ASPECTS CONCERNING NATRIUM NITRITE INFLUENCE ON MEAT PREPARATS TECHNOLOGICAL PROPERTIES AND SHELFLIFE

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Abstract: *This study subscribes together many others on this theme, so modern and actual, that are preserving the foods inocuity in a tight correlation with the best storage life and also with food safety maintaining. Consumers increasingly want to be assured that there are no harmful chemicals in their food. Food safety control systems used in the European Union in the public and private sectors depend heavily on conventional microbiological testing based on sample sizes and methods. A more focused application of risk analysis to new processes in food production would help to avoid unnecessary food scares in the future. In this paper we've tried to present few aspects about using various types of antioxidants and preservative substances, for example sodium nitrite, and their effect concerning physical-chemical and microbiological characterisation of some meat preparats, on the Bacau county market, starting with meat-raw material- characteristics and, not in the last time considering the parameters of technological processes, depend on assortment of meat preparats (that are followed in the experiments).*

Keywords: *quality preserving, sodium nitrite, meat preparats*

Introduction

In food industry there are used a lot of additives for improving colour, taste, flavour, structure, preservability etc.

They are useful for standard quality assurance no matter the raw material compositional variability, for production diversification, for responding consumer's exigencies regarding sensorial qualities of products.

It has been foretold that in the future, as a consequence of unconventional raw material processing, additives' role will consistently grow.

In the same time, using additives implies some risks determined by negative effects, possibly even toxic effects.

FAO/OMS has made the following classification:

1. Substances without doubt, with fixed daily quantity determined by toxicological research and knowing their metabolising type in organisms.

2. Substances with daily quantity temporarily established, because there is no sufficient data about their toxic role.

3. Additives truly toxic for organism that are strictly forbidden.

The salting process, one of the oldest preserving methods, is also applied in meat technology and the basic principle is anabiosys, also osmoanabiosys.

The salting also has a technological goal: raising the hydrate capacity of the meat and a sensorial one: assuring the taste, and not least the improvement of the shelf life capacity of foodstuffs.

In the meat preparats' technologies and also cans and semi-cans, it is used a nitrates, nitrites, ascorbic acid and their salts, some organic acids.

Nitrates and nitrites are natural compounds of soil. Nitrates have a reduced toxicity and on the contrary, nitrites have a high level of toxicity, because they inhibit the mitochondrial respiration and oxidative phosphorilation,

reduce significantly the protein and lipids absorption and also have a role in nitrosamines encounters.

The sodium or potassium nitrite is responsible for reddening the meat, for the meat flavour and also for preservation of the meat by the bacteriological and lipid oxidation point of view. Also, the nitrite may intervene in favouring the spores and vegetative forms' destructions.

It has been observed that ascorbic acid and his salts improve the antimicrobial activity of sodium nitrite by iron complexion. The thermal treatment along with nitrite presence assures the antibotulinic protection of meat preparats.

All these aspects are very tied with animal species, with breed, also with sex, but the most important factors are the type of muscle, that induces different chemical compositions: amino acids, organic acids, lipid content etc. and the maturation level of the meat that is responsible for the level of protein degradation, the level of triglyceride hydrolysis.

In the present study we tried to reveal some aspects concerning the main parameters of raw material, in our case meat, and the residual content of sodium nitrites in a couple of meat preparats assortments correlated with their recipe of fabrication and the thermal treatments that are applied.

Materials and methods

The samples studied in this paper, represent raw meat received by the few producers of the Bacau county and also the finished products obtained by their processing in the production sections. The samples are lifted by operators and specialists and are immediately introduced for analysis. They were processed by the classic methods for: protein determination, pH, hydrolysable ammonium, Nessler, Kreiss and nitrite determination.

For total nitrogen determination we used Kjeldhal method and Gerhardt apparatus system: for digestion, for distillation and potentiometer for final titration.

