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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

Qualitative Traits Characterization of Yoruba and Fulani Ecotype Indigenous Chickens in Derived Savannah Zone of Nigeria

A.O. Ige¹, A.E. Salako², A. Yakubu³ and S.A. Adeyemi⁴

¹Department of Animal Nutrition and Biotechnology, Ladoké Akintola University of Technology, Ogbomoso

²Animal Breeding and Genetics Unit, Animal Science Department University of Ibadan, Ibadan, Nigeria

³Department of Animal Science, Nassrawa State University, Lafia, Keffi, Nigeria

⁴Department of Biological Sciences, Al-Hikmah University, Ilorin, Nigeria

Abstract: Qualitative traits characteristics of indigenous Chickens in derived savannah Zone of Nigeria were studied. A total of two thousand and forty one (2,041) indigenous chickens comprising 1274 Yoruba Ecotype Chickens (YEC) and 767 Fulani Ecotype Chickens (FEC) were sampled for the study. Traits studied included Sex, Comb Size, Wattle Size, Comb Type, Ear lobe Colour, Feather Structure, Plumage and Comb Colour. The result indicated that female chickens dominated the two Ecotypes with 52.04% in YEC and 52.28% in FEC. Highest percentage of Large Comb Size was observed for male chicken in both ecotypes: 67.57% in YEC and 71.32% in FEC. Three types of wattle size were observed in the two populations (Small, Medium and Large). Proportion of Large Wattle size favoured male chickens (YEC: 51.13%, FEC: 49.38%) in both populations. Three different types of comb (Single, Rose and Pea) with Single Comb type dominant over others (94.29% in YEC and 80.44% in FEC). Three colour patterns of ear lobe were observed in YEC with White Ear Lobe (69.07%) dominated the population while five colour patterns were observed in FEC with Red Ear lobe (74.97%) dominated. Three feather structure (Normal, Frizzled and Naked Neck) pattern were observed in the two populations, Normal type had the highest percentage (YEC: 83.99%, FEC: 83.05%). Plumage colour varied widely, six different types were observed in YEC and mixed colour had the highest percentage (31.4%) followed by dominant black (25.69%) while Eight different types of plumage colour were observed in FEC in which black colour (31.55%) had the highest percentage. The study revealed a wide variation in some of the traits, therefore future study can be concentrated on selection for qualitative traits of interest.

Key words: Qualitative traits, indigenous chickens, derived savannah zone and ecotype

INTRODUCTION

Nigeria indigenous chickens are under extensive and semi extensive system of husbandry with little or no input and they are widely distributed in rural areas of the country as a source of protein and income to poultry farmers. They also contribute substantially not only to rural economies but also to the gross national product (Momoh *et al.*, 2007). They equally play a key role within the context of many social events (Special banquets for family for distinguished guests, cocks as alarm clocks) and religions ceremonies (Cocks as offerings to the deities). There are no cultural or religions taboos of any kind relating to the consumption eggs and poultry meat. However, they are characterized with low output in terms of egg and meat production simply because they have not been improved genetically for any of the traits. Genetic improvement is the systematic exploitation of genetic variation of important traits among individual within or between breeds and has been considered as high priority in poultry development project (Branchaert *et al.*, 2000). Genetic improvement can take many forms

but generally and logically an ordered hierarchy of events thus starts from characterization studies. Several workers have reported on unique adaptive features of Nigerian local chicken which include small body size, multicoloured plumage colour, presence of major gene affecting feather structure and feather distribution (Adebambo *et al.*, 1999; Orheruata *et al.*, 2004). Little information on qualitative variation are available on the native chickens in the derived savannah zone of Nigeria. Such variation within and between ecotypes gives room and opportunity for breeding and selection. Yoruba and Fulani ecotype chicken are the most popular types of chicken in derived savannah zone of Nigeria and thus investigated for variation in qualitative characteristics.

