

## CARCASS CHARACTERISTICS AND MEAT QUALITY OF PIGS FED DIETS CONTAINING PROBIOTIC PREPARATION BASED ON LACTOBACILLUS PLANTARUM

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### Abstract

The aim of the study was to evaluate the impression of probiotic food additive on production parameters of the pigs and nutritional composition of the meat. The feed mixture of the experimental group was enriched with a potential probiotic preparation based on *Lactobacillus plantarum* CCM 7102 at a concentration of 3g per day per pig. The results of the carcass parameters showed a positive effect of probiotic addition, the difference was statistically highly significant ( $P \leq 0.01$ ) in the weight of the thigh and statistically significant in the backfat thickness ( $P \leq 0.05$ ). It was found statistically significant differences ( $P \leq 0.05$ ) in the chemical composition of pork between the compared groups, in the parameter total water content, content of intramuscular fat and cholesterol content.

**Key Words:** Carcass, meat, pigs, *Lactobacillus plantarum*

Probiotics are live microbial feed supplements which beneficially affect the host animal by improving its intestinal microbial balance (Fuller, 1989). Use of in-feed antibiotics in pigs was prohibited on 31 December 2005, therefore probiotics are considered to be suitable antibiotic substitutes in pigs' diet (Velechovská, 2008). Positive effects of probiotics on pigs include: resistance to various infectious diseases, improving the growth potential of the animal, increasing daily weight gain, improvement in feed conversion, improving in growth, such as improving the quality of the carcass (Fuller, 1997). Beneficial effect of probiotics was found in piglets on daily gain, food intake, animal health and reduction of fever and mortality (Schneiderová, 2006). The most suitable probiotic bacteria in pigs' nutrition are lactobacilli because they are the main component of natural microflora of the pigs (Václavková, Lustyková, 2011). Probiotics is a generic term that covers a wide variety of different products comprising tablets, powders, fermented milks (bioyogurts) and liquid suspensions (Fuller, Gibson, 1998). Probiotics with scientifically proven efficacy and documented stability can provide reliable solutions to maintain gastrointestinal integrity and thereby improve pig production (Jorgensen and Hansen, 2004). Based on

the findings, the study of Tufarelli et al. (2017) and Liu et al. (2003) provided evidence for the positive influence of probiotics supplementation on growth performance and meat quality as well as faecal microbial shedding in growing-finishing pigs. Piglets are the most suitable category of the pig for the probiotics application, but it must be remembered that the most important source of microorganisms for the piglet is their close contact with the mother (Skřivanová, Marounek and Opletal 2010).

### Material and Methods

The aim of the experiment was to evaluate the effect of probiotics on the performance parameters and meat quality of the pigs. The experimental group consisted of 6 pigs of Large white breed (3 boars, 3 gilts). The control group had the same composition. The nutritional composition of the feed mixture was in both groups identical. The feed mixture in experimental group was enriched with a potentiated probiotic preparation based on *Lactobacillus plantarum* CCM 7102 at a concentration of 3 g per pig per day. The test period was realized from 30 kg to 100 kg of live weight. The carcass parameters were determined in accordance with STN 466164 after the pigs were

slaughtered during the dissection of the carcasses. The samples for the chemical parameters of the meat were taken from the thoracic vertebrae (MLD) and analysis was done by FT-IR method (Nicolet 6700). Comparison of the experimental groups was realized on the individual indicators by a single factor analysis of variance using the SPSS 11 software package.

## Results and Discussion

Nowadays, probiotics have received considerable attention as a suitable replacement for antibiotics to support the growth of the pigs (Chen et al., 2006, Meng et al., 2010, Yan and Kim, 2011). The performance parameters of fattening pigs after the addition of probiotics to the feed mixture were monitored by Prokop et al. (1985), with an average daily gain in the probiotic group at 0,68 kg and a control group at 0,67 kg. The average daily gain per kg per day in the probiotic group was 2,12 kg and in the control group was 2,25 kg. In our experiment, the average daily gain in the probiotic group was 0,82 kg and in the control group was 0,83 kg. We can compare the average feed intake per 1 kg gain, the probiotic group reached 2,77 kg and in the control group was 2,78 kg. For comparison, it can be concluded that our measured parameters were not statistically significant in both parameters ( $P > 0,05$ ) with the values obtained in the mentioned studies. In our experiment were found

