THE FUNCTIONAL TECHNOLOGICAL PROPERTIES OF THE RAW MATERIAL ANIMAL

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Abstract
As objects for analysis there were chosen the types of meat most used for the production meat products form beef, pork, lamb and other sub products of high value such as liver, lungs and diaphragm used for production of pates. The content of proteins, fats, humidity and pH were determined in order to interpret the results regarding the determination of functional technological properties.
From the results obtained and presented, we easily notice that beef lungs have the highest value of water binding capacity (WBC), due to a high content of such a protein as collagen even at increased humidity, this value is the biggest even after thermal treatment of the analysed samples. The smallest value refers to unsorted lamb and skim pork due to an increased content of fat, as we can see from, a fact which diminishes the water binding capacity of meat.
The hydration with water of the samples reaches its maximum for the raw material with a maximum muscular tissue and respectively total protein for the beef and lamb, and it decreases after water bath treatment, whilst for the beef and pork liver and the diaphragm the value of this functional indicator increases after thermal processing. This is probably caused by a different morphological structure of the liver and by the fact that liver proteins are better hydrated after thermal treatment.
Fat absorption reaches its maximum for beef and lamb as well as the hydration. But it decreases after thermal treatment, whilst the sub products increase this value after thermal treatment, which I suppose, is caused by a higher content of protein and a smaller content of fat, which they tend to increase and balance the fat-protein ration in the system.
The value of pH of the raw material has an influence of the functional technological properties, but in my opinion this influence is insignificant, because the raw material has the same values of the active acidity. Beef lungs have a higher pH and the determined pH is bigger, a fact which directly influences the functional technological properties.

Keywords: swine, cattle, liver, binding capacity of water, hydration, fat absorption.

1. INTRODUCTION

Animal raw material is poly-component, variable according to composition and properties, which strongly influences the quality of meat products. Due to this, the information regarding functional technological properties of various types of raw material and its components and animal sub products becomes highly important, as well as influence of auxiliary raw material and exterior factors on the character of its modification [1].
The actual research aims to analyse animal raw material from Moldova and to enrich the database of functional technological properties of meat and its derivates, in order to direct the technological process as well as the quality of the final meat products.
Functional technological properties of animal raw material determine the stability of the emulsions obtained from this raw material. The first part of the production problem, namely the forecasted composition, is based on the knowledge related to chemical composition, quantity of amino-acids, fat acids and micro- and macro elements and its solution is the calculation method. But obtaining a stable emulsion from the chosen raw material is much more complicated, because a specialist approaches these questions empirically, taking into account his own practice and knowledge about the functional technological properties of certain components of the meat and food additives used [3].

2. METHODS AND MATERIALS

As materials for analysis there was used animal raw material from the Republic of Moldova, air thawed at 18±2°C after preservation at -23°C

for 14-21 days. Raw material was minced ø3mm. Thermal treatment is performed on water bath at 80±2°C for 30 minutes.
The humidity of animal raw material: beef of 2nd category, semi fat pork, mixed vein, beef lungs, pork and beef liver, beef diaphragm was determined by gravimetric method, drying at 103±2°C to a constant mass. The content of proteins according to Keldal method, the content of fats by means gravimetric method in the Soxhlet installation with petroleum ether. Active acidity pH was measured with universal pH-meter [2].
Functional technological properties: Water binding capacity, (%) of initial humidity, hydration and absorption of fats (%) at the initial mass was determined by gravimetric methods proposed by the scientist [1].

3. RESULTS AND DISCUSSION

As objects for analysis there were chosen the types of meat most used for the production meat products form beef, pork, lamb and other sub products of high value such as liver, lungs and diaphragm used for production of pates. The content of proteins, fats, humidity and pH were determined in order to interpret the results regarding the determination of functional technological properties.
From the results obtained and presented in table 1, we easily notice that beef lungs have the highest value of water binding capacity (WBC), due to a high content of such a protein as collagen even at increased humidity, this value is the biggest even after thermal treatment of the analysed samples. The smallest value refers to unsorted lamb and skim pork due to an increased content of fat, as we can see from the table, a fact which diminishes the water binding capacity of meat.
The hydration with water of the samples reaches its maximum for the raw material with a maximum muscular tissue and respectively total protein for the beef and lamb, and it decreases after water bath treatment, whilst for the beef and pork liver and the diaphragm the value of this functional indicator increases after thermal processing. This is probably caused by a different morphological structure of the liver and by the fact that liver proteins are better hydrated after thermal treatment.
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Table 1 Functional technological properties of the animal raw material

