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CONSUMER PROPERTIES OF NATURAL SEMIS FROM MUSC DUCK MEAT

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Abstract

Research of the morphological composition of Musc duck carcass has been done. The cutting scheme for a whole Musk duck has been presented. Quality indicators of natural semis in chemical, amino acid, fatty acid, vitamin and mineral composition have been studied. The results indicate a high nutritional and biological value of natural semis from Musk duck meat. Therefore, it can be recommended for diet purposes.

Keywords: *musk duck meat, consumer properties, nutritional value, natural semis, chemical composition.*

JEL classification: O 00, O 32

1. Introduction

Proper and adequate nutrition is one of the most important factors in determining the health of the population. The main objective of government policy in the field of healthy nutrition is development of high-quality and safe foods. Food products supply the necessary nutrients needed by the human body performing not only a life-saving function but also providing good health.

It is very important for today's consumer to know that in addition to taste qualities products contain some useful food components. Consequently, it is necessary to consider their usefulness in detail given the comprehensive analysis of their composition.

In recent years a certain interest has been noticed with regard to industrial production of duck meat [1]. Duck meat stands among the most valuable protein products having high nutritional value and ensuring human body's supply with protein, lipids, minerals, vitamins. Musk ducks posses many consumer useful biological features, their main advantage being an excellent meat quality.

Earlier, in a homestead farm in the town of Buinsk, the Republic of Tatarstan, experiments were conducted on growing and slaughtering musk ducks. Studies on consumer properties of musk duck meat were done as well [2, 3, 4].

Studies of musk ducks meat productivity noted that the timing of growing ducklings for meat is

connected to the biological features of ducks. Optimal feeding period of Musk ducks related to high intensity weight gain is 70 days. By this age, the mass fraction of the protein and lipids in the meat increases and moisture content reduces. Musk duck carcass contains a large amount of eatable pulpy tissue and the mass fraction of breast (32.14%) is greater than the mass fraction of legs (20.73%). Yield of comestible parts is 64% [2].

Nutritional value of poultry meat is determined by its chemical composition and the value of its individual components for human nutrition. At the same time, greater importance is given to the presence of such important meat components as water, proteins, fats, macro- and microelements, vitamins, influencing the building of consumer properties of finished meat products. A comparative analysis of the chemical composition of average sample of Peking duck meat (according to the literature) and of average sample of Musk duck meat at 70 days of age showed that Musk duck meat had higher water content (64.2%) and relatively low fat content (17.2%). Peking duck meat has a higher caloric value due to its higher fat content (24.9%) [3, 4].

It was also found out that Musk duck meat has higher protein value. 100 gr of Musk duck meat satisfies the average daily human requirement of animal protein by 36% and meets the needs of the human body in essential amino acids from 12 to 24%. According to the amount of essential amino acids and proteins Musk duck meat exceeds the standard value by 12.84%. The same scoring regarding scarce amino acids such as lysine, tryptophan, and methionine + cystine was 126.2%, 122.0%, 94.2%, respectively [3, 4].

It is known that one of the most significant indicators of meat nutritional value is fatty acid composition of the lipids. Unsaturated fatty acids (68.91%) have the largest share in the total lipid content of Musk duck meat. Oleic acid (37.1%) accounts for the main share in monounsaturated fatty acids. Musk duck fat is rich in unsaturated linoleic, linolenic and arachidonic acids, which are contained in cell membranes and in other structural components of the tissue and perform a number of important functions including assurance of normal growth, metabolism and vascular elasticity. Linoleic acid (18.10%) prevails among the poly-unsaturated fatty acids. Saturated fatty acids make 30.6% and palmitic acid (20.80%) having the greatest share among them [3, 4].

Previous studies [2, 3, 4] allow us to conclude that Musk ducks are valuable raw material for the production of meat food products. Data regarding the chemical composition content of essential amino acids as well as biologically valuable unsaturated fatty acids prove it.

2. Objective and carrying out the tests

This paper aims to study the quality of natural semis made of Musk duck meat.

Morphological composition of Musk ducks carcasses was studied. The cutting scheme of a whole Musk duck was presented. Quality indicators of natural semis regarding chemical, amino acid, fatty acid, vitamin and mineral composition were investigated as well.

In order to objectively evaluate the quality of Musk duck meat and taking into account deep processing of poultry meat, it is definitely important to assess the morphological composition of poultry carcasses. That's why the morphological composition of Musk duck meat was studied first.

3. Results and their discussions

Comparative data on the ratio of muscle tissue, skin and bones of Musk and Peking ducks (percentage in terms of given duck weight) are shown in Table 1.

