Genetic Parameter Estimation on Pra Production Traits of Alabio and Mojosari Ducks After Selection Based on Egg Production in Two Generation

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ABSTRACT

This experiment was conducted to analyze the genetics parameter of preproduction traits of Alabio and Mojosari Ducks after two generation selection for laying line. Alabio and Mojosari Ducks were selected 20 males and 200 females, respectively, as twice generation and placed in group mating for egg production. All collected eggs were hatched to find about 450 of Alabio and 520 of Mojosari female ducklings. All birds were individually identification, based of group lines mating of the pwerents. Ducklings were rewered and weight two weekly interval of 16 weeks and old of sexual maturities. Data were collected followed on half- and full-sib nested design. Collected data were egg weight, body weight of day, 2, 4, 6, 8, 10, 12, 14, 16 weeks old ducks, sexual maturity and age of sexual maturity. Estimated genetic parameter of heritability ($h^2 \pm s_{h^2}$) was estimated based on variance components of half-sib and full sib. The result showed that on half sib estimation of the $h^2 \pm s_{h^2}$ of body weight and age of sexual maturity of Alabio (0.89 ± 0.26 and 0.35 ± 0.20) was higher than Mojosari (0.48 ± 0.21and 0.59 ± 0.23 ducks. On full sib estimation, Alabio also had a higher $h^2 \pm s_{h^2}$ on body weight of sexual maturity (0.88 ± 0.32) than Mojosari (0.45 ± 0.16), but lower on age of sexual maturity, 0.28 ± 0.25 and 0.59 ± 0.16,respectively. On egg and body weight of dod, 2, 4, 6, 8, 10, 12, 14 and 16 weeks of age, shown that $h^2 \pm s_{h^2}$ on half sib estimation of Alabio were 1.07±0.28, 0.47±0.22, 0.24±0.18, 0.25±0.20, 0.49±0.22, 0.44±0.22, 0.02±0.12 0.42±0.21, **0.43±0.21** and **0.55±0.23** compared to Mojosari 0.84±0.25, 0.41±0.20, 0.08±0.14, 0.63±0.25, 0.25±0.18, 0.10±0.17, 0.04±0.13, 0.11±0.15, 0.03±0.12 and 0.15±0.15, respectively. On full sib estimation of $h^2 \pm s_{h^2}$ of Alabio, respectively were 0.81±0.36, 0.18±0.19, 0.27±0.13, 0.52±0.29, 0.32±0.20, 0.48±0.20, -0.04±0.07, 0.29±0.18, **0.24±0.18** and **0.36±0.22** its lower compwered to Mojosari, respectively, 0.85±0.30, 0.31±0.17, 0.14±0.07, 0.28±0.30, 0.23±0.13, 0.12±0.11, 0.05±0.06, 0.09±0.09, 0.001±0.06 and 0.13±0.10.

Keywords : Alabio and Mojosari Ducks, Genetic parameter, Heritability, Preproduction,

INTRODUCTION

Alabio and Mojosari ducks were a famous duck originated in Indonesia. Alabio ducks from South Kalimantan was a duck that has a large body weight, bright brown fur, yellow feet and beak and less upright than the Mojosari that had a smaller weight, dark brown fur and black beak. Both ducks maintained to produce eggs. Efforts to improve the genetic quality of Alabio and Mojosari duck in BPTU KDI Pelaihari, South Kalimantan has been done since 2005 until

2010. The results obtained that the average production of eggs were 53 - 55% / head / year. These results were not sufficient according to the desired expectations. These results were not sufficient according to the desired expectations. The selection was mass selection without regard to family relationships among individuals.

Very few papers refer to the genetic parameters on waterfowl. Larzul et al. [2000] report the value h² of body weight in geese aged 8 and 11 weeks achieved respectively 0.64 and 0.68, with a genetic correlation of 0.92 between them. The same thing was also estimated value h² in different weight on waterfowl in Canada ranged from 0.41 to 0.77 [Shrestha and Grunder 2006]. In Poland the value of h² body weight was found to vary from 0.35 to 0.51 [Rosiński 2000]. Low heritability of body weight (0.18) reported by Yeh et al. [1999] for the white swan Roman in Taiwan. WEZYK (1999) cited SHANIN and SALEH (1997) that obtained a heritability score of 0.28, 0.25, 0.24 and 0.21 for Peking duck weights of age 2, 4, 6 and 8 weeks respectively. LE et al. (1998) obtained heritability value of 0.104 for 8 weeks on a live weight of ducks in Vietnam. LARZUL et al. (1999) also obtained heritability value of live weight of geese age 8 weeks.0.62. The age of sexual maturity, egg weight, egg production and body weight at 8 weeks were the most important traits to improve the economic efficiency of poultry (Kianimanesh, 2002).Prasetyo and Susanti (2007) reported the heritability body weight of Alabio and Mojosari duck on the population of ducks at BPTU KDI in Pelaihari, before the intensive selection to be done. The value of heritability of Alabio and Mojosari duck at 1 to 8 weeks of ages were lower, respectively in the range of 0.016 to 0.15, and 0.081 to 0.227.

