

POLYDACTYLISM IN NIGERIAN MUSCOVY DUCK (*Cairina moschata*)

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Polydactylism is one of the mutant traits of the limbs in farm animals. The incidence of polydactylism in Muscovy duck (*Cairina moschata*) in Nigeria is reported in this study. Only one (1) female Muscovy duck was found expressing the trait out of 1020 adult males (287) and females (733) sampled in three agro-ecological zones in Nigeria. The observed (0.098%) and calculated (0.0005) gene frequencies of polydactyly were highly ($P < 0.001$) significantly different to the expected.

Keywords: Mutant trait, Nigeria, polydactyly.

Polydactylism also known as polydactyly, polydactylia or hyperdactyly refers to the presence of more than normal number of digits on the limb (depending on the species under investigation). This mutant trait is one of the common deformities of limb in man and animals. Expression of supernumerary toes has been reported in man (Zguricas *et al.*, 1999) and some mammalian species such as pig (Huston, 1993), goat (Al-Ani *et al.*, 1997; 1998), cattle (Johnson *et al.*, 1981), Arctic foxes (Gugolek *et al.*, 2011), guinea pigs (Pictet, 1932), mouse (Sweet and Lane, 1980), horse (Colbourne *et al.*, 1991) and dogs (Jubb *et al.*, 1995).

Among poultry species, the incidence of extra toe has been widely reported in various breeds of chicken and its association with metric traits has also been documented (Fayeye *et al.*, 2006; Ikeobi and Godwin, 1999; Lowe *et al.*, 1965; Shoffner *et al.*, 1993; Somes and Jakowski, 1974). In addition, the occurrence of foot digits in excess of four has been reported as breed characteristics of Houdans, Dorkings and Silkies breeds of chicken (Landauer, 1948). The common type of polydactylism (five-toed condition) in chicken is expressed

unilaterally (expression of extra digit on left or right foot alone) or bilaterally (incidence of extra digit on the two feet) in the affected chickens.

As far as this author knows, report on incidence of supernumerary toe in Muscovy ducks is practically non-existing. The incidence of polydactylism in Muscovy duck is hereby reported.

MATERIALS AND METHODS

Study area

Survey on phenotypic characterization of Muscovy duck in Nigeria was conducted in three agro-ecological zones in Nigeria; namely: Rain Forest, Derived Savanna and Guinea Savanna. The prevailing climatic conditions of the study area have been extensively described by Oguntunji (2013) and Yakubu (2011).

Experimental animals and data collection

The survey covered 1,020 adult, random mating, non-descript Muscovy ducks in Nigeria comprising 287 males and 733 females. They were mainly reared extensively with little or no supplementation. Each sampled duck was physically examined for non-expression or expression of supernumerary digit (polydactyly). The sex and mode of expression (unilateral or bilaterally) of the affected duck was noted.

Statistical analyses

Chi-square analysis was used to test the observed number of polydactylous ducks against the expected Mendelian values (25% and 75%, respectively for absence and presence of polydactyl trait) while Hardy–Weinberg Principle (Falconer and Mackay, 1996) was used to estimate gene frequency of recessive gene (po/po):

$$q = \sqrt{m/t}$$

Where

q = frequency of recessive gene (po)
 m = number of non-polydactylous
 Muscovy ducks (genotype
 po/po)
 t = total number of Muscovy ducks
 sampled (polydactylous (Po/- and
 non polydactylous).

RESULTS

Polydactyly was unilaterally expressed on the left foot of a female Muscovy duck just above the fourth toe (Figure 1). The observed frequency of occurrence (0.098) and gene frequency (0.0005) of polydactyl were very low and highly significantly ($P < 0.001$) different from the expected (Table 1).



Fig. 1: Leg of an adult female Muscovy duck showing incidence of polydactylism.

The extra digit is marked with a red arrow just above the first toe

DISCUSSION

Scarcity of related studies on incidence of polydactylism in Muscovy and common (*Anas platyrhynchos*) ducks did not permit head-to-head comparison with the results of the present study. However, the observed

low frequency of this trait in Muscovy ducks in Nigeria agrees with the previous reports on Nigerian local chickens (Ikeobi and Godwin, 1999; Fayeye *et al.*, 2006; Oguntunji *et al.*, 2007; Fajemilehin, 2011). Ikeobi and Godwin (1999) postulated natural selection and social preference against polydactylous fowls due to their small body size while Fayeye *et al.* (2006) suggested selection for supernumerary-toed chickens because of their improved body weight relative to their normal counterparts.

The low frequency of occurrence of this mutant trait in Nigerian Muscovy duck might be attributed to the widely reported low penetrance of this gene as reported for chickens. Several pioneer workers (Bond, 1926; Punnet and Pease, 1929; Warren, 1944) have studied the inheritance of five-toed condition as found in some standard breeds of poultry and concluded that the gene controlling its expression behaved as an autosomal dominant, and that some individuals carrying the gene failed to express the gene (incomplete penetrance). A possible non genetic factor for its low frequency in the studied population could probably be attributed to its non-relevance with economic traits in Muscovy ducks.

The affected female duck was bought from the owner and kept in the duck pen of the University with the aim of mating it with male in order to establish inheritance pattern and mode of expression of polydactyly in Muscovy ducks. Unfortunately the bird escaped even before radiographical analysis could be performed for comprehensible examination.

Table 1: The incidence and gene frequency of polydactylism in Nigerian Muscovy duck

Phenotype	Genotype	Sex		No. of ducks	Obs. freq. (%)	Exp. freq. (%)	Cal. gene freq.	Exp. Gene freq.
		Male	Female					
Polydactylous	Po/ -	0	1	1	0.098 ^a	75	0.0005 ^a	0.75
Non Polydactylous	po/po	287	732	1019	99.902 ^b	25	0.9995 ^b	0.25
Total		287	733	1020				

^{ab}Values with different superscripts in the same column are highly significantly different ($P < 0.001$)

CONCLUSION

Further investigations under controlled environment are needed to establish inheritance pattern and expressivity of this mutant trait in Muscovy ducks.

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