STUDY OF QUALITY MARKERS AND TRACEABILITY IN EGG INCUBATION STATION

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Abstract

Incubation is an important link in the chain poultry, which is based on several determining factors. The analysis and record of main indicators of production and quality, allows the tracing of product "chicken meat" in the following links and making certain links within the chain of production and between the chains of production. Therefore, management of incubation may affect hatching chicks, which in turn influences the vitality and performances of the lots of broiler.

Key words: poultry, quality, route, traceability, biomarkers, ROSS 308

INTRODUCTION

Agriculture in Romania is a basic industry of national economy, industry that after the integration in the European Union needs reorganization, to be successfully included within the unique market.

Considering the major impact of globalization of food markets concerning health and consumers' safety, quality assurance is vital for the future of poultry farming and requires controls over the branch – from the factory with combined fodder to the farm and slaughterhouse.

The safety of food is a global issue and is crucial for the future of poultry farming. In order to increase food security in major poultry areas such as bio-security, poultry raising or poultry feeding, several management and control programs are being used

At each link in the chain of poultry, quality control must begin with control inputs at each stage of production (raw materials, egg quality, quality chicken, feed quality, etc.) and must be maintained throughout the production process.

Traceability is a fundamental component of any quality management system in food industry and is part of the legislative effort to track the route of food products using records, from the obtaining moment to the consumer (Borda et al., 2006), becoming the main element that involves and brings responsibilities to the producers, farmers, operators in direct correlation with the quality of finished products (Raspor, 2005), as well as in risk assessment and management. The main elements that clearly influence the policy of an organization regarding **traceability** are: monitoring the entire chain of supply and targets set by the organization to ensure food safety.

Traceability becomes the key element in both the effective involvement and empowerment of producers, farmers, processors, those who are in direct

relationship with the quality of finished products (Raspor, 2005) and involved in the assessment and management of risk.

Biomarkers are used in traceability for verifying the quality and safety of food in the food. In the literature there are mentioned several indicators of primary and secondary traceability. They are represented by a number of characteristics, physical, physiological, morphological, which presents a stable signal for food matrix (Stănciuc et al., 2008).

Choosing a biomarker requires consideration of the following criteria: general indicators, absolute sensitivity, biological and chemical specificity, clear interpretation, final time of response, persistence of the obtained response, variability, applicability in specific circumstances, analytical method, necessary equipment and tools, validation and utility.

We can also include this work here in this section, because this paper is part of a broad study on a branch of poultry meat in Bihor County, concerning the markers of quality and traceability on poultry meat chain.

MATERIAL AND METHODS

In order to achieve the proposed target, there have been studied a number of breeding ROSS 308, from which were obtained several batches of eggs, that were incubated. Among all groups, three of them were surveyed. The groups were formed from different numbers of eggs as follows: 59.394 pcs. in group I, 40 068 in group II and 14 490 in group III. Eggs were incubated in an incubator, and during and at the end of the incubation period, leading indicators have been pursued at this level. The results were statistically processed and interpreted by Fisher and Tukey test.

RESULT AND DISCUSSION

Providing physical parameters of incubation is essential for obtaining good qualitative and quantitative indicators. Thus, the temperature recorded variations between 37.5ºC and 37.9ºC and relative humidity fluctuated around 30°C, range between 29 and 32°C (Fig. 1 and 2).

