

UDC: 616-092.9.546.4:636.27/082.31

## CHANGES OF ORGANOLEPTIC, PHYSICAL AND CHEMICAL INDICES IN THE PROCESS OF BEEF STORAGE

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*The influence of the rations correction containing trace elements (Cu, Mn, Zn, Co, Fe, Se) in the form of mineral salts and their methionate complexes on organoleptic, physical and chemical indices of beef in the process of storage has been studied.*

**Key words:** bulls, Simmentales, Polisska meat breed, trace elements, methionate.

**Introduction.** Previous searches revealed that Simmental bulls fed with multi-component trace elements premix had the best indicators of meat.

The aim of our search was to examine changes in organoleptic, physical and chemical indices in the process of beef storage obtained under intensive growing of animals on diets enriched with trace elements.

**Material and methods.** Experimental part of the work was performed in LLC «Litynske», Drohobych district, Lviv region. Two parallel experiments on calves of Polisska meat and Simmental breeds were conducted. Clinically healthy calves of both breeds, including the live weight and age were selected for the experiment.

**Table  
1.**

### Scheme of the experiment

Groups	Number of heads	Character feeding
Control	20	basic ration ( <b>OR</b> )
The first experimental	20	OP+CuSO <sub>4</sub> -0,1 +ZnSO <sub>4</sub> - 0,1+ CoSO <sub>4</sub> - 0,03 + NaHSeO <sub>3</sub> - 0,03 + FeSO <sub>4</sub> 0,05 mg / kg of body weight.
The second experimental	20	OP+CuMet - 0,1 +ZnMet - 0,1+ CoMet - 0,03 + SeMet - 0,03 + FeMt - 0,05 + MnMet - 0,05of mg/kg

Two control and two experimental groups of calves - analogues, 20 in each were formed, Table 1. Animals of the control group received the basic diet. Bulls from the first experimental group both Polisska meat and Simmental breeds received, besides the basic diet, trace element dieting salts: copper, iron, zinc,

cobalt and selenium. Animals of the second experimental group received methionate dieting with the above mentioned trace elements.

Veterinary - sanitary examination of meat and subproducts was performed according to the current "Rules of veterinary inspection of slaughtered animals and veterinary- sanitary examination of meat and meat products", 2002.

**Research results.** After the control slaughter visible pathologic changes and defects of appearance, color, texture and smell of meat, the cut of muscle, fat and tendon condition were not revealed.

**Table 2.**

**Results of the meat freshness study in 48 hours.,  $M \pm m$ ,  $n = 5$**

Indices	Groups of animals		
	Control	I	II
<i>Bulls of Polisska meat breed</i>			
Number of microorganisms in sight	4-5	2-3	1-2
Copper sulphate reaction	–	–	–
Number of volatile fatty acids, mg	3,1±0,06	2,9±0,09	2,0±0,10
pH	5,86±0,04	5,70±0,05*	5,62±0,03****
Peroxidase reaction	+	+	+
Ammonia reaction	–	–	–
Content of amino-ammonia nitrogen	1,26±0,04	1,24±0,07	1,20±0,05
<i>Simmental bulls</i>			
Number of microorganisms in sight	4-5	2-3	1-2
Copper sulphate reaction	–	–	–
Number of volatile fatty acids, mg	3,1±0,07	2,8±0,10	2,0±0,04
pH	5,79±0,03	5,60±0,04****	5,56±0,02****
Peroxidase reaction	+	+	+
Ammonia reaction	–	–	–
Content of amino-ammonia nitrogen	1,24±0,05	1,23±0,03	1,20±0,08

\* (+) - Positive reaction; (-) - Negative reaction.

Studying organoleptic characteristics of beef we have found that in experimental animals of both breeds the cut surface of meat is reddish with distinctive red hue, meat juice is transparent. The cut surface of meat, is dense, the hole after finger pressing quickly levels. The smell characterizes fresh meat. Fat is shiny, solid, whitish and crumbles under pressing. Bone marrow fills the lumen of the bone, it is hard, yellowish and bright. Tendons and joints are solid, white, bright, synovia is transparent. Broth is transparent, has pleasant smell.

In 48 hours after slaughter (Table. 2) microscopy of smears samples of the longest muscle of the bull's back of Polesska meat and Simmental breeds has been conducted.