As we know that highly heritability of variables is dependent on the species of livestock, cultivation and maintenance purposes of the herd in question. For poultry that have been several generations maintained as beef cattle will have the value of heritability of life weights that tend to be higher. The fact is that the ducks used in this study were more intended to be maintained as an egg producer, and this is indicated by the alleged heritability value of life weight that tend to be low. Therefore, estimating the variance components and genetic value of some of traits, namely, the body weight of growth, sexual maturity and egg-weight traits in the 4th generation of breeding programs for increasing egg production through closed inbreeding system within each of the 20 duck breeding groups of Alabio and Mojosari was done. This study was conducted to determine the development of genetic parameters of growth until sexual maturity ages. All of the females offspring of the 4th generation after breeding program of egg production improvement with closed inbreeding pattern in 20 groups each Alabio and Mojosari ducklings. The genetic parameters include hatched weight, body weight of 2 weeks (BW2) up to 16 weeks (BW 16) in 2 weeks interval, body weight of sexual maturity (BWSM), age of sexual maturity (USM) and first egg weight. EW1) will be observed.

MATERIALS AND METHODS

The duck population of Alabio and Mojosari comes from the 4th generation, which is selected by a continuous closed inbreeding program (Brandsch, 1979). The breeding program has been started since 2010 with an initial population of 20 males and 200 females for each duck line in 20 mating flocks in ratio of 1 males 10 females. Selection was done for egg production based on the first three months egg production. The egg production was analyzed by statistic method using hierarchal design of variance analysis based on half sib and full sib, to obtain the heritability value of egg production. Heritability value was used to obtain coefficient of breeding value in each group. The coefficient of breeding value is then, used later to determine the breeding value of each female heredity, based on three months of egg production. Every ten females with the highest breeding value were declwered as breeding ducks, instead of the elders for each group in the next generation.

Animals and traits: The fourth generation of female offspring from the breeding programs above was used in this study. A total of 458 females Alabio ducks from 18 males and 180 females, as well as 517 females Mojosari ducks from 19 males and 190 females of the 4th generation will study the genetic parameters of growth and sexual maturity traits. The measured variables were hatched weight (BW1), body weight of 2 weeks (BW2), 4 weeks (BW4), 6 weeks (BW6), 8 weeks (BW8), 10 weeks (BW10), 12 weeks (BW12), 14 weeks (BW14), 16 weeks (BW16), and body weight of sexual maturity (BWSM), first egg weight (BW1)

Analysis of variance was used to estimate component variance from various genetic parameters with statistical model of a random unbalanced design for the half sibling and hierarchal unbalanced design for full siblings (Becker, 1975)

Model 1. Design of the one-way layout with an unequal number of progeny per sire.

Statistical random model is $Y_{ijk} = \mu + \alpha_i + e_{ijk}$

Where, μ is the common mean; αi is the effect of the i-th sire, and eijk uncontrolled environmental and genetic deviations attributable to individuals within sire groups. All effects were random, normal and independent with expectations equal to zero.

Table 1. The one way analysis of variance to estimate variance component.

Source of variation	df	SS	MS	EMS
Between sires	S - 1	SS_{Shave}	MS_S	$\sigma^2_W + k\sigma^2_S$
Progeny within sires	N.- s	SS_W	MS_W	σ^2_W

S = number of sires

n_i = number of individuals with the i-th sires = number of dams mated to the i-th sire

k = ni in expected mean squweres

n. = total number of individuals

Model 2. Design of Hierarchal variance analysis with unequal numbers of dams per sires and progeny per dam.

Statistical random model is $Y_{ijk} = \mu + S_i + D_{i:j} + e_{ijk}$

Where, μ is the common mean; Si is the effect of the i-th sire; Di:j is the effect of dam j-th mated to the i-th sire; and eijk = the uncontrolled environmental and genetic deviation attributable to the individuals.

All effects were random, normal, and independent with expectation.

Table 2. The Hierarchal analysis of variance to estimate variance component.

