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SANITARY AND MICROBIOLOGICAL CONTROL OF THE MEAT OF ANIMALS FOR SLAUGHTER DURING PRODUCTION AND HANDLING

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Introduction. Market operators are obliged to comply with the requirements of legislation during the production and circulation of ecologically safe meat from slaughter animals - beef, pork, lamb and goat meat. According to the Law of Ukraine "On the Basic Principles and Requirements for the Safety and Quality of Food Products", it is necessary to carry out inspection checks on compliance with sanitary

and hygienic requirements for the storage of meat from slaughtered animals in cold rooms at their production facilities, wholesale bases, supermarkets and agro-food markets. as well as comply with the requirements of the new European regulations on food products, the Codex Alimentarius Commission, as well as organize your work based on food safety risk assessment [1, 2].

Therefore, food market operators implementing the HACCP system based on the current GMP, GHP and GLP procedures should carry out sanitary and microbiological control of cold chambers of meat production facilities, wholesale bases, supermarkets and agro-food markets, which will make it possible to create proper sanitary and hygienic conditions at these facilities, to prevent contamination of the meat of slaughter animals with microorganisms, its spoilage, and the occurrence of food toxic infections [3, 4].

Aim. The aim of the work was to determine the content of MAFAnM in the meat of slaughter animals during production and circulation at different storage and sale periods and at different temperature conditions.

Materials and methods. The meat of slaughtered animals − beef, pork, mutton, meat of goat − which was collected and sold at production and distribution facilities, supermarkets and agro-food markets of the Kyiv region served as the material for the research. Bacterial insemination, in particular the content of MAFAnM in chilled minced meat of various species in CFU/cm^2 of product was determined according to DSTU 8381 [5].

Results and discussion. In order to identify the negative impact on the safety of the meat of slaughter animals during its storage and circulation, we conducted studies to determine the content of MAFAnM. The meat of slaughtered animals was stored in refrigerating chambers at production and circulation facilities at different temperatures (from 4±2 ºC to -12 ºC), relative air humidity (80, 88, 90 and 95%), which was within the normal range and meat of slaughter animals of different storage periods − 2, 16, 20 days, 3, 6 and 8 months.

Bacterial contamination of the meat of slaughtered animals during its final normative storage period at the production and circulation facilities during storage

and sale in refrigerating chambers at different temperatures and relative air humidity was established (table 1).

Table 1

The content of MAFAnM on the surface of the meat of slaughter animals stored in refrigerating chambers of different capacities, CFU/cm^2, M±m, n=9

A type of meat from slaughtered animals	The content of MAFAnM, CFU/cm^2 for the storage of meat of slaughter animals at different types of facilities	
Refrigeration chambers at facilities for the production of meat for slaughter animals		
Temperature and relative humidity	at a temperature of -12 ºC and a relative humidity of 95%	temperature of -2...-3 ºC and relative humidity of 90% for 20 days
Beef [1]	(2.56±0.18) ×10^2	(3.11±0.20) ×10^2*
Pork[2]	(2.69±0.14) ×10^2	(3.48±0.12) ×10^2***
Mutton [3]	(1.85±0.17) ×10^2	(2.51±0.19) ×10^2**
Meat of goat[3]	(1.77±0.16) ×10^2	(2.63±0.17) ×10^2***
Refrigeration chambers at wholesale bases for storing meat of slaughtered animals		
Temperature and relative humidity	at a temperature of -12 ºC and a relative humidity of 95%	temperature of -2...-3 ºC and relative humidity of 90% for 20 days
Beef [1]	(2.73±0.23) ×10^2	(2.86±0.13) ×10^2
Pork[2]	(2.44±0.21) ×10^2	(3.07±0.17) ×10^2*
Mutton[3]	(2.51±0.18) ×10^2	(3.31±0.19) ×10^2**
Meat of goat[3]	(2.13±0.12) ×10^2	(2.75±0.16) ×10^2
Refrigerators in supermarkets for the sale of meat from slaughtered animals		
Temperature and relative humidity	за температури -6…-8 ºС та відносної вологості 85 % на 20 добу	за температури 4±2 ºС та відносної вологості 82 % на 2 добу
Beef	(0.83±0.14) ×10^3	(1.15±0.22) ×10^3
Pork	(0.74±0.11) ×10^3	(1.32±0.18) ×10^3**
Mutton	(0.65±0.09) ×10^3	(1.09±0.20) ×10^3*
Meat of goat	(0.98±0.15) ×10^3	(1.18±0.12) ×10^3
Refrigeration chambers/premises in agro-food markets for the sale of meat from slaughtered animals		
Temperature and relative humidity	at a temperature of 0...-1 ºC and a relative humidity of 85% for 16 days	at a temperature of 0...6 ºC and a relative humidity of 88% for 2 days
Beef	(1.22±0.23) ×10^3	(2.26±0.21) ×10^3***
Pork	(1.42±0.18) ×10^3	(2.81±0.19) ×10^3***
Mutton	(1.19±0.20) ×10^3	(2.18±0.22) ×10^3**
Meat of goat	(1.08±0.18) ×10^3	(1.97±0.17) ×10^3***

