ISSN 2310-1008

Ukrainian Journal of Food Science

Volume 2, Issue 1
2014

Kyiv 2014

Ukrainian Journal of Food Science publishes original research articles, short communications, review papers, news and literature reviews.

Topic covered by the journal include:

Food engineering
Food chemistry
Biotechnology, microbiology
Physical property of food
Food quality and safety
Health
Food nanotechnologies
Food processes
Economics and management
Automation of food processes
Food packaging

Periodicity of the journal 2 issues per year (June, December).

Studies must be novel, have a clear connection to food science, and be of general interest to the international scientific community.

The editors make every effort to ensure rapid and fair reviews, resulting in timely publication of accepted manuscripts.

Ukrainian Journal of Food Science is Abstracted and indexated by bases:
Index Copernicus (2014), Google Scholar (2013), Directory of Research Journal Indexing (DRJI) (2014), Universal Impact Factor (2014).

Reviewing a Manuscript for Publication. All scientific articles submitted for publication in "Ukrainian Journal of Food Science" are double-blind reviewed by at least two academics appointed by the Editors' Board: one from the Editorial Board and one independent scientist.

Copyright. Authors submitting articles for publication warrant that the work is not an infringement of any existing copyright and will indemnify the publisher against any breach of such warranty. For ease of dissemination and to ensure proper policing of use papers and contributions become the legal copyright of the publisher unless otherwise agreed.

Academic ethics policy. The Editorial Board of "Ukrainian Journal of Food Science" follows the rules on academic writing and academic ethics, according to the work by Miguel Roig (2003, 2006) "Avoiding plagiarism, self-plagiarism, and other questionable writing practices. A guide to ethical writing". The Editorial Board suggests to potential contributors of the journal, reviewers and readers to dully follow this guidance in order to avoid misconceptions in academic writing.

For a full guide for Autor please visit website at **http://ukrfoodscience.ho.ua**

Editorial office address:
National University of Food Technologies
Volodymyrska str., 68
Kyiv 01601
Ukraine

E-mail:
Ukrfoodscience@meta.ua

Ukrainian Journal of Food Science

Editorial board

Contents

Food technologies…… 6

Irina Kyshenko, Oleksandr Donets, Yulia Kryzhova
The study of properties of a raw meat product during salting by brines…….. 6

Olena Grek, Olena Krasulia, Oleksandr Savchenko, Alla Petrina
Fatty acid composition of dairy fat products of vegetable origin …… 14

Mariya Zholdosh, Evgeniya Shemanska, Irina Radzievska
Modeling composition of the mixed oils by blending ……..... 22

Iryna Panasiuk, Svitlana Danylenko, Galyna Cherednichenko
Screening strains for fermentation of meet raw material ……..... 29

Lyudmyla Peshuk, Oleg Halenko, Nina Budnyk
Rational use of the collagen ……...……...……... 35

Natalya Cherno, Georgii Stankevych, Sophya Osolina, Oleksandra Nikitina
The optimization of conditions for obtaining food supple-ment with the adaptogenic activity from Agaricus bisporus …….. 43

Biotechnology, microbiology…….. 52

Mykola Ivahniuk, Tetyana Pirog
Intensification of microbial exopolysaccharide ethapolan synthesis under Acinetobacter sp. IMV B-7005 cultivation on sunflower oil…..... 52

Food chemistry…… 58

Olena Podobiy, Svitlana Bondarenko, Anastasia Yarosh, Marina Ladonko
Extracting P - vitamin complex from green tea leaves …… 58

Maksym Polumbryk, Vira Ischenko, Oleg Polumbryk
Determination of trace elements (Cr, Al, Pb) by atomic absorption in natural water of Kyiv ……... 65

Processes and equipment of food productions…….. 73

Vitalii Shutiuk, Oleksandr Bessarab, Temenuzhka Haralanova, Sergii Vasylenko
Analysis of the process of formation of n-nitrosodimethylamine in brewer's malt……..…. 73

Oleksandr Kravchenko, Yuliya Telychkun, Volodymyr Telychkun
Perfection of equipment for improvement of dough semi finished……..…..... 81

Oleksandr Gavva, Ludmyla Kryvoplyas-Volodina, Mykola Maslo 89
Scientific bases of method of synthesis for the structure of machines that provide packing process by foodstuffs……....

