Kiyko E.I.,
Junior Research Scientist, Tambov branch of VNIIZH
(Russian Academy of Agricultural Sciences)
Shikhov R.I.,
livestock specialist, JSC "Golitsino"

PROBIOTICS "MONOSPORIN" AND "BACELL" EFFECTIVENESS IN CALVES RATIONS

Currently there is a wide range of feed additives that improve animal production efficiency. Of greatest interest are the additives normalizing the digestive system and thereby increasing the efficiency of feed conversion. In recent years the probiotics administration in livestock has become increasingly popular because they have a positive effect on the homeostasis in the intestines. This is especially important for young animals whose digestive tract is still developing.

Russia has registered more than 90 names of probiotics; the most promising are spore-forming probiotics, and probiotic preparations which consist of different species of bacteria combining multiple mechanisms of action on the digestive system biocoenoses (e.g., a combination of a probiotic preparation and enzymatic properties). "Monosporin" and "Bacell" belong to this group. They are generated by scientists and specialists of the Kuban State Agrarian University and Krasnodar Biocentre.

"Monosporin" differs from the known analogues by a broader spectrum of activity and a new form with a high content of active viable microorganisms. Spore form of *Bacillus subtilis* serves as a basis of the preparation.

"Bacell" is the associated culture of lactic acid bacteria, ruminococci and hay bacillus possessing a complex probiotic-enzymatic action. The preparation contains a multienzyme complex of proteolytic enzymes, amylolytic and cellulosolytic activities and has antibiotic factors to a wide range of pathogenic microorganisms.

"Monosporin" and "Bacell" passed the production tests. However there is not enough data on the joint application of these preparations to the same stock. That is why the aim of the research is to have a scientific and economic expertise of the joint use of "Monosporin", the feed mixture of the probiotic action, and "Bacell", a probiotic-enzymatic preparation, on veal calves.

The study of the effectiveness of "Monosporin" and "Bacell" probiotic feed additives was conducted on young cattle aged from birth to 4 months. The experimental groups were formed on the basis of pairs of analogs; the animals were kept under identical conditions. Before 20 days of age the experimental group calves received "Monosporin" and "Bacell" with milk, and then these preparations were added to drinking water (water t=38°C). The mixture for feeding consisted of 55% extruded oats, 28%extruded peas, 13% SWM, 4% mineral supplements. From the first month the calves in the experimental group showed better feeding on coarse and succulent feeds. The studies found that calves in the experimental group (Table 1) consumed 16,4% more bulky feed (hay and silage), 12,3%, grain mixture, respectively, than control group.

Table 1

Feed consumption per animal during the experiment

Feed	Group		% to control
	control	experimental	
grass-legume hay, kg	155	170	9,7
corn silage, kg	101	128	26,7
oats, kg	81	93	14,8
extruded grain, kg	20	26	9,2
milk, l	120	120	0
liquid feeding mixture, l	600	600	0
Used:			
exchange energy, MJ	3034,9	3365	10,9
dry matter, kg	308,3	345,8	12,2
digestible protein, kg	34,1	37,4	9,7
crude fiber, kg	73,0	81,5	11,6

Introduction to the calves diet of "Monosporin" and "Bacell" probiotics increased 12,2% dry matter consumption, 9,7% digestible protein and 11,6% crude fiber.

Adding probiotic supplements in the diet affected the growth rate of experimental animals (Table 2). The data show that at the age of 4 months the calves of the experimental group were significantly superior to the control animals in live weight (13 kg or 12,5%). Average daily gains for the period of experiment was also 19,2% higher in the experimental group of animals (665 g) compared to controls (551 g) (difference significant at $P < 0.001$).

Table 2

Changes in live weight, average daily gain and feed cost per 1 kg gain

Parameters	Group	
	control	experimental
Live weight, kg		
At the beginning of the experiment (at birth)	37,9±0,34	38,8±1,1
at the age of 1 month	51,6±0,48	54,6±0,6
at the age of 2 months	65,3±0,26	70,6±0,42
at the age of 3 months	81,3±0,42	91,5±0,46
at the age of 4 months	104,0±0,31	117,0±0,44
Gross gain for the period of the experiment	66,1	78,2
Average daily gain, g		
from birth to 1 month	430±9,9	496±17,4
from 1 to 2 months	490±16,9	580±14,3
from 2 to 3 months	571±15	737±12,5
from 3 to 4 months	783±14,4	925±15,2
from birth to 4 months	551±12,42	657±10,38
Cost per 1 kg gain		
exchange energy, MJ	45,9	43,0
ECE	4,59	4,3
digestible protein, g	515,9	478,3

The cost of feed per 1 kg gain in the calves of the experimental group was lower compared with the calves of the control group where 1 kg of gain required 6,3% less ECE and 7,2% digestible protein.

