BODY BIOMETRICS AND CHARACTERIZATION OF THE AZAWAK CATTLE BREED IN ADAMAWA STATE, NIGERIA.

***Okoh, J. J.[1], La'azarus, K.[1], Shuaibu, A.[1], Dafur, BS.[2], Efienokwu, J.[3], Moseri, H.[4], Adepoju, A.A.[4] and Usman, D.[4]**

[1]Department of Animal Science, Federal University of Kashere, Nigeria.
[2]Department of Animal Production, University of Jos, Nigeria
[3]Department of Science Laboratory Technology, Delta State Polytechnic, Ogwashi-Uku, Nigeria
[4]Department of Agricultural Education, College of Education, Agbor, Nigeria
[5]Department of Animal Health and Production Technology, Federal College of Horticulture, Dadinkowa, Nigeria
***Corresponding email: okohjoe@yahoo.com**

ABSTRACT

*The study was conducted in Adamawa, Northeastern part of Nigeria to access the phenotypic characteristics of the indigenous Azawak cattle breed. Measurements were taken on 256 males and 165 females Azawak cattle. The location of the study was in Yola North, Yola South, Girei and Demsa which were randomly selected. Results on the age range of cattle farmers within 18-35 years were 1.7, 3.3, 6.7 and 0% in Demsa, Girei, Yola North and Yola South, 36-45 years of age were 8.3, 5.0, 8.3 and 10.0% in Demsa, Girei, Yola North and Yola South. Those within 46-65 years of age were 8.3, 10.0, 8.3 and 10.0% in Demsa, Girei, Yola North and Yola South, Cattle owner greater than 66 years were 6.7, 6.7, 1.7 and 8.3% in Demsa, Girei, Yola North and Yola South respectively. Informal education was highest 23.3% in Demsa, 21.7% in Yola South, 18.3% in Yola North and least 16.7% in Girei. Males kept more cattle, which was highest in Yola North and South (25.0%) each, 21.7% in Girei and least with Demsa 6.7%. chi-square showed that there was significant difference (P<0.05). Bulls kept by families within 10-20 heads revealed that Girei, Yola North and Yola South have above 10 bulls with corresponding percentage of 15.0%, 20.0% and 13.3%. Chi-square showed a significant difference (P<0.001). However, those within 1-9 bulls indicated that Demsa was 25.0%, Girei 10.0%, Yola North 5.0% and Yola South 11.7%; while cow head per location within 5-8 cows indicated that Girei 11.8% and Yola North 5.9%, while 1- 4 cows' ownership were 17.6%, 17.6%, 17.6% and 29.4% in Demsa, Girei, Yola North and Yola south respectively. Housing was basically semi-intensive, Demsa 16.7%, Girei 18.4%, Yola North 18.4% and Yola South 10.0% respectively. Body weight for male was 315.347±6.367kg, female was 272.959±12.965kg, mean of both sexes was 294.153±4.960kg which was significantly (P<0.05) different. Chest length was 42.954±0.190cm (male) and 40.604±0.388cm (female) which also differ significantly (P<0.001). Chest girth (P<0.01), height at wither (P<0.05), rump length (P<0.01), rump width (P<0.05) were significant. Body weight is positively correlated with head width (0.458**), chest girth (0.952**), chest length (0.787**) and body length (0.659**) respectively. Cattle production seems to be an adult enterprise, as more adult owned cattle. The positive correlations observed in body weight against other traits are an indication that selection for body weight alone can improve other traits therefore hastens selection process and breeding goals.*

KEYWORDS: Characterization, Azawak Cattle, body measurements, LGA, Sex, Correlation

INTRODUCTION

Characterization of cattle species involves the documentation of its physical and genetic characteristics. Phenotypic characterization is used to identify and document diversity within and between distinct breeds, based on their observable attributes (FAO, 2012). Characterization of the indigenous Azawak cattle breed in Nigeria is limited due to logistic, technical challenges and the localized nature of the animal. The Azawak breed found in Nigeria is said to be native to the Azawak valley North-East of Nigeria and is distributed along its North-Western border. It is lightly built with medium-length horns, the Azawak that enter Nigeria are usually a light fawn color, though they can also be white, brown, pied and black (Rege and Tawah, 1999). They represent just 0.7% of the national herd (NNLRS, 1990). A small population of Azawak cattle exists in Nigeria throughout the year, but the majority is seasonally transhumant (Blench, 1993; Meghan*et al.*, 1999). Comprehensive phenotypic assessment has not been carried out on this breed. Recently, nine West African cattle breeds such as Sokoto Gudali, White Fulani, Red Bororo, Ankole, Nganda, Sanga, N'Dama, Kuri and Wadara were jointly analyzed for body measurements and qualitative-type traits using multifactorial analyses (Traoré*et al.*, 2015; Traoré*et al.*, 2016).