Note. Meat storage at a temperature of -12°C: [1] – beef for 8 months; [2] – pork for months; [3] – lamb, meat of goat for 6 months; * – p≤0.05; ** –

p≤0.01; *** - p≤0.001

At a temperature of -2...-3 ºC in a refrigerating chamber with a relative humidity of 90% at the meat production capacity for 20 days of storage, the content of MAFAnM on the surface of the meat of slaughtered animals was probably higher: in pork – 1.29 times more (p≤0.001), in lamb − 1.36 times (p≤0.001), in meat of goat − 1.46 times more (p≤0.001), and in beef a low probability was observed − 1.21 times more (p≤ 0.05) compared to the indicators in the meat of slaughtered animals stored in a refrigerating chamber at a temperature of -12 ºC and a relative humidity of 95% (beef − for 8 months, pork − for 3 months, lamb and meat of goat − for 6 months) .

At a temperature of -2...-3 ºC in a refrigerating chamber with a relative humidity of 90% at a wholesale base for 20 days of storage of meat from slaughter animals, the content of MAFAnM was also somewhat higher compared to the indicators in meat for storage in a refrigerating chamber at a temperature of -12 ºC and relative humidity of 95%: in beef for 8 months – 1.05 times more, in pork for 3 months – 1.26 times (p≤0.05), in lamb for 6 months – 1.32 times (p≤0.01), in meat of goat at 6 months – 1.29 times more.

At a temperature of 4±2 ºC in a refrigerating chamber with a relative humidity of 82% in a supermarket on the 2nd day of sale, the content of MAFAnM on the surface of the meat of slaughtered animals was significantly increased: in beef − by 1.39 times more, in pork − by 1.78 times (p≤0.01), in lamb – by 1.68 times (p≤0.05) and in meat of goat – by 1.20 times more compared to the indicators in meat sold in a supermarket from a refrigerator at temperatures -6...-8 ºC and relative humidity of 85% for 20 days.

At a temperature of 0...-6 ºC in a refrigerating chamber/room with a relative humidity of 88% in the agro-food market on the 2-nd day of sale of the meat of slaughtered animals, the content of MAFAnM was higher and the difference was probable: in beef it was 1.85 times more (p≤ 0.001), in pork − by 1.98 times (p≤0.001), in lamb − by 1.82 times (p≤0.01) and in meat of goat − by 1.82 times more (p≤0.001) compared to the indicators in meat for sale on the agro-food market

from a refrigerating chamber at a temperature of 0...-1 ºC and a relative humidity of 85% for 16 days.

Scientists have established that when beef is stored at a temperature of -12 ºC, the intensity of the death of psychrotrophic microflora is lower, compared to a storage temperature of -20...-25 ºC, and it was also noted that BGCP and mold fungi were isolated from beef with significant microbial seeding [6].

It should be noted that the safety and quality of the meat of slaughter animals largely depends on the conditions of their storage, that is, the sanitary and hygienic condition of refrigerating chambers and facilities for their production and circulation (storage and sale).

Conclusions. There was a directly proportional increase in the insemination of the meat of slaughter animals MAFAnM for storage and sale in refrigerators in a supermarket at a temperature of 4±2 ºC and an agro-food market at a temperature of 0...6 ºC for 2 days, respectively: in beef − $(1.15\pm0.22)\times10^3$ and $(2.26\pm0.21)\times10^3$ CFU/cm^2; pork − $(1.32\pm0.18)\times10^3$ and $(2.81\pm0.19)\times103$ CFU/cm^2; lamb - $(1.09\pm0.20)\times10^3$ and $(2.18\pm0.22)\times10^3$ CFU/cm^2; meat of goat - $(1.18\pm0.12)\times10^3$ and $(1.97\pm0.17)\times10^3$ CFU/cm^2.

Inspectors of veterinary medicine must control the technological process of cooling the meat of slaughter animals. Inspections should be carried out on the basis of risk assessment, they should prevent cross-contamination in the slaughterhouse and cold rooms, and the quality of meat inspection should be improved by introducing strict hygiene requirements at the farm level.

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