the total water content 74,20 % in the control group of and in the experimental group was measured 73,44 %. The difference between the control and the experimental group was statistically significant ( $P > 0,05$ ) in the monitored parameter total water content. According the study of Nguyen (2018), pigs fed the diets with probiotics mixture supplementation improved the nutrient digestibility, faecal bacterial enumeration, and decreased  $\text{NH}_3$  emission. The increasing percentage of intramuscular caused by probiotics was found by comparison between the control and the experimental group, which was statistically significant ( $P > 0,05$ ). Total cholesterol content in the control group was found  $0,20 \text{ g.kg}^{-1}$  and  $0,35 \text{ g.kg}^{-1}$  in the experimental group, with a statistically significant difference between the compared groups ( $P > 0,05$ ). Parameters of the nutritional composition of meat can be compared with the results obtained by Jukna et al. (2005), in the groups enriched with probiotics the total protein content was 19,52 - 20,78% and a content of intramuscular fat was 4,46 - 5,01 %, with an increase in both parameters compared to the control group, which is inconsistent with our results of protein content (- 0,47 % in the experimental group) and in the content of intramuscular fat, we also reached higher values in experimental group after the application of probiotics (+1.26 %).

**Table 1. The effect of probiotics in the diet of pigs on the fattening and slaughter traits**

Trait		CG (n=6)	EG (n=6)	Analysis of vari- ance	Group A A $F_A = 1$	Error e $f_e = 10$
Average daily gain (kg/day)	$\bar{x}$	0,83	0,82	MS	0,000084	0,003
	s	0,06	0,05	F	0,026	
Average daily feed intake/gain (kg/day)	$\bar{x}$	2,78	2,77	MS	0,001	0,100
	s	0,27	0,36	F	0,009	
Lean meat parts ( %)	$\bar{x}$	50,93	52,77	MS	10,129	4,018
	s	2,12	1,88	F	2,521	
Weight of the thigh (%)	$\bar{x}$	19,79	21,57	MS	9,495	0,810
	s	0,70	1,06	F	<b>11,726<sup>++</sup></b>	
Loin eye area (cm <sup>2</sup> )	$\bar{x}$	43,33	43,83	MS	0,750	8,017
	s	1,63	3,66	F	0,094	
Average backfat thickness (cm)	$\bar{x}$	3,43	2,81	MS	1,163	0,240
	s	0,46	0,52	F	<b>4,840<sup>+</sup></b>	

CG – control group EG – experimental group

**Table 2. The effect of probiotics in the diet of the pigs on the nutrient composition of pork**

Trait		CG (n=6)	EG (n=6)	Analysis of vari- ance	Group A A FA = 1	Error e fe = 10
Proteins (%)	$\bar{x}$	23,97	23,50	MS	0,677	0,240
	s	0,27	0,64	F	2,816	
Total water (%)	$\bar{x}$	74,20	73,44	MS	1,725	0,235
	s	0,18	73,44	F	<b>7,330<sup>+</sup></b>	
Intramuscular fat (%)	$\bar{x}$	0,98	2,24	MS	4,750	0,705
	s	0,11	1,18	F	<b>6,734<sup>+</sup></b>	
Cholesterol (g.kg <sup>-1</sup> )	$\bar{x}$	0,20	0,35	MS	0,060	0,007
	s	0,03	0,12	F	<b>8,470<sup>+</sup></b>	

CG – control group EG – experimental group

## Conclusion

The probiotics can be used in gastrointestinal tract problems such as prevention of diarrheal diseases of piglets, weaned pigs, breeding and fattening pigs. Improvement and support of the body's immune response, as well as recolonization and restoration of intestinal microflora after the application of antibiotics and chemotherapists, it is very important solution to use of probiotic cultures in the treatment process. Based on our results, it can be concluded the usefulness of using probiotic cultures to promote health and gastrointestinal tract with a positive impact on the production characteristics of the pigs.

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