The current state of knowledge on the characterization of farm animal genetic resources shows that there is still lack of information about the production characters of local breeds managed in their native production system, although the country is widely known to possess a large population of livestock with enormous diversity. Indigenous Azawak have developed specific

adaptations to survive and produce under adverse condition of climate stresses, poor quality feed, seasonal feed and water shortage, endemic disease and parasite challenges, these make them suitable for use in the traditional, low-external-input production system. Therefore, selection and breeding based on phenotypic measurement, fast growth rate, good body size and conformation could result in improvement in live weight of indigenous Azawak cattle breed for meat production.

The information in body measurement is the basis for the establishment of further advanced characterization, conservation, breeding and selection strategies for indigenous cattle breed which is used to assess the type and function and the value of the animal as potential breeding stocks.

Since the Azawak cattle are highly localized and are hardy, used as draught animals they may never be fully studied for their potentials and may risk extinction. Because of very few populations, indiscriminate mating with other breeds may result to gene dilution and pure Azawak may not be fully studied and characterized. Despite their importance, these cattle have not been well-defined, classified or studied adequately.

Their current classification based on phenotypic data may not be adequate, additional studies are required to provide more for the implementation of conservation and utilization strategies. There is need to seek how to improve these breed of cattle using their phenotypic characteristics.

MATERIALS AND METHODS

Location of Experiment

Adamawa state is located in the North-Eastern part of Nigeria. The state has an area of 36,917 km^2 and a population of around 3,178,950 people as of 2006. The climate of the state is generally of the hot humid Tropical type. It has an average rainfall of 458mm, with two distinct seasons; the dry seasons last for a minimum of five months (Nov. – March), and the wet season spans from April to October. The state is found on latitude 9^0 20'N and longitude 12^0 30'E. Sunshine duration is 10 hours. The vegetation comprised of the Southern Guinea savannah, the Northern Guinea savannah and the Sudan savannah types which is described as short grasses interspersed with short trees. Temperature average of 26.8^0c.

The major occupation of the people is farming as reflected in their two notable vegetation zones, the Sub-Sudan and Northern Guinea Savannah zones, the food crops are groundnut, maize, guinea corn, millet and rice. The village communities living on the banks of the rivers engage in fishing while the Fulani are cattle rearers.

Animal used for the study

The animals used for the research are Azawak cattle kept and grazed freely by herdsmen and household in Adamawa, only mature productive ages of both sexes were assessed.

Plate I: Azawak cattle

Data collection

The preliminary phase involving the use of participatory rural appraisal technique (PRAT) with farmer groups representatives and other stakeholders for an overview of the cattle production systems in the area.
Visual observation and phenotypic features was recorded based on breed phenotypic characteristics descriptor list (FAO, 2012; Wuletaw, 2004). Linear body measurements were taken using a standard textile measuring tape, standard weighing tape and standard wooden tape.

Cattle biometry
Measurements were carried out on the following parameters:
Body weight, Body length, forehead length, ear length, horn length, horn diameter, neck length, chest length, heart girth, wither height, hump diameter, thigh length, scrotal circumference, scrotal length, udder diameter, udder length, udder teat length and tail length as described below:

i. Body weight (BW) – Measured in the field by using a weight measuring tape and measuring the chest circumference of the animal behind the hump of the elbow – joint. After measuring the circumference in centimetre, the life weight is measured directly on the reverse side of the measuring tape.
ii. Head width (HW) -- measured as the distance from the right ear to the left.
iii. Head length (HL) - measured as the distance from the head to the mouth
iv. Ear length (EL) – measured as the longest portion of the ear.
v. Body length (BL) – measured as the distance from the tail (first coccygeal) to the external occipital protuberance.
vi. Body width (BWi)- measured as where the stomach has extended at both sides.
vii. Facial length (FL) – measured as the longest portion of the fore head.
viii. Facial width (FW) - measured from the left to the right portion of the eyes.
ix. Horn length (HL) – measured as the longest portion of the horn.
x. Chest length (CL) measured as the distance from the coriniform cartilage of the sternum to the xiphoid cartilage of the sternum.
xi. Dewlap width (DW) – measured as the half length of the dewlap.
xii. Chest Girth(CG) – measured as the circumference across the heart region
xiii. Height at Withers (HAW) measured as the distance from the surface of the platform to the ground that is from the spiral cord to the ground.
xiv. Rump height (RH) - measured as the distance from spinal cord to the ground that is as the point of Rump.
xv. Rump length (RL) - measured as the distance from the head of the femur to the hock.
xvi. Rump width (RW) - measured from left to the right of the hip bone.
xvii. Hump length (HuL) – measured as the longest portion of the hump.
xviii. Hump with (HW) – measured from left to the right of the hump
xix. Mouth circumference (MC) – Taken as the overall diameter of the mouth.
xx. Cannon bone circumference (CBC) – Taken as the overall diameter of the cannon bone.
xxi. Tail length (TL) – measured as the longest distance of the tail.

