

# The Performance of Nagrak and Kampung Chicken Kept Intensively in Cibadak Sukabumi, West Java

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## ABSTRAK

NATAAMIJAYA, A.G. 2008. Kinerja ayam Nagrak dan ayam Kampung yang dipelihara secara intensif di Cibadak Sukabumi Jawa Barat. *JITV* 14(2): 97-103.

Suatu kegiatan penelitian mengenai kinerja ayam Nagrak dan ayam Kampung yang dipelihara secara intensif telah dilaksanakan di Cibadak Sukabumi Jawa Barat. Sebanyak masing-masing 200 ekor ayam Nagrak dan Kampung betina dewasa ditempatkan dalam kandang individu (batere) dan mendapat pakan ayam ras petelur yang dicampur dedak halus dengan rasio 1:1. Setiap ayam diberikan pakan sebanyak 90 g setiap hari sedangkan air minum diberikan secara berlebih (*ad libitum*). Inseminasi buatan dilakukan setiap tiga hari mempergunakan *semen* yang dihasilkan pejantan ayam Nagrak dan Kampung, masing-masing tersedia 20 ekor untuk setiap jenis ayam. Pengendalian penyakit dilakukan dengan cara vaksinasi tetelo (*Newcastle Disease*) dan gumboro (*Infectious Bursal Disease*) serta pemberian sulfamix dan antibiotika bilamana diperlukan. Telur yang dihasilkan dikumpulkan dua kali sehari dan ditimbang, sebagian ditetaskan dalam inkubator sedangkan sebagian lainnya dievaluasi karakteristiknya. Parameter yang diamati adalah penampilan fisik luar, produksi telur (*hen-day production*), karakteristik, fertilitas dan daya tetas telur, bobot hidup, angka konversi pakan dan mortalitas. Hasil pengamatan menunjukkan bahwa ayam Nagrak memiliki penampilan fisik berbeda dengan ayam Kampung namun produktivitas telur ayam Nagrak ( $26,93 \pm 12,10\%$ ) dan ayam Kampung ( $27,04 \pm 16,20\%$ ) tidak berbeda nyata. Karakteristik telur ayam Nagrak vs ayam Kampung adalah sebagai berikut: Bobot telur ( $36,29 \pm 7,50$  g vs  $35,55 \pm 5,42$  g); bobot *yolk* ( $16,61 \pm 1,34$  g vs  $16,22 \pm 2,11$  g); bobot albumin ( $17,31 \pm 2,67$  g vs  $16,87 \pm 1,35$  g); bobot kerabang ( $2,37 \pm 0,81$  g vs  $2,46 \pm 0,54$  g); warna *yolk* ( $9,62 \pm 1,81$  g vs  $9,67 \pm 1,70$  g); *haugh unit* ( $83,60 \pm 5,41$  vs  $84,45 \pm 6,10$ ); tebal kerabang ( $24,00 \pm 0,83\mu\text{m}$  vs  $24,4 \pm 0,67\mu\text{m}$ ), tidak berbeda nyata pada parameter karakteristik telur yang diamati. Demikian juga pada parameter fertilitas dan daya tetas telur serta mortalitas tidak berbeda nyata. Pada umur 12 minggu rata-ran bobot hidup ayam Nagrak jantan ( $1260,04 \pm 57,33$  g) sangat nyata ( $P < 0,01$ ) lebih tinggi dari pada ayam Kampung jantan ( $750,68 \pm 60,11$  g) demikian juga bobot hidup ayam Nagrak betina ( $980,37 \pm 48,11$  g) sangat nyata ( $P < 0,01$ ) lebih tinggi daripada bobot hidup ayam Kampung betina ( $656,11 \pm 58,47$  g). Angka konversi pakan ayam Nagrak jantan (4,21) lebih baik ( $P < 0,05$ ) dari pada ayam Kampung jantan (5,62), demikian juga angka konversi ayam Nagrak betina (5,15) lebih efisien ( $P < 0,05$ ) dari pada ayam Kampung betina (6,81). Angka konversi pakan pada ayam petelur Nagrak dan Kampung tidak berbeda nyata yaitu masing-masing 9,24 dan 9,06.

