CHARACTERIZATION OF DONKEYS IN NORTH WEST NIGERIA USING COAT COLOUR AND HAIR TYPES

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ABSTRACT
One hundred donkeys were sampled from each of Sokoto, Jigawa, Kano, Katsina, Kaduna, Zamfara and Kebbi State to make a total of 700 sample size for characterization of domestic donkeys in North-West Nigeria using coat colour and hair types among Red (Auraki), Black (Duni), White (Fari) and Brown (Idabari) strains of donkeys. Coat colour and hair types of donkeys was tabulated using frequency procedure while their distribution was tested using Chi Square of SAS. Distances were used to construct a dendogram using the Unweighted Pairs Group Method Analysis implemented in R 2.13.0. Coat colours and hair types were significantly ($P<0.01$) distributed among donkeys in the studied population. The most prominent coat colour observable among donkeys in North West of Nigeria was Brown (86%) with confidence level between 85 and 87%. The most occurring hair type was short-smooth (75%) with confidence interval between 71 and 78%. The other variants of coat colours were short-rough (14%) and long-curly (11%). Two major clusters were formed. The first cluster showed close relationship between Red (Auraki) and Black (Duni) donkeys. The second cluster was further divided into two sub-groups with Brown (Idabari) as leader and White (Fari) as joiner. The dendogram indicated that the Idabari-Fari was more closely related with Idabari than with Fari and also indicated that Auraki and Duni are closer and similar for hair type but are distant from Idabari, Idabari-fari and Fari. Apart from coat colour, classification of donkeys on the basis of hair type should be developed using morphological, biochemical and molecular techniques.

INTRODUCTION
The population of donkeys is on the increase in Africa, and the animals are increasingly becoming important in transportation of farm produce (Blench, 2004). Evidence from mitochondrial DNA studies has confirmed that the present day domestic donkey originated in Africa rather than in Asia (Beja-Pereira *et al.*, 2004). There are four major strains of donkeys in Northwest Nigeria which are clearly identified by their coat colours:Brown (Idabari), Red (Duni), Black (Duni) and Fari (White). Brown (Idabari) strain is the most popular donkey strain among the smallholder farmers and was reported by (Blench, 1990) to costs higher than the other strains.Morphological characters are expected to provide useful information for detection of genetic relationships among strains in different domesticated animal species (Herrera *et al.*,1996). This study is therefore aimed at characterization of domestic donkeys in North-West Nigeria using coat colour and hair types among Red (Auraki), Black (Duni), White (Fari) and Brown (Idabari) strains of donkeys.

MATERIALS AND METHODS
One hundred donkeys were sampled from each of Sokoto, Jigawa, Kano, Katsina, Kaduna, Zamfara and Kebbi State to make a total of 700 sample size. These States in North West Nigeria were selected for this study because of existence of high population of donkeys. All the three senatorial zones in each of the seven States were covered in this study.Thirty-three (33) donkeys were randomly selected from two different senatorial zone, while thirty-four (34) donkeys were randomly sampled in third senatorial zone in each of the 7 States.

Donkeys sampled were grouped into five (5) on the basis of coat colour, which are Red (Auraki), Black (Duni), White (Fari), Brown (Idabari) and brown-white (Idabari-Fari). Distribution of hair type of donkeys was classified into three, which are short-smooth, short-rough and long-curly. Coat colour and hair types of donkeys was

tabulated using frequency procedure while their distribution was tested using Chi Square of SAS (SAS, 2004). Distances were used to construct dendogram using the Unweighted Pairs Group Method Analysis implemented in R 2.13.0 (R Development Core Team, 2015) package TREE procedure that prints the dendogram based on the distances between the clusters was introduced in PROC CLUSTER procedure.

RESULTS AND DISCUSSION

The distribution of coat colour and hair types among donkeys in North West Nigeria is shown in Table 1. Coat colours and hair types were significantly ($P<0.01$) distributed among donkeys in the studied population. The most prominent coat colour observable among donkeys in North West of Nigeria is Brown (86%) with confidence level between 85 and 87%. The keepers of these donkeys tagged the brown coloured strain as Idabari. The other strains are Black, White, Brown-White and Red, which were tagged as Duni, Fari, Idabari-Fari and Auraki, respectively. The most occurring hair type was short-smooth (75%) with confidence interval between 71 and 78%. The other variants of coat colours were short-rough (14%) and long-curly (11%).

