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Performance and Egg Quality of Isa-Brown Layers Fed Different Quantities of Feed

M. Adegbenro, A.S. Ajidara, S.G. Modupe and G.E. Onibi

Animal Production and Management Division, Department of Animal Production and Health, Federal University of Technology, Akure, Nigeria

Corresponding authors: M. Adegbenro; E-mail: madegbenro@futa.edu.ng; Phone: +234 803 4935735

Abstract

One hundred and twenty (120) 16-weeks in-lay Isa-Brown hens were used in this study that lasted for 12 weeks to investigate the effects of different feeding quantities on their egg laying performance and cost of production. Four (4) different quantities of feed were offered; 95, 105, 115 and 125 grams per day and designated treatments I, II, III and IV, respectively. The hens were assigned to these treatments in a completely randomized experimental design with three (3) replicates per group and ten (10) birds per replicate. The birds were housed in a three (3) tiers California type colony cages (43x41 cm). Results at the end of experiment showed that bird fed 115 g/day had the highest hen-day-production ($80.48 \pm 1.13\%$) and best feed conversion ratio (2.17 ± 0.05). Also, tray of egg produced/bird, gross return from egg and net profit were significantly higher in birds fed 115 g/day. Bird fed 115 g/day had the highest gross return (N1915.33 $\pm$ 30.21) and highest net profit (N524.29 $\pm$ 30.21), while lowest gross return (N1530.00 $\pm$ 12.92) and lowest net profit (N299.44 $\pm$ 21.36) were recorded in bird fed 95 g/day and 125 g/day, respectively. It was concluded that for optimum laying performance and to save/reduce cost of production, feeding Isa-brown laying bird with 115 g/day would be most economical and therefore recommended.

Keywords: Isa Brown, egg quality, layer, feed

Introduction

In commercial poultry production system, profit can be attained by minimizing feed cost which accounts for about 60 - 75% of the total cost of production under intensive system of management (Etalem *et al.*, 2009, Adegbenro *et al.*, 2012). Regular supply of feed over and above maintenance requirements is essential to improve productivity in family of poultry production (FAO, 2004). The increasing cost of feed resources in livestock production has been identified as a serious impediment to meeting the demand for animal protein particularly in developing countries (Adejinmi *et al.*, 2000). This challenge resulted in research focus that could reduce the cost of feeding without negatively influencing the performance of the birds.

Feed is the most important input for poultry production and the availability of low-priced, high-quality feeds is critical for the expansion of the poultry industry and quality (Ismoyowati and Sumarmono, 2011). The commercial laying bird industry in Nigeria can either be small, medium or large-scale production. Generally, most poultry farmers in Nigeria feed their laying hens twice a day, while very few feed once or thrice a day and there has been little or no documentation on how many times laying hens should be fed in a day to optimize profit. Splitting the daily feed allotment can ensure that a sufficient volume of feed is provided at each feeding time to minimize competition among the hens. However, the effect of feeding more than once a day is still controversial (Majid *et al.*, 2013). Faulty feed and feeding methods are some factors affecting reduced egg production, small egg size, body weight, excess fat, overfeeding and mortality (Oyedeji *et al.*, 2007).

Unrestricted feeding of laying birds leads to over consumption of which enhances excessive accumulation of abdominal fat (Carter, 1975) and this also lead to wastage.

This study is therefore carried out to determine the quantity of feed that should be given to Isa-brown laying bird per day and if rationing feed for hens, whereby the daily feed requirement of hen is given once, twice or thrice in a day and the effect on laying performance and egg quality.

