IJAS Iranian Journal of Applied Animal Science

Effect of Wattle Trait on Body Sizes and Scrotal Dimensions of Traditionally Reared West African Dwarf (WAD) Bucks in the Derived Savannah Environment

Research Article

T.A. Adedeji[1*], M.O. Ozoje[2], T.A. Otunta[1], L.O. Ojedapo[1], T.K. Ojediran[1] and A.O. Ige[1]

[1] Department of Animal Production and Health, Ladoke Akintola University of Technology, Ogbomoso, P.M.B, 4000, Nigeria
[2] Department of Animal Breeding and Genetics, University of Agriculture, Abeokuta, P.M.B, 4000, Nigeria

Received on: 21 Apr 2011
Revised on: 5 Jun 2011
Accepted on: 15 Jun 2011
Online Published on: Mar 2012

*Correspondence E-mail: tosinadedeji2003@yahoo.com

Online version is available on: www.ijas.ir

ABSTRACT

This study was focused on the effect of wattle trait on body sizes and scrotal dimensions of traditionally reared WAD bucks in the derived savannah environment. Data were collected from 153 bucks ranging from 4 months to 2 years of age and this included, scrotal length, scrotal circumference, body weight, height at withers, body length and chest girth. Parameters for wattle traits included, wattle incidence (presence or absence), wattle shape (oval or cylindrical) and wattle position (under or beside neck). Data obtained were adjusted for age effect and subjected to Analysis of variance. There were significant effects ($P<0.05$) of wattle incidence, wattle shape and wattle location on body weight, body length, chest girth and scrotal length of WAD bucks. In addition, height at wither was only affected ($P<0.05$) by wattle shape. Cylindrically shaped wattled bucks whose wattles were located under the neck had more of body weight, body length, chest girth and scrotal length. Meanwhile, the height of goats whose wattles were cylindrical were more than those with oval shaped. Therefore, selection based on wattle traits can be employed as an indirect and affordable means of determining higher body sizes and fertility in WAD bucks.

KEY WORDS body sizes, bucks, scrotal dimensions, WAD, wattle.

INTRODUCTION

The West African Dwarf (WAD) goat, a predominant breed of the humid and sub humid zones of Nigeria is characterized by small size with matured body weight varying between 20-25 kg, and possess the ability to survive, adapt and reproductive under harsh conditions (Ozoje, 2002). The majorities of these goats are found in the rural areas where they serve as source of income and meat to the rural populace. However, this breed is known to display a wide range of qualitative variations in coat colour and wattle traits. The coat colour varies from white, brown, black to mixture of colours. Wattle possession in this breed of animal could be either present or absent. When present, could vary in number, shape and position. Varied expression of these wattle traits may represent some adaptive mechanisms related to adaptation and survival in different ecological zones within the rainforest, mangrove swamps and coastal regions in southern Nigeria (Odubote, 1994). Wattle is the cartilaginous tissue surrounded by dense fibrous connective tissue hanging on the neck of some ruminants (Robert, 1994). Several research findings (Casu *et al*. 1970; Osinowo *et al*. 1988; Shongjia *et al*. 1992; Ozoje, 2002; Ozoje and Mgbere, 2002) have reported some positive associations

between wattle traits and livestock performances, namely; growth, reproduction and heat tolerance. Odubote (1994) observed significant effect of wattle on yearling weight of WAD goats and concluded that bilateral wattled goats were heavier than non-wattled. Also, Ozoje (2002) reported positive association of wattle incidence with tail length and neck circumference in WAD goats, while Osinowo *et al.* (1990) observed higher weaning weight in wattled lambs than non-wattled in Yankassa lambs. Higher lambing rate in ewes with wattle was reported by Casu *et al.* (1970) while Shongjia *et al.* (1992) observed significantly higher litter size and milk yield in wattled Saanen does. However, Osinowo *et al.* (1990) found no significant effect of wattle on fertility traits but concluded that wattled Yankassa ewes had lower number of oestrus period per conception, higher litter size and higher fertility index compared to non-wattled ewes which had fewer apparent abortions. Testicular size is considered the most important criterion from physiological, genetic and practical perspective to improve reproductive performance of related female (Peter and Lesile, 1980; Palasz *et al.* 1994). Keeton *et al.* (1996) have indicated that the scrotal trait was genetically and phenotypically correlated with important growth traits and other body measurements used in most selection programs. So far, past reports on the wattle traits has focused mainly on the incidence (presence, absence) and number (bilateral and unilateral) of wattle in sheep and goats in relation to performance, however, wattle traits in WAD goats also varied in shape and position. Therefore, this research seeks to evaluate the effect of wattle incidence, shape and position on body sizes, scrotal length and scrotal circumference of extensively reared West African Dwarf bucks.

