

Performance of Interse Merawangarab and Arabmerawang Chicken Cross at Age 1 to 10 Weeks

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Abstract

Indonesia have many local chicken, such as merawang chicken and arab chicken. Arab chickens are layer local chicken that has egg production more than merawang chicken. Crossing between merawang arab chicken and arab merawang chicken aimed to improve genetic quality through heterosis effect. Interse of merawangarab (MAMA) with interse of arab merawang (AMAM) were observed for their production traits. Total of 98 MAMA chickens and 46 AMAM chickens were observed for their body weight, feed consumption, feed conversion and mortality. This research used covariance (ANCOVA) in randomized complete block designed (RAK). Chicken crossing as a treatment and concomitant is DOC weight. The body weight of MAMA and AMAM were not different ($P>0.05$). Body weight MAMA male and female at age 10 weeks were 843.10 g and 763.5 g respectively. Body weight AMAM male and female at age 10 weeks were 825.82 g and 741.2 g respectively. Feed intake and feed conversion of MAMA and AMAM male were not different ($P>0.05$) as well as MAMA and AMAM female. Mortality were occurred in early rearing phase of AMAM chicken was 2.2%. Performance of MAMA and AMAM chicken at age 1-10 weeks were same.

Keywords: arabmerawang and merawangarab chicken, crossing, performance, production trait

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INTRODUCTION

The productivity of Indonesian local chicken is still varied. Local chicken in Indonesia is only as side line so that the maintenance and feeding is still traditional, causing the development of population and the productivity of local chickens don't maximal. Crossbreeding is one of the tools for exploiting genetic variation. (Saadey *et al.*, Siwendu *et al.*, 2012). Razuki *et al.* (2011) conducted a breed complementarity study by crossing the Iraq brown, White Leghorn and New Hampshire chickens. This study was conducted to improve egg production and egg weight traits. Saadey *et al.* (2008) found that crossbreds obtained from crossing between Sinai (S) and White Leghorn had positive and high heterotic percentage at all ages

Increasing of local chicken productivity can be done through crossbreeding with the other superior local chickens. Merawang chicken have egg production higher than kampung chicken, averaged 165 eggs per bird per year, while the production of kampung chicken eggs was 70-80 eggs per bird per year with the same maintenance system. This causes that merawang chicken has potential as a good egg-producing chicken (Abu Bakar *et al.*, 2005). Another local chicken that has high egg production is arab chicken. Natalia *et al.* (2005) reported that the production egg of arab chicken can reach 190-250 eggs per bird per year with an egg weight of 30-35 g and have low incubate trait so that the laying time becomes longer. Yusdja *et al.* (2005) stated that arab chicken has a good resistance to disease and weather changes in Indonesia.

Previous research by Darwati *et al.* (2017) that the productivity of merawang and arab chicken crossing at age 10 weeks with male sex has weight of 846.5 g and weight of female was 748.5 g, while the weight of chicken from crossing of arab chicken with merawang chicken at age 10 weeks in males was 818.2 g and in females was 733.73 g. In this study need to evaluate performance of interse between merawangarab chicken (MAMA) and interse between arabmerawang chicken (AMAM) at age 1-10 weeks, so the purpose of this study was conducted to assess the growth of interse among merawangarab chickens compared with interse among arabmerawang at the age of 1-10 weeks.

METHOD

The research was conducted in Field Laboratory of Breeding and Genetic Faculty of Animal Husbandry, Bogor Agricultural University. The study was conducted from November 2017 to February 2018.

The materials used in the research DOC MAMA and DOC AMAM each of 98 tails and 46 tails. Commercial feed for broiler growth phase and rice bran. DOC are kept within the colony cage. The cage is equipped with a brooder, feeding place, and a potable water container.

Prevention of disease is done by giving the vaccine ND through eye drop at the age of 3 days and 3 weeks. Provision of vitachick is done by mixing with drinking water until the chicken is 4 weeks old. Furthermore, vitachick is given after and after weighing. 5-week-old chickens are separated by sex. Consumption data is done daily by weighing the rest of the feed. Chicken weight gain was measured every 1 week and observed mortality. Feeding and drinking is given 2 times a day i.e. morning and afternoon. Drinking water is given ad libitum. DOC until the age of 3 weeks was given 100% commercial feed for broiler, 4-5 week old chickens fed 80% commercial feed mixture with 20% rice bran. Chickens aged 5-6 weeks fed 70% commercial feed mix with 30% rice bran. Chickens aged 6-12 weeks fed 60% commercial feed mixture with 40% rice bran.

