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STUDY OF THE INFLUENCE OF THE FODDER, CULTIVATED WITH THE USE OF ORGANIC AND MINERAL FERTILIZERS, ON THE BODY MASS OF RABBITS

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Abstract:
In the article is reflected the assessmnet of the influence of feed grown with fund of organic and mineral fertilizer on the physiological development (body mass gain) of rabbits. For this purpose forage crops (corn, alfalfa, fodder beet), grown with the use of organic fertilizers and minerals, were used in the food ration of rabbits. To resolve the expected objective it was organized an experiment with three lots of rabbits analogues in terms of body weight: a control lot and two - experimental. In the food ration of rabbits in the first, second and third lots were used respectively, forage crops grown with natural background (lot I), with the fund of organic fertilizer (lot II) and mineral fertilizer (lot III). Analyzing the obtained results it was found, that the body weight gain of rabbits that used in the food ration forage cultivated with natural background, worm compost and ammonium nitrate was respectively with 166.59%, 184.80% and 146.60 % higher enhanced than that from the start of the experiment. Daily weight gain of rabbits in lot II overtook with 10.59% and that of the animals in lot III has decreased with 12.30% compared with that of animals in the control lot. Thus, it was established the influence of forage plants cultivated with the use of organic and mineral fertilizer on the body weight gain of rabbits.

Key words: *body weight, fodder, mineral fertilizer, organic fertilizer, rabbits*

INTRODUCTION

Ecological agriculture promotes the sustainable production systems, diversified and balanced in order to prevent pollution of harvest and environment. Ecological production regarding crop production without the use of harmful traditional products, knows a special concern for decades in economically developed countries. The interest for the products and organic production is growing. The system of ecological (organic) agriculture has as theoretical basis the full use of natural soil fertility and the factors which favors [14].
Organic farming is an alternative to the traditional system of agriculture that ensures sustainable development of the sector. The process of transition from conventional agriculture to that of organic does not represent a short action. This transition is gradual, by going through a transitional period, called "conversion period". One of manifestation of organic agriculture consists in gradually decreasing of quantities of mineral fertilizers (chemical) and the extensive use of those organic obtained by traditional composting or using various methods of bioconversion of organic waste biodegradable of diverse origin [4].
The presence of significant amounts of manure that can be used as organic fertilizer, determined the researchers to elaborate a comprehensive system of measures to improve the ecological situation in the republic, including measures to ensure the veterinary, zoo hygienic and epidemiological welfare [3].
One of the measures that can solve these problems of the environment in order to ensure human and animal health is the implementation of bioconversion technology (processing) biodegradable organic waste (of diverse origin). For this purpose, in some countries (Italy, the Netherlands, Germany, Romania, Estonia, Ukraine, Russia, Bulgaria, Slovakia, Hungary Japan, a.) is practiced widely the technology of bioconversion of organic waste by worm cultivation. In the result of the use of this technology is obtained worm compost organic fertilizer ecologically

efficient, which possesses increased biological activity [9; 11].

According to the obtained results, it was found that a proprietary characteristic of worm compost is the increased content of organic matter, which constitutes 22.00% - 30.00%, and also in its composition is presented beneficial microorganisms, nitrogen, enzymes, micro- and macro-elements. The ingoing amount of worm compost in soil is 10 times lower than that of conventional composting (regular) having a long-acting (3-4 years) [3].

It was found that worm compost used as organic fertilizer reduces the accumulation of nitrous-compounds in plants, increases plant resistance to the attack of phytopathogenic agents and to unfavorable climatic conditions, improves product quality and increases crop yields [2, 5].

The continuous development of the zootechnic sector, the increase of productivity and quality of livestock products directly depends on the creation of fodder with high biological value and high nutritive created as a result of the implementation of the efficient technologies for the production of quality forage used in feed ration of animals [1].

Ensuring the health of animals and of food security is the reduce of the amount of toxic chemicals in their food ration. It is known that from the group of the toxic substances take part and nitrosocompounds (nitrates and nitrites). Nitrates from feed can be converted by the rumen bacteria into nitrite, which are toxic through methemoglobin formation or by blocking the enzyme activity resulting, for example the symptom of deficiency in vitamin A, even if the intake of carotene is normal. High content of nitrates in plants is directly influenced application as fertilizer of nitrogen fertilizer at the beginning of the growing season and before harvesting. A special role in the accumulation of nitrates in plants belong to the following factors: insufficient light, low temperature, increased acidity of soil and insufficiency in it of molybdenum, cobalt and sulfur and failure to comply technological elements for collecting and storing fodder [10]. As a result of multiple investigations it was found that nitrosocompounds accumulation in crops grown with worm compost fund is lower than in those fertilized with mineral fertilizers, plant thus improving the quality [6].