MATERIALS AND METHODS

One hundred and fifty three (153) apparently healthy and extensively managed West African Dwarf bucks between the ages of 4 months and 2 years were purposively sampled in Ogbomoso, a derived savannah, sub-humid agro-ecological zone in the southwestern part of Nigeria. The zone covers a total land mass of 14.82 square kilometers. Ogbomoso is located approximately at the intersection of latitude $8^0\ 15^1$ north of the Equator and longitude $4^0\ 15^1$ east of the Greenwich Meridian. It lies between 300 and 600 meters above the sea level. The annual temperature ranges between 25.5 ^{0}C to 40.0 ^{0}C and while the mean annual rainfall is 1247 mm (Oguntoyinbo, 1988). The relative humidity is high in the early mornings (89%) throughout the year with marked decrease in the afternoons (62%). The area is a derived savannah woodland, secondary forests and anthropic vegetation communities, as well as mixed cropping arable farmland (Adejuwon, 1983). West African Dwarf goats in the agro-ecological zone are usually reared under the free range system whereby the owners occasionally feed their animals with kitchen wastes, cassava peels or whole cassava and corn chaff in the morning before they are left to roam around the house and the surrounding environment with minimum or no shelter provided. The research lasted for twelve weeks.

Each buck was adequately restrained and calmed before data collection was done. All linear body measurements were taken with the aid of Tailors' tape rule in centimeter. The data collected included, age (through dentition and personal interview), scrotal length (the length was taken as the distance from the point of attachment of the scrotal sac to the tip of the scrotum), scrotal circumference (as the width of the upper, middle and lower parts of the scrotum, added and divided by three.), body weight (Each animal was turned on their back in a sling made from a Hessian bag and weighed using a pocket hanging spring balance of 50 kg capacity), height at withers (measured as the distance from the highest point of the withers vertically to the ground with the animal standing with its feet placed squarely on the level ground), body length (measured as the distance between the anterior point of the shoulder to the posterior extremity of the pin bone), chest girth (measured directly behind the front leg as vertically as possible). Wattle traits such as, wattle incidence (presence or absence), wattle shape (oval or cylindrical) and wattle position (under or beside the neck) were done through visual appraisal.

Data obtained were adjusted for age effect and subjected to analysis of variance (General Linear Model procedure) (SAS, 2003) and significant means were separated using Duncan Multiple Range Tests procedure of SAS (2003). The second and third order interactions were not significant ($P>0.05$), therefore, they were not included in the model. The final linear model is shown below:

Model

$Y_{ijkl} = \mu + A_i + B_j + C_k + e_{ijkl}$

Y_{ijkl}: The parameter of interest.

μ: The overall mean.

A_i: Fixed effect of the i^{th} wattle incidence (i=presence, absence).

B_j: Fixed effect of the j^{th} wattle shape (j=cylindrical, oval).

C_k: Fixed effect of the k^{th} wattle position (k^{th}=beside, under the neck).

e_{ijkl}: Random error associated with each record.

Implication

Majority of our WAD goats are found in the villages under extensive management with no weighing scale and owners generally are illiterate living below poverty line, it thus become imperative that alternative ways of animal selection

which is cheap and unambiguous to the rural farmers be evolved to genetically improve their animals in their own way and consequently accelerate protein availability to the populace.

RESULTS AND DISCUSSION

The study revealed that higher number of West African Dwarf bucks possessed wattle and they were oval shaped and the wattles were generally found under the animals' neck. Tables 1 and 2 show the least square means of body sizes and scrotal dimensions as affected by wattle traits of WAD bucks in Ogbomoso, Nigeria respectively.

