Clinical Cancer Investigation Journal-ISSN: 2278-0513

Effects of Daily Egg Collection Number on Grade Percentage, Hatching percentage, Egg Infertility, and Contamination Percentage in the Broiler Parent Stock Farm

Abstract

Egg collection for hatching in poultry farms is done in different numbers based on the experience of the farms. Daily egg collection times recommended for hatching are at least 4 and 6 times daily in heat conditions. Regarding that the daily egg collection-number affects the quality index of the eggs, this study aimed to investigate the effects of daily egg collection on Grade Percentage, hatching percentage, hatching percentage, infertility rate, and egg contamination rate.

This study was carried out in a completely randomized design with 4 treatments and 6 replications over 24 days on an Arbreakers strain flock aged 46 weeks. Due to the high number of experiments and costs, a salon was randomly selected for the experiments. One day was assigned for each replication. Eggs were collected twice on the first day, 4 times on the second day, 6 times on the third day, and 8 times on the fourth day. These four treatments of 2, 4, 6, and 8 times egg collection were performed in six replicates.

The results showed that the number of collected eggs was effective on the grade percentage of eggs in incubation, hatching percentage, the percentage of first and second-grade chicks, and also, the production and quality of the chickens. As the number of daily collections increased, the grade percentage in incubation and the percentage of hatching increased and the percentage of second-grade chicks decreased.

Keywords: *Grade Percentage index, Daily egg collection rate, Infertility percentage*

Mehdi khosropoor 1* , Abolfazl Zarei 2 , Alireza Nooshary 3

1- ** Department of Animal Science, Karaj Branch, Islamic Azad University, Karaj, Iran. Email:mehdi.khosropour61 @gmail.com*

2- *Faculty member, Department of Animal Science, Karaj Branch, Islamic Azad University, Karaj, Iran*

3- *Faculty member, Department of Animal Science, Karaj Branch, Islamic Azad University, Karaj, Iran*

Introduction

The use of poultry meat and eggs as human food has a very long history. In this respect, the breeding of hens is done to produce eggs is done. A good egg is an egg that can be fertilized, so it is very important in poultry production. If the egg is not fertile it will not have a fetus and will not be able to hatch. It should be noted that hatchability is about 8% lower than fertility because some chick embryos are destroyed during incubation. Even if 93% of the eggs were able to, only 85% of them would become chicks. This example somehow demonstrates how high-quality fertility must be to achieve anything above average.

Achieving desirable and cost-effective fertility in the flock of chickens which is the primary objective of breeding is now always possible by understanding the causes of success and failure in desirable fertility as a controllable factor is possible and by evaluating it by controlling the breeding and reproduction pathways in each male and females gender help improves it (ITPnews, 93).

Given that the final production of a single hen unit is the producing laying eggs and thus the quality of one-day-old broilers. It also is affected by environmental conditions such as contamination, thin-crust, and egg fragility. Management aspects such as the way and number of egg collections are important.

In poultry companies, growth-related traits are an important issue in selecting commercial strains, whereas, for companies producing broiler breeder hens, the production of hatching eggs or day-old chicks, reproducing traits such as the number of eggs, fertility, and ability of hatching are important. The mentioned reproducing traits are influenced by genetic, environmental, and management factors. Given the genetic modifications in broiler breeder strains in the country and the necessity of using new criteria to meet the needs of broiler breeder flocks, the present study aimed to investigate the management factors in broiler breeder flocks in Iran to provide an appropriate management model in the country to optimize production and economize it, particularly to increase the per capita production of hatching eggs per broiler by the number of broilers available at the beginning of the laying period. Since broiler breeds in the country are active as producers of one-day-old broilers, it is necessary to plan in this part of the poultry industry to achieve a proper performance in its results. The purpose of this study was to investigate the effects of the number of collected hatched eggs on grade percentage, hatching percentage, infertility percentage, and contamination percentage.

The number of times eggs are collected for incubation in poultry farms varies according to farm experience. Egg collection times recommended for incubation are at least 4 times and in heat conditions 6 times daily. In each collection, no more than 30% of the total egg must be collected.

Usually, some eggs in the hatchery do not become eggs (troubleshooting), which can be due to various causes, such as nutritional deficiencies in chickens and sows, as well as the management of breeding flocks and sometimes genetic factors.

