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THE EFFECT OF SWINE INTAKE SUPPLEMENTATION WITH BIOZYME X 1000 UPON THE INTESTINAL MICROFLORA AND MEAT QUALITY

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The presence of high-quantity non-starch poly-glucids (Pn A), as a consequent of the utilization of wheat, rye, soy flour in animal intake with one-compartment stomach release an enzymatic equipment unable to generate enough amounts of enzymes necessary for digestion, leads to the apparition of some serious digestive disorders and implicitly to serious economic losses. Intake's high content in brute cellulosis expresses as anti-nutritive factor, because it affects the digestibility of all nutrients (including protein and starch). The negative effect upon the bioproductive indices is much bigger in young animals which have a much weaker enzymatic equipment (1, 2).

One of the current alternatives counteracting the anti-nutritive effect is the utilization of fodder enzymes. They achieve an enzymatic pre-digestion, respectively a cleavage of the nutrient macromolecules up to levels of adsorption and metabolization by the animal body.

In this experiment, we proposed to supplement swine intake with an enzymatic preparate, Biozyme X 1000, in order to observe the effect of this enzymatic product upon the intestinal microflora, the intestinal morphology and the annex glands of the digestive tract, the carcass parameters and the meat quality parameters.

Materials and methods. The researches were performed within a microfarm from the Western part of the country, populated with hybrids F1 Landrace x Large White, belonging to a swine breeding industrial complex. We made two groups (control and experimental), each of them consisted of 6 individuals, bred under the same comfort microclimate. We supplemented the intake of the swine in the experimental group with the peparate Biozyme X100, which is a grey-yellowish powder with a specific taste and smell, bought in 25 kg-packages. The percentage of this preparate within the fodder varies depending upon the percentage of wheat participation. In this experiment, we introduced an amount of 1000 g/t into the fodder, at a wheat participation of 30%.

After killing, we took samples of ceccal content from each animal for physical-chemical and microbiological determinations. We also took limb fragments from all the individuals within the two groups, which were then fixed in formaldehyde and colored (Giemsa). In the same way, we weighted carcasses and limbs and took meat samples which were then analyzed in a certified laboratory.

Results achieved

In Table 1, we present the results of the microbiological examination (ceccal content).

Table 1

Microbiological examination results (ceccal content)

Specification	Group 1 (control)	Group 2 (experimental)	Group 2 of Group 1 (%)
N.T.G.	$13,83 \times 10^6 \pm 0,34$	$16,33 \times 10^6 \pm 0,32$	**118,07**
Coliform b.	$4 \times 10^4 \pm 0,54$	$11,33\ 10^4 \pm 0,12$	**283,25**
E. coli	Present in 5 samples	Present in 6 samples	120
Staphylococcus c.p.	Absent	Absent	-
Salmonella spp.	Present – 1 sample (C type)	Absent	-

In the table above, we may notice that the enzymatic supplement did not have effects upon the intestinal flora. The investigated parameters indicate an increase of the NTG and coliform bacilli in the experimental group, compared with the control group.

Table 2

Physical-chemical examination results (ceccal content)

Specification	Group 1 (control)		Group 2 (experimental)		Group 2 of Group 1 (%)
	Identification no.	%	Identification no.	%	
S.U.	001	13,11	011	13,62	
S.U.	002	13,52	012	13,69	
S.U.	003	13,53	013	13,24	
S.U.	004	14,11	014	12,56	
S.U.	005	13,10	015	11,16	
S.U.	006	14,40	016	12,76	
X		13,62±0,01		13,17±0,03	96,69

After the dry matter determinations within the ceccal content (Table 2), we may observe a decrease with 3.4% of the dry matter content in the control group, compared to the experimental group, fact that can be attributed to the enzymatic preparate which has caused an increase in the dry matter intestinal digestibility.

The microscopical examination of the limb preparates (stomach, colon, liver, pancreas) did not make evident any histological changes with pathological signification. The only differentiating aspects between the two groups were related to colon and liver.

In the experimental group, within the colon mucous belonging to 4 of the 6 analyzed samples, we made evident the presence of an “abundant inter-glandular leukocytary infiltrate”, and also in 3 of the 6 liver samples we observed “granular degenerations”.

After killing, the carcasses and limbs were weighed, and the results achieved were statistically processed (Table 3).

In the analysis of the results achieved for all parameters supervised, we may notice an improvement of all carcass parameters in the group fed with Biozyme X 1000, but statistically assured significant differences could be recorded only for three parameters, namely: the weight of Longisimus dorsi muscle, which is an important parameter in carcass assessment, was significantly bigger in the experimental group compared to the control group ($p<0.05$); liver weight in the animals from the experimental group was significantly bigger ($p<0.01$) compared to the control group (this aspect, when associated with the granular degenerations made evident at the histological examination, could be attributed to a stimulator effect of the metabolism induced by the enzymatic preparation); the fat layer of the carcasses in the experimental group was 9% bigger that in the control group.