Automatization of technological processes …….. 98

Volodymyr Shesterenko, Igor Izvolenskiy, Oleg Mashchenko, Oleksandra Shesterenko
Optimization of power supply system at food production enterprises……..... 98

Olga Mazurenko, Valerii Samsonov
Calculation of final heating temperature of turbogenerator stator winding for control over development of winding thermal damage…… 106

Volodymyr Fedorov, Oleg Kepko, Oleksandr Skarboviychuk
Returning heat flow during thermal treatment of food……..…….. 118

Life safety…… 124

Olga Evtushenko
An increasement of general occupational safety level at food industry plants 124

Nataliya Volodchenkova, Oleksandr Hivrych, Mariika Petrova
Modeling of risk of hazardous industrial facilities in emergencies …… 136

Abstracts…… 144

Instructions for authors…….. 169

The study of properties of a raw meat product during salting by brines

Irina Kyshenko[1], Oleksandr Donets[1] , Yulia Kryzhova[2]

1 - National university of food technology, Kyiv, Ukraine
2 - National university of life and environmental of Ukraine, Kyiv, Ukraine

Keywords:

Meat
Brine
Colour
Pigment
Myoglobin

Article history:

Received 12.05.2014
Received in revised form 17.06.2014
Accepted 30.06.2014

Corresponding author:

Yulia Kryzhova
E-mail:
yuliya.kryzhova@mail.ru

Abstract

Introduction. The mechanism of forming of the coloured descriptions of the model meat systems is investigational with low maintenance of myoglobin on the stage of salting on the change of the coloured descriptions of meat raw material in the process of salting.

Materials and methods. Determination of relative content of myoglobin and its derivatives was performed by reflectivity spectroscopy spectrophotometer SF-18, the total content of pigments - pigments meat first extraction of water, acetone and hydrochloric acid, followed by extraction by photokolorimeter at a wavelength of 540 nm with respect to hydrochloric acid acetone; color intensity - the photoelectric KF-77 at a wavelength of 540 nm against distilled, the determination and colored integral characteristics - Cary 50 spectrophotometer.

Results and discussion. The expediency of using technology-based dyes of meat preparations hemoglobin slaughtered animals Vepro 70 Col R Red Apro and as components of multi brine for color correction ham products with high injection and with different levels of myoglobin in the meat raw. Rational drug concentrations of hemoglobin (Vepro 70 Col P and Apro Red) color for meat with a fat content of 10% was respectively 0.5% and 0.6%, while the use of 0.05% Sodium Erythorbate and 0.006% sodium nitrite.

Conclusions. The results recommended for modern production technologies ham products using intensification methods of salting.

Introduction

The development of new and improvement of existing technologies, improvement of manufactured products quality, namely, the exclusion of the using or minimizing various toxic substances is an urgent problem in a meat-processing industry.

Creation of cured-meat products with a high level of safety needs improving some core processes of production using some intensive cost-effective ways to influence the feedstock. In this regard, it is necessary to study the question of colour-correcting of whole muscle meat products of a high level injection, using some intensive methods of salting in combination with colour-correcting components of multicomponent brines. However, the analysis of the Ukrainian meat market shows that there are a lot of cured-meat products with the salt-brine level of 60% and 80% 'economy class' among them, in meat formula of which there are connective animal albumens and food hydrocolloids, i.e. the proportion of without myoglobine raw materials, contained in the finished product, exceeds 15 – 20%. During colour correcting of such products, as the results of research and practical experience have shown, staining power of sodium nitrite is not enough to produce the traditional red-pink colour. In this regard, it is appropriate to search for mixture with a more expressive red-pink variety, which would provide an opportunity to obtain the desired colour for products with a high level of the brine system injection in dependence to quantitative scope of hemoglobin.

There are almost always some contradictions as for the use of sodium nitrite salting process. Europe may introduce a ban on its use and we are, the Ukrainians, also can get rid of it. To do such step is easy, but what nitrite will be replaced is a rather complex issue. The list of colouring substances, that are allowed by the Ukrainian Government, for using them as food colouring additives, has more than 30 namings. But most of them can not be used in the manufacture of meat products for a number of reasons. Firstly, the colourant formation of model meat system is outlying for this type of sausage or meat products. Secondly, this is instability of colourant properties in the process of meat production.