The phenotypic variables recorded in this study are adapted from the standard cattle breed descriptor list (DAGRIS, 2006; Wuletaw, 2004; Getachew and Ayalew, W., 2014). Every animal was measured and identified by sex and study site. A total of four (4) Local Government Areas (LGAs) were selected randomly from the zones. These LGAs are Yola North, Yola South, Girei and Demsa.

Statistical analysis
Data obtained were analyzed using Statistical Package for Social Science SPSS version 23 (2015). Significantly different means in a subset were separated using Ryan Einot Gabriel Welsh F- Test. Person's Correlation co-efficient was computed to test the relationship between body traits.
Qualitative data was classified into different categories, percentage calculated and chi-squares (χ^2) were used to test the significance of proportion.
Where:
$\chi^2 = \sum (O - E)^2 / E$
$\sum$ = Summation
O = Observed values
E = Expected values

Linear measurements were subjected to analysis of variance as follows:
$$\mathbf{Y_{ij} = \mu + Se_i + S_l + e_{ij}}$$

Where:
Y_{ij} = an observation on variables
μ = overall population mean
Se_i = effect of sex
Sl_j = effect of location
E_{ij} = residual error

RESULTS AND DISCUSSION

Result on the characteristics of cattle farmers are presented in table I. The age range of cattle farmers (18-35) years that kept Azawak cattle in the study location were 1.7, 3.3, 6.7 and 0% in Demsa, Girei, Yola North and Yola South respectively. Those within (36-45) years of age were 8.3, 5.0, 8.3 and 10.0% in Demsa, Girei, Yola North and Yola South. Farmers within (46-65) years of age were 8.3, 10.0, 8.3 and 10.0% in Demsa, Girei, Yola North and Yola South respectively. However, the age of cattle farmers greater than 66 years were 6.7, 6.7, 1.7 and 8.3% in Demsa, Girei, Yola North and Yola South respectively. The chi-square value showed that there were no significant variations in age by location. The age range of farmers, which favour 46-65 years showed that cattle production may not be an enterprise that the younger generation had interest in venturing into, this may be due to capital that handicapped the younger age bracket to purchase cattle for livestock production. It might also be as a result of the stress involved in the handling and herding of cattle which the younger generation find as outdated. Similar observation has been reported by Loren, (2017) that cattle is mostly kept by older ages as their principal occupation for sustainability of household. Also, the observation showed that majority of the Azawak farmers were in their active age, which is an indication cattle farming was a middle-age group business. This finding agrees with the report of Voh (1988), who found that productive farmers were generally in their middle age and had high tendency for innovativeness.

Informal education was highest 23.3% in Demsa, 21.7% in Yola South, 18.3% in Yola North and least 16.7% in Girei. Chi-square value was not significant. Most cattle farmers do not have formal education and as a result this could hamper the dissemination of useful information or innovation in cattle production. This is comparable to the situation in West Africa where livestock farmers with formal education are normally in the minority. Education helps farmers in making decisions, solving problems, and learning new technologies (IFPRI, 2010).

Male were predominantly involved in the keeping of cattle, which was highest in Yola North and South (25.0%) each, 21.7% in Girei and least with Demsa 6.7%. Chi-square value showed that there was significant difference ($P<0.05$) by location. The majority of males who kept and grazed cattle in the study area is an indication that the production system are basically a male dominated occupation, this finding agrees with report of Bayola and Intong (2006), that women rarely participate in livestock production.