Raw material	Content, %			pH	Before thermal treatment			After thermal treatment		
	water	pro-teins	fats		WBC, % at total humidity	Hydration, % of the initial mass	Fat absorption % of the initial mass	WRC, % at total humidity	Hydration, % of the initial mass	Fat absorption % of the initial mass
1	2	3	4	5	6	7	8	9	10	11
Beef II category	62-73	14-19	5-14	6,2-6,4	78±2,8	56,2±4,4	28,4±3,0	70,0±4,3	29,4±1,6	18,8±1,0
Semi fat pork	52-54	11-15	30-35	5,6-6,1	73,8±6,0	34,9±2,3	22,5±1,2	61,7±5,3	13,1±1,4	17,4±0,9
Unsorted lamb	41-56	15-21	20-36	6,2-6,4	70,4±3,2	40,2±3,7	24,9±1,6	58,8±2,2	12,7±0,8	18,8±1,7
Beef lungs	75-79	15-16	3-4	6,8-7,2	94,3±1,6	30,6±2,8	25,2±2,2	82,5±1,5	33,2±2,7	32,7±1,9
Pork liver	68-70	15-17	3-5	6,0-6,3	82,6±3,1	15,2±3,2	19,8±2,1	74,4±2,0	20,2±1,5	27,2±1,9
Beef liver	72-73	17-18	3-4	6,2-6,4	80,4±1,8	14,0±2,8	21,6±1,8	78,1±2,6	18,2±1,1	31,5±1,7
Beef diaphragm	73-76	14-16	6-7	6,0-6,5	78,6±3,4	9,3±0,9	9,8±0,7	64,3±2,7	18,9±1,3	19,9±2,1

Beef lungs have a higher pH and the determined pH is bigger, a fact which directly influences the functional technological properties.
The content of muscular tissue in the composition of the animal raw material influences considerably the functional technological properties, because it consists form a complex of proteins, which have structural differences. When producing meat products, the functional properties of the muscular tissue' proteins influences the efficiency of the emulsion formation. The quantity of the proteins from the system, its quality structure, environment conditions all determine the stability degree of the meat systems and the degree of water binding and absorption, fat retention and emulsion properties, as well as of mechanical, structural and organoleptic properties.
Humidity retention capacity as the fat absorption depends on the degree of interaction between protein and water, and of the degree of protein denaturising. With regard to this the thermal treatment has a strong influence of the protein's water binding capacity, fat absorption and products hydration, which ultimately influences the final efficiency [4].
The interdependence in the protein – water system is influenced by such factors as, solubility of protean systems, concentration, protein composition, the look, and the level of native conformation deformation, the deepness of denaturising processes, system's pH, the presence and concentration of salts in the system. The sense and direction of the use of particularities regarding humidity binding of various raw materials containing proteins allow us to forecast and regulate the efficiency, level of humidity loss during thermal treatment and the organoleptic characteristics of the product.
The priority principle does not guarantee the correct choice of the ratio of the basic raw material in the recipe due to several reasons.
First of all, the raw material is multi component, its state changes quickly because of the permanent biochemical processes, of the not homogenous morphological structure and not adequate chemical composition. All these particularities vary strongly even for the various types of the standardized raw material.
Second of all, functional technological properties of the raw material and the systems are strongly related to the quantity of the basic components contained (mainly proteins and fats in the muscular tissue) and their quality composition (amino acids and fat acids).
Third of all, the high quality composition of the proteins in the muscular tissue does not stand for good functional technological properties of the raw material, because the protean content of the meat usually represents the total of proteins in the muscular and connective tissue, whilst the level of emulsion capacities and water binding capacity vary a lot.
Fourth of all, functional technological properties of the raw material modify in time (during auto lythic processes), mechanical treatment (mincing, grinding), humid salting, thermal treatment and another technological actions [3].

4.CONCLUSIONS

The analysis of the functional technological properties of the animal raw material allow us to create stable meat products, during the preparation period as well as consumption.
The production of quality meat products based on emulsion or rough grinding is possible due to the knowledge of the functional technological properties f the raw material used during production. As a result of the research carried, we can say that the highest values and the best functional technological properties were shown by the beef lungs (from the ones studied), but when composing a recipe of the product we don't take into account just these data, but also such indicators as: nutritive value of the raw material, organolpetic indicators and the consumers preferences. Due to these the production of various meat products requires recipe modelling for different types of raw material, that allow for a stable quality of the product and competitiveness of the market.
The goal of our further research is development of recipes and production technologies for meat

products on the basis of the determined functional technological properties.

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