The aim of the pilot experiment was to investigate the mechanism of formation of the coloured meat characteristics models with low myoglobin at the stage of curing with the inclusion to the feature-rich brine colloidal systems some nitrite salts instead of sodium nitrite and natural colourants (Apro Red and Vepro 70 Col P ('Viadi' company, the Netherlands), to change coloured characteristics of the raw meat products during salting.

In accordance with the objectives and tasks of the scientific paper, there has been studied the characteristics of the formation of the coloured raw meat products during salting using nitrite salts composed of multifunctional brine in an amount that is an equivalent to the content of sodium nitrite (20 g per 100 l), that in conversion is 3.5 % of nitrite salts to the mass of brine. Insufficient amount of salt was supplemented by vacuum, as it has a higher degree of sodium chloride (99.84%), while a small amount of insolubles, compared with unrefined type of food salt (rocksalt, deposited salt, solar salt).

Materials and methods

The object of the study was a longitudinal muscle of the back (L. Dorsi), which was obtained from the cooled lean beef of the 2nd category fatness with the autolysis period of 48 hours, pH 6.2 ± 0.01, weight pieces – 300 g. Drinking tap water (pH 7.8-8.0) was used for the brine preparation. The prepared raw product was injected by single-needle syringe by staggered scheme with a step 2.5×10-3m of different brines composition (Table 1).

Rational use of the collagen

Lyudmyla Peshuk[1], Oleg Halenko[1]
Nina Budnyk[2]

1 - National University of Food Technologies, Kyiv, Ukraine
2 - Poltava university of economy and trade, Poltava, Ukraine

Keywords:

Meat
Cattle rumen
Raw
Gerontology

Article history:

Received 21.04.2014
Received in revised form 22.06.2014
Accepted 30.06.2014

Corresponding author:

Oleg Halenko
E-mail:
galen@i.ua

Abstract

Introduction. The topicality of the work is to justify the choice of low-grade meat raw material as a matrix for tying together calcium ions.

Materials and methods. A safe, effective and affordable enzyme preparation is chosen from literature sources in order to increase the number of functional groups in the raw material.

It was necessary to prove the amount of enzyme preparation for efficient proteolysis subject to technological processes and economic expediency.

Results. It was determined rational pH parameters (6,8 - 7,0), temperature (12±1°C), duration (3 hour), duty of water curve of environment (1:1) and amount of enzyme preparation for efficient proteolysis on model systems (0,1 %).

By means of complete factorial test, followed by mathematical modeling in problem-oriented package MathCad, mathematical model of dependence of length and temperature of proteolysis is developed the indicator of amino nitrogen content in the received of paunch of cattle was selected as the parameter of optimization. The study is conducted and the confirmation of the data in model environments during proteolysis of cow tripe is received.

The results are suggested to use in meat products industry of special food - gerodietetic. The development enables to reduce price of finished product, enrich it with micronutrients and improve it digestion by the human body.

Introduction

Nation health is a determining factor in the effectiveness and efficiency of both social and economic reforms. Today, state suffers from the combined effects of economic, environmental and demographic crisis, which reinforce each other and prevent the improving of the quality of life and socio-economic development of the state's population.

Disruption of the normal flow of processes of natural reproduction of population led to a decrease in the proportion of people whose age is under working age, to growth in working age and older than working age, which generally resulted in an increase in population pressure on the working age population. Overall mortality exceeds twice the corresponding rates of EU countries, the mortality rate of working age people exceeds in 2 - 3 times.

According to the Constitution of Ukraine, ensuring the health of the nation is a problem that should be solved in close conjunction with the public policy and activities of local governments, local communities and populations.

So, ensuring and strengthening of population health, extending the period of active longevity, prolonging life expectancy, focusing on health as a social value can provide citizen with competitiveness in the labor market, professional longevity, welfare and as a result - improvement of life quality, strengthening of human potential, preservation of the gene pool of the people, improvement of the demographic situation in the country. The economic business costs for employment potential recovery from disability will reduce. However it is important to form an understanding of individual responsibility for health.

