

INVESTIGATION OF THE PROCESS OF STORING PACKAGED RABBIT MEAT IN MODIFIED ATMOSPHERE

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Abstract: *The article presents experimental studies with packaged in modified atmosphere and stored refrigerated rabbit meat. We have used gas environment with a composition 80% O₂ and 20% CO₂ and vacuum. As a result of the experiment graphs of ambient temperature in cold storage were constructed. The shelf life of the packaged rabbit meat has been determined on the basis of microbiological analysis.*

Keywords: *modified atmosphere, cold storage, shelf life, rabbit meat*

1. Introduction

Meat and meat products are fast tainting foods therefore they must be stored refrigerated immediately after they are obtained. According to the European legislation of the modern meat industry, the fresh meat should be refrigerated to below 7°C.

Rabbit meat refers to the so-called white meat. It is obtained in specialized abattoirs. Due to its low cholesterol content it is recommended to people, suffering from cardiovascular or digestive system disease. Compared to other meats, it has the lowest fats content - 5,1% and highest proteins content - 22,77%. The human body absorbs it up to 90 %, while the beef is being absorbed up to 64%.

The rabbit meat is stored in refrigerated condition up to 7 days at temperature between 0 to 4°C. The refrigeration slows down the growth of microorganisms, the metabolite processes and reactions, which can lead to worse quality of the meat. The influence of the refrigeration on the

microflora depends on the temperature and the storage time. The storing effect of the refrigeration can be increased to a great extent by combining with storing in modified atmosphere.

There are different approaches for applying modified atmosphere for increasing the expiry date of packaged and refrigerated stored meats.

The definition of the expiry date of these foods is a complex investigation of the store temperature and their microflora.

The aim of the present work is to investigate the expiry date of refrigerated stored rabbit meat, packaged in vacuum and gas environment with a composition of 20% CO₂ и 80%O₂.

2. Materials and methods

For packaging of the rabbit meat are used semi-automatic machines Tray sealer “Multivac 250T” and double chamber vacuum “Henkelman H500”. The meat had been obtained the same day and it has been preliminary refrigerated to 4°C.

When packaged with Tray sealer “Multivac 250T” the rabbit meat is put in a polypropylene (PP) tray with dimensions 227x178x36 mm, which is sealed with foil “Bialon PP65 AF” made by “Wipak” company, having been preliminary filled with gas environment of 80%O₂ and 20%CO₂.

When packaged in vacuum by “Henkelman H500”, the rabbit meat is put in a bag 180/220/70 IPTV and is sealed in the package at the pressure of 10 mbar.

Each packaging machine makes five packages, as each of their sealing seams are visually checked. One of each is give for microbiological analysis as a control sample and the rest are put in refrigerator “Liebherr” CT2841 and are stored in refrigerated conditions. The reading and registration of the store temperature is done by Remote Integrated Control System (R.I.C.S.) EVCO ITALY, which has five separate temperature probes – Pt 100 (fig. 1).



Figure 1. R.I.C.S.
(Remote Integrated Control System)

During the refrigerated store (table 1) of the packaged rabbit meat, we define the microbiological indexes by the following methods:

- БДC EN ISO 4833:2004 Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of

microorganisms - Colony-count technique at 30 degrees C ;

- БДC EN ISO 6888:2005 Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species);

- БДC EN ISO 6579:2002 Microbiology of food and animal feeding stuffs - Horizontal method for the detection of Salmonella spp (ISO 6579:2002);

- ISO16649-2:2001 Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli -- Part 2: Colony-count technique at 44 degrees C using 5-bromo-4-chloro-3-indolyl beta-D-glucuronide ;

The reading and registration of the temperature is done by the temperature probes of R.I.C.S, which are located in the following zones: (Fig. 2).

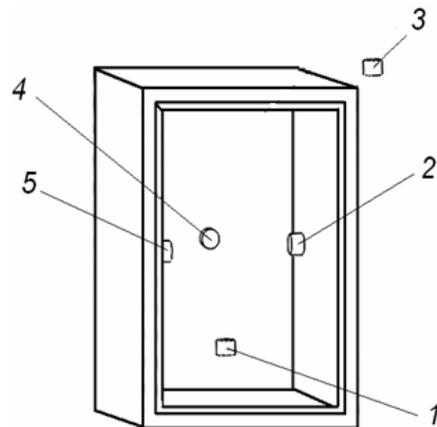


Figure 2. Location of the temperature probes

1 lower part; 2,4,5 central part;
3 in the room.