The results obtained showed that body weight, body length, chest girth and scrotal length were significantly influenced ($P<0.05$) by wattle incidence, wattle shape and wattle position of WAD bucks while height at withers was only affected by wattle shape. West African Dwarf bucks whose wattles were cylindrical in shape and located under the neck were more in body weight, body length, chest girth and scrotal length. Only WAD bucks possessing cylindrical shaped wattle were 2.59 cm higher than their counterparts with oval shaped. Wattled WAD bucks had the higher scrotal length (0.81cm). Regarding wattle shape, higher scrotal lengths were obtained in bucks whose wattle were cylindrical shaped (1.29 cm) while bucks possessing wattles under

Table 1 Least square means of body sizes as affected by wattle traits of WAD bucks in Ogbomoso , Nigeria

Parameters	Obs	Body weight (kg)	Body length (cm)	Height at wither (cm)	Chest girth (cm)
Wattle incidence:					
Presence	114 (67.97%)	10.36±0.3[a]	44.71±0.42[a]	40.50±0.32	50.74±0.57[a]
Absence	39 (25.33%)	7.77±0.39[b]	40.23±0.44[b]	39.20±0.60	46.19±1.31[b]
Wattle shape:					
Oval	105 (68.63%)	10.30±0.33[b]	44.570.45[b]	40.30±0.34[b]	50.72±0.62[b]
Cylindrical	09 (8.57%)	11.00±0.29[a]	46.39±0.33[a]	42.89±0.11[a]	51.00±0.58[a]
Wattle position:					
Under	108 (70.59%)	10.40±0.32[a]	44.78±0.44[a]	40.53±0.33	50.84±0.60[a]
Beside	06 (3.92%)	9.50±0.67[b]	43.50±0.22[b]	40.00±0.02	49.00±0.45[b]

Obs: observation.
a, b Means in the same column within each parameter are significantly different ($P<0.05$).

Table 2 Least square means of scrotal dimensions as affected by wattle traits of WAD bucks in Ogbomoso, Nigeria

Parameters	Obs	Scrotal length (cm)	Scrotal circumference (cm)
Wattle incidence:			
Presence	114(67.97%)	10.32±0.18[a]	18.41±0.22
Absence	39(25.33%)	9.51±0.47[b]	18.19±0.46
Wattle shape:			
Oval	105(68.63%)	10.21±0.19[b]	18.41±0.24
Cylindrical	09(8.57%)	11.50±0.18[a]	18.33±0.33
Wattle position:			
Under	108(70.59%)	10.42±0.18[a]	18.38±0.23
Beside	06(3.92%)	8.50±0.22[b]	19.00±0.89

Obs: observation.
a, b Means in the same column within each parameter are significantly different ($P<0.05$).

the neck wattle also had higher scrotal length (1.92 cm). Odubote (1994); Osinowo *et al.* (1988); Katongole *et al.* (1996) and Adedeji (2009) had earlier reported the preponderance of wattled goats in their various studies thus confirming the report of this study.

The values of body weight, body length, height at wither and chest girth reported in this study fell within the range reported (Ozoje, 2002; Adedeji, 2009) in the same ecological zone. The significant effects of wattle traits on most of the body dimensions of WAD bucks indicated that wattle is an adaptive feature in WAD goats thus influencing their better performance.

Although, Ozoje (2002) reported a non- significant effect of wattle on linear body measurement of West African Dwarf goats, however, the author suggested a possible thermo-regulatory ability of this trait in WAD goats. Also, reports in the literature tends to link possession of wattle with reproductive traits such as higher prolificacy, higher milk yield, higher litter size and conception rate (Shongjia *et al.* 1992).

The biometric analysis of testicular development is of great importance because testicular growth and development have been reported to be positively related to body size (Osinowo *et al.* 1981). The higher scrotal length obtained in WAD bucks possessing cylindrically shaped wattle situated under the neck in the present study could be an indication of possession of inherent fertility by the bucks involved. Kafi *et al.* (2004) reported that testicular growth could be used to determine a male genetic merit for sperm production in the livestock enterprise. Therefore, wattle occurrences could used as an urgent, indirect and affordable means of livestock improvement.

