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Influence of the immune modulation drug "PIM" on the cows' metabolism and calves growth rates born from them.

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ABSTRACT

It has been established that injections of PIM preparation to sterile cows two months prior to calving promote the activation of metabolic processes in their bodies, which in turn improves the growth and development of the fetus, and the nutritional value of milk of cows. The live weight of calves at birth increases by 1.59 and 2.89 kg, the fat content of milk rises by 0.60 and 0.74%, and the amount of protein by 0.26 and 0.48%. The stimulating effect on the physiological processes of the PIM preparation introduced to the cows a month before the calving was to increase the morphological and biochemical parameters of the blood (the content of hemoglobin, leukocytes, erythrocytes, total protein and its fractions, calcium, phosphorus) during the suckling period in gobies. The stimulation of physiological processes as a result of the use of the PIM preparation was within the physiological norm, as evidenced by the activity of the transamination enzymes (AST and ALT), indicating the absence of damaging effects on the liver and heart cells.
Keywords: cows, PIM preparation, biogenic stimulators, hematological indices, milk quality, growth.

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INTRODUCTION

Effective influence of biogenic stimulants on the body is manifested by diverse positive effects (from the correction of the body's immunity to the hormonal and enzymatic systems of young animals of farm animals). Positively influencing the growth of young animals, they reduce feed costs, shorten the growing time, increase the safety of livestock and the level of profitability of the industry [1, 4, 7, 8, 9].

Currently, in zoo-veterinary practice, biologically active egg mass, embryonic stimulant (STEM), complex immune modulator (CMM), a stimulator from the drone brood of bees are widely used to stimulate fattening, manifested in the energy of growth and development, increase of natural resistance and preservation of young animals. CITP), stimulant from drones (CT) and others [2, 3, 5, 6, 10].

In LLC "Laboratory of Biological Modulators", a new preparation of PIM (an immune modeling drug) was developed. It is produced in the Federal State Unitary Enterprise "Armavir Biofactory". PIM is a lyophilized dried preparation of natural origin.

The purpose of our studies was to study the effect of the immune modeling drug PIM on metabolic rates, in the Kalmyk breeds, as well as on the growth and interior characteristics of the young animals obtained from them.

MATERIALS AND METHODS

Scientific and economic experience was conducted in 2015-2017 in the farm "Arl", Yashkul region, Republic of Kalmykia.

In accordance with the developed scheme, three groups of Kalmyk breed cows were formed in the farm with 25 heads in each 2-3 lactation, which was injected intramuscularly 2 months before delivery (Table 1).

Table 1: Scheme of experience

Indicators	Group		
	I	II	III
Number of animals	25	25	25
Name of the preparation	Saline	PIM	PIM
Dose of drug administration	5 ml per head	5 ml per head	5 ml per head
Multiplicity of drug injection	Four times in 7 days	Twice in 7 days	Twice in 7 days

Born calves were grown on the technology of beef cattle. The diet of feeding of stale dead cows of Kalmyk breed in all groups was the same.

The cows were subjected to hematologic examinations before the administration of PIM and a week after the last administration. In addition, the chemical composition of the milk of cows was determined in the suckling period of growing calves.

Studies of the growth dynamics of calves were weighed at birth, at 90 and 205 days of postnatal development. In young animals, haematological studies were carried out in the suckling period at the age of 6 months in accordance with generally accepted methods.

RESULTS AND DISCUSSION

The main indicator of studying the interior of animals is the blood.

Hematologic indices in the experimental groups of cows prior to the introduction of PAM are presented in table 2.

Table 2: Hematologic indices in cows before the administration of PIM preparation