The distribution of coat colour obtained in this study agreed with the findings of Blench *et al.* (1990) that Idabari strain (brown donkey) is the most popular donkey strain among small holder farmers in Nigeria. The preponderance of short-smooth hair type over short-rough and long-curly reported by Yakubu *et al.* (2010) was similar with the trend observed in this study. The propensity towards smooth hair structure could be an advantage as it provides a medium for conventional heat loss from the animal body surface from the tropical environment. This is supported by the assertion that hair structures have an important role to play in the adaptability of animals to different ecological zones (Banerji, 1984).

Figure 1 showed the dendogram of clustering of donkey strains on the basis of their hair types. Two major clusters were formed. The first cluster showed close relationship between Red (Auraki) and Black (Duni) donkeys where the two strains were shown to existed at the node on a distance of zero platform and were farther from node containing second cluster. The second cluster was further divided into two sub-groups with Brown (Idabari) as leader and White (Fari) as joiner. The dendogram indicated that the Idabari-Fari was more closely related with Idabari than with Fariand also indicated that Auraki and Duni are closer and similar for hair type but are distant from Idabari, Idabari-fari and Fari.

CONCLUSION AND RECOMMENDATIONS

Donkeys in North West Nigeria were differentiated into two major clusters on the basis of their hair type. Apart from coat colour, classification of donkeys on the basis of hair type should be developed using morphological, biochemical and molecular techniques.

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Table 1: Distribution of coat colour and hair types among donkeys in North West Nigeria

Characteristics	N	Variants	Frequency (%)	Confidence level (%)	Chi-square value	LOS
Coat colour	700	-	100		2044.01	**
		Brown	86	85-87		
		Black	5	3-7		
		White	4	3-6		
		Red	2	0.1-1		
		Brown-white	3	2-4		
Hair type	700	-	100		555.53	**
		Short-smooth	75	71-78		
		Short-rough	14	11-16		
		Long-curly	11	8-13		

LOS= Level of significance, N = Number**P<0.01.

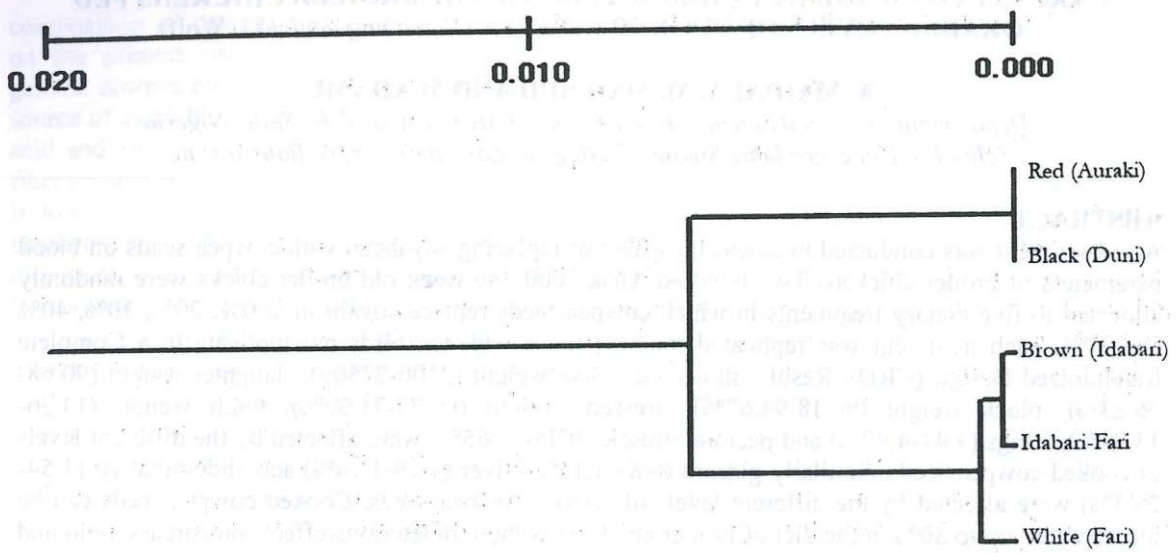


Figure 1: Dendogram showing relationships clustering of strains of donkeys based on hair type