Phenotypic Traits, Egg Productivity and Body Weight Performance of 
Gama Ayam BC\textsubscript{1} Kamper

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ABSTRAK

Indonesia kini tengah menempati peringkat 10 besar negara produsen daging dan telur unggas di dunia. Ayam ras pedaging tipe fast-growing Broiler dan ayam ras petelur tipe Layer Lohmann Brown-Classic merupakan dua galur ayam yang mendominasi sektor peternakan unggas di Indonesia. Potensi plasma nutfah ayam lokal asli Indonesia sebanyak 31 galur ayam belum dimanfaatkan secara optimal dalam usaha mewujudkan kemandirian peternakan unggas Indonesia. Hal ini berujung kepada ketergantungan Indonesia terhadap impor bibit ayam (grandparent stock, GPS) dalam kegiatan penyediaan bibit ayam. Gama Ayam Research Team telah memberdayakan potensi plasma nutfah ayam lokal asli Indonesia, salah satunya Pelung melalui program persilangan selektif. Hasilnya beberapa galur ayam potensial untuk dikembangkan diantaranya Kambro dan Kamper. Dalam penelitian ini program persilangan selektif galur ayam Kamper ditingkatkan melalui persilangan balik (backcross) antara ayam pejantan F\textsubscript{1} Kamper (hibrida Pelung dan Layer Lohmann Brown-Classic) dengan ayam betina F\textsubscript{1} Layer Lohmann Brown-Classic. Generasi BC\textsubscript{1} (backcross I) diikspetasikan untuk mewarisi performa pertumbuhan ayam Pelung, produktivitas telur ayam Layer Lohmann Brown-Classic dan karakter fenotipe (postur tubuh dan warna bulu) ayam Kamper. Karakter fenotipe yang diangkat dalam generasi BC\textsubscript{1} Kamper digolongkan ke dalam enam kelas fenotipe. Bobot tubuh BC\textsubscript{1} Kamper (n = 50) mencapai 538.84 g lebih tinggi dibandingkan F\textsubscript{1} Kamper and Layer Lohmann Brown-Classic dalam sistem semi-intensive dengan diet pakan standar ad libitum dalam periode delapan minggu. Produktivitas telur BC\textsubscript{1} Kamper mencapai 39.11 telur (periode 16-minggu) dan hen day production (HDP) sekitar 0.6-0.67. Telur BC\textsubscript{1} Kamper diklasifikasikan sebagai round egg, AB dan spherical dengan nilai heritabilitas telur sekitar 0.2-0.244. Estimasi heritabilitas (h\textsuperscript{2} = low-moderate) menunjukkan kesamaan dengan F\textsubscript{1} Kamper mengindikasikan proporsi distribusi alel antara generasi tetua dengan generasi indukan Layer Lohmann Brown-Classic dan F\textsubscript{1} Kamper.

Kata Kunci: Ayam asli Indonesia, plasma nutfah, hen day production, Pelung, Layer Lohmann Brown-Classic

INTRODUCTION

Indonesia is currently in the top 10 of the world’s poultry meat and egg producers. The consumption of chicken meat and eggs provide the largest contribution of domestic demand for 60.73% then followed by beef at 21.94%. Based on this percentage, for about 67% is chicken poultry production and only about 23% is provided by local chickens. Pusat Data dan Sistem Informasi Pertanian (2015) stated that chicken meat consumption rate of 2014 reached 4.48 kg/capita/year (total consumption of broiler chicken, post-laying layer chicken and male layer also native chicken). Pusat Data dan Sistem Informasi Pertanian (2015) also stated that chicken meat consumption in 2014 consisted of 1.8 billion broiler-type/broiler chickens, 181.752 layer chickens and 310.960 native chickens.

Broiler and layer are types of chicken that dominate the current poultry industry in Indonesia. The domination is caused by the fact that broilers and layers have higher meat and eggs production rate and grow relatively faster than the free range chicken. Broiler-type and laying-type chicken poultry industry went through significant growth per year driven by improvement on income and knowledge on healthy nutritional-balance food product (Iskandar, 2017; Mahardhika and Daryono, 2019). Ditjen PKH (2017) showed that native chicken production nationally reached 8.50% or 284.9 thousand tons with contribution percentage of 12.86% to nation chicken meat production. Ditjen PKH (2018) showed that Indonesia poultry livestock populations in 2018 consisted of 1.8 billion broiler-type/broiler chickens, 181.752 layer chickens and 310.960 native chickens.
period and rapid turnover (Nurfadillah et al., 2018).

