The Influence of the Preparation Primix Bionorm K on the Digestibility of the Nutrients in the Fodders for Young Pigs

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Abstract
The study was carried out in order to determine nutrient digestibility in breed gilts under the influence of the supplementation of the mixed fodder with the preparation pro-prebiotic Primix Bionorm K at the level of 0.15, 0.30, and 0.45 kg/t. During February 2011, in a digestibility trial which lasted 13 days 12 similar piglets were used, which were randomly divided into four experimental groups (CG, EG_1, EG_2, EG_3) three heads each. It was established that the supplementation of the mixed fodder for young gilts with the preparation pro-prebiotic Primix Bionorm K had a positive influence on the digestibility of the dry and organic substances by 0.86% and 1.18%, crude protein, fat and cellulose showed a digestibility of 0.57, 1.05 and 12.37% respectively higher in EG_3 compared to CG. However, the addition of pro-prebiotic preparation during the growth period of the breed gilts at the level of 0.45 kg/t (EG_3) allowed obtaining an absolute increase in body weight during the digestibility trial by 8% higher than in the CG and EG_1.

Keywords: gilt, digestibility, mixed fodder, nutrients, pro-prebiotic

1. Introduction

The stabilization of the digestion and intestinal microflora in monogastric animals is only possible through the efficient and continuous supplementation with probiotic of the mixed fodder, because the microorganisms used in fodders do not permanently colonize the intestine.
In the industry of pig breeding the probiotics may be associated with the following positive effects: nutrient digestibility [1, 2], the increase of the populations of beneficial bacteria in the gastrointestinal tract and the competitive exclusion of pathogenic bacteria that is part of the gram-negative flora such as Coli and Salmonella Escherichia [3], the development of the enzyme activity in the intestinal mucosal tissue of young pigs [4], the increase of the production of volatile fatty acids, the increase of body mass, and nutritional efficiency [5, 6].
A number of researches have shown that such preparations normalize the growth and development of the young pigs, are effective for prophylaxis and treatment of gastrointestinal diseases in calves, piglets, chickens, and increase the stamina of young animals [7].
Thus, the utilisation of probiotics solve a very broad spectrum of issues, beginning with the correction of the intestinal biocenosis which affects also the correction of the immune, hormones and enzymes systems of young and adult animals. At the same time the utilisation of probiotics is important not only in animal breeding but also for health care, as a potential to reduce morbidity and to improve human security in terms of producing ecological agricultural products [8].
The perspective of the utilisation of biological preparations in animal rations in order to normalize metabolic processes, and to increase fodder consumption, productivity and safety requires more detailed comprehensive studies [9].

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2. Materials and methods

The purpose of the investigations was to study the influence of the pro-prebiotic preparation Primix Bionorm K on the digestibility of nutrients by young breed gilts.

The digestibility trial was carried out at the State Enterprise "Moldsuinhibrid" during February 2011, and lasted 13 days. During the trial twelve gilts of Landrace breed selected according to the method of similar groups were used. The animals were randomly divided into four experimental groups three heads each. The gilts in the CG were fed with mixed fodder of standard structure used within the enterprise. The gilts in EG_1, EG_2 and EG_3 received the same standard mixed fodder which was supplemented with the examined preparation at different levels in accordance with the trial scheme (Table 1).

Table 1. The scheme of the physiological trial

Groups	Number of heads per group	Characteristics feeding
CG	3	NC – basic mixed fodder
EG_1	3	NC + 0.15кg/t Primix Bionorm K*
EG_2	3	NC + 0.30кg/t Primix Bionorm K
EG_3	3	NC + 0.45кg/t Primix Bionorm K

* The examined preparation – Primix Bionorm K – a fodder additive containing a complex of probiotic and prebiotics the purpose of which is to increase the productivity of domestic animals by normalizing the operation of their gastro-intestinal tract, consisting of frozen living cells with a pronounced antagonism towards the pathogenic microflora of the strains of bifido- and lactobacteria with an activity of $1x10^6$ KOE per 1 g, amino acids, vitamins of group B, pectin and lactulose produced at the Scientific and Practical Association "Ariadna" (Ukraine).

