

INFLUENCE OF CHOLINECHLORIDE ON RESISTANCE OF ANIMALS AND ON SOME PHYSICO-CHEMICAL  
PROCESSES IN MUSCLE TISSUE

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INTRODUCTION

Development of methods and means, compatible with biological characteristics of animal organism and capable to reduce stress syndroms during transportation and pre-slaughter lairage, remains an acute problem.

The aim of the present study was to reveal the effect of cholinechloride (70% solution of choline trimethyl- $\beta$ -oxyethylammonium) on resistance of animal organism and on some quality indices of muscle tissue of pig carcasses.

MATERIALS AND METHODS

Indices of resistance were evaluated by time of swimming of white mice in water at 20°C with load, constituting 5% of body weight ( $20 \pm 2$ g) and also by resistance to hypoxic hypercapnia which we registered according to lifetime of animals in hermetically sealed vessels with 100 cm<sup>3</sup> capacity.

The effect of swimming of test groups was expressed in % to control groups.

The effect of cholinechloride on concentration of glucose in blood and on glycogen content in liver was determined on white breedless male rats with body weight 180-220 g. Cholinechloride solution (1:200) was introduced orally (0.15 ml/kg of body weight), adrenalin hydrochloride - intraperitoneally at the level of 500 mg/kg body weight (Zoloev, 1987).

The study of cholinechloride effect on pigs during transportation and pre-slaughter lairage was conducted on crossbreeds - Moldavian White x Landrace - grown under conditions of industrial complex. Animals kept in one cage were divided into 2 groups - test and control group. Test animals received during feeding cholinechloride solution, 0.15 mg of a 70% solution per kg of body weight. Preparation was introduced with evening feed, in the morning (16.5-17 hrs) test and control groups were weighted and delivered to slaughter house (50 km), after that they were subjected to pre-slaughter lairage during 2.5-3 hrs.

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RESULTS AND DISCUSSION

The study of the effect of cholinechloride at the level of 0.15 ml/kg on resistance of white mice and changes in the body weight in the period from 4 to 24 hrs after introduction of the solution was conducted with 4, 6, 9, 12 and 24 hrs intervals on white mice. The highest resistance was studied on groups, consisting of not less than 10 animals.

The highest resistance was observed 4 hrs after introduction of preparation, after 6 hrs it was higher than in control group by 20%, then it slowly increased and by 24 hrs reached 50% in relation to controls (fi.1).

The regularity of the highest loss of body weight was observed in test groups as compared to control ones at the beginning of experiment, by 14 hrs the difference between test and control groups levelled, and by 24 hrs inverse picture was observed, i.e. body

weight losses in controls were higher than in test groups.

Survival of mice under acute oxygen deficiency during the same periods of time after introduction of the solution tended to increase as compared to control animals, however, the difference was insignificant.

During study of cholinechloride effect on the content of glucose in blood and of glycogen in liver, 4 groups of rats were used in the experiment:

Group 1: pure controls, distilled water was introduced per os, after 5 hrs sterile physiological solution - intraperitoneally.

Group 2: controls with adrenalin, distilled water was introduced per os, after 5 hrs, adrenalin - intraperitoneally.

Group 3: test animals, cholinechloride solution was introduced per os (0.15 ml/kg of live weight), after 5 hrs - adrenalin - intraperitoneally.

Group 4: test animals without adrenalin, cholinechloride was introduced in the same amount after 5 hours - sterile physiological solution - intraperitoneally.

After 5 hours animals received adrenalin and physiological solution intraperitoneally, after 1 hour they were decapitated under light ether anaesthesia, samples of blood were taken to determine glucose levels by ortholuidine method, samples of blood - to determine glycogen levels spectrophotometrically (Meshkov and Severin, 1979), and also for light microscopic research. Mean data of tests are given in table 1.

TABLE 1 Changes in the content of glucose in blood and of glycogen in liver (mg%) as dependent on type of treatment

Groups of animals <sup>1</sup>	Glucose content in blood, mg %	Glycogen content in liver, mg %
1. Distilled water, phys.solution	137.8	387.4
2. Distilled water, adrenalin	211.5	222.2
3. Cholinechloride, adrenalin	178.0	388.8
4. Cholinechloride, phys.solution	159.7	230.6

<sup>1</sup>In each series of experiments we used not less than 18 animals. Loss of body weight in all groups after 6 hours of experiment was higher than in first group (pure controls), this correlating with data on weight loss obtained during tests with white mice.

According to similar method we studied the effect of cholinechloride on dynamics of glucose level change in blood of rats in the period of 6-24 hrs from the moment of introduction (fig.2).

It can be seen that cholinechloride decreases the amount of glucose in blood of both adrenalectomized and non-adrenalectomized animals.

Microstructural research was conducted on liver samples of rats, obtained after 6 hrs from the beginning of experiment from 4 groups of animals, tests were conducted according to above-mentioned scheme.

Fig. 1 Changes in the animal resistance as dependent on time from introduction of cholinechloride.

