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Submission date: 30-Jan-2021 09:14PM (UTC+0700)

Submission ID: 1497689231

File name: 1 JITAA 2016 author.pdf (166.37K)

Word count: 3122

Character count: 16732

**EGG PRODUCTION AND HATCHABILITY OF LOCAL DUCKS
UNDER SEMI INTENSIVE VS EXTENSIVE MANagements**

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Received May 18, 2015; Accepted April 09, 2016

ABSTRAK

Tujuan penelitian untuk membandingkan produksi dan daya tetas telur itik lokal yang dipelihara peternak dalam dua sistem berbeda, yaitu semi intensif dan ekstensif. Penelitian menggunakan rancangan klasifikasi satu arah terdiri dari 2 perlakuan, setiap perlakuan terdiri dari 15 jantan dan 120 ekor betina (nisbah perkawinan 1:8). Umur itik antara 13-14 bulan. Pencatatan jumlah produksi telur dilakukan selama tiga minggu. Telur sebanyak 300 butir diseleksi dari masing-masing perlakuan untuk ditetaskan dan diteliti fertilitas, dan daya tetasnya. Fertilitas dihitung pada hari ke 4 penetasan dengan menggunakan *egg candler*. Hasil pengamatan produksi telur, berat telur, fertilitas dan daya tetas dianalisis menggunakan uji beda *unpaired two sample Student's t-test*. Hasil penelitian menunjukkan rata-rata berat telur, fertilitas dan daya tetas tidak berbeda pada kedua sistem pemeliharaan, tetapi total produksi telur pada pemeliharaan semi intensif nyata lebih tinggi ($P < 0,05$) dari pada sistem ekstensif. Perbedaan total produksi telur pada kedua perlakuan sebesar 12,3%. Kesimpulan, sistem semi intensif meningkatkan jumlah telur yang dihasilkan, tetapi tidak berbeda pada rata-rata bobot, fertilitas dan daya tetas telur.

Kata kunci : itik lokal, semi intensif, ekstensif, produksi, daya tetas

ABSTRACT

The study aimed to compare the egg production and hatchability of local ducks under different management systems, namely semi-intensive and extensive. The research conducted was an experimental *one-way classification with two treatments*. Each treatment used 15 male and 120 females (mating ratio 1:8), and ducks aged 13-14 months. Eggs production was recorded during three weeks period. About 300 eggs were selected from each treatment to be hatched. Fertility was observed at 4th days of hatching process using *egg candler*. Data of eggs production, eggs weight, fertility, and hatchability were analyzed using *unpaired two sample Student's t-test*. The results showed that average of egg weight, fertility and hatchability were not different under two management system, but egg production in the semi-intensive maintenance was significantly higher ($P < 0.05$) than those in the extensive system. Egg production in the semi-intensive was 12.3% higher than those in the extensive. In conclusion, the semi-intensive system that is applied in this study the number of eggs production but did not affect the average of egg weight, fertility and hatchability.

Keywords : local duck, semi intensive system, extensive system, egg production, hatchability

INTRODUCTION

Most rural farmers are raising ducks in an extensive system and less in an intensive management. Generally, the extensive system is performed by herding ducks to find locations of feed sources such as rice field or swampy areas. This system is the simplest method and needs small capital input because most farmers are raising ducks as part of the mixed farm. This is called free range system (Meulen and Dikken, 2004). Zhang *et al.* (2009) stated that rice-duck farming (in China) was one of the traditional systems, but currently and gradually popularized as ecological farming techniques for paddy rice production, because the research showed that 84% of the weed biomass was inhibited by duck activities in the rice field.

In Indonesia, duck plays as a source of food and income for rural communities. Unfortunately, most farmers are raising it in a traditional method, which is characterized by low productivity and the availability of feeds depended on the season, so the egg products, meat, and grain prices are fluctuated (Salendu, 2012). Therefore, the growth rate and productivity of eggs are not promising compared with the results reported on ducks maintenance in intensive or semi-intensive (Etuk *et al.*, 2006).

A study by Center for Indonesian Veterinary Analytical Studies (2006) showed that 86% of total respondents (as the highest percentages of farmers interviewed) applied the extensive system with little or no feed supplementation. Hence, growth rate and egg productivity were lower compared to other research reports where intensive or semi-intensive management systems were used (Etuk *et al.*, 2006). In fact, especially in Java and Bali, duck is traditionally raised in rice fields that have natural food of 22.5%. The low egg production is due to lack of food, so it is not sufficient for the growth need and egg production. This fact is still prevalent in some agricultural areas, which indicates that it is a cultural system that is not easily eliminated. An early observation in Wedung district, Demak Regency, revealed that ducks reared in traditional system (herding system) had low productivity because herding is usually done far from the village, causing ducks took more energy to do the activity and produce eggs. Moreover, supplemental feeding is not routinely given causing lack of nutrition (unpublished report).

