Biochemical profile of blood of rabbits on the dependence of the consumed fodder

Mariana CARAMAN
Scientific and Practical Institute of Biotechnologies in Zootechny and Veterinary Medicine, village Maximovca, district Anenii Noi, Republic of Moldova
Correspondent author: m_caraman@mail.ru

Abstract
In order to study the variation of the biochemical profile of the blood of the rabbits depending on the biochemical composition of the consumed fodder (with and without the addition of streptomycetes biomass), an experiment was carried out under laboratory conditions in which were included two lots (control and experimental) of 5 animals per lot. During the experiment, was carried out the biochemical analysis of the fodder, of the blood of the rabbits from both lots taken initially, over 15 days and the end of the experiment.As a result of the experiment, the superiority of the biochemical profile of the rabbit blood from the experimental lot was compared with that of the control lot. The quantitative increase of protein, albumin and glucose respectively by 5.34%, 25.86% and 26.32%, in the blood serum of the animals from the experimental lot compared to the control lot, was favored by the consumption, by rabbits, during 60 days, of the combined granulated fodder with the addition of 0.1% of S. levoris biomass CNMN-Ac-01 .
Keyword: *biomass, rabbit, biochemical indicators, protean metabolism*

Introduction

Rabbits, which are rodent animals, for the physiological development need nutrition rich in vitamins, proteins, calcium and minerals. It is necessary that the nutritional value of the food must cover the nutritional and energy needs in the growing phase of the young rabbits and ensure that the optimal temperature of the body is maintained (Galatanu Diana,2017; Macovschi B.,2014).

Violation of rabbit maintenance and feeding technology reduces the body's resistance to adverse environmental factors. In recent years, in the practice of veterinary medicine and the livestock sector, for the prophylaxis of some animal diseases that occur on the verge of food shortage, are used preparations with benefic micro flora (probiotics) (Nozdrin G. et al, 2012; Petrova N. et al., 2007; Titova A., 2010)

In literature sources, there is a lot of information that states that the use of probiotics contributes to the optimization of metabolic processes in the animals' body, elucidates the effectiveness in the protein amino acid status, in the modification of morphological and biochemical blood indicators (Nozdrin G. et al, 2012). In this sense, the study of the effects of probiotic preparations on the physiological state of the animal body has a theoretical and practical impact.

Feeding and maintenance conditions of rabbits influence the biochemical composition of the blood (Kotsyubenko A).

The image of the blood allows the physiological state of the animals to be evaluated and provides general information about their adaptation to environmental conditions (Petrova N. et al., 2007)

The purpose of this work was to study the effect of the combined granulated fodder with and without the addition of Streptomyces levoris biomass of CNMN-Ac-01 on the blood biochemical indicators of rabbits.

Materials and methods

To achieve the proposed goal, an experiment was conducted under laboratory conditions. Two lots of 5 rabbits were included in the experiment. Rabbits in the control lot received daily granulated combined fodder, and those in the experimental lot - combined granulated fodder with the addition of streptomycetes biomass.

The object of the research served: two types of granulated combined fodder (with and without the addition of 0.1% biomass of S. levoris CNMN-Ac-01) and blood samples collected from rabbits.

Basic research was conducted in the Disease Combat and Prophylaxis Laboratory, Biotechnologies in Embryo Reproduction and Embryo Transfer, Nutrition and Fodder Technology within SPIBZVM. The biomass of S. levoris CNMN-Ac-01 was provided by the Institute of Microbiology and Biotechnologies (National Collection of Non-pathogenic Microorganisms) of the Academy of Sciences of Moldova.

Blood samples were collected from rabbits (at the age of 60 days, 75 days, 138 days) in the morning, after the first bite, because it is forbidden to take blood from starving animals. Rabbits are very sensitive to stress. Any type of stress causes severe hyperglycemia, and flaming even in the short term leads to a severe metabolic change. If these requirements are not taken into account, the research results may be incorrect.

Biochemical blood tests (of three samples collected from rabbits in the control and experimental lots) were performed using the Stat Fax 3300 analyzer.

To perform the analyzes of the biochemical composition of the fodder, Gerhard's performance lab equipment was used.

Results and discussions

Productive parameters of domestic rabbits, such as gain weight, fecundity, prolificity, viability, etc., are ensured by protein intake in the daily ration (Bura M., 2006).

Initially, to determine if the rabbits throughout the experiment will be provided with metabolic energy, crude protein, cellulose, carotenes, some micro- and macroelements, was studied the biochemical composition of the granulated fodder intended for supplying the animals in the control and experimental lot.