Scientific novelty of the study consisted in examining the possibility of application of worm compost in the process of obtaining ecological forage crops. Studies also have focused on getting qualitative feed with the use of various fertilizers and the assessment of their influence on the body weight of rabbits. Feeding rabbits is one of the main factors by which the grower can act for the achieve of higher performance of production and for high economic efficiency. These results are obtained using feed which contain nutrients necessary for life processes in the body (proteins, fats, minerals, vitamins, carbohydrates, cellulose and water) [7] and do not contain toxic substances, the content of which exceed the maximum permissible concentration (MPC) [10].

Basic nutrition for rabbits is dry hay. Because rabbits have a digestive system quite complicated, the hay is needed to be of a very good quality. A good hay which is administered to rabbits must have green color, must smell good and be well dried.

The rabbits in winter need and juicy fodder, so in this period is welcomed fodder beet administration [8].

Proceeding from the above, the objectives of the conducted research consisted in the use of the technology of organic waste by worm cultivation in order: complete bioconversion of organic biodegradable waste; obtaining ecological organic fertilizer, long-acting; improving and reanimation soil fertility; improving the quality of forage crops and increasing the body mass of animals.

MATERIALS AND METHODS

In order to obtain worm compost, in Experimental Section of Scientific and Practical Institute of Biotechnologies in Animal Husbandry and Veterinary Medicine it was organized under production conditions, the process of the bioconversion of the organic waste by worm cultivation in three sectors, which have undergone processing

about 50 tons of organic waste. In the obtained worm compost, before being incorporation in soil, some indicators were determined as: active acidity (pH), organic matter, and total nitrogen content of potassium, phosphorus, magnesium, and humus.

In order to obtain forage crops subsequently used in ration of rabbits, it was organized experiment in field conditions in which were included three types of forage crops: alfalfa varieties „Tuna" fodder beet variety „Ekkendorfskaya" and maize varieties „M-450". Surface lots amounted to 2 acres. For each fodder crop were used three lots: one control and two experimental. For lot I was kept natural background, lot II was fertilized with worm compost (from considerations 4ton/ ha), and the third lot - ammonium nitrate (285 kg/ha). Before the incorporation of fertilizers in the soil, was performed the soil preparation (autumn - tilling to a depth of 30-40 cm and spring – loosening (by harrowing). Fertilization was carried out in early spring, immediately after snow melting on the autumn plowing. After harvesting of the forage crops in alfalfa hay the vegetable part (stems and leaves) and corn crops stern of fodder beet, was carried out the determination of some quality indicators in accordance with the usual methods [12; 13].

Subsequently, according to the scheme of the experiment (Table 1) the obtained feed were used as an addition to food ration of the rabbits.

In order to assess the influence of feed grown with organic fertilizer fund (worm compost) and mineral fertilizer (ammonium nitrate) on the development of physiological (body weight gain) of rabbits in the organized experiment were included 3 lots of rabbits. In each lot there were selected 5 rabbits, according to the principle of analogues with regard to body weight. In ration feeding of rabbits were included forage crops: alfalfa (hay), corn (grain) and fodder beet (crops stern), cultivated with natural background (without fertilizer), with worm compost fund and ammonium nitrate.

Initially, during the three weeks rabbits in all groups were subjected to preparatory period, they received the same ration (mixed fodder and water) of food. According to the scheme of the experiment at the basic rate of rabbits in the control lot were included hay of alfalfa, corn grains and fodder beet grown with natural fund.

Table 1. The experimental scheme

Lot number	Number of animals	Experimental conditions	Research during the experiment
I-Control	5	The basic rate and fodder from the lot with natural fund	It was determined: a) the content of nitrates in forages; b) the increase of the body mass daily, monthly and total.
II-Exp.	5	The basic rate and fodder from the lot with fund of worm compost	
III-Exp.	5	The basic rate and fodder from the lot with fund of ammonium nitrate	

For rabbits in experimental lots II and III, at the base rate were added, feed analogous to those of control lot cultivated respectively with the fund of worm compost and ammonium nitrate. Duration of the experiment constituted 5 months. During the experiment, monthly and at its end, by weighing was determined daily gain, monthly and total increase body mass and of rabbits.