Table 1: Characteristics of cattle farmers by location (%)

		LGA				Total	χ^2
		Demsa	**Girei**	**Yola North**	**Yola South**		
Age	18-35 years	1.7	3.3	6.7	0.0	11.7	8.400^{ns}
	36-45 years	8.3	5.0	8.3	6.7	28.3	
	46-65 years	8.3	10.0	8.3	10.0	36.6	
	66 – Above	6.7	6.7	1.7	8.3	23.4	
Sex	Male	18.3	21.7	25.0	25.0	90.0	8.148*
	Female	6.7	3.3	0.0	0.0	10.0	
Educational level	Non-formal	23.3	16.7	18.3	21.7	80.0	4.167^{ns}
	Formal	1.7	8.3	3.3	6.7	20.0	
Occupation	Rearing	3.3	11.7	6.7	10.0	31.7	25.028**
	Civil servant	0.0	5.0	0.0	1.7	6.7	
	Farmer	20.0	0.0	10.0	10.0	40.0	
	Business	1.7	8.3	8.3	3.3	21.6	
Farm activities	Yes	21.7	6.7	13.3	13.3	55.0	10.976*
	No	3.3	18.3	11.7	11.7	45.0	
Crop cultivated	Rice	0.0	6.1	15.2	0.0	21.3	25.657*
	Maize	18.2	6.1	6.1	12.1	42.5	
	Sorghum	15.2	0.0	0.0	6.1	21.3	
	Groundnut	0.0	0.0	0.0	6.1	6.1	
	Cowpea	6.1	0.0	3.0	0.0	6.1	

**= significant at ($P<0.01$), *= significant at ($P<0.05$), NS= not significant at ($P>0.05$) figures are in percentage
LGA= Local Government Area

Table 2: Showed stock characteristics of cattle by location. The herd structure reveals that bulls that were kept by families between 10-20 heads revealed that Girei, Yola North and Yola South has cattle head above 10 bulls with percentages of 15.0%, 20.0% and 13.3% per households which showed a significant difference (P<0.001) by location. However, within 1-9 bull head per households indicated that Demsa had 25.0%, Girei 10.0%, Yola North 5.0% and Yola South 11.7%; while 5-8 heads of cows per household revealed that Girei was 11.8%, Yola North 5.9% while between 1-4 cows per household were 17.6%, 17.6%, 17.6% and 29.4% in Demsa, Girei, Yola North and Yola south respectively. Chi-square for cow's head per family was not significant. The herd structure revealed that the production pattern is a small holder system as few Azawak were managed. It may also be that the Azawak cattle is a very rare breed in Nigeria as reported by the NNLRS (1990) who estimated that, they represent just 0.7% of the national herd and further stated that just a small population of Azawak cattle exists in Nigeria throughout the year and that the majority is seasonally transhumant. Blench (1993) andMeghan*et al.,* (1999) also reported that Azawak cattle are localized in specific Nigerian town and are only found on the border North and West of Sokoto but there are also some in the North-West of Borgu and dotted along the frontier from Sokoto to Katsina, which makes the breed very rare.

Table 2: Stock characteristics of cattle in percentage by location

		LGA %				Total	χ^2
		Demsa	**Girei**	**Yola North**	**Yola South**		
Bull kept	10-20 bulls	0.0	15.0	20.0	13.3	48.3	21.023***
	1-9 bulls	25.0	10.0	5.0	11.7	51.7	
Cow kept	5-8 cow	0.0	11.8	0.0	5.9	17.7	3.009^{ns}
	1-4 cow	17.6	17.6	17.6	29.4	82.2	

***= significant at (P<0.001), NS= not significant at (P>0.05) figures are in percentage
LGA= Local Government Area

Table 3: Reveal the result of the production system in the study area. Management in terms of housing was predominantly semi-intensive in all the location. Demsa 16.7%, Girei 18.4%, Yola North 18.4% and Yola South 10.0% respectively. Chi-square was significantly (P<0.01) different by location.

The farmers gave supplementary feeds by location which were 25.0%, 20.0%, 18.3% and 25.0% in Demsa, Girei, Yola North and Yola South which were significant (P<0.05). Several supplements given to cattle include Maize chaff, Cowpea chaff, sorghum chaff, Cowpea haulm and Groundnut straw. These feeding stuff were not significant by location. These feeding stuffs in all the location showed that they are either purchased or harvested. In Demsa 12.0%, Girei 14.0%, Yola North 24.0% and Yola South 18.0% were purchased while those from the farm harvest were 18.0%, 4.0%, 6.0% and 4.0% in Demsa, Girei, Yola North and Yola South respectively.

Feeding time and water availability was not significant by location, water source and frequency of supply were significant (P<0.001) and (P<0.05).

