RELATIONSHIPS BETWEEN TEMPERAMENT AND LINEAR BODY PARAMETERS OF BEEF CATTLE UNDER COMMUNAL PRODUCTION SYSTEM

A.E. Nesamvuni[1], A.J. Nekhofhe[2], N.D. Ramanyimi[1], J. Mulaudzi[1], J.G. Taylor[2] and F.J.C. Swanepoel[3]

[1] Department of Animal Science, School of Agriculture, Rural Development and Forestry, University of Venda for Science and Technology, Thohoyandou, South Africa
[2] Department of Agricultural Management, Faculty of Civil Engineering, Building, Architecture and Agriculture, P.E. Technikon, Private Bagx6531, George, South Africa
[3] Post Graduate School of Agriculture and Rural Development, University of Pretoria, Pretoria, 0002, South Africa

INTRODUCTION

Indigenous cattle are mostly reared where the traditional farming is practiced including the Northern Province of South Africa. The majority of farmers own Nguni cattle although other breeds are found in the region. The management of cattle under traditional farming systems also require constant movement and handling during dipping, branding and counting. The behavioral response of animals as they are handled around and through the dipping tank crush pen impacts on the productivity through increased production costs (Burrow, 1995) and losses in hides, carcass and meat quality (Grandin, 1980 and Burrow, 1997). The purpose of this study was to determine the relationship between temperament and linear body measurements (LBM) of Nguni cattle under traditional management systems.

MATERIALS AND METHODS

Animals and measurements. Data of 263 Nguni cattle and their crosses were collected from two communal dipping tanks over the year 2000. Live weights (LW), heart girth (HG), scrotal circumference (SC) and body condition scores (BCS) were measured. Also, temperament score (TS), bruise score (BS) and time taken (TT) in the weighing scale were measured as an indication of the animal's temperament. Temperament was scored using a scale from 1- for docile animal which stand quite on the scale and 6 – for a wild animal that struggle violently, unmanageable, and attempting to jump out. Bruise score was on the scale from 1- no horn wounds and scurs to 3- for more than 5 wounds and scurs. All measurements were taken during the periods animals were brought to the tank for dipping. Dipping is done on a weekly basis in summer and fortnight in winter to control tick borne diseases. Castration to bulls is done when they have one to eight months of age. Dehorning and ear-tagging were not commonly practiced until the introduction of this study to the farmers. Communal grazing is used with calves born throughout the year.

Statistical analyses. Data were analysed using the General Linear Model (GLM) procedure (SAS, 1989). The mathematical models included the effects of age, sex, breed and their interactions. Model I was for LW, HG and SC while Model II was for TT, BS and TS.

MODEL I ➔ $Y_{ijkl} = \mu + R_i + S_j + M_k + R_i S_j + E_{ijkl}$

MODEL II ➔ $Y_{ijkl} = \mu + R_i + S_j + M_k + R_i S_j + S_j M_k + E_{ijkl}$

Where : μ = Overall mean
R_i = Effect of age
S_j = Effect of sex
M_k = Effect of breed
$R_i S_j$ = Interaction between age and sex
$S_j M_k$ = Interaction between sex and breed
E_{ijkl} = Random error effect

RESULTS AND DISCUSSION

Numbers of animals, means and standard deviation of key measurements are shown in Table 1.

Table 1. Numbers of animals (N), means and standard deviations (± std) of key measurements

Measurement	N	Mean	Standard Deviation.	Minimum	Maximum
Live weight (Kg)	263	303.51	87.46	100.00	620.0
Heart girth (cm)	263	335.20	106.39	86.00	800.0
Bruises score	263	1.74	0.75	1.00	3.00
Body Condition Score	263	2.12	0.97	1.00	4.00
Time (Seconds)	263	5.10	3.98	1.00	28.00
Temperament score	263	2.57	1.39	1.00	6.00

On average the BS and TS indicate animals that have less than five wounds and a mild restless temper. The frequency of dipping, number of animal with horns and the manner they are handled through the dipping system influences their response and the number of animals with wounds. The analysis of variance for linear body measurements and temperament traits are indicated in Table 2.

Table 2. Analysis of variance for body measurement and temperament score (TS)

Sources		LW	HG		TS
	DF	MS	MS	DF	MS
Age	3	190007.58 ***	255101.89***	3	5.53*
Sex	1	69543.9***	131530.16***	1	1.79^{NS}
Breed	1	29612.22**	2320.82^{NS}	1	19.97***
Age * Sex	2	45197.02**	64295.52***	2	8.88**
Sex * Breed	-	-	-	1	7.11*
R^2		0.52	0.43		0.14

***P < 0.001 ** P < 0.01 * P < 0.1 ^{NS} Non-significant

Age and its interaction with sex were the two main effects that affected body measurements and temperament. A review by Burrow (1997) also revealed that temperament being influenced by age or experience, sex, breed and handling. Also, age was the only factor that caused a variation in SC and BS. The least square means and the standard errors for body measurements and temperament traits are reflected in Table 3.

