IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 16, Issue 2 Ser. I (February. 2023), PP 35-41
www.iosrjournals.org

Variety and Correlations of Phenotype Characteristics the Body of Female Alabio Ducks (*Anas platyrhynchos* Borneo) In South Kalimantan Indonesia

Abrani Sulaiman[1*], S.N. Rahmatullah[2], Herliani[1], R.Y. Surya[1], and N. A. Khisanafi[1]

[1]*Animal Science Study Program, Faculty of Agriculture,LambungMangkurat University, Banjarbaru, Indonesia*
[2]*Animal Science Study Program, Faculty of Agriculture,Mulawarman University, Samarinda, Indonesia*
**Corresponding author: abranisulaiman@ulm.ac.id*

Abstract:
Background*: This study aims to examine the variety and correlations of phenotypic characteristics of female Alabio ducks (Anas platyrhynchos Borneo) including body weight, body length, body height, neck length, chest width, abdomen width, pubic width, shank length, beak length and width, beak color, shank color in duck farming centers in Banjar and Tanah Laut (Tala) districts in South Kalimantan.*
Materials and Methods*: The method used in this research is a survey method. The material used in the study was 300 Alabio ducks with an age range of 12-24 months.. Observations and parameter measurements were carried out directly on each individual duck in the field..*
Results*: The characteristics of duck data are uniforms with a relatively small CV below 15% except for pubic width (35.88%), shank length (25.28%), and beak color (32.68%). The correlation value shows a value that can be categorized as medium to large, the lowest between pubic width and shank length (0.14) and the largest between body length and body height (0.73).The results of simple and multiple linear regression analysis showed that the relationship model between body length, chest width, body height, abdomen width, pubic width, and shank length with the body weight of female Alabio ducks both separately and together was significant (P<0.05).*
Conclusion:*The characteristics of duck data are uniforms with a relatively small CV below 15% and the correlation value shows a value that can be categorized as medium to large.*
Key Word*: Alabio duck, body physical-characters, correlation, variation*

Date of Submission: 11-02-2023 Date of Acceptance: 23-02-2023

I. Introduction

The Alabio duck (*Anas platyrhynchos* Borneo) is one of the natural genetic resources that has the potential as a superior type of laying duck in South Kalimantan. The population of ducks in South Kalimantan based on Animal Husbandry and Animal Health Statistics in 2019 was recorded at 4,291,895 heads spread across 13 districts/cities in South Kalimantan with the annual productivity of duck eggs produced showing significant results, reaching 29,430 tons and 1,321 tons of meat in 2020 (Directorate General of Livestock and Animal Health, 2020). Alabio ducks have enormous potential to be developed both as broilers and as laying ducks (Syaifudin *et al*., 2015). According to Sulaiman & Ramatullah (2011) from the aspect of productivity, the highest percentage of egg production is the intensive system of 91.00% followed by the semi-intensive system of 83.17% and then the extensive system of 55.38% at the Alabio duck production center in Hulu Sungai Utara. Other studies have shown that the egg production of Alabio ducks can reach of 72%, this is generally higher than egg production of Tegal ducks and Magelang ducks (Ismoyowati & Sumarmono, 2019).

Alabio ducks are traditionally recognized as ducks that have the advantage of high egg production and high quality based on egg weight, shell color, and bright yolk color, as well as being able to produce good carcass and the taste is preferred because of its predominance meat and its less fishy odor eggs. Another advantage of Alabio ducks is the ability of ducks to adapt to environmental conditions, one of them have a good tolerance for drinking water salinity (Sulaiman *et al*., 2022). However, the problem until now is that Alabio ducks still lack in their selection and breeding efforts, even some observers suspect that in general, Alabio ducks experience a decline in genetic quality, both in production quantity and quality, due to an increase in inbreeding caused by matting between close relatives. On the other hand, a crucial issue that is currently happening is the threat to the purity of the Alabio duck by the introduction of many breeds of ducks from other regions, such as Mojosari ducks, Tegal ducks, Pekin ducks and also the occurrence of crossbreed without strict and directed

management. It is feared that the authenticity or purity of the Alabio duck will gradually decline and even become extinct.