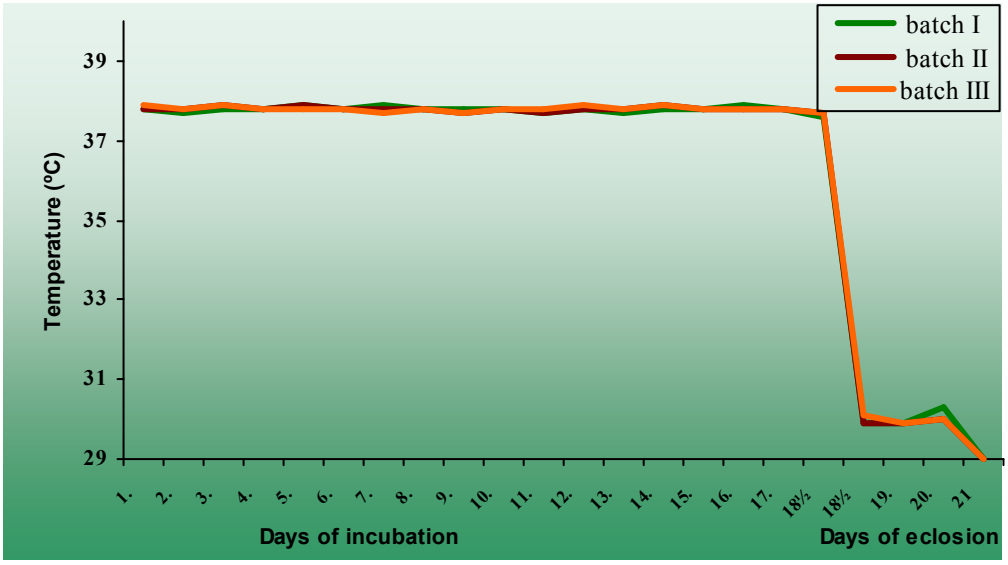

Fig. 1. Diagram of temperature for the incubation of the eggs studied

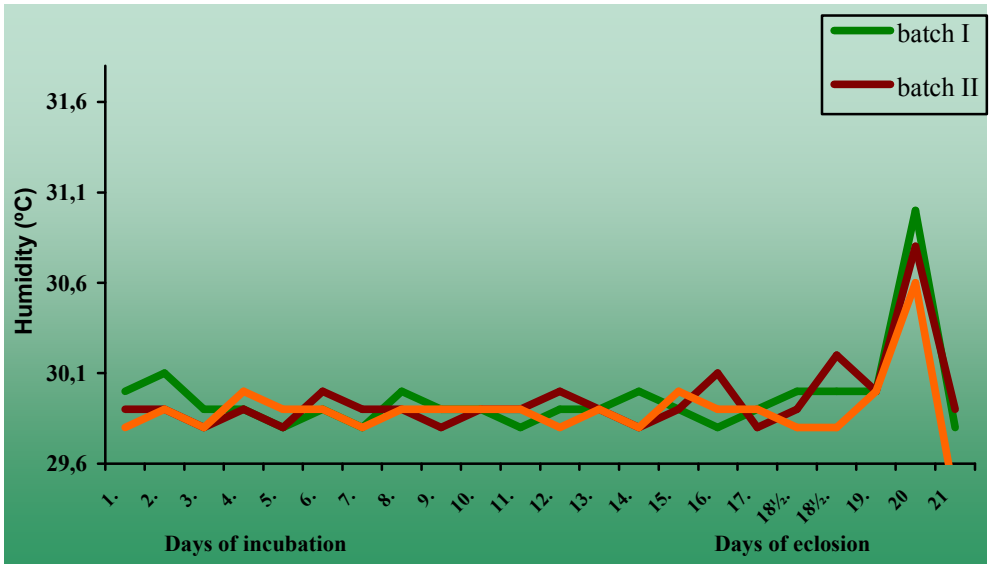

Fig. 2. Diagram of relative humidity of air along the incubation of the eggs studied

In determining *the weight of eg*gs during the incubation period there were chosen, at random, 150 eggs from each series. The eggs were returned every one hour, at an angle of 180°, less in the period of hatching (Table 1).

The results can show that, when the eggs were introduced in the device, their weight was very close between the three lots of experience, varying between 59.86 g in group III and 60.39 g in group I. After 10 days of

incubation, the weight of eggs was reduced with 6-7%, but was consistent between the three groups, with an average of about 56.5 g. After 18 days, the weight of eggs has been reduced to 11% of compared with the weight they had before their introduction the apparatus. Eggs were weighed between 53.37 and 53.85 g.

Table 1

Dynamic of the experimental eggs

Specification	*Batch*	n	$\overline{x} \pm s_{\overline{x}}$ (g)	*weight losses*		s	V%	Min (g)	Max (g)
				%	**g**				
Weight of eggs at loading the devices	I	150	60,39±0,563	100	-	6,898	11,42	50,00	73,00
	II	150	60,13±0,569	100	-	6,971	11,59	50,00	72,00
	III	150	59,86±0,536	100	-	6,567	10,97	50,00	71,00
Weight of eggs at 7 days	I	142	56,96±0,503	94,32	6,72	5,997	10,53	47,00	67,00
	II	141	56,92±0,488	94,66	6,51	5,794	10,18	47,00	67,00
	III	139	56,79±0,447	94,87	6,49	5,270	9,28	47,00	65,00
Weight of eggs at 18 days	I	141	53,85±0,443	89,17	10,83	5,255	9,76	44,00	63,00
	II	140	53,62±0,433	89,17	10,83	5,124	9,56	44,00	63,00
	III	138	53,37±0,382	89,15	10,85	4,484	8,40	44,00	62,00

The coefficient of variation showed us a good homogeneity of the character studied in placing eggs in the device, followed by the second and the third controls, to provide a very good homogeneity. Analyzing the significance of differences in egg weight between the three lots of experience and for the three specific determinations (at the time of incubation, 7 days hatching and 18 days of incubation) by Fisher test, insignificant results were obtained ($p < 0.05$).