CONCLUSION

Heavier weight, longer body and broader chest provide more surface area for muscle development and where market size is the determining factor of market price, therefore, selection based on wattle traits can be employed as an indirect and affordable means of determining higher body sizes. Longer scrotal length is an indication of inherent fertility in West African Dwarf goats.

REFERENCES

Adedeji T.A. (2009). Pleiotropic effects of coat colour and wattle genes on the adaptive potentials of West African Dwarf goats. Ph.D Thesis. University of Agriculture, Abeokuta, Nigeria.

Adejuwon J.O. (1983). Soil Atrophic of Oyo state of Nigeria. Heinemann Nigeria Publ., Ibadan.

Casu S., Boyazoglu J.G. and Lauvergne J.J. (1970). The Inheritance of wattles in the Sardinian breed of sheep. *Anal. Genet. Sel. Anim.* **2,** 249-261.

Kafi M., Safdarian M. and Hashemi M. (2004). Seasonal variation in semen characteristics, scrotal circumference and libido of Persian Karakul rams. *Small Rumin. Res.* **53,** 133-139.

Katongole J.B.D., Sebolai B. and Madimabe M.J. (1996). Morphological characterization of the Tswana goat. In: Small ruminant research and development in Africa. S.H.B. Lebbie and E.Kagwini. Pp. 5-9 in Proc. 3rd Biennial Conference of the African Small Ruminant Research Network. UICC, Kampla, Uganda.

Keeton L.L., Green R.D., Golden B.L. and Anderson K.J. (1996). Estimation of variance components and prediction of breeding values for scrotal circumference and weaning weight in Limousin cattle. *J. Anim. Sci.* **74,** 31-36.

Odubote I.K. (1994). Influence of qualitative traits on the performance of West African Dwarf goats. *Nigerian J. Anim. Prod.* **21,** 25-28.

Oguntoyinbo J.S. (1988). Climate. Pp. 78 in Geography of Nigeria Development. J.S. Oguntoyinbo and M. Filani, Eds. Heinemann Nigeria Ltd, Ibadan.

Osinowo O.A., Buvanendram V. and Koning N.L. (1988). A study of coat type, pigmentation and wattle incidence in Yankasa sheep and their effects on fertility and weaning weight. In Proc. 13th Annual Conference of the Nigerian. Soc. Anim.Prod. University of Calabar, Nigeria.

Osinowo O.A., Molokwu E.C.I. and Osori D.I.K. (1981). Growth and testicular development in Bunaji bulls. *J. Anim. Prod. Res.* **1,** 55-67.

Osinowo O.A., Buvanendran V. and Koining M.L. (1990). The Occurrence and inheritance of Wattles in Yankasa sheep. *Nigerian. J. Anim. Prod.* **17(1/2),** 63-64.

Ozoje M.O. (2002). Incidence and relative effects of qualitative traits in West African Dwarf goats. *Small Rumin. Res.* **43,** 97-100.

Ozoje M.O. and Mgbere O.O. (2002). Coat pigmentation effects in West Africa Dwarf goats: Live weights and body dimensions. *Nigerian. J. Anim. Prod.* **29(1),** 5-10.

Palasz A.T., Cates W.F., Barth A.B. and Mapletoft R.J. (1994). The relationship between scrotal circumference and quantitative testicular traits in yearling beef bulls. *Theriogenology.* **42,** 715-726.

Peter J.C. and Lesile B. (1980). Current therapy. Pp. 330-335, in: Theriognelogy. W.B. Morrow and Co. Saunders. Eds. Philadelphia.

Robert A.V. (1994). Raising Healthy Goats under Primitive Conditions, Overview of General Information, Pp. 12-18. Christian Veterinary Mission, Washington, U.S.A.

SAS. (2003). Statistical Analysis System. SAS stat. Version 9. SAS institute Inc. Gary NC U.S.A.

Shongjia L., Xiangmo L., Gangyl X. and Shenov C. (1992). Relationship between physical traits, litter size and milk yield in Saanen, Guanzhong and Crossbred goats. Pp. 83 in Proc. 5th Int. Conf. Goats. New Delhi.