Meat is the most important food product that provides human with essential, high-quality and full value animal protein. One of the most important tasks of providing humanity with food is to increase production of meat and meat products to satisfy the needs of population. It is important not only to increase the total production of meat products, but also provide their maximum production of each ton of raw materials, improve the quality, nutritional value and commodity indices extend the range. Solving this problem requires work to create precocious meat breeds of cattle, rational use of meat and products of animal slaughter, the intensification of technological processes, creating meat analogy and the use of plant and microbial proteins.

It is known that to achieve high economic efficiency of processing by-products it is necessary to strive to maximize their use in cost-effective high-quality manufactured meat products, such as sausages and smoked sausages that are most in demand and more stable to storage. One of the most promising ways to achieve maximum production efficiency, improve and stabilize the quality of sausages is the production with a minimum cost. This is achieved through the most rational use of raw materials, first of all, through the usage of muscle protein, the wide use of secondary raw materials (scrap, offal, protein components of plant and animal origin).

By-products of the second category have a full set of essential amino acids. As it is shown in Table 1, cattle rumen is the most significant source of collagen, which has more than half of connective tissue proteins (contains 61,3 % of collagen of the total protein). Collagens form insoluble filaments (fibrils), which are the part of extracellular matrix and connective tissues.

Table 1

Chemical composition of beef by-products of the second category

By-products	Protein content, %			
	total protein	collagen	salt-soluble	collagen of the protein
Lips	20,3±2,9	13,4±1,4	0,6±0,1	66,0
Abomasum	14,4±1,5	5,9±0,2	0,7±0,2	41,2
Cattle rumen	17,1±1,8	10,5±0,8	0,8±0,1	61,2
Gullet meat	16,3±1,4	5,7±0,7	1,9±0,1	34,7
Spleen	16,4±0,6	1,9±0,4	7,9±0,2	11,3
Lungs	16,1±1,0	4,3±0,5	4,4±0,1	26,3
Trachea	15,6±0,8	6,2±0,9	-	39,5
Head' meat	18,8±0,4	6,5±0,2	-	36,3
Ears	25,2±0,1	17,9±0,1	-	71,0

Materials and methods

Purpose of the study - the rumen of cattle, leaf mussels, semi-finished and ready-minced sausages.

Rumen of cattle receiving from healthy adult cattle from private farms. Leaf mussels were collected from private mussel farms in the Black Sea in the waters of Kerch. All parties were selected toxicological and radiological control center for evaluating the quality and safety of food materials. Semi-finished and ready-minced sausages produced in the scientific laboratory of the university.

It was determined rational pH parameters, temperature, duration, duty of water curve of environment and amount of enzyme preparation for efficient proteolysis on model systems.

Processing of the experimental data was carried out statistical modeling using Excel spreadsheet and problem-oriented mathematical calculations package Math Cad. A mathematical model of comprehensive quality index calculated by the method of numerical characteristics of the object, based on the law of additivity, which can be used to construct a model of food quality designation. The results of any measurements always contain some error. Therefore, the results of the studies were subjected to mathematical treatment in accordance with the recommendations set forth in by the formulas: arithmetic mean values of the chemical composition of prototypes:

$$\overline{X} = \frac{\sum X}{N}, \tag{1}$$

where X - the individual values of;

N - total number of studies.

Dispersion parameters determined by the formula:

$$S^2 = \frac{\sum (X - \overline{X})^2}{n-1}, \tag{2}$$

where n - sample size;

n - 1 - number of degrees of freedom.

Standard deviation values of parameters determined by the formula:

$$S = \sqrt{S^2} \tag{3}$$

Standard error:

$$S_{\overline{X}} = \frac{S}{\sqrt{n}} \tag{4}$$

The experimental results were treated by mathematical statistics, given the repetition of experiments, average values of the studied parameters, the rate of approximation.

The aim of the research is the usage of cattle rumen in the production of cooked sausages in raw condition. The expediency of using cattle rumen in raw condition in recipe of cooked sausages is due to the thermal properties of collagen. Depending on the nature of collagen, its temperature welding depends on the content of oxyproline. "Welding" temperature raises with the increase in the content of this amino acid residue in the peptide chain of protein. The content of oxyproline for cattle rumen is 7,6 % of the total protein. Accordingly, higher temperature and duration of heating is required to "weld" the rumen, which leads to a decrease in the nutritional value of the given by-product.

