

INHERITANCE OF PHENOTYPIC CHARACTER ON HYBRID CHICKEN F2 DERIVED FROM CROSSES BETWEEN ♀ F1 KAMPER WITH ♂ F1 KAMPER

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ABSTRACT

There are various types of chicken in Indonesia and their special quality, one of them is local chicken or kampung chicken that has an advantage in the quality of meat and eggs, but has not been matched with good productivity capabilities. This research aims to determine the qualitative and quantitative phenotypic characters of hybrid chicken, and hybrid chicken weight growth for 7 weeks. The method is breeding, that is crosses linked between the two strains which aims to get the special quality properties of the parents. This research uses individual F2 reciprocal bred. The research is conducted by doing a cross between chicken ♀ F1 and chicken ♂ F1, then the baby chicken or Day Old Chicken (DOC) is raised for 7 weeks. Data analysis is conducted by doing measurement the qualitative and quantitative phenotype character. The results obtained are phenotypic character and growth of F2 hybrid chicken. F2 hybrid chicken growth faster than Pelung because it inherits the rapid growth of its parent, but not as fast as F1 chicken. The phenotypic character of the F2 hybrid chicken is still varied and the fusion of both parents characters. Based on the data obtained it can be concluded that the hybrid chicken (*Gallus gallus gallus*) result of crossing between F1 chickens has a phenotype character in the form of quantitative and qualitative data varies and hybrid chicken growth at age 7 weeks faster than poultry with the largest weight reaches 644 grams and flat The overall weight of 513.2 grams.

Keywords: Breeding, Chicken, F1, Kamper, Phenotypic

INTRODUCTION

Kampung chicken is the most populous poultry in the world. In 2003, the Kampung chicken population reached 24 billion more than other poultry species (Yaman, 2012). Kampung chicken have many utility to support human life. Its meat contain higher protein, that is 18.1% than the other chicken that only 15.6% (Anang & Suharyanto, 2007). In addition, Ayam Kampung has a delicious meat in demand by consumers (Iswanto, 2005) and stronger body resistance to disease (Sujionohadi & Setiawan, 2002).

However, Ayam Kampung has some disadvantages such as difficult to get a good breed and the egg production is lower than Ayam Ras. The low productivity of this chicken is generally caused by the less intensivecultivation system and still using the conventional methods (Sujiono & Setiawan, 2002) and also the relatively slow breeding due to relatively small egg production volume and the nature of natural hatching is still high. In addition, the growth of chicken is also

relatively slow and the body frame is small so it takes a long time (Iswanto, 2005).

Based on the results of studies and experience of breeders, breeding systems, improvements in genetic quality, and intensive maintenance patterns can improve the productivity of chicken. Currently, the development of genetic quality of Kampung chicken is still lacking and has not been focused. In fact, when viewed from the genetic potential of some types of Indonesian chickens, it is not impossible to be developed and the emergence of productive chickens both broiler and laying (Yaman, 2010). The improvement of genetic quality, feed, cultivation, and disease control successfully increase the productivity of Kampung chicken (Natamijaya, 2010).

The large number of consumers who love Ayam Kampung can enlarge the market demand for Kampung chicken. Efforts that can be done to compensate for consumer demand is to inbreed or crossbreed it with other chicken that has high productivity to increase the productivity of chicken. Therefore, Laboratorium Genetika dan Pemuliaan Fakultas Biologi Universitas Gadjah Mada developed a local chicken breeding program to get a good quality breed that has a qualitative character like a chicken and has a fast growth like broiler. In previous research, crossing between the Pelung chicken (one type of Kampung chicken) with Layer chicken (laying chicken) that produce the offspring first filial (F1). F1 chicken is known by the name of Kamper chicken. The productivity of eggs from Kamper chicken is higher than the Pelung chicken, but F1 Kamper chicken still has a shortage of posture that resembles a layer chicken (short) and feathers are still diverse. So, in this research, conducted crossbreeding between F1 chickens to produce F2 Kamper chicken, it done to get chicken with egg productivity such as layer chicken and growth character (body posture, feather color, etc) such as Ayam Pelung. This research was conducted with the aim to obtain the superior nature of the broodstock in order to obtain a new strain that has more homozygous character.

MATERIALS AND METHODS

Material

The materials that used in this research parent chicken in the form of male F1 Kamper cock and female F1 Kamper hen (Figure 2), offspring of crossing, cross breeding data, feed and water.



Figure 1. Female Parent F1 Kamper (left) F1 and Male Parent F1 Kamper (right)

While the tool needed in this research is the cage the place of chickens, 15 watts bulb for lighting and heating cages, drinking places, feeding places, semi-analytical scales to weigh the body weight of the chicken, stationery to write weight data chicken bodies, digital cameras to take pictures of chickens, calculators for data analysis, and medline to measure qualitative data.