Materials and Methods

One hundred and twenty (120) 16-weeks in-lay Isa-Brown hens were used in this study that lasted for 12 weeks to investigate the effects of different feeding quantities on their egg laying performance and cost of production generally. Four (4) different quantities of feed were offered; 95, 105, 115 and 125 grams per day and designated treatments I, II, III and IV, respectively. The hens were assigned to these treatments in a completely randomized experimental design with three (3) replicates per group and ten (10) birds per replicate. The birds were housed in a three (3) tiers California type colony cages (43 x 41 cm). The birds were weighed individually in

all groups and average weight was taken at the beginning of the experiment and thereafter at the end of each phase. The feeding trial was carried out for twelve (12) weeks. The weekly feed intake and eggs laid were recorded while feed conversion ratio were calculated from the data obtained from the weekly feed intake and egg mass. The number of eggs laid by each replicate was recorded daily and the hen-day egg production (HDP) was calculated as number of egg laid divided by the number of hens multiply by 100 (Ahmed *et al.*, 2009).

All data collected were analyzed using SPSS version 17 package and where significant difference exists, Duncan Multiple Range Test (DMRT) of the same package will be used to separate the means.

Results

The effects of quantities of feed on the performance of Isa-Brown laying birds are shown in Table 1. All parameters measured were significantly influenced ($p < 0.05$) by the quantity of feed given. The highest final weight and highest egg weight (1.80 ± 0.01 kg, and 65.15 ± 0.96 g) were recorded in birds fed 125 g/day while lowest final weight and lowest egg weight (1.68 ± 0.01 kg and 64.03 ± 0.36 g) were recorded in birds fed 95 g/day. Also highest HDP ($80.48 \pm 1.13\%$) and lowest FCR (2.17 ± 0.05) were recorded in bird fed 115 g/day while lowest HDP ($64.29 \pm 0.48\%$) and highest FCR (2.38 ± 0.03) were observed in birds fed 95 g/day and 125 g/day, respectively. Table 2 shows the economic effect of different quantities of feed on Isa-Brown laying birds.

All parameters measured were significantly influenced ($p < 0.05$) by the quantity of feed given. Bird fed 125 g/day had the highest total cost of feed consumed (1512.00 ± 0.00 N/kg) and lowest (1149.12 ± 0.00 N/kg) total cost of feed consumed was recorded in bird fed 95 g/day. Bird fed 115 g/day had the highest tray of egg (2.25 ± 0.04), highest gross return (N1915.33 $\pm$ 30.21) and highest net profit (N524.29 $\pm$ 30.21) while lowest tray of egg (1.80 ± 0.02) and lowest gross return (N1530.00 $\pm$ 12.92) were recorded in bird fed 95 g/day and lowest net profit (N299.44 $\pm$ 21.36) was recorded in bird fed 125 g/day.

Table 1: Performance of Isa-Brown laying birds fed different quantities of feed

Parameters	Treatment I	Treatment II	Treatment III	Treatment IV
Initial weight (kg)	1.62.00 $\pm$ 0.01 ^b	1.61.00 $\pm$ 0.01 ^b	1.64.00 $\pm$ 0.02 ^{ab}	1.67.00 $\pm$ 0.01 ^a
Final weight (kg)	1.68.00 $\pm$ 0.01 ^c	1.72.00 $\pm$ 0.02 ^{bc}	1.73.00 $\pm$ 0.02 ^b	1.80.00 $\pm$ 0.01 ^a
Feed consumed/bird/Day (g)	94.40 $\pm$ 0.31 ^d	103.29 $\pm$ 0.34 ^c	112.30 $\pm$ 0.45 ^b	117.86 $\pm$ 0.69 ^a
Hen day production (%)	64.29 $\pm$ 0.48 ^d	71.59 $\pm$ 0.61 ^c	80.48 $\pm$ 1.13 ^a	76.11 $\pm$ 0.80 ^b
Egg weight (g)	64.33 $\pm$ 0.21 ^b	64.03 $\pm$ 0.36 ^d	64.16 $\pm$ 0.53 ^c	65.15 $\pm$ 0.96 ^a
Egg mass (g)	41.37 $\pm$ 0.42 ^d	45.85 $\pm$ 0.52 ^c	51.71 $\pm$ 1.14 ^a	49.57 $\pm$ 0.86 ^b
Feed conversion ratio	2.28 $\pm$ 0.02 ^b	2.25 $\pm$ 0.03 ^c	2.17 $\pm$ 0.05 ^d	2.38 $\pm$ 0.03 ^a

Within row, means followed by different letters are significantly different ($p < 0.05$).