At present, as part of efforts to increase livestock, it is highly dependent on variations in the characteristics of livestock that influence production, and such variations are a great opportunity for livestock selection and breeding programs. One form is the identification of phenotypic characterization that can be used to describe and compare the morphological characteristics of native poultry species in different agroecological zones so that diversity occurs (Maharani *et al.*, 2019). This genetic diversity can be used to increase the productivity and uniformity of existing ducks. Genetic diversity is very important in the formation of a nation or livestock clump (Suryana, 2015). As stated by (Ismoyowati & Purwantini, 2013) that the identification and characterization of the local duck breed is very much needed as basic germplasm (SDG) data and the need to support the local duck breeding program.

Research on Alabio ducks, especially in terms of breeding, has not been done much because it requires both expertise and large funds and takes a long time. In fact, for the development of Alabio ducks to become a well-established local superior ducks, research or breeding programs is a necessity that must be done. Improving genetic quality is an effective way because it has a more permanent impact. Genetic improvement efforts can basically be done through selection and crossbreeding separately or in combination (Prasetyo & Susanti, 2007). Research on the phenotypic character of the body or eggs of ducks including Alabio ducks has been studied with limitation by Sulaiman & Rahmatullah (2011), Suryana *et al*. (2016), ,Ismoyowati& Purwantini (2013), Maharani *et al.* (2019).

One way to determine the determinants of duck characteristics can be done by measuring body parts (morphometrics) and identification, both qualitative and quantitative traits *(Mahanta et al*., 1999) ;Muzani*et al*., 2005) stated that genetic research to determine body measurements of birds can be done by measuring the parts of the bone, while Ishii *et al*. (1996) argue that body size and shape can be used to determine growth standards and assess livestock (judging).

Selection of duck breeds carried out by breeders until now is still based on the characteristics of body shape or body morphology and egg production. According to *Yuwanta et al*. (1999), there is a correlation between duck productivity and certain body sizes (body length, chest width, abdominal width, neck length and leg length. The morphological characteristics of the body and body weight are quantifiable phenotypes. However, until now there is still little known about the correlation or closeness of the relationship between morphological characteristics or the size of body parts and body weight in male ducks and female ducks.

Responding to the above problems and the need for selection efforts in breeding Alabio ducks, it is very necessary to conduct research on the study of the variety of phenotypic characteristics of female Alabio ducks (*Anas platyrhynchos* Borneo) in South Kalimantan including body weight, body length, body height, neck length, chest width, abdomen width, pubic width, shank length, beak length and width and their correlations. The results of this study are expected to serve as a basic data for the conservation, selection and breeding of Alabio ducks.
(10)

II. Material And Methods

Study Design: The method used in this research is a survey method.
Study Location: The research was conducted in Banjar Regency (2049'55 -30 43'38 South Latitude and 114030'20' – 115'35'37' East Longitude) and Tanah Laut Regency (03030' -04011' South Latitude and 114030' - 115023 East Longitude) which are the two centers of development of Alabio ducks in South Kalimantan.
Study Duration: March 2021 to September 2021.
Sample size: 300 female Alabio ducks
Sample size calculation: The materials used in this study were 300 female Alabio ducks with an age range of 12-24 months or already laying eggs

Procedure methodology

The method used in this research is a survey method with multistage random sampling, starting from determining the sub-district to the farmer group. The physical phenotype character data of ducks includes body weight, height, body length, chest width, abdomen width, pubic width, neck length, shank length, beak length and width, beak color, shank color.

