



Doi: 10.21059/buletinpeternak.v44i2.45508

## Refeeding Postmolting Method to Improve Weekly Production Performance of Rejected Laying Hens with Low Mortality

Claude Mona Airin<sup>1\*</sup>, Amelia Hana<sup>1</sup>, Pudji Astuti<sup>1</sup>, Sarmin<sup>1</sup>, Trini Susmiati<sup>2</sup>, and Okti Herawati<sup>3</sup>

<sup>1</sup>Department of Physiology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta, 55283, Indonesia

<sup>2</sup>Department of Biochemistry, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta, 55283, Indonesia

<sup>3</sup>Department of Microbiology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta, 55283, Indonesia

### ABSTRACT

This research aimed to investigate the influence of gradually feeding rejected laying hens after molting on the performance of production. This research used 6,000 rejected laying hens of 80 weeks old in Subur Farm. Molting method was a modification method by reducing the feed gradually. At the beginning of this research, the feed was given 120 g/laying hens/day and it would be reduced by 10 g/laying hens/day until it reach 50 g/laying hens/day. In the next phase, all chickens fasted for seven days then the chicken was given 10 g/laying hens on the first day. The feed was increased 10 g/laying hens every two days up to 120 g/laying hens/day. Data Collection of Feed conversion ratio (FCR), mortality rate, amount of feed, and egg production were taken at the start of re-feeding. The results showed that during the period of molting until refeeding, mortality was 3.6%, an increase in egg production was seen since week 1, peak of production was 78% at week 9 with FCR 2.3. The results of statistical analysis showed significant differences ( $P < 0.05$ ) on the percentage of egg production between time periods after the treatment of feed reduction. As the conclusion, molting followed by refeeding in rejected laying hen influences weekly production performance by extending peak production period, optimal FCR and daily egg production.

Keyword: FCR, Peak production, Refeeding, Rejected laying hen

#### Article history

Submitted: 29 April 2019

Accepted: 15 January 2020

\* Corresponding author:

Telp. +62 8112510999

E-mail: monaairin@ugm.ac.id

### Introduction

Molting period will take place naturally in the chickens of 1.5-2 years of age and will last for 3-4 months. Postproduction chickens (rejected chicken) are considered only as broilers. The rejecting period in big chicken farms is no longer determined on the basis of low production rate, but on the time when new egg layers enter the farms so that occasionally the rejected chickens still have egg production potential. Molting method aims at providing the chickens with resting period for next production period. Forced molting by fasting the chickens is used to shorten the resting period. There have been some studies of the forced molting of the layers of 66 weeks of age with refeeding and illumination regulation treatments (Fukuma and Ishibashi, 1997); of the layers of 90 weeks with the parameters of blood biochemicals and tissue histology (Mert and Yildirim, 2016); of the chickens of 1-1.5 years of age with the supplementation of snail flour feed (Kiptiyah *et al.*, 2012); of the chickens of 84 weeks and 64 weeks of age with different molting treatments (Oguike *et al.*, 2005); of the rejected chickens of 60-70 years of age with molting method and different feed composition and the

parameter of the number of molted feathers (Fitroh *et al.*, 2016). The study will use the forced molting of the postproduction chickens that are usually considered as broilers and sold in traditional markets.

Layers will culminate in egg production if their production percentage is stable in 5 successive weeks and the egg production does not increase for any longer. In a laying cycle, the egg production of chickens would constantly decrease in a long period of time (Salang *et al.*, 2015). Normally, the decrease in egg production rate was in the ranges of 0.4-0.5% per week. At the age of 80 weeks the production rate was 75% and in such condition chickens were ready for rejection (Anonymous, 2018). Generally, traditional chicken farms in Indonesia rejected the layers of 100 weeks of age, while modern chicken farms would reject the chicken of 80 weeks of age. Chickens at that age were classified into non-productive ones, usually sold as broilers, and it inflicted significant economic loss. Bain and Dunn (2016) suggested that one of the challenges in developing layers was long life cycle in which 500 eggs were produced in 100 weeks. The study by Salang *et al.* (2015) indicated that the weight of the ovarium of the rejected chickens was not