Source of variation	d.f.	SS	MS	EMS
Between Sire	S – 1	SS_S	MS_S	$\sigma^2_W + k_2\,\sigma^2_D + k_3\,\sigma^2_S$
Between dams, within sires	D – S	SS_D	MS_D	$\sigma^2_W + k_1\,\sigma^2_D$
Between progeny within dams	n.. – D	SS_W	MS_W	σ^2_W

S = number of sires

D = total number of dams

n.. = total number of progeny

With unequal numbers of dams per sire and progeny per dam the coefficients k1, k2 and k3 have to determine by the formula :

$$k1 = (n.. - \Sigma \frac{\Sigma n^2 ij}{ni.})/d.f.\text{(dams)}$$

$$k2 = (\frac{\Sigma\Sigma n^2 ij}{ni.} - \frac{\Sigma\Sigma n^2 ij}{n..})/\text{d.f. (sires)}$$

$$k3 = (n.. - \frac{\Sigma n^2 i.}{n..})/\text{d.f. (sires)}$$

The variance component σ²S, σ²D, σ²ε and σ²T at both statistical models would be used to estimate heritability value base on half siblings and full sibling.

RESULTS AND DISCUSSION

Growth performances

The result of observation shown (Table 1) that body weight of hatched duckling (BW1), 2 weeks (BW2) and 4 weeks (BW4) of age between Alabio and Mojosari duck were not significant difference, and coefficient of variance at BW2 were high for both duck breed and Mojosari was higher (46.05%) than Alabio (20.27%). At BW4 the coefficient of variance decreases to 15.88% (Mojosari) and 16.04% (Alabio). The growth rate between Mojosari and Alabio at BW6 and BW8 shown a high significant difference (P<0.001) than decrease at BW10 and BW12 and Mojosari showed faster growth than Alabio. The growth rate begins to slow down at BW10 to BW 16, although there was a marked difference in BW14 (P<0.001), but it only shown the variation in the speed difference between the two ducks.

Table 3. Mean body weight (grams) and sexual maturity age (days) and first egg weight (grams) of female of Alabio and Mojosari ducks after 4th generation of selection

Traits	Alabio Ducks			Mojosari Ducks			Stat.
	n	Mean weight	CV, %	*n*	Mean weight	CV, %	
DOD Weight (BW1)	*466*	40.31 ± 003.82	9.48	*516*	40.24 ± 003.97	9.86	ns
2nd Weeks BW (BW2)	*398*	238.69 ± 048.38	20.27	*510*	231.10 ± 106.41	46.05	ns
4th Weeks BW (BW4)	*314*	679.43 ± 108.99	16.04	*274*	674.08 ± 107.06	15.88	ns
6th Weeks BW (BW6)	*417*	1003.81 ± 127.68	12.72	*454*	1066.58 ± 142.30	13.34	***
8th Weeks BW (BW8)	*347*	1195.88 ± 129.87	10.86	*313*	1221.25 ± 149.83	12.27	*
10th Weeks BW (BW10)	*466*	1313.85 ± 571.11	43.47	*507*	1263.56 ± 165.78	13.12	ns
12th Weeks BW (BW12)	*462*	1313.92 ± 122.45	9.32	*486*	1317.41 ± 144.42	10.96	ns
14th Weeks BW (BW14)	*453*	1315.44 ± 151.87	11.54	*491*	1350.39 ± 129.34	9.58	***
16th Weeks BW (BW16)	*458*	1377.72 ± 127.67	9.27	*519*	1388.62 ± 140.33	10.11	ns
Sex. Mat. BW (BWSM)	*451*	1689.95 ± 154.70	9.16	*516*	1588.72 ± 145.70	9.17	***
Age of Sex. Mat.(ASM)	*458*	186.48 ± 036.34	19.49	*517*	186.39 ± 029.45	15.80	ns
1st Egg Weight (EW1)	*457*	59.70 ± 004.58	7.68	*503*	58.64 ± 005.65	9.63	***

*ns : not significant; * : significant by P<0.05; ** : significant by P<0.01; ***):significant by P<0.001*

The age of sexual maturity was not difference significantly but sexual maturity body weight was highly significant difference. The Alabio ducks (1689.95 grams) was higher (P<0.001) 100 grams compwere to Mojosari duck. The greater body weight of sexual maturity on Alabio supports the first large eggs produced. Alabio's first egg weight showed a significant difference (P <0.01) with the first egg weight of Mojosari duck.

The observations on body weight indicate that the two duck breeds differ in BW6, BW8, BW14 and BWSM, but then the same on BW10 and BW12 and BW16. The difference in the rate of growth indicates differences in the breed of both Alabio and Mojosari ducks.