However, it depends on how the eggs are stored until the eggs are laid in the hatchery, the egg handling, and how the egg hatching machinery is managed. Therefore, troubleshooting can be done to find causes preventing the eggs from becoming chicks. This issue is very important for mother flocks who are trying to study the problems in the flock (Leeson and Summers, 2005).

Materials and Methods

This study aimed to investigate the effects of egg collection rate on Grade Percentage, hatching percentage, infertility rate, and infestation rate of broiler breeder in Naz Morgh mother poultry united in Zanjan province.

The study was carried out in a completely randomized design with 4 treatments and 6 replications over 24 days on an Arbreakers strain flock aged 46 weeks. Due to the high volume and cost of the experiments, a salon was randomly selected for the experiments. Every day, based on the general schedule all the halls were given light at 6:00 in the morning, and by 20:00 all the halls were shut off and the halls were maintained at about 22 ° C. One day was assigned for each replication. Eggs were collected twice on the first day, 4 times on the second day, 6 times on the third day, and 8 times on the fourth day. These four treatments of 2, 4, 6, and 8 times egg collection were performed in six replicates. Grade percentage in hatching, percentage of hatching of first and second-grade chickens, the way and times of collection, egg collection hours, troubleshooting, handling, and all daily records recorded on the farm.

Based on the procedure, the egg collection on the first day (the first treatment) (two collection times) was performed once at noon and the second time at 4:00 in the afternoon. On the second treatment (four collection times) it was done first at 9:00 in the morning, the second time at 11:00 in the morning, the third time at 2 pm, and the fourth time late in the evening. In the third treatment (six times of the collection), the first time was performed at 8 am, the second time at 9:30 am, the third time at 11 am, the fourth time at 12:30 pm, the fifth time at 2 pm, and sixth time at late in the evening. In the fourth treatment (eight times of the collection), it was done once at 8 am, the second time at 9 am, the third time at 10 am, the fourth time at 11 am, the fifth time at 12 am, the sixth time at 2 pm, seventh time at 4 pm and the last and eighth time was done at late in the evening.

The eggs were collected in the halls with plastic combs, each hallmarked with a specific color of the comb, and after each collection step, the eggs were transferred to the egg cell and gassed and disinfected with permanganate and formalin for 20 minutes. The laying eggs were also collected separately.

At the end of one treatment period (four days), the eggs were transferred to the hatchery. The transfer of graded eggs to the hatchery was carried out to 180 eggs with specifications and collection date specified in cartons. After the eggs were transferred to the hatchery, they were removed from the cartons and graded to isolate the broken or cracked and unformed, or infected eggs. The eggs were then laid out on the shoulder blades with the specification of each treatment, replication, and date, and after 18 days the blades are removed and housed in a hatchery machine 12960. On hatching day, hatchlings were evaluated for each treatment individually and the quality of chicks was evaluated.

Figure 1: Hatching

Troubleshooting was done on non-hatched eggs. The number and percentage of first and second-grade chickens were recorded separately and during the total of six stages of four days, eggs were sent to the hatchery for this experiment, indicating 6 replications of 4 treatments. The first hatching was on 2018/ 12/07 and the first hatching was on 2018/ 12/ 31. Also, the last transfer for hatching was in 2018/ 12/ 26 and the last hatching was on 2019/01/17 (3300 eggs were transferred for each treatment).

Results and Discussion

1. Examining the effect of the number of eggs collections on the grade percentage in hatching

Duncan's mean comparison table showed that in none of the treatments except the last treatment, ie, 8 times of collection, there was no significant difference between the number of times the eggs were collected and the grade percentage in the hatching and this difference was significant compared to the other treatments. The grade percentage was increased by increased collection times. The results of this study were consistent with the suggestions made by the Ajdad company (Ajdade Zarbal, Ajdade Hubbard).

2- Investigating the effect of the number of eggs collections on the percentage of hatching

The results of the effect of egg collection rate on hatching percent indicated that the number of egg collection times had a significant effect on hatching percentage and had a large impact on hatching percentage.

2. A comparison of the mean hatching percentage showed that with an increasing number of collections, a significant difference was observed in hatching and a significant difference was with the fourth treatment (8 harvesting stages). Therefore, the results showed that the percentage of hatching raised with increasing collection times (Table 1).

