

# VETERINARY SCIENCES

## SAFETY OF MINCED FOR SALE IN SUPERMARKETS

### **Bogatko Nadiia**

Doctor of Veterinary Sciences, Associate Professor  
Bila Tserkva National University, Bila Tserkva, Ukraine

### **Bukalova Nataliia**

Candidate of Veterinary Sciences, Associate Professor  
Bila Tserkva National University, Bila Tserkva, Ukraine

### **Prylipko Tetiana**

Doctor of Agricultural Sciences, Professor  
Podolsk State Agrarian Technical University  
Kamyanets-Podilsky, Khmelnytsky Region, Ukraine

### **Lyasota Vasul**

Doctor of Veterinary Sciences, Professor  
Bila Tserkva National University, Bila Tserkva, Ukraine

### **Bogatko Aliona**

Assistant of the Department of Epizootology and Infectious Diseases  
Bila Tserkva National University, Bila Tserkva, Ukraine

### **Samoray Mykola**

Candidate of Veterinary Medicine, Associate Professor  
Bila Tserkva National University, Bila Tserkva, Ukraine

**Introduction.** In supermarkets, official doctors of veterinary medicine carry out state risk-oriented control over the safety and quality of chilled and frozen minced meat, which are sold to the average consumer [1]. One of the important indicators of the safety of minced meat is its degree of bacterial insemination, which depends on the shelf life, storage conditions and temperature regime [2].

Minced meat is sold at the temperature in the middle of the product: chilled not higher than 8 °C; frozen – no higher than minus 10 °C. Cooled semi-finished products are stored at a temperature from 0 °C to 6 °C and a relative humidity of 76±2 %, their shelf life is no more than 12 hours from the end of the technological process. The

shelf life of frozen minced meat at a temperature no higher than minus 10 °C is no more than 30 days [3].

**Aim.** The purpose of the work was the need to establish our research on compliance with temperature regimes for the sale of minced meat (beef, pork and combined) chilled and frozen in supermarkets, their appearance and the degree of their insemination by microorganisms.

**Materials and methods.** The material for the research was minced meat, which was sold in supermarkets "Nash Kray", "Silpo", "Velika Kishenya" in the Kyiv region. Bacterial insemination, in particular the content of MAFAnM in chilled minced meat of various species in CFU/g of product was determined according to DSTU 8381 [4].

**Results and discussion.** First of all, it is important to establish the appearance of the minced meat in the package: plastic film bags, pads and parchment were undamaged, the surface was clean. All types of minced meat sold by the supermarkets "Our land", "Silpo", "Big pocket" had a homogeneous mass, without bones, cartilage, evenly mixed, light pink in color, and in the minced meat of the supermarket "Furshet" – coarse connective tissue and blood clots in the combined minced meat, dark red in color.

The consistency of the studied minced meat was smear-like, the smell in its raw form is characteristic of good-quality raw materials and spices, without extraneous smell. The package of minced meat was labeled with proper labeling, except for the supermarket "Furshet".

We determined the degree of bacterial insemination of chilled and frozen minced meat sold in supermarkets. Table 1 presents the temperature regimes of the thermal state of minced meat sold in various supermarkets.

Table 1

### Temperature regimes for the sale of minced meat, $M \pm m$ , $n=20$

Supermar-kets	Temperature in the middle of minced meat of various types, °C					
	beef minced meat, n=6		pork minced meat, n=8		combined minced meat, n=6	
	chilled*	frozen**	chilled *	frozen**	chilled*	frozen**
«Our land»	7.1±0.2	-10.2±0.1	7.5±0.1	-10.1±0.1	7.6±0.2	-10.2±0.1
«Silpo»	8.3±0,1	-8.2±0.2	8.5±0.2	-8.1±0.2	8.4±0.1	-7.9±0.2
«Furshe»	9.5±0.2	-9.1±0.2	9.2±0.1	-9.2±0.2	9.3±0.1	-9.0±0.2
«Big pocket»	7.5±0.1	-10.2±0.1	7.4±0.2	-10.3±0.1	7.8±0.1	-10.2±0.1

**Note.** \* – norm  $t^0$  – not higher than 8 °C; \*\* – norm  $t^0$  – not higher than minus 10 °C.

Analyzing table 1, it should be noted that the temperature regimes of cooling and freezing of minced meat in "Silpo" and "Furshet" supermarkets were violated respectively, on average 8.4±0.1 and 9.3±0.1 °C; – 8.06±0.1 and – 9.1±0.1 °C. The degree of bacterial insemination of chilled and frozen minced meat is presented in tables 2 and 3.

