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Evaluation of Temperament and Morphometric Traits in White Fulani and Simmental X Sokoto Gudali Cattle

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Target audience: Beef cattle breeders, graduate students

Abstract

The study was undertaken to assess the temperament traits associated with handling activities and morphometric traits in two genotypes of cattle. Data from 90 bulls comprising 47 White Fulani (WF) and 43 Simmental x Sokoto Gudali (SG) aged between 36-38 months was utilised. All the morphometric traits of the SG were significantly (P<0.05) higher than the White Fulani (WF) breeds. The coefficient of variation for bodyweight (BW) and thigh length (TL) were high. The temperamental traits for the SG were significantly (P<0.05) lower than the WF genotypes. The coefficient of variation for the temperament traits was high. The correlation between BW and body length (BL), Ear length (EL), thigh length (TL) and height at wither (HW) were highly significant (P<0.01) and positive in WF. Pen score (PS), chute score (CS) and exit score (ES) had significantly (P<0.05) negative correlations with BW in the WF genotype. The relationships between BW and BL, TL and height at withers (HW) were highly significant (P<0.01) and positive in SG. CS had a significant (P<0.05) positive relationship with BW in the SG genotype. The variations in the population can be used for improvement of beef cattle which are easier to manage by their handlers,

Keywords beef cattle, temperament traits, morphometric traits

Description of Problem

The temperament observed in a livestock is the response of that animal to environmental as well as social stimuli (1,2). Temperamental traits in cattle have bearing on their welfare, handling during routine management, milking, response to perceived challenge when humans approach them, during intervention at calving (2) meat quality and quantity (3). Cattle which are highly temperamental are difficult to manage, posing a latent safety threat to their handlers (4) and this may result to very serious injury to the cattle, injury to the handlers. The effect of temperament in beef cattle cannot be over emphasized because it has direct bearing on production, welfare, human safety during handling operations and meat quality thus having a strong influence on farm management efficiency (5).

The genetic basis for temperament traits has been investigated such that moderate heritability estimates, vast variations in the major handling temperament traits, identification of quantitative trait loci (QTL) have made temperamental traits

open to selection (2,6) has reported that in order to meet production goals in cattle, temperament traits can be incorporated in the selection process. In any good beef production system, human-beef cattle contact cannot be avoided, these include serving of feed, provision of water, weighing of animals, administration of drugs, pen clearing and others. In view of these, temperament traits are hardly used in selection programmes in beef cattle even though the traits have economic, animal welfare and human safety attributes. This study was carried out to evaluate the temperamental traits which have direct bearing on handling.

The objectives of the study are;

i. To evaluate the extent of variations in the temperament and morphometric traits of White Fulani and Simmental x Sokoto Gudali breed
ii. To assess the relationship between morphometric and temperamental traits in White Fulani and Simmental x Sokoto Gudali breed

Materials and Methods

Location of the animals and management

The experiment was conducted on AJAMS farms in Kaduna, Kaduna State, Nigeria. A total of 90 bulls (47 White Fulani and 43 Simmental x Sokoto Gudali) aged between 36-38 months were utilised for the study. They were reared extensively such that they grazed after supplying salt licks on pasture.

Data collection for the temperament traits

i. The Chute Temperament Score as described (5) was adopted. The bulls were restrained by a head gate in a manually operated squeeze chute; the animal's behavior was observed and scored on a 5-point scale.

1-point, Calm and no movement

2-point. Slightly restless

3-point. Squirming, occasional shaking of chute

4-point. Continuous vigorous movement of chute

5-point. Rearing, twisting or violently stuggling.

ii. The Pen Score adopted was as described (5). A small group of bulls, five in number, were put unrestrained in a corner of the pen while a handler tried to approach them. A five point scoring scale was used.

1-point The animal is non- aggressive, walks slowly, can be approached closely and not excited by humans or facilities

2-point. Slightly aggressive, runs along fences may stand in corner of fence when humans approaches, may pace fence

3-point. Moderately aggressive, runs along fences, heads up and will run if humans move closer, stops before hitting fences, avoids human

4-point. Aggressive, runs, stays in back of group (in case of group), heads are held high and very aware of humans, may run into fences and gates even with some distance, will likely run into fences if alone in pen

5-points. The bull is very aggressive, excited, runs into fences, runs over humans and anything in the path.

iii. Chute Exit Score was: as described (5,7). .It is the classification of the gait of the animal as it leaves the chute based on a 4-point scale.