**Kata kunci:** Kinerja, Nagrak, Kampung, Ayam Lokal

## ABSTRACT

NATAAMIJAYA, A.G. 2008. The performance of Nagrak and Kampung chicken kept intensively in Cibadak Sukabumi, West Java. *JITV* 14(2): 97-103.

A study on the performance of Nagrak and Kampung chicken under intensive management system was conducted in Cibadak District of Sukabumi West Java. As many as 200 hens of Nagrak and Kampung, each were placed in individual cages. The birds were given 90 g of diet daily, the diet was the mixture of layer commercial diet and ricebran at equal ratio, drinking water was given *ad libitum*. Artificial insemination was conducted every three days using semen collected from 20 cockerels of each local bird. Disease control was done by vaccination against Newcastle Disease and Infectious Bursal Disease. Sulfamix and antibiotics were given whenever needed. Eggs were collected twice a day, weighed and stored to be incubated or to be analyzed for their characteristics. Parameters observed were physical appearance, hen-day egg production, egg quality, egg fertility and hatchability, body weight, feed conversion and mortality. Results showed that Nagrak chicken physical appearance was different from that of Kampung chicken, yet their hen-day production were not significantly different ( $26.93 \pm 14.10\%$  vs  $27.04 \pm 16.20\%$ ). The egg characteristics of these birds (Nagrak vs Kampung) were as follows: egg weight ( $36.29 \pm 6.50$  g vs  $35.55 \pm 5.42$  g); yolk weight ( $16.61 \pm 1.34$  g vs  $16.22 \pm 2.11$  g); albumen weight ( $17.31 \pm 2.64$  g vs  $16.87 \pm 1.35$  g); shell weight  $37 \pm 0.81$  g vs  $2.46 \pm 0.54$  g); yolk color ( $9.62 \pm 1.81$  g vs  $9.67 \pm 1.70$  g); haugh unit ( $83.60 \pm 5.41$  vs  $83.45 \pm 6.10$ ); shell thickness ( $24.0 \pm 0.83\mu\text{m}$  vs  $24.4 \pm 0.67\mu\text{m}$ ), however no significant difference was found. Neither the egg fertility, hatchability nor mortality rate of the birds was significantly different. At 12 weeks old the average body weight of male Nagrak chicken ( $1260.04 \pm 57.33$  g) was much higher ( $P < 0.01$ ) than that of male Kampung chicken ( $750.68 \pm 60.11$  g) while the average body weight of female Nagrak chicken ( $980.37 \pm 48.11$  g) was much higher ( $P < 0.01$ ) than that of female Kampung chicken ( $656.11 \pm 58.47$  g). The feed conversion ratio of male Nagrak chicken (4.21) was better ( $P < 0.05$ ) than that of male Kampung chicken (5.62), the

feed conversion ratio of female Nagrak chicken (5.15) was also better ( $P < 0.05$ ) than that of female Kampung chicken (6.81). No significant difference was found on the feed conversion ratio of Nagrak hens (9.24) and Kampung hens (9.06).

**Key words:** Performance, Nagrak, Kampung, Local Chicken

### INTRODUCTION

Indonesia is known as one of the world three chicken domestication centers (HANOTTE, 2002), so far as much as 31 ecotypes were identified (NATAAMIJAYA, 2000), Kampung chicken (KC), Pelung chicken (PC) and Nagrak chicken (NC) are among them. The KC is common local chicken which has no specific characteristics and can be found easily in most of the Indonesian islands. It has very good adaptation ability to the environment so that its population is the highest among local chicken. In spite of its highest population, the KC growth rate and egg productivity is very poor especially if compared to that of commercial chicken. The PC has the largest body size among the local chicken. It has also the best crow voice of the cockerel. Therefore the male PC quality is valued mostly based on its crow voice quality. Yet, the PC population is very low because it has low fertility rate due to very high inbreeding level resulting from uncontrolled mating program conducted by the smallholders in order to produce offsprings with good quality crow voice.

