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Physico-chemical parameters - indicators of egg freshness

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•Abstract: The aim of this work was to determine the influence/effect of genotype and storage conditions of hen eggs on egg mass, weight and physico-chemical properties of their internal components. Eggs produced by chickens from two breeds appreciated among consumers (Marans and Araucană), maintained in an extensive or traditional system, purchased from a household in Timișoara, were used. A number of physical characteristics of the eggs were analysed, depending on the genotype (breed) and the duration of storage. The study was carried out over a period of 21 days, the eggs being stored at 4^0C. During the storage of the eggs, the weight of the internal components decreased both in the Marans breed and in the Araucan breed, the decrease being statistically insignificant ($p>0.05$), except for the weight of the white of eggs from the Araucan breed, where the decrease of about 1.75p% was significant at $p<0.05$. In both breeds, the values of the white/yolk ratio were statistically insignificantly changed during the storage period. The weight of the white of eggs produced by the hens of both breeds decreased during the storage period, the differences being small and insignificant from a statistical point of view ($p>0.05$). A significant increase ($p>0.05$) in the pH of the white was observed after keeping the eggs for 21 days at refrigerator temperature, the pH changes being more important than in the case of the yolk. Significant increases ($p<0.05$) in the density of both egg white and yolk after storage are observed for both breeds. Genotype did not result in significant differences between the density variations.

• Introduction

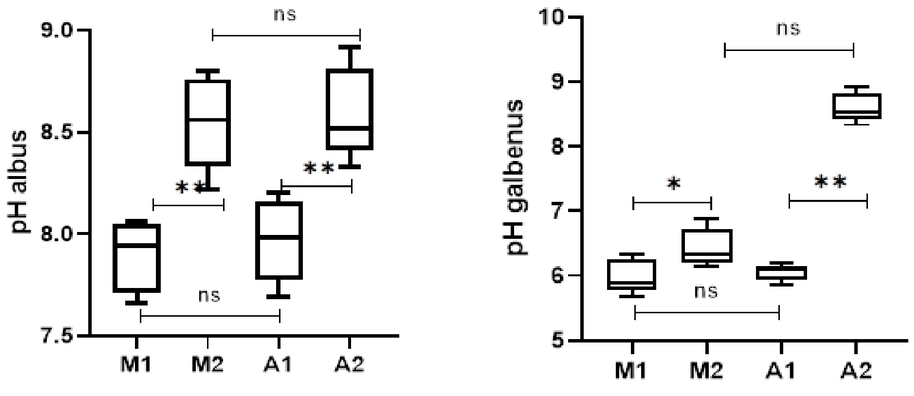
- Consumers for healthy and tasty food demand fresh, quality eggs. Egg freshness is also an important criterion for the success of incubation. The physico-chemical properties of eggs are indicators of the freshness required by each consumer, but also by the egg processing industry and their components. Among the factors that influence the physico-chemical properties of chicken eggs, the genotype can be mentioned, but the most important changes are determined by the storage conditions (temperature, humidity and duration). The storage conditions significantly influence almost all physico-chemical parameters of eggs. The pH and density of the internal components of eggs change during their storage, as a result of evaporation processes through the porous shell and the loss of carbon dioxide from the albumen.

• Material and method

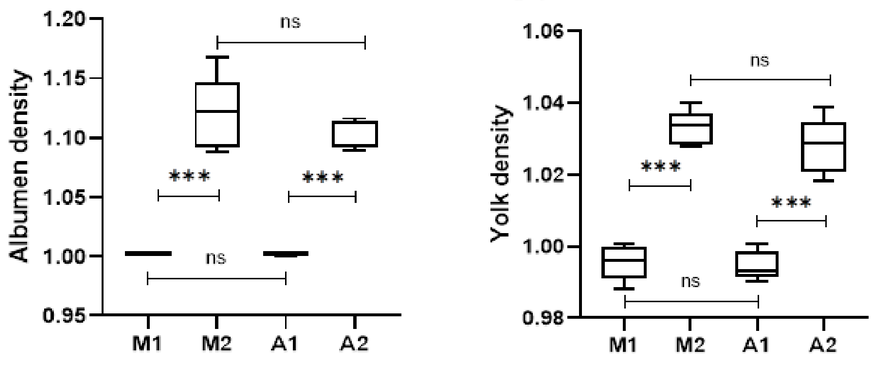
The study was carried out in two stages:
- Stage 1: 10 eggs from each breed were analyzed one day after their deposition
- Stage 2: 10 samples/breed were analyzed after 21 days of storage at 4^0C

The measurements made:
- the total weight and the weight of the egg components - weighing each whole sample and then on the components using the Kern analytical balance.
- appreciation of the shape of the eggs - the percentage ratio between the two diameters of the egg measured with the caliper
- measurement of the pH of the internal components of eggs – Consort C532 pH meter
- measurement of the density of the components of eggs – the pycnometer method

