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The Potential of White Muscovy as Parent Stock for the Production of Broiler Ducks

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ABSTRACT

In rural areas, male muscovy was commonly crossed with layer ducks for the production of mule ducks to be sold as broiler ducks. However, their population was very few with various plumage colors, and with very low egg production. Muscovy can be used as the male parent stock in a commercial production of mule ducks, but it was preferable if they have white plumage for better carcass performance and with higher egg production. The aim of the study was to evaluate the characteristics of a muscovy population whether they were suitable as the foundation stock for a selection program to improve egg production. Groups of 125 female and 51 male of local white muscovy were used in this study. They were kept under close confinements and fed according their nutrition requirements. Measurements were taken on body weight at first laying, weight of first egg, 6 month egg production, and morphological characteristics. Results showed that the average body weight at first laying was 1805.41±89.31 grams with a variation of 4.95%. The average first egg weight was 58.23±2.33 grams with a variation of 4%, and the average 6 month production was 22.52±6.38% with a variation of 28.31%. With such large variations, the population was appropriate to be used as the foundation stock for a selection to improve egg production.

Key Words: White Muscovy, Mule Duck, Selection, Egg Production

INTRODUCTION

As in other developing countries in the world, one of the genetic resources of poultry was the muscovy which also popular for rural communities in Indonesia. Pingel (2009) reported that the muscovy duck would be suitable for smallscale farmers in rural in Africa and Latin America. Due to theirs good foraging, muscovy have a better adaptability to hot Climates than chickens (Raji et al. 2009).

The muscovy could contribute to food security as a producer of meat (Pingel 2009). The muscovy duck (*Cairina moschata*) were valued throughout the world for its unique taste, high yield of breast meat, low caloric content and the muscovy duck meat were healthier to the consumed due to a higher polyunsaturated fatty acids than the other local ducks (Chen et al. 2009; Ismoyowati et al. 2006). In addition, muscovy had a growth rate and feed conversion were better than ducks which were equally as waterfowl. At the age of 10 weeks muscovy males have a body weight of about 1.700±101.55 g/bird with a value of FCR 3.03±0.21 (Arifah et al. 2013). However, the availability of muscovy meat until now were very limited, because the population of muscovy relatively little too. The Directorate General of Livestock and Animal Health Services of Indonesia (2015) reported that muscovy population nationally were still relatively low *i.e.* 7.41 million birds.

Aside from the local muscovy, demand on duck meat fulfilled from the male laying ducks, the culled laying ducks female and Peking duck. The meat of the laying ducks either male or female was relatively little, because its weight was only about 1.2-1.3 kg/bird at the age of 10 weeks, so that the resulting meat was only about 0.6-0.7 kg/bird/10 weeks (Susanti & Prasetyo 2014). Therefore, the people tried to conduct crossbreeding between the muscovy male and ducks female to produce mule duck. The purpose was to

increase of duck meat production. However, the mule duck generated by the community were still vary, both coat color and productivity. Therefore, recently in the Indonesia Research Institute for Animal Production (IRIAP) have been pioneered the establishment of mule duck stocks that were expected to have a uniform of color feather and meat production.

As the female line has been produced duck called PMp which is composite breed from Peking with Mojosari white duck. The PMp ducks have relatively large weight *i.e.* 2.2-2.5 kg at the age of 10 weeks and a white uniform coat color (Suparyanto et al. 2004). After the selection program for 5 generations, the parent stock of PMp duck have rate of egg production about 65-70% per year and a relatively stable body weight *i.e.* 2.2-2.5 kg/bird at the age of 10 weeks with a uniform white of coat color (Prasetyo et al. 2014). Based on the productivity, the PMp ducks have been regarded as steady female parent lines to produce broiler ducks. The results of crosses between muscovy male and PMp females will produce mule duck named EPMp as final stock.

The PMp duck population was currently available in relatively large number. However, to obtain the relatively large of mule duck, the muscovy population as a strain males have too much anyway. One of the efforts that can be done to increase the population of muscovy by increasing their egg production. The Directorate General of Livestock and Animal Health Services of Indonesia (2015) reported that the egg production of muscovy were 30 thousand tons per year, equivalent to 500.000 eggs. With the number of muscovy reached 7.41 million, this egg production rate was very low. This might be as one of the causes of the low muscovy population today. On the other hand, muscovy have the potential to be developed into a source of meat. One of the efforts to increase muscovy egg production by selection program that can provide permanent impact, due to the improving of production levels would be inherited to their offspring.