Through grading up mating program using male PC and female KC until the third generation the blood composition is 87.5% of PC and 12.5% of KC - the inbreeding level was presumably decreased while its growth rate was much better than that of KC. The crossbred was called as Nagrak chicken (NC) and considered as meat type local chicken (Figure 1).

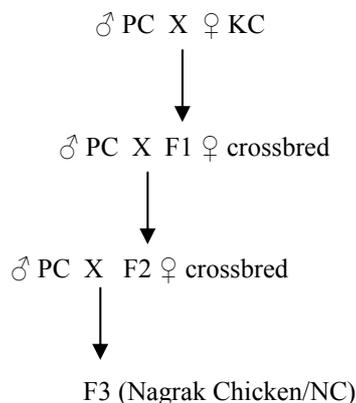
The smallholders usually feed the local chicken using the mixture of commercial diet and ricebran, because it is not easy to find a ready to use local

chicken diet in the villages. Commercial diets are very much easier to find even in the villages. Yet they are too good in quality and consequently too expensive to be given to the local chicken, so the farmers mix such diets with ricebran at equal ratio (NATAAMIJAYA, 2006). In this study, the performance of the NC and the KC were observed when reared under intensive management system.

### MATERIALS AND METHOD

This study was conducted at Triafary Farm Cibadak Sukabumi, using 200 NC and 200 KC hens of 20 weeks old which were placed in individual cages. Besides as much as 20 males (36 weeks old) of NC and KC each were used as sources of semen being used for artificial insemination. The birds were given ricebran mixed with layer commercial diet (in equal ratio), therefore it was calculated to contain approximately 14% of crude protein and 2400 Kcal/kg metabolizable energy. Each bird received 90 g diet daily, while drinking water was provided at libitum. Disease control was conducted through vaccination program against Newcastle Disease and Infectious Bursal Disease. Sulfamix and antibiotics were used whenever needed.

Artificial insemination was conducted every three days, using semen collected from the cockerel, after it was diluted with saline solution at the same volume. At 36 weeks old, 100 eggs of NC and KC each were analyzed for its characteristics while the rest of it were regularly, every three day period, placed in the



**Figure 1.** Mating program using male PC and female KC to produce NC

incubator. Egg quality was examined using ounces per dozen scale, conventional scale, tripod micrometer, USDA egg quality slide rule and Roche Yolk Color Fan. Day old chicks were reared intensively in the brooders and were given broiler commercial starter diet until 4 weeks old. Thereafter the chicks were given rice bran mixed diet (50% broiler diet +50% rice bran).

Parameters observed were hen-day production, egg characteristics (weight of yolk, albumen and shell, yolk color and shell thickness), body weight and feed conversion. Data obtained were analysed using T test (STEEL and TORRIE, 1991)

## RESULTS AND DISCUSSION

### Physical appearance

Female NC body was taller and bigger than that of KC, covered either by black, brown or light brown plumage, the beak was white, while the scales were black, grey or light yellow, the comb is red serrated single comb. Male NC body was also much taller and bigger than that of male KC, covered by black plumage ornamented with red, orange or yellow feather on the neck, back, waist and wings. The tail feathers were mostly black with one or two pieces of white feathers. They formed curve like sickle. The NC in general looked more alert and vigorous when compared to PC this may be due to the effect of heterosis, however its crow was not as good as that of male PC crow.

### Egg production

The average hen-day production (hd) of NC was  $26.93 \pm 12.10\%$  while the hd of KC was  $27.94 \pm 16.20\%$  being higher than that reported by WATIMENA *et al.*, 1974 (9.6%) and GULTOM, *et al.* (1989) (20.9%). However it was lower than that reported by SUDJONO (1998) which was 60%. Differences between reported data caused by some factors i.e. genetics, nutrition, management system and climate. This also showed that local chicken genetic potential was varied widely, yet to a certain level it responded very well to the improvement in rearing system.

