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Phenotypic Characterization According to The Feather Color of Indigenous Muscovy Ducks Bred in The Back Yard in Brazzaville, The Congo

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Abstract. In Congo, waterfowl genetic resources are constituted by native population of Muscovy ducks that play an important role in food security. The present study aimed to identify and to characterize strains bred in the back yard in the households in Brazzaville. A sample of 154 households drawn over seven districts of Brazzaville was enrolled in the survey. Adults ducks found in the households were identified, pictured by a key of determination and then compared by using the multi resolution analysis image method. The survey recorded 13 strains in which four were considered as newly since they have never been reported elsewhere. These strains received temporally the name of the districts where they have been identified for the first time Makélékélé 1 (0.34%, n=6), Makélékélé 2 (0.11%, n =2), Poto poto 1 (0.28%, n=5) and in Poto poto 2 (0.11%, n=2). Finally, the survey reported nine classical strains such as black plumage, duclair, white, tortora, sepia, chocolate, lavender, grey and canizie. The apparent wide variation in plumage colors is an indication that the duck populations have not been 'purified' through selective breeding. In the context of the valorization of poultry biodiversity, this work represents a step toward a better knowledge of the production abilities of local ducks breeds in Congo.

Key words: Muscovy ducks, color feather, strains, Congo.

Abstrak. Sumber daya genetik unggas air di Kongo mencakup populasi itik lokal yang memegang peranan penting dalam ketahanan pangan. Penelitian ini bertujuan mengidentifikasi dan menggolongkan jenis itik yang dipelihara di pekarangan rumah di Brazzaville. Sampel penelitian menggunakan 154 responden rumah tangga yang tersebar di 7 wilayah Brazzaville. Itik dewasa diidentifikasi dari pekarangan, dan dibandingkan dengan metode Analisis Multi Resolusi. Survey mencatat 13 jenis peranakan, 4 diantaranya dianggap baru karena belum pernah dilaporkan di studi manapun. Jenis ini sementara dinamai sesuai distrik tempatnya pertama ditemukan, yaitu Makélékélé 1 (0,34%, n=6), Makélékélé 2 (0,11%, n =2), Poto poto 1 (0,28%, n=5) dan di Poto poto 2 (0,11%, n=2). Berdasarkan survei didapatkan sembilan jenis klasik yaitu bulu hitam, duclair, putih, tortora, sepia, coklat, lavender, abu-abu dan canizie. Banyaknya ragam warna bulu adalah indikasi bahwa populasi itik belum "dimurnikan" melalui seleksi. Dalam konteks penetapan nilai keanekaragaman hayati unggas, penelitian ini mewakili sebuah langkah menuju pengetahuan yang mendalam akan kemampuan produksi itik yang berkembang di Kongo.

Kata kunci: itik Muscovy, warna bulu, strain, Kongo

Introduction

Animal genetic resources are crucial to all future developments and adaptations, and they carry an international obligation to conserve certain characteristics for sustainable and

future use (FAO 2007). Therefore, local animal diversity such as indigenous waterfowl is necessary to be identified and adapted to future markets, production systems, and available feed resources. Over more than 150 genera of waterfowl, the common duck and the

Muscovy duck are the two most species of farmed ducks reared throughout the world.

All breeds of common duck originate from domestication of the mallard duck (*Anas platyrhynchos*) and they are present principally on the Asian market as well as in Europe and the USA. A number of breeds of common ducks have been selected for meat or egg production. The Rouen, the Aylesbury and the Khaki Campbell are laying ducks whereas the Pekin duck is currently the most popular common duck in commercial meat production (INRA, 1990).

The Muscovy duck (*Cairina moschata*) is a roosting duck originating from the tropical regions of Central and South America. This species has supplanted the common duck in several countries in the world. The Muscovy duck was domesticated by the Colombian and Peruvian Indians and then introduced to the old World by the Spanish and the Portuguese in the 16th century. Under natural conditions, the Muscovy duck is a tropical bird and lives in marshy forests (INRA, 1990)

Cross breeding between the two species involving the Muscovy drake and the common female has resulted in a hybrid called the mule duck, which is reared for the production of "foie gras", but also kept for meat production. The intercross is a sterile hybrid because of the difference in chromosome sizes and number between the two parents (INRA, 1990).

