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Review Articles

Research Articles

Research Article

EFFECT OF FORCED MOLTING ON POST MOLT PRODUCTION PERFORMANCE OF LOCALLY AVAILABLE COMMERCIAL LAYING CHICKEN

S. Sapkota, R. Shah, D. K. Chetri, and S. R. Barsila*
Agricultural and Forestry University, Rampur, Chitwan, Nepal

ABSTRACT

A study was done at a commercial farm in Sorabhagh, Morang district on layers using a cage system for 114 days during June 24, 2017 to October 15, 2017. The objective of this study was to determine the effect of forced molting on production parameters of Lohmann layers. The cages were disinfected before the study with Virkon-s and Hydrogen peroxide. 3072 laying birds were divided into three treatment groups.The treatments were- without feed restriction (control=T0), 7 days feed restriction (T_1) and 15 days feed restriction (T2) which was further replicated each for four times. There were 256 birds in each replication. The mortality rates, feed intake per bird, egg production and egg weight were recorded. Analysis of variance showed significantly ($p<0.01$) different mortality rate among the treatment groups during the first 15 days. Accordingly, higher mortality (1.07%) was recorded in T2. Result revealed a significant difference in feed intake throughout the study period. In the end, higher feed intake (102.45 g) was recorded in T2. However, statistically similar ($p>0.05$) feed intake was observed in T_1 and T0. The results showed a significant difference in egg production among the treatment groups. Higher egg production (65.9%) was observed in the T_2 group at the end of the experimental period with an increasing trend. However, lower egg production (47.7%) was recorded in T0. Statistically similar egg weight ($p>0.05$) was recorded in all treatment groups throughout the study period.The results obtained from this study revealed that forced molting can increase the egg production and feed intake rate with the cost of slight increment in the mortality rate.

Key words*:* Forced molting, layers, post molt, mortality, feed intake

INTRODUCTION

Molting is a natural phenomenon in adult birds for growth of new feathers, resulting in weight-loss, regression of the reproductive organs and declined in egg production (Park et al., 2004). The moltingis rathera slow process and may cause severe economic losses due to the plummet in egg production for a longer period of time. So, induced molting to initiate additional egg-laying cycles in commercial laying hen flocks has been implemented in farm level (Berry, 2003). Various studies related to molting peaked up its pace from the early 1900s (Bell, 2003).

The fastening of birds for a definite period of time either or, sometimes also by controlling the availability of water are done for induction of molting (Berry, 2003).During the induced molting, the birds cease producing eggs for at least two weeks, which allows the bird's reproductive tracts to regress and rejuvenate and after that, the hen's egg production rate shows a noticeable amount of improvement along with the egg quality in general.

Feed withdrawal is the primary procedure to induce a molt and stimulate multiple egg-laying cycles in hens (Brake, 1993). The complete removal of feed for 10 to 14 days combined with a reduction in photoperiod from 16 to 8 hours remains the method of choice but shorter periods of feed removal (4 to 5 days) are also practiced (Brake, 1993; Bell, 2003). In this context, the study was done with the objective of understanding the effect of forced molting on the change in body weight pattern, mortality rate, feed intake per bird, egg production, egg weight along with the production cost per egg.

MATERIALS AND METHODS

Experimental site and Duration

The experiment was conducted in a private poultry farm located in Sorabhagh VDC, Morang in a cage system for 114 days from 2074/03/10 to 2074/06/29. The experimental site was located in 26° 27' 47.4516" N and 87° 26' 59.7768" E. The maximum average temperature inside the shed was 33̊ C during the midday during the study period whereas the average temperature was around 20ºC during the night time.

* Corresponding author: srbarsila@afu.edu.np

Experimental Design

A total of 3072 well vaccinated laying birds of 100 weeks were randomly placed in a well-disinfected cage system under one control group (T_0) and 2 treatments (T_1) and (T_2), with each group containing 1024 birds. All the groups were further replicated 4 times following a completely randomized design (CRD). Each replication consisted of 256 birds.

Feeding Schedule

Control Group (T0)

For T0 ad-libitum feeding was supplied in the feeding tray and the net feed intake was calculated by subtracting the total supplied feed to the feed left in the feeding tray. However, feed wasted on the floor was not considered on calculation. In case of T_1 feed was restricted for 7 days. From 8th day 30gm/ day was provided for the bird. At the interval of 2 days, the feed was increased by 20gm/ day and taken to 90gm/day on 14th day.

From 16th, ad libitum feed was provided and net consumed feed was calculated by subtracting the provided feed with the remaining feed in the feeding tray. For T_2, the feed was restricted for 15 days. From 16th day feed was given at the rate of 30gm/ day per bird. At the interval of 2 days, the feed was increased by 20gm/day and taken to 90gm/day on day 22.From day 24, ad libitum feed was provided and net consumed feed was calculated by subtracting the provided feed with the remaining feed in the feeding tray.