Methods

The procedure that used in this research is first the ♀ F1 and ♂ F1 breeds are crosslinked and maintained in semi-intensive cages then after the hen and cock mate, the eggs are hatched by hatching machines at the Tirta Yogyakarta Hatchery with 37-38 °C and 55-65% humidity for 21 days. After that, DOC or chicks that have been hatched will be maintained intensively in bamboo which is essentially coated with newspapers that have been done. A 15 watt bulb lamp is installed to keep the chicks warm. Maintenance performed for 7 weeks with attention to cleanliness and health of chicks. Then intake of chicken growth data, The data collection of chicken body weight done every 7 days for 7 weeks to observe the growth of chicken. Chickens are photographed for growth comparison. After that observe the qualitative and quantitative phenotypic characters. The measurement of qualitative and quantitative characters use Koch theory, Waggoner and Hutchin theory.

Analysis data of this research was done after DOC hatching. Data collection is qualitative phenotypic character and the quantitative phenotypic character is done when chickens are 56 days (8 weeks). The measurement results are entered into the data table of the qualitative phenotypic character and the quantitative phenotypic character data table.

RESULTS AND DISCUSSION

Based on the result of crossing between males breeder F1 Kamper and female breeder F1 Kamper obtained offspring (DOC) called F2 Kamper chicken. Based on the results obtained, there are 22 tail of F2 Kamper chicken (figure 2) with the quantitative character and qualitative characters that can be seen in Tables 1 and Tables 2. In Figure 3 can be seen the comparison of growth by measuring the increase of chicken weight in each week between F2 Kamper chicken, Pelung chicken as control, and F1 Kamper chicken as control. The picture shows that F2 Kamper chicken has faster growth than Pelung chicken but is slower than F1 Kamper chicken. Then in Figure 4 can be observed the phenotypic characters in each offspring.

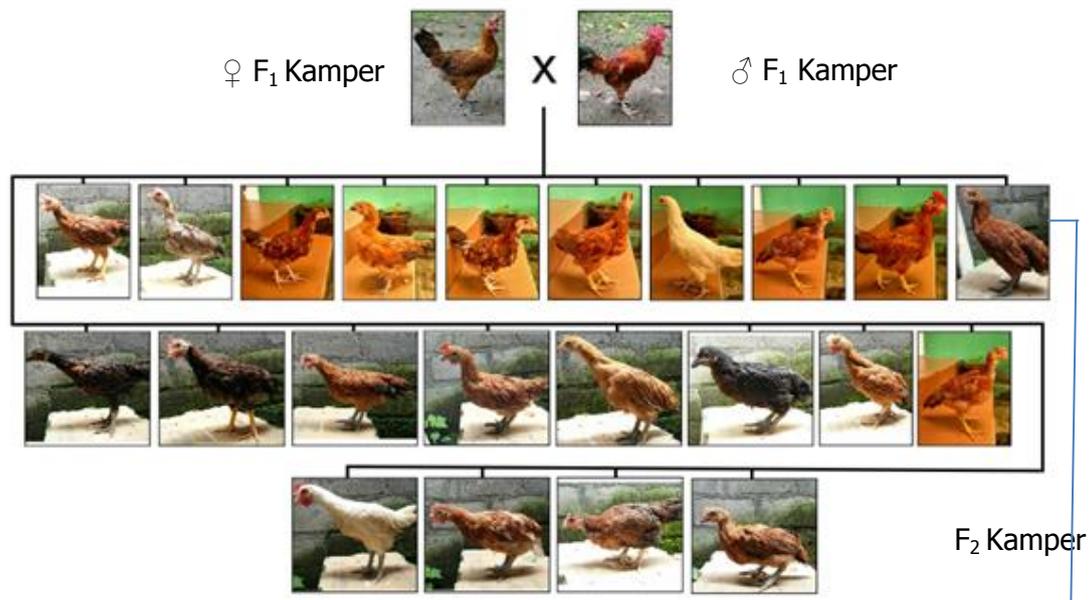


Figure 2. Cross breeding between ♀ F1 Kamper chicken with ♂ F1 Kamper chicken and 22 tail of F2 Kamper chickens

Table 1. Quantitative character average data of F2 Kamper

Quantitative caharacters average (cm)							
Chicken height	Body height	Beak width	Beak width	Head length	Head width	Comb height	Comb length
30.209	22.164	1.936	2.918	2.777	2.545	1.264	2.85
Body length	Body width	Circum-ference	Back length	Wing length	Neck length	Tibia length	Femur length
16.832	6.491	20.795	16.964	11.582	7.95	10.359	9.105

