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Performance and Productivity of Local Chicken Cross Third Generation at Age 1 to 10 Weeks

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Abstract

Local chickens had some advantages such as high adaptability and resistance to disease, so they can be raised in remote rural areas. However, there are several drawbacks including the relatively slow growth. One way to overcome these weaknesses is by conducting cross-breeding and selection so that the productivity of chickens can increase.The aim of this research was to evaluate the product of crossbreeding between SkkeduxkeduSK and SkkeduxkeduSK chickens**.**The chickens used in this research were 43DOC SKkeduxkeduSK and 46 KeduSKxSKkedu DOC. This research used t test was to determine the difference in average body weight, feed consumption, feed conversion and mortality from crosses between kedu chickens and sentul-kampung chickens.Crossbreeding between SkkeduxkeduSK and SkkeduxkeduSK chickens**.**The feed given was in 3 phases: 1) 100% commercial feed for 0-3 week old chickens, 2) 80% commercial feed mixed with 20% rice bran for 4 week old chickens and 3) 60% commercial feed mixed with 40% rice bran for 5-10 week old chickens.The variables measured included body weight, feed consumption, feed conversion and mortality. between SKkeduxkeduSK and KeduSKxSKkedu were not significantly different. SKkeduxkeduSK and KeduSKxSKkedu chickens had the same growth. The body weight of crossbreeding between SKkeduxkeduSK and keduSKxSKkedu reached 0.8 – 0.9 kg at the age 10 week.SKkeduxkeduSK and keduSKxSKkedu chickens were quite efficient in the use of feed with a conversion value of 3.0-3.7. But the mortality on this crossbreeding chickens was still quite high as it reached 3% in the population.

Keywords: Crossbreeding, KeduSK chickens, Productivity, SKKedu chickens.

Introduction

Local chickens had potential to provide animal protein such as eggs and meat.The eggs and meat of local chickens had higher prices than the eggs and meat of boiler chickens so that local chickens needed to be developed and utilized,but the quality of local chicken production currently tends to be low.Improving growth rate and reproduction capability local chicken is not enough by improvement feed and management maintenance, But necessary to improve the quality of genetic selection and a cross breeding

Crossbreeding was one of exploiting genetic variations. it could be done for two types of grown up chickens from the same or higher class. (Saadey *et al*., 2008; Momoh and Nwosu, 2008; Siwendu *et al*, 2012) . Study on genetic variability of some village chickens in Indonesia showed a higher degree of genetic differentiation compare to Myanmar native chicken (Maa *et al*., 2012).

Among several types of Indonesian local chickens there were sentul, kampung, and black kedu chickens.Researchers previously reported that the average weight of crossbreeding chickens between the sentul and the kampong at the age of 10 weeks reached 1.009 g (Sopian 2014) and hen day production reached 42.16% (Rahayu 2014) while the weight of black kedu chicken at the age of 10 weeks reached 1032, 28 g and hen day production reached 40% (Nataamijaya 2008).Therefore, the crossbreeding between Sentul kampung kedu (SKkedu) and Kedu Sentul kampung (KeduSK) was done to produce the crossbreeding chicken which had better growth compared to local chickens such as kampung, sentul, and kedu.

The objective of this research was to evaluate the productivity of the crossbreeding between 1maleofsentulkampungkedu (SKkedu) and the female of kedusentulkampung (KeduSK) at the age 0 to 10weeks.Therefore, crossing sentulkampungkeduchickens (SKKedu) and black kedusentulkampung(Kedu SK) chickens is expected to produce better broiler and laying hens. This research is expected to be a solution for breeders in Indonesia in providing local chicken seeds that are superior to other local chickens.

Materials and Methods

The research was conducted in Field Laboratory of Breeding and Genetics Faculty of Animal Husbandry, Bogor Agricultural University. The research was conducted from September 2015 to January 2016.

The tool used in this research were 4 cages measuring 3x3 m, 12 drinking gallons with 6 L capacity, 2 large drinking gallons, 12 small feeding places, 2 large feeding places, OSUKA digital scale with 0,1 g accuracy. Other tools also used are lights, bailer, cable, bucket, egg tray, hatchery, and plastic tray. In addition were husk, bamboo bulkhead, crumble-shaped commercial feed, bran, ND vaccine, and vitachick.

