

Full Length Research Paper

# Investigating the effect of forcing reproduction of lay-off broiler breeders at the middle of production period on economic performance of flock

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Accepted 13 May, 2013

Lay-off broiler breeders are hens with low or without egg production at the middle of laying period. In order to obtain a better output from the lay-off hens existing in the flock, lay-off broiler breeders are being forced to molt at the middle of laying period. It is done while the laying hens existing in flock continue their production trend. With this method, the lay-off hens in the flock are identified, collected and kept in separate boxes in their house for 40 weeks. At the end of the collection (7 weeks), the lay-off hens of different houses are kept in one house and all laying hens of that house are taken back to their original houses. The lay-off hens from week 47 are molted regularly and produce in week 52. Numbers of eggs yield, fertile eggs yield and chicks yield per hen of molting flock at the end of week 66 were 5.44, 5.13 and 3.98 respectively. The net profit from sales of chicks yield of molting flock at the end of week 66 was 320109780 Rials, while the net profit per each molted hen was 2866.2 Rials, which is the net and extra revenue of suitable management of broiler breeder flock.

**Key words:** Molting, broiler breeder, profit, chicks yield, lay-off hen.

## INTRODUCTION

Molting is a natural phenomenon in birds during which old plumage is replaced with new ones, feed intake is reduced, body weight is reduced and laying is stopped (Khoshoei and khajali, 2006; Venkata Reddy et al., 2008). The practice of induced molting has been beneficial in extending the productive lives of birds which would otherwise be culled as soon as they begin to produce lower eggs yield (Bar et al., 2003; El-Deek and Al-Harhi, 2004). Induced molting can result in increased eggs yield and quality. Molting reduces mortality, production cost and investments in new hatches and hatcheries and involves reproductive quiescence (Ahmed et al., 2005). Molt induction for rejuvenating the egg laying performance of commercial laying hen flocks is an important practice in many parts of the world; often

necessary to make a flock profitable under certain market scenarios (Biggs et al., 2004). The first objective of an induced molt program is to cause hens to cease eggs yield and enter a non-reproductive state (Hassanabadi and Kermanshahi, 2007).

A lot of studies have been done on induced molting of broiler breeders after the end of production period, but only few are available on forced reproduction of lay-off hens at the middle of production period along with the production of laying hens. In this case, there is no need to molt the whole flock and just lay-off broiler breeder at the middle of production period; they should be identified step by step, collected, force to molt and taken into production process again. This should be done while the laying hens existing in the flock continue their production

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trend. If the production period surmounts the pick around week 40 upward, the laying ability of some hens is decreased and are gradually removed from the flock production process. It also can be found by observing unusual behavior of lay-off hens and decrease in production trend of flock. The crest of lay-off hen is smaller than the laying hens, is also pale and the feathers of the head and back fall. Observing the distance between two appendixes of pubis bones is one of the important ways of distinguishing a lay-off hen from laying hens. The lay-off hens are usually treated separately from other hens; for example they hide under the trough (feed ray), laying nest or anywhere possible so that the roosters or other laying hens can not hurt them. A lot of farmers collect these lay-off hens and move them away from the flock. Here is the question, 'can these hens be of a better use?' In addition, they spend 6 months in growing period and the farmers spend a lot of money to make them mature. Forcing reproduction of lay-off broiler breeder at the middle of production period increases the production output and economical performance of flock. Here, a few cases are mentioned:

1. Increases per capita production (eggs yield, fertile eggs yield and chicks yield).
2. Increases quality and percent of hatch (hatchability) due to support from the active roosters and exchange with inactive ones.
3. Prevents over use of feed.
4. Leads to production stay-ability due to a better economical justification because of increasing production and hatchability.
5. Decreases mortality rate.

The goal of this study is to find the efficiency of forcing reproduction of lay-off broiler breeder at the middle of production period; and also the continuous production trend of laying hens existing in flock and its effects on economical performance of flock.

