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DIGESTIBILITY OF NUTRIENTS IN THE BODY OF GROWING RABBITS WITH DIFFERENT RATIOS OF FIBER FACTIONS IN MIXED FODDERS

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Abstract

The article presents the results of studies to determine the effect of the ratio of neutral detergent to the acid detergent fiber in mixed fodder on digestibility of nutrients in the body of growing rabbits. Found that the use of feed with optimal ratio of fiber fractions provides a tendency to higher digestibility of protein and fat on, respectively, 0,3 and 0,9%.

Rabbits, digestibility, neutral detergent fiber, acid detergent fiber, mixed fodder.

Fiber is not the primary source of energy for rabbits, but this component of the diet is important in stabilizing the digestive processes. Their key importance is in the prevention of disorders of the alimentary canal and depends on the ratio of fractions of fiber in the diet and its digestibility in the body of rabbits [3, 5].

In recent years significantly increased the number of research on rationing of fiber in feeding of monogastric animals [6, 7, 8], this is due to the change of attitude to it not only as ballast material, but also as important nutrient of feed.

For a long time in the feed were tested crude fiber, but it does not accurately describes the the ratio of structural and non-structural carbohydrates in feeds, although it is still used in many countries. Therefore developed other methods for determining fiber. The most widespread method was developed by P. J. Van Soest in 1965 [9]. The composition of neutral detergent of fiber is cellulose, hemicellulose

and lignin, and acid detergent fiber contains cellulose and lignin. Hemicellulose defined as the difference between neutral detergent and acid detergent fiber [1].

So, given the current rationing aspects of fiber, study of the effect of the ratio of its factions in mixed fodder on digestibility of feed nutrients is important.

The purpose of the research – to study the digestibility of nutrients in the body of growing rabbits of meat productivity direction with using mixed fodders, containing different ratio of neutral detergent to acid detergent fiber.

Methods and materials of the research – Comparative analysis to determine the optimum ratio of fiber fractions in mixed fodder for rabbits conducted by the scientific-economic experiment at the Department of animal nutrition and feed technology named P. D. Pshenichnogo of National university of life and environmental sciences of Ukraine. For the experiment had were selected 60 heads of rabbits 42-day old of hybrid Hyplus, selection of French company Grimaud Frères Sélection, of which according to the principle of analogues formed three groups - control and two experimental, For the experiment had were selected 60 heads of rabbits 42-day old of hybrid Hyplus, selection of French company Grimaud Frères Sélection, of which according to the principle of analogues formed three groups - control and two experimental, which contained 20 units (10 females and 10 males) in each. The main period of the experiment lasted for 42 days and was divided into six sub-periods of 7 days each.

Within the scientific-economic experiment was conducted physiological experiment to study digestibility of nutrients for which from each group according to the principle of analogues selected 4 head (2 males and 2 females) 78-day age rabbits [2]. For the experiment of the study of digestibility of nutrients, rabbits housed individually in specially equipped cages.

During the preparatory period, lasting three days, rabbits became accustomed to the change of conditions. In account period of experiment, lasting six days, calculated daily amount of feed consumed by each animal and amount of feces. Feces were collected once per day - in the evening. After weighing it was conserved by the 10 % solution of hydrochloric acid at the rate of 1,5 ml per 100 g of feces.

Samples of feed stored in plastic bags. Prior to the zootechnical analysis its samples were stored in the refrigerator in a tightly closed containers.

For the feeding of experimental rabbits using full-granulated feed which by chemical composition differed only by the ratio of fiber fractions, according to the scheme of experiment (Table. 1).

1. The scheme of the experiment

Group		The periods of experiment	
		egalitarian	main
		the ratio of NDF:ADF in мixed fodder	
Control :	1	1,5:1	1,5:1
Experimental:	2	1,5:1	1,4:1
	3	1,5:1	1,6:1

Ratio of factions of fiber in the diet of experimental groups of animals regulated by changing the feed components, using for a drafting of recipes mathematical optimization techniques on programming complex WinMix 3.0 (Table. 1).

2. The content of energy and basic nutrients in 100 g of mixed fodder, %

Indicator	Group		
	First	Second	Third
	The content in 100 g of mixed fodder		
Metabolic energy, MJ	1,03	1,03	1,02
Crude protein	17,07	17,11	17,05
Crude fiber	18,0	18,0	18,0
Neutral detergent fiber	43,7	40,2	46,1
Acid detergent fiber	29,1	28,7	28,8
Calcium	0,81	0,81	0,81
Phosphorus	0,52	0,52	0,52
Sodium	0,22	0,22	0,22
Vitamin A, thousand of IU	0,6	0,6	0,6
Vitamin D, thousand of IU	0,1	0,1	0,1
Vitamin E, mg	0,3	0,3	0,3

Statistical analysis of the data carried out on a PC using software MS Excel.

In the samples of mixed fodder and feces obtained during physiological experiment by traditional methods of zootechnical analysis [1] determined the initial moisture, absorbent moisture, crude ash, crude protein, crude fat, crude fiber, Calcium and Phosphorus, and neutral detergent and acid detergent fiber by the method of Van Soest.

The results of research. The results of physiological experiment to study digestibility of nutrients in feed for rabbits show that established by us digestibility

coefficients of nutrients of mixed fodders with different ratios of NDF to the ADF in the body of rabbits of experimental groups did not differ significantly from that coefficients of growing animals in the control group (Table. 3).