Indicator		Group (n=5)			rate
		I	II	III	
Leucocytes, 10^9 / l		8,10±1,02	8,54±1,14	7,73±0,63	4,5-12,0
Erythrocytes, 10^{12} / L		6,52±0,57	6,22±0,62	6,47±0,69	5,0-7,5
Hemoglobin, g / l		107,8±3,11	103,8±5,45	106,6±3,85	99-129
Total protein, g / l		73,23±6,8	70,95±2,26	72,05±1,42	70-85
Albumins, g / l		23,91±2,08	22,33±5,00	23,26±4,55	18-42,5
Globulins, g / l	α	12,6±1,25	12,4±2,46	13,0±2,46	7,2-17,0
	β	6,35±1,27	7,1±0,74	6,87±0,74	6,0-13,6
	γ	30,37±5,74	29,12±5,05	28,92±5,05	15,0-34,0
AST, µkat / l		0,46±0,05	0,48±0,13	0,50±0,07	0,62
ALT, µkat / l		0,4±0,07	0,42±0,13	0,36±0,05	0,42
Glucose, mmol / l		2,54±0,30	2,44±0,12	2,41±0,23	2,22-3,33
Cholesterol, mmol / l		4,36±0,20	4,06±1,04	4,18±0,36	1,6-5,0
Urea, mmol / l		3,75±0,73	3,74±0,79	4,34±0,64	2,8-8,8
Phosphorus, µg%		4,2±0,5	4,9±0,9	5,0±0,68	4,5-6,0
Calcium, mg%		11,57±1,3	11,85±0,33	11,68±0,67	10-12,5
Magnesium, mg%		1,98±0,5	1,88±0,3	2,07±0,38	1,7-2,9

Before the administration of the PIM preparation, all the morphological and biochemical parameters of the blood in sterile dry cows were within the physiological norm. The difference in hematological parameters, between the control and the experimental groups was insignificant and unreliable.

After the introduction of immune modulator PAM in cows, changes in blood indices were observed (Table 3).

Table 3: Hematologic parameters in cows after the administration of PIM preparation

Indicators		Group (n=5)			rate
		I	II	III	
Leucocytes, 10^9 / l		9,18±1,26	9,39±1,53	9,40±1,26	4,5-12,0
Erythrocytes, 10^{12} / L		6,43±0,09	7,07±0,48*	7,31±0,31*	5,0-7,5
Hemoglobin, g / l		110,8±1,64	120,6±3,36*	122,4±3,36*	99-129
Total protein, g / l		77,91±1,63	80,12±3,15	83,67±0,80*	70-85
Albumins, g / l		27,72±0,72	31,58±2,34**	31,18±2,14**	18-42,5
Globulins, g / l	α	13,85±0,51	9,57±2,18*	11,84±0,81*	7,2-17,0
	β	9,25±1,00	7,81±0,93	8,19±1,72	6,0-13,6
	γ	27,09±1,11	31,16±3,44**	32,46±3,32***	15,0-34,0
AST, µkat / l		0,56±0,05	0,58±0,11	0,58±0,04	0,62
ALT, µkat / l		0,40±0,07	0,34±0,05	0,43±0,10	0,42
Glucose, mmol / l		2,89±0,14	2,77±0,44	2,86±0,52	2,22-3,33
Cholesterol, mmol / l		3,32±0,32	4,07±0,67	3,19±0,06	1,6-5,0
Urea, mmol / l		3,46±1,18	3,63±0,62	4,18±1,80	2,8-8,8
Phosphorus, µg%		5,98±0,33	5,78±0,50	5,64±0,38	4,5-6,0
Calcium, mg%		11,46±0,30	12,18±0,34*	12,05±0,35*	10-12,5
Magnesium, mg%		2,26±0,42	2,01±0,31	1,80±0,09	1,7-2,9

Note: *$P \leq 0,05$; **$P \leq 0,01$; *** $P \leq 0,001$

One week after the last injection of the drug in the first control group, the number of leukocytes in the blood increased significantly by 13.34%, in the 2nd test group by 9.96%, and in the third test group by 21.61%.

As a result, in II and III experimental groups, this indicator was higher (unreliable) than in control

animals by 2.29 and 2.40%, respectively.

There was a significant difference in such indicators as the number of erythrocytes and hemoglobin. The second test group exceeded the control animals by 9.6 and 8.85%, respectively, and the third group - by 13.69 and 10.47% (P≤0.05).

The analysis of biochemical studies showed a significant increase in the II and III experimental groups in comparison with the control group for the level of total protein - by 1.78 and 6.32%; albumins - by 13.93 and 12.49%; γ - globulins - by 15, 03 and 19.83%; Calcium - by 6.29 and 5.15% respectively.

Marker enzymes of AST and ALT were within the normal range. This indicates the absence of pathological processes in the body of cows after intramuscular injection of the immune modulation drug.

The introduction of PIM has had a positive effect on the quality of milk and the milkiness of cows - an important indicator of calves' feeding in the suckling period.