## MATERIALS AND METHODS

In order to collect the lay-off hens in flock at week 40, one box in each house was installed separately for individual inspection and collection of lay-off hens in their house. This trend is continued in all of the houses till the end of week 46. The lay-off hens in their special box received feed by rearing ration and it was while the laying hens of main flock received feed by production period ration. Here, no vaccination is renewed except that a titer of one special vaccine is reduced for the whole flock before the program begins. This method is similar to that of Holt (1993). After the end of week 46, total lay-off hens of different houses were transferred to new house for better management and then program of molting was performed. So, the flock is separated into two groups of main and molting flock.

### Management of lay-off broiler breeder hens

The 'molting program' of hens included feed withdrawal. The lay-off

hens based on method of Koch et al. (2007) are divided in two groups in their respected house: light-weight and heavy-weight. Different amount of feed for the light-weight and the heavy-weight groups is considered at the start of the molting program. This decrease in amount of feed leads to weight loss and uniformity of the flock. Weighing program is done at the end of each week regularly. The beginning of week 47 was considered as the first week of molting period. Concerning lightning, during the first week of the program, the first 24 h was dark and for other 6 days, 3 to 4 h light was considered as accepted based on the method of Khajali et al. (2007). At the end of each week, grading program is performed between the two boxes to prevent their weight loss by doing replacement between boxes and giving extra feed. Atrophiing more than expected will lead to atrophy in body tissues such as liver, kidney... and if the bird survives till the end of the molting period, the food metabolism may have some disorders (Koch et al., 2007; Oguike et al., 2004). Extra feeding of the light-weight group continued till they reached usual uniformity. The lightning time for both groups during weeks 2, 3 and 4 were 8 h with 4 to 5 lux. At the beginning of week 5, 12 h light stimulation with 30 to 35 lux was considered.

At the 6<sup>th</sup> week of the molting program, both groups had 14 h light with 50 to 60 lux. By regular grading program between the two boxes of the birds, the uniformity tried to get to 80% at the end of the 6<sup>th</sup> week. The ration for the two groups during weeks 5 and 6 of the molting program was pre-laying ration (Oguike et al., 2004). During the week 6 of the program (week 52 of main flock), laying (beginning of egg production) began and was considered as the first week of production from molting flock. The lightning time for this week (15 h) was considered. The lightning time was 16 h and then it was fixed.

### Management of male broiler breeder

At the time of collection and transferring of lay-off hens from old houses to a new one, the more active roosters were transferred to the laying house to help increase the hatchability; and they were exchanged by inactive ones and other roosters (both active and inactive). Other inactive roosters of other houses were transferred to the new house to stay with the lay-off hens. Molting program is separately kept in different boxes. For better results, the selective roosters can be divided into two groups of light and heavy-weight, and to prevent weight loss they must be cared for. Even the ones which are losing weight are given a little more feed temporarily. The ration of males during weeks 5 and 6 of the program was pre-laying ration.

### Estimation of production per each hen existing in houses (HH)

When transferring the lay-off hens from the main flock and taking them to the molting flock, production per each hen house (HH) at the beginning of productive period (not only for the birds existing in main flock but also for the birds existing in molting flock) was computed according to the number of hens during the 5% production of main flock (week 25).

### Derivation of additive profit of the system

Profit of the system is based on economic efficiency estimated by revenues minus costs (Groen et al., 1998):

$$P = R - C \quad (1)$$

Where P: Profit of the system (Rials) R: sum of costs, and Rials); C:

**Table 1.** The productive data gained from the molting flock during the weeks 52 till 66.

Weeks	Eggs yield (HH)	Fertile eggs yield (HH)	Chicks yield (HH)
52	0.04	0.04	0.3
53	0.12	0.11	0.09
54	0.31	0.29	0.24
55	0.57	0.54	0.45
56	0.96	0.90	0.74
57	1.38	1.29	1.6
58	1.84	1.72	1.41
59	2.31	2.16	1.76
60	2.78	2.61	2.11
61	3.24	3.04	2.45
62	3.70	3.47	2.77
63	4.15	3.89	3.09
64	4.59	4.31	3.39
65	5.02	4.72	3.69
66	5.44	5.13	3.98

sum of revenues (Rials).

