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IMPACT OF BIOMASS OF STREPTOMYCES LEVORIS CNMN-AC-01 AND SOME EXTERNAL FACTORS ON QUALITY OF COMBINED FODDER FOR RABBITS

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Abstract

The qualitative composition of combined fodder for rabbits plays a key role in achieving success in raising these animals, because 60-80% of the prime cost production constitutes the part of the feed. The purpose of the work was to appreciate the influence of biomass of Streptomyces levoris CNMN-Ac-01 and of some external factors on the microbiological and biochemical quality of the friable and granular combined fodder for rabbits. As a result of study of the microbiological composition of friable and granular combined fodder, it was found that the addition of Streptomyces levoris CNMN-Ac-01 biomass, the temperature and the pressure during the compaction of the combined fodder, improve the sanitary condition of the granulated fodder by reducing the amount of E. coli and Enterococcus spp. and the destruction of Aspergillum niger. The results of the biochemical analyzes of the studied fodder indicate that the elaborated fodder recipe can provide rabbits with the necessary in metabolic energy, crude protein, cellulose, carotene, calcium and phosphorus for their vital activity, and extrinsic factors (Streptomyces levoris biomass of CNMN-Ac -01, temperature and high pressure) do not significantly affect their chemical composition.

***Key words*:** *biomass, granulated combined fodder, rabbits*

INTRODUCTION

Rabbit-breeding is a relatively new sub-branch of rabbit growth, which provides the population with high-quality dietary meat, beautiful fur and wool [2].

Of all mammals raised by humans, as a source of food, rabbits have the best growth rate. On the 6-th day of life, they double their body weight at birth. Approximately at 100 days, rabbits reach 2.5-3.0 kg live weight [2], [6].

Feeding rabbits is one of the main factors by which the breeder can act to achieve superior production performance and increased economic efficiency. These results are obtained by the use of fodder that contain the nutrients (proteins, fats, carbohydrates, cellulose, vitamins, minerals and water) required for the vital processes in the body, and at the same time avoid the negative effects due to the excess of one of the nutrients or the proportional imbalance between them [2], [5], [6].

Thus, the main purpose of intensive rabbit growth is to achieve maximum productivity, while reducing expenditure, which depends directly on the quantity and quality of consumed fodder [4], [5]. Making a balanced ration is a very important task, which worldwide is solved with the so - called fodder additives. These in turn balance the ration and contribute to the more efficient food assimilation, stimulating the growth and productivity of the animals.

Lately, it has increased the interest towards the ability of preparations with beneficial micro flora to treat and prevent gastrointestinal tract diseases as well as to restore intestinal micro flora after antibiotic therapy [8].

The intensification of the study of preparations with beneficial microorganisms has been determined in recent years by the restrictions imposed on animal breeders and feed manufacturers to limit the use of antibiotics as a growth promoter. Thus, with the ban on the use of antibiotics, many farmers are worried that the action of

pathogens on farm animals may increase drastically [8], [9].

Considering the fact that Streptomyces are important producers of biologically active substances with large application in zootechny and agriculture [3], [7], the aim of the work was to appreciate the influence of the biomass of Streptomyces levoris CNMN-Ac-01 on the microbiological and biochemical qualities of combined fodder in grained and granular form for rabbits.

MATERIALS AND METHODS

The basic research was conducted in the laboratory of Methods of Combating and Preventing Diseases and the Nutrition and Fodder Technology Laboratory of Scientific and Practical Institute of Biotechnologies in Zootechny and Veterinary Medicine, and the biomass of S. levoris CNMN-Ac-01 was offered by the Institute of Microbiology and Biotechnology (National Collection of Non-pathogenic Micoorganisms).

Research materials served four types of fodder: friable combined fodder and control granulate and combined and granulated fodder with addition of 0.1% of biomass Streptomyces levoris CNMN-Ac-01.

Determination of the total amount and the species of microorganisms was performed on the nutrient media, in accordance with the usual methods [1], [10], [11].

Analyzes of the biochemical composition of the fodder included the determination of: moisture, dry substance, crude protein, crude fat, crude cellulose, metabolic energy, carotene, calcium and phosphorus.

When assessing biochemical indicators were used performing laboratory equipment of Gerhard Company.

RESULTS AND DISCUSSIONS

Initially, S. levoris biomass CNMN-Ac-01a was seeded on culture media to determine TNG (total number of germs per gram of biomass). After 48 hours from sowing, were recorded 4.3×10^8 UFC/g of biomass on the Nutrient Agar medium.