Native Indonesia chickens are called Kampung chickens or native (non-breed chickens) to differentiate commercial breed such as Cobb, Hubbar, Hybro, Isa Hyline and Hisex (Henuk and Bakti, 2018; Mahardhika and Daryono, 2019). Identification of native chicken germplasm resulted in 34 breeds of chicken consist of Ayunai, Balenggek, Banten, Bangkok, Burgo, Bekisar, Cangehgar, Cemani, Ciparage, Gaok, Jepun, Kampung, Kasintu, Kedu (hitam and putih), Pelung, Lamba, Maleo, Melayu, Merawang, Nagrak, Nunukan, Nusa Penida, Olagan, Rintillatatu Walik, Sedaya, Sentul, Siem, Sumatera, Tolaki, Tukung, Wareng, Sabu, and Semau (Nataamijaya, 2010; Henuk and Bakti, 2018; Mahardhika and Daryono, 2019).

Approximately 11 native chicken breeds are categorized as candidates of broiler-type and laying-type chicken (Henuk and Bakti, 2018). Ardo et al. (2019) stated that improvement of productivity and competitive quality of local broiler chicken can be achieved through selective breeding of indigenous Indonesia chicken breeds. Selective breeding is aimed to produce superior chicken breed with adjusted phenotype quality based on human needs (Das et al., 2008; Cheng, 2010; Oldenbroek and van der waaij, 2014; Mariandayani et al., 2013; Sudrajat and Isyanto, 2018; Mahardhika and Daryono, 2019).

Pelung Blirik Hitam has several distinguished characters such as higher posture and body weight (BWT) compared with other indigenous breeds (Daryono et al., 2010; Mahardhika and Daryono, 2019; Ardo et al., 2019). Body weight (BWT) of male Pelung chicken can reach 3.37 kg, and females can reach 2.52 kg (Daryono et al., 2010). Hidayat and Asmarasari (2015) stated that in the period of 20 weeks body weight (BWT) of Pelung can reach 1663 g/head heavier than other meat producer indigenous chicken such as Kambro chickens (Henuk and Bakti, 2018). Meanwhile, Broiler Cobb 500 has distinguished productivity and a high growth rate in the early phase (7 to 18 weeks). The male and female Broiler Cobb 500 can reach 1,599.17 g and 1,540.46 g (Hassan et al., 2016). Selective breeding between Pelung Blirik Hitam and Broiler Cobb 500 produced hybrid chicken F₁, Broiler or Kambro (Kampung-Broiler) (Mahardhika and Daryono, 2019). Based on body weight (BWT) measurement, Kambro population (n = 17) has an average BWT of 1,244.14 ± 453.82 g significant (p<0.01) to F₁ Pelung (n = 7) with an average BWT of 602.88 ± 79.93 g in 8 weeks period with ad libitum diet of standard feed (Mahardhika and Daryono, 2019).

Due to this promising result, we conducted a selective breeding program between Pelung and Layer Lohmann Brown-Class and produced Kamper. The purpose of this research is to develop a breed of chicken with both characteristic of meat-type chicken and egg-producer chicken. F₁ Kamper was produced as the first generation, further in the selective breeding program we conducted backcross to evaluate the result. BC₁ Kamper generation (backcross I) was expected to inherit the growth performance of Pelung chickens, the egg productivity of Layer chicken and phenotypic traits (body posture and feather colors) of Kamper chickens.

### MATERIALS AND METHODS

This research was conducted in Pusat Inovasi Agroteknologi (PIAT), Desa Kali Tirto, Berbah, Sleman Regency, Yogyakarta, Indonesia using 50 females layer Lohmann Brown-Class and 10 males F₁, Kamper in semi-intensive rearing system with the ratio female to male of 5:1. Parental crossbreeding was conducted in brood shed (8 m²) owned by Gama Ayam Research Team and fed with ad libitum AD-II diet. Standard feed produced by PT. Japfa Comfeed Indonesia, AD-II (brood/juvenile, 9-22 week) and BR-1 (starter, 0-22 day). A total of 50 day-old BC₁ Kamper chicks were reared intensively in insulated bamboo pens fed with ad libitum BR-1 diet. Four weeks-old BC₁ Kamper chickens then transferred into the larger shed under a semi-intensive rearing system (8 m²) with ad libitum BR-1 diet for the extents of eight weeks. Body weight (BWT) growth of BC₁ Kamper was measured over eight weeks period, followed by observation and measurement of phenotypic traits at the week-
7. Body weight (BWT) growth performance was measured with a digital scale KrisChef EK9350H with 0.01 g accuracy per week. Zoometrical measurement was measured with metline based on morphological guidance of chicken skeletal adopted with modification and addition from Daryono et al. (2010) (Table 1).

