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BODY WEIGHT AND LINEAR MEASUREMENT AT SEXUAL MATURITY OF F_1 PROGENY FROM WEST AFRICAN DWARF AND WHITE BORNU GOATS CROSSING IN HUMID NIGERIA

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ABSTRACT*: Twenty-four unit breeding herd of two indigenous goat breeds (West African Dwarf and White Bornu) were raised in a humid environment of Nigeria to evaluate the effect of breed and sex on the body weight and linear measurement at sexual maturity of progenies from within and between crosses of both breeds. Results from the study revealed that breed and sex had significant influence on parameters assessed with higher values been observed in the crossbred and the White Bomu purebred. Body weight values ranged from 22. 76 ± 2.17 to 34.43 ± 1. 77 cm with higher value observed in crossbred. This trend was also revealed in traits such as Height at wither (HA W), Heart girth (HG), Body length (BL), Upper fore limb (UFL), Lower fore limb (LFL), and Upper hind limb (UHL). However, lower hind limb (LHL) -was higher in White Bornu purebred with value of 18.47+0.60 and the crossbred recording 17.64 ± 0.74 cm which implies that improvement was made on traits of the West African Dwarf goat due to crossbreeding with White Bornu.*

KEYWORDS*:* Indigenous goat, Sexual maturity, Body weight, Improvement, Crossbreeding

INTRODUCTION

In humid zone, the predominant breed of goats is the West African Dwarf (WAD) goats, and according to Lutz, (1983) the WAD goats grows slowly, attains a low adult or mature weight, and is usually not milked. The large WAD goats' population, their extensive distribution, their hardiness, suspected resistance to some common diseases like trypanosomiasis, makes them particularly suitable for rural communities in the southern humid areas (6do *et at*, 2000). The traditional use of the WAD goats as a meat animal can be enhanced through improving their growth and milk yield of the does and thus the kids can be weaned heavier. Research has also shown that this weight advantage is maintained to slaughter age, which is also attained quicker (Moruppa and Ngere, 1986; Wilson, *et al*, 1983). Therefore, improver genes for rapid growth and for higher milk yield could be introduced through crossbreeding with a dairy type (Jagusch, 1980). Moruppa and Ngere, (1986) have shown that a breed, White Borun (WB) with the high potential for meat and milk exists in the North Eastern Area of Nigeria. The general aim of this work therefore is to investigate the use of White Borun (WB) goat breed as a potential source for increasing growth rate and meat potential of the WAD goat. The research work was designed to access the effect of type breed, sex and interaction on body weight and linear measurement of kids produced within and between breeds

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MATERIALS AND METHODS

Experimental Site

The experiment was carried out in phases in a private goat ranch located at Aiiize - Emai, Owan East Local Government Area of Edo State, Nigeria. It is situated between latitudes 6^0 N and 7° N of the equator, with an average temperature of 32°C in peak dry season and 28-30 C in raining season and annual rainfall ranging from 2000 mm to 4000 mm in mid raining season.

Experimental Animals

Two breeds of goats were used for the experiment, the West African Dwarf (WAD) and White Bornu (WB) goats. An initial herd of ten females and two males of each breed were sourced as the breeding herd.

Source of Experimental Animals

Initial breeding stocks were purchased direct from the local farmers in preference to buying from the market place. The low input nature of traditional production system of the small ruminants ensures that only sick/problem animals are taken to the market. Selection at this stage was done by visual appraised. Only those animals that are structurally sound free from obvious physical and hereditary defects that appear apparently healthy and are from dams with good reproductive history were purchased. The White Bomu (WB) breeds were sourced around the dry months of September to December as their survivability was greatly influenced by rains.

Management of Experimental Animals

Animals were managed under semi-intensive .system such that the animals are let out to graze on the paddock at certain hours of the day between 10.00 am and return to the pens at 5.00pm were their feeding is supplemented with whole maize and dry grass forage consisting of dried-chopped giant stargrass, *Panicum maximum*, *Glihcidia sepium* and groundnut leaves supplied by the Hausa/Fulani herds-men as, supplement .feed to make up for their nutrient requirement; Fresh water and supplement were given *ad-libitum* in the pens. At the peak of rainy season in August, they were kept in confinement within the pen and zero-grazed. Animals were vaccinated against *Peste des petits ruminant* (PPR), dewormed once in three months and dipped regularly were skin lesions were observed. Where Stress situation was observed solution of glucose and vitastress were orally given to the affected animals. The flock was given salt licks and trace element as the need arises.

Housing of Experimental Animals

The pens though partitioned into smaller pens of dimensions 90 cm by 150 cm for individual pen and 360 cm by 360 cm for grouped pen large enough to occupy a doe and a buck in the grouped pen during breeding, there is a service corridor between every row of pen. The roof of the pen is made of corrugated iron sheet supported on teak poles with half walls around. This provides adequate ventilation. The floor is sand filled to ease waste disposal.

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Attached to the pen is a 250ft by 300ft-fenced paddock, with expanded wire quartz, which served as grazing paddock for the experimental period.