Subsequently, dry biomass of S. levoris CNMN-Ac-01a was included in the recipe for the preparation of the granulated fodder intended for rabbits in the experimental lot.

It was studied the microbiological composition of the combined friable fodder and the final product - granulated fodder (Table 1).

Table 1. Microbiological composition of the combined fodder before and after granulation, UFC/g

Indicators	Combined friable food		Combined granulated fodder	
	Witness	Experi-ment	Witness	Experi-ment
TNG	7.8×10^5	8.5×10^5	4.6×10^5	6.4×10^5
E coli	4.8×10^5	4.6×10^5	1.7×10^4	4.0×10^4
Enterococcus spp.	1.6×10^4	1.1×10^4	9.0×10^3	$<10^2$
Clostridia spp.	3.2×10^6	2.3×10^5	6.1×10^5	2.4×10^5
Lactobacteria spp.	1.4×10^4	5.5×10^4	1.0×10^4	3.0×10^4
Bifidobacteria spp.	4.2×10^5	5.8×10^5	1.0×10^5	2.3×10^5
Bacillus spp.	8.8×10^5	1.8×10^5	1.1×10^5	6.2×10^5
Fungi	8.0×10^4	9.7×10^4	5.3×10^3	2.2×10^5

Source: Own calculation

According to the data in Table 1, in all types of combined fodder, TNG was $(4.6\text{-}8.5)\times10^5$ UFC/g, Bacillus spp. and Bifidobacteria spp. did not exceed 10^5 UFC/g, and the amount of Lactobacteria spp oscillated within the range $(1.0\text{-}5.5)\times10^4$ UFC/g.

As a result of granulation process of the friable combined fodder, has diminished numerically E. coli and Enterococcus spp. and Aspergillum niger was not detected. The amount of E. coli decreased from 4.6×10^5 UFC/g in the experimental friable combined fodder up to 4.0×10^4 UFC/g in that experimental granulated and from 4.8×10^5 UFC/g in witness combined friable fodder up to 1.7×10^4 UFC/g in that control granulated.

The total amount of fungi was increased by 100 times in the experimental granulated combined fodder compared to that witness and consisted of 2.2×10^5 UFC/g and 5.3×10^3 UFC/g, respectively.

It was found that at sowing the samples of the granulated witness on the Nutrient agar medium increased various colonies as aspect and morphology, and at sowing the samples of experimentally granulated fodder, only colonies of Streptomyces have been detected, which proves that they have antagonistic action on some microorganisms (Fig. 1).

a) b)

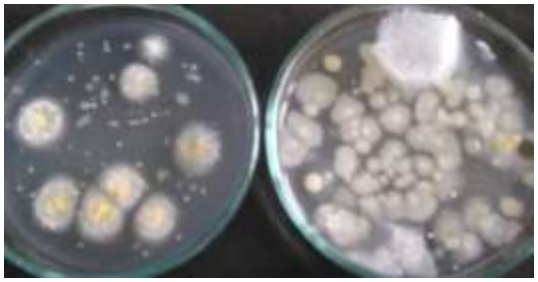
Fig. 1. Colonies on Nutrient Agar medium: a) witness granulated fodder and b) experimentally granulated fodder
Sourse: Own determination

The same legitimacy was also found and on the Sabourand environment. Both on plant medium of the Nutrient Agar and Sabourand Agar the colonies had the same form (Fig. 2).

a) b)

Fig. 2. Colonies on Sabourand medium: a) witness granulated fodder and b) experimental granulated fodder
Sourse: Own determination

Unlike granulated fodder in friable combined fodder, has been found a wider range of colonies, including a non-essential amount of Aspergillus niger (found in hay).



a) b)

Fig. 3. Colonies on the Sabourand Agar medium:
a) witness combined friable fodder b) experimental friable combined fodder
Sourse: Own determination

Analyzing Fig. 2 and 3 we can conclude that the addition of streptomycete biomass in fodder, as well as high temperature and pressure, favor the numerical reduction or destruction of some microorganisms in its composition.