Body weight (g) the amount of body weight of ducks that was weighed using a digital scale, beak length (cm), measured the distance from the base of the maxilla to the tip of the maxilla, which was measured with a digital caliper. Beak width (cm), measured from the left and right outer edges of the beak, using a digital caliper. Neck length (cm), measured from the first cervical vertebrae to the last cervical vertebrae using a digital caliper. Body length (cm), measured from the tip of the neck to the base of the tail using a measuring tape. Body height (cm) was measured from the bottom of the duck to the top of the back using a measuring tape. Chest

width (cm), measured at the widest part of the chest using a digital caliper, Abdominal width (cm), measured from the tip of the sternum to the pubic bone. Pubic width (cm) was measured from the distance between the right and left pubic bones, shank length (cm), measured along the tarsometatarsus (shank) using a digital caliper. Shank color (RC) and beak color (RC) were measured by comparing with Roche yolk color fan (YCF).

Statistical analysis

Observational data that have been collected are then grouped according to their classification. Data which is a parameter of physical phenotypic characters were analyzed to find out the correlation in the observed parameters so that results are obtained then continued with a determination analysis to find out the percentage of correlation between among parameters. The analysis was performed using SPSS Ver 21.0 application program (SPSS Inc. Chicago, Il., USA, 2012).

The mathematical model of a simple correlation analysis is:

$$r = \frac{\sum X_1 Y - \frac{(\sum X_1)(\sum Y_1)}{n}}{\sqrt{\{\sum {X_1}^2 - \frac{\{\sum X_1\}^2}{n}\}}\sqrt{\{\sum {Y_1}^2 - \frac{\{\sum Y_1\}^2}{n}\}}}$$

Information:

Y= Body weight, X_1= Body size parameter, n= replication

Mathematical model Coefficient of determination (R^2): $R^2 = (R)^2 \times 100\ \%$

III. Result and Discussion

Body size data for the physical phenotypic character of the Alabio duck body consisting of the mean, standard error of mean (SEM), minimum and maximum, coefficient of variety can be seen in Table 1.

.

The results of observations on the physical character of the body showed Results on the parameters of body weight 1774.12 g, body length 20.62 cm, neck length 16.27 cm, chest width 8.56 cm, body height 24.63 cm, abdomen width 8.50 cm, pubic width 3.42 cm, shank length 3.99 cm, beak length 6.10 cm, beak width 2.66 cm, beak color 9.88, and shank color 13.45. In general, the means of the characteristics of duck data are uniforms with a relatively small CV below 15% except for pubic width (35.88%), shank length (25.28%), and beak color (32.68%). This results about the CV obtained in this study were higher than the results of research from Maharani *et al*., (2019) which results of CV an average > 10%.

Table 1.The mean, SEM, minimum and maximum, and CV the physical phenotypic character of the Alabio duck body

	Mean	±SEM	Minimum	Maximum	CV (%)
Body Weight (g)	1447.12	± 8.60	1080.00	1960.00	10.29
Body Length (cm)	20.62	± 0.13	16.00	27.00	11.09
Neck Length (cm)	16.27	± 0.06	13.00	23.00	6.69
Chest Width (cm)	8.56	± 0.03	6.00	9.90	5.65
Body Height (cm)	24.63	± 0.09	21.00	28.00	6.40
Abdomen Width (cm)	8.50	± 0.06	5.00	13.00	13.12
Pubic Width (cm)	3.42	± 0.07	1.50	10.50	35.88
Shank Length (cm)	3.99	± 0.06	2.40	6.00	25.28
Beak Length (cm)	6.10	± 0.02	5.00	7.10	5.60
Beak Width (cm)	2.66	± 0.01	2.40	3.50	5.42
Beak Color (RYCF)	9.88	± 0.19	2.00	15.00	32.68
Shank Color (RYCF)	13.45	± 0.09	9.00	15.00	11.82
Valid N	300				

Note: N = 300 female ducks, SEM = Standard Error Mean, CV= Coefficient of Variants

The result of body weight (1774.12 g) is greater than Indonesian National Standard which is 1400 g. The SEM is 8.6 g and the CV is 10.29%. According to the classification by Kurnianto (2009) the variety of body weight of female Alabio ducks is relatively small. Pamungkas & Ismoyowati (2013) state that body weight is

influenced by genetic factors and external factors, such as feed and maintenance systems. According to Morduzzaman *et al*. (2015), variations found in this phenotype component will support the selection process and mating system to be applied in poultry especially in duck, because phenotype is closely related to performance appearance, especially in growth production.