Profit obtained per each bird is estimated by this equation:

$$P_{HH} = P / (N_f * N_{CHH}) \quad (2)$$

Where  $P_{HH}$ : Profit per each chick or hen house (Rials);  $P$ : profit of the system (Rials);  $N_f$ : number of final female product at the beginning of the molting period (end of week 53);  $N_{CHH}$ : number of final product of chicks (HH).

## RESULTS

The light and heavy weight of lay-off hens and the average weight of flock before the beginning of the molting program were 3400, 3650 and 3550 g, respectively. The average weight of the two groups after the molting program started at the end of weeks 1, 2, 3 and 4 were 3128, 2924, 2786 and 2720 g, respectively; the weight loss for the weeks mentioned was 8, 14, 18 and 20%, respectively. Using pre-laying ration of week 5, the changes of the birds' weight had an additive trend: 30 g increase in the weights led to 2750 g weights at the end of week 5; with 100 g increase in weight, at the end of the week 6, the weight average of the two groups reached 2850 g. The production percentage of the molting flock at week 52 of the main flock reached 5%. At week 52, about 0.04 eggs based on HH were produced (68.5%) from molting flock which changed into 0.03 chicks based on HH. Production percentage of molting flock in 5 weeks reached 60% from weeks 7 to 11 (weeks 58 - 62 of main flock).

The production percentage of main and molting flocks at the end of production period were 51.2 and 52.8%, respectively. No cases of induced molting at the middle of production period have been reported. Numerical data of

eggs yield, fertile eggs yield and chicks yield at weeks 52 to 66 from main flock based on HH are shown in Table 1.

### Eggs yield based on HH

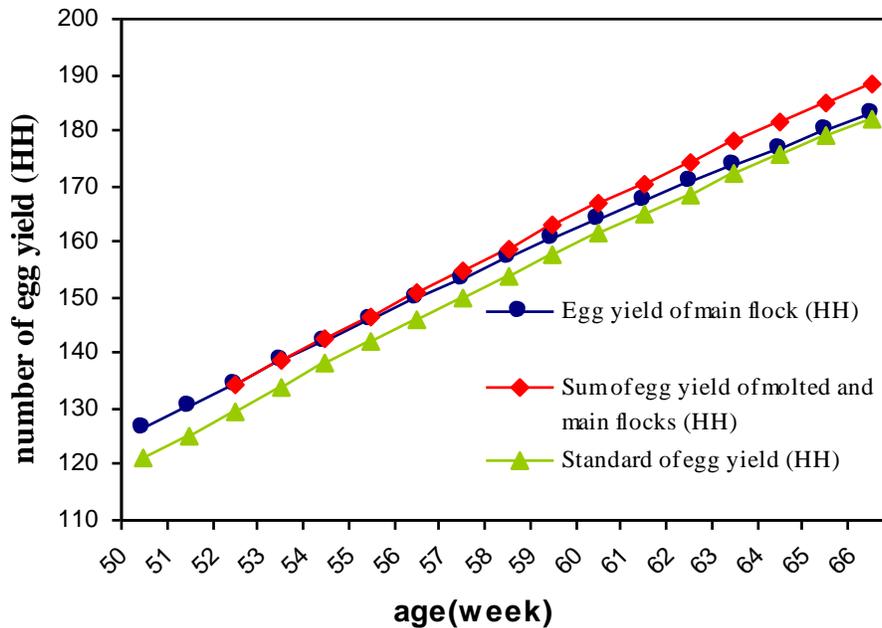
The egg yields based on HH of main and molting flock at week 52 (at 5% production of molting flock) were 134.51 and 0.04 eggs, respectively. At the end of week 66, eggs yield based on HH of main and molting flock reached 182.2 and 5.44 eggs. Figure 1 shows the number of eggs yield of molting and main flock and comparing it with the standard.