significantly different from that of the chickens in the production period, meaning that the rejected chickens were still able to produce eggs. Mulyono *et al.* (2008) described that the forced molting in the study was conducted by totally fasting the chickens for 6 weeks and followed by the restriction of corn consumption. The recent study would introduce the molting method that has been modified by considering animal welfare and gradually reducing the supplied feed. The gradual reduction of the feed aimed at preventing sudden change in the condition of the chickens. The parameters that would be daily observed include the number of deaths, the weight of individual eggs, production percentage, and feed conversion ratio (FCR) that could describe the performance of weekly reproduction during the refeeding period of 15 weeks. It was expected that the results of the study could be useful as alternative molting method of reference and the refeeding of rejected chickens for reproduction efficiency by improving the reproduction of the chickens at very low mortality rate.

### Materials and Methods

The study used 6,000 rejected layers of 85 weeks of age of Subur Farm. The chickens were individually raised in battery-warmed coop at the ambient temperature of 20°C - 23°C in Nglingsi Village, Pakem of Sleman district. The feed was of commercial one with the gross protein content of 17-19%, the gross fat content of 9%, the gross fiber content of 7%, the ash content of 145, the calcium content of 3.25 – 4.25%, the phosphorus content of 0.45%, and the aflatoxin content of 50 ppb. All of the chickens in the study would be given the same molting treatment by initially reducing feed and then refeeding for 15 days. The number of deaths, the weight of individual eggs, the production percentage, and the FCR would be observed during the refeeding. Data would be gathered from each of the coops (K1 to K6). Each of the coops contained 1,000 rejected chickens.

The data were the daily ones that would be further processed into weekly ones.

The study began with the reduction of the feed quantity and then it was continued by fasting of the feed without any reduction of drinking water intake. It began once the chickens have undergone the molting procedure. The molting treatment was given by reducing 10 g/chicken/day of the feed (on the first day) and gradually continuing the reduction of the feed up to 50 g/chicken/day (on the eighth day). On the 9<sup>th</sup> day the chickens were fasted (without any discontinuation of drinking water supply) for 7 successive days (up to the 15<sup>th</sup> day). The refeeding stage began on the 16<sup>th</sup> day and the chickens were given 10 g/chicken/day. The feed supply was increased by 10 g/chicken in two days till the feed supply reached 120 g/chicken/day (on the thirty eighth day). The reproduction performance was daily observed during the refeeding stage. The observation included the number of deaths, the weight of individual eggs, the production percentage, and the feed conversion rate (FCR). The collected data were statistically analyzed using ANOVA to find out the impact of the refeeding on the number of the deaths, the weight of the individual eggs, the production percentage and the FCR every week.

### Results and Discussion

Molting was a physiological process taking place in adult birds as indicated by the change in feathers and the decrease in egg production (Mert and Yildirim, 2016). Regeneration and remodeling of the reproduction system took place during the molting process (Sundaresan *et al.*, 2007). The results of the study showed that the production performance improved, including the number of the deaths, the number of those that survive, the number of eggs, the weight of the eggs in kg, the FCR, and the weight of the eggs during the refeeding stage (Table 1).