Suryana *et al*. (2011) found that there were differences in Alabio ducks in three other regencies (HSU, HSS, HST) of South Kalimantan with Body weight 1.623 g, beak length 5.52 cm, beak width 2.18 cm, neck length 21.56 cm, body length 22.08 cm . While Maharani *et al*. (2019) found the body character of an Alabio duck, beak length 5.92 cm beak width 2.76 cm, neck length 17.14 cm, shank length 6.61 cm

The variety are caused of breed, ages and environmental factors, especially the feed. (Suryana *et al*., 2011) found the phenotypic character of Alabio ducks from different rearing center locations, namely HSU, HSS and HST, presumably because Alabio ducks received different feeds in feed ingredients and nutritional value of their rations. The results of this study are in line with the opinion of (Sopiyana *et al*., 2006), that the variety in body weight and body size between Tegal, Magelang and Damiaking ducks is influenced by different feeding and management. Nozawa (1980) reports that the diversity of animal body sizes is due to genetic and environmental factors

The beak color and orange shank color are distinctive characteristics of the Alabio duck compared to other Indonesian local ducks. In general, the beak color is 9.88 and the shank color is 13.45, these finding similar with the findings of Sulaiman & Rahmatullah (2011), the beak color of 48% of the sample is in the score of 6-15 (48%) and the color of the shank of 86% of the sample is in the score of 6-15. The difference in beak color is thought to be due to the age of production, the higher the egg production or the age of production the yellow color of the beak will fade, this can be seen in many Alabio ducks at the age of 18 months when the duck began to enter the first molting. While the color of the shank is relatively fixed, the color is not affected by production or ages of ducks.

Table 2. Pearson Correlations of phenotypic character of the Alabio duck body

	Body Weight	Body Length	Chest Width	Body Height	Abdomen Width	Pubic Width	Shank Length
Body Weight	1.00	0.51	0.56	0.55	0.38	0.45	-0.34
Body Length	0.51	1.00	0.44	0.73	0.33	0.42	-0.45
Chest Width	0.56	0.44	1.00	0.50	0.23	0.22	-0.40
Body Height	0.55	0.73	0.50	1.00	0.30	0.35	-0.51
Abdomen Width	0.38	0.33	0.23	0.30	1.00	0.64	0.24
Pubic Width	0.45	0.42	0.22	0.35	0.64	1.00	0.14
Shank Length	-0.34	-0.45	0.20	-0.40	-0.51	0.24	1.00

All correlations are significant ($P < 0.05$)

The correlation between or inter phenotypic character of the Alabio duck the body can be seen in Table 2. The correlation between the phenotypic characters of the body shows that there is a relationship or is positively correlated unless the length of the shank with others is negatively correlated. The correlation value shows a value that can be categorized as medium to large, the lowest between pubic width and shank length which is 0.14 and the largest between body length and body height which is 0.73.

The equation of the multiple linear regression model as can be seen in Table 3 between the six variables X and the variable Y is obtained $Y = 113.84 + 1.63\ X_1 + 96.01\ X_2 + 13.66\ X_3 + 17.96\ X_4 + 31.52\ X_5 - 29.76\ X_6$From the results of the regression equation, it shows that if there is an increase in body length by 1 cm, the body weight will increase by 1.63 g, if the chest width increases by 1 cm, the body weight will increase by 96.01 g, if the body height increases by 1 cm, the body weight will increase by 13.66 g, if the abdomen width increase by 1 cm, the body weight will increase by 19.96 g, if the pubic width increase by 1 cm the body weight will increase by 31.52 g, if the shank length increase by 1 cm the body weight will decrease by 29.76 g and In line with that, the influence of body length, chest width, body height, abdomen width, pubic width, shank length on body weight obtained a significance value of 0.00 significant ($p<0.05$).