Table 2

### Microbiological indicators of chilled minced meat, $M \pm m$ , $n=10$

Супермаркети	The content of MAFAnM in chilled minced meat of various types, CFU in 1 g of the product *		
	beef minced meat, n=3	pork minced meat, n=4	combined minced meat, n=3
«Our land»	1.16·10 <sup>5</sup> ±110.28	1.04·10 <sup>5</sup> ±126.22	1.10·10 <sup>5</sup> ±138.42
«Silpo»	7.81·10 <sup>6</sup> ±125.46	8.24·10 <sup>6</sup> ±184.34	8.06·10 <sup>6</sup> ±165.49
«Furshe»	1.52·10 <sup>6</sup> ±112.82	1.48·10 <sup>6</sup> ±168.62	1.24·10 <sup>6</sup> ±132.12
«Big pocket»	9.26·10 <sup>4</sup> ±121.18	8.96·10 <sup>4</sup> ±142.08	9.02·10 <sup>4</sup> ±129.54

**Note.** \* – the permissible level of KMAFAnM is 1.0·10<sup>7</sup> CFU/g according to DSTU 4437.

Table 3

### Microbiological indicators of frozen minced meat, $M \pm m$ , $n=10$

Перелік супермаркетів	The content of MAFAnM in frozen minced meat of various types, CFU in 1 g of the product *		
	beef minced meat, n=3	pork minced meat, n=4	combined minced meat, n=3
«Our land»	10.91·10 <sup>3</sup> ±88.16	9.84·10 <sup>3</sup> ±116.20	11.14·10 <sup>3</sup> ±133.65
«Silpo»	6.61·10 <sup>4</sup> ±115.34	6.14·10 <sup>4</sup> ±173.14	6.06·10 <sup>4</sup> ±155.41
«Furshe»	5.57·10 <sup>4</sup> ±104.18	5.45·10 <sup>4</sup> ±156.12	5.17·10 <sup>4</sup> ±112.71
«Big pocket»	9.06·10 <sup>3</sup> ±147.11	8.45·10 <sup>3</sup> ±129.21	8.44·10 <sup>3</sup> ±119.04

**Note.** \* – the permissible level of KMAFAnM is 1.0·10<sup>7</sup> CFU/g according to DSTU 4437.

The highest content of microorganisms was found in chilled minced meat (beef respectively  $7.81 \cdot 10^6 \pm 125.46$  and  $1.52 \cdot 10^6 \pm 112.82$  CFU/g; pork –  $8.24 \cdot 10^6 \pm 184.34$  and  $1.48 \cdot 10^6 \pm 168.62$  CFU/g; combined –  $8.06 \cdot 10^6 \pm 165.49$  and  $1.24 \cdot 10^6 \pm 132.12$  CFU/g) and frozen (beef – respectively  $6.61 \cdot 10^4 \pm 115.34$  and  $5.57 \cdot 10^4 \pm 104.18$  CFU/g; pork –  $6.14 \cdot 10^4 \pm 173.14$  and  $5.45 \cdot 10^4 \pm 156.12$  CFU/g; combined  $6.06 \cdot 10^4 \pm 155.41$  and  $5.17 \cdot 10^4 \pm 112.71$  CFU/g) supermarkets of "Silpo" and "Furshet". But this content of MAFAnM corresponds to the norms of the national standard (at the rate of  $1.0 \cdot 10^7$  CFU/g) and is mainly represented by non-pathogenic mesophilic microorganisms [5]. Sulfite-reducing clostridia and pathogenic microorganisms, including salmonella, listeria, coagulase-positive staphylococci, and coliforms of bacteria of the Escherichia coli group were not detected [6].

**Conclusions.** During the sale of minced meat in "Silpo" and "Furshet" supermarkets, violations of temperature regimes were detected, which affected the increase of bacterial insemination of chilled and frozen meat products. But the investigated beef, pork and combined minced meat in terms of MAFAnM content met the regulated safety indicators according to regulatory documentation.

## LIST OF REFERENCES

1. Traceability in feed and food chains. General principles and basic requirements for system development and implementation. DSTU ISO 22005:2009 (ISO 22005:2007, IDT). [Effective from 2010–01–01]. Kyiv: Derzhspozhivstandard of Ukraine, 2010. 10 p.

2. Bogatko N. M., Yatsenko I. V., Bogatko L. M. Risk-oriented control of meat of processed foods for production and treatment when chemical dangerous factor is installed. *International scientific and practical conference «Topical issues of methods of teaching natural sciences»*, 27–28 December 2019 year. Lublin, Poland. 2019. P 114–117. URL:<http://sci-conf.com.ua>.

3. Semi-finished meat and chopped meat-vegetable products. Specifications. DSTU 4437:2005. [Effective from 2005–15–07]. Kyiv: Derzhspozhivstandard of Ukraine, 2006. 21 p.

4. Meat and meat products. Organization and methods of microbiological research. DSTU 8381:2015. [Effective from 2017-07-01]. Kyiv: SE "UkrNDNC", 2017, 45 p.

5. Bogatko N. M. The degree of bacterial insemination of minced meat depending on the thermal condition for sale in supermarkets. Zhytomyr National Herald. agroecology university: science and theory. collection. 2012. Issue 1 (32), Volume 3, Part 1. Zhytomyr. 2012. P. 117–120.

6. Alahakoon A. U., Faridnia F., Bremer P. J., Silcock P., Oey I. (2016). Pulsed electric fields on meat tissue quality and functionality. *Handbook of Electroporation*. 21 p. URL: [http://doi:10.1007/978-3-319-26779-1\\_179-1](http://doi:10.1007/978-3-319-26779-1_179-1).