### Egg characteristics

The average egg weight of NC was  $36.29 \pm 7.50$  g while that of KC was  $35.55 \pm 5.42$  g, no significant difference was found. The yolk weight, albumen weight, shell weight, yolk color, haugh unit and shell thickness of NC were  $16.61 \pm 1.34$  g;  $17.31 \pm 2.67$  g;  $2.37 \pm 0.81$  g;  $9.62 \pm 1.81$ ;  $83.60 \pm 5.41$  and  $24.00 \pm 0.83$   $\mu\text{m}$  while those of KC were  $16.22 \pm 2.11$  g;  $16.87 \pm 1.35$  g;  $2.46 \pm 0.54$  g;  $9.67 \pm 1.79$ ;  $84.45 \pm 6.10$  and  $24.40 \pm 0.67$   $\mu\text{m}$  and no significant differences were

found between these values. The characteristics of all the eggs in this study were good enough despite lower values than those of previous research reported of 40.03 – 46.0 g (NATAAMIJAYA, 1988; 2006; MUGIYONO *et al.*, 1989, GULTOM *et al.*, 1989). These values were lower than those in previous reports because the birds in the present study were given diet with lower content of crude protein (14%) and metabolizable energy (2400 Kcal/kg). The yolk color in this study was lower than that of KC i.e.  $11.23 \pm 2.24$  (NATAAMIJAYA and JARMANI, 1992). This was caused by low content of  $\beta$ -carotene in the diet, due to high rice bran portion (50%) in the diet which has very low content of  $\beta$ -carotene as source of xanthophylls that give yellow color to the yolk.

The average yolk weight percentages were 43.03% (NC) and 44.03% (KC); albumen weights were 47.72% (NC) and 47.34% (KC); shell weights were 6.44% (NC) and 6.64% (KC), these values were different from those of commercial layer stock i.e. 31.20%; 51.50% and 10.34% respectively (KUCHIDA *et al.*, 1999). The yolk weight percentages of NC and KC were higher while their shell weight percentages were lower than those of hybrid layer chicken. These differences were caused by genetic and nutrient status differences in the birds. The main factor which affected the shell weight in this study was the low Ca content of the rice bran, hence the total Ca content of the diet (2.0%) was only one half of the Ca requirement for layer diet i.e. 4.00%

### Egg fertility and hatchability

The egg fertility of NC was  $79.82 \pm 23.60\%$  while that of KC was  $80.14 \pm 18.43\%$ , no significant difference was found and it was also not much different from previous result, 79.20% (NATAAMIJAYA, 1988). According to ABIOLA *et al.* (2008) the egg fertility rate of broiler chicken egg was around 70%. The egg hatchabilities in this study were  $76.89 \pm 24.11\%$  for NC and  $77.13 \pm 22.87\%$  for KC, the differences were not statistically significant. Previous reports of several experiments on KC were 91.67% (NATAAMIJAYA, 2006); 43.44% (MANSJOER, 1989). Actually there are many factors that influence the egg hatchability such as nutrition, sanitation, handling during storing, incubating and hatching period. In this study all of the eggs were treated equally, so that we concluded that the genetic factor did not give any significant effect on the hatchability of these eggs.

