The Effectiveness of the Influence of the Additive Mycofix+ on the Digestibility of Nutrients by Breeding Pigs

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Abstract
The investigations were carried out using breeding pigs of Landrace breed in the conditions of the enterprise "Moldsuingibrid" specialising in pig selection and hybridizationn in the period October-November 2010. The aim of the investigation was to study the effectiveness of the influence of the drug Mykofiks+ (introduced in the main fodder at the level of 0.1, 1.5 and 2.0 g/t) on the digestibility of the nutrients in the forages for breeding piglets. The obtained research data showed that the addition of the drug Mikofiks at the level of 0.1 and 1.5 kg / t in the fodder for breeding piglets in EG2 and EG3 increased the digestibility of the nutrients respectively: protein by 7.11% and by 0.90%, fat by 7.40% and by 5.63%, fibber by 19.81 and by 11.66%, compared with the control group, and had a beneficial effect on the young pigs' growth.

Keywords: : pigs, nutrition, digestibility, absorbent, Mycofix

1. Introduction

The economic damage from mycotoxicosis is due to the lower productivity of animals and their reproductive capacity, the decrease of the efficiency of fodder assimilation, the increase of the susceptibility of animals to disease, the increase of material costs for treatment and preventive measures, the deterioration of the quality of the manufactured products, and in case when the permissible concentrations of mycotoxins exceeds, due to their total unsuitability for utilisation; the threat to human health when a mycotoxin gets into meat, eggs, milk and other animal products. Mycotoxins are the most dangerous contaminants of fodders and food products under natural conditions, which are characterized by highly toxic, mutagenic, teratogenic, carcinogenic and immunosuppressive properties [1,2].

Microscopic fungi are ubiquitous, and they are capable to contaminate fodders and agricultural production at any stage of production; so mycotoxins are unavoidable contaminants of food and fodders, and dangerous to the health of animals as natural ecotoxicants [3, 4].

The sensitivity of animals to mycotoxins is predetermined genetically. Of all farm animals the most susceptible to mycotoxins are swines, especially gestating and lactating sows and piglets in the rearing period. The maximum permissible level of zearalenone in fodder for these age groups is 50 times lower than for the pigs in the fattening period, and 100 times lower than for cattle and poultry [5, 6].

The way the microscopic fungi that produce mycotoxins in different regions disseminate is not yet clear, which makes it difficult to forecast the occurrence of a mycotoxicosis, the development of preventive and therapeutic

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measures, particularly in the geochemical zone of our country, the nature and extent of toxigenic fungi; the way they produce mycotoxins has not been studied. The development of means to prevent mycotoxicosis of rules governing, the content of mycotoxins, and the utilization of different absorbing additives, is a relevant and important veterinary and zootechnical problem.

2. Materials and methods

The physiological experiment was performed using weaning piglets of Landrace breed in the conditions of the enterprise «Moldsuinhibrid» using the method of groups (the method of pair-analogues [7].The trial was conducted on the background of a scientific and economic experiment, and consisted of a preparation and accounting periods which lasted for 10 days. For the physiological experiment, animals similar in breed, age, body weight and energy growth were selected which were divided into 4 groups (3 animals in each group) under the scheme presented below (Table 1).

In the main fodder for the pigs in EG1 the studied drug Mycofix^{+} was added in the amount of 1.0 kg /t, for the pigs in EG2 – 1.5 kg/t, and for the pigs in EG3 – 2.0 kg/t.

Throughout the experiment the fodder palatability was accounted: each animal was fed individually three times a day, then the fodder residues were weighed; the quantity of drunk water was also measured. The quantity of fodder and water residues was noted in a log after each feeding and watering.

At the end of each day of the accounting period of the experience the collected faeces from each animal was weighed, carefully mixed, and 10% of its quantity were selected for the subsequent chemical analysis.

The chemical analysis of the fodder and metabolic products was carried out (at the end of the physiological experiment) using zootechnical methods [8].

Table 1. Scheme of the physiological experiment

Groups	Number of animals in a group, heads	Feeding features
CG	3	MF (the main mixed fodder)
EG1	3	MF + 1.0 kg/t Mycofix $^{+}$
EG2	3	MF + 1.5 kg/t Mycofix $^{+}$
EG3	3	MF + 2.0 kg/t Mycofix $^{+}$

The mixed fodders for the experiment were prepared on the fodder mill according to the accepted technology in the enterprise inaccordance with specially developed recipes (Table2).

