ISSN No:-2456-2165

Characterization of Muscovy Ducks at PNGUNRE Poultry Farm in East New Britain Province

Limai Lan
Papua New Guinea University of Natural Resources and Environment, Private Mail Bag Service,
Kokopo, East New Britain Province

Abstract:- This study was conducted at the PNGUNRE poultry farm using 270 birds in 2018. Muscovy ducks are hardy waterfowls existing with variations in phenotypic characteristics. Five phenotypes (n=25 lavender, n=20 chocolate, n= 56 silver, n=59 black and n=110white) by plumage colour where distinctively sampled and characterized. Measurements on body weight, neck length and neck height were used as the parameters for comparison on five phenotypes. Analysis was done using SPSS version 16.0 involving Duncan's multiple tests to separate the means while Pearson's correlation coefficient was performed to find relationship between the parameters. Negative correlation (-.137*) was observed between plumage colour and BW,NL,NH and BL. The sexual dimorphism accounted for -.402, -.238**, -.315** and -.172** at high significant (P<0.01) of BW, NL, BL and BH respectively. There's high negative correlation of sex on the traits measured. Plumage colour cannot be used to select BW, BL BH and NL for breeding purposes. Dimorphism in ducks has a negative effect on the assed parameters accept NL. Separate study on the effect of sex on the measured parameters is required.**

Keywords:- *Muscovy Duck, Body Weight, Body Length, Body Height, Neck Length, Plumage Colour, Correlation, Phenotype,*

I. INTRODUCTION

Meat is contributing to PNG house hold consumption at a predicted growth rate of 5% per year (Quartermain, 2000). Poultry meat contributed a total of 40,760 tonnes in 1998. Muscovy duck statistics was not recorded requiring more effort to investigate and document the production trends. Quartermain may be right to state that production is low due to people participating for the wrong and not following up on projected farmers leading to unavailability of Muscovy duck records. This affects population size records of Muscovy duck like in the PNGUNRE farm. The current population size of Muscovy duck at the farm is 270 as it was sampled into clusters of five phenotypic plumage colours. According to Macharia et al., (2017) phenotypic traits are sometimes linked to specific adaptations.

Chineke *et al*,(2002)reported that the relationship that exist among body measurement traits provides useful information on performance, productivity and carcass characteristics of Livestock Animals and that these quantitative measures of size and shape may be used for estimating genetic parameters in Animal breeding plans.

Muscovy duck distribution population is unknown in East New Britain. Phenotypic plumage distribution across ecosystems needs attention to closely analyse the plumage cluster size. Small holder farmers keep ducks in small numbers as pets with less concentration on production. Ducks (mainly Muscovy ducks), are found in various part of the country in small numbers for local meat consumption and also for ornamental purposes (Macharia et al. 2017).

The present study aims to investigate whether the plumage colour will have an effect on the phenotypic traits in Muscovy ducks. This could aid their proper management, conservation and improvement in breeding program.

❖ *Problem Definition*

Phenotypic variations in plumage colour indicates variations in production, reproduction and economic traits of Muscovy duck under certain ecosystems. Variations in the traits remains uncertain to investigate the genetics of Muscovy duck. Phenotypic expression of genes is a combined influence of genetics and environment (P=G+E), but by how much remains uncertain. Thus, investigating the phenotypic plumage cluster defines the phenotypic genetic distances that would assist with appropriate breeding plans and selection to improve the desired traits of Muscovy duck breed. The study investigates to answer the two questions.

1. Does plumage colour influence population size of Muscovy duck?
2. Does plumage colour have effect on other phenotypes?

❖ *Plumage Colour*

"Lavender" is autosomal recessive. Lavender is an independent mutation and not a combination of chocolate and blue like other domesticated ducks. It can be viewed as untypical colour too, as it suppresses both black and red creating a pastel effect. They weigh up to 7 kg (15 lb). Females are considerably smaller, and only grow to 3 kg (6.6 lb), roughly half the males' size. Thin bodied boat- shaped body. Extra-large egg size weighs in around2.3 ounces and jumbos around 2.5 ounces. Both sexes have a nude black-and-

red or all-red face; the drake also has pronounced caruncles at the base of the bill and a low erectile crest of feathers, (Johnson, 2009).

Chocolate" (Ch) is the only colour that is sex–linked recessive. Ch causes a brown plumage, because all black pigment is replace by a less light-absorbing version of it (brown). It does not affect red. In domestic drake (male), length is about 86 cm and weight is 4.6 – 6.8kg, (Johnson, 2009).

"**White**" inherit autosomal incomplete dominant. This is caused by the same gene "Pied" that is mention above. For a complete white you need double factor or homozygous Pied: PP White Muscovy ducks have long claws on their feet and wide flat tail. The drake male is about 86cm in length and weighs 4.6-7kg while the female is smaller, at 64cm in length and weighs2.6-4kg, (Johnson, 2009).

Black is the usual wild type colouring without visible mutations and therefore the base for all other patterns and colours. It's the most common colour, hence the name, though it is often combined with some form of pied. The reason for this is because probably most colour mutations are recessive. The drake male is about 80 cm in length and weight about 7-10kg while female weighs about 5-6kg, (Philip, 2007).