The maintenance conditions of all the experimental animals were identical. During the accounting period of the trial (8 days) strict records of food and water intake and faeces excretions, and respectively media sample collection were made.

The chemical analysis of the conditioned medium samples was performed using the methodology described by P. Lebedev, A. Usovici [10], and V. Razumov [11]. Based on the intake and excretion evidence and the performed analysis the fodder consumption and the digestibility of nutrients such as dry and organic substances, protein, fat, cellulose and nitrogen-free extractives substances were calculated.

At the beginning and the end of the trial the animals were weighed individually.

The results obtained during the investigations were statistically processed using computer programs according to the methodology described by N. Plohinschii [12].

Table 2. The mixed fodder composition and its nutritional value

Ingredients	%, by mass	Concentration of nutrients/1 kg of mixed fodder	
Barley	27.00	Metabolic energy, Mj	12.60
		Dry substance, kg	0.81
Wheat	16.00	Crude protein, g	155.00
		Digestible protein, g	85.60
Corn	24.00	Crude cellulose, g	42.60
		Lysine, g	6.75
Wheat bran	12.60	Methionine + cystine, g	4.09
		Calcium, g	7.21
Soybean meal	10.50	Phosphor, g	4.63
		Iron, mg	138.60
Fish meal	2.50	Copper, mg	6.18
		Zinc, mg	37.30
Soybean oil	4.00	Manganese, mg	30.80
		Cobalt, mg	0.14
Premix 2231	2.00	Iodine, mg	0.37
Chalk	1.40		

Throughout the trial period the gilts were fed with mixed fodder produced at the factory of mixed fodder of the enterprise "Moldsuinhibrid". Structure of mixed fodder was composed of traditional feed concentrates and residues of Moldova and balanced according to the nutritional requirements (Table 2) [13].

3. Results and discussion

During the trial period the animals' body weight was assessed by individual weighing and the absolute and daily average weight gain were determined (Table 3).

Table 3. The dynamics of the body weight and the weight gain during the trial, (X ± Sx)

Groups	Body weight, kg			Weight gain	
	at the beginning of the preparatory period	at the beginning of the trial period	at the end of the trial	absolute, kg	daily average, g
CG	37.33±2.19	39.61±2.01	45.67±1.77	6.06±0.87	0.76±0.11
EG_1	36.00±3.06	38.27±3.13	44.33±3.35	6.06±0.32	0.76±0.04
EG_2	37.33±2.85	39.69±2.68	46.00±2.26	6.31±0.53	0.79±0.07
EG_3	37.00±4.17	39.45±4.06	46.00±3.79	6.55±0.42	0.82±0.05

The analysis of the data on the gilts' live mass at the end of the research showed that the piglets' average body weight in EG_2 and EG_3 was 46.0 kg, by 0.7% higher than in CG. The absolute gain obtained during the record period was observed in EG_2 and EG_3, and namely by 4.13 and respectively by 8.09% higher compared to CG, the piglets' average daily gain was 0.790 and 0.820 kg, which was by 3.95 and 7.89% higher than in CG.

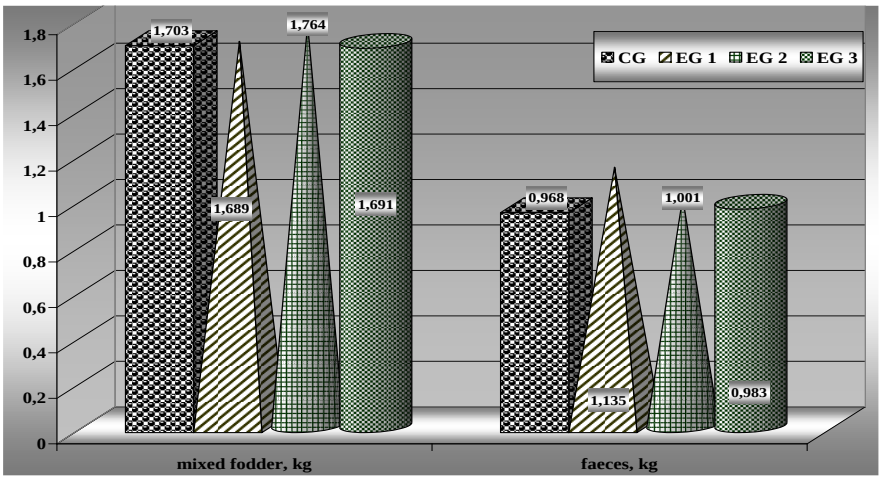

Figure 1. Fodder intake and faeces excretion

Therefore, the supplementation of the mixed fodder with pro-prebiotic preparation Primix Bionorm K at the level of 0.45 kg/t was optimal and led to the increase of the gilts' body weight and the average daily gain in EG_3.