In the broiler breeder books and articles on the factors that reduce hatching, other issues have been addressed and have not been examined in detail. In the broiler breeding book by Leeson & Summers, factors such as setter and hatcher's conditions, feeding off the hen, especially vitamins, nest management, body weight conditions, poultry to rooster ratio, feather conditions, etc. (Pourreza & Nikkhah, 2003) were mentioned.

3. Investigating the impact of the number of egg collection times on the percentage of production

Results of analysis of variance of percent of production showed that the treatment effect was not significant. Duncan's mean test also showed no significant difference in the percentage of production between different treatments (Table 1). Other factors that affect production such as poultry age, strain, nutrition, nutrient deficiency, flock health, temperature, and brightness (complete poultry farming guide, North & Day, 1996: 114).

4- Investigating the effect of the number of egg collection on the percentage of hatched grade 2 chickens

Analysis of variance of percentages of hatched grade 2 chicks indicated that the effect of treatments on the percentage of hatched grade 2 chicks was significant.

Duncan's mean comparison test of hatched grade 2 chicks (Table 1) indicated that the percentages of hatched chicks were different in different treatments, which were significantly different at all stages. The percentage of grade 2 chickens decreased as the number of egg collections increased. However, this change was not significant at the 2 and 4 stages of the collection but was significant at the 6 and 8 stages.

In most articles and books on breeder chickens, the production of grade 2 chickens is more attributable to the performance of the hatcheries. The success rate of each hatchery depends on the number of grade 1 chickens produced. There are, of course, other controlling factors involved in hatchability. At the farm (the mother's feeding, disease, breeding activities of roasters, egg breakage, proper weight gain of the chicken and the rooster, egg health, egg storage in hatching egg health and storage, egg breakage, setters and hatchers management, chickens transfer are effective (Hatching Management Guide, Ajdade cobb, 2008). The results of this study are in agreement with the Ajdade cobb results.

Table 1: Effects of egg collection frequency on grade percentage in hatching, hatching percentage, production percentage, and hatched grade 2 chickens

Treatment	grade percentage in hatching	hatching percentage	production percentage	hatched grade 2 chickens
2 times collection	$98.87^{b}_{\pm}0.08$	$82.43^{d}_{\pm}0.15$	74.43 ∓ 0.38	$1.25^{a}_{\mp}0.06$
4 times collection	$98.97^{b}_{\pm}0.08$	$83.46^{c}_{\pm}0.15$	74.3 ∓ 0.38	$1.1^{a}_{\mp}0.06$
6 times collection	$98.95^{b}_{\pm}0.08$	$86.57^{b}_{\pm}0.15$	74.12 ∓ 0.38	$0.87^{b}_{\mp}0.06$
8 times collection	$99.23^{a}_{\pm}0.08$	$87.14^{a}_{\mp}0.15$	74.02 ∓ 0.38	$0.67^{c}_{\mp}0.06$
p-value	0.0432	0.0001	0.8708	0.0001
) SEM(	18.81	36.51	8.91	0.13
Total mean	99	84.9	74.22	0.97
cv	0.19	0.43	0.12	0.14

5- Investigation of the effects of egg collection rate on infertility and membrane percentage in troubleshooting, contamination percentage, and hatching percentage of grade 1 hatched chickens.

1-5- Investigation of the effect of the number of egg collections on infertility and membrane percentage.

The results showed that the number of egg collections had no significant effect on infertility and membrane percentage.

The results of the study were consistent with the results in the Complete Hatching Guidebook (Salahi, 2015) and the Hatching Principles by Mehdi Jestekey. Factors that cause infertility are: 1) high gassing 2) non-proper storage and early death of the fetus 3) infertility is due to egg infertility.

Factors causing mortality 3 to 0: 1) due to genetic diseases 2) maternal flock disease 3) decrease or increase in heat of the setter.

5-2- Impact of Egg Collection Rate on Contamination Percentage in troubleshooting

The results of the Duncan mean comparison test (Table 4-4) showed that the difference in the percentage of contamination in different treatments was significant. The results showed that there was no significant difference between treatments in two and four stages of collection, but the percentage of contamination was still higher in 2 stages of harvesting than 4 stages. Also, 6 and 8 treatments of the collection stage had significant differences from other treatments.