The researsch design was Ancova in Randomized Block Design (RAK) according to Mattjik and Sumertajaya (2013) consisting of 2 types of cross breeders (MAMA and AMAM chickens). Data analysis was used to compare growth between male MAMA chickens with male AMAM chickens, and MAMA female chickens with AMAM female chickens. The parameters measured were body weight, feed consumption, feed conversion, and mortality. Data collection is done every week.

RESULT

Body weight

Body weight in phase growth will increase in harmony with increasing the age. Based on a study conducted by the intake body weight of interse MA and AM at the age of 1-10 weeks presented in Table 1.

Table 1 Body weight of MAMA and AMAM interse at DOC 1- 10 age weeks

| Week | $\bar{x} \pm sd(n;CV\%)$ Body Weight (g bird ⁻¹) | | | |
|------|--|--|-------------------------|--|
| | MAMA | | AMAM | |
| DOC | 30.31 ± 2.88 (98;9.51) | | 26.59±2.805 (46;10.55) | |
| 1 | 49.84 ± 7.50 (98;15.05) | | 47.98±9,370 (46;19.53) | |
| 2 | 103.97 ± 28.57(98;27.48) | | 93.43±19.79 (45;21.19) | |
| 3 | 162.62±32.29 (98;19.87) | | 148.62±22.14 (45;22.14) | |
| 4 | 238.55±43.44(98;18.21) | | 216.24±41.48 (45;19.18) | |

| Week | $\bar{x} \pm sd (n; CV\%)$ Body Weight | | | |
|------|--|-------------------------------|------------------------------|----------------------------|
| | Male | | Female | |
| | MAMA | AMAM | MAMA | AMAM |
| 5 | 335.13 ± 49.46 (63;14.76) | 303.69 ± 38,30 (24; 12.61) | 295.51 ± 44.47 (34;15.05) | 294.9 ± 49,2 (21;16,68) |
| 6 | 424.30 ± 58.33 (63;13.75) | 397 ± 38.10 (24;9.59) | 379.60 ± 44.20 (34;11.64) | 375.5 ± 46.2 (21;12.30) |
| 7 | 522.80 ± 78.6 (60;15.04) | 488.58 ± 46.89 (24;9.6) | 475.65 ± 53.19 (33;11.18) | 472.5 ± 53.6 (21;11.35) |
| 8 | 629.3 ± 99.6 (59;15.83) | 592.7 ± 50.0 (24;8.44) | 575.39 ± 47.24 (32;8.21) | 560.3 ± 63.5 (21;11.3) |
| 9 | 729.90 ± 110.3 (59;15.11) | 703.9 ± 53.2 (23;7.56) | 676.48 ± 49.74 (32;7.35) | 656.8 ± 85.7 (19;13.04) |
| 10 | 843.10 ± 121.6 (54;14.42) | 825.82 ± 36.55 (22;4.43) | 763.5 ± 69.5 (31;9.11) | 741.2 ± 93.4 (17;12.61) |

A = Arab, M = Merawang, MA = Merawang Arab, AM = Arab Merawang, \bar{x} = mean, sd = standar deviation, CV= coefficient of variation; DOC = *Day Old Chick*. Number with same big abjad was highly significant (P<0.01).

Feed Consumption

Feed consumption of MAMA and AMAM chicken at age 1-10 weeks presented in Table 2.

Table 2 Feed consumption of MAMA and AMAM at 1-10 age weeks

| Week | $\bar{x} \pm sb$ (CV %) of Feed Consumption (g bird ⁻¹) | |
|--------|---|----------------------|
| | MAMA | AMAM |
| 1 | 46.91 ± 0.94 (2.01) | 44.89 ± 1.87 (4.17) |
| 2 | 96.74 ± 0.94 (0.98) | 92.74 ± 6.20 (6.69) |
| 3 | 144.66 ± 1.92 (1.93) | 142.08 ± 4.19 (2.95) |
| 4 | 193.20 ± 1.03 (0.53) | 188.49 ± 6.35 (3.37) |
| Σ(1-4) | 481.517 | 468.203 |

| Week | $\bar{x} \pm sb$ (CV%) of Feed Consumption | | | |
|------|--|-------------------------|--------------------------|-------------------------|
| | Male | | Female | |
| | MAMA | AMAM | MAMA | AMAM |
| 5 | 257.8 ± 44 (17.07) | 237.99 ± 3.86 (1.62) | 237.13 ± 3.10 (1.31) | 231.43 ± 6.75 (2.92) |
| 6 | 291.02 ± 1.32 (0.45) | 289.61 ± 4.00 (1.38) | 288.93 ± 2.53 (0.87) | 281.17 ± 8.25 (2.93) |
| 7 | 340.97 ± 1.85 (0.54) | 340.55 ± 3.66 (1.08) | 335.15 ± 10.66 (3.18) | 346 ± 41.9 (12.10) |
| 8 | 389.71 ± 2.03 (0.52) | 388.23 ± 3.7 (0.95) | 376.16 ± 19.66 (5.23) | 381.84 ± 9.96 (2.61) |
| 9 | 438.89 ± 1.49 (0.34) | 433.10 ± 8.56 (1.98) | 431.16 ± 3.15 (0.73) | 431.94 ± 4.84 (1.12) |
| 10 | 487.36 ± 2.24 (0.46) | 484.05 ± 4.53 (0.94) | 483.32 ± 5.58 (5.58) | 479.33 ± 4.22 (0.88) |

