STUDY ON THE INFLUENCE OF STORAGE DURATION OF EGGS UNDER CONDITIONS OF HIGH TEMPERATURE ON QUAIL POPULATION ”BALOTEŞTI” PERFORMANCE OF HATCHING

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Abstract

To determine the incubation performance and to establish measures to improve them in quail eggs of the "Baloteşti" population stored for 1 to 6 days under high temperature, an experiment was organized on 6 batches of 150 eggs. Eggs were kept at a temperature of 25ºC and humidity of 60%. Following the investigations it was found that weight loss of eggs during storage varied from 6.52% in eggs stored for 6 days and 0.45% in those stored for 1 day. The average percentage of weight loss during eggs incubation of the 6 groups was of 12.79% and the average percentage of hatching of 52.5%. Highest proportion of hatching occurred in eggs stored for 2 days (62%) and lowest in eggs stored for 5 days (44%). Prolonged preservation increases the proportion of clear eggs due to embryonic mortality, from 14.7% in eggs stored 2 days at 23.3% in those stored 5 days. Eggs stored over a period of 3-6 days, begin to hatch later, in the 16th day of incubation, probably due to its prolongation. The ones stored 1-2 days hatch earlier, staring with day 15. Following the investigation it can be stated that the recommended storage period to achieve high performance of hatching is of 2-3 days.

Key words: quail, incubation, eggs, storage, duration

INTRODUCTION

In general, hatching eggs shall be kept for a period between 1 and 3 weeks [1]. Eggs should be stored at low temperature to get the best results from hatching. But given the fact that Romania is still increasing quail household system in most cases, it should be noted that many breeders keep hatching eggs at room temperature, air cool spaces where to store hatching eggs is quite expensive. As such, it is important to determine which is the maximum and economically optimal storage quail eggs hatching.

Percentage weight loss of hatching eggs during storage is influenced by the temperature and humidity during its [7], [9]. A too low or too high percentage of weight loss during storage affect embryonic development during incubation [6] and consequently the percentage of hatching [3].

The researchers noted that, in general, an increased number of days of storage leads to increased embryonic mortality during incubation and storage and increases the likelihood of having a low percentage of hatching [8], [11], [12]. Some authors mention a decrease in the percentage of hatching more than 5% per day after 7 days of storage [2].

MATERIAL AND METHOD

The research was conducted on a total of 900 quail hatching eggs of the population "Baloteşti" the individual enterprise of IONIȚĂ T. LUCIAN Bucharest, Gherghița commune working point, Ungureni village, Prahova county.

The plots were organized by 6 batches of 150 eggs, corresponding to the six days of storage of eggs. The plots were marked with L1, L2, L3, L4, L5 and L6, L1 with the most senior of respectively 6 days and L6 group is the group with the lowest age of 1 day. The average temperature during egg storage was 25ºC and humidity was 60%.

In the experiment six incubators Cleo surface type 5 were used. There were

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temperature and relative humidity for each lot so eggs during storage and during incubation. Temperature was measured in each incubator with digital thermometer and humidity using hygrometer.

Environmental conditions during incubation were within the limits of literature.

Return eggs during incubation was performed twice a day along the longitudinal axis at an angle of 180 º.

It was determined that the initial weight of the eggs and weightings were made by survey method to control every 50 eggs (33%) per lot per day of storage, determining the average weight loss and overall during storage. During incubation random control weighing at 50 eggs (33%) per lot (in days incubation 1, 3, 5, 7, 10 and 15) were also conducted, determining the average percentage loss weight during storage. It was determined the mean weight of pups at 1 day by individual weighting 20 chickens per batch, total and percentage of hatching day, the proportion of clear eggs and embryos dead in shell.

Primary processing of data was performed using Microsoft Excel 2003 and for testing differences between mean variance analysis was performed to determine the average weight per egg during incubation in part. After using the analysis of variance the Fisher testing Tukey test followed.

RESULTS AND DISCUSSIONS

1) Weight loss during storage in eggs of the 6 lots

As can be seen in Table 1, the highest percentage of weight loss of eggs was recorded for eggs stored for 6 days (6.52%), while the eggs of the age group of 1-2 days there recorded the lowest percentage of weight loss (0.45%).