Recently, Yakubu (2013) reviewed Muscovy ducks traits and found a large variation in phenotypic and biochemical characteristics in indigenous Muscovy population. In this review study, on the basis of phenotypic traits, Raji et al. (2009) reported four plumage colors in Muscovy ducks in the northern part of Nigeria namely multicolored (36.9%), white (30.6%), black (6.4%) and black and white (26.1%).

In Vietnam, there are three native Muscovy duck breeds, named according to their feather color: "Re" (white color) , "Trau" (black color)

and "Sen" (mixed white and black color) (NIAS, 2004).

In India, Banerjee and Banerjee (2003) reported two strains of Muscovy, the Black Muscovy and White Muscovy ducks. Presently a detailed study is being conducted by the same authors to develop a strain of broader duck (mule duck) in the region. Reports on availability of Muscovy in this part of the subcontinent are lacking.

Migliore et al. (1988) gathered many works on feathered color from USA, Italia and France. The above work included various Muscovy ducks strains such as feathered black, black and white, sepia, chocolate, Duclair and atypic. In Congo although duck is the second birds breed in backyard, next to the chicken, the productivity is still very low (Banga-Mboko et al., 2008).

The black feathered Muscovy duck is the most widespread genetic resource. There may also exist other strains that have never been described which can serve as a basis for genetic improvement (Banga-Mboko et al., 2007). Consequently, characterization of indigenous ducks constitutes one of the priorities in food security research in Africa (FAO, 2011) mainly in Congo, where there is a lack of information regarding what and how to conserve, develop, and select among local ducks. Therefore, the main objective of the present study was to identify and to characterize the potential genetic of Muscovy ducks in Congo.

Materials and Methods

Study Area. The study was carried out in Brazzaville (Figure 1), located in the southern part of the Congo, 04°15' from southern latitude and 15°15' of longitude. Brazzaville has 1.500.000 inhabitants and covers 17,000 ha with more than 30 km stretching along the Stanley Pool on the right bank of the Congo River (Samba-Kimbata, 1978).

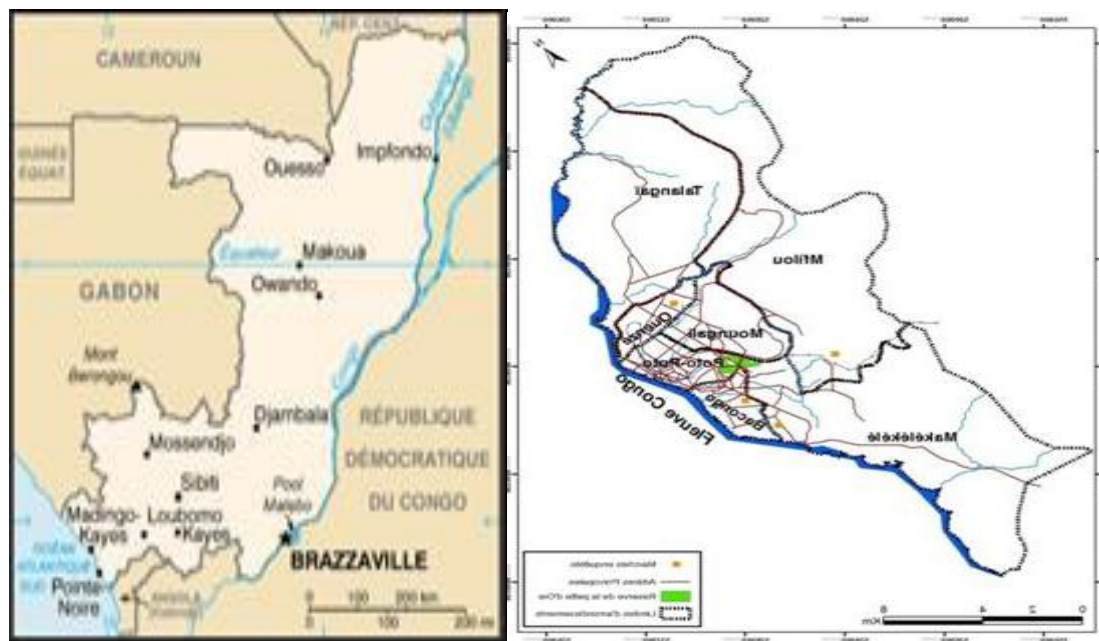


Figure 1. Study area (Mairie de Brazzaville, 2005)

Brazzaville is the administrative and political capital of Congo and is divided into seven distinct geo-ethnic districts, i.e., Makélékélé, Baongo, Poto-Poto, Mouloungou, Ouenze, Talangai and Mfilou, with altitude varying between 275 m and 313 m.

