

INFLUENCE OF FREEZING TIME ON THE WATER ACTIVITY AND LIPID OXIDATION IN MEAT OF BROILERS REARED AT THE CONVENTIONAL AND ANTIBIOTIC-FREE SYSTEMS

Aline Giampietro-Ganeco¹, Hirasilva Borba², Juliana L. M. Mello¹, Ana Paula de O.

Saccomani³, Rodrigo A. de Souza³ and Pedro A. de Souza²

¹Post-graduation students at São Paulo State University – UNESP, Jaboticabal, São Paulo, Brazil

²Professor of Technology Department at São Paulo State University – UNESP, Jaboticabal, São Paulo, Brazil

³Post-graduation students at Instituto de Zootecnia - APTA/SAA, Nova Odessa, São Paulo, Brazil

*algiamp@yahoo.com.br

Abstract – The aim of this study was to evaluate the water activity and lipid oxidation in frozen breast meat from broilers reared at the conventional and antibiotic-free creation systems. Carcasses from 120 broilers of Cobb lineage, from conventional and antibiotic-free creation systems, were used in this study. Were analyzed the water activity and lipid oxidation (TBARS) in fresh breast meat and after three and six months under freezing. The water activity values decreased in broiler's meat from antibiotic-free system. The meat from conventional broilers showed higher lipid oxidation during storage period. The storage influences the water activity and lipid oxidation values in breast meat from broilers from antibiotic-free and conventional creation systems.

I. INTRODUCTION

Classified as a healthy food, the chicken meat is used for food, by presenting rich protein content of good quality and is recommended, its consumption, the people of all age groups. But the great majority of animal foods can deteriorate easily. Therefore one way to preserve these foods is the system from freezing.

Frozen foods have an enormous growth in the market. Freezing is one of the best methods of food preservation. The process of freezing appropriate limits microbial growth, reduces the speed of chemical reactions, such as enzyme activity and lipid oxidation. At the same time, the freezing process retains the flavor, aroma, color and nutritional value. The freezing process is to reduce the temperature of the food, crystallization from one part of water and some solutes. The benefits are the strengthening of structures and removal of free water from the food. Therefore the importance of studying the activity of water (a_w) frozen foods.

The deterioration of the meat due to fat oxidation is a factor limiting the shelf life of meat and frozen meat also. The meat from poultry and swine oxidizes more rapidly than

bovine meat. Lipid oxidation is the principal process by which the loss of quality of meat and its products.

The aim of this study was to evaluate the water activity and lipid oxidation in frozen breast meat from broilers reared at the conventional and antibiotic-free creation systems.

II. MATERIALS AND METHODS

Carcasses from 120 broilers of Cobb lineage from antibiotic-free and conventional creation systems, with 42 days of age, purchased from a commercial slaughterhouse were used in this study.

Later, the carcasses were sent to Technology Laboratory of Animal Products in São Paulo State University – UNESP, Jaboticabal, São Paulo, Brazil, maintaining the cold chain, for meat tenderness tests.

Forty carcasses were considered refrigerated carcasses. The other 80 carcasses were brought to the freezing tunnel (fast freezing), and stored for up to three (40) and six months (40) under freezing.

Were analyzed the water activity (a_w) and lipid oxidation (TBARS) in fresh breast meat (*Pectoralis major* muscle) and after three and six months under freezing.

The a_w was measured using the water activity analyzer Aqualab (Decagon Devices Inc.), that bases its measure on the dew point technique. The lipid oxidation was evaluated by measuring substances reactive to thiobarbituric acid (TBARS) according Pikul et al. [1].

For statistical analysis a completely randomized design in 2x3 factorial was used with two creation systems (antibiotic-free and conventional systems) and three freezing periods (0, 3 and 6 months), in forty replications. Data were submitted to analysis of variance using the

GLM Procedure and means compared by Tukey test (5%) using the statistical program SAS [2].

III. RESULTS AND DISCUSSION

Table 1 shows the average results obtained from water activity (a_w) and TBARS analysis in breast meat from broilers from antibiotic-free and conventional creation systems.

Table 1 Water activity (A_w) and test substances reactive to thiobarbituric (TBARS) of breast meat

	a_w	TBARS (mg TMP/kg)
Creation Systems		
Antibiotic Free	0.983 A	0.413 B
Convencional	0.980 A	0.893 A
<i>P-value</i>	0.2224	<0.0001
Freezing periods		
Refrigerated	0.990 A	0.079 C
3 months frozen storage	0.980 B	0.545 B
6 months frozen storage	0.974 C	1.334 A
<i>P-value</i>	0.007	<0.0001
<i>CV(%)</i>	0.89	6.32

Averages followed by different letters differ according to Tukey's test. The following abbreviations are used: CV: Coefficient of variation

There was no statistical difference between creation systems to analysis that evaluates to water activity values. There was no difference to water activity with the storage period and are shown in Table 2.

In broilers meat from the creation of antibiotic-free system decreased the values of water activity. There was a decrease of water activity values in meat from antibiotic-free broilers during the storage process.

Table 2 Breakdown of the interaction between creations systems and period of storage for water activity

	Refrigerated	3 months frozen storage	6 months frozen storage
Antibiotic Free	0.992 Aa	0.985Aab	0.971 Ac
Convencional	0.987 Aa	0.976 Aa	0.977 Aa

For a given factor, means followed by different capital letters in the column and different lowercase letters in the row are differ according to Tukey's test.

For lipid oxidation analysis, were observed significant difference between creation systems and storage periods, as shown in the Table 3.

Breast meat from broilers from conventional system showed higher lipid oxidation during storage period than broilers from antibiotic-free system. Carcasses only refrigerated showed lower TBARS values, indicating that the freezing don't interrupts the lipid oxidation.

Table 3 Breakdown of the interaction between creations systems and period of storage for test substances reactive to thiobarbituric (TBARS)

	Refrigerated	3 months frozen storage	6 months frozen storage
Antibiotic Free	0.054 Bc	0.345 Bb	0.939 Ba
Convencional	0.105 Ac	0.745 Ab	1.829 Aa

For a given factor, means followed by different capital letters in the column and different lowercase letters in the row are differ according to Tukey's test.

Lipid oxidation is a spontaneous and inevitable phenomenon, and the storage of meat under freezing not can to interrupt this process. The meat from "antibiotic-free broilers" showed lower TBARS values, it is possible that these animals receive food with some source of natural antioxidant that contributes to this lower lipid oxidation.

IV. CONCLUSION

The storage under freezing influences the water activity and lipid oxidation of breast meat from broilers from antibiotic-free and conventional creation systems.

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