MORPHOLOGICAL AND QUALITATIVE CHARACTERISTICS OF A COMPOSITE RABBIT POPULATION IN BACKYARD SYSTEMS IN SOUTHWESTERN NIGERIA

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ABSTRACT

Limited reports exist on the phenotypic and genetic characterization of heterogeneous rabbit populations raised in traditional backyard systems prevalent in Nigeria and other countries in sub-Saharan Africa. Such information will facilitate the design of sustainable breeding programmes that would have direct benefits to limited-resource farmers as well as promote conservation through utilization. It would also enhance the inclusion of these stocks into animal genetic resources data bases, as well as the full understanding of this population of rabbits that is raised principally under backyard systems. The objectives of this study were to conduct an *on farm* characterisation of composite rabbit population based on morphological and qualitative traits and to evaluate the extent of phenotypic variability in a heterogeneous rabbit population. The study was conducted in farms across four locations (Ile-Ife, Oshogbo, Ogbomoso and Ibadan) in south-western Nigeria. Variables recorded included qualitative and morphological traits and include the following: ear dimension and orientation, coat texture, colour and fur density, face and nose profiles, temperament, body type, eye colour, teat number (breeding does) and pad size. Morphological measurements included body length, chest and thigh circumference. Results showed three-quarters of the animals had long and broad ear dimensions, while ear orientation was predominantly erect (98.5%). Coat colour patterns were non-uniform (56.2%) and uniform (43.8%). The distribution of animals for temperament showed that docile, moderately docile and wild were 44.8%, 52.5% and 2.7% respectively. Eye colour classes were 60.5%, 14%, 15% and 0.5% for black, red, blue and yellow eyes respectively. For breeding does, functional teat number were 94.9%, 3.7% and 1.4% for 8, 10 and 6 teats respectively. Analysis of morphological traits of heterogeneous rabbits across locations in south-western showed that there were no marked differences in chest circumference, body length and thigh circumference (P>0.05). In summary, heterogeneous rabbits display diversity in qualitative traits that could be further investigated for inclusion in a structured breeding programme under a clientele-based system, with resource-limited farmers and householders as beneficiaries.

Keywords: Rabbit, Nigerian populations, Phenotypic characterization, morphological traits, backyard systems, sustainable breeding programmes.

INTRODUCTION

The prevalent rabbit stocks in many developing countries in sub-Saharan Africa (SSA) are predominantly heterogeneous or composite rabbits described by Lukefahr (1998) as a non-standard breed of rabbits. These stocks are product of matings (planned and un-planned) among exotic breeds principally California, New Zealand White, Chinchilla, Flemish Giant, etc and/or local breeds (Lukefahr, 2000). This author noted that composite rabbits are highly heterozygous and adapted to backyard systems in the tropics. Colin and Lebas (1996) emphasized the importance of such traditional backyard rabbit systems in SSA, noting that about three-quarters of all breeding does in the region are found in such systems. The report also noted that Nigeria belongs to a list of countries with over one million does where rabbit production was described as relatively important in the local economy, and heavily dependent on such backyard systems. Oseni *et al*. (2008) described smallholder

rabbit production in Nigeria, while Oseni (2008) presented a proposal for the genetic improvement of rabbits for smallholder units in south-western Nigeria.

In this regard, characterizing composite rabbit populations, as well as the production system in which they are raised is an important step in the design and implementation of sustainable breeding programmes geared towards the sustainable utilization of these stocks by resource-limited households as part of a poverty alleviation programme. Detailed procedures for the characterization of rabbit breeds and populations was described by Khalil (1993) following the guidelines presented by FAO (1986). The objective of this study was to describe the morphological and qualitative characteristics of a composite rabbit population raised under backyard systems in south-western Nigeria following Khalil *et al*. (1993).