Table 1: Morphological composition of duck carcass, %

Carcass	Muscle tissue	Skin	Bones
Musk duck			
Breast	44,0 ± 0,8	21,3 ± 0,7	34,7 ± 0,7
Leg	55,0 ± 0,9	21,8 ± 0,6	23,2 ± 0,7
Scapular, spinal and lumbar-sacral parts with wings and neck skin	38,0 ± 0,5	19,5 ± 0,6	42,5 ± 0,9
Peking duck			
Breast	32,4 ± 0,8	32,0 ± 0,7	35,6 ± 0,7
Leg	43,7 ± 0,9	32,0 ± 0,6	24,3 ± 0,7
Scapular, spinal and lumbar-sacral parts with wings and neck skin	26,4 ± 0,5	29,7 ± 0,6	43,9 ± 0,9

According to these data it is clear that the bulk of muscle tissue of both Musk and Peking ducks is concentrated in the breast and legs of the carcass. A significantly smaller share of muscle tissue is located in the scapular and spinal lumbar-sacral parts of carcasses. Breast, scapular, spinal and lumbar-sacral parts of Musk ducks contain more muscle tissue and less skin than those of Peking ducks. Bones content in both Musk and Peking ducks carcasses is about the same.

The key to most efficient use of raw materials in trade and poultry processing industry is employment of advanced poultry carcass cutting schemes.

On the basis of qualitative assessment of individual parts of carcasses and taking into consideration their morphological composition, culinary purposes, gastronomic usage for public catering and particularly for fast-food restaurants, universal technological schemes for cutting birds carcasses, including ducks [5], as well as technologies to obtain joint meat were developed for retail trade.

Of the many possible schemes of cutting poultry carcasses the anatomical one is the most appropriate. Birds' parts are cut according to strictly controlled points and lines (Figure 1).

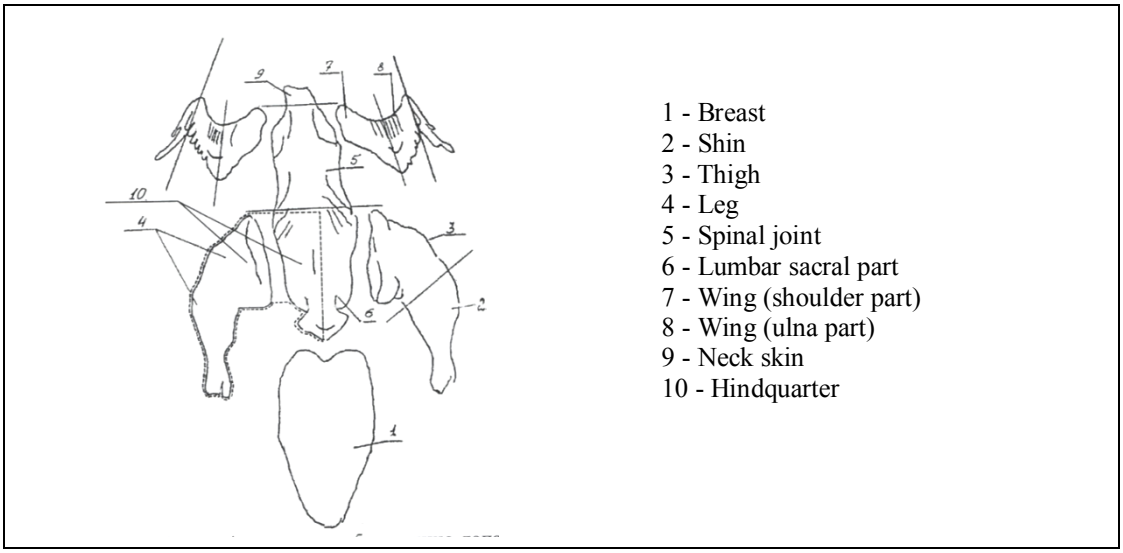

Figure 1: Anatomical cutting of a whole Musk duck:

In accordance with GOST R 52313-2005 “Poultry industry. Foodstuffs. Terms and definitions” breast is part of the duck carcass consisting of breast bone with adjacent pulpy tissue; shin is duck carcass part, consisting of the tibia with adjacent pulpy tissue; thigh is part of duck carcass, consisting of the femur with adjacent pulpy tissue; leg is a duck carcass part, consisting of the femur and tibia with the adjacent pulpy tissue; spinal joint is part of duck carcass, consisting of the spinal column with the adjacent bone; lumbar sacral part is a part of duck carcass consisting of lumbar and sacral vertebrae with adjacent pulpy tissue; wing is part of duck carcass wing, consisting of humeral and ulna parts of the wing; wing is part of duck carcass wing, consisting of ulna and radius bones with adjacent pulpy tissue separated in place of their connection with humeral and ulna parts of the wing; neck skin is a food product obtained after cutting skin from bird's neck; hindquarter is part of duck carcass obtained after cutting the spinal part of duck carcass along the spinal column and transverse cutting of half of the carcass into two parts, it includes legs with a part of the back and half of the rump.