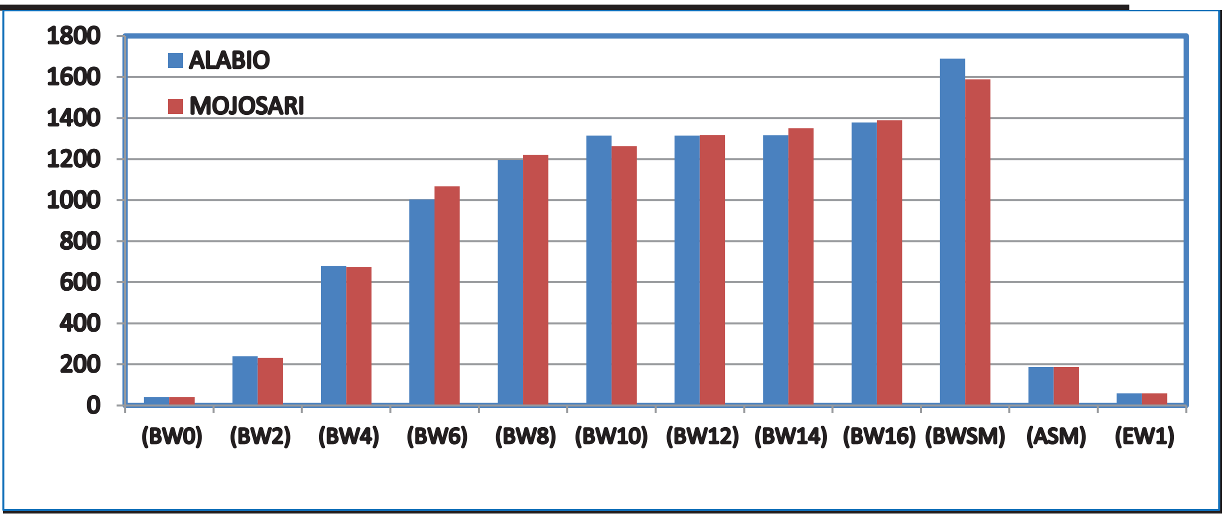


Figure 1. The growthduction and repr graphic of Alabio and Mojosari duck

According to Prasetyo and Susanti (2005), who examined the growth differences between these duck breed. They found that at the age of 6 and 8 weeks both of duck breeds had the same growth rate pattern. Based on the coefficient of variation, two duck breeds showed the same distribution of variance coefficient, where the highest distribution seen at the beginning of growth (BW2) and at the age of sexual maturity. Especially in Alabio duck, the highest variation coefficient was in BW10.

Distribution of variance component

The results of the analysis of variance based on half-siblings in Table 2 and 3 shown the distribution of the variances components of additive gene by half sibling relationships. Sibling intra-correlation (tHB) describes the level of homogeneity of additive genes in the observed population. Gene additives in Alabio ducks seen consistent positive with the highest coefficients achieved in the body weight of sexual maturity (BWSM) and first egg weight (EW1). At body weight of BW1, BW6, BW8. BW12, BW14 and BW16 shown a correlation rate above 10%, and at BW2, BW4 was 6% and the lowest at BW10. In the Mojosari duck there was an over estimate of BW2 and the coefficient of additive gene above 10% found only in BW2, BW4 and BWSM, while others were below of 10% with a range of 1 to 6%.

Based on hierarchal analysis of variance were found the distribution of all genetic variance (tVB) higher than genetic additive (tHB) and shown that in some of traits were under estimated (BW2 and BW8). The negative value indicated the dominant effect of gene reduced the effect of additive gene. The component variance of additive gene ($\sigma^2\delta$) of Alabio duck was found under estimate only at BW10 and found the highest value (20 %) at the first egg weight (EW1). Other body weight traits showed the component variance value of additive gene in the range of 4.53 to 13.01 % of total component variance. It was differ with component variance of additive gene ($\sigma^2\delta$) of Mojosari. It had also been found that the component variance of gene additives at BW10 was low and this low value continues up to BW16, and increases again in the age of sexual maturity (BWSM)

Table 4. Component of variance (in %) of growth traits on Alabio female duck based on half and full-siblings variance analysis .