Table 3. Pearson Correlations of phenotypic character of the Alabio duck body and Linear Regression Equation Model

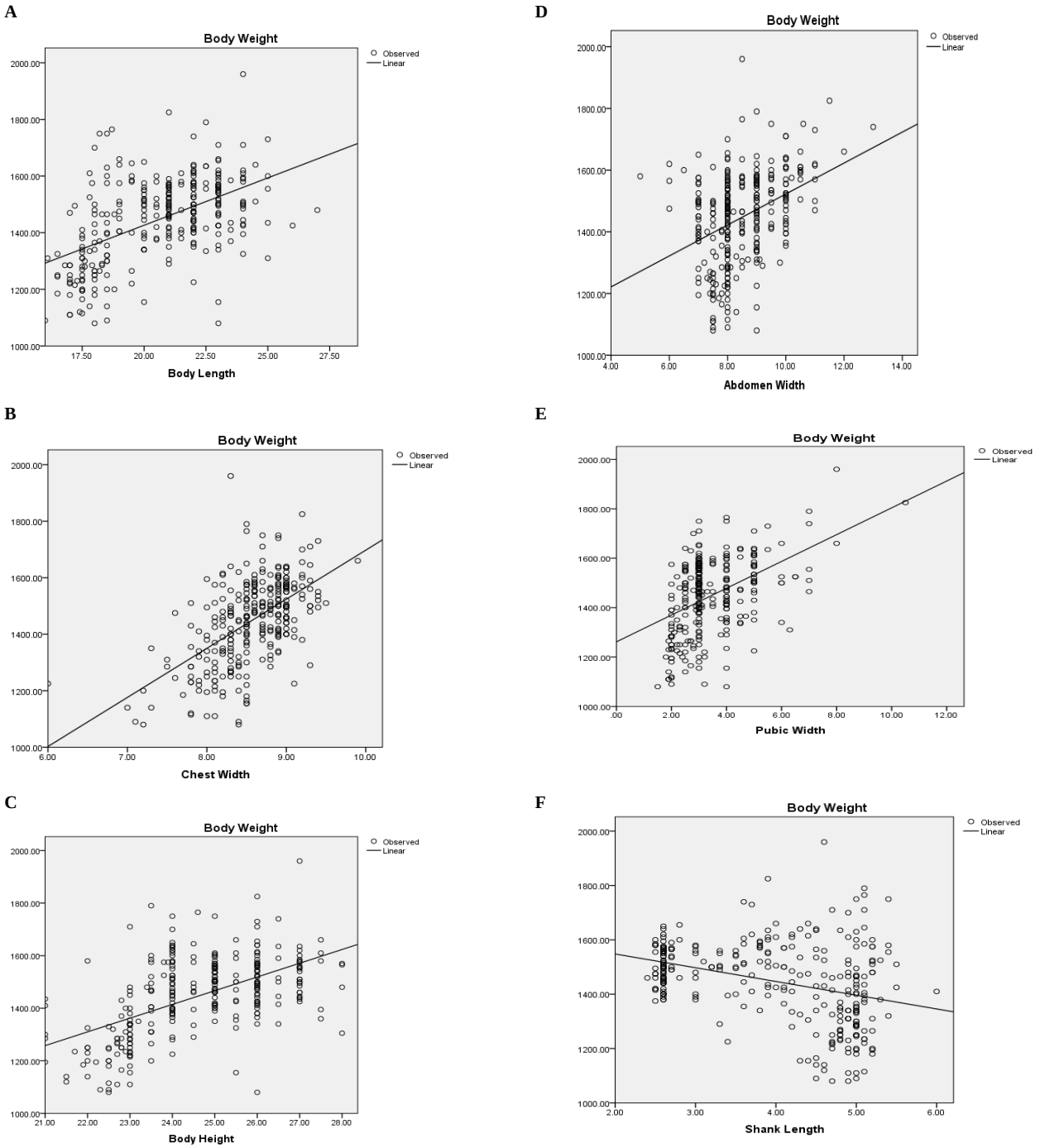
	X/Y	R	R^2	Sig P	Regression Equation Model
1	Y (Body Weight)	0.71	0.50	0	$Y = 113.84 + 1.63 X_1 + 96.01 X_2 + 13.66 X_3 + 17.96 X_4 + 31.52 X_5 - 29.76 X_6$
2	X_1 (Body Length)	0.51	0.26	0	$Y = 757.19 + 33.46 X_1$
3	X_2 (Chest Width)	0.56	0.32	0	$Y = -39.82 + 173.73 X_2$
4	X_3 (Body Height)	0.55	0.31	0	$Y = 160 + 52.24 X_3$
5	X_4 (Abdomen Width)	0.38	0.14	0	$Y = 1020.85 + 50.17 X_4$
6	X_5 (Pubic Width)	0.45	0.20	0	$Y = 1261.53 + 52.24 X_5$
7	X_6 (Shank Length)	-0.34	0.12	0	$Y = 1648.84 - 50.53 X_6$