It was determined that during the physiological trial the gilts in EG_1 and EG_3 registered the lowest fodder consumption – by 0.82 and 0.70% lower than in CG. While the proportion of the dose excreted via faeces was the lowest in the gilts which received fodder supplemented with the preparation at the level of 0.45 kg/t (EG_3) – 0.983 kg, practically at the same level with CG but by 13.4 and 1.8% lower than in EG_1 and EG_2 respectively (Figure 1).

Based on the fodder intake and faeces excretion as well as the chemical analysis of the conditioned amples the digestibility coefficients of nutrients in the mixed fodder were calculated (Table 4).

The results obtained by the researchers indicated a positive effect of the supplementation with pro-biotic preparations of the mixed fodder for young gilts on the nutrients digestibility [14; 15, 16].

Table 4. Digestibility of the fodder nutrients during the trial, %

Groups	Dry substance	Organic substance	Crude protein	Crude fat	Crude cellulose	Free-nitrogen extractive substances
CG	83.99±0.09	84.87±0.24	77.44±2,22	74.06±1.83	36.90±0.85	91.50±0.29
EG_1	84.05±1.50	85.04±0.18	75.04±1.56	67.66±4.19	38.30±1.45	93.07±0.41
EG_2	84.05±0.32	84.96±0.40	73.85±2.34	69.45±2.44	42.02±5.59	92.76±0.57
EG_3	84.85±0.57	86.05±0.57	78.01±1.43	75.11±1.41	49.27±1.92*	92.22±0.30

*P<0,05

The digestibility coefficients of the dry and organic substances, protein, fat and cellulose in the breed gilts in EG_3 were confirmed to be higher compared with the CG.

It was determined that the digestibility of the dry substance was higher in EG_3 by 0.86% compared with the CG, and by 0.80% compared with EG_1 and EG_2; of the organic substance by 1.18 and 1.01% respectively compared with the CG and EG_1.

The protein digestibility in the CG was at the level of 77.44, in EG_1 – 75.04, in EG_2 – 73.85, and in EG_3 – 78.01%, which was by 0.57 and 2.97% higher than in the CG and EG_1.

The data on the crude fat showed a lower digestibility in EG_1 – 67.66%. The gilts in EG_3 which were supplemented the preparation Primix Bionorm K at the level of 0.45 kg/t with mixed fodder showed a higher digestibility – by 1.05% compared with the CG, by 7.45% compared with EG_1, and by 5.66% compared with EG_2 the ration of which was supplemented with the preparation at the level of 0.30 kg/t.

The higher digestibility of the crude cellulose was observed in the gilts in EG_3 – 49.27% (*P<0,05*), which was 12.37% and 10.97% higher than in the CG and EG_1 respectively.

The assessing of the digestibility of the free-nitrogen extractive substances indicated that the gilts in EG_1 achieved a coefficient of 93.07%, the gilts in the CG and EG_2 – 91.50 and 92.76% respectively, which was by 1.57 and 0.31% lower than in EG_1.

4. Conclusions

The preparation pro-prebiotic Primix Bionorm K added to the mixed fodder for young gilts at the level of 0.45 kg/t (EG_3) allowed us to obtain an absolute increase in body weight during the digestibility trial by 8% higher than in the CG and EG_1.

The pro-prebiotic Primix Bionorm K supplementation to the extent of 0.45 kg/t positively influenced the digestibility of the dry substance by 0.86%, of the organic substance by 1.18%; the digestibility of crude protein and fat was of 0.57% and 1.06% higher compared to CG; the digestibility of the crude cellulose in EG_3 was higher by 12.37 and 10.97% compared with the CG and EG_1.

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