Lighting schedule

For Control group (T_0) the lighting schedule of 16 hours was followed throughout the study period, whereas for T_1 and T_2, no artificial lighting was provided during the feed restriction period (up to 7 days for T_1 and 15 days for T_2). Afterward, the same lighting schedule of 16 hours was implemented for T_1 and T_2 for all the remaining study period.

Data record

The total number of dead birds for all treatments along with their individual replication was recorded daily. The record of opening and closing balance of birds were recorded precisely for all treatments and their replications. Total feed given was recorded each day for all the treatments and their replications and total feed intake was calculated by subtracting the feed left in the feeder. Amount of feed wasted by the birds on the floor was not considered during the calculation. The total numbers of eggs laid was recorded daily from all the treatments and their replications separately. The cracked eggs were also considered during the calculation. For all individual replications and treatment, hen day production was calculated in percentage. The weight of egg was recorded for all the individual replications and treatments on weekly basis. The weight was taken in a cartoon which consisted of 8 crates of egg (210 eggs). Then total weight was subtracted from the weight of the cartoon and crates and a net weight of 210 eggs was calculated along with the average weight of an egg from each replication of all treatments.

RESULTS

Mortality

During the initial days (0-15 days), the mean mortality rate among all three different groups were different with the highest mean mortality rate of 11 (i.e. 0.19%) in T_2 followed by mean mortality rate of 7.5 (i.e. 0.73%) in T_1 group and least mean mortality of 2 (i.e. 1.07%) in the control group (T0). This pattern of mortality rate was found to be statistically different (p<0.01) among three different groups (table 1).

Table 1. Effect of forced molting on mortality pattern of laying birds

Mortality	0-15 days	16-30 days	31-45 days	46-60 days	61-75 days	76-90 days	91-105 days	106-114 days
T_0	2.00^c (0.19%)	2.25^b	2.50^a	1.25^b	1.50^b	1.50^a	1.75^a	0.25^a
T_1	7.50^b (0.73%)	2.75^{ab}	2.00^a	2.00^a	1.25^b	2.25^a	1.00^a	1.00^a
T_2	11.00^a (1.07%)	4.00^a	2.00^a	2.25^a	3.00^a	2.25^a	1.75^a	1.00^a
F-value	39.00	5.31	1.00	6.50	8.60	2.70	1.92	2.45
P-value	<0.01	<0.05	>0.05	0.0179	0.0082	>0.05	>0.05	>0.05
CV%	21.26	26.06	26.65	22.27	33.68	26.35	41.57	37.70

Note: Mean separated by LSD with different alphabets within the columns are statistically different (p>0.05).

As the days passed by, there was a slight drop in the mortality rate. During (16-30) days, the highest mortality rate of (4) was noticed on T_2 followed by T_1. The mean comparison of these two treatment groups showed similarity in their mean value. Though the mean value of control group (T_0) was least (2) among three different groups, the value was statistically similar ($P<0.05$) with the mortality rate of T_1 on the mean comparison by LSD test. Overall, the mortality rate was statistically significant ($p<0.05$) among three different groups during this time frame.

The result was statistically similar ($p>0.05$) from (31-45 days) among three different groups and no difference was noticed on statistical mean comparison among the three groups. Though the result was statistically significant ($p<0.01$) among the three groups during 61 to 90 days, some differences were noticed during mean comparison among the individual groups on LSD mean rankings (table 1). After 90 days onwards, the result was statistically similar ($p>0.05$) with similarity in statistical mean comparison as well.

Feed intake /bird

The result revealed that during the first 15 days, a significant difference ($p<0.01$) was seen in an average feed intake among the birds of control (T_0) and other treatment groups. During this period, the control group had the highest rate of feed intake (101.61g) followed by treatment 1 (31.99 g) and treatment 2 (0 g). Each individual group showed the difference in the LSD mean comparison (table 2).

Table 2. Effect of force molting method on feed intake per bird during feed restriction

Fi/bird	0-15 days	16-30 days	31-45 days	46-60 days	61-75 days	76-90 days	91-105 days	106-114 days
T0	101.61^a	101.95^a	99.82^b	100.46^b	100.70^b	100.69^b	100.14^b	100.06^b
T1	31.99^b	103.62^a	101.02^b	101.87^{ab}	101.56^{ab}	101.73^{ab}	101.76^{ab}	101.06^{ab}
T2	0.00^c	80.56^b	103.08^a	103.57^a	102.89^a	102.33^a	102.11^a	102.44^a
F-value	5936.28	1582.10	13.16	6.10	6.69	2.63	6.86	5.72
P-value	<0.01	<0.01	<0.01	<0.05	<0.05	>0.05	<0.05	<0.05
CV%	0.96%	0.68%	0.90%	1.24%	0.84%	1.00%	0.79%	0.99%

Note: Mean separated by LSD with different alphabets within the columns are statistically different (p>0.05).

