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Characterization of Traditionally Reared West African Dwarf Goats (WAD) in the Derived Savannah Zone of Nigeria

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Abstract: 207 WAD goats were randomly sampled in a survey study of some qualitative traits in Surulere local government of Oyo state, Nigeria. Traits studied were presence or absence of horns (Ho), Wattles (Wa), Beard (Bd); Coat colours and Hair types. Parameters studied revealed sexual dimorphism in the traits studied. Wattles, beard and horns were predominant in both sexes but more prominent in the male goats. The gene frequencies for the recessive alleles beard (0.67) and Horness (1.00) were higher than those of dominant alleles while dominant allele wattled gene (0.68) was more frequent. The majority of the goats sampled had black coat colour (36%) and smooth hair type (84%). The levels of variation in some of the traits surveyed indicated that the WAD goat has not been purified for such traits in the environment; rather their evolvement could be mainly for adaptive purposes.

Key words: WAD goat, characterization, wattle, beard, horn, coat colour and hair type

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 mature body weights varying between 20-25kg[1,2] and variable colours[3]. They are hardy and possess the ability to survive, adapt and reproduce under harsh conditions[2,4]. The majority of smallholder rural farmers for whom this resource is critical for nutrition and income own them. Traditional goat rearing in Nigeria is free-range whereby animals are left to roam about fending for themselves with minimum shelter provided thereby exposing them to the risk of harsh weather. This ability to survive under adverse environmental conditions with low in puts and disease risk is attributed to the possession of adaptive traits[1]. Odubote[3] reported on the influence of certain qualitative traits of WAD goats in Nigeria and concluded that these traits have positive effect on the genetic superiority or adaptability of this breed. Meanwhile, characterization of WAD goats for qualitative traits has been carried out at various times in the humid zone of Nigeria both on-farm[2,3] and on free range[5,6]. There is the need to conserve and preserve these animals to take advantage of these unique traits (qualitative traits).

However, no such characterization has been done under the traditional village setting in a derived savannah environment with its characteristic weather. Therefore, this study embarked upon the survey to describe the WAD goats for certain qualitative traits in a rural area of the derived savannah environment of Nigeria.

MATERIALS AND METHODS

Study area: The survey was carried out at Surulere local government area of Ogbomoso, Oyo State of Nigeria. A derived savannah zone located approximately at the intersection of latitude 8°15[1] North of the equator and longitude 4°15[1] East of the Greenwich Meridian and it is about 500 m above sea level. The mean annual temperature and rainfall are 27°C and 1247 mm respectively. The local government, has 10 wards with a total of 260 villages and occupies 975 km^2 area of land and inhabited by 126,692 villages[7] and they are predominantly farmers.

Animal management: Goats are allowed to freely roam about feeding on grasses, browse plants and kitchen wastes with little or no shelter provided at night.

Data collection: 207 WAD goats (both sexes) were randomly surveyed and assessed in all the aforementioned local governments' wards. Each goat sampled was simply described for coat type and pigmentation, wattle, him and board. As regards coat pigmentation, the whole body was taken into

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consideration to derive 1-black, 2-brown, 3-white 4-mixture of colours. The wattle is either present or absent and if present unilateral or bilateral. Horn and beard were also considered for presence or absence. Coat hair type was also assessed visually and classified into smooth and rough.

Statistical analysis: The frequency distributions of these qualitative characters were calculated and then applying Hardy-Weinberg equilibrium theory[8], their respective gene frequencies were estimated.

RESULTS AND DISCUSSION

Table 1 shows the incidence of qualitative traits in traditionally reared WAD goats and their relative frequency of occurrence. Two phenotypic classes were observed for Wattle, Horn, Beard, Ear orientation and Coat hair type. Wattle was predominant in both male (71.34%) and female (58.13%) but more in the male and is majorly bilateral. Similarly, horn and horizontal ear carriage are features in both sexes. However, possession of beard and smooth hair type were predominant characteristics in the male population (11.45 and 84.27%, respectively). Four phenotypic classes were observed for coat colour, however, majority of the goats were completely black in pigmentation. These observations were in agreement with past literatures[3,5,6]. However, the findings of Lauvergne[9] and Rodero[10] did not support the result of this study on possession of wattle in goat.