Table 2: Economic effect of different quantities of feed on Isa-Brown laying birds

Parameters	Treatment I	Treatment II	Treatment III	Treatment IV
Feed given/bird/day (g)	95 $\pm$ 0.00 ^d	105 $\pm$ 0.00 ^c	115 $\pm$ 0.00 ^b	125 $\pm$ 0.00 ^a
Total feed consumed/bird (kg)	7.98 $\pm$ 0.00 ^d	8.82 $\pm$ 0.00 ^c	9.66 $\pm$ 0.00 ^b	10.5 $\pm$ 0.00 ^a
Cost of feed (N/kg)	144	144	144	144
TC of feed consumed/bird (N/kg)	1149.12 $\pm$ 00 ^a	1270.08 $\pm$ 00 ^c	1391.04 $\pm$ 00 ^b	1512.00 $\pm$ 00 ^a
Crate of egg/bird	1.80 $\pm$ 0.02 ^d	2.00 $\pm$ 0.02 ^c	2.25 $\pm$ 0.04 ^a	2.13 $\pm$ 0.03 ^b
Gross return @ N850/crate	1530.00 $\pm$ 12.92 ^d	1703.78 $\pm$ 16.39 ^c	1915.33 $\pm$ 30.21 ^a	1811.44 $\pm$ 21.36 ^b
Net profit	380.88 $\pm$ 12.92 ^c	433.70 $\pm$ 16.39 ^b	524.29 $\pm$ 30.21 ^a	299.44 $\pm$ 21.36 ^d

Within row, means followed by different letters are significantly different ($p < 0.05$); TC – Total cost.

Discussion

In this study, the birds were alert and very healthy throughout the entire period. Bird fed 125 g/day with highest body weight produced highest egg weight, this could be explained that the excess feed consumed by this bird was used to develop the body muscle which justify for the increase in the body weight. This agreed with the findings of King'ori; (2012) who reported a direct correlation between body weight and egg weight. However, there is no direct correlation between production and bodyweight which contradict the findings of Olawumi, (2014) who reported that egg production at whatever age depends on body weight of hens, and that whatever affects the latter will have concomitant effect on the former. Bird fed 105 g/day that consume less compared to bird fed 115 g/day had a better weight increase. This could be explained that the excess feed consumed by bird

fed 115 g/day was used for egg production to justify for the lesser increase in weight gain. This could also be attributed to increasing demand for nutrients from physiological reserve to meet the demand for egg production as reported by (Olawumi, 2014).

It was also observed that hen fed 115 g/day had a better result compared to the rest of the treatment. This could be attributed to better feed conversion and efficient feed utilization observed in this treatment. This corroborate the report of Renema *et al.* (2008) who stated that small degrees of over or under feeding have been shown to negatively impact egg production. However, this report contradicted the findings of (Sekoni *et al.*, 2002) who concluded that quantitative feed restriction did not have any significance on feed consumption and efficiency of feed for egg production. Looking at the net profit, despite bird fed 125 g/day had higher production percentage than 95 g/day and 105 g/day, the cost of extra feed/bird (2.52 kg and 1.22 kg) which resulted in additional cost of N362.88 and N175.68, respectively has definitely reduce the net return. The superiority of 115 g/day in net revenue and economic efficiency and percentage gain over other treatments could be attributed to the better feed conversion, higher hen day production, higher feed efficiency, total egg number per hen and the total egg price recorded. The result agrees with the report of (Olawumi, 2014).

Conclusion

In conclusion, the study has shown that feeding laying hens the required quantity of feed generally resulted in a better laying performance and net profit returns and excess feed intake may become commercially significant when thousands of birds are involved. Poultry farmer using Isa-brown for egg production are advised to use 115g/bird/day to feed their birds for optimum laying performance, improve profitability and reduce wastage due to overfeeding.

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