For hydrolysable ammonium we used the same distillation Gerhardt system that can be adjusted to a lower value of steam power that is 60%.

In the two cases: total nitrogen and hydrolysable ammonium determination, the titration was made with HCl, 0.1N and the distillate is caught in boric acid of 40% concentration.

For collagen determination we made a hydrolysis with HCl concentrated, in the presence of $SnCl_2$, followed by dilution, filtration and reaction with colouring substance, the resulted complex being evaluated at spectrometer.

For nitrite determination we used the Griess method and Spekol 1100 as apparatus. The reagent is Griess solution originally prepared by Merck. The determinations are made at λ=520 nm.

Results and discussion

In the tables1 are the results of the analyses for the raw meat. We can observe from the results of table 1 that all the samples have the examined parameters in the limits recommended by the present standards and these are: pH in the limit of maximum 6.5; NH3 maximum admitted 35 mg/100g.

We have also determined total nitrogen and the nitrogen from hidroxy-proline that is an important indicator for protein quality in the meat that is supposed to be processed in products with high energetic value.

The results for total nitrogen, as we seen in the table, differ from sample to sample, depending on their type and origin. The samples of MDM presented in the table consist of recovered meat from the bones, in this case from the chicken meat processing, meat that is minced and

refrigerated. This type of raw meat is used for its formidable properties connected with the water retention and also the assurance of some consistency and rheological properties of finished products.

Table 1 Results for raw meat

Sample	pH	NH_3 [mg/100g]	Total nitrogen [%]	Collagen [Hidroxy proline] [%]
Pork meat 1	5.73	15.26	2.68	1.73
Pork meat 2	5.70	16.49	2.73	1.69
Pork meat 3	5.71	15.22	2.64	1.86
Beef meat 1	5.71	14.80	2.64	1.81
Beef meat 2	5.69	14.95	2.79	1.77
Beef meat 3	5.65	15.11	2.86	1.80
MDM 1	5.80	17.23	2.22	2.78
MDM 2	5.83	17.45	2.28	2.54

In table 2 we present the values for nitrite residual content in the finished products that are grouped in some categories: salami, sausages and specialities.

As we can observe the values for nitrite residual content are in a very large range that can be explained also by the technological recipe and also by the metabolising mode referring the muscle fibre. For the salami assortments the values are almost the same with one exception at the sample Ungarische that has the lowest value. The values for sausages assortments are very tight: [1.96-3.33] that explains the same technology for obtainment, with little differences regarding one single thermal treatment or two thermal treatments followed by smoking treatment. In the specialties field, the values demonstrate a tight correlation with the principle of nitrite reaction with mioglobine in muscle fiber.

Table 2 Results for finished products

Category	Assortments	NO_2 [mg/100g]
A Salami	Victoria	3.21
	De vara	2.68
	Italian	2.89
	Rustic	3.51
	Ungarische	1.65
B Sausages	De casa	2.52
	Afumati	2.97
	Cabanos	3.33
	Gratar	2.80
	Crenwursti	1.96
C Specialities	Pastrama	5.70
	Muschi file	3.08
	Jambonel din piept de pui	1.51
	Sunca de Praga	3.82
	Muschi tiganesc	4.24

Conclusions

The present study is small contribution at a large European project that wants to satisfy the consumer and political demands that means to make all food products completely traceable "from farm to fork". At present, each possible chemical contaminant is analysed individually in a few specialist laboratories, process which is slow and expensive.

The safety and health of Europe's citizens would be better protected by screening foods for the cumulative effect of naturally occurring and illegal contaminants in faster and more widely applicable processes. The nitrate and nitrite contribute to colour developing in meat, in the technological process for sausages, common salami and mould-dried salami and different specialities by combining with residual mioglobin and hemoglobin in course of thermal treatment. Having in consideration the toxicity for consumers, especially for the child, their usage in food products must be under rigorous control and their storage in food producing units must be very restricted.

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