### Growth rate

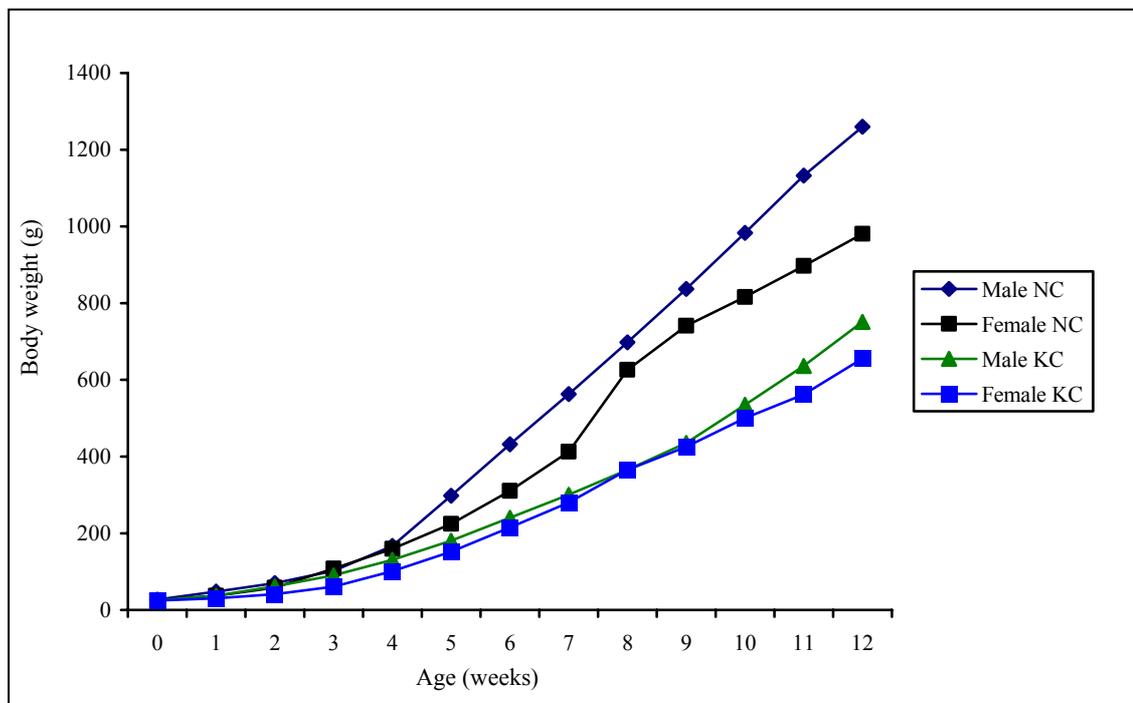
At day one, the average body weights of the male chicks were  $27.20 \pm 3.40$  g (NC) and  $25.67 \pm 4.22$  g (KC), the NC chicks were heavier than KC however statistically the difference was not significant. The

growth in the following days of NC and KC chicks is shown in Table 1. At week 4 the male NC chicks were heavier than male KC ( $P<0.05$ ) and started from week 5 to week 12 the difference between the male NC and male KC chicks was highly significant ( $P<0.05$ ) i.e.  $1260.04 \pm 57.32$  g vs  $750.68 \pm 60.11$  g (Figure 2).

**Table 1.** The body weight (gram) of NC and KC until 12 weeks old

Week	NC		KC	
	Male	Female	Male	Female
0	27.10	25.02	25.67	24.54
1	48.27	37.23	36.74	30.64
2	70.40	58.47	61.46	41.46
3	101.74	108.11	90.43	60.43
4	167.50	159.44	130.44	101.44
5	297.72	224.50	180.22	151.77
6	432.24	310.47	240.49	215.28
7	562.51	412.92	300.28	280.07
8	697.80	626.19	365.78	365.47
9	837.42	740.77	435.21	425.65
10	982.76	816.27	534.74	500.41
11	1132.42	897.41	636.16	561.78
12	1260.04 <sup>a</sup>	980.37 <sup>b</sup>	750.68 <sup>c</sup>	656.11 <sup>d</sup>

Values with different superscripts at the same row showed significant differences either at  $P<0.05$  or  $P<0.01$ .



**Figure 2.** Graph of body weight of NC and KC until 12 weeks old.

The female NC chick weight at day one was  $25.82 \pm 4.54$  g while the female KC chicks was  $22.54 \pm 3.92$  g which was not significantly different. At the end of week one the body weight of female NC and female KC were  $37.23 \pm 4.57$  g and  $30.64 \pm 5.17$  g and at week 3 until week 8 the female NC was significantly heavier than KC ( $P < 0.05$ ). At week 9 to 12 the difference became highly significant ( $P < 0.01$ ) as shown in Table 1.

Research reports on KC body weight at 12 weeks old were 708.78 g (CRESWELL and GUNAWAN, 1982); 374.17 g (MUGIYONO *et al.*, 1989); 638.61 g (PRASETYO, 1989), 834.5 g (NATAAMIJAYA *et al.*, 1993) and 725-967 g (SUPRIYATI *et al.*, 2003). The growth rate of non hybrid chick was much lower than that of broiler chick, i.e. 2502.5 g at 8 weeks old (ORHUERATA *et al.*, 2006). The results of this study indicated that the use of male PC as sire, improved substantially the growth rate and the physical appearance of the

offsprings. YIN and JIANG (2005) stated that the interbreed mating produces offsprings with better performance than their parents do. Yet, this genetic potential will perform whenever all environmental factors allow the genes to express its capacity (MULDER and BIJMA, 2005).