Based on Table 1 it can be seen that the quantitative average data includes chicken height 30.209, body height 22.164, beak width 1.936, beak length 2.918, head length 2.777, head width 2.545, comb height 1.264, comb length 2.85, body length 16.832, body width 6.491, chest circumference 20.795, back length 16.964, wing length 11.582, neck length 7.95, tibia length 10.359 and femur length 9.105. This data is obtained by measuring each of these characters on all offspring obtained and averaged

Table 2. Average qualitative character average percentage of F2 Kamper

Qualitative characters average									
Neck color		Back color		Chest color		Body fur color		Femur color	
Brown	50	Brown	54.5	Brown	63.6	Brown	4.5	Brown	77.3
Brownish white	27.3	Brownish white	18.2	Brownish white	13.6	Brownish white	18.2	White	9.1
White	9.1	White	9.1	White	9.1	White	9.1	Black	13.6
Black	4.5	Black	4.5	Black	4.5	Blackish brown	54.5	-	-
Brownish black	9.1	Brownish black	13.6	Brownish black	9.1	Brownish black	136	-	-
Foot color		Beak color		Comb color		Comb shape		-	-
Black	50	Black	27.3	Red	100	Single	100	-	-
White	18.2	White	36.4	-	-	-	-	-	-
Yellow	31.8	Yellow	36.4	-	-	-	-	-	-

Here is the average data of qualitative characters of F2 Kamper chicken, based on the table can be seen that the qualitative data include neck color, back color, chest color, body fur color, femur color, foot color, beak color, comb color, and comb shape. This data is obtained by counting the characters on each individual then made a percentage.

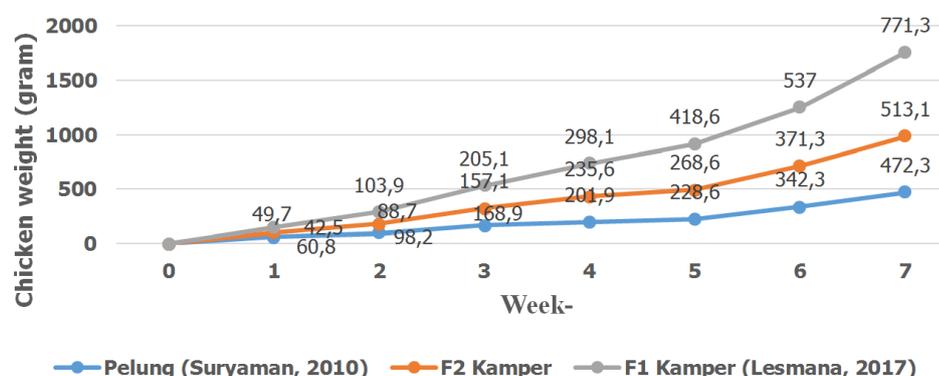


Figure 3. F2 Kamper, Pelung and F1 Kamper growth for 7 weeks

This study was conducted with an effort to increase the egg productivity and growth of local chicken, because the typical local chicken is a chicken that has good meat quality and strong resistance against various diseases, but the chicken has a deficiency of low productivity and slow growth. The efforts made to improve the productivity and growth of chicken is by crossbreeding with chickens that have high productivity and rapid growth.

Crossbreeding is a marriage between two individual animals that belong to the same species but different genetic traits. Cross breeding is a marriage between chickens that have different genetic properties but still one species (Yuwanta, 2004). The purpose of cross breeding in chickens is to improve the genetic quality of chickens so as to produce some achievements as expected. The objective criteria of genetic quality improvement are body weight, growth rate, life force during growth period, chicken quality, adult age, egg weight, egg production, eggshell quality, and chicken life force (Fadilah & Fatkhuroji, 2013).

Pelung chicken is a local chicken that developed in Cianjur and Sukabumi (West Java). Pelung chicken has a large body and sturdy. If standing straight up the cache stands out. Her legs are long, strong, and her thighs are thick flesh (Rukmana, 2003). Although long-legged, this chicken has a strong toe and muscular thick. Feet scale neatly lined up with long spurs. The comb is a single jaw, the edges are real jagged, thick, erect, and red, just like the color of the comb (Tohir and Wahyu, 2008). Adult male chopsticks have a body weight ranging from 3.5 kg-5.5 kg, while the female 2.5 kg-3.5 kg. Egg production between 39-68 grains per year or about 13-17 eggs per season. Cloudy chickens start laying eggs at the age of 6-7 months (Rukmana, 2003). Chicken Layer is a chicken that can produce many eggs or high egg productivity. The characteristics of Layer chickens are having a slightly fat body shape, weighing the female chickens (18 weeks old) reaching 1800-2350, the dominant color of brown fur, the color and the thickness of the eggshell brown and thick, the production of medium eggs, and the production of many flesh (Setyono *et al.*, 2013).