Thus, as a result of the biochemical analysis of fodder, it was found that all the studied quality indicators were approximately the same in both fodder (with an insignificant deviation of crude fat, crude pulp, crude ash and carotene).

Only the content of carotene, fat and crude pulp from the compound granulated control fodder exceeded that of the experimental feed by 11.08%, 9.57% and 2.64% (Table 1).

Table 1. Biochemical composition of granulated fodder for rabbits

lots	Crude protein, %	Crude fat, %	Crude fiber, %	Crude ash, %	UN	EM, Mj/kg	Carotene, mg/kg	Ca,%	P,%
control	18.18	3.24	16.30	8.84	0.71	10.63	12.00	1.63	0.39
experimental	18.23	2.93	15.87	8.43	0.72	10.72	10.67	1,45	0.40

A primary role in the exchange of substances in the body exerts its proteins, being involved in nutrition and growth processes, tissue regeneration and immunity (Petrova N. et al., 2007).

Analyzing the results of the research it was found that during the first two weeks, the level of protein increased by 11.14% and 3.82% (Table 2) in the rabbit serum in the control and

experimental lots. Correspondingly, the albumin level was by 3.67% higher in the rabbit serum in the control lot.

Rabbit consumption for 60 days of the combined granulated fodder with the addition of 0.1% of biomass of S. levoris CNMN-Ac-01 intensified protein metabolism in the body, indicating an increase in protein and albumin synthesis in blood serum of animals in the experimental lots with 5.34% and 25.86% (P <0.001) as compared to the serum of animals of the control lot.

The quantitative importance of the blood albumin content is due to the fact that they produce a coloidosmotic blood pressure, provide the dissolution and transport of anions, carry soluble intermediate products of metabolism (Nozdrin G. et al, 2012).

Of the exposed ones, it appears that the increase in protein content in the blood plasma reflects the more intensive growth of the rabbits, and thus the increase in the muscle mass, which was proved by weekly weighing of the animals in both lots.

At the same time, it was found that protein intake in ration is directly proportional to the content of urea in the blood. Urea is a finished product of nitrogen metabolism, which is formed in the liver. Thus, as a result of the intensification of protein metabolism, it was found that in the rabbit growth period (15 days after the beginning of the experiment at the age of 60-70 days) the urea level was increased at the rabbits of the experimental lot by 22,46% compared to those in the control lot. At the end of the experiment the amount of urea was by 12.35% (P <0.001) higher in the rabbit serum in the experimental lot compared to the control and was conditioned by the level of creationin in their blood, which constituted 69.70 ± 0.36 mmol / l. Creatinine is the basic substance of skeletal muscles.

Table 2. Results of biochemical analysis of the blood of rabbits

Specification	initial	75 days		End of the experiment	
		control	experimental	control	experimental
Protein, g/l	24.17±1,08	27.20±0,47	25.13±3,01	31.40±2,83	33.17±1,94
Albumin, g/l	20.93±0,75	23.70±0,26	22.83±2,30	20.93±2,50	28.23±0,33**
Creatinine, mmol/l	69.07±2,42	33.9±4,74	90.73±31,24**	70.60±1,90	69.70±0,36
Urea, mmol/l	0.39±0,02	0.45±0,08	0.58±0,17	0.71±0,04	0.81±0,05**
Amylase, ME/l	23.77±7,90	64.33±16,55	134.67±39,21**	80.20±9,68	167.33±22,08**
Glucose, mmol/l	1.06±0,01	8.08±0,72	5.88±0,78**	4.06±0,32	5.51±0,17**
Triglycerides, mmol/l	1.29±0,15	0.69±0,01	0.40±0,13**	0.46±0,15	0.52±0,03
Cholesterol, mmol/l	193.47±31,92	67.84±6,45	53.46±13,57*	57.28±7,02	34.27±1,54**
Alkaline phosphatase, ME/l	8.07±0,44	17.37±4,13	17.47±3,4	6.80±1,63	10.59±0,59**
Ca, mmol/l	5.07±0,71	2.77±1,34	3.43±0,65	4.40±0,94	3.03±0,12**
Fe, mmol/l	0.52±0,01	0.20±0,06	0.06±0,04**	0.56±0,07	0.42±0,05**

Note: *-P<0,01;**- P<0,001

It is known that in the body of animals glucose is the main source of energy. As a result of the research it was found that in two weeks from the beginning of the experiment, the level of glucose in the blood of the animals in both lots exceeded the original one by over 80.00%. At 75

days of age in the rabbit serum of the control lot, was found by 27.23% ($P < 0.001$) more glucose compared with the experimental one. At the end of the experiment, in the rabbit serum in the experimental lot was found a quantity of 5.51 ± 0.17 mmol/l ($P < 0.001$) of glucose, which surpassed that of the control lot by 26.32%.