MATERIALS AND METHODS

The study was carried out Ogbomoso, Nigeria. Geographically Ogbomoso lies within the derived savannah region on longitude 4°15' East of Greenwich meridian and latitude 8°7' North of the equator. It is about 145km North East of Ibadan, the capital of Oyo

state. It is between 300 and 600 meters above sea level and with annual temperature and rainfall of 27°C and 1247mm respectively (Oguntoyinbo, 1978).

Animals and management: The Nigerian indigenous chickens found in the study area are the Yoruba Ecotype and Fulani ecotype. The chickens were maintained under the traditional and semi-intensive system of Animal husbandry where they scavenge for most of their feed resources such as crop residues and kitchen waste with little or no grain supplement. They were partially housed their owners' compound and usually released in the morning.

Data collection: Data were collected from a total of two thousand and forty one chickens comprising one thousand two hundred and seventy four Yoruba Ecotype chickens and seven hundred sixty seven Fulani ecotype chickens from purposively selected villages in Ogbomoso. The qualitative traits studied were; sex, comb size, wattle size, comb type, Ear lobe colour, feather structure and plumage colour. Simple visual appraisal was employed in the study.

Statistical analysis: The data were analyzed using descriptive statistics (SPSS, 2000) to generate tables and percentage distribution of the traits.

RESULTS

The summaries of frequency distribution of qualitative traits studied were presented on Table 1. Percentage of male (52.04%) sample was more than female (47.96%) in Yoruba ecotype chickens, so also in Fulani Ecotype Chicken: Male (52.25%) and female (47.72%). Three type of comb sizes were observed in the two populations, small, medium and large comb size. Highest percentage of large comb size was observed for male chickens in both ecotypes; (67.57%) for Yoruba ecotype and (71.32%) for Fulani ecotype while highest percentage of small comb size was observed for female chickens in both ecotypes. The same pattern of frequency distribution was observed for wattle size as three types were observed, small, medium and large wattle. Proportion of large wattle size was high in male chickens than female in both ecotypes; likewise proportion of small wattle size was high in female chickens in both populations. Three different comb types (Single, Rose and pea) were observed in the two populations. Single comb type dominated the two populations with (94.29%) in Yoruba Ecotype and 80.44% in Fulani ecotype population. Three colour patterns were observed were observed for ear lobe in Yoruba ecotype (Red, white and Ash) and white ear lobe colour (69.07%) dominated the population. While five colour patterns were observed in Fulani ecotype (Red, white, ash, brown and yellow), Red ear lobe colour (74.97) equally dominated the population.

Three feather structure (Normal, frizzle and Naked week) pattern were observed in the two population. Normal type (83.99%) had the highest percentage followed by Naked Neck (8.79%) and frizzle type (7.22%) in Yoruba ecotype. So also in Fulani ecotype, normal feather type (83.05) dominated the population followed by frizzle (10.17%) and Nike Neck type (6.78).

Six different types of plumage colour were observed in Yoruba ecotype. Mixed colour (31.40%) had the highest percentage followed by dominant black (25.69%), dominant white (15.07%), dominant Ash (9.42%), dominant Ash (9.42%) and dominant Red (9.11%). Eight different plumage colour patterns were observed in Fulani Ecotype chicken. Black (31.55%) had the highest frequency followed by white (20.60%), mixed colour (13.30%) and least was observed for yellow (2.35%).

DISCUSSION

Qualitative traits are important tools for characterization (Egahi *et al.*, 2010; Faruque *et al.*, 2010; Adebambo *et al.*, 1999; Ikeobi *et al.*, 2001) and therefore traits such as comb size, wattle size, comb type, Ear lobe color, feather structure and plumage colour were evaluated in Yoruba and Fulani ecotypes of chicken. Percentage distribution of females were generally high than male chickens in two populations, this is in line with what is expected in a natural breeding flock, in addition there is a social factor that allows the best animals usually males to be preferentially selected for culling during festive period and do command higher price for income generation. This is in line with reports of Egahi *et al.* (2010), Ige *et al.* (2009), Fayeye *et al.* (2006), Faruque *et al.* (2010). It however contradicts with the work of Otchere *et al.* (1990) who reported that both males and females native chickens and other poultry species were sample in equal number in their study. It also in line with work of Orheruata *et al.* (2004) who reported higher percentage for female (62.4%) and lower percentage for male (37.6%) in their study.