The crossbreeding of the elder chickens was done between the male of keduSK and female hen SKkedu. The reciprocal crossbreeding was between the rooster of SKkedu and the mother hen of keduSK. The egg collection was done in the morning and evening. Eggs are inserted into the hatching machine every week as the hatching period. Before being put into the hatching machine, the eggs were coded according to the type of the crossbreeding chickens. When the eggs hatched, the DOC was weighed using a digital scale and then wingband was installed to facilitate the research.

Food in the form of commercial feed and bran with 60%: 40% ratio for 100 g per day was given to laying hen.Feed is given two times a day, in the morning and evening. For drinking water, it was given ad libitum.

The Day Old Chicks (DOC) wereweighed and wing bands were mounted on their wings.Theupkeeping of crossbreeding chickens was done in the cage of colony. Chickens were obtained from 10 hatching periods or 10 replications with 43 DOC SKkeduxkeduSK and 46 DOCs KeduSKxSKkedu. The chickens were separated by sex after 4 weeks of age.

Vaccination of ND through mouth drops with a dose of 0.1 mL was given when the chicks werre 3 days and 3 weeks of age.Vitachick was done by mixing it with drinking water at a dose of 0.7 g L-1 drinking water up to the chickens 2 weeks of age.Furthermore, vitachick was given after weighing.

Chickens aged 3-4 weeks were given a mixture of commercial feed and rice bran with a ratio of commercial feed 80: bran 20.Chickens aged 5-10 weeks were given a mixture of commercial feed and rice bran with a ratio of commercial feed 60: bran 40.

Data are presented descriptively by knowing the mean ($\bar{x}$) and standard deviation (s). T test was used to determine the difference in average body weight, feed consumption, feed conversion and mortality from crosses between kedu chickens and sentul-kampung chickens. The formula for the t test according to Walpole (1993) is as followsThe following model was used:

$$t = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{\frac{{s_1}^2}{n_1}} + \sqrt{\frac{{s_2}^2}{n_2}}}$$

Wherex_1 $x_1$is average sample1 and 2,μ_1 andμ_2 is average of population, s_1 and s_2 is standart deviation, $_{n1}$ and $_{n2}$ is number of sample 1 and 2.

The measured variables werebody weight, feed consumption, feed conversion and mortality.Body weight was obtained by weighing the body weight weekly during the maintenance.Feed consumption was obtained by calculating the difference between the amount of feed given and the leftover feed in 1 week. The conversion of feed was obtained by comparing the feed consumption and the increase of body weight.The mortality (%) was obtained by comparing the total number of dead chickens and the total number of chickens maintained.

Result and Discussion

1. Body Weight

Body weight produced by crossbreeding between Sentul-Kampung-kedu (SKkedu) and Kedu-Sentul-Kampung (keduSK) with its reciprocal at age 0-4 weeks were presented in Table 1.

Table 1 The average and standard deviation of body weight between crossbreeding SKkedu and keduSK at the age 0 to 4weeks.

Week	x̄ ± sb Body weight (%KK) on the species of chicken			
	SkkeduxkeduSK		KeduSkxSKkedu	
	Male	Female	Male	Female
	g tail^{-1}			
0	28,72 ± 0,40 (1)		29,46 ± 0,38 (1)	
1	41,91 ± 1,12 (3)		43,91 ± 1,08 (2)	
2	71,01 ± 2,51 (4)		73,22 ± 2,39 (3)	
3	119,83 ± 4,38 (4)		125,03 ± 4,34 (3)	
4	181,19 ± 6,06 (3)		181,51 ± 5,93 (3)	

The results of measuring the body weight of the crosses between KeduSK and SKKedu did not show a significant difference (P <0.05) after the t test. This shows that the results of crosses between KeduSK and SKKedu do not affect the body weight of the crossed chickens. The body weight of the crosses of SKKedu and KeduSK is higher when compared to crossbred chicken in SK. This is shown in SKKedu chickens aged 0 weeks of 30.16 and KeduSK 34.16, while the results of Sopian research (2014) on SK crosses were only 28.28 g.