Traits	HALF-SIB				FULL-SIB					
	tHB	σ²δ	σ²ε	σ²T	tHB	tVB	σ²δ	σ²ϙ	σ²ε	σ²T
BW1	0.12	11.71	88.29	100.00	0.05	0.69	4.53	64.33	31.14	100.00
BW2	0.06	5.93	94.07	100.00	0.07	(0.03)	6.73	(10.00)	103.27	100.00
BW4	0.06	6.36	93.64	100.00	0.13	0.42	13.01	29.42	57.57	100.00
BW6	0.12	12.16	87.84	100.00	0.08	0.42	8.08	33.97	57.95	100.00
BW8	0.11	11.04	88.96	100.00	0.12	(0.01)	11.96	(13.41)	101.45	100.00
BW10	0.01	0.57	99.43	100.00	(0.01)	0.15	(0.99)	16.09	84.90	100.00
BW12	0.10	10.40	89.60	100.00	0.07	0.34	7.18	26.98	65.84	100.00
BW14	0.11	10.80	89.20	100.00	0.06	0.47	6.09	40.93	52.98	100.00
BW16	0.14	13.85	86.15	100.00	0.09	0.48	9.12	39.06	51.82	100.00
BWSM	0.22	22.35	77.65	100.00	0.22	0.18	6.90	13.69	79.41	100.00
ASM	0.09	8.68	91.32	100.00	0.07	0.21	5.83	10.55	83.61	100.00
EW1	0.21	20.53	79.47	100.00	0.20	0.69	20.33	48.54	31.12	100.00

(oo) : marked for negative value

The variance component based on dam (σ²ϙ), on the Alabio and Mojosari ducks shown the difference in the percentage of total variance. The component of variance at Alabio ducks was higher than the components of variance at the Mojosari duck. The negative variance component of the Alabio duck is found in BW2 and BW8 traits. In Mojosari ducks were found also on BW2, and BW8 with different magnitudes, as well as on the ASM and EW1 traits. Another difference is also shown on each increment variance components of sire (σ²δ) and dams (σ²ϙ). In the Alabio duck the dam variance component (σ²ϙ) was much larger than the sire component of variance(σ²δ), while in the Mojosari duck the difference is very small, even in some dam variance component (σ²ϙ) traits smaller than the sire variance component(σ²δ) in

Table 5. Component of variance (%) of growth traits on Mojosari female duck based on half and full-siblings variance analysis.

Traits	HALF-SIB				FULL-SIB					
	tHB	σ²δ	σ²ε	σ²T	tHB	tVB	σ²δ	σ²ϙ	σ²ε	σ²T
BW1	0.10	10.23	89.77	100.00	0.05	0.33	5.43	27.59	66.98	100.00
BW2	2.09	228.57	-128.57	100.00	0.03	(0.12)	3.38	(5.64)	112.25	100.00
BW4	0.16	15.70	84.30	100.00	0.15	0.41	14.76	25.98	59.27	100.00
BW6	0.06	6.20	93.80	100.00	0.05	0.10	5.22	4.72	90.05	100.00
BW8	0.03	2.60	97.40	100.00	0.04	0.03	4.22	(1.71)	97.49	100.00
BW10	0.01	1.11	98.89	100.00	0.00	0.00	0.32	0.56	100.24	100.00
BW12	0.03	2.80	97.20	100.00	0.02	0.06	1.57	4.68	93.75	100.00
BW14	0.01	0.78	99.22	100.00	(0.01)	0.07	(0.98)	8.10	92.88	100.00
BW16	0.04	3.83	96.17	100.00	0.02	0.09	1.91	6.79	91.30	100.00
BWSM	0.12	11.92	88.08	100.00	0.10	0.17	10.25	6.30	83.46	100.00
ASM	0.15	14.79	85.21	100.00	0.14	0.14	14.11	(0.05)	85.94	100.00
EW1	0.21	20.95	79.02	100.00	0.21	0.19	20.70	(1.47)	80.74	100.00

(oo) : marked for negative value

BW6. The range interval of the component variance (**σ²ϙ**) of Alabio duck was from -13.61% to 64.33, and at the Mojosari duck was from -5.54% to 27.59%. Estimates of the effect of dominant genes were found in some body weight and reproductive traits in Alabio and Mojosari ducks and this shown of interesting results. Increasing the variance component of the additive gene reduced the influence of the dominant gene to be negative effects. The influenced of negative dominant genes on Alabio ducks was found in several traits, namely in BW2, BW4, BW8 and BWSM.

In the Mojosari duck the negative dominant gene effect was found in more traits, that was on BW2, BW6, BW8, BW10, BWSM, ASM and EW1. Figure 3 (B)

Table 6. Heritabiliities value of some preproduction traits of Alabio Ducks based on Half-sib and Full-sib Relationship