Climatic factors. Climate of Brazzaville is humid tropical climate, characterized by two rainy seasons: one long rainy season from October to May with a bending from January to February, and a dry season from June to September. The annual rainfall is about 1400 mm, ranging from 1,400–1,600 mm (Samba-Kimbata, 1978). The average temperature is around 25°C with thermal amplitudes no more than 5°C. The rainy season corresponds to the hot period with the maximum temperature 30-35°C whereas the lowest temperature is observed in dry season of 22°C.

The research units. The household and the districts were the research units, and ducks were the variables. The household was constituted by persons living in the same house

and sharing their food under the authority of a leader (Banga-Mboko et al., 2007)

The household survey sample. The sample size was calculated as formulated by Vaughan and Morrow (1991) as follow:

$$N = \frac{p.Q}{(E/1.96)^2}$$

where N: the size minimum of the sample; p: the representative rate of duck population in Congo= 11% (Mfoukou-Ntsakala et al., 2006); Q = 100 – p; E: the tolerated margin error = 2 standard deviations.

By considering a margin of error E = 5% and confidence interval of 95%, a total sample of 154 urban households (22 per district) having ducks, were subjected to the investigation.

The key of identification. Muscovy ducks were easily recognized by their fleshy outgrowths, and red colored around the eyes and beaks. Candid pictures of ducks were taken as found in their environment and the same pictures were

compared throughout the work of Migloire et al. (1988).

Methods of image analysis. Both pictures from the determination key and those obtained during the survey were scanned and then computed. The extraction of meaningful information from digital images and comparison between pictures were performed by means of techniques developed by Journet et al. (2008).

Results and Discussion

Characteristics of breeding and distribution of ducks throughout Brazzaville city. The survey recorded 1,768 adults (395 males and 1,373 females) over Mougali (20.48%), Baongo (17.99%), Talangai (17.25%), Ouenzé (13.80%), Poto-Poto (12.5%), Makélékélé (12.16%) and Mfilou (5.83%). The average of males per district and per households was 56.3 ± 21.4 (range 28-90) and 2.5 ± 0.97 , respectively, and for the female was 195.5 ± 67.5 (range 75-283) and 8.9 ± 3.10 , respectively. Accordingly, the mean sex-ratio per district and per household was $1:3.5 \pm 0.8$ (range 4.5-2.3).

The new native muscovy strains. As shown in Figure 2, the survey identified four strains in Makélékélé and in Poto poto districts. These strains, never been reported before (Migloire et

al., 1988), were considered new. Therefore, next to the scientific homologation, these strains were temporally named after the districts where they were firstly identified: Makélékélé 1 (n=6), Makélékélé 2 (n=2), Poto poto 1 (n=5) and Poto poto 2 (n=2).

The appearance of the new strains in Brazzaville may be explained by the fact that the last key of determination was never updated since its first report in 1985. The new version is therefore unknown for 26 years.

The classical native muscovy strains. The classical strains can be seen in Figure 3. These strains included numeric importance: black plumage (34.96%, n=623), duclair (23.10%, n=411), white (18.54%, n=330), tortora (17.65%, n=314), sepia (2.86%, n=51), chocolate (0.51%, n=9), lavender (0.44%, n=8), grey (0.34%, n=6), canizie (0.06%, n=1). The study confirmed the previous works that the black feathered strain is the most popular duck in the native population (Banga-Mboko et al., 2007).

The number of strains found in the present study is higher than those observed in Nigeria, Raji et al. (2009), Vietnam and India. This high number may be explained by the breeding system characterized by the scavenging ducks, so the reproduction is very open and not controlled.



Figure 2. Indigenous Muscovy duck new strains



Figure 3. Classical Muscovy duck stains

Conclusions

The apparent wide variation in plumage colors is an indication that the duck populations have not been 'purified' through selective breeding. Therefore, great opportunities exist for their improvement. One of the possibilities is to drive selection towards specific coat colors putting into cognizance the relationship between polygenetic effects of coat color and other traits of interest, namely physiology, morphology, behavior and molecular characterization (FAO, 2011). In the context of the valorization of poultry biodiversity, this

work represented a step towards a better knowledge of the production abilities of local ducks breeds may be carried out in Congo.

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