Most books and articles have cited the main causes of egg contamination, fertilized eggs, and laid eggs as well as hatchery contamination. It is important to note, however, that the outer membrane of the egg protector is highly sensitive and, by being in the contaminated environment, opens the way for contamination to the egg. Eggs should be collected at the earliest opportunity and disinfected at the earliest opportunity (formalin gas) to eliminate surface contamination.

Eggs on the bed should never be placed in egg nests, an egg that looks perfectly clean is not, in fact, sterile and can contain up to 500 bacterial cells on the surface of the newly hatched egg. After one hour of laying, the number of bacteria reaches 2000 cells (Leeson & Summers, 2005).

3.5- Investigating the effects of the number of eggs collections on the percentage of hatching grade 1 chickens

The results of the mean comparison with Duncan's method showed significant differences (Table 2) and the results showed that the percentage of hatched grade 1 chicks has been significantly affected by different treatments. This means that as the number of collections increased, the percentage of hatches increased. The results of the analysis table showed that the effect of treatments on the percentage of hatched grade 1 chicks was significant.

Table 2: Effects of egg collection on infertility and membrane percentage, percentage of contamination in troubleshooting, and percentage of hatched chicks

Treatment	infertility and membrane percentage in troubleshooting	percentage of contamination in troubleshooting	percentage of hatched chicks
2 times collection	4.24 ∓ 0.23	$3.43^{a}_{\mp}0.23$	$81.19^{d}_{\mp}0.18$
4 times collection	4.27 ∓ 0.23	$2.98^{a}_{\mp}0.23$	$82.36^{c}_{\mp}0.18$
6 times collection	3.87 ∓ 0.23	$2.04^{b}_{\mp}0.23$	$85.68^{b}_{\mp}0.18$
8 times collection	$3.98_{\mp}0.23$	$1.25^{c}_{\mp}0.23$	$86.3^{a}_{\mp}0.18$
p-value	0.8578	0.0001	0.0001
) SEM(	0.53	0.56	45.29
Total mean	4.09	2.43	83.88
cv	0.13	0.23	0.54

Conclusion

Based on the results of this study, it can be concluded that the number of eggs collected has a great influence on the performance and also on the quality parameters of broiler production in broiler breeder flocks.

The results of this study indicated that since the recommendation of ancestral companies is different in egg collection and that in most books and articles on mother egg collection, the recommendation is that more than four times the total egg collection should be done, in none of them the results of the number of eggs collected are not referred. The results showed that the number of egg collections was effective on the percentage of egg grade in hatching, the percentage of hatching and the percentage of grade 1 and 2 chickens, and the

production and quality of the chickens. Also during the experiments, the results showed that the number of egg collections had a significant effect on *E. coli* contamination and decreased with the greater number of egg collections *E. coli* contamination decreased.

Recommendations

1) Based on the results, the laid eggs collection in less than 6 stages causes damage and low yield of the flock. It is recommended to collect at least 6 eggs per day.

2) It is recommended to increase the number of farmworkers at the time of production and collect the eggs 8 times a day to obtain better performance due to the low labor cost of the production product and also the high importance of one-day-old chickens.

Acknowledgments

None.

Conflict of interest

None.

Financial support

None.

Ethics statement

None

References

1- Zarbal Ancestors Company. 1391. Hospitalized Egg Prevention Magazine.

2. Salahi, A. 2015. Complete Incubation Guide. IS Publishing.

3. Leeson, E. Summers, 2005. Translated by Yahya Zadeh, H. Rahimi, B. 2013. Principles of Management in Meat Units. Noorbakhsh Publications.

4- Leeson, Ed Summers, 2005. Broiler chicken breeding. Translated by Akbar Nikkhah and Javad Pour Reza. The Isfahan University of Technology Publications. Second edition.

5- Soroush Growth Magazine, 2009, ITP News.

6- Nikkhah, N. Karimzadeh, P. Scientific and practical management of bird incubation. Liaz Publications.

7- Farrokhi, M. Khalifi Sigaroudi, D. Nicknafs F. Complete guide to poultry farming. Compiled by North McDonald Donald. Publications of Shahid Foundation of Agricultural Education (1996).