1-point. The animal walked
2-point, Trot (*i.e.* walks but in a hurry)
3-point. Run
5-point.The animal jumped out of the chute

Data collection for the morphometric traits

All measurements recorded in centimeters (cm) except bodyweight which was recorded in kilogram (Kg).

Ear length (cm) – measured from the ear base to the zygomatic arch of the ear.

Chest girth (cm)- measured as standing the animal with head in an normal position and placing a flexible tape around the animal at the point of lowest circumference just behind the forelegs and behind the hump (8).

Tail length (cm)- measured from the base of the tail t the tip (coccygeal vertebrae)

Body length (cm)- was measured as the distance from the highest point on the shoulder to the pin bone (8).

Height at withers (cm)- was measured as the distance from the ground to the highest point of the withers (8).

Thigh length (cm)- measured as the length between the hip joint up to the stifle joint.

Body weight (Kg)- was done using the weighing band. The chest girth immediately behind the elbow was measure with the weighing band and the weight was read off immediately and recorded.

Data analysis

The data collected was analysed using the Analysis of variance (ANOVA) and means were compared using the the t-test in the Statistical Analysis System (SAS) 9.0 program. The relationship among bodyweight, body linear measurements and temperament traits were analysed using the Pearson correlation matrix.

Results and Discussions

Morphometric traits in two genotypes of cattle

All the morphometric traits of the Simmental x Sokoto Gudali (SG) including bodyweights were significantly ($P<0.05$) higher than the White Fulani (WF) genotype (Table 1). Height at withers (HW), Chest girth (CG), Body length (BL) have been positively correlated with bodyweights in cattle (8). The higher values observed in SG for all these traits which have bearing on the bodyweight maybe as a result of the genotypes. The Simmental breeds have been reputed to have rapid growth and development, good grass converter and when used in crossbreeding with beef breeds improve growth as well as muscularity and beef quality (9. The Simmental may have contributed the additive portion of genes for high bodyweight to the Simmental x Sokoto Gudali genotype.

The coefficient of variation for BW and TL were high indicating that selection can be carried out for improved bodyweight and thigh length in the two genotypes. The Simmental has been used extensively all over the world for crossbreeding because of the adaptability to different climes and climates (9).

Table 1: Mean bodyweight ± S.D of two genotypes of cattle

Morphometric Traits	Simmental x Sokoto Gudali	White Fulani	CV	SEM
Bodyweight	236.74 ± 19.76[a]	100.40 ± 5.54[b]	33.18	4.30
Ear length	26.71± 0.97[a]	21.43 ± 0.40[b]	12.46	0.33
Thigh length	83.29 ±3.13[a]	56.29 ± 1.51[b]	17.42	1.21
Chest girth	169.86 ± 4.78[a]	133.83 ± 0.94[b]	7.86	1.29
Height at withers	136.00 ± 3.23[a]	120.10 ± 0.94[b]	5.33	0.77
Body length	185.57 ±4.32[a]	146.40 ± 2.20[b]	9.40	1.69

[a,b]Means with different superscripts along same rows are significantly different.
SEM: standard error of mean. CV: coefficient of variation. P<0.05

Temperamental traits associated with handling activities in two genotypes of cattle

The temperamental traits associated with handling activities for the Simmental x Sokoto Gudali (SG) were significantly (P<0.05) lower than the White Fulani (WF) genotypes. The Simmental breeds are reputable gentle natured with excellent temperaments (9). This could be the reason why the SG genotype is more docile than the WF genotype (Table 2). The pen score of the WF indicated that the animal is moderately aggressive, runs along fences, heads up and will run if humans move closer, stops before hitting fences, avoids human unlike the SG which would rather assess the human from a "safe" distance and is less wary of the presence of humans. The exit score (Table 2) of the WF indicated that the animal would be in a hurry to get out of confinement (chute) soon as restraining for activities such as physical examinations, drenching, vaccinations *etc* is over. The SG would calmly walk out (Table 2) of the chute (exit score) probably due to the genes of the Simmental which have been reported (9) as having excellent temperaments. The chute score (Table 2) indicated that when restrained by a head gate, the WF would be squirming, occasional shaking of chute whereas the SG would be significantly (P<0.05) calmer.

The coefficient of variation for all the temperament traits associated with handling are very high (Table 2) indicating that these traits; pen score (PS), exit score (ES) and chute score (CS) were not previously selected for. The observed large variation could thus be utilised for selection and improvement for temperament traits while improving for beef production (bodyweight and thigh length) traits (Table 1). This is because temperament traits have been reported (10) to have moderate to high heritablities thus can be selected through breeding.