Table 1 Average and total weight loss during storage in eggs of the 6 lots (%)

	Lot L1 6 days storage	Lot L2 5 days storage	Lot L3 4 days storage	Lot L4 3 days storage	Lot L5 2 days storage	Lot L6 1 day storage	Average
	%	%	%	%	%	%	%
1 day	1.83	2.73	1.19	1.37	0.45	0.45	1.34 %
2 days	3.72	0.47	0	0	0	-	2.09 %
3 days	0	0	0.93	0.93	-	-	0.93 %
4 days	0	0.47	0.93	-	-	-	0.70 %
5 days	0.97	0.47	-	-	-	-	0.72 %
6 days	0	-	-	-	-	-	0
Total	6.52	4.14	3.05	2.30	0.45	0.45	2.82 %
Average	1.09±0.60	0.69±0.41	0.51±0.23	0.38±0.24	0.08±0.08	0.08±0.08	0.47±0.18

Overall, the average weight loss during storage was 1.34% on the first day of storage, 0.84% in the second day of storage, 0.47% in the 3rd day of storage, 0.47% in the 4 th day of storage and 0.72% in the 5-day storage. On the sixth day of storage eggs have not lost weight. Total weight loss was 6.52% in eggs stored for 6 days, 4.14% for eggs stored for 5 days, 3.05% for eggs stored for 4 days, 2.30% for eggs stored for 3 days and 0.45% for eggs stored for 1-2 days.

2). Evolution of weight loss in the 6 batches of eggs during incubation experiment

If L1 (eggs stored 6 days) was recorded following increases in egg weight loss during incubation: 3 days of incubation there was a percentage weight loss of 3.67% at 5 days of incubation it increased to 6.42% at 7 days was 8.26%, 11.93% at 10 days and at 15 days of incubation of 13.76%.

In L2 (eggs stored for 5 days) the following evolution of the percentage of weight loss during incubation was recorded: 3 days of incubation there was a weight loss of 2.33% at 5 days it increased to 4.65%, 7 day weight loss was 6.05%, 8.84% at 10 days and at 15 days 12.09%.

Weight loss during incubation in sample L3 was as follows: 3 days of incubation of 2.73% at 5 days of incubation it increased to 6.36% at 7 days weight loss was 8.64% at 10 days of 11.36% and 12.73% at 15 days.

Table 2 Evolution of the average loss in weight of eggs of the six lots incubating

	Lot L1 6 days storage	Lot L2 5 days storage	Lot L3 4 days storage	Lot L4 3 days storage	Lot L5 2 days storage	Lot L6 1 day storage	Average
	%	%	%	%	%	%	%
3 days	3.67	2.33	2.73	3.62	3.13	3.15	3.10 %
5 days	6.42	4.65	6.36	6.63	8.04	6.76	6.48 %
7 days	8.26	6.05	8.64	9.05	9.82	10.36	8.69 %
10 days	11.93	8.84	11.36	10.41	12.85	11.26	11.10 %
15 days	13.76	12.09	12.73	11.76	13.84	12.61	12.79 %

In group L4 (eggs stored 3 days) the following increases in the percentage of weight loss during incubation were recorded: 3 days of incubation there was a weight loss of 3.62% at 5 days of incubation it increased to 6.63 % at 7 days weight loss was 9.05% at 10 days 10.41% and 11.76% at 15 days.

In the lot L5 (eggs stored 2 days) the following increases in the percentage of weight loss during incubation were recorded: 3 days of incubation there was a percentage weight loss of 3.13% at 5 days of incubation it increased to 8.04% at 7 days was 9.82% at 10 days 12.85% and 13.84% at 15 days.

In L6 lot the following developments in the percentage of weight loss during incubation have been recorded: 3 days of incubation there was a weight loss of 3.15% at 5 days of incubation it increased to 6.76% at 7 days weight loss was 10.36%, 11.26% at 10 days and at 15 days 12.61%.

Lots L4 and L2 had the lowest weight loss after 15 days of incubation, the L2 weight loss maintaining minimum controls throughout the incubation.

In the experiment, the average weight loss in the 6 groups was 3.10% at 3 days of incubation, 6.48% from 5 days to 7 days 8.69%, 11.10% and 12.79% from 10 days to 15 days of incubation.

Researchers [10] showed a weight loss of less than average egg of this work and performed close to the L4 group, 11.32% of the Japanese quail eggs incubated at a temperature of 37.5°C and humidity relative to 56% and also they say that early mortality is the result of excessive loss of hatching egg weight.