Previously, the rumen was deprived of fat, released of the contents, washed in limbo for dimethyl sulfoxide working [$(CH_3)_2S=O$]. After thorough brush cleaning of internal and external sides of the rumen on the umbrella table or on a centrifuge at water temperature of 35 °C for 3 - 4 min the raw materials were sent to the tub to scald at a temperature of 64 ... 68 °C for 5 - 8 min. Then it was transferred to a centrifuge (ISO-3C) for purification.

Results and discussion

Cleaned rumens were cooled in the tub with running water and kept for 20 - 30 min on frames with hooks. At the end of the process rumens were chopped in the meat mincer with a grating diameter of 2 - 3 mm. Salt was added at a rate of 3 kg per 100 kg of raw material (3 %) and dimethyl sulfoxide - 200 ml per 100 kg of rumen (0,25 %).

The ready substance is mixed thoroughly for 3 - 4 minutes and placed in a refrigerator (2 ... 4 °C). Filling was prepared after 24 hours of storage. Before cooking the filling we poured liquid that was released from the rumen softened in salt mixture.

Before salting, beef was chopped in the meat mincer with a grilles diameter of 16 - 22 mm, and for pork – 8 - 12 mm. Meat was` salted and kept at a temperature of 2 - 4 °C overnight. During this process the raw was stored in a container with a layer of 15 cm.

Enzymatic treatment leads to destructive changes of raw materials, increase of number of hydrophilic centers, increase of functional groups as a result of rupture of polypeptide chains, which further will be more accessible for reactions including calcium. However, our goal was not a complete hydrolyzate of protein molecules to amino acids, we tried to achieve only partial hydrolysis to increase the number of free functional groups, including those that are capable of binding calcium (figure 1).

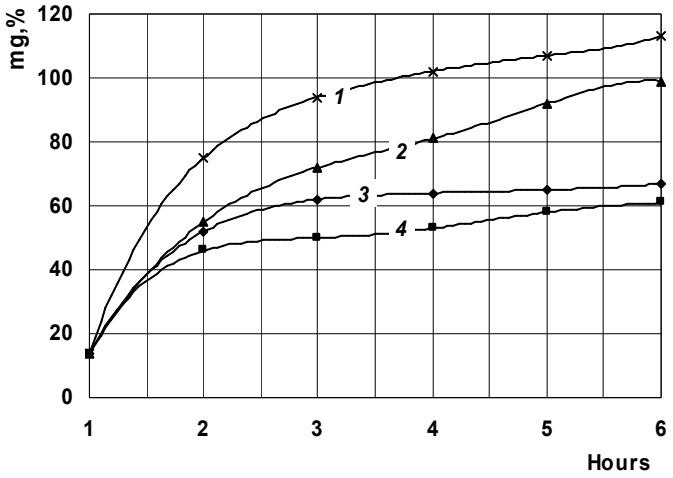

Figure 1. Diagram of accumulation of amino nitrogen in the processing of the rumen of cattle, depending on the ambient temperature:
1 - treatment at 2 °C; 2 - treatment at 12 °C; 3 - treatment at 37 °C; 4 - treatment at 50 °C (pH - 7,0).

Processing of cattle rumen was held by 0,05% solution of the enzyme by weight of raw materials (recommendations of Tolstobokov O. M.) at temperature regimes: 2 °C (cold chamber), 12 °C (in meat processing plants in the shops), 37 °C (norm of body temperature) and 50 ° C (thermostat) for 5 hours.

Proteolysis of protein of collagen containing tissue is observed in all modes, as evidenced by the accumulation of amino nitrogen. The highest rate of proteolysis of proteins is observed during the first time, as shown by angle curves from the second processing time it is reduced. The largest number of amino nitrogen was observed at 37 ° C in each period, minimum - at 2 ° C. So, after 2 hours of fermentation amount of amino nitrogen in samples that were treated at 37 ° C increased by 5.8 times at 12 ° C - 4.5 times, at 2 ° C - 3 times, further the rate of decay of proteins to peptides and amino acids gradually decreased. Thus, the most effective fermentation temperature is 37 ° C.