Figure 2 shows the scheme of a complex cutting of a whole Musk duck carcass.

Study results show that a large proportion of the mass of Musk duck carcasses are breasts (38.1%) and legs (19.5%), the proportion of spinal blade and lumbar sacral parts being 36.6%. Muscle tissue of Musk ducks carcasses is concentrated in the breast and legs quarters (44.0% and 55.0%, respectively) and a significantly smaller proportion of it is located in the spinal joint and the lumbar sacral parts of the carcass (38.0%).

Due to different eating habits and demands of consumers duck meat should be sold in separate parts in accordance with gastronomic usage and ecological requirements. Schemes regarding deep processing of duck meat give an idea of the variety of trends in the processing of this raw material.

One of the trends regarding deep processing of duck meat is the production of natural semis and of joint boneless poultry products. Natural semis due to their nutritional value and taste qualities are suitable for the preparation of main dishes. They are not subject to any mechanical stress and are natural meat products. The advantage of natural semis is that they liberate housekeepers from labor consuming primary processing of raw foods.

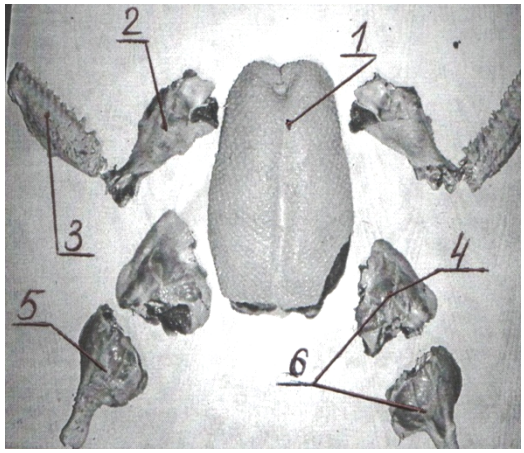

Figure 2: Cutting scheme of a whole Musk duck:
1- Breast, 2 - Wing (shoulder part), 3 - Wing (ulna part), 4 - Thigh, 5 - Shin, 6 - Leg

Natural semis produced from Musk duck carcasses are characterized by high-level protein content. Table 2 shows chemical composition and energy value of natural semis made of Musk duck meat. These are most popular among buyers.

Table 2: Chemical composition and energy value of natural semis from Musk duck meat

Data	Semis made of Musk duck meat	
	Breast	Leg
Moisture content, %	65,4 ± 0,2	67,4 ± 0,1
Mass fraction of protein, %	18,9 ± 0,2	17,1 ± 0,3
Mass fraction of fat, %	14,8 ± 0,3	14,9 ± 0,4
Mass fraction of ash, %	0,9 ± 0,1	0,6 ± 0,2
Energy value, kcal / 100g	208,8	202,5

Ratio of protein: fat in the semis was: in breast - 1: 0.78, in legs - 1:0.87, i.e. semis are sources of protein and fully comply with human physiological requirements and have good assimilability.

Data on amino acid composition of semis is presented in Table 3.

Presented data suggest that significant differences in amino acid composition of breast and legs of Musk ducks were not observed. The amino acid structure comprises 19 amino acids.

The largest shares have the essential amino acids among which glutamic, aspartic acid and glycine prevail. The total content of essential amino acids in breasts and legs quarters is higher than in a perfect protein. Essential amino acids are mainly presented by leucine, phenylalanine + tyrosine and lysine.