While the feed intake of T_1 and control group (T_0) was 103.62gm and 101.95gm respectively between 16-30 days, it was just 80.56 gm for the T_2 group. On mean comparison, T_0 and T_1 group were in par with each other but were different with the mean feed intake value of T_2 for the same time period (table 2).

In comparison to control (T_0) and T_1, whose feed intake rate was 99.82 gm and 101.02gm respectively for 31-45 days revealed similarity on the mean comparison. The highest mean feed intake rate of 103.08 gm was observed in T_2 with the highest order in mean comparison rankings. Analysis of variance for the same time period revealed statistical difference ($p<0.01$) in feed intake per bird (table 2).

From day (46-75), analysis of variance revealed statistical difference ($p<0.05$) in feed intake per bird, while the mean comparison showed difference among Control (T_0) and T_2 groups, mean value for T_2 being greater than that of control group and mean value for T_1 was similar to both control and T_2 (table 2).

After 90 days onwards, there was the statistical difference ($p<0.01$) in feed intake per bird between a control group (T_0) and two treatments T_1 and T_2. Mean comparison among three different groups revealed a difference between control and T_2, while the mean value for T_1 fell between control and T_2 and showed similarity with both of them (table 2).

Egg output

Analysis of variance for egg production showed that during initial days of (0-15 days), control group (T_0) had the mean egg production percentage of 50.7 which was greater than that of mean production rate of T_1 (3.2%) and T_2 (3.1%), ultimately showing a statistical difference in production rate for these groups. The LSD mean comparison showed that mean was greatest for the control group (T_0), while the mean for $T_1$and $T_2$was on par with each other (table 3).

Table 3. Effect of force molting method on egg production percentage due to feed restriction

	0-15 days	16-30 days	31-45 days	46-60 days	61-75 days	76-90 days	91-105 days	106-114 days
T_0	50.7^a	48.6^a	48.7^a	49.6^a	49.7^c	48.0^c	47.7^c	48.0^c
T1	3.2^b	6.4^b	23.6^b	43.9^b	51.3^b	55.1^b	55.2^b	54.2^b
T2	3.1^b	0.2^c	12.0^c	39.3^c	58.5^a	64.2^a	65.9^a	65.2^a
F-value	83086.30	17651.43	907.26	73.799	124.036	195.019	397.617	346.256
P value	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CV%	1.00%	2.16%	4.43%	2.71%	1.59%	2.09%	1.63%	1.68%

Note: Mean separated by LSD with different alphabets within the columns indicated statistically different (p>0.05).

Similarly, from the 16thday, the production rate in both treatments showed gradual improvement. There was a statistical difference ($p<0.01$) in the percentage of egg production among three different groups between 16- 90 days. By comparing the mean, the mean was largest in control followed by T_1 and T_2 till 60 days without any similarity in the level of mean value. But, after 60 days the mean production percentage was greatest in T_2 followed by T_1 and control (T0) and no similarity was seen among the three groups during the mean comparison (table 3).

Both T_2 and T_1 showed their peak performance during (91-105) day.The largest mean egg production rate of 65.9% belonged to T_2 during this time frame followed by 55.2% for T_1 and 47.7% for the control group. The mean comparison showed the difference in mean for all three groups. Overall, analysis of variance showed a statistical difference ($p<0.01$) in mean egg production rate during this time period. For an individual day performance, highest production of 56.55% was recorded for T_1 in the 91st day, whereas production rate of T_2 touched 67.42% on day 103 (table 3).

Finally, towards the end of our study i.e. from 106 to 114 days, there was a statistical difference ($p<0.01$) in egg production among three different groups along with the difference in mean between each group on the mean comparison. T2 had the highest mean egg percentage of 65.2, followed by 54.2 for T_1 and least of 48.0% for the control group (T_0).

Egg Weight

Analysis of variance to see the effect of forced molting on egg weight showed no significant difference ($p>0.05$) in the mean egg weight of an egg before the start of a molt program. However, on the meancomparison, the largest mean egg weight of 64.690 g was observed for T_2 followed by 64.525 gm for T_1 and 64.183 g for the control group (T_0). Though the result revealed the difference in mean comparison between Control and T_2, the mean egg weight for T_1 was in par with both the control group (T_0) and T_2 (table 4).