In conditions of production the support of 37 ° C entails additional costs for equipment and energy, which is undesirable in the development of new technologies. Also such temperature creates optimal conditions for microbial growth. Therefore, temperature 12 ° C is more suitable, which is chosen for further studies because it is constantly maintained at a meat processing enterprises in manufacturing plants, but also increased the concentration of enzyme to 0,1%.

Salted beef was minced in meat mincer with holes diameter of 2 – 3 mm before cooking. Preparation and processing of minced were performed in mixer. Minced meat and rumen were mixed with spices and auxiliary materials for 2 – 3 min. Six batches of minced meat were prepared under the first variant, one batch under the second variant to assess the influence of the composition of minced meat with rumen on the quality of sausages (Table 2).

Pork bellies were filled with minced meat of each batch, twisted like a long loaf of 20 - 25cm long. After ling loaf sinking at temperatures above 8 °C for 2 - 4 hours it was boiled at 80 ± 5°C for 60 min. to achieve the temperature inside the long loaf 75 ± 2 °C. After, the sausage was cooled at a temperature of 12 ± 2°C.

Spices and support materials are the following components (g/100kg, raw): sodium nitrite (solution) – 5; sugar sand - 100; ground black pepper – 100; allspice powder - 100; coriander - 150; fresh garlic – 200.

Table 3 and 4 show the results of the laboratory analysis.

Table 2

The composition of cooked sausages

Ingredients, %	Variant						
	1						2
	A	B	C	D	E	F	-
First class beef	60	60	60	60	60	60	60
Half-fat, veiny pork	35	33	30	28	22	20	30
Cattle rumen	3	5	7	8	9	11	7
Starch of flour	2	2	3	4	4	4	3

Samples of each batch were selected and analyzed under the established rules to (5-7) at the Department of Technology of meat and meat products of National University of Food Technologies determine the organoleptic and physico-chemical parameters and yield. Table 3 and 4 show that batches A, B, C and D meet the requires of cooked sausages. In terms of profitability of used raw and the possibility of using the optimal quantity of rumen batch formulation C and D can be used.

Formulations of the batches E and F do not meet the requirements for the 1st grade cooked sausages because of the smell, taste, color, texture as well as moisture content. The best sausage formulation is from variant 2, as it is shown in Table 3 and 4.

Table 3

Organoleptic evaluation of cooked sausages

Batch	Look	Taste and smell	Look in a cut
A	Loaf with a clean, dry surface without spots don't stick, without flow of minced meat	Taste and smell are specific to the type of product, with a particular aroma of spices, smoking and the smell of garlic, with a pleasant aftertaste, slightly spicy flavor, moderately salty	Stuffing is evenly mixed, has a pink color, without gray inclusions, voids and contains bits of rumen no more than 2-3 mm
B	The same	The same	The same
C	The same	The same	The same
D	The same	The same	The same
E	The same	Unusual to this type of product taste and smell begin to appear	Looseness of minced meat appears in cuts
F	The same	Unusual to this type of product taste and smell strengths	Looseness of minced meat increases
-	The same	Taste and smell are specific to the type of product, with a particular aroma of spices, smoking and the smell of garlic, with a pleasant aftertaste, slightly spicy flavor, moderately salty.	Stuffing is evenly mixed, has a pink color, without gray inclusions, voids and contains bits of rumen no more than 2 - 3mm

Studies showed that the shelf life of such a sausage is no more than 8 days at a temperature not higher than 12 °C and a relative humidity of 75 – 78 %. The moisture

content in the finished product 57 - 60 %, salt – 3 %. The output of finished products (sausages) to substance of unsalted raw is 115 - 128 %.

Depending on the species and varieties of sausages, meat is ground to varying degrees: in pieces weighing 100 g to 16 – 25 mm or 2 – 3 mm and to finely condition. Experiments have found that rumen grinding on the particle with a size of 2 – 3 mm is more profitable than others. It must be emphasized that it is not profitable to salt the by-products before grinding. In medium of the salt + dimethyl sulfoxide the diffusion transition of protein, extractives and minerals from rumen to brine enhances while grinding. It is therefore necessary to maintain rumen in brine after grinding.