Simultaneously with the microbiological study, the biochemical analysis of the combined fodder for rabbits was carried out.
Thus, according to the data in Table 2 and 3, the highest humidity of 13.13% was found in the witness granulated fodder, and the minimum in the combined friable fodder with the value of 10.82%. The difference of these

Table 2. The biochemical composition of combined friable fodder for rabbits

Indices	Combined friable fodder	
	witness	experimental
Moisture %:Initial	6.64	7.38
Hidroscopic	4.48	4.11
total	10.82	11.19
Dry substances (DS),%	89.18	88.81
Azote,% :In DS	2.71	2.81
In the absolutely dry substance	2.84	2.93
With natural humidity	2.53	2.60
Crude protein.%: In DS	16.94	17.56
In the absolutely dry substance	17.73	18.32
With natural humidity	15.81	16.27
g/kg	158.15	162.64
Digestible protein,g/kg	113.87	117.10
Gross fat. %: In DS	2.47	2.57
In the absolutely dry substance	2.59	2.68
With natural humidity	2.31	2.38
g/kg	23.06	23.8
Gross cellulose. %: In DS	14.47	16.21
In the absolutely dry substance	15.15	16.91
With natural humidity.%	13.51	15.01
g/kg	135.09	150.14
Gross ash.%,: In DS	9.78	8.32
In the absolutely dry substance	10.24	8.68
With natural humidity	9.13	7.71
UN With natural humidity	0.72	0,72
EM, Mj/kg: In DS	10.38	10.51
With natural humidity	8.62	8.65
Caroten, mg/kg	10.50	10.00
Ca,% :In DS	2.24	1.55
P,%: In DS	0.38	0.37

Source: Own calculation.

indicators can be explained by the fact that until compressing combined friable fodder, it was moistened (according to the production technology), then granulated.
Correspondingly, the dry substance in witness combined friable fodder exceeded by 2.66% that of the witness granulated fodder.
The productive parameters of the rabbits (increase in weight gain, fecundity, prolificacy, viability, fur quality, etc.) require a certain protein level, quantitative and qualitative. At a level of 15.00-17.00% crude protein of the fodder, may satisfy the requirements of the growing rabbit [6]. According to the data in Table 3, the witness and experimental granulated fodder can

provide rabbits with a level of 18,18% crude protein and 18,23% crude protein respectively The crude fat content of the absolutely dry substance oscillated from the minimum 2.47% in the witness combined friable fodder up to 3.12% in the witness granulated fodder.

Table 3. The biochemical composition of granulated combined fodder for rabbits

Indices	Granulated combined fodder	
	witness	experimental
Moisture %:Initial	9.77	9.58
Hidroscopic	3.72	3.34
total	13.13	12.60
Dry substances (DS),%	86.87	87.40
Azote,% :In DS	2.80	2.82
In the absolutely dry substance	2.91	2.92
With natural humidity	2.53	2.55
Crude protein.%: In DS	17.50	17.63
In the absolutely dry substance	18.18	18.23
With natural humidity	15.79	15.94
g/kg	157.90	159.41
Digestible protein,g/kg	113.69	114.78
Gross fat. %: In DS	3.12	2.83
In the absolutely dry substance	3.24	2.93
With natural humidity	2.82	2.56
g/kg	28.15	25.59
Gross cellulose. %: In DS	15.69	15.34
In the absolutely dry substance	16.30	15.87
With natural humidity.%	14.16	13.87
g/kg	141.57	138.70
Gross ash.%,: In DS	8.51	8.15
In the absolutely dry substance	8.84	8.43
With natural humidity	7.68	7.37
UN With natural humidity	0.71	0,72
EM, Mj/kg: In DS	10.63	10.72
With natural humidity	8.52	8.62
Caroten, mg/kg	12.00	10.67
Ca,% :In DS	1.63	1.45
P,%: In DS	0.39	0.40

Source: Own calculation.

Cellulose is a weak source of energy among other sources, but it is indispensable as a stimulant for rabbit digestion [8]. It stimulates intestinal peristalsis, being practically a digestive regulator. In the granulated witness fodder was found 16.30% of crude cellulose, and in the experimentally granulated fodder - by 2.64% less.

Carotene content oscillated from 10.00 mg/kg in experimental friable combined fodder to 12.00 mg/kg in witness granulated fodder.

So, as a result of the biochemical analysis of the compound fodder, it was found that the elaborated granulated fodder recipe will provide the rabbits in the witness and experimental lot with metabolic energy, crude protein, cellulose, carotene, calcium and phosphorus necessary for the vital activity of the animals for obtaining high quality dietetic meat.

CONCLUSIONS

As a result of the carried out research it was found that the biomass of Streptomyces levoris CNMN-Ac-01, the temperature and the pressure during the compaction of the friable combined fodder improve the sanitary condition of the granulated fodder, by reducing the amount of E. coli and Enterococcus spp., and the total destruction of Aspergillum niger, but does not significantly affect the biochemical composition of the fodder.

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