Analysis of milk quality showed an increase in such indicators as fat, protein, dry skim milk residue (SOMO) and density.

The introduction of PIM to cows in seven months of the pregnancy period positively affected the live weight of the bull-calves at birth (Table 4).

Table 4: Dynamics of live weight of bull-calves in the suckling period

Indicator	Group		
	I	II	III
Number of animals	14	15	13
Live weight: at birth, kg %	21,21±0,86 100,0	22,80±0,68 107,5	24,10±0,7* 113,6
in 205 days, kg%	186,85±2,57 100,0	201,30±2,38* 107,7	205,80±2,1** 110,2
Average daily growth for the period of cultivation, g	808	871	886

In the experimental groups, it exceeded by 7.5 and 13.6% of its peers from the control group.

To the weaning at the age of 205 days the second experimental group of bull-calves was 7.7% higher than the control group by the indicator of the average live weight. The third trial group was more than 10.2% of control animals.

The change in live weight was observed in bull-calves because of an increase in their average daily growth. To the weaning in the experimental animals of the second group, it exceeded by 7.8%, and in the third group - by 9.7% of the steers of the control group.

Hematologic analyzes showed a significant increase in the studied parameters in gobies of experimental groups to the upper limits of the norm (Table 5).

Table 5: Hematologic parameters in bull-calves at the age of 6 months

Indicator		Group (n=5)			rate
		I	II	III	
Leucocytes, 10^9 / l		Leucocytes, 10^9 / l	7,34±0,57**	7,13±0,87*	4,5-12,0
Erythrocytes, 10^{12} / L		Erythrocytes, 10^{12} / L	6,76±0,73**	6,99±0,31***	5,0-7,5
Hemoglobin, g / l		Hemoglobin, g / l	108,00±1,58*	111,80±2,39*	99-129
Total protein, g / l		Total protein, g / l	73,18±3,71	73,60±1,69	70-85
Albumins, g / l		Albumins, g / l	25,03±2,73	26,67±2,5*	18-42,5
Globulins, g / l	α	12,29±1,33	12,99±1,99	12,19±1,07	7,2-17,0

	β	8,45±1,32	8,64±1,24	8,34±0,94	6,0-13,6
	γ	26,07±3,15	26,52±2,91	26,40±2,09	15,0-34,0
AST, µkat / l	AST, µkat / l	0,46±0,09	0,56±0,20	0,62
ALT, µkat / l	ALT, µkat / l	0,36±0,05	0,34±0,05	0,42
Glucose, mmol / l	Glucose, mmol / l	2,50±0,20	2,54±0,09	2,22-3,33
Cholesterol, mmol / l	Cholesterol, mmol / l	4,24±0,45	4,50±0,46	1,6-5,0
Urea, mmol / l	Urea, mmol / l	3,76±0,82	4,74±0,76*	2,8-8,8
Phosphorus, µg%	Phosphorus, µg%	4,98±0,61	5,20±0,68	4,5-6,0
Calcium, mg%	Calcium, mg%	10,78±0,49	11,65±0,15*	10-12,5
Magnesium, mg%	Magnesium, mg%	2,06±0,40	2,29±0,34	1,7-2,9

Bulls of groups II and III of the experimental groups outperformed the peer group I in terms of content in the blood of leukocytes by 20.3% and 16.9%; erythrocytes by 19.0% and 23.1%; hemoglobin by 5.1% and 8.8%.

In the serum of gobies of experimental groups, the total protein content was 5.12% and 5.70%, respectively, and the albumin content was 8.3 and 15.4%, respectively, compared with the control group. The enzymes AST and ALT, indicating the pathological processes in the body were also within the physiological norm.

The intensity of physiological processes in the bull's body is evidenced by higher urea levels in the second and third test groups and calcium by 10.96% (P≤0.05) and phosphorus - by 10.6% in the third test group.

CONCLUSION

Based on the conducted studies, it can be concluded that injections of PIM preparation to sterile cows two months prior to calving promote the activation of metabolic processes in their bodies, which in turn improves the growth and development of the fetus, and the nutritional value of milk of cows. The stimulation of physiological processes as a result of the use of the PIM preparation was within the physiological norm, as evidenced by the activity of the transamination enzymes (AST and ALT), indicating the absence of damaging effects on the liver and heart cells.

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