

ABOUT DEVELOPMENT OF THE MODEL OF INFLUENCE OF BIOLOGICALLY ACTIVE SUBSTANCES ON THE RESISTANCE AND EFFICIENCY OF BULLS

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SUMMARY

The influence of biologically active substances (BAS) on the resistance and efficiency of bulls of black and white breed in different age groups has been researched. It has been used the vegetable origin preparations and substances that were formed as a result of microwave hyperemia of bulls testicles. It has been stated that the efficiency of the use of biologically active preparations depends on the age of animal and the level of its body.

The model of influence of BAS has been developed and incomplete square-law equation of regression has been offered. The hypothesis on the formation of tissue auto stimulators under the influence of microwave hyperemia of testicles has been confirmed. The suggested methods of interior parameters in bulls provide the increasing in resistance and efficiency at 10–15%.

Keywords: biologically active substances, resistance, microwave, testicle, hyperemia, bulls, model regression

INTRODUCTION

BAS are widely used in practice of animal industries. They allow to reduce negative influence of infringements of conditions of the maintenance and feeding on growth and development of animals [1]. The efficiency and resistance of animals can be increased by their help. BAS very often have a wholesome effect on the offspring [2, 3]. The importance of their role in the removing process of radionucleids from animal and human body [4] can scarcely be exaggerated.

Practically in all scientific works of this tendency the effect mechanism of BAS is examined and the optimal preparation doses is determined, but as a rule the investigations are carried out on animals of only one definite sex age group and during one or several stages of body development.

The complication of effect mechanism of BAS on the animal body is mentioned in all scientific works.

OBJECTIVE

To study the influence of BAS on the resistance and efficiency of bulls of black and white breed the research was carried out on animals, aged 6–8 months.

Fitostimulators “Agroperon” (an extract of wheat grass creeping), “Humosvit” (made on the basis of ecologically pure land and sea flora) and tissue auto stimulators produced under the effect of microwave hyperemia of bull testicles have been used in the experiment.

This scientific work has been directed to study the peculiarity of the effect mechanism of BAS in animals of different age.

MATERIALS AND METHODS

To carry out the investigation the animals were divided into two groups: group 1 – bulls of 6 months age, group 2 – bulls of 8 month age. Inside each of the above mentioned groups there were four subgroups that were formed according to the scheme of complete two-factor experiment. Bulls of control subgroups were not given any treatment. They were used and considered in all three experiments and due to that the number of subgroups was reduced to eight.

This experiment lasted 170 days (the preparatory period lasted 14 days and the basic period – 156). The estimation of productivity was made by calculations of an absolute daily average gain weight. Natural resistance was determined by the account humoral and cellular factors of protection.

The investigations according to the control of hypothesis about formation of tissue auto stimulators under the influence of microwave hyperemia of testicles in bulls [5] were marked out in the separate group. For testicles heating the experimental setup NG-1 developed at the A. Ya. Usikov Institute of Radiophysics and Electronics of National Academy of Sciences of Ukraine (Kharkov, Ukraine) were used.

This setup consisted of the source of microwave irradiation at frequency of 2,45 GHz and the microstriped-microslitted applicator. Exposition time was determined by the timer and the radiation power is controlled by the indicator. The applicator has metal case that was divided into two hermetic cavities. The cavity from the slit side was filled with the water and the bottom border of this cavity was covered by thin rubber diaphragm which is virtually an applicator aperture. Water bolus of about 9 mm in thickness assured matching of the radiator with the object. For personnel protection the outer surface of the applicator was covered by an absorbent [6].

The preparation doses for the animals of both age groups were identical and determined according to the advices of their application. The radiation sitting lasted 90 seconds. The applicator touched with the scrotum skin and the total capacity, absorbed into the tissues, was about 15 W.

All the animals were in the same conditions (they were kept in the same house) and the feeding regime was maintained according to the technology that was formed on the farm. The microclimate parameters in the animal house have been controlled: temperature, humidity and air movement speed, the concentration of noxious gases (once a month). For a period of the whole experiment the microclimate parameters have met the standard requirements.

Before the beginning of the experiment body measurements and weighing of bulls have been made. Before the beginning of the basic period the subgroups have been formed finally: each group had five bulls (according to the results of preparatory weighing).

There was no significant difference in live weight of bulls in each subgroup, within the age groups, and there wasn't maximum departure from the average value in the group more than 7,5%. There was the same within the subgroups.

