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INFLUENCE OF VARIOUS SOURCES OF SELENIUM ON PRODUCTIVE PERFORMANCE OF YOUNG RABBITS

The analysis of literary sources testifies to insufficient content of Selenium in forage. Therefore some extra Selenium-containing compounds have to be added to the rabbits' diet so that the desired rate of Selenium could be reached. On data received from in-vivo research showed that from all used sources of Selenium (sodium selenite, sodium selenate, selenomethionine and Sel-Plex) is most effective for young rabbits was Sel-Plex. Inclusion of Sel-Plex into diet to reach Selenium level 0,2 mg/kg of dry matter improved to the increase of live weight of experimental rabbits by 4,7 % with a simultaneous decrease of 2,9 % rate of feed per 1 kg increase body weight. Using Sel-Plex instead of sodium selenite for young rabbits improves digestibility organic matter (on 3,2 %; $P < 0,05$), crude protein (on 1,2 %), crude fiber (on 5,6 %), BER (on 4,1 %). Similar results got at application in feeding of rabbits of selenomethionine. The use of inorganic salts of Selenium, comparatively with organic, has a less positive influence on the productivity of rabbits.

Key words: *Selenium, rabbits, productivity, sodium selenite, sodium selenate, selenomethionine, Sel-Plex, live weight, feed, digestibility.*

Statement of the problem. The amount of Selenium in feed used for feeding rabbits in Ukraine is not sufficient. Therefore some extra Selenium-containing compounds have to be added to the rabbits' diet so that the desired rate of Selenium could be reached.

The sources of Selenium could be conventionally divided into compounds of organic origin and those of inorganic origin. The most prevalent inorganic Selenium salts are sodium selenite and sodium selenate, among organic ones – selenomethionine preparation, selenopyranium or SP-1 (9-phenilsimmocatahydroxanthene), DAFC-25 and Sel-Plex [1–3].

Material and methods of research. The aim of our investigation was to determine the most efficient Selenium rate and study the efficiency of different sources of Selenium in the diets of young rabbits.

For the above purpose two *in-vivo* experiments were carried out in the site of rabbit farm "Chubunetske" in Kyiv region. For each of the experiments animals were selected according to the pairwise analogue principle, considering their kind, sex, breed, age, live weight, productive performance and physiological condition.

The first experiment, aimed at determining the most efficient Selenium rates for the diet of young rabbits, involved 5 groups of animals, 15 heads per group. Sodium selenite was chosen as the source of Selenium. The results of the first *in-vivo* experiment show that the most efficient Selenium rate in the diet of young rabbits grown for meat was 0,2 mg/kg of feed dry substance. At this rate the live weight of young animals obviously exceeded the control one by 8,5 %.

Considering the results of the first *in-vivo* experiment another *in-vivo* experiment was carried out. It was aimed at analyzing Selenium's biological accessibility and efficiency of different sources of Selenium in the diets of rabbits (table 1).

Table 1 – *In-vivo* experiment №2

Groups of animals	Feeding terms and conditions	
	Comparative term (15 days)	Basic term (60days)
1 – control group	Basic diet (BD), balanced as per specified norms	BD + sodium selenite (with Selenium content rate of 0,2 mg/kg of dry substance)
2 – experimental group	BD	BD + sodium selenate (with Selenium content rate of 0,2 mg/kg of dry substance)
3 – experimental group	BD	BD + selenomethionine (with Selenium content rate of 0,2 mg/kg of dry substance)
4 – experimental group	BD	BD + Sel-Plex (with Selenium content rate of 0,2 mg/kg of dry substance)

The source of Selenium used in experimental groups 2, 3 and 4 was sodium selenate, selenomethionine and Sel-Plex respectively, in control group 1 – sodium selenite.

In the course of our research the following data were analyzed: virtual amount of feed consumed, live weight dynamics, digestibility of nutrients, nitrogen exchange process, balance of calcium, phosphorus and Selenium, and hematological indices.

Research results. Feeding young rabbits with various Selenium compounds substantially effected their growth rate (table 2).

As figures in Table 2 indicate, at the beginning of the basic term of the experiment, that is at the age of 60 days, the average live weight of experimental group rabbits had little difference with that of the control group.

Table 2 – Changes of live weight of young rabbits, g

Indices	Group			
	control		experimental	
	1	2	3	4
60 days	1112,9± 21,19	1110,2± 22,69	1093,1± 26,17	1093,2± 19,74
90 days	2121,0± 27,56	2133,2± 30,44	2177,9± 14,80*	2186,9± 25,43
120 days	2937,0± 37,63	2963,8± 39,93	3049,5± 32,68*	3076,1± 39,03*

Note: hereinafter *P<0,05; **P<0,01; ***P<0,001 as compared with the control group.