MATERIALS AND METHODS

The study was conducted at 10 rabbit units (comprising of *on-station* and *on-farm* units) across four zones in south-western Nigeria. The *on-station* locations include rabbit colonies in the following: (a) IAR&T, Ibadan, Oyo State; (b) OAU, Ile-Ife, Osun State, (c) University Research Farm, University of Ibadan, Oyo State; (d) LAUTECH, (e) Our Lady of Apostle Novitiate Convent, Oke Maria, Ibadan. The *on-farm* locations are: (a) Oluokun Farms, Oyo State, (b) Niran Obadare Sreet, Oshogbo, Osun State; (c) Adeyemi Adetoye Farms, Oke-Oniti, Oshogbo; (d) ROA Farms, Moor Plantation, Ibadan; ID Farms), Moor Plantation, Ibadan; and (e) Oyerinde Farms, Oke Opa, Ile Ife, Osun State. In each location, structured questionnaire based on the guidelines for descriptor models for the characterization of rabbit breeds (Khalil *et al*., 1993) that covered qualitative traits (e.g. nose profile, ear orientation and dimensions, coat colour, temperament, teat number of breeding does, pad size, etc) was administered. Further, some morphological traits (body length, chest circumference and the thigh circumference) were measured and recorded.

Data on qualitative traits were summarised using frequency procedures, while data on morphological variables were subjected to analysis of variance using the general linear model. The statistical model used was:

$$Y_{ij} = \mu + \beta_i + e_{ij}$$

where: Y_{ij} is the observation on the ith location (i=4); μ is the general mean for each morphological character; β_i is fixed effect of the ith location; e_{ij} is random effect associated with each observation.

RESULTS AND DISCUSSION

Table 1 shows the frequency distribution of heterogeneous rabbits for qualitative traits. Results showed that coat colour patterns were mainly non-uniform. Similarly, the distribution of animals by head coat colour showed that almost two-third of the animals had variations in head coat (56.2% vs. 43.8%). Further, ear dimensions were principally long and broad (74.4%) when compared to all the other categories of long and narrow (21.1%), short and broad (2.8%%) and short and narrow (1.7%). Lukefahr and Ruiz-Feria (2003) reported that rabbits with clipped furs and long ears had superior ADG, when compared to non-clipped animals with long ears, implying that thermoregulation in rabbits is affected by hair clipping and ear dimension. Face and nose profiles were predominantly straight (80.5%) and convex (97.1%) respectively. Back type and pad size classes were dominated by animals that are convex ventrally (97.2%) and with wide pad size (96.4%). Also, temperament was mostly moderately docile (52.5%) while docile and wild temperament were 44.8 and 2.7% respectively. Coat texture was principally rough (79.2%) when compared to smooth type (20.8%). Variations in eye colour showed that animals with black, red, blue and yellow eye balls were 66.5%, 15%, 15% and 0.5% respectively. Teat number (breeding does) showed that females with 6, 8 and 10 teats were 1.4, 94.9 and 3.7% respectively.

Table 1: Categories of qualitative traits among heterogeneous rabbits in backyard systems in
   South-Western Nigeria

| Character	%
1. Colour pattern	
Uniform	43.8
Non-uniform	56.2
2. Variations in head colour	
Yes	63.8
No	36.2
3. Ear dimension	
Long and broad	74.4
Long and narrow	21.1
Short and broad	2.8
Short and narrow	1.7
4. Face profile	
Straight	80.5
Convex	19.5
Concave	0
5. Nose profile	
Straight	2.9
Convex	97.1
Concave	6.0
6. Temperament	
Docile	44.8
Moderately docile	52.5
Wild	2.7
7. Back type	
Straight	2.8
Convex ventrally	97.2
Concave	0.00
8. Coat texture	
Smooth	20.8
Rough	79.2
9. Eye colour	
Black	66.5
Red	15.0
Blue	15.0
Yellow	0.5
10. Teat number (breeding does)	
6 teats	1.4
8 teats	94.9
10 teats	3.7
11. Pad size	
Wide	96.4
Narrow	3.6

(a)

(b)

(c)