Pure breed of blue Muscovy or homozygous results in silver (splash in ducklings). **Silver** is also called pale grey. Silver Muscovy ducks weighs about 6-9 kg and have length of about 70cm, (Philip, 2007).

Objective

1. To evaluate the influenceof sex on the other parameters of Muscovy ducks measured.
2. To assess and make comparison on the effect of the phenotypic colour on other traits.

II. MATERIALS AND METHODS

➢ ***Location of study and management of experimental animals.***

The study was conducted at the farm of University of Natural Resources and Environment-Central Campus in East New Britain Province of Papua New Guinea. The farm is situated on the northwest direction of the campus.

Muscovy ducks were generally managed under semi-intensive system with provision of watering point. They roam freely during the day and scavenge for feed in and around pasture. They were fed withbroiler finisher and supplemented with copra meal. In the evening, the ducks were placed back in the shelter provided for protection against predators and harsh weather conditions and also for laying eggs.

➢ ***Data Collection***

Data were obtained from 270 Muscovy ducks having five (5) cluster of plumage colours (n= 25 lavender, n=20 chocolate,n=56 silver, n=59 black and n= 110 white).

The parameters in this study include, plumage colour, plumage pattern, feather distribution, eye colour, skin colour, beak colour, beak shape, shank length, body height, body length, live weight, egg weight, egg colour feather morphology, body shape and head colour. Each bird was measured and tagged with coloured wool to identify their sex. Only mature ducks were measured, the young ducks were only tallied and recorded.

Some parameters are visual observations while others involve measurements. The following parameters below were measured using a balance scale (5kg capacity) and sawing tape measure on centimetre units.

➢ *Parameters measured.*

1. ***Body weight.***

Individual body weight for ducks is measured using a Balance scale (5kg Capacity). The ducks were tied to the legs and placed into the bucket. Bucket weight was tared and initial reading for the scales was taken and recorded.

2. Body height

The body height was measured using a sawing tape measure having the bird stand horizontal position from the feet stage. The measurement was taken from the tip of the duck's head to the feet to get the reading.

3. Neck length

This was measured as the distance between the first and the last cervical vertebra and the pygostyle.

4. Other observations

The other parameters include, eye colour, skin colour, shank colour beak colour, beak shape, feather morphology, body shape, head shape, feather distribution, plumage colour, plumage pattern are identified based on observations.

➢ ***Statistical Analysis***

The data wasanalysed using the general linear model of SPSS 16.0 with sex and plumage color as fixed factors. Significant means were separated by the Duncan's multiple range tests. Correlation between measurements was determined by the Pearson's Correlation Coefficient at the significant level of 0.05 and 0.01.

III. RESULTS AND DISCUSSIONS

Results of the effects of five plumage colour and sex on the body weight (BW), body length (BL), body height (BH) and neck length (NL) are explainedin Table 1.

Correlations

		Plumage colour	Body weight	Neck length	Body length	Body height	Sex
Plumage colour	Pearson Correlation	1	-.137*	-.009	.086	-.107	-.001
	Sig. (2-tailed)		.024	.888	.159	.078	.983
	N	270	270	270	270	270	270
Bodyweight (BW)	Pearson Correlation	-.137*	1	.524**	.616**	.526**	-.402**
	Sig. (2-tailed)	.024		.000	.000	.000	.000
	N	270	270	270	270	270	270
Neck length (NL)	Pearson Correlation	-.009	.524**	1	.753**	.573**	-.238**
	Sig. (2-tailed)	.888	.000		.000	.000	.000
	N	270	270	270	270	270	270
Body length (BL)	Pearson Correlation	.086	.616**	.753**	1	.572**	-.315**
	Sig. (2-tailed)	.159	.000	.000		.000	.000
	N	270	270	270	270	270	270
Body height (BH)	Pearson Correlation	-.107	.526**	.573**	.572**	1	-.172**
	Sig. (2-tailed)	.078	.000	.000	.000		.005
	N	270	270	270	270	270	270
Sex	Pearson Correlation	-.001	-.402**	-.238**	-.315**	-.172**	1
	Sig. (2-tailed)	.983	.000	.000	.000	.005	
	N	270	270	270	270	270	270

Table 1: Effects of plumage colour and sex on body weight, neck length, body length and body height of Muscovy ducks.

*Correlation is significant at the 0.05 level (2- tailed)
** Correlation is significant at the 0.01 level (2- tailed)

➢ *Effects of plumage Colour*

The effect of plumage colour on body weight and other measurements of ducks are presented in Table-1. Five plumage colours were recorded in the local Muscovy duck population during the period of the study. The mean for the traits as shown on Table-1 were; BW- 2094.63, NL-27.12, BL-64.51, BH-37.61 respectively. The mean for the plumage colour shown is 2.96.