Technically, farmers are not willing to switch

to the intensive systems because the intensive system is more costly. Yet, encouraging the farmers to switch to semi-intensive is quite possible to be conducted. Under semi-intensive system, ducks still can be grazed sometimes, especially after paddy harvested, but the additional food is also given for a better egg productions. The study aimed to compare the egg production and hatchability of local ducks under different management systems, extensive versus intensive.

MATERIALS AND METHODS

Animal and Feeding Management

The study was carried out for 3 months (July-September 2013) in Wedung district, Demak Regency-Central Java province. The research was an experimental *one-way classification* with two treatments. Each treatment was performed for 15 male and 20 females (mating ratio 1:8) ducks aged 13-14 months. The laying ducks were around 13-14 months old. Under the semi-intensive system, the farmers applied fully feeding system without herding but still provide a free-range area for the duck. Ducks are free ranging, resting and swimming in the pond and around the confinement, so they felt like living in a natural environment. The ducks feed was composed of rice bran, parched rice, fish byproducts and commercial concentrate having ratio of 40:30:20:10 as farmers usually do. In the semi-intensive group, the food was given twice, in the morning and afternoon, an average of 150 g/duck/day. Proximate analysis of duck ration are shown in Table 1. In the extensive system, the farmers applied the herding system, while ducks were given 50% additional food with the same composition, only at night after herding as farmers usually do. At night, the flock is returned to a confinement (a bamboo pen), where eggs are laid during the night. During the day, a flock of ducks, are allowed to search for feed in harvested rice fields and other areas where the feed is plentiful. The desirable mating ratio for good fertility and hatchability for ducks is 1:8.

Parameters Measured and Data Analysis

Parameters observed in this study were egg production, egg weight (g), fertility (%) and hatchability (%). Egg production was recorded during three weeks. Furthermore, 300 selected eggs were used for each treatment. The candling of eggs was done at 4th days of incubation using

Table 1. Proximate Analysis of Duck Ration under Semi Intensive Management

Component	Ration			Average (%)
	1	2	3	
Water (%)	11.6591	12.5660	12.0889	12.1047
Ash (%)	20.7023	24.7708	23.9011	23.1247
Crude fat (%)	10.4900	11.2677	10.8703	10.8760
Crude fiber (%)	10.8158	10.1820	11.2102	10.7360
Crude protein (%)	21.0043	20.3116	21.3304	20.8821
Gross energy (Kcal)	3106.5	3096.1	3117.7	3106.8

an electrical calculator to sort out the clean eggs and dead embryos. The eggs with developed germinal disc were considered as fertile. Fertility percent of eggs was calculated as a total number of fertile eggs divided by a total number of eggs multiplied by 100. Hatchability was calculated after an incubation period of 25 days. Data of eggs production, eggs weight, fertility, and hatchability were analyzed using unpaired two sample Student's t-test in SPSS program (McDonald, 2008).

RESULTS AND DISCUSSION

Egg Production

The data of average egg production is shown in Figure 1. Eggs production under the semi-intensive system ranged from 60% - 82.5%, while eggs production under the extensive system were 55 - 67.5%. Eggs production in the semi-intensive system was significantly higher ($P < 0.05$) than those in the extensive system, with a difference of about 12.3%. There are many factors that influence the difference in eggs production. Eggs production is influenced by food, genetic, nutrition, balanced energy-protein, egg-laying period and the moulting period (Purba *et al.*, 2005; Pingel, 2009). Stress due to the short period of adaptation when entering a new cage will also affect eggs production (Komarudin *et al.*, 2008). In this case, the main challenge is how to encourage farmers to shift toward a more intensive and efficient production system, and to help them overcome problems facing the duck management, such as low-quality of breeding stocks, scarce and unpredictable quality of locally

available feedstuff, source of qualified day-old ducklings, and lack of information about the nutrient requirement of ducks. According to Adzitey and Adzitey (2011), under the traditional systems, ducks can scavenge on their own to obtain the necessary nutrients needed for their growth, but if they do not get extra nutrients, the egg production remains low. In an intensive care and nutritional adequacy, ducks are capable of producing eggs up to 80%. Wibowo *et al.* (2007) revealed that production of eggs and the amount of profit (income over feed cost) obtained in the semi-intensive system maintenance was higher compared to the extensive system. Total mortality in the extensive system was lower compared to semi-intensive and intensive systems while the length of moulting in the intensive and semi-intensive systems was shorter compared to the extensive system. The advantages of intensive maintenance are a higher eggs productivity, assured health and safety, and efficient maintenance cost. The average eggs production in the grazing system was 24 eggs/duck/year while eggs production in intensive maintenance could reach more than 200 egg/duck/year. In other words, the caged ducks are capable of producing more eggs, more stable with higher quality than the grazing system ducks.

The factors affecting egg production are genetic and environment. Genetic factors are heredity of the parent included earlier sexual maturity, the high intensity of spawning, the percentage of nesting and clutch while the environmental factor is feeding and maintenance (Pingel, 2009; Purba *et al.*, 2005).