Traits	HALF-SIB	FULL-SIB			
	$h^2\delta \pm s_{h^2\delta}$	$h^2\delta \pm s_{h^2\delta}$	$h^2\varrho \pm s_{h^2\varrho}$	$h^2(\delta+\varrho) \pm s_{h^2(\delta+\varrho)}$	σ^2D
BW1	0.47 ± 0.22	0.18 ± 0.19	2.57 ± 0.05	1.38 ± 0.10	2.72
BW2	0.24 ± 0.18	0.27 ± 0.13	(0.40 ± 0.00)	(0.07 ± 0.06)	(0.69)
BW4	0.25 ± 0.20	0.52 ± 0.29	1.18 ± 0.00	0.85 ± 0.14	(3.63)
BW6	0.49 ± 0.22	0.32 ± 0.20	1.36 ± 0.00	0.84 ± 0.10	1.15
BW8	0.44 ± 0.22	0.48 ± 0.20	(0.54 ± 0.00)	(0.03 ± 0.10)	(1.04)
BW10	0.02 ± 0.12	(0.04 ± 0.07)	0.64 ± 0.00	0.30 ± 0.03	0.74
BW12	0.42 ± 0.21	0.29 ± 0.18	1.08 ± 0.00	0.68 ± 0.09	0.89
BW14	0.43 ± 0.21	0.24 ± 0.18	1.64 ± 0.00	0.94 ± 0.09	1.55
BW16	0.55 ± 0.23	0.36 ± 0.22	1.56 ± 0.00	0.96 ± 0.11	0.89
BWSM	0.89 ± 0.26	0.88 ± 0.32	(0.14 ± 0.01)	0.37 ± 0.16	(1.02)
ASM	0.35 ± 0.20	0.28 ± 0.16	0.55 ± 0.01	0.41 ± 0.08	0.31
EW1	1.07 ± 0.28	0.81 ± 0.36	1.94 ± 0.04	1.38 ± 0.18	1.31

(oo) : marked for negative value

shows that the effect of dominant genes on Mojosari ducks lies within the range between -1 and 1, and in Alabio's duck its influence reached a higher than 1.

Heritability

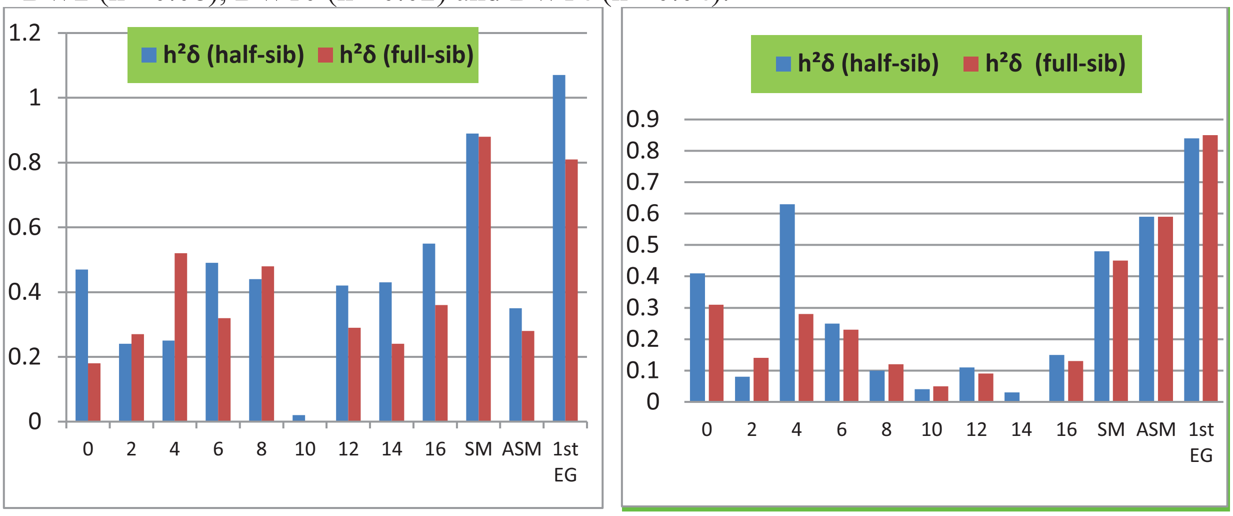
The results of heritability values for Alabio and Mojosari ducks were shown in Table 4 and Table 5. Heritability value of Alabio duck (Table 4) based on the additive component variance gene in the half sibling relationship were the highest on reproduction traits as well as on BWSM (h^2=0.84), and high on BW1 (h^2=0.47), BW6 (h^2=0.49), BW8 (h^2=0.44), BW12 (h^2=0.42), BW14 (h^2=0.43) and BW16 (h^2=0.55) and medium on BW2 (h^2=0.24) and BW4 (h^2=0.25), and the lowest on BW10 (h^2=0.02), and on EW1 was found over estimated value.