Table 1. Zoometrical measurements with modification and addition from Daryono et al. (2010) (Mahardhika and Daryono, 2019)

| Characteristics (abbreviation) | Detailed procedure |
|--------------------------------|--------------------|
| Chicken height (TA)            | measured from the digit/hallux to the tip of the comb |
| Body height (TB)               | measured from the digit/hallux to the end of the distal vertebrae |
| Beak width (LP)                | measured from articular to dexter |
| Beak length (PP)               | measured from the base of the angular process to the end of the mandibular symphysis |
| Head length (PK)               | measured from the supraorbital bone to premaxilla |
| Head width (LK)                | measured from quadratojugal sinister to dexter |
| Comb height (TJ)               | measured from the highest tip of the comb to the base of the comb |
| Comb length (PJ)               | measured from the back to the front of the comb |
| Body length (PB)               | measured from the tip of the first thoracic vertebra to the base of the pygostyle |
| Body width (LB)                | measured from the base of the femoral bone to dexter |
| Chest circumference (LD)       | measured from the sternal of the keel in a circle |
| Dorsal length (PPu)            | measured from the thoracic vertebrae to the caudal vertebrae end |
| Wingspan (PS)                  | measured from the base of the humerus to the end of the carpus |
| Neck length (PL)               | measured from the base of the atlas to the tip of the thoracic vertebrae |
| Tibia length (PBe)             | measured from the tip of the femur to the base of the tibiotarsus |
| Femur length (PPa)             | measured from the end of the patella to the base of the femur |
| Shank                          | measured from the tarsus to the base of the patella |

Data is analyzed with descriptive statistics and independent sample t-test using IBM© SPSS© Statistics version 21. Documentation of phenotypic traits conducted with high resolution camera and phenotypic classes was determined based on color of body feather. Egg productivity was measured with daily count and Hen Day Production (HDP) of 20 BC_F1 Kamper hens in the period of four months.

RESULTS AND DISCUSSION

Phenotypic Traits

In 2013-2014, Gama Ayam F1 Kamper has been observed to have as many as five phenotypic traits with metline based on morphological guidance of chicken skeletal adopted with modification and addition from Daryono et al. (2010) (Table 1).

Layer) has the combination of both its parental Pelung and Layer Lohmann Brown-Classic. Ardo et al. (2019) stated that the purpose of F1 Kamper was to inherit laying traits of Layer Lohmann Brown-Classic. The use of Pelung in this study was to enhance its phenotypic traits on body weight performance and also visual appearance for example body posture and feather color. Semakula et al. (2011) stated that visual judgement has significant influence on sale value with a tendency of increasing demand of native Ugandan chickens. Suprijatna (2010) stated that native Indonesia chickens has a niche market and the prevalencies of customer showed a higher demand on native chickens based of its unique taste and phenotypic appearance. In the previous study, F1 Kamper had been observed to have as many as five phenotypic traits...
classes of feather color variation including pure white, brown-white, belirik-brown, belirik-black, and black (Lesmana, 2016). High presence of allele heterozygosity drives the selective breeding program of \( F_1 \) Kamper chickens by selecting individuals who have prominent body weight performance and desired phenotypic traits to obtain more uniform hybrids at subsequent crosses. In order to achieve that a backcross was conducted with female Layer Lohmann Brown-Classic and male \( F_1 \) Kamper (Figure 1).

Figure 1. \( BC_1 \) Kamper chickens phenotypic traits. A crossbreed of female \( F_1 \) Layer \( (n=50) \) and male \( \delta \) \( F_1 \) Kamper \( (n=10) \) represented with the image above resulted in a total of 687 \( BC_1 \) Kamper day-old-chicks. Selected \( BC_1 \) Kamper DOC of 50 chickens were measured and observed.