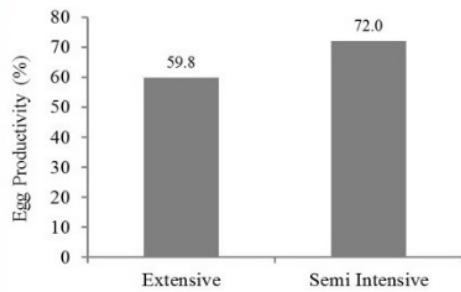


Figure 1. Average Egg Production under Two Management Systems

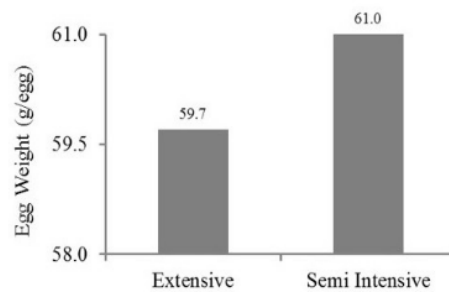


Figure 2. Average Egg weight under Two Management Systems

16 Egg Weight

Figure 2 shows that the average egg weight of local duck in the semi-intensive management system was 61.0 g and that of duck in the extensive system was 59.7 g. Nevertheless, the egg weight of both treatments showed no significant difference. These results were similar to the findings of Juliambawati *et al.* (2012) who found eggs weights around 55.89 to 58.36 g and who calculated eggs production to 58.52 g. Generally, egg weight was influenced by genetic factors, sex, age, nutrition and medicines content in the ration. This fact indicated that duck food provided by the farmer is sufficient. Under the extensive system, ducks generally eat almost all types of food they find edible, while under semi-intensive system, the ration contains enough nutrients as shown in Table 1. Thus, the duck activity that requires a lot of energy during searching naturally food in the extensive system did not affect the egg weight.

Egg Fertility

Fertility refers to the percentage of incubated eggs that are fertile. The results showed that average of egg fertility in three replications under extensive system were 82.7% while semi-intensive 83% (Table 2). This percentage is not significantly different. Thus, raising duck under both management systems did not affect the egg fertility. These results were different from the finding of Datuin and Magpantay (2006) in the Philippines. They stated that the fertility percentage of Mallard ducks raised under modified extensive management system (82.12%) was significantly higher than those of ducks raised under intensive management system

(76.56%). There are many factors contributing to the failure of a fertile egg to hatch which include lethal genes, insufficient nutrients in the egg and exposure to conditions that do not meet the needs of the developing embryo (King'ori, 2011). According to Awad (2013), temperature and photoperiod were the two main factors that influence fertility and hatchability in ducks. Fertility and hatchability are usually lower in the summer months, when the temperature rises, compared to the other months and seasons. Specifically, high environmental temperature causes a decrease in the reproduction efficiency of male and female poultry. This decrease is observed during the production of germ cells, the release of the egg, fertilization, and reduction in the strength of the embryo to survive (King'ori, 2011).

Egg Hatchability

The results showed that the hatching eggs in both management system were not significantly different (Table 2). According to Dewanti *et al.* (2014), eggs weight had no effect on fertility and hatchability, but egg weight influenced hatching weight. Hassan *et al.* (2005) conveyed that ideal size egg for being hatched is not too large or too small. In this study, handling and hatching process that applied in both management such as sex ratio, egg weight and environmental conditions were not different, so hatchability was not different too. Temperature and humidity are determining factors in the success of hatching eggs. According to Suryana (2007), an ideal temperature of hatching machine is around 37°C, and at the end of the hatching process, the humidity should be increased to 85%. He stated that the relative

Table 2. Egg Fertility and Hatchability (Semi Intensive vs Extensive System)

System	Replication	Hatched Eggs	Fertile Egg [*])	Fertility %	Hatching Eggs	Hatchability %
Extensive						
	1	100	84.0	84.0	59	70.2
	2	100	81.0	81.0	57	70.4
	3	100	83.0	83.0	57	68.7
	Average	100	82.7	82.7	57.7	69.8
Semi Intensive						
	1	100	85.0	85.0	60	70.6
	2	100	82.0	82.0	58	70.7
	3	100	82.0	82.0	58	70.7
	Average	100	83.0	83.0	59	70.7

*Fertility was observed at the 4 days of hatching process

humidity during the eggs hatching process in the 1-26 days of age was approximately 79%. The eggs quality can be obtained from good parents with balanced sex ratio. Successful hatching is determined by some factors such as quality of eggs, egg weight, fertility, and hatchability.

CONCLUSION

The semi-intensive system that was applied in this study increased the number of eggs produced, but it did not affect the average of egg weight, fertility and hatchability. The averages of egg weights in the semi-intensive and extensive system were 59.7 g and 61 g, respectively; fertility 83% and 82.7%; while hatchability 70.7% and 69.7%, respectively. The ducks under the semi-intensive system produce eggs 12.3% more than ducks in the extensive system. These results can be the positive information for the traditional farmer in Wedung district, thus, it will encourage to change the duck rearing management.

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