RESULTS AND DISCUSSIONS

Assessing the amount of nitrates from feed (hay of alfalfa, beet and maize grain) used in food ration of rabbits it was carried out before the start of the experiment and during the implementation of it. The investigation results are shown in Table 2. Analyzing the obtained results it was found that in forage samples the amount of nitrates the nitrate content was varied, in some cases, exceeding the maximum permissible concentration (MPC), which for roughage is 500 mg/kg and for fodder beet - 800 mg/kg. The amount of

nitrates depended on half collection phase of vegetation and type of fertilizer used in the cultivation of forage crops.

Table 2. The content of nitrates in forage samples used in food ration of the rabbits

No.	Types of forage crops	Variants of the experiment, the value minimum and maximum of nitrate content, (mg/kg)		
		Control	Worm compost	Ammoniu nitrate
1	Alfalfa hay	129.00±1.10 - 178.00±0.97	200.50±0.86 - 207.0±0.09	457.00±1.74 - 550.00±1.15
2	Fodder beet	283.50±0.66 - 583.50±6.19	376.00 ±7.07 - 631.00±1.11	719.00±2.11 - 919.0 ± 5.31
3	Maize (stalks and the leaves)	157.80±0.53 - 257.8±0.42	250.7±0.46 - 302.00±0.81	926.4±0. 46 - 1113.00±5.11
4	Maize (grains)	traces of nitrates	traces of nitrates	traces of nitrates

In all phases of vegetation of forage crops grown with substance of ammonium nitrate was found a high content of nitrates. In samples of food (in the last phase of vegetation) ready to be included in the ration of diet of rabbits, the amount of nitrates ascertained in hay from alfalfa, beet stems and leaves dry corn and in beans of it collected on lots with ammonium nitrate fund, surpassed that of control lot, respectively from 3.09 to 3.54 times, 1.58-2.54 times and 4.32-5.87 times. The feed used in the food ration of rabbits the amount of nitrates exceeded the maximum permissible concentration by 10.00% (in hay from alfalfa), 14.88% (in fodder beet) and 85.28% -122.60% (the stalks and leaves of corn). In the maize grains nitrates were not detected.

In fodder collected on lot with fund of worm compost this indicator exceed for 1.16-1.55 times (hay), 1.08-1.33 times (fodder beet) and 1.17-1.59 times (maize) that from plants of control lot, but did not exceed the maximum permissible concentration.

In the alimentation of rabbits during the experiment, to the basic ration were added fodder grown with organic fertilizer fund (worm compost) and mineral fertilizer (ammonium nitrate). Thus it was determined the influence of fodder fertilized with worm compost and ammonium nitrate on the daily average, monthly and final of the body mass at rabbits.

Analyzing the results of monthly growth of body mass of the rabbits (Table 3), it was found that the growth is more evident after one month from the start for the experiment animals in lot II, at which the monthly gain was 0.718 kg and the smallest increase of the body mass was manifested at animals from lot III - experimental.

Table 3. Rabbits body weight during the experimental period

No.	The period of weighing	Lot and body weight, (kg)		
		I –control	II-experimental	III- experimental
1	Initial	1.326±0.09	1.322±0.09	1.322±0.04
2	After a month	2.020±0.46	2.040±0.76	2.000±0.40
3	After two months	2.396±0.12	2.596±0.12	2.380±0.09
4	After three months	2.808±0.12	3.036±0.12	2.748±0.12
5	After four months	3.090±0.11	3.310±0.22	2.994±0.11*
6	The end of the experiment	3.535±0.30	3.765±0.12	3.260±0.17*

Note: 3.260±0.12* - authentic data

At rabbits in this lot, the increase of body mass constituted 0.678 kg. The increase of body mass of the animals in lot II - experimental exceeded it by 3.46% that of the animals in the control lot and by 5.90% that of the animals in lot III - experimental. In lot in which in animals food ration were included fertilized fodder with ammonium nitrate the increase of body weight decreased with 2.01%

of that animals from the control lot and with 5.57% of that of animals in which were used fodders fertilized with worm compost.

After two months from the beginning of the experiment, the body weight gain of the animals from the lot in which were used fertilized fodders with worm compost, those exceeded that of the animals in the control lot, with 47.87%, while that of animals of lot III - experimental - with 46.32%. In comparison with the body weight gain of animals, the animals in control lot, that of animals from lot III - experimental, increased insignificantly. This increase was only 1.06%.

