ABSTRACT

Egg is a frequently consumed food in Spain, as it is a basic component of the Mediterranean diet. When buying eggs, the Spanish consumer considers following criteria (in order of importance): newness, security, animal feeding, husbandry method, origin, label information, environmental impact, price, packaging, and, finally, brand image. Egg quality is defined by its internal and external characteristics, as well as its nutritional composition.

In conventional farming systems, light intensity, temperature and ventilation of the farm are controlled. Within conventional farming system, egg-laying hens can be classified according to their husbandry in cage hen, floor hens, and free-range hens. Organic farming is a regulated farming system which allows hens access to outside runs, with an organic-based feeding and health based in prevention, prohibiting routine mutilations and prioritizing local breeds or lineages, which better adapt to environmental conditions.

Taking into account the variability regarding to hen feeding in organic farms, the main objective of the present work is to categorise the egg quality of hens from organic and conventional farming using different quality parameters. Additionally, the effect of the type and age of the hen is evaluated in egg quality parameters.

Twenty two series of conventional eggs and 17 of organic eggs, coming from Andalusia and Valencian Community, are analysed. Each series is composed by a mean of 18 eggs which are identified and whose external quality parameters (weight, egg shape index, shell colour, shell deposition rate, shell thickness and shell percentage) and internal quality parameters (Haugh units, dense albumen index, dense albumen percentage, total albumen percentage, yolk shape index, yolk colour and yolk percentage) are determined. In 12 eggs of each series, nutritional parameters are also determined (moisture, total mineral content, protein, yolk total carotenoids, fat and fatty acid profile).

Organic hens produce eggs with less weight, less rounded, with a higher deposition rate, shell percentage and yolk content. The shell colour and its thickness are not influenced by the husbandry system. The major fraction of crude protein in feed for hens of conventional systems influences the internal quality parameters, producing eggs with higher values of Haugh units, total albumen and a higher yolk shape index. The presence of artificial colouring in conventional animal feed is the reason for the higher orange colour intensity of the yolk. From a nutritional point of view, the eggs obtained

from conventional systems show higher protein, carotenoid and fat contents, being fatty acids, both saturated and unsaturated, predominant in these eggs. Organic animal feed formulations and free diet are responsible for organic hens laying eggs with higher proportion of unsaturated fatty acids and a lower concentration of carotenoids.

The hen type influences significantly in external, internal and nutritional quality parameters except in the form index, dens albumen, and moisture and ashes contents. Aged hens lay eggs with less intense shell colour, worse albumen and yolk quality and less protein and carotenoid content.

The quality parameters allow to classify eggs into four categories. A first group formed by eggs (obtained from organic farming systems) with a high level of shell quality, high fraction of polyunsaturated fatty acids, besides a high total mineral content. A second group characterized by eggs which have intense shell and yolk colour, which is related to high values of protein, fat and fractions of saturated and monounsaturated fatty acids. A third group of eggs that are defined by high egg and yolk weights and are in opposition to the fourth group, which includes eggs with optimal quality parameters regarding the albumen. The independent variables, yolk shape index, dense albumen index and Haugh units have a positive relationship with three nutritional parameters, protein, carotenoid and monounsaturated fatty acid contents, being parameters which allow to characterize the conventional egg production.

Keywords: external quality, internal quality, nutritional quality, protein, fat, carotenoids, fatty acids