Table 2: Mean temperament traits ± S.D of two genotypes of cattle

Temperament Traits	Simmental x Sokoto Gudali	White Fulani	CV	SEM	Range
Pen score	2.14 ± 0.34 [b]	2.63 ± 0.14 [a]	42.55	0.13	1----5
Chute score	2.43 ± 0.50 [b]	2.76 ± 0.16 [a]	45.55	0.15	1----4
Exit score	1.43 ± 0.20 [b]	2.48 ± 0.13 [a]	42.67	0.13	1----5

[a,b]Means with different superscripts along same rows are significantly different.SEM: standard error of mean. CV: coefficient of variation

Interrelationship between morphometric traits and temperament traits

White Fulani

The relationships between bodyweight (BW) and body length (BL), Ear length (EL), thigh length (TL) and height at wither (HW) were highly significant (P<0.01) and positive in White Fulani (WF). This indicates that selection for high bodyweight in WF as beef cattle would benefit from selection for BL, EL, TL and HW. This could be the reason why HW has been used as a standard for predicting BW in cattle as well as BL, EL and TL (8,11) . The BW, BL, EL, TL and HW are traits which could be easily selected for because are simple to measure on live animals and have high heritabilities (12) thus would be useful for improving WF for beef cattle production.

All the temperament traits; pen score (PS), chute score (CS) and exit score (ES) had significantly (P<0.05) negative correlations with BW in the WF breed. This indicates that the temperament traits associated with handling activities have a significant detrimental effect on BW of the WF breed of cattle. This negative relationship could impact on the selection of the WF as beef cattle. The selection of the WF for improved beef cattle traits may cause the animals to be highly aggressive making them a source of danger to their handlers as well as affect meat yield and meat quality (3).

Simmental x Sokoto Gudali

The relationships between bodyweight (BW) and body length (BL), thigh length (TL) and height at withers (HW) were highly significant (P<0.01) and positive in Sokoto Gudali (SG). This indicates that the crossbreeding efforts for the SG for high bodyweight as beef cattle would benefit from selection for BL, TL and HW.

The temperamental trait, CS, was the only trait that had a significant (P<0.05) positive relationship with bodyweight in the SG genotype. This indicates that crossbreeding efforts for higher bodyweight in SG would lead to an improvement in the temperament of the animal when restrained in a chute for routine handling activities. This could be due to the genes of docility and growth performance, high muscularity (9) from the Simmental breed which is present in the SG.

Table 3: Correlation matrix between morphometric traits and handling traits

Traits	BW	BL	EL	TL	CG	HW	PS	CS	ES
BW	1	0.94**	0.87**	0.95**	0.98**	0.74**	-0.26*	-0.41*	-0.21*
BL	0.75**	1	0.93**	0.93*	0.94**	0.83**	-0.34*	-0.41*	-0.23*
EL	0.18	0.61*	1	0.83**	0.90**	0.85*	-0.37*	0.44*	-0.26*
TL	0.99**	0.69*	0.09	1	0.89**	0.71**	-0.19	-0.36*	-0.15
CG	0.99**	0.70**	0.15	0.99**	1	0.81**	-0.33*	-0.45*	-0.27*
HW	0.69**	0.91**	0.32*	0.68*	0.64*	1	-0.39*	-0.42**	-0.64**
PS	-0.18	-0.41*	-0.27	-0.10	-0.17	-0.20	1	0.66**	0.64**
CS	0.39*	0.21	0.09	0.43*	0.38	0.38*	0.74**	1	0.78**
ES	0.14	-0.13	-0.23	0.23	0.13	0.18	0.89**	0.83**	1

N.B. Values above the diagonal are for the White Fulani breed while values below the diagonal are for the Simmental x Sokoto Gudali breed. BW, Bodyweight; BL, Body length; EL, Ear length; TL, Tail length; CG, Chest girth; HW, Height at withers; PS, Pen Score; CS, Chute Score; ES, Exit Score. *significance at P<0.05; **significance at P<0.01

Conclusion

1. High variations were observed in the population of Simmental x Sokoto Gudali (SG) and White Fulani (WF) for bodyweight (BW), thigh length (TL), pen score (PS), chute score (CS) and exit score (ES)..
2. The variation indicated that the population had not been previously selected for these traits.
3. Improvement for beef production traits such as BW, BL, TL and HW in WF could lead to selection of aggressive animals.
4. Improvement efforts for beef production traits such as BW, BL, TL and HW in SG could lead to selection for docile animals which would be easier to manage by the handlers.

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