Tabel 1. Data on laying hens production and mortality per week during refeeding

| Week | Mortality | Number of lives | Number of eggs | Kg of egg           | FCR average        | Weight individual of eggs average (kg) |
|------|-----------|-----------------|----------------|---------------------|--------------------|--|
| 1    | 3         | 3952            | 2593           | 159.7 <sup>b</sup>  | 24.75 <sup>a</sup> | 0.062                                  |
| 2    | 7         | 4470            | 6532           | 419.7 <sup>b</sup>  | 10.65 <sup>a</sup> | 0.064                                  |
| 3    | 6         | 4950            | 12068          | 793.7 <sup>b</sup>  | 6.24 <sup>a</sup>  | 0.066                                  |
| 4    | 14        | 4882            | 19815          | 1344.6 <sup>b</sup> | 3.63 <sup>a</sup>  | 0.068                                  |
| 5    | 18        | 4635            | 28277          | 1545.8 <sup>b</sup> | 3.00 <sup>a</sup>  | 0.055                                  |
| 6    | 11        | 4837            | 26695          | 1815.2              | 2.66 <sup>a</sup>  | 0.068                                  |
| 7    | 14        | 4947            | 29879          | 2002.9              | 2.47               | 0.055                                  |
| 8    | 16        | 4944            | 31893          | 2149.6              | 2.3*               | 0.067                                  |
| 9    | 12        | 4874            | 32053          | 2091.86             | 2.33               | 0.065                                  |
| 10   | 15        | 4874            | 31412          | 2034.2              | 2.40               | 0.065                                  |
| 11   | 11        | 4950            | 30662          | 2004.9              | 2.47               | 0.065                                  |
| 12   | 14        | 4948            | 30210          | 1967                | 2.52               | 0.065                                  |
| 13   | 20        | 4882            | 30393          | 2160.2              | 2.26               | 0.071                                  |
| 14   | 13        | 4888            | 29745          | 1935.2              | 2.53               | 0.065                                  |
| 15   | 14        | 3423            | 21032          | 135.9               | 2.52               | 0.065                                  |

<sup>a,b</sup> same abjad in the colom showed significant different (p<0.05)

\*= best FCR

**The weight of individual eggs**

The molting procedure followed by the refeeding of the rejected layers of 85 weeks of age was proven to increase the production percentage up to 78% and the increase in the production started in sixth week. It was higher than that reported by Moustafa *et al.* (2010), which was 64.5% and takes place in the period of 7 - 10 weeks; 68.20% (Achmad *et al.*, 2010); 70.8% (Mulyono *et al.*, 2008) and 66.2% (Rahman *et al.*, 2012). The increase in the egg production in the study was consistent with the study by Rahman *et al.* (2012) reporting that the egg production of the chickens with molting treatment increases and relatively constant over time as compared to those without any molting treatment. The results of statistical analysis showed that there was significant difference ( $P < 0.05$ ) in the weight of individual eggs inter-periods of time (from the 1<sup>st</sup> week to the 6<sup>th</sup> week) after the refeeding, while there was not any significant difference in the periods of time from the 6<sup>th</sup> week to the 15<sup>th</sup> week.

**Feed conversion ratio (FCR)**

The results of the study showed that the refeeding after the molting procedure in the rejected layers also increased the number of eggs and the weight of the eggs each week from the 1<sup>st</sup> week (Figure 1). The number and the weight of the eggs would be stable in the 8<sup>th</sup> week to the 15<sup>th</sup> week. The biggest number of egg production was  $32.05 \pm 25.2$  eggs in the 9<sup>th</sup> week, while the highest egg weight was  $26.838 \pm 60.5$  kg in the 8<sup>th</sup> week. The number and the weight of the eggs were stable from the 9<sup>th</sup> week to the 15<sup>th</sup> week, while the weight of individual eggs did not increase though there was a significant increase in the egg production and in the daily egg weight (Figure 2). The weight of the individual eggs would increase along with the increase in the age (John-Jaja *et al.*, 2016).

The decrease in the egg production took place in old birds and it was followed by the increase in the size of the eggs. It was because of the decrease in follicle recruitment rate that would

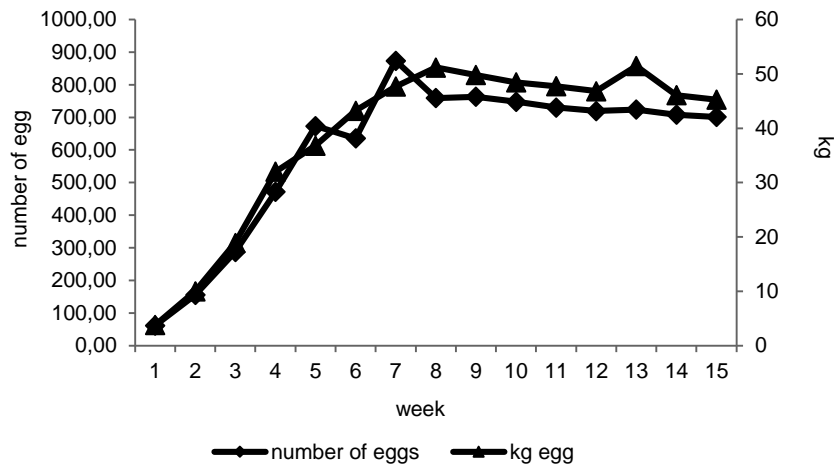


Figure 1. Graph of average egg production (kg) and number of eggs.

