STUDY OF CERTAIN FACTORS AFFECTING TABLE EGGS SORTING ON WEIGHT CLASSES

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Abstract

The research has been carried out in a table eggs sorting plant and focused on the dynamics of eggs yield and on the weight of the eggs issued from two laying farms. Two experimental factors were introduced: the farming system (cages and aviary) and fowl age (27, 28, 29 and 30 weeks old). Eggs were calibrated in accordance with the protocol concluded between the sorting plants and the beneficiaries (supermarkets) on 4 weight classes (53-63g; 63-73g; 73-80g; above 80g). The data acquired throughout the 4 study weeks revealed an increase of the eggs yield in both kinds of farming systems (+18.43% in aviary and +18.60% in cages), due to the laying peak period. Another finding was that the proportion of broken or unmarketable eggs increased (+0.03% in aviary system; +0.06% in cage system), due to a shell thickness decrease. It was recorded an increase of the eggs amount yielded in weight categories "63-73 g" (+48.48% in aviary and +44.74% in cage), "73-80 g" (+1.69% and +2.62%) as well as "above 80 g" (+0.27% in both farming systems) and, also, a decrease of those belonging to the lowest weight class, "53-63 g" (-51.37% in aviary and -46.7% in cage); these due to the fact that eggs size is reversely correlated with the laying rate. The results suggest that fowl age and farming system affects both eggs yield level and their weight.

Key words: factors, influence, eggs, sorting, weight, classifying

INTRODUCTION

The weight of the eggs is a quality trait influenced by multiple factors; among the most relevant are fowl age, laying rate, and applied rearing system [1, 3, 4, 8].

Although the weight of eggs is a trait with strong genetic determinism (h^2=0.55) and with high individual variations (due to different periods for oocytes growing and maturation), it keeps increasingly, being positively correlated with hen age [8] and also influenced by the farming system [5, 11, 12].

There is an exception from the rules enumerated above, during the laying onset, when the laid eggs are still small; however, the amount is also low and the sorting plants exclude such eggs from calibration, because they fall into the weight group "below 53 g". [6, 8].

The eggs that are too small and those belonging to other non-marketable categories (double shelled, double yolks, shell less eggs …) are capitalized as eggs secondary products (powder eggs, pasteurized liquid mixtures, frozen or lyophilized mixtures) [2, 7].

Speaking in commodity terms, the weight of table eggs is used to classify then in several quality classes, straightly related to the selling price [6, 10].

The sellers of table eggs and especially the big retailers, such as supermarkets, have a certain strategy in relation with the eggs size (weight) and the expectations of the customers they address, in order to maximize their revenues [7].

It is true that a laying bird will yield in accordance with its biological peculiarities, maximized through genetic breeding and through provided reared technology factors [6, 8] and the eggs have not long shelf life [9].

MATERIAL AND METHOD

The investigations have been carried out on eggs yielded from hens aged 27 weeks=control I; 28 weeks=control II; 29 weeks=control III and 30 weeks=control IV) and reared within 2 farming systems (cage and aviary).

Eggs were processed within a sorting plant allocated to both laying farms, using a "Orion"

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sorting-calibration installation having a daily working capacity of 100000 eggs.

The eggs are previously sorted in the production farms. Therefore, the amount of nonmarketable eggs is very low and consists in "broken eggs" which are capitalized then as liquid mixture by a plant specialized in powder eggs production.

Eggs sorting-calibration has been done using 4 weight classes ("53-63 g"; "63-73 g"; "73-80 g"; "above 80 g"), in accordance with the requirements comprised into the supplying contracts concluded with the retailers.

RESULTS AND DISCUSSIONS

Eggs yield. The acquired data revealed that the yield was higher in the cage system, compared to the aviary one, proving the economic advantages of the first farming system over the latter one.

In the aviary fowl, the weekly cumulated yield increased from 264899 pcs. (1st study week) to 313719 pcs. (4th study week), while in the cage flock, it varied from 265881 pcs. (1st week) till 315342 pcs. (last week).

Therefore, the yield increased with 18.43% (aviary system) and with 18.60% (cage system), throughout the four studied weeks.

Although the difference between the two farming system is not significant (0.17%), the amount, reported to the whole period would reach 9000 eggs, which could compensate loses caused by eggs breakage during transportation and /or sorting (tab. 1).

The proportion of broken eggs during sorting. Eggs were sorted in the same plant, using the same method. Therefore, the occurred breakage was given by different shell resistance/fragility, straightly related to the different laying rate level.

Our data revealed that the amount of broken eggs throughout the sorting operation increased slightly from one stage to another. However, it was always higher in the eggs issued from the cage system.

Thus, for the cage rearing system, 438 broken eggs occurred in control I and 679 eggs during the 4th one, hence 55.02% more in this category.

Concerning the eggs laid in aviary, the amount of broken ones during the 1st sorting was 364 pcs. and increased till the 4th sorting week, to reach 547 pcs. (+50.27%) (tab. 1).