RESULTS

The highest gain weight under the influence of fitostimulators was observed in younger bulls having the lowest live weight. It was 10–15% higher than in bulls of control subgroup, but the above values in bulls of older age slightly exceeded the values of the control subgroup.

Changes in the live weight for younger bulls, testicles of which were subjected to irradiation, correspond to the changes of that in bulls of younger subgroups that received fitostimulators, but the value was a little less in its absolute amount.

Value of gain live weight in bulls of older age with the maximum live weight, testicles of which were subjected to irradiation exceeded the values of the control subgroup at 15–17%.

Conformity analysis of distribution of live weight in bulls with normal law was carried out before the beginning of statistical treatments of results according to age groups.

The consent criterion χ^2 was used for examination. The checking results are given in table 1.

Table 1. The checking results of law of live weight distribution of bulls.

Group	Date					
	2005-11-04	2005-12-24	2006-01-24	2006-02-24	2006-03-24	2006-04-24
6 months	<i>B</i> <i>q = 30%</i>	<i>D</i> <i>q = 1%</i>	<i>C</i> <i>q = 10%</i>	<i>D</i> <i>q = 1%</i>	<i>B</i> <i>q = 30%</i>	<i>B</i> <i>q = 30%</i>
8 months	<i>B</i> <i>q = 30%</i>	<i>A</i> <i>q = 70%</i>	<i>A</i> <i>q = 70%</i>	<i>A</i> <i>q = 80%</i>	<i>B</i> <i>q = 30%</i>	<i>B</i> <i>q = 30%</i>

Notes: A – The law of distribution coincides with the normal one, even as well as possible; B – The law of distribution doesn't contradict the normal one; C – The law of distribution differs from the normal one considerably; D – The law of distribution differs from the normal one very distinctly; q – The level of importance, %.

At the beginning of the experiment the law of distribution corresponds to the normal one for the bulls of both groups. Then it becomes very distinctly from the normal law for the bull of younger age group (6 months) and by the end of the experiment it conforms to the normal law again.

The law of distribution of live weight in bulls of older group (8 months) begins to change by the end of the experiment. The most important changes are in the subgroup which was influenced by microwave hyperemia – there is sudden increasing of live weight in the most developed bulls in this subgroup.

The change character of the law of distribution is shown in picture 1. In this picture the distribution diagrams of live weight of bulls are shown. The selective dispersion values, defined in suitable time moment are given along the abscissa axis and conventional sings of bulls are shown in table 2. The same symbols were used for the designation of bulls which had the same live weight at the beginning of the experiment.

Table 2. Conventional signs of bulls

Subgroup	MH-6					H-6					WGC-6					K-6				
Number	3280	3201	3243	3348	3303	3265	3388	3202	6219	3241	3318	3290	3203	3334	3255	3340	3304	3205	3228	3293
Live Weight	157	165	170	175	180	160	166	168	171	175	160	166	168	171	175	165	169	172	175	179
Sign	1	S	M	L	5	1	S	3	M	L	1	S	3	M	L	S	M	3	L	5

Note: Subgroup designation: letters (MH – effect of microwave hyperemia, H – preparation “Humosvit”, WGC – an extract of wheat grass creeping, K – control); figures – age of bulls at the beginning of experiment, months.

The average values of gain live weight of bulls in the control subgroup are given in table 3. To determine the trustworthiness of difference in the average values of gain live weight in each subgroups, taking into account of the distribution law, has been used the criterion by White or (T – criterion). The important differences among the average values of live weight of bulls in each subgroup haven't been stated for the period of the whole experiment.

		2005-11-04																			
MH-6		1				S				M				L				5			
H-6			1				S	3			M				L						
WGC-6			1				S	3	M						L						
K-6							S	M			3				L		5				
				-1,2					0							1,2					s

		2006-02-24																			
MH-6		1			S	M					L	5									
H-6										M											
										3											
										S					L						
										1											
WGC-6										M											
										3											
							1			S	L										
K-6											5										
							S	M	3						L						
				-1,2					0							1,2					s

Picture 1. The diagram of distribution of live weight of bulls

Comparative change quantities of average values of bull gain live weight in the experimental subgroups with respect of animals of control subgroups are given in table 3. The levels of importance for these differences were also given there.