In this study, we followed the instruction provided under the direction of the Regulation of the Minister of Agriculture No. 19/Permentan/OT.140/2/2008 concerning Determination and Release of Clumps or Animal Strains. The regulation requires breeders to fulfill genetic data, one of which is genetic data on chicken phenotypes. The data consists of some phenotypic characters with population details of 30 males and 200 females from a crossing structure of 10 males and 50 females (Setiadi, 2016).

Based on classification, phenotypic traits of \( BC_1 \) Kamper \( (n=50) \) can be grouped into six classes including plain brown (10%), plain white (30%) and belirik colors (60%). Belirik class can be divided into specific classes including black and brown (hc), black, brown and white (hcp) and brown and white (cp). Habibah et al. (2019, unpublished data) found that crossbreds of \( F_1 \) Kamper were classified into four phenotypic classes including brown, white, black-brown belirik, and brown-golden belirik based on observation of feather color.
in 30 F₂ Golden Kamper (GK) chickens. These findings indicates a wider variety of allele being inherited from Layer Lohmann Brown-Classic in backcross I Kamper. Lesmana (2016) found that there were five phenotypic classes including pure white, brown-white, belirik-brown, belirik-black, and black in F₁ Kamper population. Qualitative characters are a trait that can not be measured but can be classified into different phenotypic categories (Habibah et al., 2019 unpublished data). In the natural population of chickens or poultry, there is a diversity of plumage colors among different species or very uniform plumage colors within the species. Much of this interspecies diversity is due to regulatory changes that affect the expression of involved-genes in pigment synthesis. Pigment biosynthesis itself comes from two types of melanin (eumelanin and pheomelanin) that occur in melanosomes (Kushimoto et al., 2003).

In contrast to the quantitative nature of polygenic, qualitative properties based on classical trait ability are under the genetic control of one or more genes, with little or no environmental factors that can obscure the effects of genes (Elrod et al., 2006).

Table 2. Zoometrical measurements of BC₁ Kamper (n=50)

| Parameters (cm) | Sex Groups | t   | df |
|----------------|------------|-----|----|
|                | Male (n=27) | Female (n=23) |     |    |
| TA             | 32.0148a (3.43777) | 28.8000b (3.18091) | 3.410*** | 48 |
| TB             | 21.7185a (2.32015) | 20.6435a (3.76887) | 0.819**  | 48 |
| LP             | 1.8407a (0.23900) | 1.7739a (0.33604) | 1.062*   | 48 |
| PP             | 2.8407a (0.25155) | 2.7652a (0.24974) | 1.838**  | 48 |
| PK             | 2.9333a (0.38730) | 2.7304a (0.39131) | 1.751**  | 48 |
| PJ             | 3.0741a (0.45454) | 2.1087b (0.43475) | 0.879**  | 48 |
| TJ             | 1.2407a (0.32612) | 0.8739a (1.43877) | 1.289*   | 48 |
| PL             | 9.0333a (1.0164)  | 8.6957a (1.61962) | 0.897**  | 48 |
| PPu            | 15.5741a (1.76931) | 14.7652a (1.76161) | 1.614*   | 48 |
| PB             | 10.4815a (1.05650) | 10.0739a (1.62403) | 1.067*   | 48 |
| LB             | 5.6185a (0.74112)  | 5.3087a (0.64801) | 1.560*   | 48 |
| LD             | 21.2296a (2.26475) | 20.8870a (2.89566) | 0.469**  | 48 |
| PS             | 10.7852a (1.17201) | 10.2522a (1.22544) | 1.570**  | 48 |
| PPa            | 7.7556a (0.82010)  | 7.2913a (1.01932) | 1.785**  | 48 |
| PBe            | 9.9926a (1.05500)  | 9.3391b (0.85213) | 2.381*   | 48 |
| Shank          | 5.9778a (0.63690)  | 5.4652b (0.65478) | 2.8**    | 48 |

* = p <0.05, ** = p<0.1 *** = p < 0.001, ns = non-significant. The standard deviation is listed beside the mean. The averages with different subscripts in the same column differ significantly. (TA: chicken height; TB: body height; LP: beak width; PP: beak length; LK: head width; PK: head length; PJ: comb length; TJ: comb height; PL: neck length; PPu: dorsal length; PB: body length; LB: body width; LD: chest circumference; PS: wingspan; PPa: femur length; PBe: tibia length; shank).