The authors reported lesser number of wattled goats than non-wattled. Odubote[3] stressed the importance of wattle in goats and suggested that they may be involved in heat regulation in the tropical environment. That polled goats were not observed could be suggestive of selection disadvantage for polled goats in the area of study. Liu[11] commented that it is not possible to fix the polled gene by artificial selection because of the opposing effect of natural selection. However, Warwick and Legate[12] associated non-polledness with a form of intersexuality and cryptochidism. The result of this study, which favoured horned goats, is not in agreement with the report of Lusweti[13] in South Africa. The author observed that only 30% of the village goat studied had horns. This variation may be due to differences in the environment of study areas. Possession of beard is a secondary male sexual character induced by androgen hormone and is a dominant character. This could have been responsible for the greater number of male goat having beard than the female. However, those female goats exhibiting this trait could be as a result of secretion of excess of this male hormone[3,5]. The dimorphic nature of the ear carriage is in contrast with the reports of Adebambo *et al.*,[5] and Ozoje[6] on WAD goats of Nigeria. These authors observed monomorphic ear carriage and then concluded that the alternate phenotypic class or allele could be deleterious resulting in embryonic death. Although, both horizontal and erect ear orientation were observed in this study, however, the relatively lower frequency of the erect ear carriage could be as a result of the non-adaptive feature of this trait.

The coat hair type is advantageous as it permits convectional heat loss from the animal surface. This could have been responsible for the predominant smooth hair type in the population of goat studied. The variability in the coat colour is indicative of WAD goats representing a traditional population in which no conscious selection effort has been exercised[3,5]. The observed black pigmentation may be an adaptation to the humid tropics as it predisposes the goat to high heat load and probably high metabolic rate and thyroid activity, which consequently affect growth. A reported that coat colour

Table 1: Incidence of qualitative traits in traditionally reared WAD goats

					Relative frequency		
Parameters	No. of obs	No. of male	No. of female	Total number	% Male	% female	% Total
Wattle	207						
Absent		47	18	65	28.66	41.86	31.41
Present		117	25	142	71.34	58.13	68.59
:Unilateral		4	0	4	3.28	0	1.93
:Bilateral		118	20	138	96.72	100.00	66.66
Horn	207						
Absent		0	0	0	0	0	0
Present		178	29	207	100	100.00	100.00
:Straight		160	26	186	89.88	89.66	89.86
:Curved forward		18	3	21	10.12	10.34	10.14
Beard	207						
Absent		147	38	185	88.55	92.68	89.37
Present		19	3	22	11. 45	7.31	10.63
Ear Orientation	207						
Horizontal		148	42	190	90.80	95.45	91.89
Erect		15	2	17	9.20	4.54	8.21
Coat colour	207						
Black		58	20	78	36.48	41.67	37.68
Brown		13	10	23	8.18	20.83	11.11
White		32	6	38	20.13	12.50	18.36
Mixture		56	12	68	32.21	25.00	32.85
Coat hair type	207						
Smooth		139	31	170	84.24	73.81	82.13
Rough		26	11	37	15.76	26.19	17.87

Table 2: Gene frequencies for certain qualitative traits of WAD goats

Parameters	Gene frequency
Wattle	0.68
No wattle	0.32
Bearded	0.33
Unbearded	0.67
Horned	1.00
Polled	0.00

influences radiant heat loss exerting its effect on body weight and other productive adaptability factors in livestock species most especially in the tropical environment.

Table 2 presents the gene frequencies for certain qualitative traits of WAD goats. It can be seen that the gene frequencies of the recessive allele non-wattled (0.32), unbearded (0.67) and Horned (1.00) were all higher than the gene frequencies of the dominant alleles. It further shows that the recessive alleles have a higher transmission potential in the population studied and the transmission of the dominant alleles could be by default (mutations or interaction). Ozoje[6] and Odubote[3] reported low incidences of polledness, non-wattled and beardedness in extensively managed and station reared WAD goats, respectively.

CONCLUSION

Higher relative frequencies and gene frequencies of the traits studied showed that the genetic profiles of the WAD goats have been under natural selection and this have resulted in the phenotypic characters observed.

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