Three type of comb sizes (Small, medium, large) observed in this study in agreement with work of Orheruata *et al.* (2004), Faruque *et al.* (2010). The high frequency of large comb size associated with male chicken in both populations; 67.57% for Yoruba Ecotype and 71/32% for Fulani Ecotype indicated that the trait exhibit sexual dimorphism. According to Nesheim *et al.* (1979), the size and colour of the combs and wattles are associated with gonad development and secretion of sex hormones. Large combs and wattles and long legs are important morphological traits that allow better heat dissipation in the tropical hot environment. This is also in support of Nesheim *et al.* (1979) who noted that these specialized structure makes up about 40% of the major heat losses, by radiation, convection and conduction of heat produced from body surfaces. Horst (1989) noted that gene coding for these traits are not major genes but the result of multiple genes and their interactions could

Summary of frequency distribution of qualitative traits

Traits	Yoruba ecotype chicken (No.)	Frequency (%)	Fulani ecotype chicken (No.)	Frequency(%)
Sex				
Male	611	47.96	366	47.72
Female	663	52.04	401	52.28
Total	1274	100	767	100
Comb size (Male)				
Small	103	15.54	78	19.45
Medium	112	16.89	37	9.23
Large	448	67.57	286	71.32
Total	1274	100	767	100
Comb size (Female)				
Small	458	74.96	206	56.28
Medium	56	9.17	73	19.95
Large	97	15.88	87	23.77
Total	1274	100	767	100
Wattle size (Male)				
Small	170	25.64	78	19.45
Medium	120	18.1	125	31.17
Large	339	51.13	198	49.38
Total	1274	100	767	100
Wattle size (Female)				
Small	520	85.11	212	57.92
Medium	55	9	101	27.6
Large	94	15.38	53	14.48
Total	1274	100	767	100
Comb type				
Single	1201	94.27	617	80.44
Rose	35	2.75	87	11.34
Pea	38	2.98	63	8.21
Total	1274	100	767	100
Ear lobe colour				
Red	346	27.16	143	18.64
White	880	69.09	535	69.75
Ash	48	3.77	80	10.43
Brown	-	-	3	0.39
Yellow	-	-	6	0.78
Total	1274	100	767	100
Feather structure				
Normal	1070	83.99	637	83.05
Frizzle	92	7.22	78	10.17
Naked Neck	112	8.79	52	6.78
Total	1274	100	767	100
Plumage colour				
White	192	15.07	158	20.6
Black	327	25.67	242	31.55
Brown	119	9.34	82	10.69
Ash	120	9.42	50	6.52
Multicoloured	400	31.4	102	13.3
Red	116	9.11	93	12.13
Yellow	-	-	18	2.35
Whitish brown	-	-	22	2.87
Total	1274	100	767	100
Comb colour				
Red	1274	100	767	100

be considered for incorporation into the development of local ecotypes for the tropical hot environments.

Three types of wattles sizes were also observed (Small, medium, large) and the pattern of distribution also followed similar trend with comb size. Large wattle size equally dominated female chicken in the two populations; 85.11% for male Yoruba ecotype and 57.92% for male Fulani Ecotype. As earlier noted wattle

plays a large role in sensible heat losses which conforms to the report of Nesheim *et al.* (1979).