Zoometrical measurement was conducted at week-7 with total BC₁ Kamper of 50 chickens divided into two groups based on sex, group I (male) and group II (female). An independent sample t-test was conducted to determine significance level of each parameters in group I and group II (Table 2). Based on the result several parameters including TA, PJ, PBe and shank were significantly different between two groups. Chicken height between male and female BC₁ Kamper were significantly different, male TA (M = 32.0148, SD = 3.43777), t (48) = 3.410, p<0.001) and female TA (M = 28.8000, SD = 3.18091, t (48) = 3.410, p<0.001). Comb length between male and female BC₁ Kamper were significantly different, male PJ (M = 3.0741, SD = 0.454, t (48) = 7.635, p<0.001) and female PJ (M = 2.1087, SD = 0.43475, t (48) = 7.635, p<0.001). Tibia length between male
and female BC, Kamper were significantly different, male PBe (M = 9.9926, SD = 1.05500, t (48) = 2.381, p<0.05) and female PBe (M = 9.3391, SD = 0.85213, t (48) = 2.381, p<0.05). Shank length between male and female BC, Kamper were significantly different, male shank (M = 5.977, SD = 0.63690, t (48) = 2.8, p<0.01) and female shank (M = 5.4652, SD = 0.65478, t (48) = 2.8, p<0.01). A visual comparison can be seen in Figure 2, these parameters show the physical appearance of BC, Kamper.

![Figure 2](image)

**Figure 2.** BC, Kamper chicken groups based on sex. (TA: chicken height; TB: body height; LP: beak width; PP: beak length; LK: head width; PK: head length; PJ: comb length; TJ: comb height; PL: neck length; PPu: dorsal length; PB: body length; LB: body width; LD: chest circumference; PS: wingspan; PPa: femur length; PBe: tibia length; shank).

**Egg Productivity and Body Weight Performance**

There are two types of layer chicken, light type and medium type. Light layer type chickens or often known as White Layer Chicken come from pure white leghorn strains with specific characteristics including lean body, white feather color, red comb, and have egg productivity of approximately 260 eggs per year. Medium layer type chickens or often known as the Brown Layer Chicken has the characteristic including medium body size (not too thin and fat), brown feathers, and have egg productivity of approximately 200 eggs per year. Medium layer type chickens are often called dual-type chickens, the reason is it can produce eggs and meat at once in large quantities. Egg production is the number of eggs produced by each chicken during the spawning period.

BC, Kamper egg productivity reached 39.11 eggs and HDP ranged from 0.6-0.67, slightly similar with Pelung chicken egg productivity and approaching the F1 Kamper egg productivity. Based on the previous study, it is known that there are very significant differences in egg productivity...
(P<0.05) between the three chicken strains. In the first week, the hen day production (HDP) F₁ Kamper chicken reached 0.67 while the production of Layer Lohmann Brown-Classics and Pelung chicken was 1.29 and 0.6, respectively (Kurnia, 2016). During the four months egg-laying period, F₁ Kamper chicken egg productivity reached 55.58 ± 1.04 eggs, Layer Lohmann Brown-Classics chicken egg productivity reached 71.89 ± 1.64 eggs while Pelung chicken egg productivity reached 27.2 ± 0.97 eggs (Kurnia, 2016).

Table 3. Heritability value (h²) of F₁ Kamper compare with Layer Lohmann Brown-Classics and Pelung

| Character | F₁ Kamper | Pelung |
|-----------|-----------|--------|
| Layer Lohmann Brown-Classics | 0.047 | 0.122 |
| Pelung | 0.183 | 0.064 |

BC₁ Kamper chicken egg heritability was measured according to length, width and egg shape index. The egg shape index is an observation of the shape of an egg through a comparison between the largest width or diameter of an intact egg and its length. Egg can be classified into three categories based on egg shape index (EI) including sharp egg (EI<72), standard egg (EI = 72 - 76) and round egg (EI>76) (Duman et al., 2016). Kurnia (2016) reported that egg shape index of F₁ Kamper, Layer Lohmann Brown-Classics and Pelung can be classified into 0.77, 0.79 and 0.70 respectively. Romanoff and Romanoff (1963) stated that the ideal chicken egg shape index is 0.74. This shows that morphologically, the shape of F₁ Kamper chicken eggs can be classified as ideal. Egg shape variations are influenced by variations in individual, species, age and heredity (Kurnia, 2016). Based on recent study BC₁ Kamper egg shape index shows a similarity with F₁ Kamper and classified as round egg (EI>76). The division of egg grade is grouped into three classes, AA (perfect/standard egg), A / B (nearly perfect/sharp egg) and AB (round egg) (Duman et al., 2016; Ikegwu et al., 2016). In Setiawati et al. (2016) egg shape consists of biconical (both pointed ends), elliptical (elliptical), oval (best shape) and spherical (almost round). The shape of the egg is influenced by genetic factors and no correlation is found between the maintenance system and the temperature of the egg shape (Setiawati et al., 2016). BC₁ Kamper egg can be classified into round egg, AB and spherical.

