

CHARACTERIZATION OF MUSCOVY DUCK (*CAIRINA MOSCHATA*) AND MALLARD DUCK (*ANAS PLATYRHYNCHOS*) USING POLYACRYLAMIDE GEL ELECTROPHORESIS

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ABSTRACT

The study investigated the genetic variations of Muscovy and mallard duck serum protein polymorphism. Blood sera from muscovy and mallard ducks were analyzed using 10% Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE) for genetic characterization. After the electrophoretic separation, the gel was stained, de-stained, scored and analyzed using PAST software for genetic relationship between the species. Result generated different sub-clusters within each species based on their degree of distance with muscovy having 3.4% and mallard with 3.0%. The pooled data showed 4.0% genetic distance between the species. The present study revealed approximately 96% genetic similarities between muscovy and mallard ducks that have implication on their hybridization.

Keywords: Duck, Muscovy, Mallard, Electrophoresis

INTRODUCTION

Duck is considered as the third most widely distributed poultry after chicken and guinea fowl being the second in Nigeria. Muscovy duck was reported to account for 10% of local poultry population and 74% of duck raised in Nigeria (Adeola *et al.*, 2021). Importantly, two breeds of ducks are found in Nigeria with their crosses; that is, muscovy duck, *Cairina moschata* and mallard duck, *Anas platyrhynchos*. (Suliman, 2010). The breeds differ in size, plumage and other features (Adesope and Nodu, 2002). They are hardy, less susceptible to diseases than chicken and quite promising among indigenous poultry species because of their rapid growth rate and carcass of their drakes (Duru *et al.*, 2006). They also have the ability to withstand extremely hot ambient temperatures than chickens (Obinne, 1997). However, duck represent the second largest population in Africa after chicken. The local ducks (*Cairina moschata*) in Nigeria constitutes about ten percent of the local poultry population (Oluyemi and Ologbobo, 1997). There are two breeds of ducks found in Nigeria together with their crosses.

Muscovy and mallard ducks are commonly called local and exotic duck respectively and represent the most common genera of ducks reared in Nigeria. Muscovy duck is more numerous with its presence all over the country (Nwanta *et al.*, 2006; Adeyemi *et al.*, 2008); constituting 74 % of all ducks in Nigeria (Adesope and Nodu, 2002). This indigenous waterfowl is concentrated mostly in rural areas in the hands of small-holders. This present study was designed to evaluate genetic relationship between the muscovy and mallard duck breeds in Nigeria using blood serum proteins.

MATERIALS AND METHODS

Samples and Location

Ten (10) samples each of muscovy mallard ducks were obtained from southwestern Nigeria for the study. Blood was drawn from veins on the wings of the duck using a 2ml hypodermic syringe and needles. Blood sample was gently released into a serological glass tubes containing normal saline (0.9% NaCl), and kept for an hour at ambient temperature. After an hour, the formed blood clot was removed and the samples were centrifuged for 10 minutes at 2,500rpm. The sera were then stored in a refrigerator at 4°C before electrophoretic analysis.

Electrophoresis

The analysis was discontinuous, and 10% resolving gel was prepared (10g of SDS/90ml in distilled water) at pH of 8.8; and 4% stacking gel at pH of 6.8, were used to cast the gel following (15) and (16). In brief, blood samples were denatured in a sample buffer of 7.5% β -mercaptoethanol (SIGMA) by heating at 95°C for 5 min. 10 ml of the mixture was then loaded using micropipette into the wells of the casted gel and proteins were separated at constant 150V for an hour with the aid of Bio-Rad Mini Protean II Cell and its electrophoresis power supply kit (Model 200/2.0). After the electrophoretic separation, the gel was gently removed from the kit and placed into a staining solution made up of 0.1% Coomassie Blue in 1:4 glacial acetic acid: methanol for about 2-3 hours. Thereafter, the gel was then de-stained in a 60% solution containing 1:4 glacial acetic acid: methanol. The analysis was repeated for constancy of protein pattern. Gels were then scored based on the intensity of the protein bands.

The signs “+” and “-” represent the presence and absence of band respectively. The sign “++” indicates strong presence of band thickness more than single “+”. The data generated from the scoring were subjected to clustering algorithm analysis the Unweighted Pairgroup average algorithm (UPGMA) of PAleontological Statistics (PAST) software for similarity association between the samples. The relative mobility of the protein band was also evaluated following Caprette (2005).

RESULTS AND DISCUSSION

Figure 1 and 2 show the UPGMA-dendrogram generated by PAST clustering algorithm for the genetic distance between the local and exotic ducks. The figure revealed different sub-clusters based on their degree of distance with local ducks having 3.4% and exotic with 3.0%. Figure 3 depicts the comparison of the pooled data of local duck and the exotic with 4.0%. Though few previous studies were mostly on morphometric within the different species of ducks (Kaushik, 2021; Veeramani *et al.*, 2004) and blood protein polymorphism (Oguntunji and Ayorinde); the present study revealed approximately 96% genetic similarities in both local and exotic breeds of the studied ducks, that may lead to differences in their morphology for within and between the breed; and also confirming common ancestry in their evolutionary trend.

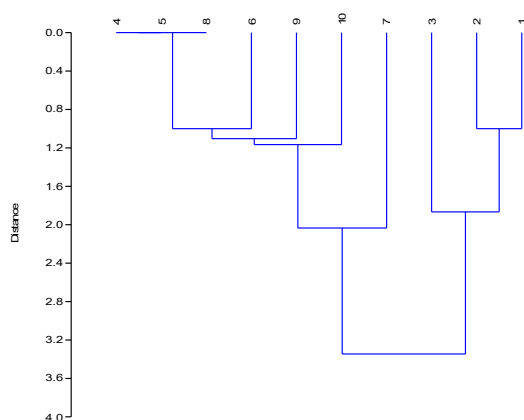


Figure 1: Dendrogram generated by PAST clustering algorithm (UPGMA) for genetic distance within muscovy dusks. 1-10 depict individual duck.

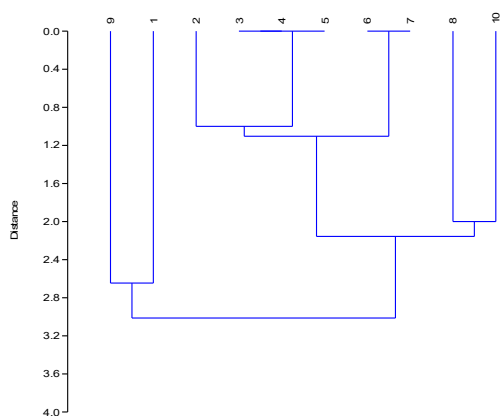


Figure 2: Dendrogram generated by PAST clustering algorithm (UPGMA) for genetic distance within mallard dusks. 1-10 depict individual duck.

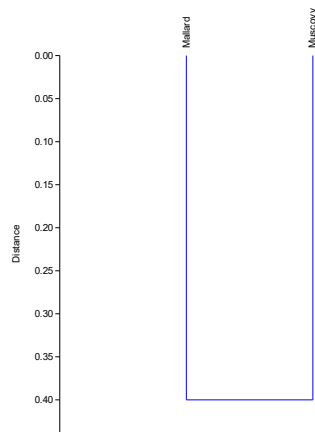


Figure 3: Dendrogram generated by PAST clustering algorithm (UPGMA) for genetic distance between the local and exotic chicken.

CONCLUSION

The present study has revealed the level of relationship between the individual local and exotic breeds serves as indicators for successful hybridization between the two breeds. However, further studies are recommended to investigate the relationship based on DNA analysis.

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