• Results and discussions



Variation of the pH of egg components (white, yolk) during storage, according to breed (M1/M2- Marans breed-1/21 days of storage, A1/A2 – Araucana breed – 1/21 days of storage}

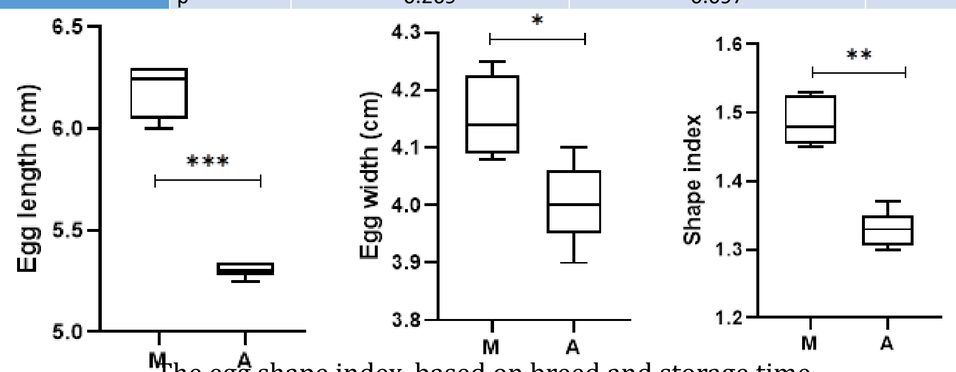


The variation of the density of the egg components (white, yolk) after storage, depending on the breed (M1/M2- Marans breed-1/21 days of storage, A1/A2 – Araucana breed – 1/21 days of storage}

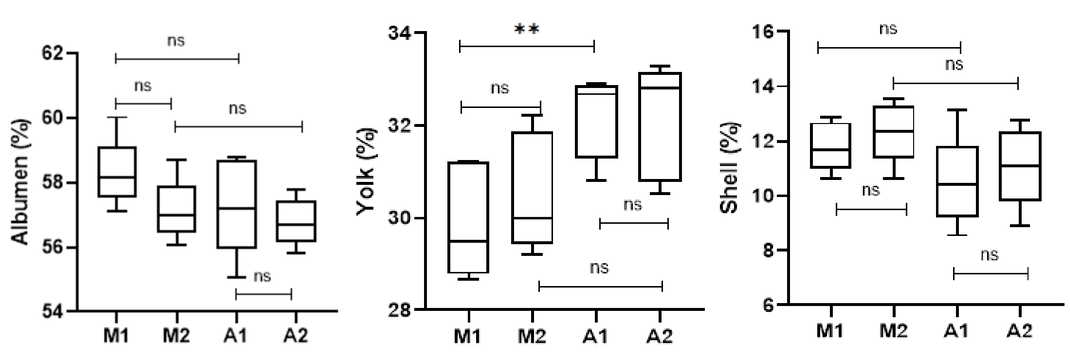
• Results and discussions

Total weight of eggs and its components according to genotype and shelf life

Item		Breed				p
		Marans		Araucana		
		Average	SD	Average	SD	
Egg weight (g)	one day	65.95	1.213	54.93	1.361	0.000
	21 days	65.19	1.381	54.06	1.213	0.000
	p	0.385		0.319		
Albumen weight (g)	one day	38.44	1.030	31.46	0.298	0.000
	21 days	37.26	1.090	30.69	0.690	0.000
	p	0.116		0.048		
Yolk weight (g)	one day	19.72	0.904	17.69	0.740	0.005
	21 days	19.89	0.891	17.38	0.915	0.002
	p	0.770		0.575		
Shell weight (g)	one day	7.79	0.593	5.78	1.042	0.006
	21 days	8.04	0.733	5.99	0.762	0.002
	p	0.564		0.726		
Albumen/yolk raport	one day	1.95	0.107	1.78	0.075	0.020
	21 days	1.87	0.101	1.77	0.075	0.097
	p	0.269		0.097		



The egg shape index, based on breed and storage time (M- Marans breed, A – Araucana breed}



The proportion of egg components according to breed and storage time (M1/M2- Marans breed-1/21 days of storage, A1/A2 – Araucana breed – 1/21 days of storage}

Conclusions

- egg weight was significantly influenced by genotype;
- storage duration and conditions led to a decrease in egg weight, but this decrease was statistically insignificant;
- genotype and storage time did not significantly influence the weight of egg components (white, yolk, shell);
- a marked increase in the alkalinity of the egg white was observed;
- pH increases were also determined in the case of the yolk, but lower than those measured in the case of the egg white;
- the density of the white and yolk increased after storage;
- the genotype does not significantly influence changes in pH and density as a result of storage.