Table 2. The composition of fodder used for the experimental pigs n the physiological experiment,%

Ingredients	%
Corn, grain	27.3
Barley, grain	40.0
Wheat bran	16.3
Soybean meal	9.5
Fishmeal	1.5
Soybean oil	2.0
Chalk	0.9
Premix 2231	2.0
Salt	0.5

The nutrients concentration in 1kg of mixed fodder for pigs (Table 3) in the physiological experience met the requirements of the feeding rules for breeding piglets [11].

To determine the live weight and its total and average daily gain, the animals were weighed at the beginning of the preparatory phase of the experience, in the early accounting phase, and at the end of the experiment (Table 4).

Table 3. Nutrients concentration in 1 kg of mixed fodder for pigs

Indicators	Quantity
Feed units	1.09
EM, MJ	12.28
Crude protein, g	147.66
Digestible protein, g	114.97
Lysine, g	6.37
Methionine + cistine, g	6.09
Crude fiber, g	50.21
Salt, g	5.0
Calcium, g	6.94
Phosphorus, g	5.55
Iron, mg	65.0
Copper, mg	5.09
Zing, mg	34.19
Manganese, mg	16.33
Cobalt, mg	0.29
Iodine, mg	0.20
Vitamins:	
Vitamin A, thousand IU	2.10
Vitamin D, thousand IU	0.59
Vitamin E, mg	0.46
B_1, mg	21.71
B_2, mg	3.85
B_3, mg	2.65
B_4, g	1.00
B_5 mg	953.45
B_{12}, mg	37.30

Table 4. Data on the experimental pigs' live weight and its daily gain in the experiment, $\bar{X} \pm Sx$

Group	Pigs' live weight, kg			Weight gain, kg	
	At the beginning of the preparatory phase of the experience	In the early accounting phase	At the end of the experiment	Total gain	Average daily gain
CG	66.63±4.447	69.07±4.373	73.77±3.720	4.70±1.563	0.588±0.195
EG1	69.00±4.508	70.33±3.414	74.70±3.223	4.37±0.233	0.546±0.029
EG2	69.33±0.845	69.87±0.448	74.87±0.067	5.00±0.404	0.625±0.051
EG3	65.77±3.318	69.40±3.158	73.80±3.175	4.40±0.100	0.550±0.013

The analysis of the results of data on the experimental pigs' live weight and its average daily gain in the experiment showed, that under the influence of the additive Mycofix$^+$ the weight of the pigs in the experimental groups EG1 and EG2 was higher, than in the CG respectively, higher by 1.26 and 1.49%. The obtained data allowed to determine the total amount of fodder consumed during the whole trial, and the average amount of fodder consumed daily, and to determine the average daily excretion of faeces and urine (Table 5).

The introduction of the additive Mycofix$^+$ into the fodder for pigs had also an effect on fodder intake, which was generally lower in EG1 by 4.77%, compared with CG, but in EG2 and EG3 it was higher by 6.01% and 4.33% respectively.

At the end of the balance experiment a chemical analysis of fodders, their residues and the animals' excreta (Table 6) was carried out, using the conventional methods mentioned earlier.

The performed chemical analysis and the subsequent calculations allowed to determine the digestibility of nutrients (Table 7) depending on the level of the injected preparation.

Table 5. Data on the accounting of fodder and water consumption, and the excretion of faeces and urine

Group	The number of the animal	During 8 days of the trial				On average during 1 day			
		Fodder consumed, kg	Water consumed, l	Excretion of faeces, kg	Excretion of water, l	Fodder consumed, kg	Water consumed, l	Excretion of faeces, kg	Excretion of water, l
CG	MD 0868 732	27.16	52.62	16.98	25.66	3.40	6.58	2.12	3.21
	MD 1402	22.35	85.97	10.89	61.73	2.79	10.75	1.36	7.72
	MD 0886 466	21.70	43.35	10.77	26.60	2.71	5.42	1.35	3.33
						2.26	7.58	1.16	4.75
EG1	MD 0868 734	16.50	53,11	8.41	35.01	2.06	6.64	1.05	4.38
	MD 1404	22.10	74,62	12.26	50.85	2.76	9.33	1.53	6.36
	MD 0872 470	13.10	65,10	7.86	50.45	1.64	8.14	0.98	6.31
						2.15	8.04	1.19	5.68
EG	MD 0868 588	21.20	63,41	10.64	43.79	2.65	7.93	1.33	5.47
	MD 1408	19.70	78,51	11.280	60.89	2.46	9.82	1.41	7.61
	MD 0872 486	16.65	34,24	7.15	16.86	2.08	4.28	0.89	2.11
						2.40	7.34	1.21	5.06
EG3	MD 0868 730	21.95	50,55	12.94	28.09	2.74	6.32	1.69	3.51
	MD1410	18.80	57,78	11.23	37.99	2.35	7.22	1.40	4.75
	MD 0886 480	15.90	49,41	9.70	32.50	1.99	6.18	1.21	4.06
						2.36	6.57	1.41	4.11

