age. Comparatively, the body weights of the males were generally higher than that of the females. The variation due to the month of kidding as observed on birth weight and body weight of the kids to 9 months of age may be as reflection on the variations due to quality and quantity of pastures available for the does to feed, during the kidding period. The rainy season usually starts in the month of May in the study area; hence there is a relatively high availability and quality forages for the animals to feed than on the month of April. Thus, the higher body weight of MBK might have been due to higher milk production by dams fed good quality forages available at the time (Ebangi *et al.*, 2002). Therefore, it is necessary for farmers in smallholder production system to design a breeding programme where does kid toward the end of the dry season; so as to benefit from the earlier rainy season nutritive pastures that will favour higher milk production, and optimum profitability. This will contribute to rapid growth and heavier kids at birth and at weaning to later months.

CONCLUSION

The observed significant effects as noted on sex, month of kidding and dam mating weight implies that they should be taking into consideration in any selection programme aimed at improving the growth of Red Sokoto goats.

REFERENCES

Aganga, A.A and Moganetse, B.P. (1998). Traditional goat production and utilization of goats milk in kgatleng and kwenenga district of Botswana. Dertropenlandwirt, beitrage Zurtropischen landwincaft und. Veterinamerdizim. 99 Jahrgang.pp.9-16

Akpa, G. N., Alphonsus, C and Duru, S (2006). The Relationship between Body parameters and Testicular and Horn development in Yakasa Rams. *Production Agriculture and Technology*, 2(2): 72 – 79.

Akpa, G.N., Duru, S. and Amos, T.T. (1998). Influence of strain and sex on estimation of within-age-group body weight of Nigerian Maradi goats from their linear body measurement. *Tropical Agriculture (Trinindad)* 74: 462 – 467.

APRU, (1994). Livestock production and range research in Botswana. Ministry of agriculture, Gaborone, Botswana.

Bratte, A., Ari,Jeniwa, A. and Ikhimioya, I. (1999). Age and body weight and their relationship with testicular and horn development in Yaankasa- West African dwarf cross bred rams. *Journal of Applied Animal Resesarch. India*. 99:10971-2119.

Butswat , I.S.R., Zahraddeen, D. and Hussaini, A.S. (2005). Prevalence of peste des petits ruminantia (PPR) and helminthiasis in sheep and goats. *Bulletin for Animal Health and Production in Africa*. 53:131-134.

Ebangi, A. L., Erasmus, G. J., Mbah, D. A., Tawah, C. L. and Massine, O. (2002). Factors affecting growth performance in purebred Gudah and two breed synthetic Wakwa beef cattle in a tropical environment. *Med. Vet. Pays. Trop*. 55(2): 149-157.

FAO, (2006). Food and Agricultural Organization. *Quarterly Bulletin of statistics Rome, Italy*. http//fao.org/statistic/yearbook:May 2006

IAR, 2005. Institute for Agricultural Research meteorological station, weather report, Kano office (2005). Ahmadu Bello University, Zaria, Nigeria.

Ibe S.N and Nwakalor, L.N (1987). Gowth pattern and conformation in broilers, influence of genotype and management on isometric of growth. *Poultry science.* 66: 1247-1251

Malau-Aduli,B.S., Eduvie, L.O., Lakpini, CAM and Malau-Aduli, A. E. O.(2001). Effect of supplementation on the milk yield of Red Sokoto does. *Proceeding of the 26th annual conference of Nigerian Society for Animal Production.* March 2001, ABU, Zaria, Nigeria.pp.353-355

Ndlova, L.R and Simela, L (1996). Effect of season of birth and sex of kid on the production performance of live weaned single born kids in small holder East African goat Flock in North East Zimbabwe. *Small Ruminant Research*. 22:1-6

Nsoso, S. J., Aganga, A. A., Moganetsi, B. P and S.O. Tshwenyane (2003). Body weight, body condition score and heart girth in indigenous Tswana goats during the dry and wet seasons in Southeast Botswana. *Livestock Research for Rural Development* 4 (15): 1-6.

Orheruata, A. M and Olutogun O. (1994). Pre-and post – weaning phenotypic relationship between some N'Dama cattle linear measurement in the tropics. *Nigeria Journal of Animal Production*, 21: 76 – 82.

Ozoje, M.O and Hebert, U (1997). Linear measurements in West African Dwarf(WAD) and WAD x Red Sokoto goats. *Nig J.Anim Prod*.

SAS (1999) SAS User's Guide Version 8.1. *Statistical Analysis system institute Inc*, Cary, Nc, USA.

Taure ,G and Meyer, C (1990). Body weight testicular and behavioural development of Djallonke lamb. *Small Ruminat Research Network News Letter*. No 17 IKA Addis Ababa.

Zahraddeen ,D.(2006). Studies on reproductive performance and milk productivity of goats in Bauchi. *A Ph.D Thesis, Animal production programme*, ATBU, Bauchi Nigeria.

Zahraddeen ,D., Bustwat, I.S.R., Mbap, S.T and S.A Naibi (2008). Correlation of some reproductive traits with partial daily milk yield and growth traits in local goats of Nigeria. *Proceeding of 13th annual conference of animal science association of Nigeria*, September 15-19, 2008,A.B.U Zaria.pp.13-15