#### Feed conversion ratio (FCR)

To produce 1 kg of eggs the NC hen needed 9.24 kg of diet while the KC needed 9.06 kg. It showed that the KC was more efficient egg layer, however statistically the difference was not significant. According to ZAINUDIN and WAHYU (1995) the KC consumed as much as 4.89 to 7.25 kg of diet in order to produce 1 kg of eggs, even GULTOM *et al.* (1989) found that KC hen needed more than 10 kg of diet to lay 1 kg of eggs. These were very much different from that of

**Table 2.** Performance of Nagrak chicken and Kampung chicken kept intensively in Cibadak Sukabumi West Java

Items	Nagrak Chicken		Kampung Chicken	
	Male	Female	Male	Female
Egg Production				
Age at first egg laid (d)	-	166.00	-	163.00
Hen day (%)	-	26.93	-	27.04
Peak (%)	-	44.00	-	51.00
Weight (g) of				
Whole egg	-	36.29	-	35.55
Yolk	-	16.61	-	16.22
Albumen	-	17.31	-	16.87
Shell	-	2.37	-	2.46
Yolk color	-	9.62	-	9.67
Haugh unit	-	83.60	-	84.45
Shell thickness( $\mu$ m)	-	24.00	-	24.40
Egg fertility (%)	-	79.82	-	80.14
Egg hatchability (%)	-	76.89	-	77.13
Day 1 chick wt. (g)	27.20	25.82	25.67	24.54
Body wt. at 12 wk. (g)	1260.40 <sup>a</sup>	980.37 <sup>b</sup>	750.68 <sup>c</sup>	656.11 <sup>d</sup>
Feed conversion for				
Egg	-	9.24	-	9.06
Body weight	4.21 <sup>a</sup>	4.62 <sup>a</sup>	5.15 <sup>b</sup>	5.81 <sup>b</sup>
Mortality (%)				
0 – 12 weeks	11.00	12.00	13.00	10.33
Adult	0	2.0	0	2.67

Values with different superscripts at the same row showed significant differences either at  $P < 0.05$  or  $P < 0.01$

commercial layer hen which need only 2.50 kg of diet to do it, because hen-day production was over 70% (MORRIS, 2004).

FCR for body weight at 12 weeks old was 4.21 (male NC); 4.62 (female NC), better than ( $P < 0.05$ ) that of male KC (5.15) and female KC (6.81). However it was worse than that of commercial broiler which has feed conversion of 1.7 – 2.0 (AWOBAJO *et al.*, 2008). The results of this study was in accordance with NATAAMIJAYA and DIWYANTO (1995) that the local chicken with better growth rate also showed better feed conversion and the same thing occurred in the commercial broiler chick as reported by HAVENSTEIN *et al.* (2003) and TADELLE *et al.*, (2003).

### Mortality rate

Until 12 weeks old the mortality rates of male and female NC were 11 and 12% while that of male and female KC were 13 and 10.33%, considerably high when compared to that of broiler chick (only 1.7%) at market age (AWOBAJO *et al.*, 2007). However when compared to previous reports on KC which were 68% (KINGSTON, 1979) and 10% (NATAAMIJAYA *et al.*, 1986), mortality rates in this study were good enough. During the laying period, mortality rates of NC (2%) and KC (2.67%) were low because non hybrid chickens naturally have very good resistancy to most avian diseases.

### CONCLUSION

Cross breed mating using male PC and female KC resulted in NC with a specific characteristics which were different from that of PC or KC. Hen-day egg production, egg characteristics, fertility, hatchability and mortality rates of NC was about the same as that of KC. The NC grew faster and more efficiently than KC, so it has good potential to be reared and developed as meat type of local chicken.

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