Table 3: Production system of farmers by location %

		LGA				Total	χ^2
		Demsa	**Girei**	**Yola North**	**Yola South**		
Housing	Semi-intensive	16.7	18.4	18.4	10.0	63.5	23.968**
	intensive	8.1	6.7	6.7	15.0	36.5	
Feeding	Yes	25.0	20.0	18.3	25.0	88.3	8.248*
supplement	No	0.0	5.0	0.0	6.7	11.7	
Supplement	Maize chaff	13.2	11.3	20.8	15.1	60.4	13.502^{ns}
Type	Cowpea chaff	5.7	3.8	3.8	0.0	13.3	
	Sorghum chaff	5.7	3.8	0.0	0.0	9.5	
	Cowpea haulm	3.8	1.9	3.8	1.9	9.5	
	Groundnut straw	0.0	1.9	0.0	3.8	5.7	
Supplementar	Purchase	12.0	14.0	24.0	18.0	68.0	7.785*

y feeding source	Harvest	18.0	4.0	6.0	4.0	32.0	
Feeding time	Once	14.5	16.4	18.2	7.3	56.4	9.680^{ns}
	Twice	12.7	5.5	7.3	10.9	36.4	
	No fed time	0.0	5.5	0.0	1.8	7.3	
Water availability	Yes	23.3	18.3	16.7	21.7	80	4.167^{ns}
	No	1.7	6.7	3.3	8.3	20	
Water source	Well	12.5	10.4	4.2	10.4	37.5	20.960**
	River	16.7	2.1	4.2	4.2	27.2	
	Borehole	0.0	10.4	18.8	2.1	31.3	
Watering frequency	Once a day	10.4	2.1	2.1	2.1	16.7	15.116*
	Twice a day	12.5	12.5	6.3	16.7	48.0	
	Ad-libitum	6.3	8.3	18.8	2.1	35.5	

**= significant at (P<0.01), *= significant at (P<0.05), NS= not significant at (P>0.05) figures are in percentage
LGA= Local Government Area

Table 4: Showed body measurements of cattle by location. Apart from horn length which was significant (P<0.05) by location, all other parameters measured; Body weight (BW), Head width (HW) Head Length (HL), Body length (BL), Body width (BWI), Chest length (CL), Chest girth (CG), Height at wither (HAW), Rump height (RH), Rump length (RL), Rump width (RW), Hump length (HUL), Hump width (HUW), Ear length (EL), Dewlap width (DW), Tail length (TL), Mouth circumference (MC), Cannon bone circumference (CBC), Facial width (FW), Facial length (FL) were not significant

Table 4: Body measurements of Azawak cattle by location (cm)

Traits	**Location**				**Total**	**LS**
	Yola North	Yola South	Girei	Demsa		
BW(kg)	291.246±11.434	293.556±11.434	300.444±8.929	291.365±10.778	294.153±4.960	NS
HW	23.059±0.308	23.149±0.308	23.481±291	23.367±0.291	23.264±0.134	NS
HL	49.429±0.435	49.119±0.435	49.181±0.340	48.188±0.410	48.979±0.189	NS
BL	110.615±2.407	110.535±2.407	111.525±1.879	105.718±2.269	109.598±1.044	NS
BWI	93.575±1.900	93.405±1.900	92.925±1.483	89.889±1.791	92.449±0.824	NS
CL	41.625±0.342	41.705±0.342	41.625±0.267	42.161±0.322	41.779±0.148	NS
CG	155.032±2.172	155.782±2.172	156.637±1.696	154.802±2.047	155.564±0.942	NS
HAW	121.109±0.774	120.769±0.774	121.381±0.605	121.167±0.730	121.106±0.336	NS
RH	122.425±0.633	122.415±0.633	122.975±0.495	122.982±0.597	122.699±0.275	NS
RL	30.546±0.380	30.726±0.380	30.744±0.297	30.929±0.358	30.736±0.165	NS
RW	19.849±0.335	19.519±0.335	20.231±0.261	20.331±0.315	19.983±0.145	NS
HUL	39.801±0.375	39.541±0.375	39.669±0.293	39.762±0.353	39.693±0.163	NS
HUW	23.255±0.354	23.965±0.354	23.825±0.276	24.468±0.334	23.878±0.154	NS
HOL	13.246±0.627^{a}	13.466±0.627^{a}	15.194±0.489^{b}	15.165±0.591^{a}	14.268±0.272	*
EL	18.376±0.655	19.006±0.655	18.594±0.512	20.165±0.618	19.035±0.284	NS
DW	20.459±0.862	20.909±0.862	20.581±0.673	23.924±0.813	21.468±0.374	NS
TL	97.735±2.786	101.315±2.786	100.125±2.175	97.261±2.626	99.109±1.208	NS
MC	42.050±0.785	41.900±0.785	41.500±0.613	41.200±0.740	41.662±0.340	NS
CBC	22.265±0.715	22.215±0.715	22.275±0.558	22.782±0.64	22.384±0.310	NS
FW	16.938±0.365^{b}	16.738±0.365^{b}	16.863±0.285^{b}	16.991±0.344	16.822±o.158	NS
FL	31.728±1.130	30.838±1.130	32.613±0.883	31.584±1.065	31.690±0.490	NS