Breeding of Experimental Animals

Improver gene through crossbreeding of the West African Dwarf (WAD) females to the adapted White Bornu (WB) males was carried out. Three lines of breeding plans were observed, each serving as a treatment.

Line A: Involved the mating of one White Bornu (WB) male goat to five West African Dwarf (WAD) females (WB_M x WAD_F).

Line B: One White Bomu (WB) male goat was mated to five White Bornu (WB) females (WB_M x WB_F).

Line C'.One West African Dwarf male (WAD) goat was mated to five female West African Dwarf (WAD) goats (WAD_M x WAD_F).

All pure line crosses served as comparison (control) to the crossbred. Offspring from all crosses were referred to as F_1 progeny.

Experimental Design

The design use for the study was the completely randomized design with four treatments and five replicates each.

Data Collection

Various data were collected at parturition and point of weaning as enumerated. Parameters measured includes, Body weight (BWT), Height at wither (HAW), Heart girth (HG), Body length (BL), Upper fore limb (UFL), Lower fore limb (LFL), Upper hind limb (UHL) and Lower hind limb (LHL)

Statistical Analysis

Data obtained were subjected to Analysis of variance, were LSMEAN, with effect of Breed, sex and their interaction on body linear measurements were determined.

RESULTS AND DISCUSSION

Body Weight

The result reveals a significant difference ($P<0.05$) between breeds. However, body weights were not different between White Bornu purebred and the cross between White Bornu and West African Dwarf goats. Sex did not affect body weight of all FI progeny but male had a higher absolute value of 30.58 ± 1.60 against 30.08 ± 1.37 kg for females. Results on between and within breed and sex interaction shows that WB x WAD progeny had better body weight of 36.57 ± 2.51 and 32.29± 2.51 kg for males and females respectively which is a reverse of that of WAD purebred which had 19.0 ± 3.55 and 26.53± 2.51 kg being performance of males and females respectively. Analysis of the results reveals a significant difference between breed and sex interaction hence the males performed significantly better in WB purebred and the crossbred,

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while in WAD the females had a better performance of 26.53 ± 2.51 compared to 19.00 ± 3.55 kg in their male counterpart. Generally, crossbred progeny had better body weight sex notwithstanding.

Height at Wither

Results on Height at Wither (HAW) revealed that breed as well as sex affected this trait in all breeds considered. Males were generally higher at wither in WB and its cross with WAD goats. It is only in WAD that female were higher at wither.

Heart Girth

The obtained values of 66.34 ± 2.16 cm for WAD was significantly different (P<0.05) from 78.95± 1.44 cm and 80.62 ± 1.76 cm obtained for WB and WB x WAD goats respectively. Sex also had a significant effect (P<0.05) on the heart girth of F_1 progeny with values of 76.55 ± 1.59 cm and 74.05 ± 1.36 cm obtained for males and females goats respectively. Breed * sex interaction had a negative effect on HG of females in the crossbred. However, both had an improvement over that of WAD goat. Males of WB x WAD crossbred had better heart girth of 84.86 ± 2.49 cm compared with 80.70 ± 2.03 cm and 64.10 ± 3.52 cm obtained for WB and WAD purebred respectively. However, females of WB had a high HG measurement with HG of 77.20 ± 2.03 cm compared to 68.58 ± 2.49 cm and 76.36 ± 2.49 cm for WAD and WB x WAD progeny respectively.

Body Length

Body length (BL) of F_1 progeny reveals a significant difference (P<0.05) between sex in WAD purebred and a non-significant (P>0.05) performance among progenies of WB purebred and their cross with WAD goats. Mean values of 98.35 ± 5.01 cm and 90.46 ± 5.01 cm where obtained for male and female WB x WAD crossbred progeny. They were better when compared to values obtained for WB and WAD purebred. However, there was a decrease in values for all progenies with the interaction of breed and sex.

Upper Fore Limb

Values of UFL for WAD and WB purebred and their cross (WB x WAD) were 18.92 ± 1.23, 22.91 ± 0.82 cm and 23.42± 1.00 cm respectively. Breed, sex and their interaction had significant effect (P<0.05) on UFL. However, there was no significant difference (P>0.05) between breed effect in WB purebred and the WB x WAD crossbred as difference were negligible. The crossbred generally had lowered upper fore limbs in both sexes compared to the purebred. In all, males of WB x WAD had higher UFL of 25.27 ± 1.42 cm and least value was recorded for WAD male with value of 18.20 ± 2.00 cm. Performance of females showed that those of WB purebred and WB x WAD crossbred had similar length of 21.00 ± 1.16 and 21.58±1.42 cm respectively.

Lower Fore Limb

Mean values of 12.36 ± 0.53 cm, 15.42 ± 0.35 cm and 15.55 ± 0.43 cm for LFL in WAD, WB and WB x WAD respectively. Effects of breed, sex and interaction were significant (P<0.05). WAD goat had the least value compared to others. Difference in length of UFL among sexes within breed were higher in WB and WB x WAD with values of up to 2.00 cm as compared to 0.73 cm in WAD. The close values of WB and WAD progeny in LFL as

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distinct from the WAD goats implies that there was improvement through the contribution of the WB goat on genes that influence lower fore limb.