Table 3. Least square means (LSM) ± standard errors (SE) for body measurements and temperament scores (TS)

Factors		LW (Kg)	HG (cm)	TS (sec)
Age (years) :				
<3	93	246.81 ± 9.46	258.73 ± 12.31	2.44 ± 0.23
3 to 5	38	333.83 ± 12.51	370.22 ± 16.27	2.56 ± 0.27
5 to 9	107	455.93 ± 18.38	493.94 ± 23.90	2.72 ± 0.39
> 10	25	349.12 ± 55.33	388.16 ± 73.59	1.76 ± 1.33
Sex :				
Male	59	255.37 ± 105.59	284.29 ± 124.20	3.03 ± 1.55
Female	204	326.34 ± 8.10	344.94 ± 10.52	2.16 ± 0.19

Age caused a linear increase in LW, HG and TS up to nine years and the decline at 10 years. The small number of animals over 10 years may have influenced the means as reflected by the higher standard errors. The same logic can be used for the differences between the bulls and cows. Contrary to reports (Hearnshaw *et al.*, 1979 ; Fordyce and Goddard, 1984) and that TS of animals improves with increasing age or experience, this study found TS were higher with age indicating restlessness during weighing. The reason may be that most of the animals in this study were being introduced to the scale for the first time at an old age. Results of this study also showed cows and heifers with better temperament than bulls. Other studies (Tulloh, 1961 ; Stricklin *et al.*, 1980 ; Shrode and Hammack, 1971) reported bulls and steers having a better temperament than heifers. Hearnshaw *et al*., (1979) and Hearnshaw and Morris (1984) showed in their study no differences in temperament between the sex groups.

Table 4. Correlation coefficients (observations) for body measurements and temperament score (TS)

Measurements	HG	BS	TS
Live body weight (LW)	0.83 (263)***	0.31 (263)***	-0.18 (262)**
Heart girth (HG)		0.27 (263) ***	-0.19 (262)**
Bruise score (BS)			-0.10 (262)*
Body condition score (BCS)			-0.12 (262)**
Time taken (TT)			0.15 (262)*

Correlation between body measurements and TS are shown in Table 4. The high positive correlation between LW and HG was expected. Similar results were reported by Mulaudzi *et al*. (2000). The number of bruises were positively correlated to LW. However, TS were negatively correlated to all traits except time taken in the scale during weighing. The low and negative correlation between TS and LW is supported by the findings of Fordyce *et al*. (1985) and Fordyce *et al.* (1988) who showed that heavier cattle had better temperament scores.

CONCLUSION

Age, experience and sex were the major factors that influenced temperament and its relationship to body measurements of cattle in traditional farming systems. Temperament scores and times taken in the scale may not be the most appropriate method to measure response of animals exposed to a new handling management for the first time. For long term genetic improvement of cattle in tradition farming systems a period of adjustment should be introduced before body measurements and temperament traits are recorded.

REFERENCES

Burrow, H.M. (1995) *Proc. Assoc. Advmt. Anim. Breed. Genet.* **13** : 227

Burrow, H.M. (1997) *Anim. Breed. Abst.* **65** : 477.

Fordyce, G. and Goddard, M.E. (1985) *Proc. Aust. Soc. Anim. Prod.***15** : 345.

Fordyce, G., Goddard, M.E., Tyler, R., Williams, G. and Toleman, M.A. (1985) *Aust. J. Exp. Agric.* **25** : 283.

Fordyce, G., Wythes, J.R., Shorthose, W.R., Underwood, D.W. and Shepherd, R.K. (1988) *Aust. J. Exp. Agric.* **28**: 689.

Grandin, T. (1980) *Int. J. Study Anim. Problems* **1** : 313.

Hearnshaw, H., Barlow, R. and Want, G. (1979) *Proc. Aust. Ass. Anim. Breed. and Gent.* **1** : 164

Hearnshaw, H. and Morris, C.A. (1984) *Aust. J. Agric. Res.* **35** : 723.

Mulaudzi, J., Nesamvuni, A.E.,Ramanyimi, N. D. and Taylor, G.J.(2000). *Proc. 38th Nat. Congr. S. African. Soc. Anim. Sci.,***13**

SAS Institute Inc. (1989) SAS/STAT User's Guide, Version 6, Fourth Edition, Volume 2.

Shrode, R.R. and Hammack, S.P. (1971) *J. Anim. Sci.* **33 :** 193

Stricklin, W.R., Heisler, C.E., and Wilson, L.L. (1980*) J. Anim. Sci.* **51** (Suppl.1) : 109

Tulloh, N.M. (1961) *Anim Behavior* **9 :** 20

Voisinet, B.D., Grandin, T., O'Connor, S.F., Tatum, J.D. and Deasing, M.J. (1997) *Meat Sci.* **46** : 367.