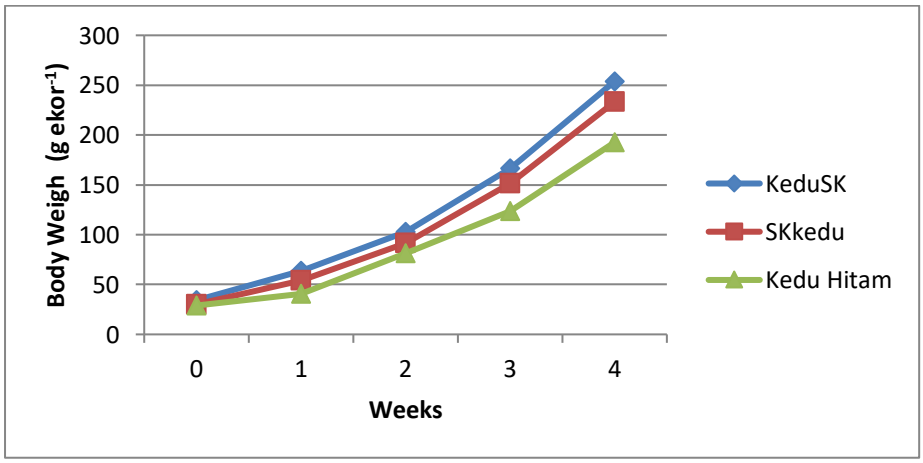

Figure 1. Average of body weight KeduSK and SKKedu at age 0-4 week.

Figure 1, shows the growth rate between crosses of KeduSK (blue), SKKedu (red) and black Kedu (Nataamijaya, 2008). At the age of 0 weeks or at the time of DOC Day Old Chick), the body weight is relatively the same, but in subsequent growth it shows a difference, namely the KeduSK crossed chickens have the highest followed by SKKedu and finally the black kedu chicken. This shows that the KeduSK crossed chickens showed optimal results. In accordance with the statement of Noor (2008), that the purpose of holding crosses is the hope of heterosis. This shows that the high body weight and growth rate of the results of this study by crossing 3 types of local chickens, namely sentul, kedu and kampung.

Table 2 show theSKkeduxkeduSK had no significant different weight (P <0.05) to week 10.Theweight of this crossbreeding chickens at the age of 10 weeks 771.70 g. was higher than theresults of the research done by Darwati and Martojo (2001) that the chicken at the age of 10weeks reached 681.01 g.

Table 2 The average and standard deviation of body weight between crossbreeding SKkedu and keduSK at the age 5 to 10 weeks.

Week	$\bar{x}$ ± sb Body weight (%KK) on the species of chicken			
	SkkeduxkeduSK		KeduSkxSKkedu	
	Male	Female	Male	Female
	g tail^{-1}			
5	292,21 ± 17,47 (6)	233,40 ± 8,77 (4)	266,34 ± 18,68 (7)	239,43 ± 8,63 (4)
6	389,40 ± 24,83 (6)	309,71 ± 13,17 (4)	360,34 ± 27,54 (8)	324,71 ± 12,47 (4)
7	497,22 ± 27,76 (6)	389,65 ± 16,60 (5)	459,43 ± 30,80 (7)	423,95 ± 16,29 (4)
8	615,06 ± 35,28 (6)	487,79 ± 21,21 (4)	563,38 ± 39,14 (7)	528,44 ± 20,80 (4)
9	724,64 ± 40,54 (6)	578,54 ± 26,64 (5)	664,40 ± 44,98 (7)	628,23 ± 26,10 (4)
10	826,64 ± 43,74 (5)	674,37 ± 30,05 (4)	771,70 ± 48,52 (6)	723,42 ± 28,82 (4)

Based on Isa (2020), chicks weight at 6 and 18 wk of age differ along purebred and crossbred line, within the purebred but not within the crossbreds. The average body weight at the age of 5 weeks to 10 weeks was differentiated by sex. Based on the statistical test conducted, the average body weight of cross-breed chickens SKkeduxkeduSK and keduSKxSKkedu was not significantly different at the age of 5 to 10 weeks. The weight of male chicks in both types of chickens is heavier than that of hens. According to Soeparno (2005) one of the causes of the growth rate in livestock is gender. Herren (2012) adds that there is the testosterone hormone in the testes which functions to stimulate muscle growth in male animals, while estrogen functions to stimulate bone and meat growth in female animals.