*= significant at (P<0.05), NS= not significant at (P>0.05).^{abc}Different superscripts denote significantly different trait at (P<0.05).Key: BW= Body weight, HW= Head width, HL= Head Length, BL= Body length, BWI= Body width, CL= Chest length, CG= Chest girth, HAW= Height at wither, RH= Rump height, RL= Rump length, RW= Rump width, HUL= Hump length, HUW= Hump width, HOL= Horn length, EL= Ear length, DW= Dewlap width, TL= Tail length, MC= Mouth circumference, CBC= Cannon bone circumference, FW= Facial width, FL= Facial length

Table 5: showed body measurements by sex. Result revealed that body weight for male was 315.347±6.367kg, female was 272.959±12.965kg with mean of both sexes was 294.153±4.960kg. Head length for male was 49.461±0.242cm and female 48.398±0.494cm with mean of 48.979±0.189cm, Chest length was 42.954±0.190cm (male) and 40.604±0.388cm (female), height at wither (P<0.05), rump length (P<0.01), rump width (P<0.05), hump length (P<0.05), hump width (P<0.01), horn length (P<0.05), ear length (P<0.05) and dewlap width (P<0.0) were significant. Other body measurements (HW, BL, BWI, RH, TL, MC, CBC, FW and FL) were not significant. The differences in body weight and body measurements in the Azawak by sex may have been hormonal rather than management. Similar reports have been given by Mwacharo*et al.,* (2006) and Kugonza*et al.,* (2011) that the differences between the phenotypic measurements of male and female cattle are attributable to sexual dimorphism that results from hormonal differences between the two sexes at respective ages

Table 5: Body measurements of Azawak cattle by sex

Trait	Sex		Total	LS
	Male	Female		
BW	315.347±6.367[a]	272.959±12.965[b]	294.153±4.960	*
HW	23.545±0.72	22.983±0.350	23.264±0.134	NS
HL	49.461±0.242 [a]	48.398±0.494 [b]	48.979±0.189	*
BL	110.823±1.340	108.373±2.729	109.598±1.044	NS
BWI	93.474±1.058	91.424±2.154	92.449±0.824	NS
CL	42.954±0.190 [a]	40.604±0.388 [b]	41.779±0.148	***
CG	159.351±1.209 [a]	151.776±2.463 [b]	155.564±0.942	*
HAW	122.338±0.431 [a]	119.875±0.878 [b]	121.106±0.336	*
RH	124.124±0.353	121.274±0.718	122.699±0.275	NS
RL	31.780±0.212 [a]	29.693±0.431 [b]	30.736±0.165	**
RW	20.514±0.186 [a]	19.401±0.380 [b]	19.983±0.145	*
HUL	40.462±0.209 [a]	38.924±0.425 [b]	39.693±0.163	*
HUW	24.853±0.197 [a]	22.903±0.401 [b]	23.878±0.154	**
HOL	15.462±0.349 [a]	13.074±0.711 [b]	14.268±0.272	*
EL	20.021±0.365 [a]	18.042±0.743 [b]	19.035±0.284	*
DW	22.899±0.480 [a]	20.037±0.978	21.468±0.374	*
TL	101.184±1.551	97.034±3.159	99.109±1.208	NS
MC	42.013±0.437	41.312±0.890	41.662±0.340	NS
CBC	23.009±0.398	21.759±1.810	22.384±0.310	NS
FW	17.695±0.203	16.070±0.414	16.822±o.158	NS
FL	32.353±0.629	31.028±1.281	31.690±0.490	NS

*= significant at (P<0.05), **= significant at (P<0.001), ***= significant at (P<0.0001), NS= not significant at (P>0.05). [abcDifferent] superscripts denote significantly different trait at(P<0.05). Key: BW= Body weight, HW= Head width, HL= Head Length, BL= Body length, BWI= Body width, CL= Chest length, CG= Chest girth, HAW= Height at wither, RH= Rump height, RL= Rump length, RW= Rump width, HUL= Hump length, HUW= Hump width, HOL= Horn length, EL= Ear length, DW= Dewlap width, TL= Tail length, MC= Mouth circumference, CBC= Cannon bone circumference, FW= Facial width, FL= Facial length