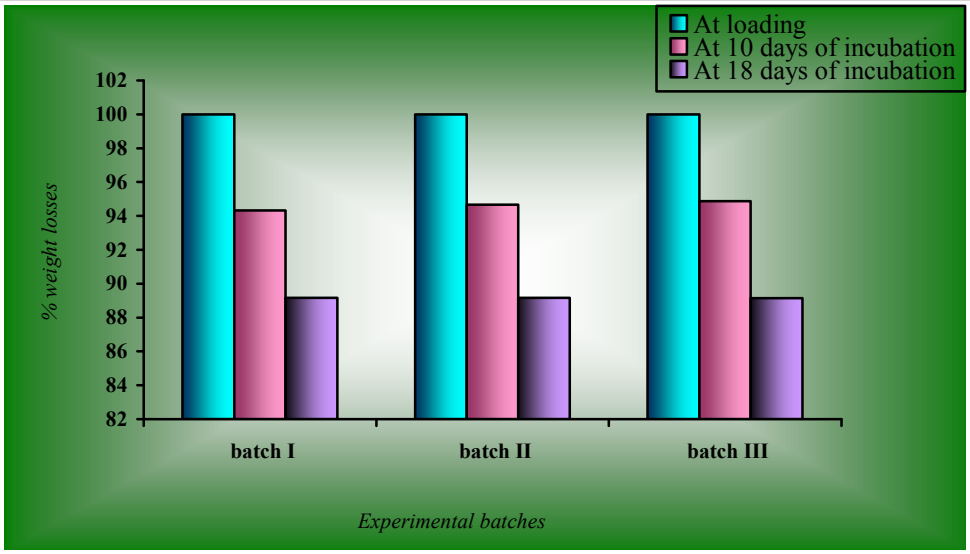

Fig. 3. Dynamic of weight losses at the eggs studied

Organoleptic and microbiological control of the eggs was done periodically, at intervals of about two weeks, when there were analyzed a total of 40-60 eggs , to which there were determined: appearance, size of the air space, the white of the egg, the yolk, smell as well as *Salmonella* ,from the surface of the shell and from its content. They were made in all three groups studied, and the results have revealed the following: shell eggs showed integrity, air space of approx. 3mm , transparent white of egg, the yolk was globular and less mobile, without any foreign smell and *Salmonella* was absent from the surface of the shell and from its content.

In conclusion, to all three groups that were analyzed, the quality characteristics of eggs were good, so in this respect they could not influence the quality of chicks hatched from these egg batches.

In order to determine *the microbial load from the mineral shell of eggs,* there were carried out sanitation tests, which allowed the determination of the total number of germs - NTG (col./ml) and making the tests of staphylococcal and coliform bacteria. Based on the results obtained we have drawn the following conclusions:

- NTG recorded values of 380 col/ml in group II, 390 col/ml, NTG and in group III increased with 15col./ml compared to group II;
- no coliform bacteria were isolated on selective media used;
- no fungi were isolated in any test group.

Analysis of the incubation process is shown in Table 2.

Table 2

The situation of eclosion for the experimental batches

No.	*Indicators*	*Batch I*	%	*Batch II*	%	*Batch III*	%
1	*Number of eggs loaded (pieces)*	**59394**	**100**	**40068**	**100**	**14490**	**100**
2	Seven day dead embryos	1531	2,58	1100	2,75	465	3,21
3	Infertile eggs	3997	6,73	4230	10,56	1770	12,22
Total of eggs rejected at transfer		**5528**	**9,31**	**5330**	**13,31**	**2235**	**15,42**
4	Number of hatched chicks quality I (pcs)	48070	80,93	30870	77,04	10720	73,98
5	Number of hatched chicks quality II (pcs)	450	0,76	220	0,55	75	0,52
Total of chicken eclosed		**48520**	**81,69**	**31090**	**77,59**	**10795**	**74,50**
6	Non hatched chicks	**5346**	**9,00**	**3648**	**9,10**	**1460**	**10,08**
7	Fertility (%)	55397	93,27	35838	89,44	12720	87,78
8	Hatching(%)	-	90,07	-	89,50	-	88,09

The analysis of these results note that, the number of rejected eggs at the biological control of 7 days, was significantly lower in group I (9.31) compared with the other two series (group II 13.31%, group III - 15 42%).