Table 1 Dynamic of the eggs amount submitted to processing

Notice			Categories		
			Received eggs	Eggs with broken shells and anomalies	Sorted eggs
control I	aviary	pcs.	264899	364	264535
		%	100.0	0.14	99.86
	cage	pcs.	265881	438	265443
		%	100.0	0.16	99.83
control II	aviary	pcs.	305151	455	304696
		%	100.0	0.15	99.85
	cage	pcs.	306180	525	305655
		%	100.0	0.17	99.83
control III	aviary	pcs.	308798	483	308315
		%	100.0	0.16	99.84
	cage	pcs.	310275	546	309729
		%	100.0	0.18	99.82
control IV	aviary	pcs.	313719	547	313172
		%	100.0	0.17	99.73
	cage	pcs.	315342	679	314663
		%	100.0	0.22	99.78

Assignation of eggs per weight classes. The amount of processed (sorted) eggs in each of the 4 controls is given by the difference between received eggs in the sorting plant (cumulated week yield) and those broken or eliminated during the sorting phase.

In both farming systems, it was found that the amount of eggs belonging to weight classes ”63-73 g”, ”73-80 g” and ”above 80 g” increased, while that in the weight group ” 53-63 g” decreased; this is explained through the fact that the eggs size (weight) is reversely correlated with the laying rate level (tab. 2).

Table 2 Eggs sorting per weight classes

Notice			Total sorted eggs	Weight class			
				53-63g	63-73g	73-80g	above 80g
control I	aviary	pcs.	264535	203138	44247	16604	546
		%	100.0	76.79	16.85	6.33	0.21
	cage	pcs.	265443	204659	43970	16331	483
		%	100.0	77.11	16.56	6.15	0.18
control II	aviary	pcs.	304696	150745	133364	19838	749
		%	100.0	49.47	43.77	6.51	0.25
	cage	pcs.	305655	157241	128639	19138	637
		%	100.0	51.44	42.09	6.26	0.21
control III	aviary	pcs.	308315	91994	193319	22015	987
		%	100.0	29.84	62.70	7.14	0.32
	cage	pcs.	309729	97615	189707	21476	931
		%	100.0	31.52	61.25	6.93	0.30
control IV	aviary	pcs.	313172	79044	204602	28028	1498
		%	100.0	25.24	65.33	8.95	0.48
	cage	pcs.	314663	95368	193276	24605	1414
		%	100.0	30.41	61.42	7.84	0.45

For the aviary system, the amount of eggs belonging to the ”above 80 g” category increased from 546 pcs. (1st study week) to 1498 pcs. (4th study week); in the class ”73-80 g” it increased from 16604 pcs. to 28028 pcs., while in the group ”63-73 g” it evolved from 44247 pcs. to 204602 pcs. Concerning the eggs in the lowest weight group (”53-63 g”), their initial amount was 203138 pcs., while the final amount reached just 79044 pcs.

For the eggs laid by caged hens, the class ”above 80 g” started from 483 pcs. (1st week) and reached 1414 eggs (4th week); the class ”73-80 g” gradually increased from 16331 eggs to 24605 eggs, while the group ”63-73 g” contained 43970 eggs in the 1st control and 193276 eggs in the last control. The category ”53-63 g” had an initial amount of 204659 eggs, to reach, by the end of last studied week 95368 eggs.

CONCLUSIONS

Data concerning eggs classifying revealed certain correlations between the rearing systems applied (cage or aviary), fowl age and certain production parameters (laying rate, eggs weight, shell strength), as follows:

- eggs yield increased during the studied period, with 18.43% in aviary system and with 18.60% in cage system; the situation was normal and predictable, knowing that the control moments were chosen before and during laying peak;
- compared to the whole received amounts of eggs for sorting, the proportion of those broken reached 0.14-0.17% (aviary farming system) and 0.16-0.22% (cage farming system);
- eggs sorting per weight classes revealed a gradually decrease of those belonging to the 53-63g class (-51.37%, eggs from aviary and -46.7%, eggs from cages), strictly related to fowl aging;
- an overall increase of the eggs weight was noticed, most of them falling in the weight class 63-73g (+48.48% eggs from aviary and +44.74% eggs from cage), or in the weight class 73-80g (+1.69% and +2.62%), or even in the weight class above 80g (+0.27% in both farming systems).

The final conclusion of the study was that the eggs yield is strictly related to the hens age and, of course, correlated with the applied farming system.

Also, the influence of the fowl age on the nonmarketable eggs (broken or presenting morphologic anomalies) proportion must be noticed, as well as on the eggs repartition per quality/weight classes.

Therefore, it must be considered that the fowl are biological systems functioning in accordance with certain principles that are available only for fine tuning; although the eggs production increased considerably during the last decades, it remains restricted by some physiological laws that could not be subordinated to the marketing requirements and issues existing in the public food service sector.

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