INFLUENCE OF BREED, FEED TYPE AND AGE ON SCROTAL SIZE OF WEST AFRICAN DWARF AND SAHEL GOAT KIDS FROM BIRTH TO PUBERTY CORRELATED WITH THEIR BODY MEASUREMENTS

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ABSTRACT
The study evaluated the influence of feed type on scrotal size of West African dwarf and Sahel goat kids, from birth to weaning age, correlated with their body measurements, at the Teaching and Research farm of the Federal Polytechnic Bali, Taraba State. A total of 32 goats for the two breeds (WAD and Sahel) were used for the experiment. The animals were fed with Gmelina arborea leaves(Gm) and cassava peel meal, Gmelina leaves and cowpea husk, Ficus sycamores (Fs) and cassava peel meal(Cpm), and Ficus leaves and cowpea husk as experimental treatment diets (T1, T2, T3 and T4). The data obtained was subjected to analysis of variance and Pearson correlation coefficients analysis to determine variability among the scrotal size of the bucks as influence by different feeds types. The results show that, Sahelian goat had the higher scrotal size (SCL and SCR) compared to WAD. Diets containing Gmelina had higher scrotal value than the two without. Furthermore, the change in SCL (3.51cm) from one to six months of age was lower than that of SCR (4.92cm). The rates of kid bucks' scrotal size from 7 to 12 months, the breed, diet and age had significant (P<0.01) effects on scrotal size. During this period WAD had higher SCL (10.49cm) and SCR (15.73cm) than Sahel with value of 9.18cm to 12.50cm respectively. The Fs+Cph diet had the lowest SCL (7.36cm) and SCR (10.14cm) while the values of SCL for other diets were not statistically different. Higher SCR value (17.01cm) was deserved for Gm +Cpm, while the lowest was Fs+Cph (10.14 cm). The range from 7.93cm to 13.38cm for SCL and 11.70cm to 18.74cm for SCR. The correlation values were high, significant (P<0.001) and positive. They varied from 0.6330 to 0.9040. In conclusion, feeding bucks with Gmelina arborea leaves +Cowpea husk and Ficus sycamores leaves give significant increase in scrotal size of bucks compared to Gmelina arborea leaves and cassava peel meal. Therefore, Ficus containing diets should be preferably used as against their Gmelina counterparts in scrotal size as well as semen quality of bucks.
Keywords: Feed, Ficus, Gmelina, Scrotal size, Bucks, Weaning, Puberty

INTRODUCTION

Goats have important drought survival strategy in marginal cropping areas where mixed farming is prevalent (Doma *et al.,* 1999). Goat contributes 24% to Nigeria meat supply (Oni, 2002). They also feature prominently in the economic and social lives of Nigerians (Ajala, 2004).

Economically, goats serve as saving and living banks for the resource poor rural people, since they can easily be converted into cash when a need arises (Dossa *et al*., 2008; Gurmesa *et al*., 2011). Livestock of different species fulfill different functions in the household economy (Anderson, 2003). The domestic goat *(Capra hircus, L.)* provides a range of useful products including meat, milk, skin and hair. They survive on grass and available browse in harsh environments. Feed represents the largest cost of raising small ruminants, accounting for 60% or more (Schoenian, 2007) and is the most limiting factor in goat production (Zahraddeen, 2006). Reproduction is one of the main factors of production. Reproductive activities are affected by a range of factors including, socio-sexual cues, photoperiod, energy balance etc. Energy balance is also a regulator of reproductive functions. Variations in nutrition and energy balance affect reproductive cycle at almost all the stages (Dominique *et al.*, 2008). The goal of the study was to evaluate the reproductive performance of West African Dwarf and Sahel goats fed different browse plants as basal diet, supplemented with cassava peel meal and cowpea haulm as sources of energy and protein respectively.

MATERIALS AND METHODS

The study was conducted at the Teaching and Research farm, of Federal Polytechnic, Bali, Taraba State, Nigeria. Bali Local Government Area (LGA) is located between the latitude $7^0$12' and $9^0$00'N of the

equator, longitudes $10^{0}00$ and $12^{0}00$'E of the Greenwich Meridian, and at an altitude of 4500 to 5000 metres above sea level (Adebayo and Bashir, 2005). It is the largest LGA in Taraba State with an estimated land area of 11,500Km^2 and population of 211,024 (NPC, 2006). Thirty-two goats made up of West African Dwarf (16) and Sahel (16), of both sexes, 6-8 months old and 8-9 kg, were the population stock used for the study. The animals were obtained from small holder subsistence farmers, who reared them extensively, on natural pastures with little or no supplementations and took them to local livestock markets in and around Bali town. The ages of the animals were determined using the dentition estimation method, by counting the number of permanent incisors that have erupted on the lower jaw of the mouth as described by Sastry and Thomas (1980) and Matika *et al.* (1992). They were measured using a flexible tape; Scrotal length (SCL) which is the distance from the base of a pendulous hanging scrotal to its lowest part and Scrotal circumference (SCR), this is the measurement round the scrotum of the testicles at the largest central dimension. The testicular dimensions were measured after every week before semen collection.

RESULTS AND DISCUSSION

Scrotal sizes of kids from birth to weaning and, to puberty

Table 1 depicts scrotal length (SCL) and circumference (SCR) development of goat Bucks from 1 to 6 months. There were significant (P<0.01) breed, diet, and age differences in the scrotal parameters. Sahelian goats had the higher scrotal size (SCL and SCR) than WAD. Diets containing Gmelina had higher scrotal value than the two without. Furthermore, the change in SCL(3.51cm) from one to six months' age was lower than that of SCR (4.92cm). Presented in Table 2 are growth rates of kid bucks' scrotal size from 7 to 12 months. Breed, diet and age had significant(P<0.01) effects on scrotal size. During this period WAD had higher SCL (10.49cm) and SCR (15.73cm) than Sahel with value of 9.18 and 12.50 cm respectively. The Fs+Cph diet had the lowest SCL (7.36cm) and SCR (10.14 cm), while the values of SCL for other diets were not statistically different. Highest SCR value (17.01 cm) was observed for Gm+Cpm while the lowest was for Fs+Cph (10.14 cm). The change in SCL and SCR with age were fairly consistent, varying from 7.93 to 13.38cm for SCL and11.70 to 18.74cm for SCR.