Table 3

Carcass parameters at killing

Specification	Group 1 (control)				Group 2 (experimental)				Differences	Mann-Whitney test
	n	x±Sx	cv%	s	n	x±Sx	cv%	s	L1 – L2	p
Live weight / kg	6	99,17±2,63	6,49	6,44	6	105,25±2,06	4,80	5,05	-6,08	0,149 ns
Warm carcass weight / kg	6	73,84±1,99	6,59	4,87	6	77,08±1,17	3,71	2,86	-3,24	0,262 ns
Cold carcass weight / kg	6	72,01±2,00	6,82	4,91	6	75,90±1,08	3,48	2,64	-3,89	0,109 ns
Weight Longisimus dorsi m. / kg	6	1,70±0,07	10,65	0,18	6	1,94±0,07	8,58/	0,17	-0,24	**0,037 sem**
Area Longisimus dorsi / cm^2	6	49,19±2,68	13,35	6,57	6	50,28±2,15	10,47	5,26	-1,09	0,748 ns
Weight psoas m.m. / kg	6	0,50±0,01	4,57	0,02	6	0,51±0,02	9,68	0,05	-0,01	0,872 ns
Liver weight / kg	6	1,54±0,13	20,53	0,32	6	2,06±0,06	7,38	0,15	-0,52	**0,010 sem**
Pancreas weight / kg	6	0,16±0,02	30,75	0,05	6	0,18±0,01	9,82	0,02	-0,02	0,078 ns
Muscle tissue depth	6	10,24±0,35	8,32	0,85	6	11,17±0,20	4,48	0,50	-0,93	**0,037 sem**
Fat layer depth	6	2,94±0,18	14,86	0,44	6	3,06±0,12	9,77	0,30	-0,12	0,630 ns

The results of the physical-chemical meat examination are presented in Table 4.

Table 4

Results of the meat physical-chemical examination

Specification	Group 1 (control) (X±s)	Group 2 (experimental) (X±s)	Group 2 of Group 1 (%)
Dry matter %	27,11±0,48	26,82±0,96	98,93
pH (after 0.5 hours)	5,58±0,12	5,76±0,14	103,22
Losses at cooking %	38,22±3,02	41,11±3,93	107,56
Ash %	1,14±0,22	1,08±0,19	94,73
Fat %	4,44±0,31	4,27±0,34	96,17
Protein %	193,64±1,52	20,05±1,43	99,68
E.H.N. mgNH_3 / 100 g	13,60±0,54	14,45±0,97	106,25

In this table, we may observe that dry matter level was lower in the experimental group compared with the control group. Meat pH in the experimental group was bigger immediately after killing with 2.32%, respectively 15 hours after killing with 3.22%; losses at cooking were bigger in the experimental group compared to the control group; ash was lower with 5.2% in the experimental group compared to the control group; easy hydrolysable nitrogen (E.H.N. – mgNH_3 / 100 g) was bigger in the experimental group compared with the control group with 6.25%, indicating a reduced preservation capacity of the meat achieved from the group fed with Biozyme X 100; the protein content of the meat achieved in the experimental group was bigger with 2.8% compared with the control group, and the fat percentage was lower with 3.83%.

Regarding the effect upon animal health along our experiment, we have not noticed any digestive or respiratory disorders in animals.

CONCLUSIONS

The product Biozyme X 1000determined the increase of food digestibility, fact proved by the reduced percentage of dry matter within the ceccal content, and also by the body gain bigger with 6.135.

Liver metabolic activity increased in the animals from the experimental group, leading to hepatic degenerations. The presence of the leukocytary infiltrate within colon may represent the stimulatory effect exerted by the enzymatic product upon the immune system.

The administration of Biozyme X 1000 led to the improvement of carcass meat percentage, to the weight increase of the muscle Longisimus dorsi with 14% and of liver with 33.7%, fact that can indicate an increase of the metabolic activity, possibly induced by the enzymatic supplement.

Meat protein content increased in the animals from the experimental group with 2.08% and the fat percentage within meat decreased with 3.83%.

We also observed, in the experimental group, a decrease of the dry matter percentage with 1.07% and a more significant loss at cooking, of 7.25%, compared to the control group.

We did not observed effects of the enzymatic preparation related to the reduction of digestive disorders (through a better digestion of the non-starch poly-glucids from the wheat's cellular wall) because we did not record any cases of disease in animals.

BIBLIOGRAPHY

1. ETTLE, T., FRANK MARIANE, ROTH, X.F. (2005) – *Zur probiotischen wirkung von fructooligosacchariden bei ferkeln*, BOKU-Symposium Tierernahrung.
2. PATTERSON, A.J. (2005) *Prebiotic feed additives: rationale an duse in pig*, Advances in Pork Production, 16, 149.
3. SHIM, S.B. (2005) – *Effects of probiotics, prebiotics and symbiotics in the diet of young pigs*, Doctoral thesis, Wageningen University and Researche Centre, Wageningen, The Netherlands.