Table 3: Amino acid composition of Musk duck meat semis, grammes per 100 grammes of protein

Data	Semis	
	Breast	Leg
Essential amino acids, including	45,75	47,71
valine	4,95 ± 0,13	5,91 ± 0,14
isoleucine	5,2 ± 0,18	5,3 ± 0,16
leucine	9,53 ± 0,11	9,48 ± 0,11
lysine	8,01 ± 0,16	8,1 ± 0,18
methionine + cystine	4,12 ± 0,10	4,23 ± 0,09
threonine	4,55 ± 0,13	4,62 ± 0,07
tryptophan	1,22 ± 0,04	1,34 ± 0,02
phenyl alanine + tyrosine	8,17 ± 0,27	8,73 ± 0,19
Nonessential amino acids, including	54,25	52,29
alanine	5,81 ± 0,31	5,32 ± 0,19
arginine	7,4 ± 0,48	7,53 ± 0,38
aspartic acid	8,42 ± 0,18	8,24 ± 0,25
histidine	3,5 ± 0,21	3,72 ± 0,11
glycine	6,32 ± 0,20	7,19 ± 0,34
glutamic acid	13,6 ± 0,35	10,27 ± 0,41
hydroxyproline	1,01 ± 0,04	1,23 ± 0,03
proline	4,58 ± 0,23	5,41 ± 0,18
Series	3,61 ± 0,14	3,38 ± 0,19

Table 4 shows fatty acid composition of lipids in Musk duck meat natural semis.

Table 4: Fatty acid composition of lipids in Musk duck meat natural semis, % of the total composition

ndices	Semis	
	Breast	Leg
Saturated	33,10	30,16
Including: $C_{12:0}$ (lauric)	0,74	0,11
$C_{14:0}$ (myristic)	1,50	1,10
$C_{15:0}$ (pentadecanoic)	0,72	0,20
$C_{16:0}$ (palmitic)	20,40	21,00
$C_{17:0}$ (margarine)	1,00	0,48
$C_{18:0}$ (stearic)	7,93	7,01
$C_{20:0}$ arachidic)	0,81	0,26
Monounsaturated	42,38	46,58
Including: $C_{16:1}$ (palmitoleic)	7,32	6,60
$C_{17:}$ (geptadetsenovaya)	0,85	0,37
$C_{18:1}$ (oleic)	32,10	38,10
$C_{20:}$ (gadoleic)	2,11	1,51
Polyunsaturated	24,12	22,96
Including: $C_{18:2}$ (linoleic) ω_6	19,00	19,02
$C_{18:}$ (a-linolenic) ω_3	3,80	2,70
$C_{20:}$ (arachidonic) ω_6	0,40	0,34
eykozadienovaya	0,30	0,20
eicosatrienoic	0,20	0,30
eicosapentaenoic	eaten.	eaten.
docosapentaenoic $C_{22:5}$	0,42	0,40
Others	0,40	0,30

Unsaturated fatty acids in breast (66.5%) and legs quarters (69.54%) account for the largest share in the total content. Oleic acid in breast (32.1%) and in legs (38.1%) holds the main share of monounsaturated fatty acids. Lipids in Musk duck legs and breast meat contain about 19% linoleic acid and about 3% linolenic acid.

Semis can be considered an important source of minerals, the composition of which is shown in Table 5.

Table 5: Mineral composition of natural semis from Musk duck meat, 100 g

Indices	**Semis**	
	Breast	**Leg**
1	2	3
Macroelements, mg		
Potassium	541,5 ± 0,8	542 ± 0,7
Calcium	9,1 ± 0,13	8,61 ± 0,25
Magnesium	26,9 ± 2,2	28,1 ± 1,3
Sodium	79,3 ± 3,9	90,2 ± 5,4
Phosphorus	259,1 ± 8,3	240,1 ± 5,7

1	2	3
Micronutrients, mg		
Iron	1,4 ± 0,26	2,3 ± 0,56
Manganese	0,08 ± 0,02	0,07 ± 0,02
Copper	0,3 ± 0,01	0,3 ± 0,16
Zinc	1,1 ± 0,8	1,6 ± 1,21
Iodine, mcg	36,1 ± 2,1	38,1 ± 2,5

Natural semis are rich in potassium, phosphorus, sodium and iodine, which are necessary for the human body.

Vitamins in the semis of Musk duck meat are presented in small quantities and are shown in Table 6.

Table 6: Vitamins content in Musk duck meat natural semis, mg/100 g

Indices	Semis	
	Breast	Leg
Vitamin A	0,79	0,97
B_5 (nicotinic acid)	5,70	5,30
B_9 (folic acid), μg / 100 g	3,10	4,10
Riboflavin	0,18	0,18
Thiamin	0,36	0,40

4. **Conclusions**

The results received indicate a high nutritional and biological value of Musk duck meat natural semis, due to its optimal ratio of protein and fat, high content of essential amino acids and unsaturated fatty acids, minerals and B vitamins. Natural semis of Musk ducks meat can be recommended for diet purposes.

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