Three types of comb types were observed in the two populations (Single, rose and pea). Single comb type (94.29%) was predominant followed by pea (2.75%), rose (2.95%) in Yoruba ecotype and 80.44%, 11.34% and 8.21% respectively in Fulani ecotype, this observation contradict work of Egahi *et al.* (2010) who

reported presence of walnut comb type in their study and Badubi *et al.* (2007) who reported both walnut and multiple comb types in their study too however it agrees with the report of other workers; Morathop *et al.* (2007) Orheruata *et al.* (2004) and Faruque *et al.* (2010).

White ear lobe colour predominant in the two populations followed by red and ash while two other types brown and yellow ear lobe were in addition found in Fulani thus indicating that Fulani ecotype varied widely than Yoruba ecotype in ear lobe colour. Morathop *et al.* (2007) reported that red ear lobe colour dominated upper north Thailand chicken population. Egahi *et al.* (2010) reported result similar to this study so also Faruque *et al.* (2010).

Percentage distribution of Normal feather structure was more than that of Naked Neck and frizzled feather in the two population, this result agrees with the work of other researchers in literature, Sonaiya and Olori (1990), Sonaiya (2003), Ikeobi *et al.* (1997) and Orheruata *et al.* (2004). It however contradict work of Badubi *et al.* (2007) who reported six types of feather structures; normal, Crested, Naked Neck, frizzle, Rumpless and Creeper type in indigenous chickens of Botswana. The low occurrence of Naked Neck and Frizzled feather at the expenses of Normal feather suggest a negative selection against the genotypes in the two populations by the poultry keepers. Sonaiya (2003) adduced reasons for this negative selection that in his interaction with local poultry keepers, it was revealed that a lot of social and traditional values are placed on Naked Neck and frizzled father chickens. He stated that they are useful in rituals and sacrifices. Sonaiya and Olori (1990) equally opined that farmers see frizzled and Naked Neck chickens as ugly and irritating and that Naked neck chickens are to be raised only by old people and for occultic purposes. However, the perception by the farmer is majorly due to ignorant as most local poultry keepers are illiterate and are not aware of genetic potentials of raising chickens with major genes. Genetic improvement of heat tolerance chicken can be achieved through incorporation of Naked neck gene as chicken suffer high ambient temperature because their feather coverage hinders heat dissipation leading to elevated body temperature and in turn cause low production performance especially in tropics. Horst (1989) opined that the incorporation of such gene could be significant in the development of appropriate breeds and strains for small holder poultry production in tropics.

Six plumage colour patterns (white, black, brown, ash, mixed colour and Red) were observed in Yoruba ecotype chicken while Yellow and whitish brown were in addition found in Fulani Ecotype, the two populations varied widely in plumage colour. This result is in line with work of other researchers (Duguma, 2006, Adebambo *et al.*, 1999; Odubote, 1994; Ozoje *et al.*, 1999). Duguma (2006) reported very diverse plumage colouration in

indigenous chickens of Ethiopia and concluded that plumage colouration is adaptive features that aid for camouflage against predator, Odubote (1994) reported similar observation in Nigerian indigenous chickens that diverse plumage colour is an adaptability and survival feature. Function of plumage colour goes beyond camouflaging. Ensm Nger (1992) reported that plumage colours such as white or colour is an important factor in breeding, particularly in meat type chicken because they are easier to pick clean and preferred for appearance of carcass and cut up parts, thus, have market implications. Adebambo *et al.* (1999) noted that colour specificity for strains and functional identification has been in practice in advanced country. Nwosu *et al.* (1985) had earlier noted that multicolour variation is a result of lack of conscious selection of breeding programmes directed towards choice of colour in Nigeria indigenous chickens. However, plumage colour heterogeneity is among the traits that characterize Nigeria the indigenous chicken and thus regarded as reservoir of gene pool for conscious selection and breeding programmed for a desired trait.

Red comb colour dominated the two populations which conform to the literature works (Duguma, 2006 and Faruque *et al.*, 2010). Conclusively, the two populations studied are generally heterogenous with respect to all the traits investigated.

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