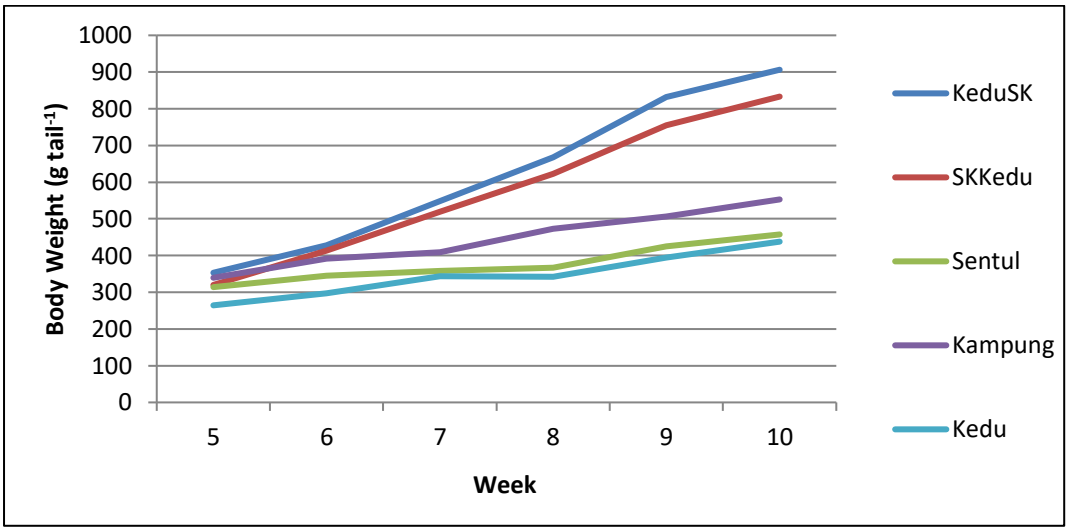

Figure 2. Average of body weight KeduSK and SKKedu at age 0-4 week.

Based on Figure 2, it can be seen that KeduSK is the highest, followed by the second SKKedu showing a significant growth in body weight when compared to the body weight of Sentul, Kampong and Kedu chickens. The increase in the growth rate is in accordance with the statement of Soeparno (2004) that in the growth phase there will be changes in size which include body weight, body shape and composition. In addition, there were changes in body components, fat muscles, bones and organs, then there were also changes in chemical components consisting mainly of water, fat, protein and ash in the carcass.

2. FeedConsumption

The consumption of chicken feed of SKkedu and keduSK at ages 0 to 10 weeks was presented in Table 2 and Table 3.SKkeduxkeduSK and keduSKxSKkekedu at the age 0-4 weeks had not done the sexing (Table 2) showing that at week 1 and week 4 the Kedu SK chickens were higher than the SKKedu chickens. But at week 2 and 3 showed lower feed consumption.The consumption by sex shown in Table 3 at the age 5-10 weeks.

Table 3 The average consumption of crossbreeding SKkedu and its reciprocal &keduSK and its reciprocal at the age 1 to 4 weeks

Week	x̄ ± sb Body weight (%KK) on the species of chickens	
	Skkedu	KeduSK
	g each[1]	
1	34,58 ± 1,84 (5)	33,01 ± 1,84 (6)
2	69,34 ± 2,75 (4)	73,75 ± 2,75 (4)
3	111,07 ± 7,45 (7)	114,15 ± 7,45 (7)
4	157,45 ± 8,56 (5)	147,82 ± 8,56 (6)

The consumption of chicken feed aged 1-4 weeks showed no significant difference (P <0.05), both in the second SK and Kedu SK. This shows that the cross between SKkedu and both SKs has no effect on feed consumption.

