ABG -37

Age Based Classification of Morphometric Traits of Different Nigeria Goat Breeds

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Abstract
A total of nine hundred (900) goats comprising of three hundred Sahel goats from Borno state, three hundred Red Sokoto goats from Sokoto state and three hundred West African Dwarf goats from Ogun state were used for the study. The goats were evaluated for morphometric characteristics. The effects of age, breed, and sex on linear measurement were estimated using the GLM procedure of the SAS software package. Data were computed on the basis of interaction with age groups. Means were separated within age groups using Duncan multiple range test. The result of this study indicated that the Sahelian breed was superior to other breeds across all age groups in body weight, while the red Sokoto was intermediate followed by the West African Dwarf. However, variations in morphometric measurements did not follow this trend and indicates that body parts are influenced differently by age, breed and sex. The variability of body weight suggests possibility of improving this trait through careful selection. Present results showed that age has strong influence, as there were consistent increases in all the traits studied as the animals aged.

Keywords: Sahel goat, Red Sokoto, West African Dwarf, ruminants

Introduction

Goats are the largest in number among ruminant livestock in Nigeria totaling about 58.3 million (FAOSTAT, 2008). The importance of goat stem from its ability to convert forages and household by-product into high quality human food and their role as locally available source of food, fibre, power and other products to suit local community needs. The indigenous breeds found in Nigeria are, Red Sokoto, Sahel, and West African Dwarf (WAD) goat (Adu and Ngere, 1979). These differ considerably in size, coat colour, horn length, etc. Their broad genetic variability enables them to survive under stressful environmental condition including high disease incidence, poor nutrition which may increase animal susceptibility to disease, high temperature, and traditional husbandry system.

In Nigeria, work has been done extensively on goats ((Adu and Ngere, 1979; Dettmers, 1983; Bunge *et al.,* 1990 and Hall, 1991). The influence of age on production characteristics cannot be overemphasized. Reports on the impact of age on puberty, kidding, growth and growth rate, birth weight etc. has been documented (Banerjee *et al.*, 2000; Mamabolo and Webb, 2005; Akpa *et al.,* 2013). That morphometric measurement varies positively with age of the animals and the correlations of body weight with diagonal body length, height at wither, sac pelvic width and hearth girth were high, positive and significant has been reported (Ojedapo *et al*., 2007).

This study was designed to characterize age based variations of morphological traits within the different breeds.

Materials and Methods

The study was carried out in Borno, Sokoto and Ogun States. These states were selected because they are locations having close to pure breeds of the goats. A total of nine hundred (900) goats comprising of three hundred Sahel goats from Borno state, three hundred Red Sokoto goats from Sokoto state and three hundred West African Dwarf goats from Ogun state were used for the study. Each breed consisted of three hundred goats each, made up of fifty males and fifty females distributed in the following age groups <1, 1-2 and 2-3 years. The goats were evaluated for morphometric characteristics. The pairs of permanent incisors in the dentition of the goat were used to determine age.

The following metric characters were measured on each animal: Body Weight (BW), Age, Horn Length (HL), Ear length (EL), Shoulder width (SW), Neck circumference (NC), body length (BL), Withers Height (WH), Heart Girth (HG), Pouch Girth (PG), Tail Length (TL) and Scrotal circumference (SC). Weights of the animals were taken using a spring balance and Walk-in weighing scale. Flexible measuring tape was used to take the body measurements. Each measurement was taken at least three times and the mean recorded to the nearest centimeter or kilogram.

The effects of age, breed, and sex on linear measurement were estimated using the GLM procedure of the statistics analysis software (SAS, 1990) package. Data were computed on the basis of interaction with age groups. Means were separated within age groups using Duncan multiple range test.

Results and Discussions

Mean body weight in Red Sokoto, Sahel and West African Dwarf goats less than one year are presented in Table 1. The Sahel breed was superior to the other breeds with a body weight of 13.56±0.56Kg and 14.94±0.52Kg in does and bucks respectively. Within the Red Sokoto population, body weight in doe and buck were 13.73±0.51Kg and 12.86±0.42Kg respectively while in West African Dwarf, 10.44±0.22Kg and 10.62±0.21Kg for does and bucks.