(d)
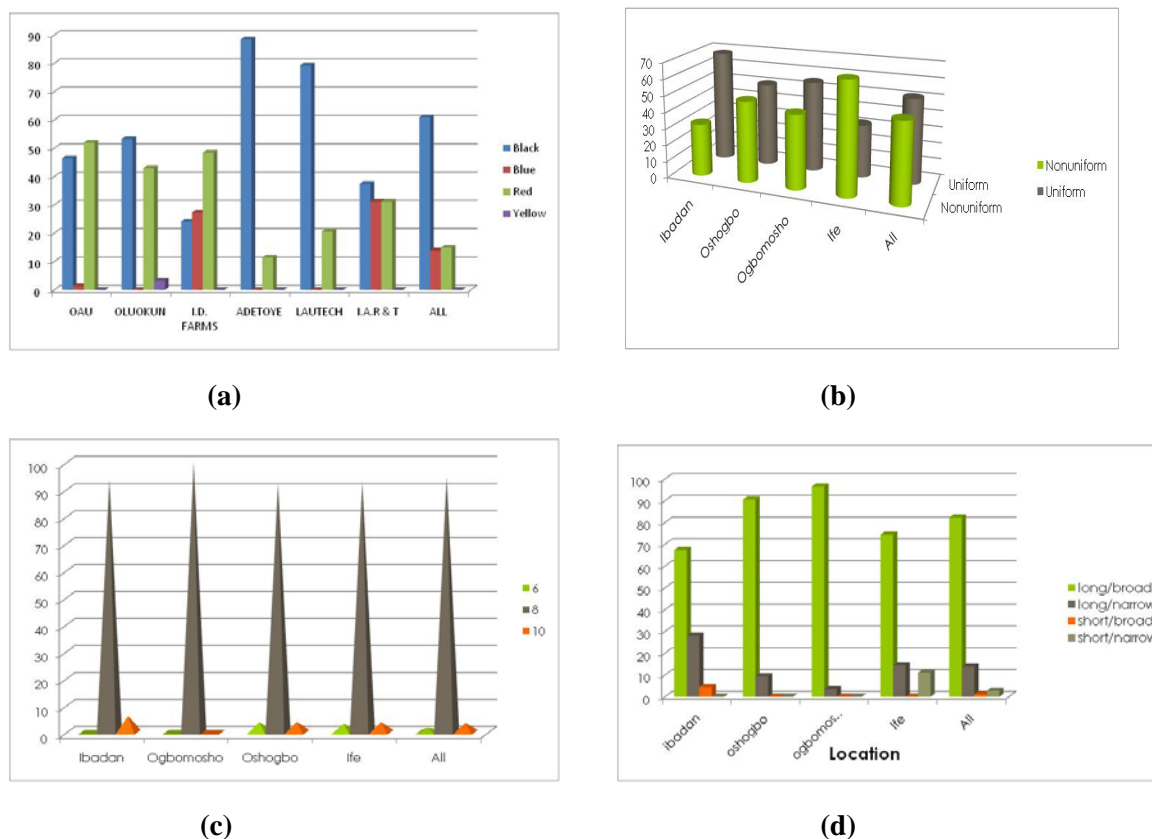
Figure 1: Frequency distribution of heterogeneous rabbits by (a) eye colour, (b) coat colour pattern, (c) teat number and (d) ear dimension across locations in south-western Nigeria

Figure 1 (a through d) shows the distribution of eye colour, coat colour pattern, doe teat number and ear dimensions across locations in southwest Nigeria. All the four charts illustrate variations in these qualitative traits across locations.

Further, Table 2 shows the least squares means for morphological measurements across locations in the region. Results of the analysis of variance showed that animals in the different locations did not show marked differences in chest circumference, body length and thigh circumference (P>0.05).

Table 2. Morphological characteristics (in cm) of heterogeneous rabbits across locations in south-Western Nigeria (se in parenthesis)

Location	Ife	Ibadan	Osogbo	Ogbomoso
Morphological trait				
Chest circumference	27.05±0.42	27.97± 0.61	27.63±0.44	26.66±0.57
Body length	49.23±0.64	47.36±1.10	47.58±0.67	50.43± 0.93
Thigh circumference	6.61±0.14	7.88±0.18	7.77±0.14	7.58± 0.15

CONCLUSIONS

The composite rabbit population can be described as having less-dense fur, increased ear dimension and pad sizes to maintain optimum functionality under sub-optimal conditions of management in hot and humid environment. Other features include variations in eye colour, teat number and coat colour patterns. This population of rabbits presents characteristics of functional importance. On the basis of the diversity in characteristics, sustainable breeding programmes can be designed to promote conservation through utilization.

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