3) Average percentages of hatching eggs recorded from 6 batches of experiment and share their hatching days hatching

The average percentage of hatching to L1 was 54.00% and from an initial number of 150 incubated eggs hatched 81 chicks, of which 37% were hatched in a 16-day incubation, and 53.09% had hatched the day the 17 th of 9.88% hatching and hatched on day 18th.

The average percentage of hatching in the L2 was 44.00% and in 150 incubated eggs hatched 66 chicks, of which 50.00% were hatched in a 16-day incubation, 39.39% in the 17-day and 10.61% the 18th day of incubation.

The average percentage of hatching the L3 group was 48.67% and in 150 incubated eggs hatched 73 chicks, of which 34.25% had hatched on day 16th, 53.42% in the 17-day and 12.33% on day 18th of incubation.

The average percentage of hatching the L4 group was 55.33% and hatched 83 chicks, of which 39.76% on day 16th of incubation, 49.40% were hatched in the 17-day and 10.84% on day 18 – a.

The average percentage of hatching the L5 group was 62.00% and hatched 93 chicks, of which 52.69% on day 16-a, 36.56% in the 17-day incubation and 10.75% on day 18 to the incubation.

The average percentage of hatching the L6 group was 51.33% and hatched 70 chicks, of which 70.13% on day 16-a, 14.29% on day 17th and 15.58% in the 18-day incubation.

Keeping the egg too long, in unsuitable conditions (high temperature, low humidity), also involves a longer total incubation eggs stored longer than fresh hatching later and are partly accounted unhatched when the total time of incubation and hatching is strictly fixed at 18 days (if quail eggs) or 21 days (for chicken eggs). In this experiment the eggs begin to hatch stored 3-6 days later, on the 16th day of incubation, and the stored 1-2 days earlier, on day 15.

On average hatching percentage curve for the 6 days of storage, the results are similar to those established by [5], the authors aimed to determine the effect of Japanese quail eggs

stored at a temperature of 28 ± 1 ºC for 15 days, except that the authors have established a higher hatching percentage (65% of eggs stored for 6 days, 75% of those stored 5 days, 72% of the stored four days, 71% of the stored e 3 days 58% to the stored 2 days and 66% in eggs stored for 1 day). The average percentage of hatching eggs stored set of authors for 6 days was 71.40%, with 18.90% higher than that determined in this experiment. Must be taken, however, the particular account and incubators, and the biological material used in the two experiments (one in Brazil and this experiment), issues that could be the basis differences between the two experiments.

Table 3 Average percentages of hatching eggs recorded from 6 batches of the experiment, the proportion of their hatching days hatching eggs proportion of clear, dry and dead poultry in shell, initial egg weight, average weight of pups at 1 day and weight percentage of the initial weight of chicken eggs

Day of incubation	Lot L1 6 days storage	Lot L2 5 days storage	Lot L3 4 days storage	Lot L4 3 days storage	Lotul L5 2 days storage	Lotul L6 1 day storage
Total number of eggs placed	150	150	150	150	150	150
Total number of chicks hatched	81	66	73	83	93	77
The average percentage of hatching, d.c. :	54.00 %	44.00 %	48.67 %	55.33 %	62.00 %	51.33 %
- in day 16	37 %	50 %	34.25 %	39.76 %	52.69 %	70.13 %
- in day 17	53.09 %	39.39 %	53.42 %	49.40 %	36.56 %	14.29 %
- in day 18	9.91 %	10.61 %	12.33 %	10.84 %	10.75 %	15.58 %
Number of clear eggs	30	35	30	27	22	34
- percentage	20 %	23.33 %	20 %	18 %	14.67 %	22.67 %
Number of eggs dried	9	14	12	6	9	8
- percentage	6 %	9.33 %	8 %	4 %	6 %	5.33 %
The number of dead in shell chicken eggs	30	35	35	34	26	31
- percentage	20 %	23.33 %	23.33 %	22.67 %	17.33 %	20.67 %
Initial weight of eggs	10.40±0.23	11.05±0.26	10.70±0.24	11.60±0.24	11.95±0.30	11.70±0.31
Average weight of pups at the age of 1 day	8.40±0.31	8.50±0.30	8.65±0.31	8.85±0.29	8.00±0.14	8.45±0.17
The average weight of eggshell after hatching	1.175±0.022	1.100±0.010	1.210±0.025	1.114±0.018	0.925±0.067	1.235±0.014
Weight chicken from the initial weight of egg	80.76 %	76.92 %	80.82 %	76.29 %	66.95 %	72.22 %