Table 1: Least squares means (X), standard deviation (SD), and coefficient of variation (CV) of morphological traits among Red Sokoto, Sahel and WAD goat (< 1 year)

		RED SOKOTO			SAHEL			WAD		
Parameter		Doe	Buck	Total	Doe	Buck	Total	Doe	Buck	Total
BW	N	50	50	100	50	50	100	50	50	100
	X	13.73	12.86	13.30	13.56	14.94	14.25	10.44	10.62	10.53
	SD	3.62	3.00	3.33	3.90	3.70	3.89	1.53	1.49	1.50
	CV	26.38	23.36	25.12	29.40	24.78	27.30	14.65	13.98	14.27
EL	N	50	50	100	50	50	100	50	50	100
	X	10.22	9.86	10.04	11.52	11.06	11.29	9.56	9.43	9.49
	SD	1.17	1.07	1.13	1.79	1.88	1.83	1.08	1.20	1.13
	CV	11.46	10.81	11.24	15.53	16.96	16.28	11.27	12.70	11.95
SW	N	50	50	100	50	50	100	50	50	100
	X	13.34	13.83	13.59	18.18	18.59	18.39	12.75	12.99	12.87
	SD	3.94	3.40	3.68	3.02	2.57	2.79	3.02	3.40	3.20
	CV	29.57	24.65	27.06	16.60	13.80	15.20	23.70	26.21	24.90
NC	N	50	50	100	50	50	100	50	50	100
	X	22.69	23.43	23.06	21.02	23.31	22.17	23.47	24.39	23.93
	SD	5.10	4.30	4.71	3.67	4.53	4.26	4.16	4.16	4.16
	CV	22.48	18.35	20.41	17.47	19.43	19.22	17.73	17.04	17.40
BL	N	50	50	100	50	50	100	50	50	100
	X	41.92	41.97	41.95	35.36	39.56	37.46	42.04	41.88	41.96
	SD	4.70	3.99	4.33	7.16	9.25	8.50	5.85	5.13	5.48
	CV	11.20	9.50	10.33	20.25	23.39	22.68	13.92	12.27	13.06
WH	N	50	50	100	50	50	100	50	50	100
	X	52.06	51.63	51.85	42.47	45.80	44.13	47.93	48.07	48.00
	SD	6.13	5.69	5.89	10.04	9.44	9.84	7.98	7.53	5.33
	CV	11.78	11.03	11.36	23.64	20.62	22.30	16.65	15.67	16.08
HG	N	50	50	100	50	50	100	50	50	100
	X	53.33	57.53	55.43	49.90	48.77	49.33	50.15	49.71	49.93
	SD	9.24	8.29	8.98	3.46	4.68	4.14	5.51	5.18	5.33
	CV	17.33	14.40	16.21	6.74	9.60	8.39	10.98	10.43	10.67
PG	N	50	50	100	50	50	100	50	50	100
	X	55.37	59.61	57.49	52.20	50.63	51.41	51.42	50.99	51.19
	SD	9.32	8.40	9.08	3.50	4.68	4.18	5.48	5.05	5.25
	CV	16.83	14.09	15.79	6.70	9.24	8.14	10.65	9.91	10.25
TL	N	50	50	100	50	50	100	50	50	100
	X	12.08	11.71	11.807	11.62	11.97	11.79	10.29	10.27	10.28
	SD	1.84	2.13	1.99	2.27	2.28	2.27	1.33	1.46	1.39
	CV	15.24	18.17	16.71	19.52	19.06	19.25	12.90	14.24	13.52

Horn Length (HL), Ear Length (EL) Shoulder Width (SW) Neck Circumference (NC) Body Length (BL) Wither Height (WH) Heart Girth (HG), Pouch Girth (PG), Tail Length (TL), Scrotal Circumference (SC) and Body Weight (BW)