BC₁ Kamper egg heritability value ranged from 0.2 to 0.244. Kurnia (2016) classified the heritability value into 3 groups, low (0-0.02), low-moderate (0.2-0.4) and high (>0.4). This shows that, heritability value of F₁ Kamper chicken eggs are classified as low-moderate (Kurnia, 2016) (Table 3). Heritability value (h²) closer to 1 indicates that the hybrid or offspring have exactly the same characteristics as the parentals. Meanwhile, if the heritability value approaches 0, it shows that the hybrid yield is more influenced by environmental factors. BC₁ Kamper heritability estimation shows a significant similarity with F₁ Kamper indicated a proportion of allelic distribution between grandparent generation with parental generation of Layer Lohmann Brown-Classics and F₁ Kamper.

Based on the calculation of heritability estimation, it was known that, h² value of F₁ Kamper chicken egg length character has more similarity with the length of the Pelung chicken egg compared with Layer Lohmann Brown-Classics chicken egg. Heritability value on width character, h² values of F₁ Kamper chicken egg has more similarity with the Layer Lohmann Brown-Classics chicken egg (Kurnia, 2016). Meanwhile, the weight character, h² value of F₁ Kamper chicken egg has more similarity with the character of Layer Lohmann Brown-Classics chicken egg (Kurnia, 2016). Thus, BC₁ Kamper heritability value gives a phenotypic proportion of egg characters inherited from parental generation of F₁ Kamper.
Figure 3. BC₁ Kamper body weight growth performance during eight weeks period observation.

In Figure 3 BC₁ Kamper under semi-intensive rearing system and ad libitum standard feed diet can reach body weight of 538.84 g in eight weeks period. In the previous study, F₁ Kamper, Layer Lohmann Brown-Classic and BC₁ Kamper each have the body weight of 771.3 g, 530 g and 448.75 g respectively (Lesmana, 2016). BC₁ Kamper shows a higher body weight compare with F₁ Kamper and Layer Lohmann Brown-Classic. In comparison, crossbreeding of Sentul chicken reached average body weight of 896.34 ± 55.46 g (male Sentul) and 736.00 ± 46.63 g (female Sentul) during 75 days period (Solikin et al., 2016; Sudrajat and Isyanto, 2018). Mariandayani et al. (2013) stated data about several body weight of native chicken at 8-weeks-old which including Pelung (male 458.23 g and female 420.11 g), Sentul (male 406.36 g and female 355.98 g), Kampung (male 411.56 g and female 358.74 g). BC₁ Kamper chicken is expected to have a better body weight and during body weight observation has not reached inflection point period. Inflection point is maximum body weight growth, during this period a shift of growth phase occurs with declining growth. Growth can occur during weeks follow because chicken has not reached sexual maturity (Sogindor, 2017). Suprijatna (2010) stated that sexual maturity of Pelung chicken at day-165 with 12-weeks-old weight can reach 669 g. Nurhuda (2017) stated that genetic component combination affects BT of chicken from crossbreeding with hybrids observed to have better performance than parantal generation on several characters or traits.

CONCLUSION

The phenotypic traits observed in the BC₁ Kamper generation are classified into six phenotypic classes. Body weight of BC₁ Kamper (n = 50) reached 538.84 g higher than both F₁ Kamper and Layer Lohmann Brown-
Classic under semi-intensive rearing system with *ad libitum* standard feed diet in eight weeks period. BC, *Kamper* egg productivity reached 39.11 eggs (16-weeks period) and hen day production (HDP) ranged from 0.6-0.67. BC, *Kamper* egg can be classified into round egg, AB and spherical with egg heritability value ranged from 0.2 to 0.244. Heritability estimation ($h^2$ = low-moderate) shows a significant similarity with F$_1$ *Kamper* indicated a proportion of allelic distribution between grandparent generation with parental generation of Layer Lohmann Brown-Classic and F$_1$ *Kamper*.

**CONFLICT OF INTEREST**

Authors have no conflict of interest to declare.

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