In addition, a correlation coefficient (R) was also obtained between body weight, of body length, chest width, body height, abdomen width, pubic width, shank length of 0.71. The results showed that the close relationship between body length, chest width, body height, abdomen width, pubic width, shank length and body weight of female Alabio ducks correlated by 71%. The value of the correlation coefficient indicates that the relationship is high positive (Dalton, 1980). However, the influence of these variables is only 50% (R^2) which means that the value can be influenced by independent variables of body length, chest width, body height, abdomen width, pubic width, shank length while 50% is influenced by other variables.

Based on Table 3 showed the correlation analysis between phenotypic traits and body weight in female Alabio ducks in this study it was found that there were phenotypic traits in Alabio ducks which had a small direct effect on the development of body weight such as abdomen width, pubic width and shank length. These results indicate that the phenotype and body weight are always related, so that in evaluating productivity one of the factors of concern is the phenotype. This results is also agreement with Asiamah *et al*. (2020), showed about in the breeding process of ducks, phenotypic traits in one of important information for evaluating growth status especially in production traits example body weight, the other reason is phenotypic traits are obtained from the effects of genotype and environment, which are closely related to body weight and reproduction performance.

Path coefficients of the explanatory variables of the he body weight of female Alabio ducks and phenotypic traits are presented in Figure 1. Although phenotypic traits significantly affected body weight in female Alabio ducks it was greatly indirectly influenced such as shank abdomen width, pubic width, and shank length. As seen in Figure 1, the distribution pattern of the analysis results is uneven in the analysis of body weight with abdomen width, pubic width, and shank length. However, abdomen width, pubic width, and shank length were the most less responsible parameters directly affecting body weight in female Alabio ducks (path coefficient, $p < 0.05$). These results are consistent with the study of Yakubu *et al*. (2015) which stated that there were several phenotypic traits that have a direct influence on the development of body weight in khaki Campbell and Peking ducks, one of which was body length and shank length. Reference for body length observation that can be done by looking at the shape of the abdomen and pubic. This can be used as a reference because the Khaki Campbell duck is one of the parents of the Alabioduck

Alabio ducks have different phenotypic characteristics and various performances compared to other local ducks in Indonesia (Suparyanto, 2005); Suryana *et al*., 2011). This is shown by the reality on the ground, that the Alabio ducks in several areas in South Kalimantan have varied diversity, both qualitative and quantitative traits (Suryana *et al*., 2011). According to Suparyanto (2003) the occurrence of phenotypic variations in ducks, one of which is due to the intensity of external crossbreeding in an unstructured manner, even though one of the breeder sources is still one family.



Figures 1. Graphs of the relationship between the body weight of female Alabio ducks (Y) and body length (A), chest width (B), body height (C), abdomen width (D), public width (E), and shank length (F).