Coefficient of variation ranged between 13.98% and 29.40% suggesting the influence of major genes on this trait. The standard deviation estimates associated with the mean live weight were generally small, (1.49-3.90). There were no significant ($p>0.05$) differences in live weight between the sexes within breeds. In Horn length, the Sahel had the highest (7.21±0.33cm and 7.42±0.31cm), while the least values (5.24±0.30cm and 4.99±0.28cm) for does and bucks respectively. Averagely, Red Sokoto showed an intermediate distribution (6.20±0.32cm and 5.22±0.23cm) respectively. Associated coefficient of variation and standard deviation ranges between 29.10% – 40.93% and 1.60-2.27 respectively, suggesting that the measurement is almost independent of the environment. Ear length in the Sahel had the highest values (11.52±0.25cm and 11.06±0.27cm), while the least values (9.56±0.15cm and 9.43±0.17cm) for does and bucks respectively. Averagely, Red Sokoto showed an intermediate distribution (10.22±0.17cm and 9.86±0.15cm) respectively. Associated coefficient of variation and standard deviation ranged between 10.81% – 16.96% and 1.07-1.88 respectively. Red Sokoto goats had the highest values for height at withers (52.06±0.87cm and 51.63±0.81cm), while the least values (42.47±1.42cm and 45.80±1.34cm) for does and bucks respectively was observed in Sahel. West African Dwarf buck had withers height of 47.93±1.13cm and does have 48.07±1.07cm. Associated coefficient of variation and standard deviation ranges between 11.03% – 23.64% and 5.69-10.04 respectively.

For mean pouch girths, Red Sokoto had the highest values (55.37±1.32cm and 59.61±1.11cm), while the lowest values of 51.42±0.77cm and 50.99±0.71cm were observed for does and bucks respectively in WAD. In Sahel goats, pouch girth measured 52.20±0.49cm in bucks and 50.63±0.66cm in does. The coefficient of variation for this trait ranged from 6.70% to 16.83% while standard deviation was from 3.50 to 9.32. Red Sokoto goats had the highest HG values (53.33±1.31cm and 57.53±1.17cm), while Sahel had 49.90±0.49cm and 48.77±0.66cm for does and bucks respectively. WAD bucks had a mean heart girth of 50.15±0.78cm and 49.71±0.73cm for does. Coefficient of variation and standard deviation for heart girth were between 6.74% – 17.33% and 3.46 – 9.24 respectively.

WAD had the highest BL values (42.04±0.83cm and 41.88±0.73cm), while the least values (35.36±1.01cm and 39.56±1.31cm) were for Sahel does and bucks respectively. Red Sokoto bucks and does had body lengths of 41.92±0.67cm and 41.97±0.56cm respectively. Coefficient of variation between 9.50%–23.39% and standard deviation from 3.99 to 9.25 were obtained for this trait. WAD goats had the highest NC values (23.47±0.59cm and 24.39±0.59cm), while the least values (21.02±0.52cm and 23.31±0.64cm) for does and bucks respectively were observed in Sahel goats. Neck circumference was 22.69±0.72cm in does and 23.43±0.61cm in bucks of Red Sokoto. Associated coefficient of variation and standard deviation ranges were between 17.04%–22.48% and 3.67-5.10 respectively. Red Sokoto goats had the highest value for tail length 11.71±0.30cm (bucks) and 12.08±0.26cm (does). The lowest length of 10.29±0.19cm and 10.27±0.21cm for doe and buck respectively was observed in WAD goat, while Sahel does and bucks had 11.62±0.32cm and 11.97±0.32cm respectively. Associated coefficient of variation and standard deviation were between 12.90% – 19.52% and 1.33 – 2.28 respectively. Shoulder width in Sahel does and bucks were 18.18±0.43cm and 18.59±0.36cm, 13.34±0.56cm and 13.83±0.48cm in WAD and 12.75±0.43 and 12.99±0.48 in Red Sokoto does and bucks respectively. Coefficient of variation for this trait was between 13.80% – 29.57% and standard deviation from 2.57-3.94.

Conclusion

Present results showed that age has strong influence, as there were consistent increases in all the traits studied as the animals aged. The scenario is however not surprising since the size and shape of the animal is expected to increase as the animal is growing with age. There was wide variability as the age of the animals increased most particularly in the bodyweight. This was in consonance with the report of Orheruata and Olutogun, (1984) in cattle.

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