Table 6. Chemical composition of the animals' excreta, g / kg

Groups	Number of the animal	Total moisture	Dry matter	Organic matter	Crude ash	Crude protein	Crude oil	Crude fiber	NFE
CG	886 466	695.05	304.95	269.28	35.67	36.53	27.81	63.23	131.71
	868 732	690.55	309.45	273.77	35.68	53.69	31.28	43.93	114.86
	1402	771.47	228.53	201.76	26.77	34.20	21.80	54.97	110.79
EG1	1404	744.69	255.31	206.45	48.86	37.94	22.50	47.68	98.32
	872 470	734.98	265.02	211.62	53.40	32.91	17.92	42.04	118.75
	868 734	745.55	254.45	206.85	47.60	38.05	21.16	45.16	102.47
EG2	1408	736.43	263.57	214.83	48.74	26.25	22.62	29.46	136.51
	868 588	740.33	259.67	210.01	49.65	32.05	23.36	43.53	111.07
	872 486	764.81	235.19	192.13	43.06	25.48	22.23	47.65	96.77
EG3	1410	749.78	250.22	204.92	45.29	34.78	18.25	42.54	109.35
	868 730	770.27	229.73	189.55	40.19	37.59	24.46	38.34	89.15
	886 480	786.57	213.43	176.56	36.87	36.23	17.04	36.17	87.13

Table 7. Digestibility of nutrients by the pigs in the physiological experiment, % ($\bar{X} \pm Sx$)

Group	Dry matter	Organic matter	Ash	Protein	Fat	Fibber	NFE
CG	82.21±2.77	83.08±2.65	70.97±4.39	81.51±4.39	51.79±10.8	35.84±3.21	89.35±0.87
EG1	83.23±0.99	85.45±0.78	54.39±3.73*	83.73±0.41	59.47±2.04	44.07±2.26*	90.09±1.00
EG2	85.09±1.69	86.94±1.48	60.97±4.56*	88.62±1.27	59.19±3.56	55.65±3.35**	90.22±1.78
EG3	83.82±0.67	85.65±0.55	59.93±2.23*	82.41±0.37	57.42±4.53	47.50±2.32**	90.47±0.69

* B = 0.90

$^{**}B = 0.95$
$^{***}B = 0.99$

During the physiological experiments it was revealed, that the addition of the preparation Mykofix^{+} into the mixed fodders had a positive effect on the digestibility of some nutrients in the fodders.

The digestibility of the dry matter by the pigs during the physiological experience was of 82.21% in the CG, in the EG1 – 83.23, in the EG2 – 85.09, and in the EG3 – 83.82%. The organic matter digestibility was also higher in the experimental groups, and in the EG2 it was significantly higher, by 3.86%, compared with the control group (Figure 1).

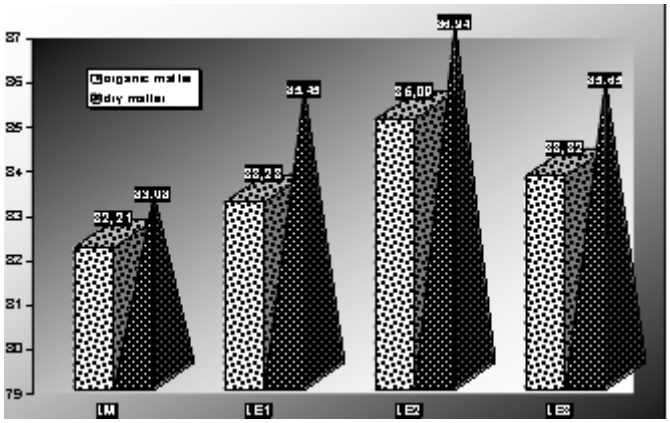

Figure 1. Digestibility of dry and organic matter by the pigs in the physiological experiment, %

The data presented in figure 2 show, that under the influence of the addition of the preparation Mykofix^{+} , the digestibility by the pigs of the protein in the fodders increased in all experimental groups – the highest indicator was of 7.11% in comparison with the control group, in EG2 (88.62%).