Table 3. Comparative changes of average values of gain live weight

Subgroup, designation	Animal number, head	The period of the experiment				
		Value of change, %				
		2005-11-04 2005-12-24	2005-12-24 2006-01-24	2006-01-24 2006-02-24	2006-02-24 2006-03-24	2006-03-24 2006-04-24
MH-6	5	-8	+3	+2	+6	+5
H-6	5	+10	+8	+5	-6	+2
WGC-6	5	+13	+7	-3	-4	-2
K-6 – average values of gain live weight, g.	5	760	760	750	740	720
MH-8	5	-3	+9	+15	+15	+14
H-8	5	+10	+6	+1	+2	+5
WGC-8	5	+15	+7	-5	-3	0
K-8 – average values of gain live weight, g.	5	730	730	740	740	730

Notes: Level of importance $q = 5\%$ – bold and color; The important differences haven't – italic.

In each group of bulls by the formation of subgroups the animals which live weight was practically the same, have been selected. These animals were distributed among the subgroups evenly and as a result it was found that each group received three heads (in table 2 they are marked off by special symbol).

Incomplete square – law equations of regression for three factors which of them were on two levels have been determined according to the results of investigations (indices values of these animals have been used).

The first factor x_1 – research preparation. The second factor x_2 – age of animal. The third factor x_3 – level of animal development (value of live weight of bull at the beginning of the experiment). The low level of the factor: parameters of bulls with the minimum live weight, and upper one: parameters of bulls with the maximum live weight (from selected three animals which have been distributed among the subgroups).

As a result of statistical treatment (at the level of importance at 5%) for the gain live weight of bulls the following equations have been received:

$$y = 750 - 8x_1 - 17x_2 + 8x_3 + 8x_1x_3$$

for the preparation "Agroperon";

$$y = 766 + 24x_1 - 17x_2 - 8x_3 - 24x_1x_3$$

for the preparation "Humosvit";

$$y = 774 + 32x_1 + 16x_1x_2 + 16x_3$$

for the tissue preparations formed as a result of microwave hyperemia effect.

The value control of the gain live weight of bulls defined by these formulae and determined during this experiment for the animals with average value of live weight has been shown that the divergence wasn't more than 2,5%.

Cellular and humoral parameter of resistance, an albuminous spectrum blood serum corresponded to the character of live weight change.

CONCLUSION

From our point of view, the results of this experiment confirm beneficial influence of BAS on the efficiency and resistance of bulls very well. The results of table 3 and the equations of regression are evidence of these. But the presence of important effect of interaction in the equations shows, that the using effectiveness of researched BAS will greatly depend on the age of animals and the level of their development.

The changes of the law of distribution of bull live weight in the younger group take place as a result of influence of BAS – the gain live weight of bulls which were backward in their development in the past, but which were give “Agroperon” and “Humosvit” increases very rapidly. The important changes were not registered in the subgroup MH because at age of 6 months the formation of sexual system in bulls was not completed.

As soon as the influence of preparations has finished, the law of distribution became normal again – the bulls returned to the conditions where the gain live weight became to depend on the great amount of factors again, each of them has an insignificant influence. From our point of view, it confirms by the character of changes of bull gain live weight of the subgroups WGC (taking “Agroperon” – the preparation influencing on the protein metabolism). The changes in this subgroup began earlier, proceeded more rapidly and stopped earlier.

From our point of view, the changes in bulls of the older group can be explained by the influence of tissue preparations formed by the influence of microwave hyperemia. The maximum effect was observed in the most developed bulls which sexual system was completely formed. Vegetable preparations have had a positive influence which was observed in the “leveling” of the law of distribution of live weight – the gain live weight in bulls of experimental group was more than in bulls of control group though the important distinctions haven’t been determined.

The fact is that the difference of live weight values of bulls of the same age, which was by the group formation, explains the difference of the development levels, is a consequence of Chirvinski-Maligonov’s law. The growth has a staged uneven character and at the same time it has the conformity to natural law of continuous growth as an interactive process.

The normalization of metabolism processes is one of the displays of influence of BAS on the objects, especially by the long term use. The overwhelming majority of animals were enveloped by this process in this case [3]. The influence was non-permanent in this experiment and the effect was observed for a period of several months. In case of microwave hyperemia application the positive effect began to affect by the end of this experiment. At first even the lowering of gain live weight in the subgroups MH was observed.

We think that the substances presented in the preparation composition or formed after microwave hyperemia “started up” the mechanism regulating the animal growth or influenced on the organs controlling by this process. It’s coordinated with conceptions of modern genetics about the mechanism of “gene engaging” very well.

It’s necessary to mention that by the using of BAS for increasing of animal efficiency, it’s necessary to form the groups of definite development levels preliminarily and to correlate with the preparation using according to age of animals and their development level.

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