However, the feed consumption per day will differ between crossed chickens and chickens that have not been crossed, namely in KeduSK chickens of 20.48 g per head per day, while according to Nataamijaya (2008) in black kedu chickens 25.48 g per head per day.

At the age of 5 to 10 weeks, chicks had been differentiated by sex. The consumption of crossbreeding chickens increased at age 5 to 10 weeks but among the crossbreeding chickens themselves was not different (P <0,05). In this table, there is a difference in feed consumption between males and females. The 10 weeks old chickens showed that the chicken feed consumption between male and female was 435.22 g and 419.33 g and the resulting body weights were 1064.18 and 962.55 g. These results are in accordance with the results of research by Nurcahya (2013) that the body weight of male chickens is higher than that of hens in Sentul, Kampong and Kedu chickens.According to Amrullah (2004), the amount of consumption for various age was not fixed. The amount varied according to rate of growth and production.

Table 4 The average consumption between the crossbreeding of SKkeduandkeduSK at the age 5 to 10 weeks

Week	x̄ ± sb Body weight (%KK) on the species of chickens			
	Skkedu		KeduSk	
	Male	fmale	Male	female
	g each[1]			
5	200,19 ± 6,01 (3)	191,73 ± 6,11 (3)	189,19 ± 6,01 (3)	184,81 ± 5,76 (3)
6	241,40 ± 8,22 (3)	235,69 ± 9,49 (4)	237,34 ± 8,22 (3)	229,64 ± 8,94 (4)
7	289,91 ± 8,36 (3)	286,35 ± 6,02 (2)	277,71 ± 8,36 (3)	274,60 ± 6,02 (2)
8	345,04 ± 8,82 (3)	326,96 ± 7,55 (2)	327,37 ± 8,82 (3)	320,77 ± 7,55 (2)
9	384,79 ± 6,95 (2)	373,01 ± 12,46 (3)	367,96 ± 6,95 (2)	382,06 ± 12,46 (3)
10	431,49 ± 7,11 (2)	411,22 ± 10,34 (3)	426,19 ± 7,11 (2)	414,88 ± 10,34 (2)

3.Feed Conversion

Feed conversion indicated the amount of feed consumed by chickens to increase body weight. Feed conversion of crossbreeding SKkedu and keduSKthe age 1-4 weeks was presented in Table 4 and age 5-10 weeks at Table 5.

Table 5. Average of feed conversation for crossbreeding of SKkedu and keduSK at the age 1 to 4 weeks

Week	x̄ ± sb Body weight (%KK) on the species of chickens	
	SkkeduxkeduSK	KeduSkxSKkedu
	g each^{-1}	
1	3,37 ± 0,56 (17)	2,93 ± 0,56 (19)
2	3,15 ± 0,28 (9)	3,21 ± 0,28 (9)
3	2,38 ± 0,12 (5)	2,41 ± 0,12 (5)
4	2,85 ± 0,19 (7)	2,74 ± 0,19 (7)

Chickens of SKkeduandkeduSK at age 0 to 4 weeks had not done the sexing. Feed conversion of keduSK was better than that of SKkedu at age 1 to 4 weeks.The average conversion value of SKkedu chicken feed was 1.97 higher and less efficient to convert the feed into muscle compared to the chicken keduSK with feed conversion of 1.90.Amrullah (2004) said that the lower the conversion value of the ration, the more efficient the use of ration, and the higher the conversion value of rations, the more rations needed to increase the body weight and the efficiency of ration use decreased.

Table 6. The average of feed convertion between crossbreeding chicken of SKkedu and its reciprocal and also chicken keduSK and its reciprokal at the age of 5 to 10 weeks

