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From shell eggs to pasteurized egg products: importance of the rearing system on microbiological and technological properties of egg and egg products

Séverine Chevalier¹, Tino Jamme¹, Sophie Jan¹, Maylis Dop², Eve-Anne Norwood², Guillaume Gillot³, Julie Evrard³, Véronique Huchet³, Amélie Chastagner⁴, Angélique Travel⁴, Carole Debregeas⁵, Valérie Lechevalier¹

¹ STLO, INRAE, INSTITUT AGRO RENNES-ANGERS, 35042 Rennes, France

² ONIRIS-GEPEA, 44000 Nantes, France

³ ADRIA Food Technology Institute, UMT ACTIA 19.03-ALTER'ix, Quimper, France

⁴ ITAVI, centre INRAE de Tours, 37380 Nouzilly, France

⁵ ADRO ouest, 35000 Rennes, France

Hen egg production methods have changed considerably over the last 15 years with the consideration of animal welfare and changes in European regulations. In Europe, fewer and fewer eggs are produced in cage giving way to an increasing number of systems with an access to an outdoor run.

This study aimed at determining the impact of the rearing system of laying hens on microbiological and technological properties of shell eggs and egg products. Eggs were collected from cage, barn or free-range rearing systems during a “cold” and a “warm” season. Eggs from Lohmann White and Lohmann Brown hens aged from 57 to 71 weeks old were collected following an equilibrated experimental design. The corresponding industrial egg products (i.e. egg white and whole egg) were also collected in French egg product companies before and after the pasteurization process. The microbial quality of eggshells and egg products was assayed by total and fecal bacterial counts. The microbial diversity was evaluated by metabarcoding 16S. Technological properties were evaluated by measuring egg white foaming properties and whole egg emulsifying properties as well as cooked angel food cake (for egg white) and sponge cake (for whole egg) color, specific volume and texture.

The first source of variability of microbiological count and technological properties of shell eggs was the hen breed, followed by the season and thirdly the rearing systems. The latter was however found to be the main source of variability of microbial diversity of eggshell. Considering industrial egg products, the season and then the rearing system were the two main sources of variability of microbiological and technological properties of unpasteurized egg products, whereas the first source of variability of microbiological and technological properties of pasteurized egg products was the rearing system.

Keywords: rearing system, microbiological quality, technological properties, shell eggs, egg products