Table 7. Heritabilities value of some preproduction traits of Mojosari Ducks based on Half-sib and Full-sib Relationship

Traits	HALF-SIB	FULL-SIB			
	$h^2\delta \pm s_{h^2\delta}$	$h^2\delta \pm s_{h^2\delta}$	$h^2\varrho \pm s_{h^2\varrho}$	$h^2(\delta+\varrho) \pm s_{h^2(\delta+\varrho)}$	σ^2D
BW1	0.41 ± 0.20	0.31 ± 0.17	1.08 ± 0.04	0.69 ± 0.09	0.89
BW2	0.08 ± 0.14	0.14 ± 0.07	(0.63 ± 0.00)	(0.24 ± 0.03)	(0.76)
BW4	0.63 ± 0.25	0.28 ± 0.30	1.13 ± 0.00	0.71 ± 0.15	0.45
BW6	0.25 ± 0.18	0.23 ± 0.13	0.19 ± 0.00	0.21 ± 0.06	(0.02)
BW8	0.10 ± 0.17	0.12 ± 0.11	(0.07 ± 0.00	0.02 ± 0.04	(0.24)
BW10	0.04 ± 0.13	0.05 ± 0.06	(0.02 ± 0.00	0.01 ± 0.03	(0.04)
BW12	0.11 ± 0.15	0.09 ± 0.09	0.19 ± 0.00	0.14 ± 0.04	0.12
BW14	0.03 ± 0.12	0.001 ± 0.06	0.32 ± 0.00	0.16 ± 0.03	0.36
BW16	0.15 ± 0.15	0.13 ± 0.10	0.27 ± 0.00	0.20 ± 0.05	0.20
BWSM	0.48 ± 0.21	0.45 ± 0.16	0.25 ± 0.02	0.35 ± 0.08	(0.16)
ASM	0.59 ± 0.23	0.59 ± 0.25	(0.002 ± 0.02	0.30 ± 0.13	(0.57)
EW1	0.84 ± 0.25	0.85 ± 0.30	(0.06 ± 0.02	0.39 ± 0.15	(0.89)

(oo) : marked for negative value

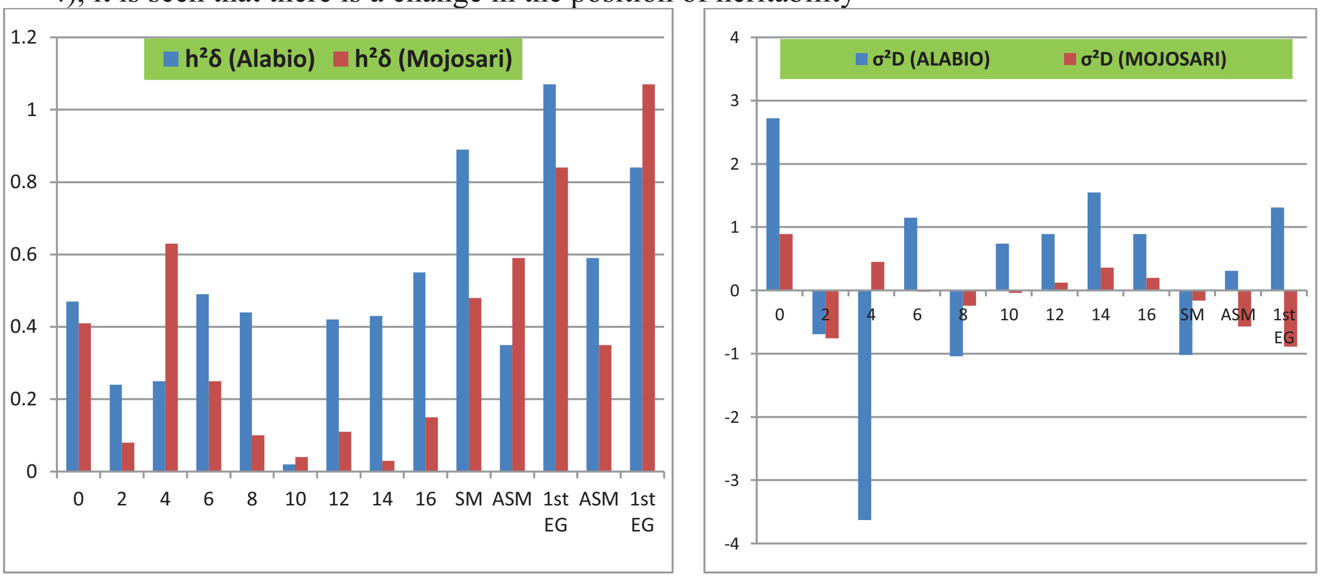
At Mojosari duck (Table 5) was found the highest heritability value on EW1(h^2=0.84), and high on BW1 (h^2=0.41), BW4 (h^2=0.63), BWSM (h^2=0.48) and ASM (h^2=0.59) and medium on BW6 (h^2=0.25) and low on BW8 (h^2=0.10), BW12 (h^2=0.11) and BW16(h^2=0.15), lowest on BW2 (h^2=0.08), BW10 (h^2=0.02) and BW14 (h^2=0.04).