Correlation coefficients of plumage colour on measurable traits of Muscovy ducks are presented in Table-1. There's negative and highly significant (P<0.01) observed for the body weight(-.137*). Studies conducted by Górski and Witak (2003) show that development of body weight of Muscovy ducks is to a greater extent related to feeding rather than to color type. According to Taguia *et al (*2007), high and positive correlations have been reported between zoometrical measurements and body weights in African Muscovy as the effect of plumage colour. The result of the present study with variations could be attributed to the sensitivity of these trait to

environmental changes such as temperature, nutrition or other external factors and genetic.

From the result,Plumage colour has negative correlation on neck length and body height (-.009 and -.107 respectively) with no significant (P<0.05) or (P<0.01) were observed on traits from the effects of plumage. The result simply indicates that the plumage colour does not cause any effect on neck length and body height.

However, there's positive correlation on body length as indicated on the result at 0.086. The result indicates that plumage colour trend does have effects on body length.

- *Effects of sex*

Result of sex on body weight, neck length, body length and body height are shown in Table-1. The sexual dimorphism accounted for -.402**, -.238**,-.315** and -.172** at high significant (P<0.01) of BW, NL, BL and BH respectively. There's high negative correlation of sex on the traits measured. The sex does not have any influence on this parameters. However, these sources *Leclerq, 1990; Baeza et al., 1999; Ogah et al., 2009,* states that, 'because of the sexual dimorphism in Muscovy duck and its marked effect on muscular and body growth, the assessment of changes in shape and size in Muscovy duck will be sex dependent.'Atchney and Rutledge, *(1980*) argued that these dynamic processes of multidimensional growth are accompanied by concomitant changes in the phenotypic variance and covariances and their components. On the other hand, Jolicoeur and Mosimann, *(1960*) indicates that, the size of most organisms is more affected than shape by fluctuation of the external environment. The variations might result from genetic composition and level of inbreeding in the population under consideration.

According to Veeramani et al (2014), the interaction between variety and sex had no significant effect on neck length. The difference in neck length might be due to breed variation and age of birds.

IV. CONCLUSION

The high, negative and significant correlation between plumage colour and body weights, neck length and body height measurements indicate that plumage colour cannot be used as criteria for assessment and selection to improve those parameters in breeding program. However, body length can be considered with further investigations.Our study shows resultson the sexual dimorphism of Muscovy ducks and its marked effect parameters to be of high negative correlation and high significance (P<0.0) which contradicts studies done in other areas. Therefore, it is recommended that more investigation is required to be carried out on effects of sex on the parameters measured by categorizing the Muscovy ducks into age groups to investigate males and females separately.

REFERENCES

[1]. Atchley, W. R., Rutledge, J. J. (1980): Genetic components of size and shape. Dynamics of component of phenotypic variability and covariability during ontogeny in laboratory rat. Evolution 34:1161-1173.
[2]. Baeza, E., Marche, G., Wacrenier, N. (1999): Effect of sex on musculardevelopment of muscovy ducks. Reprod. Nutr. Dev. 39:675-682.
[3]. Chineke CA, Agaviezor B, Ikeobi C, Ologun AG (2002). Some factors affecting body weight and measurements of rabbit at pre and post weaning ages. Proc. 27th annual conf. Nig. Soc. Anim. Prod., October 17th, pp. 1-3
[4]. Górski, J. Witak, B. (2003). Production Results of White and Black-and-White Muscovy
[5]. Ducks Fed with Different Feed Mixtures. Ann. Univ. Mariae Curie-Sklodowska. Sectio
[6]. EE: Zootechnica, 21, 7–16.
[7]. Johnson, Steve A.; Hawk, Michelle (2009). "Florida's Introduced Birds: Muscovy Duck (Cairina moschata)". University of Florida.
[8]. Jolicoeur, P. AND Mosimann, J. E. (1960): Size and shape in the painted turtle: A principal component analysis. Growth 24: 339
[9]. Leclercq, B. (1990): Croissance et composition corporelle du canard de Barbarie. In: Le Canard de Barbarie (Sauveur B. et de Carville H., Ed.). Institut National de la Recherche Agronomique, Paris: 23–29.
[10]. Macharia J.W et al., (2017). Phenotypic analysis of underutilised poultry species in Kenya. Livestock Research for Rural Development.
[11]. Ogah, D. M., Alaga, A. A., Momoh, O. M. (2009): Principal component factor analysis of the morphostructural traits of Muscovy duck. Inter. J. Poult. Sc.8(11) 1100-1103.
[12]. Philip J,*2007,* Department of Poultry Science at Pensylvania State University.
[13]. Quartermain R.A (2000). Food Security in Papua New Guinea: *Potential for Producing More Meat from Small-Scale Livestock Production*: ACIAR Proceedings No.99 (pp 625)
[14]. Taguia A., H. Mafouo Ngandjou, H. Defang and J. Tchoumboue. (2007). Study of the live body weight and body characteristics of the African Muscovy duck (*Caraina moschata*). Tropical Animal Health and Production. 40(1):5-10. October 19th
[15]. Veeramani.P., R.Prabakaran, S.T.Selvan, S.N.Sivaselvam & T.Sivakumar, (2014), Morphology and Morphometry of Indigenous Ducks of Tamil Nadu Vol 14,