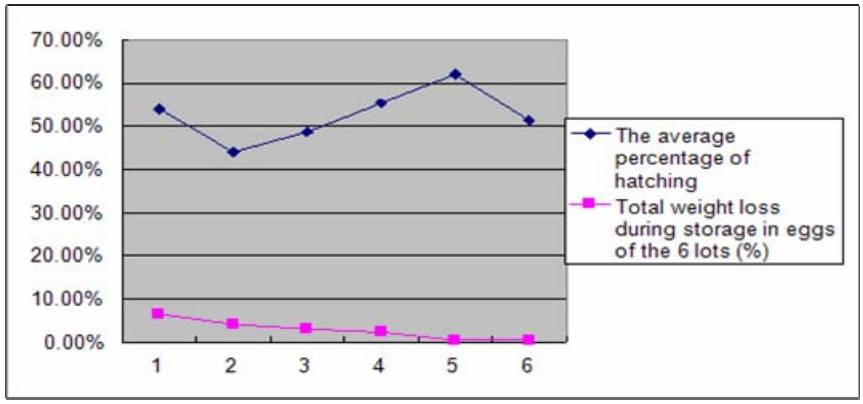

Fig. 1 Average percentage of weight loss during storage and percentage hatching of eggs of environments studied groups

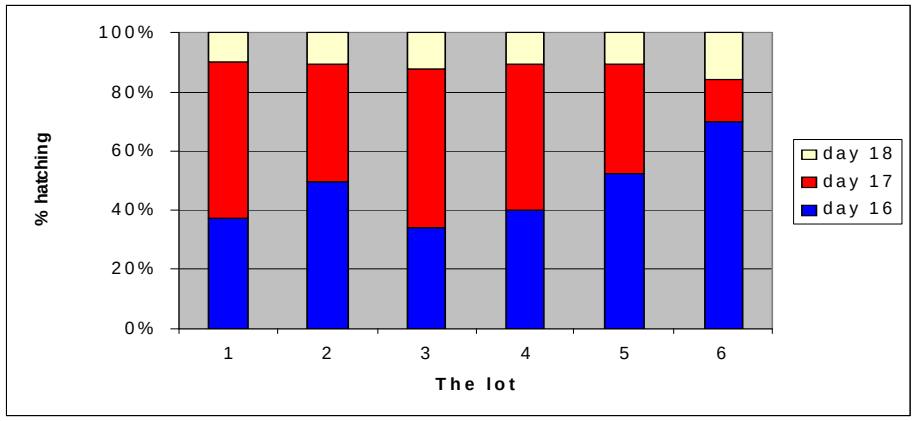

Fig. 2 Average hatching percentage for days of hatching for the eggs of the studied lots

4) Initial weight of the eggs, the average weight of baby at the age of 1 day, the average weight of eggshell after hatching chick weight and weight at 1 day of initial egg weight in eggs of the 6 batches of experiment

To L1 (Table 3), the initial average weight of eggs (10.40 ± 0.23 g) the average weight of pups at 1 day held a share of 80.76% (8.40 ± 0.31 g), shell having an average weight of 1175 ± 0.022 g

At L2, the initial average weight of eggs (11.05 ± 0.26 g) the average weight of pups at 1 day was 76.92% (8.50 ± 0.30 g), shell weighing an average of 1,100 ± 0,010 g

In group L3, initial average weight of eggs (10.70 ± 0.24 g) the average weight of pups at 1 day was 80.82% (8.65 ± 0.31 g), shell having an average weight of 1.210 ± 0.025 g

In group L4, initial average weight of eggs (11.60 ± 0.24 g) the average weight of pups at 1 day was 76.29% (8.85 ± 0.29 g), shell having an average weight of 1.114 ± 0.018 g

In group L5 with initial average weight of eggs largest (11.95 ± 0.30 g) the average weight of pups at 1 day held a share of 66.95% (8.00 ± 0.14 g), shell having an average weight of 0.925 ± 0.067 g

In group L6, initial average weight of eggs (11.70 ± 0.31 g) the average weight of pups at 1 day was 72.22% (8.45 ± 0.17 g), shell having an average weight of 1.235 ± 0.014 g 5.