IV. Conclusion

Based on results and the discussions that have been carried out, it can be concluded that:The characteristics of duck data are uniforms with a relatively small CV below 15% except for pubic width (35.88%), shank length (25.28%), and beak color (32.68%). The correlation value shows a value that can be categorized as medium to large, the lowest between pubic width and shank length which is 0.14 and the largest between body length and body height which is 0.73.

The results of simple and multiple linear regression analysis showed that the relationship model between body length, chest width, body height, abdomen width, pubic width, and shank length with the body weight of female Alabio ducks both separately and together was significant (*P<0.05*).Body length (X_1), chest width (X_2) body height (X_3), abdomen width (X_4), pubic width (X_5), and shank length (X_6) can be used to

estimate the body weight of a female Alabio duck. The regression value obtained from each variable is Y (Body weight) = 113.84 + 1.63 X_1 + 96.01 X_2 + 13.66 X_3 + 17.96 X_4 + 31.52 X_5 – 29.76 X_6. The results of the study are expected to be a complementary database that can be used as the basis for the Alabio duck breeding program.

References

[1]. Asiamah, C., Xue, Y., Lu, L. L., Zou, K., Zhao, Z., & Su, Y. (2020). Evaluation of growth performance on family breeding of the Leizhou Black Duck: A preliminary study. Veterinary Medicine and Science, 6(3), 500–510.

[2]. Dalton, D. C. (1980). An Introduction To Practical Animal Breeding. BSP Profesional Books.

[3]. Health, D. G. of L. and A. (2020). Livestock and Animal Health Statistics. Accesed 15 September 2021.

[4]. Ishii, T., Oda, T., Fukuda, K., & Fukaya, N. (1996). Three dimensions measuring apparatus for body form of farm animal. Proceeding AAAP Soc Zootech Sci, 2, 544–545.

[5]. Ismoyowati, I., & Sumarmono, J. (2019). Duck Production for Food Security. IOP Conference Series: Earth and Environmental Science, 372(1), 0–11. https://doi.org/10.1088/1755-1315/372/1/012070

[6]. Ismoyowati, & Purwantini, D. (2013). Egg production and quality of local ducks in Ducks Farming Center Area. Jurnal Pembangunan Pedesaan, 13(1), 11–16.

[7]. Kurnianto, E. (2009). Ilmu Pemuliaan Ternak. Graha Ilmu.

[8]. Mahanta, J. D., Ramakrishnan, A., & Jalaludeen, A. (1999). Biometric characteristics of two indigenous types of ducks of Kerala. Indian Vet.J, 76, 1061–1094.

[9]. Maharani, D., Hariyono, D. N. H., Putra, D. D. I., Lee, J. H., & Sidadolog, J. H. P. (2019). Phenotypic characterization of local female duck populations in Indonesia. Journal of Asia-Pacific Biodiversity, 12(4), 508–514. https://doi.org/10.1016/j.japb.2019.07.004

[10]. Morduzzaman, M., Bhuiyan, A. K. F. H., Rana, M., Islam, M. R., & Bhuiyan, M. S. A. (2015). Phenotypic characterization and production potentials of Nageswari duck in Bangladesh. Bangladesh Journal of Animal Science, 44(2), 92–99. https://doi.org/10.3329/bjas.v44i2.26007

[11]. Muzani, A., Brahmantiyo, B., & A.Tapyadi, C. S. (2005). Pendugaan jarak genetik itik Cihateup, Cirebon dan Mojosari. Med. Petern, 28(3), 109–116.

[12]. Nozawa, K. (1980). Phylogenetic Studies on Native Domestic an Animal in East and Shoutheast Asia. Tropical Agriculture Research Center.

[13]. Pamungkas, R. S., Ismoyowati, & A, S. S. (2013). Kajian Bobot tetas, Bobot Badan Umur 4 dan 8 Minggu Serta Korelasinya Pada Berbagai Itik Lokal.