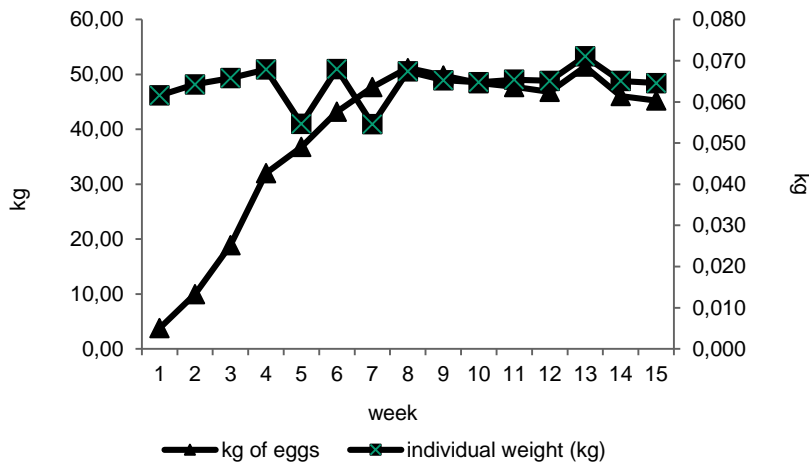


Figure 2. Graph of average daily egg weight and individual egg weight.

have significant impact on the growth of the follicles and the development of the eggs (Joyner *et al.*, 1987). The results of the study showed that the weight of the individual eggs was stable in the range of  $6.2 \pm 0.06$  g and it was equivalent to that of the eggs of the chickens of 72 weeks of age (John-Jaja *et al.*, 2016), which was 6.0 g in the chickens of 50 weeks of age (Rath *et al.*, 2015), 6.91-7.81 g in the New Black Breed chickens of 28-60 weeks of age, and 6.5-6.91 g in the Hisex Brown chickens in the 60<sup>th</sup> week (Tumova *et al.*, 2011).

The results of the study showed that the best FCRs in the refeeding period after the molting procedure was in the range of 2.3 and 2.6 in the 8<sup>th</sup> and 13<sup>th</sup> weeks after the refeeding. Normally, the FCR of the rejected chickens without any molting treatment reached 2.57, while it reached 2.23 in the rejected chickens with molting treatment (Mulyono *et al.*, 2008); 2.13 at the age of 22 weeks (Bozkruatt *et al.*, 2011); 2.20-2.25 in the chickens of 26-18 weeks of age (Bovera *et al.*, 2014); 2.13, 2.01 dan 1.99 in the chickens raised in small, medium and big flocks (Farooq *et al.*, 2002). The increase in egg production after refeeding resulted from cell improvement process in ovarium that had significant impact on the improvement of the function of the ovarium after refeeding (Oguike *et al.*, 2005). The fasting treatment for 72 hours and 168 hours was able to decrease vasoactive intestinal polypeptide (VIP) secretion from hypothalamus so that the stimulation of prolactin hormone of anterior pituitary was not adequate. The decrease in the prolactin hormone secretion caused the increase in the secretion of the follicle stimulation hormone (FSH) and luteinizing hormone (LH) of the anterior pituitary. The follicle stimulation hormone stimulated the growth of yolk follicle and the luteinizing hormone played an important role in ovulation process that stimulated the ovarium to increase the number of the follicles (Kiptiyah *et al.*, 2012). Gjorgosvska *et al.* (2008) suggested that the FSH content of blood during the molting treatment was 25.16 ng/ml, 10 days and 20 days after the molting treatment, which were 60.41 ng/ml and 61.62 ng/ml for each. The LH contents in blood plasma during 2.08 ng/ml molting treatment, 10 days and 20 days after the molting treatment were 5.71 ng/ml and 12.64 ng/ml for each. Oguike *et al.* (2005) suggested that there was not any significant difference in the weight of the ovarium before the molting treatment and after 35 days after the molting treatment. It was expected that it was the initial regeneration period of the ovarium, while the regeneration took place on the 21<sup>st</sup> day after the molting treatment as indicated by the growth of yolk follicle. The results of statistic analysis showed that there was significant difference ( $P < 0.05$ ) in the FCR inter-periods of time (from the 1<sup>st</sup> week to the 6<sup>th</sup> week) after refeeding process, while there was not any significant difference in the period of the 6<sup>th</sup> week to 15<sup>th</sup> week.