Week	x̄ ± sb Body weight (%KK) on the species of chickens			
	SkkeduxkeduSK		KeduSkxSKkedu	
	Male	Female	Male	Female
	g each^{1}			
5	2,49 ± 0,20 (8)	2,87 ± 0,38 (13)	3,05 ± 0,19 (6)	3,49 ± 0,36 (10)
6	2,53 ± 0,22 (9)	3,33 ± 0,28 (8)	3,11 ± 0,20 (6)	3,14 ± 0,27 (9)
7	2,92 ± 0,44 (15)	3,75 ± 0,19a (5)	3,26 ± 0,42 (13)	2,86 ± 0,19b (7)
8	3,10 ± 0,28 (9)	3,70 ± 0,47 (13)	3,51 ± 0,27 (8)	3,39 ± 0,47 (14)
9	3,63 ± 0,39 (11)	4,91 ± 0,46 (9)	4,15 ± 0,37 (9)	3,88 ± 0,46 (12)
10	4,37 ± 0,29 (7)	4,46 ± 0,35 (8)	4,11 ± 0,27 (7)	4,56 ± 0,35 (8)

Table 5 showed that the conversion value of feed between the SKkeduxkeduSKandkeduSKxSKKeduwas significantly different at week 5. The feed conversion value of the male SKkeduxkeduSK was better than that of themalekeduSKxSKkedu.According to the research of Nurcahya et al, (2015), the average feed conversion rate at the age of 1 to 10weeks was 3.68 SKKedu and 3.46 for the keduSk. The average feed conversion of the crossbreeds of male and female SKkeduxkeduSK and second maleSKxSKkedu was better than that of SKkedu and keduSK chickens, but the second female chickenSKxSKkedu had a higher rate of feed conversion. Sopian (2014) also said that the female SK 12 weeks had a feed conversion value of 5.37 ± 1.09. This result is smaller than the feed conversion value of SKkeduxkeduSK hens but greater than that of second SKxSKkedu hens. Sopian (2014) also said that the 12 week old SK hens had a feed conversion value of 5.37 ± 1.09. This result was lower than the conversion value of the feed for hens of the SKkeduxkeduSK but higer than the hen of KeduSKxSKkedu.

4. Mortality

The percentage of mortality for keduSKxSKkedu at the age 1 to 4 weeks reached 17.39% while SKkeduxkeduSK was only 9.30%.Nurcahya et al. (2015) reported that the mortality of SKkedu chicken at the age of 1 to 4 weeks reached 32.33% while keduSK was only 2.70%.Low adaptation at the age of 1-4 weeks caused the high mortality.The mortality percentage of crossbreeding chickens could be seen in Table 6.

Table 7 The percentage of chicken mortality of SKkeduxkeduSK and KSKKSKxSKkedu at the age of 0 to 10 weeks.

Age (week)	Species of chickens	Sex	Mortality (each)	Total (n/N)
1 s/d 4	SkkeduxkeduSk			10% (5/50)
	KeduSKxSKkedu	*Unsex*		14,55 (8/55)
5 s/d 10	SkkeduxkeduSk	male	0% (0)	11,33% (6)
		female	11,33% (6)	
	KeduSKxSKkedu	male	2,13% (1)	10,34% (6)
		female	8,21% (5)	

Result of percentage calculation of mortality ofSKkeduxkeduSK at the age of 5-10 weeks was 11,33% whereas keduSKxSKkedu reached 10,34%. It showed that the result was higher than SK chicken in the research done by Sopian (2014) and chicken of keduSK was 13,89% and SKkedu was 0 %.The characteristics of the dead chicken were visibly lethargic, diarrhea, and white mixed faeces.It was suspected that dead chickens were caused by pullorumdisease.Shivaprasad (2000) said that pullorum disease was caused by Salmonella pullorum.Pullorum disease had symptoms such as white defecation and for young chickens or fowls, it caused high mortality, while the adult chickens acted as careers,

Pullorumdisease could be treated by giving tetra chlor, coccilin, and trisulfat (Sudrajad, 2004).The giving of tetra chlor to chickens affected by this disease had already been done, The condition of chickens that had been too severe could not be cured so that the chicken died.

Conclusion

The productivity of crossbreding chickens of SKkeduxkeduSK and KeduSKxSKkedu was the same.The body weight for both crossbreeding reached 0.7-0.8 kg at the age of 10 weeks. Chicken feed conversion of SKkeduxkeduSK and keduSKxSKkedu was quite efficient about 3.0 to 3.7.The mortality of the crossbreeding was high, it was more than 3% of total population.

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