It is necessary to mix crushed rumen for 3 - 5 minutes in order to obtain homogeneous medium of salt + dimethyl sulfoxide. Stirring of the rumen for 3 min. does not allow the complete dissolution of the salt in a medium of rumen + dimethyl sulfoxide and stirring over 5 min. leads to the already well-known transition from rumen to the brine of valuable substances. Compatible mixing of salt and dimethyl sulfoxide in the processing of rumen will reduce the complexity of the process.

Table 4

The chemical composition of cooked sausages

Variant	**Batch**	**Consistence**	**Moisture**, %	**Salt**, %	**$NaNO_3$,** 00г
1	A	Elastic	57,0	2,9	0,004
	B	»	57,9	3,0	»
	C	»	58,3	2,9	»
	D	»	59,6	»	»
	E	Slightly fragility	62,0	2,0	»
	F	Growing fragility	63,4	2,6	»
2	-	Elastic	59,5	2,9	»

These data suggest that the reduction of dimethyl sulfoxide in brine would result in undercooking of rumen and its increasing - in the loss of the substance. The timing of exposure in brine - 24 hours at a temperature of 2 ... 4 °C is connected with features of the native structure, composition and properties of by-products, and the inevitability of loss during salting of shredded rumen, that diffusion transition of protein, extractives and mineral substances and vitamins from meat to brine.

The concentration of dimethyl sulfoxide in proposed sausage is 0,015 % what is well below the sulfur compounds in garlic. Indicated content of dimethyl sulfoxide is achieved even when there were no losses during the various processes in the production of sausages.

We should emphasize that the sausage with such quantity of dimethyl sulfoxide cannot be harmful and this product can show the radioprotective properties, at normal temperature it is stored for a long time.

Conclusion

1. The use of the rumen in the production of cooked sausages is the best way to use rumen collagen and dimethyl sulfoxide + NaCl may serve as an inhibitory agent.

2. It is shown that the effective concentration of nutritive collagenase during proteolysis of the cattle rumen is - 0.1% by weight of raw material.

3. It is founded that the maximum proteolytic activity of enzyme preparation - nutritive collagenase at pH - 7,0; duty water curve - 1:1; temperature - 12 °C, proteolysis duration - 3 hours.

References

1. Jochen Weiss, Monika Gibis, Valerie Schuh, Hanna Salminen, (2010), Advances in ingredient and processing systems for meat and meat products, *Meat Science*, 86(1), pp. 196-213.
2. Hoffman L.C., Wiklund E., (2006), Game and venison – meat for the modern consumer, *Meat Science*, 74(1), pp. 197-208.
3. Alison J. McAfee, Emeir M. McSorley, Geraldine J. Cuskelly, Bruce W. Moss, Julie M.W. Wallace, Maxine P. Bonham, Anna M. Fearon, (2010), Red meat consumption: An overview of the risks and benefits, *Meat Science*, 84(1), pp. 1-13.
4. Kenneth W. McMillin, (2008), Where is MAP Going? A review and future potential of modified atmosphere packaging for meat, *Meat Science*, 80(1), pp. 43-65.
5. Saadoun A., Cabrera M.C., (2008), A review of the nutritional content and technological parameters of indigenous sources of meat in South America, *Meat Science*, 80(3), pp. 570-581.
6. Kandeepan G., Anjaneyulu A.S.R., Kondaiah N., Mendiratta S.K., Lakshmanan V., (2009), Effect of age and gender on the processing characteristics of buffalo meat, *Meat Science,* 83(1), pp. 10-14.
7. Peña F., Bonvillani A., Freire B., Juárez M., Perea J., Gómez G., (2009), Effects of genotype and slaughter weight on the meat quality of Criollo Cordobes and Anglonubian kids produced under extensive feeding conditions, *Meat Science,* 83(3), pp. 417-422.
8. Hutchison C.L., Mulley R.C., Wiklund E., Flesch J.S., (2012), Effect of concentrate feeding on instrumental meat quality and sensory characteristics of fallow deer venison, *Meat Science,* 90(3), pp. 801-806.
9. Peshuk L.V., Galenko O.O., Budnik N.V. (2014), Use of collagenase in technology gerodietetic products, *Journal of food and packing science, technique and technologies,* 2(3), pp. 8-11.
10. Peshuk L.V., Budnik N.V., Halenko O.O. (2011), Gerodietic meat products technology enriched with calcium and phosphorus, *Journal food and environment safety,* 10(4), pp. 18–24.
11. Jaturasitha S., Norkeaw R., Vearasilp T., Wicke M., Kreuzer M. (2009), Carcass and meat quality of Thai native cattle fattened on Guinea grass (Panicum maxima) or Guinea grass–legume (Stylosanthes guianensis) pastures, *Meat Science*, 81(1), pp. 155-162.
12. Taneva D. St., Prokopov Ts. V. (*2013),*Assessing the risk of noise-induced hearing lossof workers in the meat processing industry, *Journal of Food and Packaging Science, Technique and Technologies*, 2(2), pp. 100-103.
13. *Iryna Shtyk, Tetiana Ivanova, Olena Didiuk (2013),* High-quality indexes and biological value of meat of wild zoons, *Ukrainian Food Journal*, 2(2), pp. 157-162