### Production percentage

The application of the molting method to the rejected chickens could extend the production period of layers. In Indonesia layers will be rejected at the age of 80-100 weeks with the egg production of only  $\pm 50\%$ . The results of the study showed that the egg production could be 73%-79% in 9 weeks after refeeding. Normally, the production peak of layers would last for 5 weeks during the rearing period and will gradually and constantly decrease (Salang *et al.*, 2015). The increase in the production performance will be observed after the molting process as indicated by the increase in yolk and eggshell percentage. It is because of the reduction of fat accumulation in uterus epithelial gland that will improve the performance of the uterus epithelial gland (El-Sagheer *et al.*, 2014). Molting method can be used to improve production potential, especially by considering economic aspect (Sharma and Vishnu, 2013).

### Mortality rates

The results of the study showed that the number of deaths during the molding process and the refeeding was 3.5% of the total population with the mean of 0.02% per week. It was a little bit bigger than the number reported in the study by Bar *et al.* (2003) with the mortality rates of only 2.7% and 2.8%. The difference in the mortality rate might be caused by the difference in the rejected chicken that were used, the time and the molting type that was applied. The mortality rate of layers in Indonesia reached 0.5% monthly or 6% annually (Nurcholis *et al.*, 2009).

### Conclusion

The refeeding after molting improves the weekly production performance of layers and increase the weight of eggs with stable weight of individual eggs and optimal FCR.

### Acknowledgment

The authors would like to thank very much to Subur Farm for permission using data.

### References

- Anonymous. 2018. Commercial management guide. <https://www.hyline.com/userdocs/pages/BRN-COM.ENG.pdf>. Accessed 7 Juli 2019.
- Achmad, R., Y. Sukra, Barizi, and A. P. Sinurat. 2010. Hubungan antara penurunan bobot badan dan peningkatan produksi ayam petelur (*dekalb warren*) dalam program cekaman luruh bulu. *Jurnal Veteriner* 11: 58-63.
- Bain, M. M., Y. Nys, and C. Dunn. 2016. Increasing persistency in lay and stabilising egg quality in longer laying cycles. what are the challenges?. *British Poul. Sci.* 57: 330-338.