Given the cost of feed used in the experiment, it was noted that the total feed costs per calf of the control group were 1480,7rubles, of the experimental group – 1530,1 rubles. However, due to the higher growth rate of calves receiving "Monosporin" and "Bacell", the cost of feed per 1 kg gain was 19,6 rubles, i.e. 2,8 rubles or 12,5% lower compared to the control group.

During the experiment gastro-intestinal disorders of alimentary nature were observed in the control group while none were reported in the experimental group.

Effect of probiotic supplementation on the metabolism of calves can be judged by biochemical and clinical parameters of blood. Examination of blood of the experimental animals showed that the main parameters of blood were within the physiological norm (Table 3). However, in the experimental group some special features have been observed.

Table 3

Biochemical and clinical blood parameters

Parameters	Group			
	control		experimental	
	21 days	120 days	21 days	120 days
White blood cells, 10^9 / l	8,9 ± 0,33	11,0 ± 0,51	6,9 ± 0,27**	9,9 ± 0,35*
Lymphocytes,%	82,3 ± 1,55	-	75,3 ± 2,13*	-
Hemoglobin, g / l	92,2 ± 2,62	103,8 ± 2,51	84,9 ± 1,43**	105,8 ± 2,89
Red blood cells, 10^{12} / l	5,2 ± 0,34	5,3 ± 0,14	4,5 ± 0,21	6,3 ± 0,2**
Hemoglobin per erythrocyte	17,7 ± 0,41	19,6 ± 0,62	18,9 ± 0,53	17,0 ± 0,65*
Total protein, g / l	69,1 ± 1,25	69,6 ± 1,2	67,3 ± 1,43	71,3 ± 1,27
Albumin, g / l	36,9 ± 0,8	35,4 ± 0,5	34,6 ± 0,46*	36,5 ± 0,26
Globulins, g / l	32,3 ± 0,73	33,8 ± 0,36	33,2 ± 0,38	33,4 ± 0,41
Ratio A / G	1,14 ± 0,027	1,05 ± 0,02	1,04 ± 0,015	1,09 ± 0,03
Phosphorus, micromole / l	2,2 ± 0,2	2,6 ± 0,04	2,3 ± 0,1	2,4 ± 0,09
Calcium, micromole / l	2,8 ± 0,08	2,2 ± 0,06	2,9 ± 0,1	2,2 ± 0,03

* - $P < 0,05$; **- $P < 0,01$

Better absorption of feed nutrients has contributed to the content of some important components of blood. So, by the end of the experiment the amount of hemoglobin in the control and experimental groups was higher than at the beginning (11,6 and 21,9 g/l, respectively). The number of red blood cells also increased.

Despite the fact that the number of leukocytes and lymphocyte levels were within the physiological norm, there is a decrease of these parameters in the blood of experimental group calves compared to controls. This is due, apparently, to the probiotic effect on the resistance of the organism.

The level of total protein in the blood serum of calves of the experimental group at the end of the experiment was somewhat higher than in control animals (2,4%). At the same time in the coefficients of albumin / globulins ratio prevalence of albumin was observed which is typical for calves of this age.

The content of total calcium and inorganic phosphorus in all animals also had a normal value indicating that the balance of these elements of the diet is observed.

As a result of the experiment we calculated the cost-effectiveness of a diet enriched with probiotics (Table 4).

Таблица 4

Economic efficiency of calves growing

Parameters	Group	
	control	experimental
Gross increment, kg	66,1	78,2
Self-cost of gross increment (1 kg = 75,94 rubles)	5019,63	5938,51
Cost of used biological preparations, rubles	-	103,2
The sum of the possible realization of the gross gain (1 kg = 105 rubles)	6940,5	8211,0
Possible sale profit, rubles	1920,87	2169,29
Cost-effectiveness of the additional gain	-	248,42

The data in Table 4 show that probiotic feed supplements administered to calves resulted in higher live weight gain. This ensured obtaining from each experimental animal the additional profit of 248,42 rubles compared with the control. A ruble invested in probiotics "Monosporin" and "Bacell" brings 2,4 rubles profit due to the additional gain.

Thus, the use of probiotics "Monosporin" and "Bacell" added to the diet of calves contributes to the better feed consumption and nutrient intake and, consequently, a more intensive growth of the organism.

The economic indicators were also better in calves treated with probiotics.

This article can also be read in "Niva Zauraliya" № 9 October 2008