To the establishment of baseline population of the selection program, the local muscovy from different places around the West Java have been be collected at IRIAP Ciawi Bogor West Java. The local muscovy derived from the field were not known theirs productivity yet. Therefore, the characterization of productivity of local muscovy necessary to be done in the one location of maintenance. Through the same environmental conditions, that were expected the data obtained were theirs genetic potential. Therefore, the purpose of this study was to obtain the characteristic of white muscovy productivity whether the population were eligible as a base population selection. Furthermore, the basic characteristics of the population will be used as a reference to measure the progress of the selection.

MATERIAL AND METHODS

Materials

As the base population, 176 muscovy birds from the field have been collected, consisted of 125 females and 51 males with ages varying between 2-4 months. Muscovy collected from farmers in various areas in West Java as Bogor, Sukabumi, Cianjur, Karawang and Sumedang. The muscovy was maintained in the same environmental conditions such as feeds, cages and management. This was done to avoid the influence of the environment, so that their performance was due to the genetic potential.

Methods

Muscovy kept in litter cages with chaff as pedestal and high fences so they could not fly. Number of muscovy per cage varied in the range of 2-3 females and 1 male, so the number of cages were 48. Feed and water were given ad libitum in accordance with the age of the muscovy. In grower period ie 2-5 months of age, muscovy were fed with a protein content of 16% and the EM 2700 kcal/kg, while the egg-laying period muscovy were fed diet contained 18% protein and EM 2700 kcal/kg.

Observations were made on the first laying which includes the body weight and egg weight. Both of these characteristics will determine the weight of mule duck generated. In addition, observations were also made on egg production with the assumption that muscovy have the high egg production and can be hatched, so the muscovy population will increase and the number of mule duck will increase. The other observation conducted was egg production for 6 months, because it has a high correlation with the production of one year. As supporting data quantitative morphological characteristics also measured the body parts the white muscovy. The data were analyzed descriptively based on the mean value, standard deviation and coefficient of variation.

The eligibility of selection population was determined by the value base on population diversity which was high traits measured. Due to the value of diversity were high, the differential value will be also high so the selection response becomes significant.

RESULTS AND DISCUSSION

Performances of white muscovy duck at first laying

The characteristic observed of the white muscovy on the first laying in the base population (P0) include body weight first laying, egg weight and egg production during the first 6 months. The age at the first laying cannot be obtained, because the white muscovy observed was collected from various breeders who did not record the first time laid egg. The data that collected on the performances of white muscovy duck at first laying presented in Table 1.

Table 1. Performances of white muscovy duck at first laying collected as base population in IRIAP

Variable	Mean ± std	Coefficient of variation (%)
Bodyweight on the first laying (g)	1805.41±89.31	4.95
The egg weight of first laying (g)	58.23±2.33	4.00
The egg production during 6 months (%)	22.52±6.38	28.31

Based on Table 1, it shows that the body weight on the first laying of the white muscovy was relatively uniform. As indicated by the value of the coefficient of variation of 4.95%. Muscovy body weight obtained in this study was 1805.41±89.31 g/bird that estimated when first laying at around the age of 18-20 weeks. The muscovy body weight in the study was relatively high, because in Nigeria the body weight of muscovy first laying was 1.52±0.4 kg with coefficient of variation was 27.63% (Yakubu 2013). While in Bulgaria, the body weight of muscovy first laying were 1497±16.8 g and 1579±17.6 g in the guinea and rainforest agroecological zones respectively (Ogah & Musa 2011). To obtain population duck with high body weight, the selection program could be done. Baeza

et al. (2002) reported that the quality of the meat muscovy relatively unchanged on the selected population to increase body weight at the age of 12 weeks old.

Based on Table 1 obtained the first egg weight of muscovy was 58.23±2.33 g with coefficient of variation was 4%. The weight of the eggs will affect the hatching time. The larger eggs take longer to incubate. In broiler chickens for each 2.5 g above 50 g, 30 minutes were commonly added to incubation time (Cobb 1981). Furthermore, Bagliacca et al. (2005) reported that eggs muscovy with the weight greater than 76 g need time to hatch longer than 34 days as normal incubation period. The weight of eggs obtained in this study was normal for hatching category.