In the previous study, crossing of ♀ Layer chickens (laying) with ♂ Pelung chicken resulted in the first filial descent (F1). F1 chicken has a faster growth than Pelung chicken, but this chicken still has a posture and performance that resembles Layer chicken and has a variety of fur colors. This research is conducted to get chicken with fast growth and high productivity like Layer chicken, and have qualitative character (body posture, fur color, etc) like pelung chicken. Therefore, this research crossed ♀ F1 Kamper chicken with ♂ F1 Kamper chicken to obtain the superior nature of the breedstock in order to obtain a new strain that has more homozygous character. The cross is shown in Figure 2.

Based on the results of crossing ♀ F1 Kamper chicken with ♂ F1 Kamper chicken produce 22 tail F2 Kamper chicken that contain 13 of female and 9 male, which are maintained intensively in a special cage that aims to minimize the influence of the outside that can interfere health, facilitate growth monitoring and chicken feeding. At DOC cage is given a light bulb to keep the condition of the cage to stay warm and comfortable, as well as a source of light. DOC is fed daily during the observation period. Drinking water is done by replacing drinking water every day so that the quality of water obtained is guaranteed cleanliness. To observe DOC growth during observation period or for 7 weeks, DOC body weight measurement once every 7 days. On the last day of observation or the 56th day quantitative character measurements and qualitative character observations were made. This amount of offspring can seen that F1 Kamper have good egg productivity.



Figure 4. F2 Kamper phenotypic characters

Based on Figure 3 can be seen the growth of F2 Kamper chicken, F1 Kamper chicken, and Pelung chicken. Here F1 Kamper chicken and Pelung chicken is as a control because that chicken is one of the parents of F2 Kamper chicken. The picture shows that the growth of F2 Kamper chicken is faster than Pelung chicken so that the weight increase is greater, it indicates that F2 Kamper chicken inherits the rapid growth of Layer chicken. However, the F2 Kamper chicken growth is still slower than F1 Kamper chicken, this is because the F2 chicken inherits the slow growth of the Pelung chicken. It caused in F1 Kamper chicken characters that appear are intermediate characters, whereas in F2 individuals possibly make chances of the recessive alleles meet each other higher, so it can affect the growth. It can also be due to environmental and maintenance factors. It can also be due to environmental and maintenance factors. Based on figure 5 it can be seen that the highest average weight of F2 Kamper chicken at week 7 is 513.1 grams and the heaviest weight of F2 Kamper chicken is reaching 644 grams.

Phenotypic characters of F2 Kamper chicken can be seen in Figure 4. At week 8 observation or 56th day conducted quantitative character measurement and observation of qualitative character. Measurement of quantitative characters is done by measuring the body parts of each offspring to obtain the quantitative characters of F2 Kamper chicken average. Then observation of qualitative character of the chicken to compare the offspring with the breeds. Based on the picture it can be seen that there are so many variations between individual offspring can be seen on the color of feathers and foot, as for the color of the fur is still very various like white, black, brown, gray, and blackish brown, has a variety of colors such as black, yellow, and white. Beside that, the color of comb is various too. So the F2 Kamper chicken isn't produce the homozygot phenotypic offspring yet.

Based on Table 1 and Table 2 it is known that obtained hybrid chickens whose qualitative and quantitative characters are still varied and the fusion of the characters of both sides, also has a very varied hereditary color. The results obtained are similar to previous research by Lesmana (2016), the descendants of the crossbreed ♀ Layer and ♂ Pelung have varying characters that are various feathers, some are brown, blackish brown, brownish black, and also the color of the claw varies, those are white, yellow, and black so that in crossing ♀ F1 Kamper chicken and ♂ F1 Kamper chicken produces offspring that also still vary on feathers and claws. Based on Figure 3, it can be seen that F2 Kamper chicken has bigger weight than Pelung chicken so that in productive age this chicken already has the weight according to consumer demand, this is in accordance with Pramono (2006) super chicken has advantages such as growth fast, low mortality rate (about 5%), easy to adapt to the environment as well as on carcass test and taste test show that the carcass look similar to chicken, at age 8 - 10 weeks have reached cutting weight that many consumers demand.

CONCLUSION

It can conclude that hybrid chicken (*Gallus gallus gallus*) F2 result of crosses ♀ F1 Kamper and ♂ F1 Kamper with a phenotypic character in the form of quantitative and qualitative data varies and the growth of F2 Kamper hybrid chicken at the age of 7 weeks of the greatest weight can reach 644 grams and the average overall weight of chicken at age 7 weeks of 513, 2 grams.

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