MA = Merawangrab, AM = Arabmerawang, \bar{x} = mean, sd = standar deviation, CV=Coeficient of Variation, Number with different small abjad was significant (P<0.05)

Feed conversion

Based on a study conducted by the Feed conversion of interse MA and AM at the age of 1-10 weeks presented in Table 3

Table 3 Feed conversion of MAMA and AMAM chicken at 1-10age weeks

| Week | $\bar{x} \pm sd$ (CV%) Feed Conversion | |
|---------|--|-----------------------|
| | MAMA | AMAM |
| 1 | 2.796 ± 0.614 (21.98) | 2.471 ± 0.799 (32.34) |
| 2 | 2.201 ± 0.634 (28.79) | 2.206 ± 0.586 (26.54) |
| 3 | 2.638 ± 0.461 (17.46) | 2.779 ± 0.649 (23.36) |
| 4 | 2.824 ± 0.802 (28.42) | 3.021 ± 0.797 (26.38) |
| Average | 2.615 ± 0.288 (11.00) | 2.619 ± 0.356 (13.58) |

| Week | $\bar{x} \pm sd$ (CV%) Feed Conversion | | | |
|------|--|--------------------------|--------------------------|--------------------------|
| | Male | | Female | |
| | MAMA | AMAM | MAMA | AMAM |
| 5 | 3.054 ± 0.647 (21.18) | 2.882 ± 0.348 (12.07) | 3.461 ± 0.903 (26.09) | 3.166 ± 0.586 (18.52) |
| 6 | 3.398 ± 0.454 (13.37) | 3.207 ± 0.599 (18.67) | 3.571 ± 0.486 (13.61) | 3.473 ± 0.525 (15.11) |
| 7 | 3.719 ± 0.764 (20.56) | 3.701 ± 0.879 (23.74) | 3.686 ± 0.696 (18.88) | 3.827 ± 1.041 (27.21) |
| 8 | 4.203 ± 0.888 (21.13) | 3.774 ± 0.162 (4.29) | 4.030 ± 0.760 (18.85) | 4.297 ± 1.110 (25.84) |
| 9 | 4.496 ± 0.603 (13.41) | 4.037 ± 0.218 (5.40) | 4.401 ± 0.833 (18.93) | 5.196 ± 1.789 (34.43) |
| 10 | 4.695 ± 0.430 (9.16) | 4.262 ± 0.259 (6.08) | 5.083 ± 0.739 (14.53) | 6.177 ± 1.813 (29.36) |

MA = Merawangarab, AM = Arab merawang, \bar{x} = mean, sd = standar deviation, CV= Coefficient of Variation, Number with different small abjad was significant (P<0.05)

DISCUSSION

Body weight

Statistically body weight of MAMA and AMAM chicken at DOC were very different ($P < 0.01$). The body weight of DOC MAMA was 30.31 ± 2.88 g and AMAM was 26.59 ± 2.80 g. This was due to the greater egg weight of arab chicken that was 46.55 ± 3.71 g compared with the weight of eggs of arab chicken was 42.78 ± 2.96 g. Rajab (2013) states that the egg weight has a very real relationship with the weight of hatching. The greater the weight of the egg will have a large DOC hatching weight, that there was a very real relationship between the weight of the hatching egg with the weight of hatch ($P < 0.01$). The higher the weight of the eggs that are hatched will result in heavier weight of the hatching.

Based on statistical tests, MAMA and AMAM at 1-4 weeks were not significant ($P > 0.05$). Similarly, after sexing, body weight of MAMA and AMAM male aged 5-10 weeks were not significantly. The weight of MAMA and AMAM female at the age of 5-10 weeks were also not significantly different. Interse crossovers in this study showed the same body weight up to 10 weeks of age in the same sex except for DOC weight. The genetic composition of 50% of merawang and 50% of arab in MAMA and AMAM resulted same weight performance.