After 30 days of consuming mixed feed which included different Selenium-containing compounds (sodium selenate, sodium selenite, selenomethionine and Sel-Plex) by their live weight the rabbits of experimental groups 2, 3 and 4 exceeded the control level by 0,6; 2,7 (P<0,05) and 3,1 % respectively.

By the end of the basic term of the experiment (the age of the rabbits – 120 days) by their live weight rabbits of experimental group 2 exceeded their counterparts of the control group by 0,9 %, group 3 – by 3,8 % (P<0,05), group 4 – by 4,7 % (P<0,05).

Alongside with live weight, the amount of feed, consumed per 1 kg of their live weight increase, is an important efficiency index of an animal balanced diet (table 3).

Data depicted in Table 3 show that rabbits of experimental group 2, whose diet contained sodium selenate as a source of Selenium, consumed the same amount of feed as their counterparts of the control group 1 which consumed sodium selenite as a source of Selenium.

Rabbits of experimental groups 3 and 4 that used selenomethionine and Sel-Plex as a source of Selenium consumed respectively by 2,5 and 3,3 % more feed than the control group.

Table 3 – Feed consumed for growing and feeding rabbits

Indices	Group			
	control	experimental		
	1	2	3	4
Feed consumption over the total term of the experiment, kg/head	9,43	9,43	9,67	9,74
Feed consumption over the total term of the experiment, feed unit/head	8,58	8,58	8,80	8,86
Feed consumption per 1 kg of live weight increase, kg	4,46	4,41	4,35	4,33
Feed consumption per 1 kg of live weight increase, feed unit	4,06	4,01	3,95	3,94

FCR increase within experimental groups 3 and 4 reduced as compared to the control group by 2,5 and 2,9 % respectively. The same index within experimental group 2 was by 1,1 % lower as compared with the control group.

Since the rabbits of experimental groups considerably differed from those of the control group by their live weight, while consuming about the same amount of feed, we carried out a physiological (balance) experiment in order to assess the way in which different Selenium-containing compounds affect digestibility of feed nutrients (table 4).

As the data in table 4 show feeding young rabbits with feed containing sodium selenate, selenomethionine and Sel-Plex instead of sodium selenite on the whole made a positive influence on digestibility of feed nutrients. Thus, digestibility rate of feed organic matter within experimental group 4 rose by 3,2% as compared with the

control group. Such increase was possible due to increase in digestibility of crude protein – by 1,2%, crude cellulose – by 5,6% and nitrogen-free active matters – by 4,1%. However digestibility of crude fat within the same group decrease by 0,6% as compared with the control group.

Table 4 – Digestibility rate of nutrients contained in the diets, %

Name of matter	Group			
	control	experimental		
	1	2	3	4
Organic matter	68,5±0,36	68,5±0.09	70,6±0,88	70,7±0,41*
“Crude” protein	71,8±0,20	71,8±0.97	72,4±0,27	72,6±0,30
“Crude” fat	80,8±2.81	80,9±1.72	80,6±2,23	80,3±1,65
“Crude” cellulose	29,7±1,51	29,8±1.22	31,3±1,10	31,4±0,22
BER (nitrogen-free extract matters)	76,7±0,13	76,9±0.12	79,8±1,60	79,9±1,00

Rabbits of experimental group 3 showed higher than the control group digestibility rate of organic matters, crude protein, crude cellulose and BER(nitrogen-free extract matters) – by 3,2; 0,9; 5,3 and 4,0 % respectively, at the same time their digestibility rate of fat was lower than the control rate by 0,2 %. Digestibility rate of nutrients, displayed by the rabbits of experimental group 2, was virtually the same as within the control group.

Conclusions on the above researches:

1. In two in vivo trials and bio–chemical researches we found that the best doses of Selenium for rabbits is 0,2 mg/kg of dry matter and from all used sources of Selenium (sodium selenite, sodium selenate, selenomethionine and Sel-Plex) the most effective was Sel-Plex.
2. Organic Selenium (Sel-Plex), comparing with sodium selenite, increases overage weight gain of young rabbits on growing and finishing periods on 8,6 % ($P<0,001$) and decrease FCR on 2,9 %.

3. Using Sel-Plex instead of sodium selenite for young rabbits improves digestibility organic matter (on 3,2 %; $P<0,05$), crude protein (on 1,2 %), crude fiber (on 5,6 %), BER (on 4,1 %).

LIST OF USED LITERATURE

1. Використання селену в рослинництві та тваринництві / І.І. Ібатуллін, В.А. Вешицький, В.В. Отченашко. – К.: Фенікс, 2004. – 208с.
2. Селен в питании: растение, животные, человек. / Под ред. Н.А. Голубкиной, Т.Т. Папазяна – Москва, 2006. – 254с.
3. Surai Peter F. Selenium in nutrition and health / Peter F Surai. – Nottingham: Nottingham University Press, 2007. – 974p.