

STUDY REGARDING THE INCREASE OF MEAT PRESERVATION WITH MINIMIZE OF NUTRIENTS LOSSES

Constantinescu G.

Buculei A., Rebenciuc I.

“Stefan cel Mare” University of Suceava, Faculty of Food Engineering, Romania

*Constantinescu G., e-mail: gabriela.constantinescu@fia.usv.ro

Summary The meat processing couldn't be realised without the direct involvement of its preservation industry, industry that uses nowadays different processes alone or combined for to realise first the meat preservation in the best conditions without major changes of its nutrients values.

The study is based on several important directions: the chemical composition of the meat and its global quality; ways of preservation; the preserved meat storage and analysis of the modifications that appear regarding its nutritive value. The study was realised on the basis of some analysis that can underline the nutritive value of the meat and the modifications that it undergoes being subdued to the main preservation processes: salting, smoking, salting and smoking. At the same time there are underlined the modifications that appear after the storage process even though it is realized in the proper conditions.

Keywords: preservation, meat industry, nutrient

Introduction

Meat's sanitation is generally appreciated according to its sensorial traits that can give solid indications upon its freshness. In the case in which the sensorial exam has discussable results there are lead the chemical analysis and the bacteriological exam. The laboratory analysis has to be done as quickly as possible for the alteration process not to evolve fact that would turn the determinations results unusable. For the meat the appearance and color are appreciated at the day light. According to its freshness state established by the sensorial exam the meat is classified in: fresh, relatively fresh or altered meat. The salted beef meat is presented boneless as salt injected beef shank.

The beef salting as an intermediate process is practiced on a large scale for the fabrication of some meat products while the salting as a way of long term preservation is done only when there are no other possible ways for it. The smoking is a helping preservation method for the salted products but it can be applied also as an only way for meat preservation.

Materials and methods

The study regarding the increase of meat preservation with the minimize of nutrients losses was done on the basis of a theoretical support and some lab analysis lead on meat samples that were subdued to different preservation treatments. The samples were four beef pieces from the same series one of them being considered the witness sample (sample I) on which no preservation process was led. The other three samples were subdued to the following processes: sample I – non preserved meat; sample II – salted meat; sample III – smoked meat. The analysis led on the meat samples were able to show the nutritive quality and the meat freshness being led on each sample at different times until the apparition of the clear signs of altering. The

sensorial methods refer to the appreciation of the outer appearance, the color, the consistency and the smell, the biochemical and physic-chemical to the meat's capacity of retaining water and its hydration, to the pH, the redox potential, the carbon hydrates, proteins and fats modifications etc. All the samples were stored for a limited time, in refrigerating conditions (0...4°C), until the appearance of the altering signs the meat being periodically subdued to sensorial, chemical and microbiological examinations observing the modifications that appear for each type of sample. The results obtained are presented in a chart underlining the modifications that appeared for each sample during almost two weeks. The analyses led were: The meat sensorial examination (STAS 7586-66), the humidity determination by oven drying (STAS 961-66), and the ammonia determination (STAS 961-66), and the easily hydrolysable nitrogen determination (STAS 961-66).

Results and discussions

Sensorial evaluation



a. after 24 h;



b. after 4 days;



c. after 12 days;

Fig. 1. Sample I – non preserved meat



a. after 24 h;

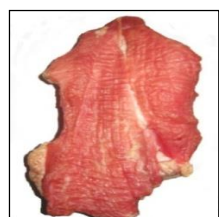


b. after 4 days;



c. after 12 day;

Fig. 2. Sample II – salted meat



a. after 24 h;



b. after 4 days;



c. after 12 days;

Fig. 3. Sample III – smoked meat

Table 1. The organoleptic properties of the non preserved meat

Appreciation factors	Sample I After 24h	Sample I After 4 days	Sample I After 12 days
OUTER APPEARANCE	- dry layer at the surface; - shinny, elastic and tough tendons; - flat and shinny joints surfaces; - clear synovial fluid.	- partially covered meat surface by a sticky mucus in small quantity; - doesn't have mold stains; - flask, opaque and grey tendons; - mucus covered joints surfaces;	- wet and sticky surface with some mold stains; - flask, opaque and grey mucus covered tendons - hard covered mucus joints surfaces; - unclear synovial fluid
COLOUR	- pinky red surface colour; - in section shinny, slightly humid, red coloured; - clear muscle fluid, hard to extract.	- at the surface and in section the colour is opaque and darker than that of the fresh meat; - in section is humid but not sticky;	- at surface the colour is gray with green areas - in section it's humid and very sticky - a decoloration is seen
CONSISTENCY	- the meat is firm and elastic - in section is compact - no prints are formed while finger pressing	- the meat is tender at the surface and in section; - the prints formed by finger pressing don't remain for long recovering rapidly and completely.	- at the surface and in section the prints formed by finger pressing are quite persistent.
SMELL	- pleasant smell for fresh beef meat	- slightly rancid at the surface there is an unaired meat smell.	- rotting smell at the surface and in the inner sections.