3. Results and Discussion

The temperature variation in the refrigerator CT 2841 Liebherr has been followed for the whole store period and we have presented data for only two days (48

hours), because during the next days the temperature has no variations (Fig.3 and 4).

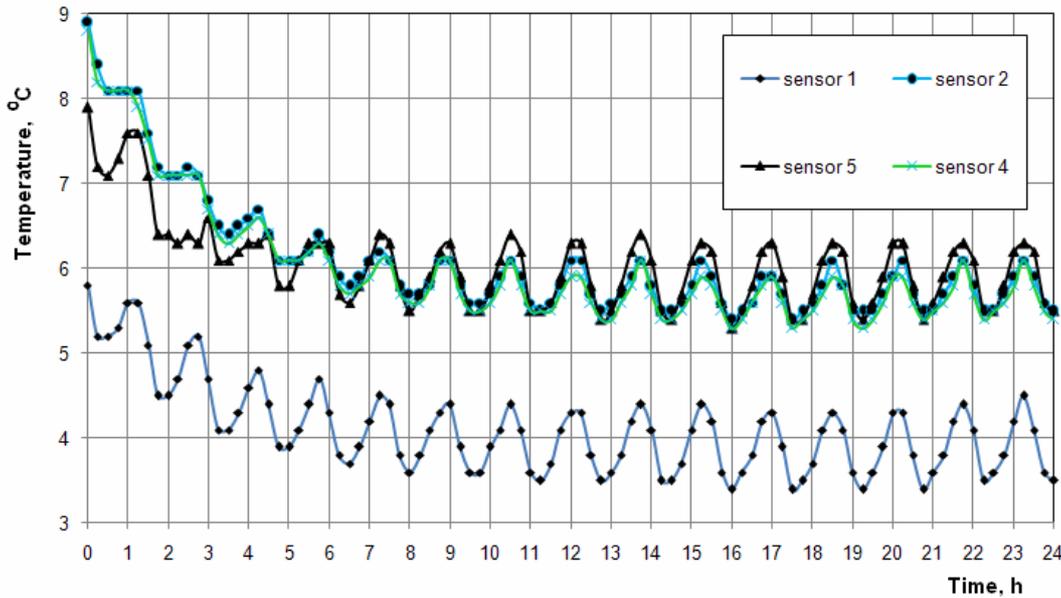


Figure 3. Store temperature during the first day

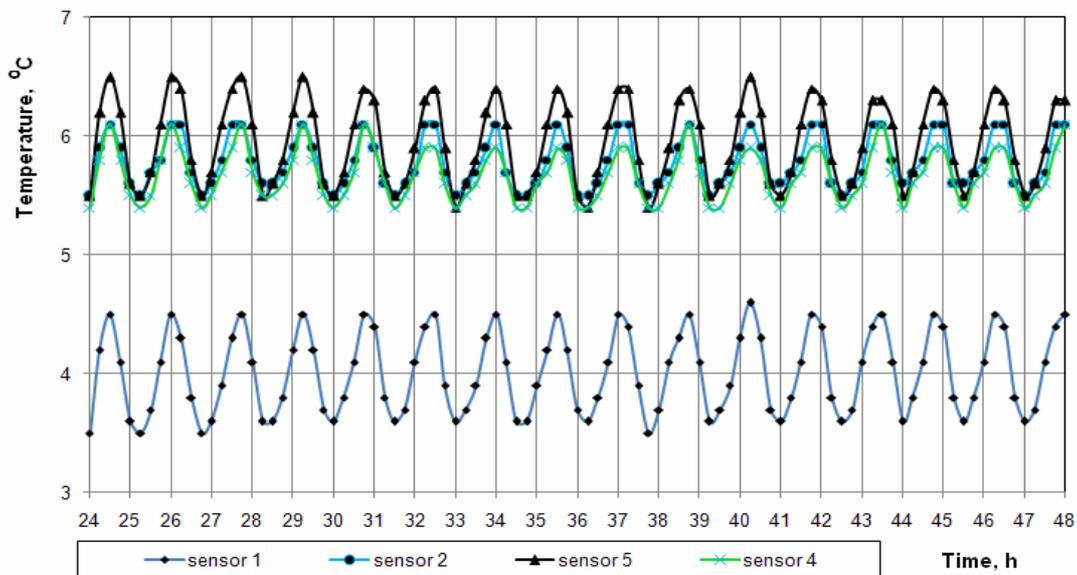


Figure 4. Store temperature during the second day

The packaged rabbit meat is stored in the central zone of the refrigerator (probe 2, 4 and 5). During storing the outer temperature varies from 25 to 28°C (probe 3). We can see on the graph that in the beginning the packages with rabbit meat are cooled and reach store temperature around the fifth hour. The average store

temperature for the whole period is 5,8°C, but the expiry date of storing is defined by the maximal temperature 6,3°C.