Table 4. Effect of forced molting on egg weight

EGG.WT	Initial	Week 5	Week 7	Week 16
T_0	64.183^b	64.645^a	64.495^a	64.718^a
T_1	64.525^{ab}	64.410^a	64.630^a	64.658^a
T_2	64.690^a	64.485^a	64.587^a	64.637^a
F-value	3.884	0.392	0.138	0.252
P-value	>0.05	>0.05	>0.05	>0.05
C.V	0.41%	0.59%	0.58%	0.26%

Note: Mean separated by LSD with different alphabets within the columns indicated statistically different (p>0.05).

In 5th, 7th and 16th week, the result for egg weight were statistically similar ($p>0.05$) among three different groups i.e. there was no effect of forced molting on egg weight. Similarly, on the mean comparison, no differences were observed in mean egg weight among three different groups (table 4).

DISCUSSION

Mortality

Mortality pattern was higher in feed restricted groups compared to the control group. The reason behind the high mortality figures for the feed-restricted groups was due to many cases of cannibalism along with many other reasons. Cannibalism was seen in feed restricted birds due to starvation. Along with it the problems like vent peaking and feather picking also caused losses. Mortality was also little higher than normal after the completion of feed restriction up to 30th day of the study. When birds completely recovered after 75 days, the mortality pattern of T_1 and T_2 was statistically similar to that of the control group (T_O). This indicates that mortality was higher until the birds recovered from molting stress. Many studies are in convention with our studies. Brake and Thaxton (1979) reported that mortality due to fasting was relatively higher in fasted birds. Similarly, McReynolds et al., (2006) also signified the higher mortality rate in the feed-restricted groups.

Feed intake per bird (fi/bird)

The fi/bird was lesser in T_1 and T_2 until the feed restriction period along with the time frame when the feed was gradually taken to normal. After the initial phase of (16-45) days, the birds of T_2 consumed more on an average followed by the birds of T_1 and control group (T_0). It may have been due to the need for extra nutrients to recover from the weight loss after molting. But, H.H.M Hassanien (2011) and Mohamed (1990) observed no significant difference in feed consumption due to fasting after a certain recovery period from fasting.

Egg production

Up to day 30, an egg per bird was very low in T_1 and T_2 because of feed restriction. Birds have no sufficient nutrients and energy for egg production during feed restriction phase. After the total and controlled restriction period was over the egg production began to rise gradually in both T_1 and T_2. The birds of T_1 had an earlier rise in egg production as the feed restriction period was shorter in T_1 than T_2. After 60 days, as the birds recovered slowly from stress the egg per bird was higher in both T2 and T1 than that of the control group (T_0). Finally, the egg production began to rise afterward and then maintained the level of around 55% (i.e.0.5 epb) for T_1 and above 65% (i.e.0.652 epb) for T_2 towards the end of our study. This may be due to the rejuvenation of reproductive tracts and other digestive organs after the molting procedure. In contrast, the birds of the control group (T_0) had less egg production than the beginning, which may have been due to the aging of the birds and egg-laying Fatigue.

Many previous studies also had shown the increase in egg production after the forced molting program (Brake et al., 1981) observed that fasting with proper post molt diet increased egg production. Similarly, (Yousaf& Ahmad, 2006) found that molting practice increased egg production and the performance was better in cage system than the deep litter system. Apart from this, Hassanien (2011) found that molting increase egg production significantly.

Egg weight

The average weight of egg taken before the start of an experiment was not statistically different among the divided groups i.e. Control (T_0), T_1 and T_2, the weight was around 64 grams in all groups. The weight was higher in the selected flock because of their higher age. During the whole course of our study, the weight of egg taken during week 5, week 7 and week 16 of our study revealed the statistically similar figure. However, previous studies have given different views regarding this weight parameter. Hassanien (2011) found no significant difference in egg weight due to Fasting. Contrastingly, many types of research have found an increment in average egg weight after the molting program. (Biggs, Douglas et al. 2003) observed that there was no consistent difference in egg weight before and after the molting procedure. Similarly, (Yousaf & Ahmad 2006) found improvement in egg weight but the result was more prominent in cage system than deep litter system. The reason behind the study not showing any increase in weight would be the high initial weight of an egg from an old flock. Precisely denoting, the egg weight increased as the flock got older and attained a certain average level. The average level of egg weight was already high for a 100 weeks old flock.

CONCLUSION

It is clear from the results of this study that molting of laying hens could significantly increase and sustain the egg production in layers whereas during the moltingphase, the mortality of the birds could be also slightly increased as well as a higher feed intake during the recovery period after molting. Cautious implementation of forced molting thus could be useful in enhancing overall productivity of laying hens.

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