[14]. Prasetyo, L. H., & Susanti, T. (2007). Pendugaan Parameter Genetik Bobot Hidup Itik Alabio dan Mojosari pada Periode Starter. Jitv, 12(3), 212–217.

[15]. Sopiyana, S., Yusnandar, M. E., & ASetioko, A. R. (2006). Identifikasi sifat-sifat kualitatif dan ukuran tubuh pada itik Tegal, itik Magelang dan itik Damiaking. Prosiding Lokakarya Nasional Inovasi Teknologi Dalam Mendukung Usaha Ternak Unggas.

[16]. Sulaiman, A., & S.N. Rahmatullah. (2011). Karakteristik eksterior, produksi dan kualitas telur itik Alabio di sentra peternakan itik Kalimantan Selatan. Bioscientiae (Journal of Biology Science, 8, 46–61. https://doi.org/10.20527/b.v8i2.196

[17]. Sulaiman, A., & S.N.Ramatullah. (2011). Karakteritik eksterior, produksi dan kualitas telur itik Alabio di sentra peternakan itik Kalimantan Selatan. Bioscientiae (Journal of Biology Science), 8(2), 46–61.

[18]. Sulaiman, A., Rahmatullah, S., Effendi, H., & Simanungkalit, G. (2022). Production performance of Alabio ducks (Anas platyrhynchos Borneo) under different levels of drinking water salinity. Journal of Advanced Veterinary and Animal Research, 9(2), 241–245. https://doi.org/10.5455/javar.2022.i589

[19]. Suparyanto, A. (2003). Karakteristik itik Mojosari putih dan peluang pengembangannya sebagai itik pedaging komersial. Wartazoa, 13(4), 143–150.

[20]. Suparyanto, A. (2005). Peningkatan produktivitas daging itik mandalung melalui pembentukan galur induk. Disertasi. Sekolah Pascasarjana, Institut Pertanian Bogor.

[21]. Suryana. (2015). The phenotypic and genetic characterization of alabio duck (Anas platyrhynchos Borneo) in South Kalimantan for it's conservation and sustainable useNo Title. IPB University.

[22]. Suryana, N., Noor, R. R., Hardjosworo, P. S., & Prasetyo, L. H. (2016). Karakteristik fenotipe itik Alabio (Anas platyrhynchos Borneo) di Kalimantan Selatan. Buletin Plasma Nutfah, 17(1), 61–67. https://doi.org/10.21082/blpn.v17n1.2011.p61-67

[23]. Suryana, Noor. R. R., & Hardjosworo, P. S. (2011). Karakteristik fenotipe itik Alabio (Anas platyrhynchos Borneo) di Kalimantan Selatan. Buletin Plasma Nuftah, 17(1), 61–67. https://doi.org/10.21082/blpn.v17n1.2011.p61-67

[24]. Syaifudin, Rukmiasih, & Afnan, R. (2015). Performa Itik Albino Jantan dan Betina bedasarkan Pengelompokan Bobot Tetas. Jurnal Ilmu Produksi Dan Teknologi Hasil Peternakan, 3(2), 83–88.

[25]. Yakubu, A., Muhammed, M. M., Ari, M. M., Musa-Azara, I. S., & Omeje, J. N. (2015). Correlation and path coefficient analysis of body weight and morphometric traits of two exotic genetic groups of ducks in Nigeria. Bangladesh Journal of Animal Science, 44(1), 1–9. https://doi.org/10.3329/bjas.v44i1.23112

[26]. Yuwanta, T., Sidadolog, J. H. P., Zuprizal, Z., & Musofie, A. (1999). Characteristic Phenotype of Turi Local Duck and It Relationship with Production and Reproduction Rate. Proceeding. Edition Dec, 1, 125 – 129.

COFLICT OF INTERESTS

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

The Institute for Research and Community Service ULM provides funding for this experiment through the 2021 PDWM Program and The Alabio Astambul and Pelaihari Duck Livestock Group are thanked for supporting this experiment.