According to literature data, triglycerides along with total cholesterol represent the lipid profile of the body. It is known that triglycerides come from food, but a small amount is synthesized in the liver. It was found that during the experiment, cholesterol decreased significantly from 193.47 ± 31.92 mmol/l to 34.27 ± 1.54 mmol/l (by 82.29%) in the blood serum of animals in the experimental lot and by 70.39% in that of the control lot of animals.

The level of triglycerides and cholesterol in the blood of the rabbits in both lots indicates a fat intake in the food ration and the fact that there is no risk of atherosclerosis and cardiovascular disease at these animals.

Alkaline phosphatase is a tetrameric glycoprotein that is found on the surface of the osteoblast and intervenes in calcification of the bone matrix. An increase in this indicator in the blood plasma of 75-day-old rabbits can be explained by increased bone metabolism at this age when growth is more intense, and at the end of the experiment when the animals cease to grow, respectively, this indicator has diminished.

The decrease of concentration of calcium in the blood plasma of the rabbits of the experimental and control lot during the experiment is due to the fact that these animals were maintained in the rooms and as a result took place their malabsorption from the gastrointestinal tract due to the lack of vitamin D.

As regards the evaluation of iron in the blood of rabbits in the experimental lot, the dynamics of the changes signal a very varied oscillation. Thus, if at the initiation of investigations the iron content in the blood plasma constituted 0.52 ± 0.01 mmol/l, then at the 75th day in the rabbit blood plasma of the experimental lot decreased significantly by 88.46%, constituting 0.06 ± 0.04 mmol/l ($P < 0.001$). This tendency of decrease and then of increase the amount of iron at the end of the experiment was also recorded in the rabbit blood samples from the control lot.

During the experiment, the clinical condition of the rabbits was satisfactory, there were no cases of morbidity or mortality, so the low level of macro and microelements did not negatively influence the general condition of the rabbits.

Since all animals were of the same age and maintained under identical microclimate conditions, and the only difference was the composition of the fodder, it can be confirmed that the superiority of the biochemical profile of the rabbit blood in the experimental lot compared to those in the control lot is due to the addition of biomass of streptomyces in the compound granulated fodder.

Conclusions

As a result of the experiment, it was found that the feeding and maintenance conditions of the rabbits influence the biochemical profile of their blood and the addition of 0.1% of Streptomyces levoris biomass of CNMN-Ac-01 in the granulated fodder of the rabbits favored protein, lipid and carbohydrate metabolism of the growing young rabbits and did not negatively influence their body.

The quantitative increase of protein, albumin and glucose respectively by 5.34%, 25.86% ($P < 0.001$) and 26.32% ($P < 0.001$), in the blood serum of the animals from the experimental lot compared to the control lot, was favored by the consumption, by rabbits, during 60 days, of the combined granulated fodder with the addition of 0.1% of S. levoris biomass CNMN-Ac-01 .

Due to the fact that the rabbits in the experimental lot had an average daily increase of 27.67 g/head, exceeding by 10.85% that of the rabbits of the control lot we recommend streptomycete biomass as a supplement in the rabbit feed.

References

1. Bura, M. (2006) - Ferma, 2, 40.
2. Galatanu, Diana Monica (2007). - Feeding Rabbits: Nutritional Requirements of the Rabbit, Magazine of Agriculture.
3. Kotsyubenko, A. Morphological and biochemical blood parameters of rabbits raised by different technologies. www.mnau.edu.ua
4. Macovschi, B. (2014). - Feeds used in the food of domestic rabbits Village
5. Nozdrin, G., Gromova, A, Ivanova A. et al. (2012). - Morphological and biochemical parameters at rabbits when using the probiotic preparation Veles 6.59 . Achievements of science and technology of the agro-industrial complex ,10, 53-55.
6. Petrova, N., Sidorov, K., Yesenbayeva, K., Bektasheva, A. (2007) - The effect of probiotics on the blood parameters of rabbits. Bulletin of the Tyumen State Agricultural Academy. Issue 1. Tyumen, 162-163.
7. Titova, A. (2010) - Abstract of dissertation for the degree of candidate of biological sciences. Protein-amino acid composition of blood and the productive qualities of rabbits when feeding of probiotic preparations. Orel, 18 .