According to Darwati *et al.* (2017) the average of body weight from cross-breeding merawang with arab chicken in males aged 10 weeks amounted to 846.5 g and in females of 748.5 g, whereas the result of crossing of arab chicken with merawang on 10 weeks old males of 818.2 g and 733.73 g in females in this research. The result of this research was the same body weight that was the same as MAMA was same with MA and AMAM same as AM. This showed no phenomenon of heterosis effect. The effect of heterosis occurs when the average performance of livestock crosses greater than the parents (Noor 2010).

Feed Consumption

The consumption of MAMA chicken 1-4 weeks old was 481,517 g and chicken AMAM had lower consumption of 468,203 g. Darwati *et al.* (2017) states that the total consumption of MA and AM chicken at 1-4 weeks of age that was 476,045 g and 477,469 g. The results of this study showed that the consumption of MAMA and AMAM chicken were more than the total consumption of MA and AM chicken at 1-4 weeks.

Feed consumption of MAMA and AMAM chicken at the age of 5-10 weeks had been separated male and female. The results of statistical analysis of feed consumption of MAMA and AMAM male or female at age 5-10 weeks were not significantly ($P > 0.05$).

In Table 2, the amount of consumption from week 1 to week 4 continued to increase. Amrullah (2004) states, the greater chicken needed more feed for basic life, causing increased feed consumption during the production period. Statically feed consumption between MAMA chicken and AMAM chicken at 1 and 3 weeks were significant ($P < 0.05$).

Consumption of MAMA and AMAM chicken at the age of 5-10 weeks have been separated male and female. The results of statistical analysis of chicken feed consumption of MAMA and AMAM chicken until 10 weeks were not different ($P > 0.05$). Total consumption of MAMA chicken feed aged 5 to 12 weeks amounted to 3 331.26 g and consumption of AMAM chicken feed at 3,288.64 g. The amount of chicken MAMA female consumption amounted to 3,264.63 g and the amount of chicken AMAM female consumption is 3,260.89 g. Chickens with lighter weight consume less feed, because they do not require as much energy as larger chickens at the same age (Darwati *et al.* 2017). Wahju

(2004) stated that feed consumption is influenced by age, health, body weight, nutrition ration, temperature, environmental humidity, and speed of growth. Other factors that influence feed consumption according to (Rasyaf 2008) are sex, feeding system, feed frequency, genetic, and palatability.

Feed Conversion

The average conversion of MAMA chicken feed at 1-4 weeks old was $2,647 \pm 0.304$, and the average conversion rate of 1-4 weeks old AMAM chicken feed was $2,664 \pm 0.358$. Feed conversion of MAMA chicken was lower compared to AMAM chicken, so MAMA chicken has a good feed conversion compared to AMAM chickens at 1-4 weeks of age. The lower the feed conversion or near 1 indicates that the feed given is efficient so in order to produce meat for a certain period it takes a small amount of feed (Subekti 2003).

Mean of feed conversion of MAMA male at age 5-12 weeks was $4,165 \pm 0.656$ and feed conversion of AMAM male age 5-12 weeks was $3,890 \pm 0.643$ respectively presented in Table 3. The average conversion of MAMA female at 5-12 weeks was $4,548 \pm 0.891$ and feed conversion of AMAM female at 5-12 weeks was $4,545 \pm 0.973$. Based on the statistical test the conversion of chicken feed MAMA and AMAM was not different ($P > 0.05$). Male feed conversion was better than female feed conversion. This is in accordance with the statement of North and Bell (1990), the rooster is more efficient in converting feed into meat because it has a faster growth compared with hens. The high value of feed conversion can be caused by the behavior of chicken who prefer to scavenge and choose feed. Curtis (1983) says that the feed is spilled and mixed with the litter so the feed is wasted and the feed calculation is greater than the consumed feed. Factors that affect feed conversion are stress, disease, ammonia levels, feeding mode and time, physical form of feed, water, anti-nutritional factors, noise, light, and temperature (Bell and Weaver 2002).

Mortality

Mortality occurred in AMAM chicken in the early rearing phase was 2.2%. Meanwhile, mortality in later stage occurred in MAMA was 6.12% and AMAM chicken was 6.52%. Mortality of AMAM chicken was higher than MAMA chicken. According to Tabara (2012) the appearance of poultry, decreased body weight gain, decreased productivity, and increased mortality and sensitivity to disease can be affected by extreme heat or cold in the environment

The death of chickens at 4 weeks of DOC age can be due to stress (stress), nutritional deficiencies, parasites, protozoa, bacteria, viruses, and fungi (Suprijatna *et al.* 2005).

CONCLUSION

Growth performance of MAMA and AMAM chicken was same at 1-10 age weeks. Growth performance in this research are body weight, feed consumption, feed conversion and mortality. Body weight of MAMA and AMAM at 10 age week ranged 741-841 g.

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