Dilution - 1 : 200

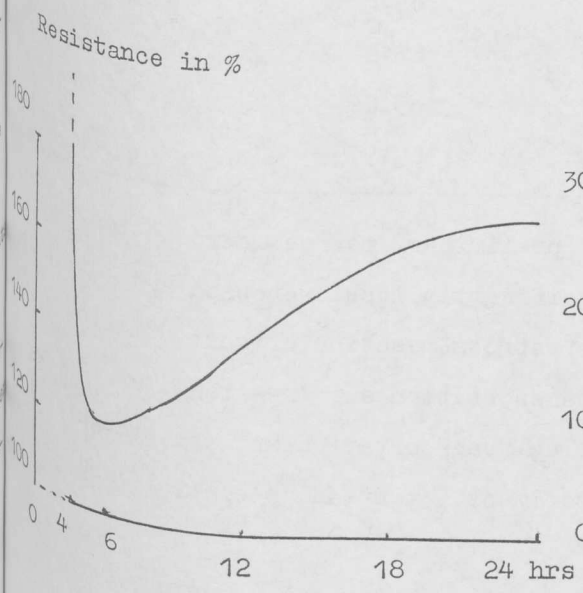
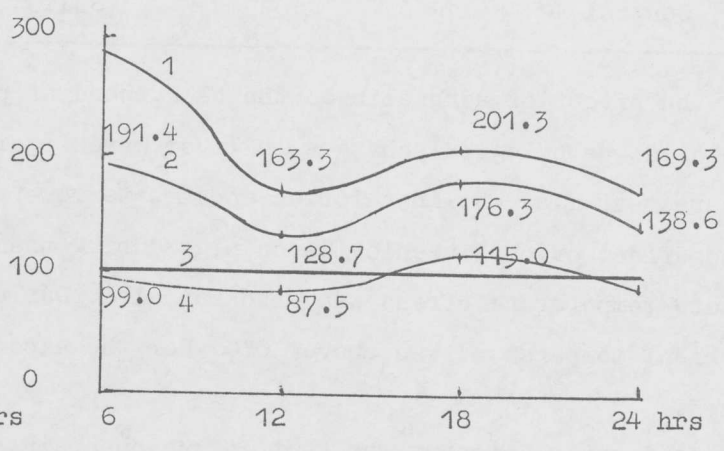


Fig. 2 Changes in the content of glucose in blood and of glycogen in liver as dependent on time and type of treatment

1. Distilled water, adrenalin
2. Cholinechloride, adrenalin
3. Distilled water, phys. solution
4. Cholinechloride, phys. solution

Glucose content in % to controls



1. Controls. Total architectonics of the liver parenchyma corresponds to the classic

2. Distilled water per os, adrenalin intraperitoneally. After introduction of adrena-  
aiming at creating a stress reaction, its effect on structural characteristics of  
parenchymatose liver cells was noted. The degree of this microstructural change is more or  
similar in cells of the whole organ, however, it differs in different animals. At ma-  
effect strong hydration of hematocytes cytoplasm is observed, its clearance as well.  
simultaneously, structure of cellular components acquires grainy character. In other animals  
clearance due to pathological reaction of liver parenchyma cells are non-significant.

3. In spite of these processes, total composition of liver tissue is not changed.

4. The cellular structure of liver of rats, treated with cholinechloride, does not differ  
controls. Only one out of 6 animals showed moderate amounts of small lipid-containing  
in parenchymatose cells, which can be referred to the normal reaction.

5. The effect of adrenalin on the background of per os influence of cholinechloride, cer-  
degree of cytoplasm hydration of parenchymatose cells is seen. Parallely, limited  
of capillary clearance is noted. Separate hepatocytes show grainy and clear cy-  
plasma. Total characteristics of parenchyma remains native.



TABLE 2 The Effect of Cholinechloride on the quality and yield of pork meat

Groups of animals	n	Liveweight before delivery, kg	Liveweight after delivery, kg	Yield of bone-in meat, kg	Yield of bone-in meat, %	pH for the group	Stunning method	
1	Test	9	791	779	486.6	62.5	6.3	stunning with hammer
	Control	9	874	861	538.6	62.5	5.6	stunning with hammer
2	Test	10	910	896	590.0	65.8	6.25	stunning with hammer
	Control	10	905	891	569.0	63.8	6.7	stunning with hammer
3	Test	10	1016	1001	631.0	63.04	6.25	electric stunning
	Control	10	1116	1099	681.0	61.97	5.65	electric stunning

At the effect of adrenalin on the background of preliminary per os introduction of cholinechloride pathological changes in liver were significantly less expressed and bore local character, i.e. cholinechloride appears to lower stress-reaction of test animals. The effect of cholinechloride on pigs during transportation and pre-slaughter lairage at acute temperature stress was also revealed. During transportation and pre-slaughter lairage ambient temperature was above 30°C. For the experiment 3 test and 3 control groups were used.

Group 1 after delivery was kept in the open air, in the shadow, it was windy. Group 2 after delivery and before slaughter was kept in the open air, under sun, in windy less environment. The animals were excited, they constantly moved, changed positions, bled heavily, showed hypersalivation and red spots on large areas of skin. Group 3 - after delivery and before slaughter was kept under conditions, similar to those for group 1. Results are given in table 2.

Experimental results show, that cholinechloride pre-treatment before transportation and during pre-slaughter lairage of pigs under conditions of acute stress, preserves or increases yield of meat and maintains its quality on acceptable level. During application of different stunning methods it was noted that yield of meat changes significantly in groups of animals that were subjected to similar treatments and were kept under similar conditions (transportation, pre-slaughter lairage).

CONCLUSION

Introduction of cholinechloride into animal organism causes its resistance, decrease of rate of glycogen decay in liver and increase of glucose levels in blood; it also helps to maintain quality of meat and increases yield of pork. The obtained data give basis to further deeper research in this direction.

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