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West African Dwarf Goat Production under Village Conditions: 1. Characterisation and the Establishment of Breed Standards.

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Abstract

The role of small ruminants in poverty alleviation and their contribution to sustainable livelihoods especially in rural areas have been demonstrated by several Research and Development (R&D) programmes in Sub-Saharan Africa. Proposals have been made for the evolution of purebreeding schemes for the conservation of the genetic pool which the WAD goat represents. A crucial starting point however, is the characterisation and the establishment of breed standards for WAD goats under village conditions. So far, there has been little progress in this regard on account of the difficulties in establishing on-farm data recording schemes. Also, comprehensive studies relating to the within breed diversity among WAD goats are rare. Such studies will show details about performance and morphometric characteristics of WAD goats in their native environment. All these represent vital information needed for breed characterisation and the establishment of breed standards. A conceptual framework for the attainment of these objectives is presented, with illustrations drawn from an ongoing R&D project involving WAD goats. The framework is hinged on on-farm livestock performance recording systems. Project inception embraced awareness campaigns and sensitisation of farmer groups, where the scope and rationale for the studies are discussed. Pilot villages are randomly selected from different ecozones where WAD goats are raised in Southwestern Nigeria. Research methodology involved structured household interviews combined with fortnightly visits and the establishment of on-farm recording schemes. Data on performance, morphometric and qualitative traits at all ages are recorded. Direct observations and documentation of all aspects of the rural setting relating to the raising of WAD goats — farming systems and feed resources - are documented. With data accumulation, computer databases are created for data management, analysis, interpretation/information retrieval. Analysis of data helps to derive doe productivity indices under village conditions. The framework involves some feedback mechanism to provide farmers with innovative techniques in goat management and simple selection schemes within each village. Overall, the framework will facilitate the design of appropriate genetic improvement measures geared towards boosting the productivity of WAD goats under smallholder units.

Keywords: West African Dwarf goat, Characterisation, Breed standards, Sustainable livelihood, On-farm research.

Introduction

The West African Dwarf (WAD) goat is widely distributed across the rainforest belt of southern Nigeria where it makes significant contributions to the livelihoods of impoverished families. The potentials of WAD goats in poverty alleviation programmes is well-recognized, but is still largely untapped. This breed is known to display a wide range of qualitative variations in coat colour (black, brown, white, pied, mottled, mixed, etc; Odubote 1994a; Ozoje and Mbgerere, 2002),

presence or absence of wattles (none, unilateral or bilateral) and super-numerary (extra) teats in adult females (which could be two, three or four extra teats; Odubote, 1994b). These previous studies were mostly restricted to on-station investigations and are thus limited in applications, since the true extent of genetic biodiversity in these traits can only be fully captured under the natural habitat in which WAD goats reside. Varied expression of these 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. On account of these variations, proposals have been made for the evolvement of pure-breeding schemes to conserve the gene pool of WAD goats. A crucial starting point however, is a characterization process as well as the establishment of breed standards for WAD goats under their natural habitat. There has been little progress in this regard, since comprehensive studies under on-farm conditions are scanty. The success of this will largely depend on the establishment of successful animal recording systems under village conditions (Maki-Hokkonen et al., 2002; Pauw et al., 2004). Such characterization efforts for WAD goats in their native habitat will provide crucial information for a comprehensive breeding policy for the breed. The objective of this paper is to establish a conceptual framework for the actualization of these goals under village conditions.

Conceptual Framework

The proposed framework is hinged on three critical components: (a) a data capture process, (b) a data base system, and (c) a feedback mechanism to local herdowners. Details of these are illustrated in Figure 1 below. Pilot villages are randomly selected from different ecological zones in the rainforest belt. Awareness campaigns/sensitization of farmer groups will be done. A Needs Assessment will be conducted as part of the of the initial steps in the study. Full participation of farmer groups will be ensured right from project inception. A farmer registration process, followed by structured household interviews will be conducted. This will be followed by regular fortnightly visits to participating farms. Data on performance, morphometric and qualitative traits will be routinely recorded. Direct observations and documentation of all aspects of rural setting related to WAD goat production will be monitored. Computer databases for data management, analysis, information retrieval and output delivery will be established. Doe productivity indices will be derived based on cumulative records on doe performance under village conditions. Based on the database on performance, morphometric and qualitative traits as well as the farming system, comprehensive information on breed standards for WAD will be established under village conditions. Output delivery and feedback mechanism to farmers will be ensured as part of the contribution of our research to sustainable livelihoods.

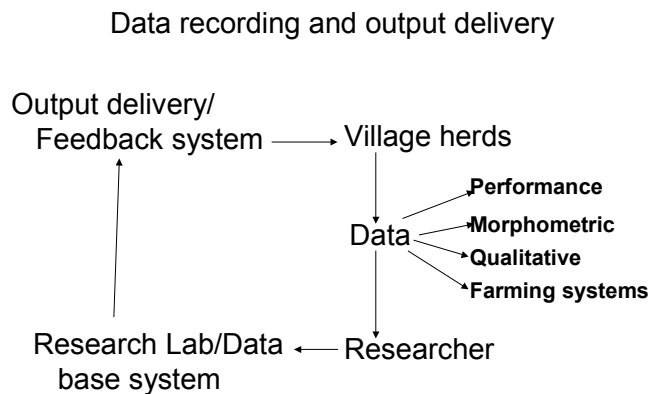


Figure 1. A conceptual frame work for data recording and output delivery to local goat herd owners.