The optimization of conditions for obtaining food supplement with the adaptogenic activity from *Agaricus bisporus*

Natalya Cherno, Georgii Stankevych, Sophya Osolina, Oleksandra Nikitina

Odessa National Academy of Food Technologies, Odesa, Ukraine

Keywords:

Food
Supplement
Adaptogenic
Activity

Article history:

Received 12.04.2014
Received in revised form
23.06.2014
Accepted 30.06.2014

Corresponding author:

Oleksandra Nikitina
E-mail:
alex.nikitina@
gmail.com

Abstract

Introduction. Adaptative and protective systems of the body cannot control homeostasis and respond to changes of the environment satisfactory. The development of supplements with the adaptogenic activity from regional raw materials will be reasonable.

Materials and methods. The studied preparations were the solid residue after treatment of mushrooms (*Agaricus bisporus*) with a number of extragent: boiling water, 3.7 % HCl solution at room temperature, 3.0 – 7.0 % NaOH solution at 98 °C for 1.5 – 4.5 hours. They were characterized by following attributes: the antioxidant activity (AOA), bifidogenic effect (BGE), sorption of cholic acid (SCA). AOA of samples was determined by thiocyanate method (after the initiation of lipid peroxidation). BGE were estimated by the number of *Bifidobacterium bifidum* cell grown in their presence. SCA was determined by spectrophotometrically.

Results. The linear regression equations are obtained. They adequately describe the correlation between AOA, BGE, SCA of isolated preparations and the analyzed factors: the concentration of alkaline agent and time of raw materials treatment. The two-factor interaction coefficients in equations for AOA and BGE are significant and have fairly large values. It is found that increasing treatment time brings about a considerable growth of AOA at low concentrations of the alkaline agent. The impact of treatment time on its level is less in the area of high values of C_{NaOH}. AOA increases significantly with the rise of an alkaline solution concentration when exposure time is minimal. The concentration of alkaline agent has a main influence on the BGE of preparations. Increasing C_{NaOH} from 3.0 to 7.0 % at minimum treatment time reduces the number of microorganisms by more than 3 times. A prolongation of the processing time in the area of minimum values of the alkaline concentration decreases this index. The opposite effect is observed at the maximum concentration. The intensity of SCA by preparations depends on both the concentration of sodium hydroxide solution and treatment time. The enlargement of the alkaline concentration increase SCA. The rise of the treatment time, vice versa, decreases this index. The optimum conditions for obtaining the food supplement with the adaptogenic activity from *Agaricus bisporus* is a raw materials treatment with boiling water, 3.7 % HCl solution at room temperature, 5.1 % NaOH solution at 98 °C for 4.2 hours. It has AOA being equal to 90.0 %, SCA – 22.4 mg/g of the supplement, BGE corresponding to $1.5 \cdot 10^{12}$ CFU/cm^3.

Conclusion. It can be recommended as the food supplement with the prevention activity if its adaptogenic properties were confirmed *in vivo* test. In Ukraine there are no preparations with such activity obtained from local raw materials.