During store of whole packaged rabbit meats there is a change of the total microbial counts (Table1 and Fig.. 5a) due to the upgrowth of psychrophilic and psychrotrophic microorganisms, which appeared there during the process. The

modified gas environment (80%O₂ and 20%CO₂) has a greater effect on their growth.

The data show that the whole rabbit meats, packaged in modified gas environment can be stored in refrigerated

condition up to 9 days (Table 1). There is no alteration in the pathogen flora.

Table 1
Microflora of rabbit meat

Packaged in vacuum				
Store time	3 days	6 days	9 days	12 days
Coliforms, CFU/g	<10 ²	<10 ²	2.10 ³	-
Staphylococcus aureus, CFU/g	<10 ²	<10 ²	<10 ²	-
Salmonella	no	no	no	no
Total microbial counts, CFU/g	3,2.10 ⁴	1.10 ⁵	>1.10 ⁶	>1.10 ⁸
Packaged in gas environment 80%O ₂ and 20%CO ₂ .				
Coliforms, CFU/g	<10 ²	<10 ²	6.10 ²	-
Staphylococcus aureus, CFU/g	<10 ²	<10 ²	<10 ²	-
Salmonella	no	no	no	no
Total microbial counts, CFU/g	3,2.10 ³	9,4.10 ³	8.10 ⁴	>1.10 ⁸

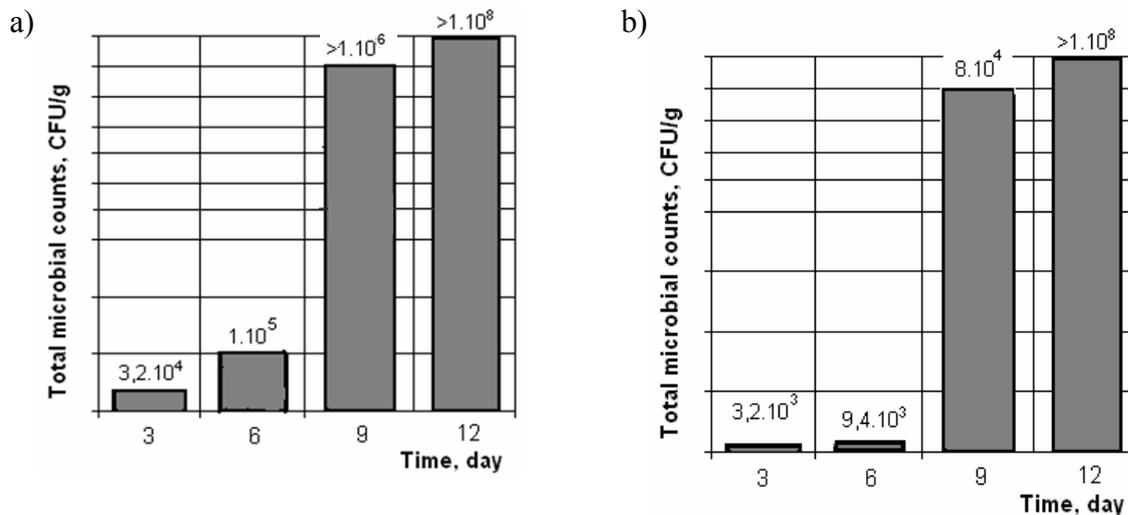


Figure 4. Total microbial counts of packaged rabbit meat in vacuum (a) and gas environment 80%O₂ and 20%CO₂ (b).

In the vacuum packaged rabbit meats the total microbial counts significantly increases till day 9. Because of that the meat in this packaging can be stored in refrigerated conditions up to 6 days (Table 1 and Fig. 5b).

The number of coliforms increases with 1 logarithmic unit (log N). The rest pathogenic microflora has no variations.

4. Conclusion

The experimental studies show the possibilities of gas environment application for packaging of whole refrigerated meats and increase the expiry date of their storage time.

5. References

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