Table 6: Showed that most correlation was significant at 1% others were significant at 5% a few does not show any correlation.Body weight is positively correlated with head width (0.458**), chest girth (0.952**), chest length (0.787**) and body length (0.659**) respectively. However, there was no correlation between body weights with dewlap (0.076) and horn length (0.268)

The positive correlations observed in body weight against other traits are an indication that selection for body weight alone can improve other traits therefore hasten selection process and ultimate breeding goals. Similarly, it is an indication that any of those phenotypic trait could serve as a predictor of body weight. This may also be that improvement in one trait may also lead to improvement in other traits (Dauda*et al.,* 2018)

Table 6: Coefficient of correlations between body weight and linear body measurements

	BW	HW	HL	BL	BWI	CL	CG	HAW	RH	RL	RW	HUL	HUW	HOL	EL	DW	TL	MC	CBC	FW	FL
BW		0.458**	0.766**	0.659**	0.483**	0.787**	0.952**	0.550**	0.566**	0.612**	0.372*	0.394**	0.619**	0.268	0.341*	0.076	0.407**	0.465**	0.328*	0.542**	0.382*
HW			0.573**	0.394**	0.318*	0.415**	0.328*	0.267	0.241	0.421**	0.262	0.351*	0.462**	0.236	0.292	0.012	0.211	0.276	0.331*	0.119	0.019
HL				0.683**	0.504**	0.748**	0.735**	0.551**	0.572**	0.677**	0.324*	0.511**	0.616**	0.286	0.139	-0.031	0.365*	0.436**	0.352*	0.623**	0.397**
BL					0.659**	0.591**	0.719**	0.505**	0.482**	0.406**	0.434**	0.437**	0.464**	0.363*	0.182	0.007	0.399**	0.496**	0.367*	0.420**	0.380*
BWI						0.560**	0.499**	0.251	0.274	0.393**	0.241	0.417**	0.603**	0.172	0.93	0.001	0.625**	0.579**	0.366*	0.432**	0.247
CL							0.806**	0.479**	0.550**	0.728**	0.342*	0.608**	0.691**	0.279	0.456**	0.255	0.389**	0.573**	0.565**	0.659**	0.232
CG								0.543**	0.555**	0.613**	0.324*	0.365*	0.670**	0.265	0.335*	0.150	0.377*	0.458**	0.394**	0.623**	0.400**
HAW									0.944**	0.360*	0.419**	0.549**	0.415**	0.048	0.328*	-0.208	0.107	0.159	0.103	0.366*	0.185
RH										0.383*	0.414**	0.594**	0.437**	0.110	0.369*	-0.232	0.181	0.173	0.127	0.447*	0.185
RL											0.377*	0.657**	0.627**	0.407**	0.171	0.162	0.415**	0.436**	0.448**	0.695**	0.198
RW												0.462**	0.188	0.400**	0.067	-0.084	0.042	0.256	0.284	0.62	0.246
HUL													0.455**	0.206	0.332*	-0.100	0.305*	0.394**	0.332*	0.454**	0.131
HUW														0.302*	0.394**	0.178	0.534**	0.451**	0.288	0.540**	0.231
HOL															-0.144	0.229	0.309*	0.218	0.085	0.139	0.090
EL																0.359*	0.189	0.377*	0.205	0.169	-0.071
DW																	0.269	0.413**	0.204	0.146	-0.019
TL																		0.619**	0.154	0.445**	0.173
MC																			0.457**	0.357*	0.202
CBC																				0.263	0.057
FW																					0.554**
FL																					

*= significant at (P<0.05), **= significant at (P<0.01), NS= not significant at (P>0.05). [abc]Different superscripts denote significantly different trait at(P<0.05). Key: BW= Body weight, HW= Head width, HL= Head Length, BL= Body length, BWI= Body width, CL= Chest length, CG= Chest girth, HAW= Height at wither, RH= Rump height, RL= Rump length, RW= Rump width, HUL= Hump length, HUW= Hump width, HOL= Horn length, EL= Ear length, DW= Dewlap width, TL= Tail length, MC= Mouth circumference, CBC= Cannon bone circumference, FW= Facial width, FL= Facial length

CONCLUSION AND RECOMMENDATION

Conclusion

It can thus be concluded that:

1. The older age population kept more Azawak than any other age revealing that cattle production is an enterprise for older generation than the younger generation
2. The differences in body weight and body measurements in favour of the male Azawak cattle might be hormonal rather than management. However, better management could add to good performance in body weights and other economic traits
3. The positive correlations observed in body weight against other traits are an indication that selection for body weight alone can improve other traits therefore hastening selection process and ultimate breeding goals.