Preliminary Results

Table 1 shows the distribution of goats by coat colours in Isoya village, Ile-Ife, Southwestern Nigeria. A total of 126 animals were sampled from this pioneer study site. Some pictures showing the extent of diversity among goat populations by coat colour are shown in Plate 1. Coat colour pigmentation include white, black, brown, pied, mottled and varied degrees of combinations of all colours. A comprehensive photo database is being set up in our laboratory to document the full extent of this diversity in coat pigmentation among WAD goats. Results (in Table 1) showed that the most frequent coat colours are the all black or predominant black colours (33%), followed by and all brown or predominant brown (32%). The least common colours were the mottled (8.73%), mixed black and white (7.94%) and all or predominant white (7.14%). The highest frequency of occurrence of coat colour in our preliminary study is the black pigmentation. This is similar to the report from an on-station study by Odubote et al., (1994) that the black pigmentation was the most frequent, though the frequency (53.3%) for black coat colour reported by this author was higher than in the current study.

The relationships between coat pigmentation and performance traits (fertility, growth rate, mature body weight, etc) need detailed investigations. While Odubote (1994b) observed that body weight of postweaned kids increased with decreasing level of pigmentation, Ozoje and Mgbere (2002) concluded that tan or white goats were superior in growth performance. Both studies may have been limited by the quantum of data used in the analysis. Detailed and meticulous on-farm participatory research will help to clarify the exact superiority among these genotypes.



Plate 1. Diversity in the coat pigmentation of WAD goats under village conditions.

Table 1. Distributions of goats by coat colour.

Coat colour	Number of animals	% of total
Predominant/All Black	42	33.33
Predominant/All Brown	40	31.75
Predominant/All White	9	7.14
Black & Brown	10	7.94
Black & White	14	11.11
Mottled	11	8.73
Total	126	100.00

Table 2 presents the distribution of goats by the presence or absence of wattles. Three distinct categories are observed – (a) no wattles, (b) single or unilateral wattles and (c) double or bilateral wattles. The frequencies show that the bilateral wattles are most common among WAD goats (constituting about 63%), while the unilateral wattles are the least common. A previous study by Odubote (1994a) reported that the bilateral wattled condition as been the most prevalent among WAD goats. A companion paper (Odubote, 1994b) established some connection between the possession of wattles and yearling weights, with the bilaterally wattled animals been lighter in weight. The quantum of the datasets used in these studies may pose some limitations to the inferences drawn in these studies. Large scale evaluations are needed to corroborate these findings.

Table 2. Distribution of goats b the presence or absence of wattles.

Wattle	Number of animals	% of total
Absent	45	35.70
Present		
Unilateral	2	1.60
Bilateral	<u>79</u>	<u>62.70</u>
Total	81	64.30

Figure 2 shows the frequency of occurrence of supernumerary teats among the sampled adult WAD goat does. The normal two-teat condition (i.e. no super-numerary teat condition) was most prevalent (77%), while the possession of two extra teat was 15%. Amao et al., (2003) reported that the presence of supernumerary teat constitute a major udder abnormality in WAD goats. However, among herdowners in the study area, it is common knowledge that the possession of extra teat is connected to high fertility and prolificacy. This, however, needs to be established scientifically.

Frequency of occurrence of supernumerary teats in WAD goats in village herds (n=84 does)

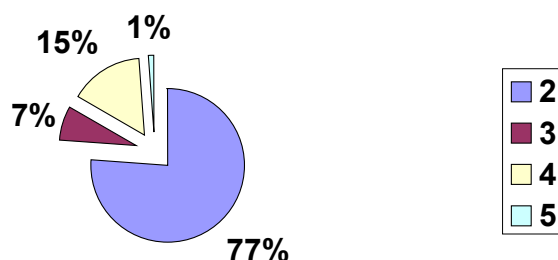


Figure 2. Frequency of occurrence of supernumerary teats in Isoya village, Ile-Ife, Southwestern Nigeria.

Discussion

This paper defined a conceptual framework for the characterization and the establishment of breed standards for WAD goats under village conditions. Attention was drawn to the extreme diversity in the gene pool of WAD goats as reflected in the varied expression of a number of qualitative traits including coat colours, possession of wattles and supernumerary teats in adult female WAD goats. Within each of these classes of qualitative traits, several categories were identified, which implies that the WAD goat is still largely unselected for qualitative or performance traits. Thus, there is the need for a comprehensive and meticulous research design to establish the following: (a) the exact relationships – genetic, phenotypic and environmental – between qualitative and performance traits; (b) the mode of inheritance of these traits, including the mode of gene action/interactions; (c) large scale evaluations of different ‘genotypes’ among WAD goats based on several combinations of the afore-mentioned traits, under participatory on-farm conditions; (d) an assessment of critical factors – genetics, housing, feeding, healthcare, etc – affecting WAD goat productivity under village conditions; (e) development of sustainable goat production models under smallholder units and its implications on sustainable livelihoods. Research collaboration is being sought in this regard.

Conclusion

We presented a conceptual framework for the establishment of breed standards for WAD goats under on-farm conditions. Some preliminary results on the frequencies of occurrences of some qualitative traits were shown. Some research topics for the implementation of the framework were outlined for large scale on-farm evaluation of the WAD goat breed. The ultimate goal is to promote its contributions to sustainable livelihoods in rural areas in Southern Nigeria.

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