ALABIO MOJOSARI

Figure 2. Hertability value of body weight and reproductions traits based on half and full siblings relationship of Alabio and Mojosari duck

In Figure 3 A., the result of heritability estimation of body weight based on half-brother showed that at Alabio duck was higher than Mojosari duck, except at week 4 (BW4), week 10 (BW10), age of sexual maturity. (ASM) and first egg weight (EW1). If the estimate of heritability between half sibling compwered with the hierarchy of variance analysis on Alabio duck (Table 4), it is seen that there is a change in the position of heritability



(A) **(B)**

Figure 3. (A) Heritability value in some body weight traits of Alabio and Mojosari ducks based on half sibling relationship. (B) The effect of dominant gene (σ^2D) in some body weight and reproduction traits of Alabio and Mojosari ducks.

value. Heritability value based on half sibling relationship is higher than the value obtained through hierarchical variance analysis, except at week 2 (BW2), week 4 (BW4) and week 8 (BW8). The same results were shown by Mojosari ducks (Table 5), except at week 4 (BW4) instead showed the highest value (0.63 vs 0.28).

In Table 4 and 5 the magnitude of the dominant gene effect is estimated based on hierarchical variance analysis. Estimates were based on the reduction of variance components of the dam and sire. These results indicate that the effects of dominant variance components vary greatly from negative to positive. In Figure 3B shown that in the Alabio duck were found the normal dominant effect value (between 0 to 1) on the body weight traits at 10 weeks (BW10) of 0.74, 12 weeks (BW12) of 0.89, 16 weeks (BW16) of 0.89 and at the age of sexual maturity (ASM) of 0.35. Overestimate dominant effects were found in traits body weight of hatched duck (BW1), 6 weeks (BW6), 14 weeks (BW14) and at the first egg weight (EW1), and others had a negative dominant effect.

In Mojosari duck found the dominant effect on the weight of hatched duck (BW1) of 0.89, 4 weeks (BW4) of 0.45, 12 weeks (BW12) of 0.12, 14 weeks (BW14) of 0.36, 1 6 weeks (BW16) of 0.20, and the underestimate dominant effect at 2 weeks (BW2), 6 weeks (BW6), 8 weeks (BW8), 10 weeks (BW10), at sexual maturity weight (BWSM), at age of sexual maturity (ASM) and at first egg brat (EW1).

In the hierarchical variance analysis, the variance component of dam consisting of the additive gene and the non-additive gene (especially the dominant gene) was separated from the total variance, resulting in a complete change in variance components (Herrendoerfer and Schueler, 1987). The dominant effect being passed on to offspring for mating could be estimated by estimating the difference of the magnitude of the components dam and the average component additive genes of sire and dam. Such changes could alter additive variance components of the sire. (Pirchner, 1981).

In the estimation approach of variance components using hierarchical variance analysis, it is included in the variance component of the dam is the effect of dominant and additive genes together. If the influence of dominant genes gave additive properties greater than alleles, then there might be a decrease in the effect of additive genes. But if dominant genes had a smaller additive effect, then in the process of combining genes and alleles there was also a decrease / increase of additive gene effects, and it really depended on the increase of homozygous dominant or homozygous recessive. As a result of previous selection, there could be an increase in homozygous population. The breeding process for improving egg production through closed inbreeding could also impact on increasing the inherited value expressed by the heritability value of the population.

In the variance component estimation approach using hierarchical variance analysis, the variance component variant will also include the effects of dominant genes and additive genes together. If the influence of dominant genes gives additive properties greater than alleles, then there were decrease in the effect of additive genes. But if dominant genes had smaller additive effect, then in the process of combining genes and alleles there is also a decrease / increase of additive gene effects, and This greatly depends on the occurrence of an increase in dominant homozygote genes or recessive homozygote. As a result of previous selection, there may be an increase in the homogeneity of the population genotype. The process of breeding with inbreeding closed to improve egg production can also impact to increase the value of inheritance expressed by the heritability value of the population.

CONCLUSIONS

The ducks' herability of Alabio and Mojosari after improving the genetic quality of egg production until the 4th generation has also increased in some weight and reproductive traits. At Alabio ducks a high increase in heritability value (0.24 - 0.89) is found in almost all properties of body weight except at week 10 only reaching 0.04. In contrast to Mojosari ducks, the increase only occurs in the weight properties of BW1 and BW4 as well as on the reproductive trait, but on the other traits were only between 0.03 - 0.25. The Alabio duck had a better genetics growth than Mojosari duck.

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