The average of egg production of muscovy obtained in this study was 22.52±6.38% or 41 eggs during the production period of 6 months with coefficient of variation was 28.31%. This muscovy egg production was relatively low, as in Nigeria under the scavenging conditions, muscovy ducks can lay between 60 and 80 eggs per year and about 100 and 125 eggs per year in controlled conditions (Ikani 2003). The coefficient of variation of egg production in this study was relatively high. This is a good chances for success selection. Generally, a higher phenotypic variation of traits indicates a higher genetic variation, which guarantees a sufficient response of selection. This is important because directional selection on morphological traits, commonly occurs in natural populations (Kingsolver et al. 2001).

Morphology characteristics of white muscovy

Morphometric was a morphological measurements on the body length of certain bones in living creatures. Body size was a good indicator and has a fairly close correlation with the live weight trait (Suparyanto et al. 2004). Morphometric measurements can also help to facilitate in selection and crossing between breeds and types of livestock (Sumantri et al. 2007; Setiaji et al. 2012; Kurnianto et al. 2013). The knowledge about body sizes in muscovy-duck was very important to be used as baseline information for females' development of muscovy duck as a source of meat and eggs for the farmer community (Johari et al. 2013). Other than that, phenotypic characterization of animal genetic resources (AnGR) was the process of identifying distinct breed populations and describing their external and production characteristics in a given environment and under certain management, taking into account the social and economic factors that affect them. The information provided by characterization studies is essential for planning the management of AnGR at local, national, regional and global levels. The Global Plan of Action for Animal Genetic Resources states that ‘A good understanding of breed characteristics is necessary to guide decision-making in livestock development and breeding programmes’ (FAO 2007; 2011).

Characterization to explore the potential of local white muscovy as parental line stock of mule duck has been carried out. The measurements performed on the adults Muscovy. The results from measurement of the body parts the local white muscovy is listed in Table 2.

According to Table 2 it appears that the body measurements muscovy was relatively uniform, except for the ridge width indicated by the coefficient of variation of more than 15%. Johari et al. (2013) stated that the muscovy duck had characteristics of a large body base on shape and size. The chest circumference, femur length, wing length and chest length were good differentiator variables used to differentiate females body morphometric of waterfowl breeds. Result from the research revealed that values of the chest circumference, femur length, wing length and chest length were 307.60; 49.23; 266.67 and 96.21 mm. The body measurements of muscovy in this study was relatively large and

uniform. Yakubu (2013) reported that the body measurements of muscovy in Nigeria was a relatively low and value of the coefficient of variation was high. Based on body measurements which were large and uniform, the muscovy population in this study was expected can be used as parent stock to form mule duck with uniform both weight and color coat.

Tabel 2. The body size characteristics of white muscovy on the base population selection

Variable	The white muscovy female		The white muscovy male	
	Mean ± std	cv (%)	Mean ± std	cv (%)
Body weight (g)	1838.76±220.09	11.97	3243.24±15.39	15.39
Maxilla length (mm)	52.42±2.68	5.12	61.96±4.66	7.52
Neck length (cm)	191.90±11.11	5.79	237.00±12.25	5.17
Neck circumference (mm)	17.90±2.46	13.74	24.88±2.24	9.01
Body length (cm)	193.61±11.21	5.79	239.80±18.62	7.77
Chest circumference (mm)	307.60±22.73	7.39	383.20±23.36	6.10
Chest length (mm)	96.21±5.67	5.90	118.36±8.82	7.45
Wing length (cm)	266.67±42.72	9.22	336.40±28.27	8.40
Tibia length (mm)	97.99±8.94	9.13	121.12±7.29	6.02
Femur length (mm)	49.23±3.00	6.10	59.56±3.47	5.82

CONCLUSION

Based on the productivity characteristics, the white muscovy population collected in IRIAP have potential as parent stock for mule duck, due to large body size and uniform. Coefficient of variation in egg production for 6 months was characterized high, therefore the selection program on egg production of muscovy was expected to give a positive response, so at the end the egg production of muscovy could be increased and followed by the increased mule duck population.

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