5) Number and percentage of egg clear the 6 batches of experiment

Number of clear eggs (Table 3) determined at the end of hatching to L1 was 20% (30 eggs) of the initial number of incubated eggs (150 eggs) in L2 was 23.33% (35 eggs) at L3 group was 20% (30 eggs), L4 group was 18% (27 eggs) at L5 group was 14.67% (22 eggs), L6 group was 22.67% (34 eggs). Lot L5 recorded the fewest and most eggs L2 clear of the studied groups.

It seems like the chicken egg preservation too long increases the proportion of egg mortality due to increased embryonic clear in the early stages of development, which is to believe that it is a drop in egg fertility and not prolonged storage.

6) The number and proportion of dried eggs from the 6 batches of experiment

Number of eggs to dry L1 (Table 3) established after hatching was 6% of the initial shoulder eggs incubated at L2 of 9.33%, 8% in group L3, L4 in group 4% in group L5 6% in group L6 of 5.33%. The dried fewer eggs were recorded at L4 group.

7) The number and proportion with dead chicken in the shell for the 6 lots of the experiment

The number of dead in shell chicken eggs (Table 3) to L1 was 20% (30 puppies) from the initial number of incubated eggs (150 eggs) in L2 of 23.33% (35 chicks) in group L3 of 23.33% (35 chicks), the L4 group 22.67% (34 chicks) at L5 group of 17.33% (26 chicks), and L6 group of 20.67% (31 puppies). Lot L5 recorded the lowest number of chicks dead in the shell of the studied groups.

CONCLUSIONS

In group L5 with storage for 2 days the eggs the highest percentage of hatching (62.00%) was recorded. Superior results were recorded in sample L3, with storage 4 days (55.33% hatching rate) and if the storage L1 6 days (54% hatching rate). The lowest percentage was recorded for hatching eggs L2 older than 5 days (44%) and L3 with eggs for 4 days.

Overall average percentage of hatching eggs recorded from 6 batches of experiment was 52.50% value.

At all 6 lots hatching occurred on day 16-th, 17-th (majority) and 18-th of the incubation.

At L5 group, the total number of chicks hatched 52.69% in the 16-day incubation, 36.56% were hatched in the 17-th day incubation and 10.75% were hatched in the 18-th day of incubation.

In group L3, the total number of chicks hatched, hatched 34.25% in the 16-day incubation, of which 53.42% were hatched in the 17-th incubation and 12.33% were hatched on Day 18-th of the incubation.

The lowest proportions of clear eggs were recorded for L5 lots of storage for 2 days (14.67%), L4 (18%) and L1 (20%) and the highest proportion was recorded for L2 (23.33%).

The less dead in shell chicks were recorded for batches L1 (14.67%) and L5 (16%), and most of the consignment L4 (18.67%).

Lowest weight loss of eggs by day 15 of incubation were recorded for lots L4 (11.76%), L2 (12.09%) and L6 (12.61%) and the highest percentage of loss weight was recorded for L1 (13.76%).

The highest average chick weight at one day was recorded in sample L4 (8.85 g / head) and the lowest in group L5 (8.00 g / head). The highest percentage of weight from the initial weight of chicken egg has been incubated introduced in sample L3 (80.82%) and lowest in group L5 (66.95%).

As shown in this experiment, the best storage period at an ambient temperature of 25°C and a humidity of 60% is 2 days, where the percentage of hatching was 62%. To achieve this it takes a lot of breeding large enough to cover the needs of hatching eggs.

A storage period of 3 days at ambient temperature of 25°C and a humidity of 60% average hatching rate was 56% (6% lower than that recorded in eggs stored for 2 days)

A storage period of between 4 and 6 days at 25°C and a humidity of 60%, the average percentage of hatching was 48.89%, about 7.11% lower than the eggs stored for 3 days and 13.11% lower than those recorded in eggs stored for 2 days.

Since the freshest eggs, the age of 1-3 days before hatching begins (even on day 15 of incubation and takes place mostly in 16 to 17 days), while older eggs begin hatching later (from the 16th day and being able to extend until the 18th day), the total percentage increase can choose hatching an introduction to the series of eggs for hatching, up to a maximum length 3 days of hatching eggs.

Using incubators Cleo surface type 5 allows the use of different series introduction incubation. In this case it should be noted that hatching will take place over three days and sufficient room is necessary for raising chickens in different compartments.

To determine accurately the influence of storage duration on the results of Baloteşti hatching quail other studies are needed in this regard.

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