- Bar, A., V. Razaphkovsky, D. Shinder, and E. Vax E. 2003. Alternative procedures for molting induction: practical aspects. *Poult. Sci.* 82: 543-550.
- Bovera, F., I. Francesco, P. Giovanni, D. Carmelo, R. Fabrizio, P. Daniela, A. A. Youssef, S. A. Saber, Hassan and N. Antonino. 2014. Effect of group size on performance and egg quality of laying hens during 20 to 36 weeks of age. *Italian J. Anim. Sci.* 13: 215 - 220
- Bozkruatt, M., K. Küçükyılmaz, V. Ayhan, M. Çabuk and A. U. Çatli. 2011. Performance of layer or broiler breeder hens ovaries in response to different probiotic preparations. *Italian J. Anim. Sci.* 10: 162-169.
- El-Sagheer, M., H. Y., El-Hammady, H. H. M., Hassanien, and H. A. Hassan. 2014. Effect of fasting period and feed form on post molt performance and egg quality in laying hens. *J. Poult. Sci.* 34: 619-634.
- Farooq, M., M. A. Mian, F. R. Durrani and M. Syed. 2002. Feed consumption and efficiency of feed utilization by egg type layers for egg production. *Livestock Research for Rural Development* 14: 76-79.
- Fitroh, M. N., M. A., Pagala, and H. Has. 2016. Pengaruh metode *force molting* yang berbeda terhadap rontok bulu ayam petelur afkir. *J. Tropical Anim. Sci. Tech.* 3: 87-92.
- Fukuma, Y. and T. Ishibashi. 1997. Effect of crude protein level and refeeding method of postmolt diet on performance and egg quality in layers after forced molting. *Jpn. Poult. Sci.* 34: 255-262.
- Gjorgosvska, N., K. Filev and R. Konakchieva. 2008. Influence of induce molting on hormonal status of aged laying hens. *Karmiva.* 50: 19-25.
- John-Jaja, S. A. A., B. U. H. Udoh, and S. C. Nwokolo. 2016. Repeatability estimates of egg weight and eggshell weight under various production periods for bovan nera black laying chicken. *Beni – Suef University Journal of Basic and Applied Sciences* 5: 389-394.
- Joyner, C. J., M. J. Peddie, and T. G. Taylor. 1987. The effect of age on egg production in the domestic hen. *Gen. Comp. Endocrinol.* 65: 331-336.
- Kiptiyah, Hartanto, and Lisin. 2012. Pengaruh ranggas paksa dan suplementasi tepung bekicot terhadap pertumbuhan folikel yolk ayam (*Gallus Turcicus*). *Sainstis* 1: 43-54.
- Mert. N. and B. A. Yildirim. 2016. Biochemical parameters and histopathological findings in the forced molt laying hens. *Brazilian J. Poult. Sci.* 18: 711-718.
- Moustafa, G. Z., W. Anwer and E. M. Badawy. 2010. Effect of induced molting on performance of cobb broiler breeders under field condition. *Arch. Geflügelk.* 74: 87-93.
- Mulyono, A. M. W., A. K. Sariri and W. T. Husodo. 2008. Penerapan teknologi *force molting* pada ayam petelur afkir: kajian parameter produksi, organ pencernaan dan reproduksi, pertahanan tubuh. *Sains Peternakan* 6: 10-17.
- Nurcholis, D. Hastuti, and B. Sutiono. 2009. Tatalaksana pemeliharaan ayam ras petelur periode layer di populer farm desa kuncen kecamatan mijen kota semarang. *Mediagro* 5: 38-49.
- Oguike, M. A., G. Igboeli, S. N. Ibe, S. M. Uzoukwu. C. Akomas and M. O. Ironkwe. 2005. Morphological characteristics and egg production of forced-moult layers under different moult induction techniques. *African J. Biotech.* 9: 1001-1004.
- Rahman, A. I., O. P. Bonsu, and M. Yaro. 2012. Effect of forced moulting on performance of exotic hy-line brown layer birds under tropical climatic conditions. *J. Anim. Sci. Adv.* 5: 481-486.
- Rath, P. K., P. K. Mishra, B. K. Mallick, and N. C. Behura. 2015. Evaluation of different egg quality traits and interpretation of their mode of inheritance in white leghorns. *Veterinary World* 8: 449-452.
- Salang, F., L. Wahyudi, E. Queljoe, and D. Y. Katili. 2015. Kapasitas ovarium ayam petelur aktif. *Jurnal Mipa Unsrat Online* 4: 99-102.
- Sharma, P. and G. Vishnu. 2013. Induced moulting in layers – A review. *Agri. Reviews* 34: 137-144.
- Sundaresan, N. R., D. Anish, K. V. Sastry, V. K. Saxena, J. Mohan, and K. A. Ahmed. 2007. Cytokines in reproductive remodeling of molting White Leghorn hens. *J. Reprod. Immunol.* 73: 39-50.
- Tumova, E., M. Englmaievova, Z. Ledvinda, and V. Charvatova. 2011. Interaction between housing system and genotype in relation internal and external egg quality parameters. *Czech J. Anim. Sci.* 56: 409-498.