Also, there can be seen an increase in *the number of dead embryos* in groups II and III, respectively with 0.63% higher in group I and with 0.17% in group II.

Concerning the number of *infertile eggs rejected in the transfer,* again groups II and III are being distinguished (6.73% in group I, 10.56% in group and 12.22% in group III).

The percentage of fertility obtained was that of 93.27% in group I, 89.44% in group II and 87.78% in group III. Results a lower fertility of eggs in group II and III, respectively with 3.83% in group II and 5.49% in group III compared with group I. Thus, there resulted 40 520 chickens in group I, 31,090 chickens in group II and 14 490 chickens in group III.

The hatching percentage was 81.69% for group I, 77.59% for group II and 74.50% for group III. The high percentage of eggs hatching, regarding group I is higher with 4.41% compared to group II and with 7.19%. compared to group III.

Quality class of hatched chicks. Regarding the three groups studied, from a total of chicken produced (90 405), 99.18% were classified in the first class of quality and 0.82% in the second class of quality.

In order to determine the weight of hatched chicks from each group, there were extracted 150 chickens, at random, to determine their

individuality and to estimate the statistical indicators. The values recorded for the weight of hatching chickens is shown in Figure 4.

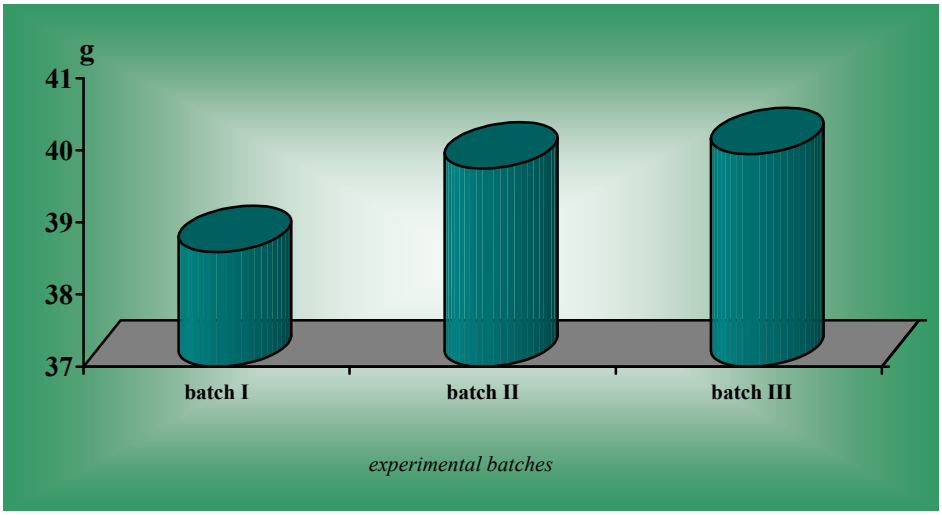

Fig. 4. Weight of chicken at eclosion

From the data obtained it follows that the highest mean weight at hatching of chicks was 39.95 g in group III, 39.75 g in group II and to 38.59 g in group I. There is a lower weight (with 2.4%) of chickens from group I compared with the chickens from group III and II, where the weight of 1 day old chicks is close.

Homogeneity of chicks in the three groups was appropriate, values of the coefficient of variation ranging from 6.72 to 7.07% for all groups studied.

CONCLUSIONS

The microclimate parameters from the hatchery were assured at its best, through their continuous monitoring. The average temperature was 37.7 ˚C and the ventilation system was around 30 ˚C.

The periodical organoleptic analysis showed a good quality of eggs, from all the three batches of eggs and in the qualitative microbiological examination carried out, they did not reveal the initial suspension, made with organic material collected from the surface of eggs, coliform bacteria and filamentous fungal pathogens, but there have been identified staphylococcal bacteria. No bacterial strains belonging to the genus Salmonella have been isolated or identified.

The number of dead embryos was lower in group I, namely 2.58% dead embryos compared to group III, which recorded 1% of 3.21% and 2% of

2.75%. Also, the percentage of fertility and hatching rate of eggs in groups I and II had a similar evolution, being superior to group III.

As far as concerns the weight of hatched chicks, the maximum average weight at hatching was recorded by group III, with a difference of 1.36 g compared with group I and group II with 0.20 g.

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