### Fertile egg yields based on HH

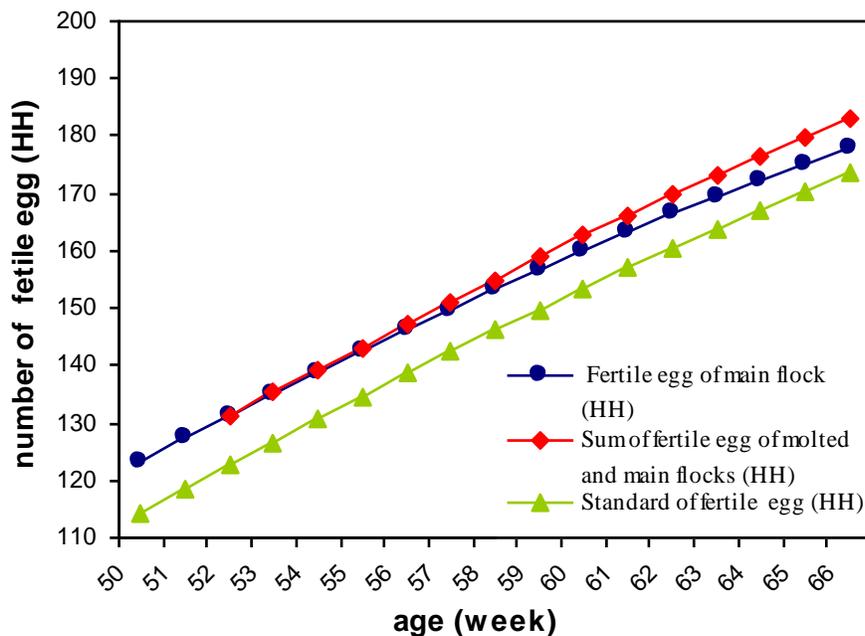
In the beginning of week 52, production based on HH for main and molting flock was 131.26 and 0.04 eggs, respectively. At the end of week 66, the number of fertile eggs based on HH of molting flock was 5.13 eggs, which if added to fertile eggs based on HH of main flock at the end of 66 (178.03 eggs) 183.16 eggs will be obtained; about 9.56 fertile eggs are produced more than standard at similar week (173.60 eggs). Number of fertile eggs from the main flock is obtained as basic production and increasing trend of fertile egg is obtained from the molting flock. This makes the total fertile egg by adding the number of fertile eggs of main flock and the standard of fertile eggs for a better comparison (Figure 2).

### Chicks yield production based on HH

When molting flock eggs yield reached 5%, number of chicks yield based on HH for main and molting flocks was



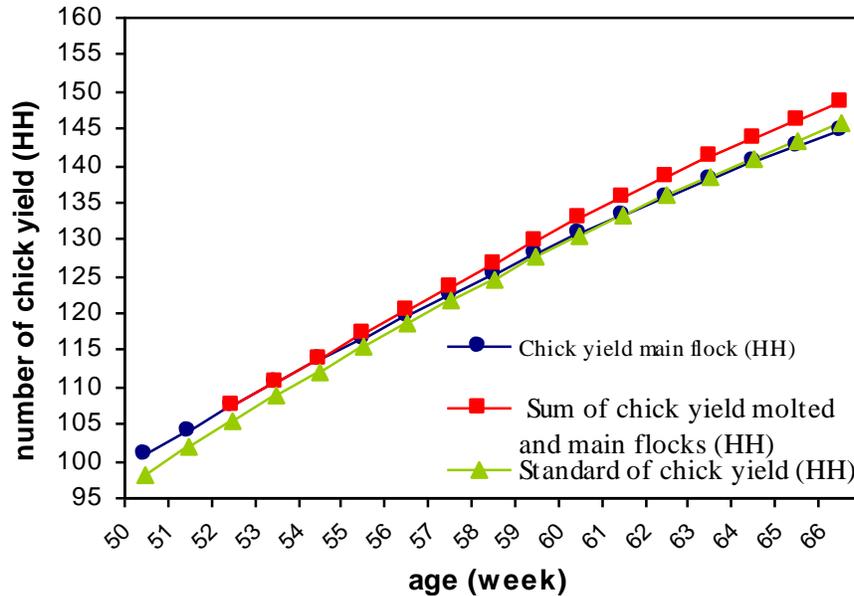
**Figure 1.** The graph of eggs yield of main flock, sum of eggs yield of two molting and main flock and their comparison with standard.