Table 1: Scrotal size of goat kids from birth to weaning.

Variable	N	SCL (cm)	SCR (cm)
Overall	**264**	**4.54**	**7.55**
Factor			
Breed		**	**
WAD	145	3.85^{b}	6.53^{b}
Sahel	120	5.23^{a}	8.56^{a}
Feed		**	**
Gm+Cpm	72	5.23^{a}	8.43^{a}
Gm+ Cph	24	4.59^{b}	8.58^{a}
Fs+ Cpm	72	3.64^{c}	7.02^{b}
Fs+ Cph	07	4.40^{b}	6.15^{c}
Age (Month)	**	**	**
1	44	2.69^{f}	4.98^{f}
2	44	3.50^{e}	6.25^{e}
3	44	4.29^{d}	7.12d
4	44	5.01^{c}	7.95^{c}
5	44	5.65^{b}	9.06^{b}
6	44	6.20^{a}	9.90^{a}

**=P<0.05, abc=means in the column with the same superscript are statistically similar, WAD=West African Dwarf goat, SCL=scrotal lengths=scrotal circumference, Gm=Gmelina arborea, Fs=Ficus sycamores, Cpm= Cassava peel meal, Cph= Cowpea husk, N=sample size.

The correlation coefficients between age and body measurements of WAD and Sahel goats are presented in Tables 3. All the correlation coefficients were highly significant(P<0.01) and positive. The correlation for WAD ranged from 0.4504 to 0.873. On the other hand, those for Sahel varied between 0.7582 and 0.8615. Scrotal size is an external and easily measurable parameter that has been used to assess spermatogenic activities and hence semen/sperm production and quality (Bongso *et al.,* 1982). The overall scrotal size (SCL and SCR) reported in this study are consistent with observation of Ezihe *et al* (2015) and Abba and Igbokwe, (2015). They Observed values of 8.17cm and 18.57cm and, 8.89cm

and12.82cm respectively for WAD and Sahel. Scrotal Size of buck from weaning to puberty**,** is still the interval of sexual inactivity in goats' buck **(**Bielli *et al* 2001) as puberty has not been attained. Therefore, as for the earlier stage (birth to weaning) all the factors considered had significant effect on scrotal size and all show similar variations as part of normal growth.

Table 2: Scrotal size of goat kids from weaning to puberty

Variable	N	SCL (cm)	SCR (cm)
Overall	139	9.81	14.11
Breed		**	**
WAD	77	10.49[a]	15.73[a]
Sahel	63	9.18[b]	12.50[b]
Feed		**	**
Gm+ Cpm	51	10.68[a]	17.01[a]
Gm+ Cph	11	11.03[a]	12.97[b]
Fs+ Cpm	30	10.19[a]	16.44[a]
Fs+ Cph	48	7.36[b]	10.14[c]
Age (Month)		**	**
7	14	7.93[c]	11.70[c]
8	43	8.61[bc]	12.28[c]
9	30	9.03[bc]	12.80[b]
10	15	9.24[bc]	13.54[b]
11	6	10.69[ab]	15.41[a]
12	2	13.38[a]	18.74[a]

**=P<0.01, abc=means in a column with the same superscript are statistically similar, WAD =West African Dwarf goat, SCL=scrotal length SCR=scrotal circumference, Gm=*Gmelina arborea*, Fs=Ficus sycamores, Cpm= Cassava peel meal, Cph= Cowpea husk, N= sample size.

Table 3: Correlations between weights, body, and scrotal measurements

	WGHT	BDL	CGS	HGW	SCL
BDL	0.7635***				
CGS	0.8309***	0.7916***			
HGW	0.7224***	0.6339***	0.8723***		
SCL	0.8674***	0.6830***	0.7400***	0.7191***	
SCR	0.8633***	0.8633***	0.7089***	0.6330***	0.904***

***= significant at P<0.001; WGHT=weight, BDL=body length, CGS=chest girth size, HGW= height at wither, SCL=scrotal length, SCR= scrotal circumference

Normally, correlations between variables indicate the relationship between them and range from 0.0 to 1.0. Correlation values from 0.0 to 0.25 are considered low, 0.25 to 0.50 are medium and above 0.50 high (Falconer,1989). The low correlation coefficient between age of first kidding and postpartum doe weight indicates that they were lowly related parameters. However, the medium correlation between age at first kidding and gestation length indicates some relationship i.e., that increase in one lead to increase in the other. The medium to high negative correlations between postpartum doe weight and gestation length and age at first kidding indicate that increase in postpartum doe weight resulted in some decrease in the other variables. High correlation value between two variable or members of a pair (shows strong relationship) are used as time and cost saver. This is because one member of the pair could be measured and the value used to indicate or approximate the other. Akpa *et al.* (2011) had reported medium correlation values between reproductive parameters. For example, relationship between litter size and parity of doe.

CONCLUSION

Feed have effect on reproductive performance of WAD and Sahel goats in Bali LGA, Taraba State. Feeding herbage types to ruminant animals, all season through improve reproduction performance of both males and female of goats. The feeds did not affect seasonal variation on reproductive parameters of bucks of both breeds of goats studied and the age.

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