Recommendations

1. The good body characteristic should be effectively studied to document all the attributes of the cattle for future genetic studies
2. More research is needed on the Azawak cattle breeds and a deliberate and continuous selection for traits of economic importance in the cattle breed be assessed.

REFERENCES

Blench, R. (1993). Trends in the distribution of traditional livestock breeds in Nigeria and explanatory models. In: Animal Genetics and Health. Rome: Food and Agriculture Organization of the United Nations.

Bayola D L and Itong J D (2006). Participation by Women and Children in Livestock Production in Bukidnon Province, Southern Philippines.

Cripps, P. J. (2000). Veterinary education, zoonoses and public health: a personal perspective. ActaTropica, 76(1), 77-80.

DAGRIS. (2006). Domestic animal genetic resource information system. DAGRIS (Eds. J.E.O.Rege, W., .Ayalew,. E., Getahun, O., Hanotteand T. Dassei). International Livestock Institution. Addis Ababa. Ethiopia.

Dauda A, Okon B, Ibom L. A. Phenotypic characterization of Balami breed of sheep in Maiduguri, North-Easthern Nigeria. Niger J Anim Sci. 2018;20(2):26-32.

FAO. Phenotypic characterization of animal genetic resources. FAO; Rome: 2012. (Animal Production and Health Guidelines No. II).

International Food Policy Research Institute (IFPRI), (2010). Impact offarmers' field schools on Agri. Prod. Poverty, East Africa.

Getachew, F. and Ayalew, W. (2014). On-Farm Phenotypic Characterization of indigenous Cattle population in Awi, East and West Gojjam Zones of Amhara Region, Ethiopia. Research Journal of Agriculture and Environmental Management.3(4): 227-237

Kugonza DR, Kiwuwa GH, Mpairwe D, Jianlin H, Nabasirye M, Okeyo AM, Hanotte O (2012a). Accuracy of pastoralists' memory based kinship assignment of Ankole cattle: a microsatellite DNA analysis. J. Anim. Breed. Genet. 129:30-40

Loren W. T. (2017). Farmer productivity by age over eight U.S census years. Paper presented at the international farm management association conference, Edinburgh, Scotland.

Meghen, C., MacHugh, D. E., Sauveroche, B., Kana, G. and Bradley, D. G. (1999). Characterizatio n of the Kuri Cattle of Lake Chad using Molecular Genetic Techniques. In R. M. Blench and K.C. MacDonald (Ed.) The origin and development of African livestock. University College Press, London, Pp. 28 - 86.

Mwacharo, J.M., Okeyo, A.M., Kamande, G.K. and Rege, J.E. (2006). The small East African shorthorn zebu cows in Kenya. I: Linear body measurements. Tropical Animal Health and Production. 2006; 38: 65- 74.

NNLRS (1990). Nigerian national livestock resource survey, Pp. 627 - 649.

Rege, J. E. O and Tawah, C. L. (1999). The state of African cattle genetic resources II. Geographical distributions, characteristics and uses of present-day breeds and strains. FAO/UNEP Animal Genetic Resources Information Bulletin. 26:1-25.

Traoré, A., Koudandé, D.O., Fernández, I.., Soudré, A., Álvarez, I., Diarra, S., Diarra, F., Kaboré, A., Sanou, M., Tamboura, H.H. andGoyache, F., (2015). Geographical assessment of body measurements and qualitative type traits in West African cattle. Tropical Animal Health and Production,47, 1505-1513.

Traoré, A., Koudandé, D.O., Fernández, I., Soudré, A., Álvarez, I., Diarra, S., Diarra, F., Kaboré, A., Sanou, M., Tamboura, H.H. &Goyache, F., (2016). Multivariate characterization of morphological traits in West African cattle sires. Arch. Anim. Breed,59, 337-344.

Voh, J.P. (1988). Information sources and awareness of selected recommended farm practices: A study in a village in Kaduna State of

Nigeria. Journal of Agricultural Science, 8 (1 & 2): 34 -40.

Wuletaw Z. (2004). Survey of indigenous cattle genetic resources, husbandry practices and cattle breeding objectives in North Gondar, Ethiopia. MSc thesis, Alemaya University, Dire Dawa, Ethiopia.