Session 1 : Growth promotors in farm animals.

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Microstructure of the muscle tissue of beef cattle fed with bioactive substances

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Use of bioactive substances and, in particular, of perchlorate preparations (PMP) to increase meat productivity of fed animals raise a question of a detailed study into the quality of meat products.
Studies on cattle meat productivity evaluation showed that under the influence of the abovementioned preparations live weight of the animals was 8-18 kg higher to the period of delivery as compared to the corresponding control(animals fed without this preparation). Test animals' carcasses were heavier by 5-8kg; slaughter yield was 0.3-0.5% greater.
PMP is a salty liquid of bright-yellow colour containing a mixture of magnesium perchlorate, magnesium chloride and sodium chloride in certain ratios. It is recommended to add this preparation to fed animals' ration in small amounts. In aquous medium the preparation fully disassociates on cathiones of Mg^{++} and Na^{+} and anions of Cl^{-} and ClO_4^{-}. PMP influence iodine-concentration mechanism of thyroid as ClO_4^{-} has the same electron structure as I. At the same time a degree of heat energy, forming in animal's organism, requirements are lower; productive efficiency of feed increases, this being expressed in weight gain increase and feed consumption per unit of product gain decreases.
There are a lot various data on positive effect of PMP on organism. All of them can be included into the store of perspective means providing a directed change of metabolism in animal's organism to their meat productivity increase /1-13/.
A lot of information on PMP influence on feeding efficiency was obtained in tests with ruminants. During these tests optimum dosage of preparation, 2mg of anion per 1kg of live weight, was determined for the first time /12/. Data allow to conclude that PMP is a highly efficient preparation that stably increases steers and sheep weight gain.
Experiment data and production test results summary shows that, irrespective of ration type and feeding level, live weight gain for young cattle and sheep, as influenced by PMP, grows up, in average to gain unit, by 8-16% /12/.
Expressing it in money, each fed steer gave additional profit of 10-25 roubles and sheep - 3-6 roubles. Taking into account that I tonne of PMP is efficient for 3-5 thousands of steers, than it is possible to calculate that its use will economize additional 100 t of beef at minimum costs (preparation cost for one steer - 30-40 copecks).

The method of feeding intensification using PMP is widely introduced at many farms of the RSFSR, Ukraine, Kazakhstan, Uzbekistan, Moldaviya.
The problem of additive, incorporated into a ration, influence on quality and technological properties of meat products is of a paramount importance at bioactive substances use for animals' feeding intensification. That is why a study into microstructure of certain organs and whole tissues of animals fed with PMP is of great interest.
Test was made on 14-15-month steers of Black-Montley breed, fed with PMP (according to MBA procedure).
The aim of investigations was a comparative study of organs and whole tissues, and animals' skeletal masculature(Table).
During 3 series of control slaughter veterinary-&-sanitary inspection of carcasses and internal organs of test animals was made. Samples of supraspinalis, l.dorsi and gluteus muscles were selected on a conveyor immediately after slaughter and during different periods of carcasses ageing. Liver and kidneys samples were fixed using 20% neutral aquous solution of formaline; pieces 10 x 5 x 2cm were extracted and used for sections preparation on a freezing microtome (thickness - 30-40mcm). Muscle samples were grouted in celloidine. Cross and longitudinal sections of selected muscles (thickness-20-30 mcm) were obtained using a sliding microtome. The sections were coloured with hematoxyline-iozine with Sudan III. Organs and muscles hystological preparations were studied with the help of a light microscope MBI-15 at x42 and x108 magnification; muscle preparations were additionally investigated using image analyzer "Leitz Pas Plus" and 6.3 x 8 and 16 x 8 magnification.
Characteristic micropictures of morphological organs and muscle at various ageing stages were studied by images obtained on a display of Leitz analyzer and processed with the method of mathematic-statistical analysis.
There were not found specific changes in internal organs as related to PMP use.
For muscle samples extracted after sluaghter at the stage of post-slaughter relaxation swelled muscle fibres were rectilinear or wavy and adhered closer to each other. Large cross lining was revealed.
For muscle hystopreparates after 2 days from slaughter muscle fibres loosening and cross lining was found. At the same time there were determined post mortem muscle fibers with a loosened cross lining and some microcracks.
Microcracks were found in hystopreparates in 5 days after slaughter, the latter being sections of muscle fiber destruction connected to meat ageing process.
There were no differences in dynamics of ageing process for control and test samples.
At a comparative investigation of muscle fibers average diameter value for control and test samples, using image analyzer, it was found that muscle fibers diameter of control animals was non-significantly larger as compared to test animals. However, at muscle bundles density analysis it was revealed that on the square of 487139 micron^2 by the

by the field of vision: test = 482246 microne^2 and control= 418725 microne^2. Square of intermuscular layers in test samples is smaller (24893.6) than in control samples (68414). Changes in ageing process for muscle tissue of test and control animals during storage period were not found.

Table

Results of steers' feeding

Parametres	"Safonovskij" State farm (winter)		"Rybnovskij" State farm (spring, summer)			
	Groups					
	Control	Test	Control	Test	Control	Test
Heads number	20	20	20	20	10	10
Test time, days	78	78	95	95	91	91
Live weight, kg						
at the beginning of the test	327.8	327.7	306.0	307.0	375.0	375.0
at the end of the test	403.9 ± 2.1	422.0 ± 2.1	387.5 ± 2.40	406.0 ± 2.99	462.5 ± 4.62	478.5 ± 5.14
Gain during test, kg	76.1	95.1	81.5	99.0	88.5	103.5
Average daily gain, g	976	1218	858	1042	951	1113
in %	100	124.8	100	121.4	100	117
Carcass weight, kg	197.0 ± 1.02	205.6 ± 1.02	199.4 ± 1.64	209.4 ± 1.59	239.4 ± 2.06	249.0 ± 2.06
Carcass weight increase, kg	-	8.6	-	10.1	-	9.6

Muscle fibers and bundles hystometry did not show, in the second series of investigations, differences between control and test samples in muscle fibers diameter (1-2 mcm difference).

At the third series of tests veterinary-&-sanitary inspection did not reveal any specific regularities in internal organs changes due to animals' feeding with PMP.

It was found that ageing processes are identical for control and test animals.

There were no significant differences in chemical composition of liver and kidneys of test and control animals. A certain tendency to protein and dry matter level increase in these by-products, as effected by PMP, was revealed.

From the abovementioned it is possible to conclude that perchlorate preparates incorporation into the rarion of young cattle doest not affect chemical composition of the tested samples of by-products; they can be widely used in production.

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