PRESERVATION OF RAW CASING MATERIALS WITH THE AIM OF IMPROVING QUALITY CHARACTERISTICS DURING STORAGE AT POSITIVE TEMPERATURES

Tatulov Yu.V., Krekhov N.M., Sus I.V.
GNU The All-Russian Meat Research Institute named after V.M.Gorbatov, 109316, Moscow, Russia

Background

The technology of processing and preservation of raw casings includes a number of processes and operations aimed at preservation of their valuable properties for a long time, and the preparation of raw materials for use in sausages production. The supply of casings during the year should be uniform to make the operation of sausages production facilities rhythmical. Even short storage period of fresh casings leads to sharp decrease of their quality, and sometimes to full loss of their technological properties. Therefore, they should be protected from damage and spoilage during certain periods of time.

Objectives

The presented work was devoted to study of theoretical and practical bases of the effects of preserving chemical substances, particularly sorbic acid, selection and creation of compositions on their base for purposeful protection of natural sausage casings from spoilage.
Experimental investigations for the study of preserving effect of sorbic acid during curing of the casing fabricate were carried out under laboratory conditions of the Institute. The object of investigations was the fabricate obtained from the raw beef and pork casings.
The investigations were carried out on the determination of the optimum indices of consumption of sorbic acid in the selection of curing mixture which would ensure the quality of the casings fabricate meeting the requirements of the technical conditions in force for these raw materials.

Methods

With this aim the selected experimental and control lots of the casings fabricate being commonly used in sausages production were preserved by means of one of the studied compositions: the control samples – with the salt; sample 1 – by curing mixture, containing 0.5% of sorbic acid to the weight of salt; sample 2- with the curing mixture, containing 1% of sorbic acid to the weight of salt.
The lots of casings were preserved according to the requirements of regulations in force and stored during 1, 3, 6 and 9 months at an ambient temperature from 17 to 25°C.
The quality of casings was evaluated by the indices of strength, elasticity, chemical composition, microbiological and microstructure properties after 1, 3, 6 and 9 months of storage.
The appearance, color, presence of fat tissue, moulds, rusting, red spots were determined visually, odor – organoleptically.
The sensory evaluation and microbiological investigations of the fabricate of different kinds of casings have shown that the raw casings, manufactured according to the technical conditions in force and preserved by traditional curing can be stored for no longer than 1 month.

Results and discussion

Results of microbiological investigations are presented in the Table.
The use of curing mixture, containing 0.5% of sorbic acid prevented from the appearance of moulds and yeasts, but did not prevent from the development of bacteria of coli group (coliform); at the same time the use of the curing mixture with 1% sorbic acid prevented from the appearance of moulds, yeasts and development of pathogenic microflora.
Analysis of the data obtained has also shown that the use of the composition with 1% sorbic acid allows to preserve the casings materials without change of structure indices, caused by the effect of spoilage microflora. Thus, while in the control samples of the fabricate of beef and pork casings there was a loosening of the structure of submucous base, lysis of cellular structures and destruction of collagen fibers caused by the effect of microflora enzymes after three months of storage, there were no signs of microbial spoilage in the microstructure of the experimental samples.
The structure of the experimental samples of the fabricate of beef and pork casings after 3 and 6 months of storage featured a dense arrangement of connective tissue bundles, forming a submucous layer, absence of destructive changes of the fiber component which suggested that there were no raw materials quality spoilage during their storage.
The walls of the experimental lots of casings under the pressure of compressed air stood the required pressure 0.1 MPa at all the stages of storage period, the strength of the walls of the control lots was not satisfactory already after 3 months of storage. Besides, in the control samples of the fabricate of beef and pork casings after three months of storage there were signs of microbial spoilage characterized by loosening of the base of the walls of the casings, destruction of collagen fibers being its base and determining the strength of the casings materials.
The tensile strength of casings of all kinds of animals preserved with the curing mixture with 1% of sorbic acid did not practically change in contrast to those cured traditionally.
It was established that in control samples the content of nitrosamines increased during storage, and in the experimental ones – decreased 10-fold.
The residual content of sorbic acid as determined in the investigated samples was considerably lower than permitted daily consumption established by JECFA. There were no ruptures of casings under production conditions of sausages manufacture.
Based on the investigations carried out it was established that the use of curing mixture with 1% sorbic acid in relation to the weight of salt allows to preserve the quality of casing materials under the temperature conditions 17-25°C during 9 months.

Table 1 Results of microbiological investigations of casings

Experimental group	Mesophilic, aerobic and faculty-anaerobic microorganisms, CFU/g in 1 g, not more, than	Bacteria of coli group in 1 g of product	Pathogenic, including Salmonella in 25 g of product	Staph. Aureus in 1 g of product	Moulds in 1 g	Yeasts in 1 g
Standard according to medical and biological requirem.	5×10^6	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Fresh raw materials						
Round casing						
Control	3×10^3	-	-	-	-	-
Experiment	3×10^3	-	-	-	-	-
Hog casings						
Control	2×10^2	-	-	-	-	-
Experiment	2×10^2	-	-	-	-	-
1 month storage						
Round casings						
Control	3×10^4	-	-	-	-	-
Experiment	3×10^2	-	-	-	-	-
Hog casings						
Control	3×10^4	-	-	-	-	-
Experiment	2×10^2	-	-	-	-	-
3 months storage						
Round casings						
Control	8×10^5	Found	-	-	2×10^3	1×10^4
Experiment	1×10^2	-	-	-	-	-
					-	-
6 months storage						
Round casings Control	Removed from storage					
Experiment	1×10^2	-	-	-	-	
Hog casings Control	Removed from storage					
Experiment	1×10^2	-	-	-	-	-
9 months storage						
Round casing Control	Removed from storage					
Experiment	1×10^2	-	-	-	-	-
Hog casings Control	Removed from storage					
Experiment	1×10^2	-	-	-	-	-

Symbols :

- no microorganisms growth

Pertinent literature

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