As we can see from the table. 2, in sight of the microscope isolated microorganisms, mainly coccoid forms have been revealed. In smears of muscle of control animals groups of both breeds from 2 to 3 of microorganisms and from 1 to 2 – in smears of muscles of animals from experimental groups have been revealed. Number of volatile fatty acids and amino ammonia nitrogen content were identical. Copper sulphate and ammonia reactions in all experimental groups of both breeds after 48 hours of storage were negative.

Peroxidase reaction, however, was positive in all groups of bulls of Polesska meat and Simmental breeds.

After 14 days of storage (Table. 3) early signs of not fresh meat were evident in the control groups with increased number of microorganisms (28- 32), mostly rod-shaped forms. Positive copper sulphate reaction, increased amount of volatile fatty acids and amino-ammonia nitrogen, negative peroxidase reaction and positive ammonia reaction testified signs of not fresh meat.

In the first experimental groups investigated indices (number of volatile fatty acids, copper sulphate reaction, ammonia reaction, amino-ammonia nitrogen content) characterized meat of dubious freshness.

In the meat samples from animals of other experimental groups the studied indices remained at the level typical for fresh meat. In the process of beef storage at low temperatures (from 0 to 2 ° C), the first signs of meat spoilage first of all were found in the control group of animals of Polesska meat and Simmental breeds at 10-11<sup>th</sup> days of storage.

**Table 3.****Results of the meat freshness study 14 days,  $M \pm m$ ,  $n = 5$** 

Indices	Groups of animals		
	Control		Control
<i>Bulls of Polisska meat breed</i>			
Number of microorganisms in sight	28-32	25-26	21-24
Copper sulphate reaction	+	±	-
Number of volatile fatty acids, mg	12,0±0,04	6,0±0,07	4,0±0,12
pH	6,30±0,05	6,15±0,03*	6,10±0,02**
Peroxidase reaction	-	-	-
Ammonia reaction	+	+	±
Content of amino-ammonia nitrogen	1,70±0,03	1,43±0,05	1,26±0,05
<i>Simmental bulls</i>			
Number of microorganisms in sight	28-32	24-26	19-21
Copper sulphate reaction	+	±	-
Number of volatile fatty acids, mg	11,0±0,03	5,8±0,07	4,0±0,11
pH	6,41±0,04	6,07±0,04***	6,01±0,05***
Peroxidase reaction	-	-	±
Ammonia reaction	+	±	±
Content of amino-ammonia nitrogen	1,69±0,02	1,40±0,07	1,25±0,05

\* (+) - Positive reaction; (-) - Negative reaction; (±) - doubtful reaction.

Resistant to damage was the meat of animals of both breeds that had been fed with methionate premix. So, the meat of animals from the first experimental group was included into the category of questionable freshness on the 13th day and the second group – on the 14th day. In addition, the meat from the experimental groups of both breeds was characterized by 2,4-6,6% lower ( $P < 0.001$ ) pH.

As we can see from the table 2 and 3, after 2 - and 12 day beef storage at temperature (0-+2°C) value of pH in the meat of bulls of Polesska meat and Simmental breeds is lower than in the control groups. The lowest pH value was revealed in the meat of Simmental bulls which had been fed with methionate premix.

**Conclusion.** Rations correction of Polesska meat and Simmental breed by scarce trace elements and their methionates gives the meat that by physical and chemical indices and microscopy comply with veterinary and sanitary expertise that characterize its purity. Meat acidity (pH) indicate that it has an acid reaction and can be stored longer than meat from calves which received traditional diets.

The best results of veterinary-sanitary examination of meat were revealed when to the ration of both bull breeds, especially Simmental, methionate premix was added.

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#### ***Зміни органолептичних та фізико-хімічних показників в процесі зберігання яловичини. Коваль Г.М., Васерук Н.Я.***

*Вивчено вплив корекції раціонів за вмістом мікроелементів (Cu, Mn, Zn, Co, Fe, Se) у формі мінеральних солей та їх метіонатних комплексів на органолептичні та фізико-хімічні показники яловичини в процесі зберігання.*

**Ключові слова:** бугайці, симентали, поліська м'ясна, мікроелементи, метіонати.

#### ***Изменения органолептических и физико-химических показателей в процессе сохранения говядины. Коваль Г.М., Васерук Н.Я.***

*Изучено влияние коррекции рационов по содержанию микроэлементов (Cu, Mn, Zn, Co, Fe, Se) в форме минеральных солей и их метионатных комплексов на органолептические и физико-химические показатели говядины в процессе сохранения.*

**Ключевые слова:** бычки, симменталы, полесская мясная, микроэлементы, метионаты.