DETERMINATION OF CHANGES IN OXIDATION PROCESS DURING STORAGE OF REFREGERATED AND FROZEN POULTRY FAT

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Abstract

The aim of this research is the the determinate the changes in oxidation process on refrigereted and frozen poultry fat. The practical work was on poultry fat, how was from S.C. AVIMAR from Baia Mare with the gas-cromatography method and Kreis reaction. For fatty acids determination it was used: Gas chromatography with Flame Ion Detector (Shimadzu GC-17 A with FID detector), spectrophotometer tip UV/VIS (T60U). It was made for peroxide index, for acidity tree series with 5 probes from refrigerated poultry fat and 5 probes from freezing poultry fat. The value of peroxide index of chilled conditions for the probes, the fresh poultry fat was 6.8 mec O_2/kg poultry fat and the evolution had an ascendant pant and in frozen conditions for the probes, the peroxide index grow up easy until the 2 mounts when the oxidation process is initiated.

Key words: fat, fatty acids, spectrophotometer methods, butter, oxidation.

INTRODUCTION

Oxidation of food under the action of atmospheric oxygen is explained by the mechanism of chain reactions with formation of free radicals which are molecules in which one atom has a free valence.

Unsaturated fats are less hazardous and contain large amounts of body fat-soluble vitamins particularly useful, which function as both antioxidant and fatty foods mainly in the human body, preventing many diseases caused by oxidative stress.

Lipids are found both in the animal kingdom and plant kingdom as well as in microorganisms (bacteria, yeasts, molds).

Some of unsaturated fatty acids fulfill important functions in the human body, so they were essential fatty acids. Some authors refer to him again and that C vitamin is essential because the body like vitamins.

Following the oxidative degradation of fats in food suffered appear as direct effects, some changes to products and their nutritional value, and that indirect effects, the possibility of altering the health of the consumer and some economic consequences.

MATERIAL AND METHODS

Determination of changes in oxidation process to poultry fat since production from SROSS race 308, purchased from S.C. AVIMAR, Baia

Mare and is made using determination of fat, on refrigerated poultry fat and freezing poultry fat.

The biologic material was storage at the temperature for two experimental variants: chilled to 2 ... 4 ° C and freezing at -15 ...- 18 ° C; and the during storage for refrigeration is few days and for freezing some mounts.

Sampling was done at the factory premises, immediately after production, then melted and filtered. They were portioned and packed in vacuumed polythene bags to prevent direct contact with atmospheric oxygen and were stored under refrigeration and freezing seeking alterative installation process: hydrolysis and oxidation.

Codification of the samples:

- ✓ G_{Par} - Chilled poultry fat;
- ✓ G_{Pac} - Frozen poultry fat.

To achieve the objectives, the following physico-chemical parameters were determined and stored under refrigeration and freezing samples:

- Content of saturated and unsaturated fatty acids;
- Peroxide index;
- Kreis reaction (epihidrinic aldehyde)

For the fatty acids we use the method Gas chromatography with Flame Ion Detector (GC-FID), were the fatty acids from butter were transform in methylic esters, then the compounds were separated on chromatography colon and following the identification of fatty acids by compare with the etalon the determination of quantity of fatty acids. The results were in % fatty acids. We use gas-chromatograph Shimadzu GC-17 A with FID detector. Gas - chromatograph colon is an Alltech AT-WAX colon, 0.25mm I.D., 0.25µm stationary faze (polyethylene glycol). The gas that we use was helium at 147 kPa pressure, the temperature of injector and of detector was 260°C.

For the peroxide index we use UV - VIS T60U spectrophotometer (England): the temperature was between 5 and 45°C; the wavelength 190 - 1100 nm; the accuracy of wavelength is 0.1 nm. It were determinate the absorbance of the solution of Fe^{3+} at 500 nm. Then was build the calibration curve and the peroxide index is like mec O_2/kg fat.

Kreis reaction is the identification of aldehyde, which is a constant result of advanced fat oxidation. The epihidrinic aldehyde, form on advanced oxidation process of fat, deliberated on acids medium, it will have an reaction with flour gluing and results an colorant compound. The color intensity is proportional with the quantity of epihidrinic aldehyde and with oxidation process too.

The studied was on three sets of samples for each indicator in both methods of preservation (refrigeration, freezing).

G_{Pa0}-fresh poultry fat, poultry fat G_{Parl}- poultry fat in 1 day refrigerated, G_{Par2} - poultry fat in to 2 days refrigerated, G_{Par3}- poultry fat in 3 days refrigerated, G_{Par4} - poultry fat in to 4dazs refrigerated.

G_{Pa0}-fresh poultry fat, G_{Pacl}- poultry fat in 1 month freezing, G_{Pac2} - poultry fat in 2 months freezing, G_{Pac3}-poultry fat in 3 months freezing; G_{Pac4}-poultry fat in 4 months freezing.

RESULTS AND DISCUSSION

To appreciate the intensity of the oxidation process for chilled poultry fat were determined iodine index, peroxide index as an indicator of incipient oxidation and epihidrinic aldehyde as an indicator of the presence of advanced oxidation, measurements performed at 1 day intervals until Kreis showed positive reaction to determine when the installation of advanced oxidation process.

In the first 3 days of refrigerated storage has been a slow increase of the peroxide oxidation, which corresponds to the oxidation initiation phase, followed by a corresponding surge propagation phase which forms the largest amount of hydro - peroxides as oxidation of primary compounds, reaching 6.8 O2/kg mec poultry fat, on day 5 the growth is slow due balance is formed between the primary and secondary compounds of oxidation, and on the decreased peroxide index in June as a result of the division hydro – peroxides secondary compounds, at this point is positive Kreis reaction indicating the presence of epihidrinic aldehyde when installing and advanced oxidation process (taste and smell oxidation of fatty acids).

In the first 2 months of storage in freezing conditions has been a slow increase of the peroxide index, followed by a corresponding surge in the propagation phase is the most abundant form of peroxide index, and 4 months reduced the peroxide value hydro - peroxides in the division due to secondary compounds, at this point is positive Kreis reaction indicating the installation of advanced oxidation process.

The freezing process alterative to install slower fat oxidation after 3 months for poultry, pork fat for 5 months and 8 months for beef fat. Among the studied fats, beef fat is more resistant to attack because of the lower alteration in unsaturated fatty acids, which also delay the installation of the oxidative processes.

CONCLUSIONS

During storage of animal fats instead of variations in their chemical composition, the most significant increase in saturated fatty acids was found followed by butter fat, lard, poultry fat and fish oil, and the significant

decrease in monounsaturated fatty acids and polyunsaturated fatty acids fish oil was found, followed by poultry fat, lard, tallow and butter.

Knowledge of the fatty acid profile is important for determining the authenticity and freshness of the state of animal fat in cases of disputes.

The shelf life of refrigerated raw fat extracted from muscle tissue is much lower than rendered animal fats, because if the water content of the latter is much smaller and hydrolytic enzymes have been destroyed during the melting process.

The chemical composition of fresh poultry fat was: saturated fatty acids (30.56%), monounsaturated fatty acids (42.38%) and polyunsaturated fatty acids (27.49%), giving a soft texture, semifluid and high values of refractive index and iodine. the largest proportion of oleic acid were determined, linoleic and palmitic.

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