Upper Hind Limb

Breed, sex and their interaction had significant (P<0.05) influence on UHL in all the breeds. WB x WAD had longer UHL value ranging from 2 to 5 cm more than WB and WAD respectively. WB purebred had value that was mid-way between WAD and WB x WAD. Results imply that value of 29.84 ± 1.41 cm obtained for the crossbred males were better than others, which is in agreement with the work of Bhamagar and chawla (1984), Odubote and Akinokun (1992).

Lower Hind Limb

Results reveal a mid-way performance of WB breed in Lower Hind Limb length and better values for WB x WAD progeny. From the result it was observed that both sex and breed had significant (P<0.05) effect on LHL. WB purebred had the highest value of 18.47 ± 0.60 cm compared to 16.59 ± 0.90 cm and 17.64 ± 0.74 cm for WAD and WB x WAD respectively. Interaction of breed and sex reveals a close values for sexes of WAD and WB and higher difference in values of sexes of WB x WAD with the male having 19.10 ± 1.04 cm compared to 16.18 ± 1.04 cm for the female.

CONCLUSION

From the results of the study the F] crossbred progeny had higher linear body measurement and body weight value at sexual maturity thus indicating better conformation compared to West African Dwarf (WAD) purebred. Since crossbred of White Bornu (WB) and West African Dwarf (WAD) goats were superior to purebred of West African Dwarf (WAD) goats farmers in sub-humid environment should used White Bornu (WB) male goat to cross their West African Dwarf (WAD) female goats for improved productivity.

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TABLE 1: BODY AND LINEAR MEASUREMENT OF F_1 PROGENIES AT SEXUAL MATURITY

VARIABLES	BWT (KG)	HAW (CM)	HG (CM)	TRAITS BL (CM)	UFL (CM)	LFL (CM)	UHL (CM	LHL (CM)
BREEDS								
WAD	22.76^{b}± 2.17	61.37^{b}± 1.89	66.34^{b} ±2.16	77.29^{b}±4.34	18.91^{b}± 4,34	12.36^{b} ±0.53	22.29^{b}± 1.22	16.59^{b}± 0.90
WB	33.81^{a}± 1.45	73.42 ^{a}±1.26	78.95 ^{a}±1.43	90.87 ^{a}±2.89	22.91 ^{a}±2.89	15.42 ^{a}±0.35	25.80 ^{ba}±0.81	18.47 ^{ba}±0.60
WB X WAD	34.43 ^{a}±1.77	74.15 ^{a}±1.54	80.62 ^{a}±1.76	94.40 ^{a}±3.55	23.42 ^{a}±3.55	15.55 ^{a}±0.43	27.48 ^{a}±0.99	17.64 ^{a}±0.74
SEX								
FEMALE	30.08 ^{a}±1.37	68.38 ^{b}±1.19	74.05 ^{a}±1.36	85.56 ^{b}±2.73	20.77 ^{b}±2.73	14.10 ^{b}±0.34	24.48 ^{b}±0.76	16.99 ^{b}±0.57
MALE	30.58 ^{a}±1.60	70.91 ^{a}±1.39	76.55 ^{b}±1.59	89.48 ^{a}±3.20	22.73 ^{a}±3.20	14.78 ^{a}±0.39	25.91 ^{a}±0.90	18.13 ^{a}±0.66
BREED SEX								
WAD	26.53±2.51	63.54± 2.18	68.58± 2.47	77.53±5.01	19.63± 1.42	12.73± 0.61	23.53± 1.41	16.68±1.04
	19.00±3.55	59.19± 3.08	64.10± 3.52	77.05±7.09	18.20± 2.00	12.00± 0.86	21.05± 1.99	16.50±1.47
FEMALE								
MALE	31.43±2.05	70.72± 1.78	77.20± 2.03	88.70±4.09	21.10± 1.16	14.7±0.50	21.78± 1.15	18.13±0.85
WB	36.18±2.05	76.12± 1.78	80.70± 2.03	93.03±4.09	24.72± 1.16	16.07± 0.50	26.82± 1.15	18.80±0.85
FEMALE								
MALE	32.29±2.51	70.88± 2.18	76.38± 2.49	90.46±5.01	21.58± 1.42	14.82± 0.61	25.12± 1.41	16.18±1.04
WB X WAD	36.57±2.51	77.42± 2.18	84.86± 2.49	98.35±5.01	25.27± 1.42	16.28± 0.61	29.84± 1.41	19.10±1.04

MEANS in the same column with different superscripts are significantly different (P< 0.05).

BWT = Body weight, HAW = Height at wither, HG = Mean Girth, BL= Body length, UFL = Upper fore limb, LFL = Lower fore limb, UHL = Upper hind limb and LHL = Lower hind limb.

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