3. Digestibility of nutrients of mixed fodders

Nutrient	Group		
	First	Second	Third
Organic matter	69,7±0,18	70,5±0,61	68,6±0,30
Protein	73,7±0,67	74,1±0,46	72,4±0,40
Fat	79,0±1,17	80,0±1,38	78,5±0,89
Fiber	32,2±0,93	33,7±0,78	31,2±0,73
NFE	82,6±0,57	83,3±1,01	81,5±0,78

Organic matter digestibility varied in the range of 68,6 to 70,5 %. This indicator was the highest in the second group, and surpassed control on 0,8 %. Rabbits of third group (consumed feed with ratio of NDF to ADF 1,6:1) inferior for this indicator to analogues in the control group on 1,1 %.

Feeding of rabbits of the second group mixed fodder with ratio of NDF to ADF 1,4:1 helped increase the digestibility of protein, fat and crude fiber compared to the indexes of the control group accordingly on 0,3; 0,9 and 1,5 %. The highest digestibility of NFE was in the second group of young animals which were fed with mixed fodder with ratio of NDF to ADF 1,4:1, and was higher than the same indicator of rabbits in the control group who consumed mixed fodder with ratio of NDF to ADF 1,5:1 on 0,7 %.

However, these studies of digestibility of fiber factions of mixed fodder, namely neutral detergent and acid detergent indicate some differences in the ability of rabbits to digest their(Fig. 1). In particular, digestibility of the NDF and ADF in rabbits of the second group 79-84-day age was higher, respectively on 1,4% and 2,5%, than in the control. The reverse regularity was found in rabbits of the third group which feed mixed fodder with a ratio of NDF to ADF 1,6:1, they conceded to the animals of the control group accordingly on 1,7 % and 2,3 %.

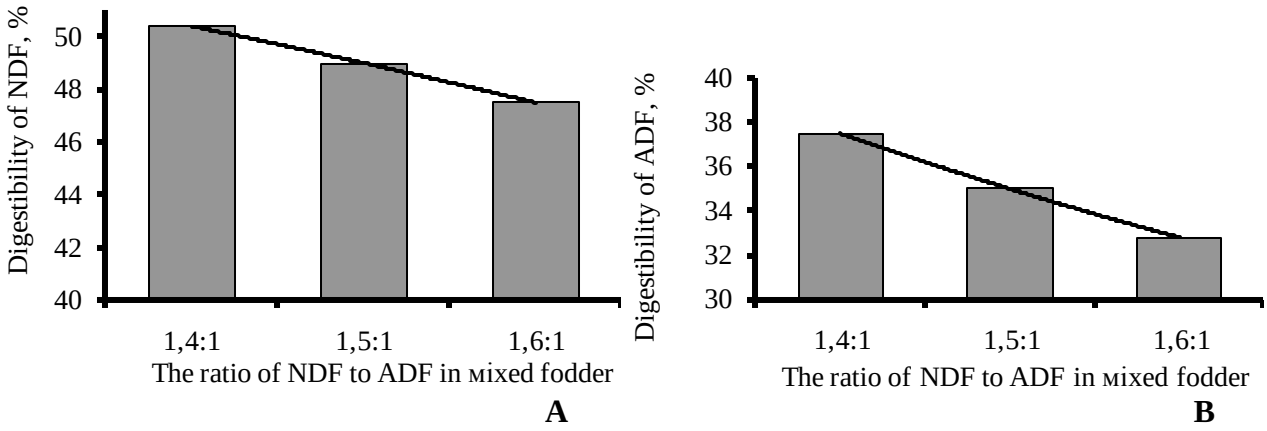

Fig. 1. Digestibility of fiber fractions

Established relationship between the ratio of neutral detergent to acid detergent fiber in mixed fodder and their digestion in the body of rabbits described polynomial trendline and are as follows:

$y = -0,05x^2 - 1,25x + 51,7$; $R^2 = 1$ (A),

$y = 0,15x^2 - 2,95x + 40,3$; $R^2 = 1$ (B).

Analysis of the correlation between content of NDF in mixed fodder and digestibility of organic matter indicates a strong inverse character of the relationship ($r = -0,84$, $p<0,001$); of protein – strong inverse ($r = -0,83$, $p<0,001$); of fat – moderate inverse ($r = -0,5$, $p>0,05$); of fiber – strong inverse ($r = -0,76$, $p<0,01$); of nitrogen-free extractives – moderate inverse ($r = -0,69$, $p<0,05$); of neutral detergent fiber – strong inverse ($r = -0,85$, $p<0,001$); of acid detergent fiber – strong inverse ($r = -0,97$, $p<0,001$).

Consequently, digestibility of nutrients of mixed fodders varied depending on the ratio of fiber fractions, but not significantly dependent on their content in mixed fodders provided by scheme of experiment.

Conclusions

1. Experimentally proved the feasibility of using full-granular mixed fodders with ratio of fiber fractions 1.4: 1.

2. Feeding rabbits in 78-84-day age mixed fodder with ratio of NDF to ADF 1.4: 1 provides a tendency to increase of digestibility protein and fat accordingly on

0,3 and 0,9%.

3. Found out that reducing the amount of neutral detergent fiber in mixed fodder increases the digestibility of protein, fat, nitrogen-free extractives and fiber fractions. Established an inverse relationship between the ratio of neutral detergent to acid detergent fiber in mixed fodder and their digestion in the body of rabbits.

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