After three months from the beginning of the experiment it was found a similar situation to the previous month. The increase of body mass of the animals in lot II - experimental overtook that of animals in the control lot with 6.80% and that of animals of lot III - experimental with 19.57%. Comparing the growth of body mass of the animals in lot III – experimental, in food ration to which were included fodder collected from the lot fertilized with ammonium nitrate with that of animals in the control lot, it was found that it decreased 10.68%.

In the fourth month of the deployment of the experiment, the increase of the body mass of animals in lots II and III - experimental decreased respectively with 2.84% and 12.73% on that of animals in the control lot. Increase of the body mass of the animals in lot II - experimental overtook that of animals in experimental lot III with 11.38%.

At the end of the experiment (after 5 months) the increase of the body mass of rabbits in lot II - experimental exceeded with 2.23%, while those in lot III - experimental decreased with 40.22% in comparison with the increase of body mass in control lot. The increase of the body mass of the animals in lot II, in which were used fodders cultivated with the fund of worm compost exceeded it with 71.05% that of rabbits in lot, in which were used fodder fertilize with ammonium nitrate.

Analyzing the results obtained during the experiment it can be concluded that the fodder cultivated with fund of worm compost influenced beneficially, similar to that of fodder obtained from the control lot, on the gain of the body mass of rabbits (with the exception of the period of 4 months) and those cultivated with the ammonium nitrate fund had a negative influence, essentially lowering the monthly increase body mass of animals.

Results are displayed in Table 4 total gain of body mass of rabbits at the end of the experiment and its daily gain during the experiment.

Table 4. Increase of body weight of the rabbits at the end of the experiment

Lots	Body weight, kg		Total gain, kg	Daily gain during the experimental period	
	Beginning of the experiment	End of the experiment		g	%
I – control	1.326±0.09	3.535± 0.30	2.209±0.12	14.63±0.,20	100.00
II -experimental	1.322±0.09	3.765± 0.12	2.443±0.10	16.18±0.18	110.59
III - experimental	1.322±0.04	3.260± 0.17*	1.938±0.11	12.83±0.14	87.70

Note**:** 3.260±0.12* - authentic data

Analyzing the results of the total gain and the daily weight of rabbits in group II-experimental, in which to animals as addition to base food ration were included fodder grown with fund of worm compost it was found that this exceeded that of the control lot with 10.59%.

The same indicators of body weight of rabbits in lot III experimental, decreased with 12.30% in comparison with animals of the control lot.

The results presented in Table 4 remarks that the total increase and daily weight of rabbits was more increased in the lot in which the animals received as a supplement to the basic food ration feed grown with the fund of worm compost (lot II-experimental). Total and daily gain of the body mass at these animals has exceeded those of animals in the control lot

and the experimental lot-III, respectively with 10.59% and 26.11%.

The lowest total gain and daily weight was found at rabbits in the experimental lot III, in which the animals received addition to the basic food ration fodder collected on the lot with the fund of ammonium nitrate, which had a high content of nitrates. Total daily gain and body mass of animals in this lot decreased with 12.30% in comparison with that of animals in the control lot and with 20.70% of the animals in the experimental lot II.

Thus, using feed with a high content of nitrates in food ration of rabbits, contributed to the decrease of their body mass gain.

CONCLUSIONS

In the results of the investigations it was found that the accumulation of nitrates in forage crops depended on phenological stages and type of used fertilizers.

The use of ammonium nitrate for fertilizing crops, determined the accumulation of increased amounts of nitrates in alfalfa hay, fodder beet and maize plant side.

The value of accumulated nitrates in alfalfa hay, fodder beet and maize the plant has exceeded that of plants essentially in control lot. In this type of forage used in the food ration of rabbits the amount of nitrates exceeded the maximum permissible concentration with 10.00% (in hay from alfalfa), 14.88% (in fodder beet) and 85.28% - 122. 60% (in corn stems and leaves).

The use of feed with increased content of nitrates in food ration of rabbits contributed to decrease of their body mass gain.

Total daily gain and body mass of rabbits in experimental lot II, in which at the basic food ration of rabbits as additives were included fodders cultivated with worm compost fund, exceeded that of the control lot with 10.59 %, and the same indicators of the body mass of rabbits from lot III-experimental, decreased with 12.27% in comparison with those of animals of the control lot.

Total and daily increase of rabbits weight, that used plants cultivated with fund of worm compost exceeded those of animals in the control lot and those of experimental lot-III, respectively with 10.59% and 26.11%.

Thus, it was found that the increased amount of nitrates in fodder used in the food ration of rabbits negatively influenced on body weight gain at rabbits.

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