**Figure 2.** The graph of fertile eggs yield of main flock, sum of fertile eggs yield of two molting and main flock and their comparison with standard.

107.36 and 0.03 pieces, respectively; totally, there were 107.39 pieces and compared with standard at the similar week (105.40 pieces); about 1.99 chicks based on HH were produced more. At the end of week 66, chicks yields based on HH of molting flock were 3.98 pieces, which if added to HH production on main flock (144.61

pieces till the end of week 66) will get to 148.59 pieces; this was compared with the standard in the same week (145.70 prices); about 2.89 more chicks were produced. Total chicks production of the whole flock and the standard of chicks yield for a better comparison are shown in Figure 3.



**Figure 3.** Chicks yield of main flock, total chicks yield of molting and main flock and comparing them to the standard.

## DISCUSSION

To compare the functions of flock and find the best applied method, the information of eggs yield, fertile eggs yield and chicks yield based on HH (by not performing middle period molting method and then using it for lay-off hens) was collected and assorted. Supposing lay-off hens are not separated from the flock (middle period molting is not used), egg yield based on HH of the flock at the end of week 66 was 193.70 eggs, which were raised to 200.75 eggs by using middle period molting method for the two flocks (eggs yield of molting flock is added to main flock). In other words, about 7.05 eggs based on HH were produced more (Table 1). Also, it is supposed that the production of fertile eggs based on HH of main flock at the end of week 66 will be 188.33 eggs; by executing middle period molting, about 194.99 fertile eggs based on HH were produced for the two flocks. In other words about 6.66 more fertile eggs based on HH were produced. It is also the same with chicks yield. Assuming lay-off hens are not separated from the flock (middle period molting is not used), chicks yields based on HH at the end of week 66 for main flock were 151.81 pieces; and by executing middle period molting, about 156.87 chicks based on HH were produced from the two flocks. In other words, about 5.06 more chicks based on HH were produced by middle period molting program. In this study by executing middle period molting method, 109314 chicks were produced from molting flock; because each chick costs 4000 Rials, the revenue of chicks' sales was 437256440 Rials. To compute the profit of chick's sale, the costs should be deducted from the revenues. The feed costs of 2370 hens at the beginning

of productive period for molting flock should be computed; let us assume that average production is 65% (equals to average production percentage of main flock from weeks 53 to 66). 165 g feed is used per each hen. 14 weeks production is computed as  $2370 \times 0.65 \times 165 \times 7 \times 14 / 1000$ ; about 24910 kg feed was used by molting flock. Considering 4400 Rials price per each kg feed, about 109604000 Rials was the costs of the feed of all molting flock which were 1002.6 Rials per chick. The maintaining cost of molting flock, hatch cost, commission cost for selling chicks, chick boxes and egg combs cost and transportation cost from farm to hatchery were estimated as 220, 240, 210, 170, 40 and 50 Rials per chick, respectively; making a total of 690 Rials per chick. Feed cost was not included. If the cost per hen of total produced chicks from molting flock is  $109314 \times 690$ , 75426660 Rials will be obtained, which is about the net profit according to the formula, (1)  $437256440 - (109604000 + 75426660)$  will be 320109780 Rials. About the profit made from middle period molting program per each molted hen according to formula (2),  $320109780 / (2370 + 109314)$  will be 2866.2 Rials. That is, if the lay-off flock is not separated and molted it will not make any profit mentioned earlier.

## Conclusion

Separating the lay-off hens of a broiler breeder flock in the middle of production period and taking care of them in a special time and short term molting to make them lay again with the main flock is a good method. It will lead to the best use of the potential of broiler breeders, and is

also economical.

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