After the sensorial examination of the four samples we can see the apparition of the first altering signs and their evolution during the storage time. In normal storage conditions the altering signs appear first in the case of the non preserved meat and we can see for it a faster altering accompanied by more severe signs like the mold spots, the decomposing smell and the greenish-dark color.

Table 2. The organoleptic properties of the salted meat

Appreciation factors	Sample II After 24h	Sample II After 4 days	Sample II After 12 days
OUTER APPEARANCE	- red colour at the surface without mucus; - no mold colonies.	- at the surface the meat is partially covered by a sticky mucus; - it presents some mucus covered areas.	- the meat surface is mucus covered.

Continuation of *Table 2.*

COLOUR	- red colour at the surface - in section the red colour is bright	- at the surface and in section the colour is opaque having sme red greenish areas	- at the surface the colour is gray greenish and in section is opaque
CONSISTENCY	- tough consistency	- the meat is less firm and in section it has a tender consistency.	- the consistency becomes too tender from the outer to the inner side - the meat has no elasticity
SMELL	- pleasant, flavour specific for the salted meat	- the rancid smell appears	- unpleasant smell, more rancid in depth. -rotting smell perceived

The modifications of the sensorial traits appear for each meat sample in a different way being seen that the best case of preservation was that of the salted-smoked meat for which the first altering signs appear after a longer period of time with no significant modifications.

Table 3. The sensorial properties of the smoked meat

Appreciation factors	Sample III After 24h	Sample III After 4 days	Sample III After 12 days
OUTER APPEARANCE	- the outer surface presents a dry layer specific for the smoked meat.	- at the surface there are some humid areas - in section a mucus can be observed with some areas without elasticity	- the meat surface is humid and a philanthe mucus appears
COLOUR	- the surface color is brown specific for the smoked meat - the outer color is shady	- brown reddish surface color - color differences from the inner to the outer side	- at the surface the color is red brownish - in section the color becomes lighter from the outer to the inner side
CONSISTENCY	- firm and elastic consistency	- the meat losses consistency and elasticity	- the meat lacks elasticity and consistency
SMELL	- pleasant flavored smell specific for the smoked meat - fresh smoke smell	- a heavy smoke smell appears - a rancid smell in section	- unpleasant smell rancid in depth - acid rotting smell in section

The evolution of the physic-chemical traits of the meat samples

After the led analysis the following results were obtained for the meat samples (figure 4). The fresh beef meat has a high humidity content of 70% this percent being modified in time due to the storage conditions, temperature and humidity an increase being observed along with the meat's altering. From the chart we can see that the easily hydrolysable nitrogen's value increases along with the increase of the storage time at the end of this period the values being higher than those admitted. According to the results obtained it can be seen that the values of the slightly added ammonia vary in ratio with the following phases in the way that at the beginning of the altering it is found in higher levels, than it decreases and increases again in the case of severe altering. The certain fact is that at values higher than 42 mg NH₃ % established by determinations the meat isn't proper any longer from the sensorial point of view suffering obvious modifications.

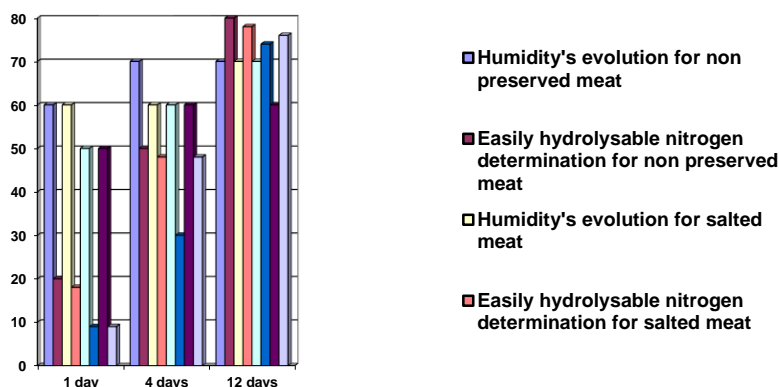


Fig. 4. The chart for the humidity and the hydrolysable nitrogen's evolution values for the meat samples

Conclusions

As a result of the led analysis the following conclusions can be drawn: the salting produces the meat's dehydration that can arrive to value up to 50% according to the time and type of salting; the meat's color is modified a brown grayish color appearing; a small quantity of proteins is lost fact due to the coagulation of the soluble proteins; by smoking the meat suffers weight losses as well as some chemical, physic-chemical and structural modifications; he weight losses are determined by the temperature, humidity and air speed in the smokehouses as well as by the initial traits of the meat. The improvement of the sensorial properties and digestibility are influenced both by the action of the smoke components and temperature that determines the collagen to inflate so that the humidity and tenderness of the product increases along with the increase of the digestibility coefficient. As a general conclusion, we can say that the preservation procedure can bring many benefits in meat processing but at the same time losses that will lead to minimize of the meat's global quality comprising the sensorial, technological and mainly nutritive quality.

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