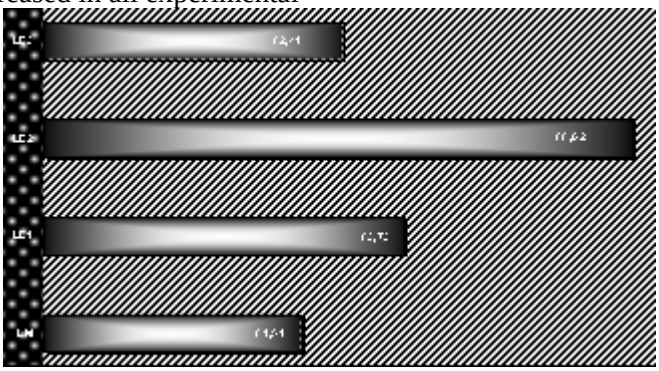

Figure 2. The digestibility of the protein by pigs in the physiological experiment, %

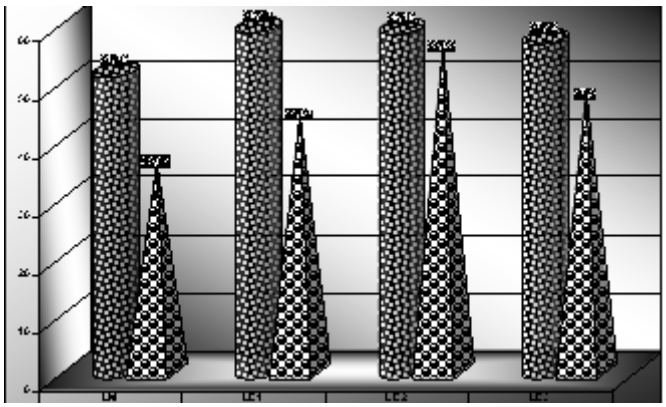

Figure 3. Digestibility of fat and fiber by the pigs in the physiological experiment, %

When comparing data on the digestibility of fat and cellulose by pigs (figure3), it could be mentioned that the digestibility of fat in the control group was lower than in all experimental groups, with the better digestion of this substance by the pigs in EG2; it could be also mentioned that the digestibility of crude fiber was higher, respectively, in EG1, EG2, EG3, the percentage of which varied at the most by 8.23, 19.80 and 11.66% in comparison with the control group.

The digestibility of ash in the experimental groups was lower than in the control group, and the digestibility of NFE in all three experimental groups was significantly higher and amounted in CG to 89.35%, in EG1 to 90.09%, in EG2 to 90.22, and in EG3 to 90.47% (figure 4).

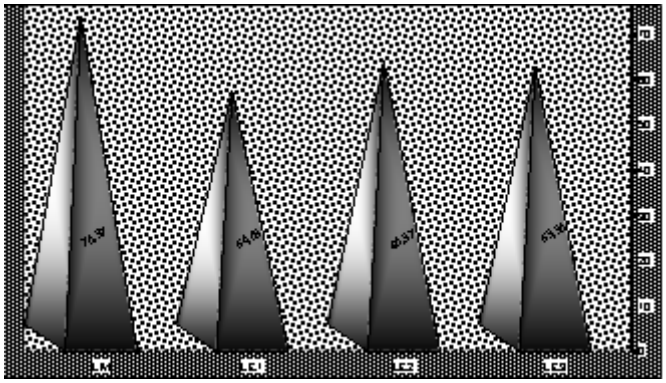

Figure 4. Digestibility of ash by the pigs in the physiological experiment, %

4. Conclusions

1. The addition of the preparation Mykofix^{+} at the level of 1.5 and 2.0 kg / t in the mixed fodders for the breeding piglets in EG2 and EG3 has had a positive effect on the digestibility of nutrients: protein by 7.11% and 0.90%, fat by 7.40% and 5.63%, fiber by 19.81% and 11.66%, respectively, compared with the control group.

2. The utilization of the preparation Mycofix^{+} in the diets for young pigs has a positive effect on the digestibility by them of the nutrients in fodders.

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