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INFLUENCE OF VARIOUS SELENIUM SOURCES ON PRODUCTIVE PERFORMANCE OF YOUNG RABBITS

Аналіз літературних джерел свідчить про недостатній вміст селену у кормах для кролів. Тому, для досягнення бажаного рівня цього мікроелемента в кормі до складу раціону необхідно додатково уводити селеновмісні сполуки. З даних, отриманих під час проведення науково-господарського досліду видно, що серед досліджуваних джерел селену (селеніт і селенат натрію, селенометіонін та Сел-Плекс) найбільш ефективним для молодняку кролів був Сел-Плекс. Уведення його в раціон для досягнення загального вмісту селену на рівні 0,2 мг/кг сухої речовини сприяло підвищенню живої маси піддослідних кролів на 4,7 % за одночасного зменшення на 2,9 % витрат корму на 1 кг приросту маси тіла. Заміна селеніту натрію у повнораціонному комбікормі на Сел-Плекс сприяє поліпшенню перетравності у молодняку кролів органічної речовини (на 3,2%; P<0,05), сирого протеїну (на 1,2%), сирої клітковини (на 5,6%) та БЕР (4,1%). Подібні результати отримали за згодовування кролям селенометіоніну. Використання неорганічних солей селену, порівняно з органічними сполуками, має менш позитивний вплив на продуктивність кролів.

Ключові слова: селен, кролі, продуктивність, селеніт, селенат, селенометіонін, Сел-Плекс, жива маса, корм, перетравність.

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-phenilsimmoctahydroxanthene), 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).

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

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 the 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.

Rabbits of experimental group 3 showed higher, if compared to 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.

Conclusion on the above research: 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), compared 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 of organic matter (on 3,2 %; $P<0,05$), crude protein (on 1,2 %), crude fiber (on 5,6 %), BER (on 4,1 %).

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Влияние различных источников селена на продуктивность молодняка кроликов

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Анализ литературных источников свидетельствует о недостаточном содержании селена в кормах для кроликов. Поэтому, для достижения необходимого количества этого микроэлемента в корме в состав рациона необходимо дополнительно вводить селеносодержащие вещества. Из данных, полученных в результате проведения научно-хозяйственного опыта видно, что среди исследуемых источников селена (селенит и селенат натрия, селенометионин и Сел-Плекс) наиболее эффективным для молодняка кроликов был Сел-Плекс. Введение его в рацион для достижения общего содержания селена на уровне 0,2 мг/кг сухого вещества способствовало увеличению живой массы подопытных кроликов на 4,7 % с одновременным снижением на 2,9 % расхода корма на 1 кг прироста массы тела. Замена селенита натрия в полнорационном комбикорме на Сел-Плекс способствует улучшению переваримости у молодняка кроликов органического вещества (на 3,2 %; $P<0,05$), сырого протеина (на 1,2 %), сырой клетчатки (на 5,6 %) и БЭВ (4,1 %). Похожие результаты получены и при скармливании кроликам селенометионина. Использование неорганических солей селена, сравнительно с органическими соединениями, оказывает менее позитивный эффект на продуктивность кроликов.

Ключевые слова: селен, кролики, продуктивность, селенит, селенат, селенометионин, Сел-Плекс, живой вес, корм, переваримость.

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