

¹ Department of Pig Breeding and Production Technology

University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin

e-mail: marek.babicz@up.lublin.pl

² Department of Nephrology, Medical University of Lublin, Jaczewskiego 8, 20-954 Lublin

MAREK BABICZ¹, KINGA KROPIWIEC-DOMAŃSKA¹,
MARCIN HAŁABIS¹, AGNIESZKA M. GRZEBALSKA²,
GRZEGORZ MAGDOŃ¹, PIOTR WITKOWSKI¹

The use of a herbal complementary mixture for rearing piglets

Wykorzystanie ziołowej mieszanki uzupełniającej w odchowie prosiąt

Summary. The aim of the study was to determine the effects of the use of a complementary herbal mixture in the prevention of weaned piglets. The experiment was conducted on piglets weaned from their mothers on 21st day of age. Piglets, hybrids of the Polish Landrace breed and Pietrain breeds, were divided into the experimental group and the control group, each consisting of 5 litters. Feeding took place in the system “eat at will” with a mixture of dry and granular feed, which had been prepared on the farm on the basis of the farmers’ own raw materials and those from the purchase. Piglets had constant access to fresh water. The experimental group was given an additive, which was a herbal blend mixture in the amount of 1250 g per 1 t full-dose feed mix. The supplementation dose was to reduce the occurrence of diarrhea in weaned piglets or a total elimination of its occurrence. The experiment proceeded since the weaning of piglets and lasted 14 days, during which measurements and observations of piglets’ biological value were performed. The analysis included: the weight of piglets on the day of weaning from the mother, the weight of piglets on day 7 after weaning, the weight of piglets 14 days after weaning, growth in assessed daily intervals, observations of behaviour and possible disease symptoms occurring in groups. The obtained results indicate that the addition of additive herbal mixture had no impact on the occurrence of diarrhea but it positively influenced the healthy piglets through a slight stimulation of growth.

Key words: pigs, piglets, feeding, feed additives, herbs

INTRODUCTION

Animal feeding means providing animals the nutrients for the purposes of fulfilling production and livelihood needs. The end result of feeding slaughter animal is to provide the consumer meat of optimum quality [Gryko *et al.* 2012].

When it comes to feeding pigs, there are some basic food groups, e.g.: pigs, piglets, fattening pigs, sows, etc. Each of them has different needs regarding the components provided them with feed [Mihułka *et al.* 2003]. In this aspect, the piglets are very demanding group, because the raw materials used in the feed must be of superior quality,

otherwise it can cause digestive disorders, diarrhea and other diseases [Janik *et al.* 2006]. In order to increase the biological value of piglets, manufacturers often use various feed additives, which may improve health of subjects [Winnicka *et al.* 2012].

Nowadays, one of the more popular feed additives with wide range of applications in modern feeding are herbs [Radkowska 2013]. Due to their specific composition, herbs are assigned to have many pro-health effects, which are often used in breeding and production of pigs [Hanczakowska 2007].

The aim of the study was to determine the usefulness of a complementary herbal blend in reducing the occurrence of diarrhea of weaned piglets and impact that herbal blend has on the development of selected traits.

MATERIALS AND METHODS

The study was performed on a family farm, that specialize in the production of hybrid porkers in closed cycle. All animals were maintained in accordance with the welfare standards [Dz.U. 2003].

The experiment was conducted on a group of 130 piglets (Polish Landrace breed and Pietrain breed hybrids), from 10 litters of second and third reproductive cycle. The number of piglets per litter on the day of weaning (21 days old) ranged from 10 to 14 animals.

The piglets after weaning from mothers remained in the farrowing houses (within the litters) to minimize the stress which occurs during and after weaning.

Weaned piglets were divided into two groups, i.e., C – control (5 litters, a total of 66 weaned pigs) and E – experimental (5 litters, a total of 64 weaned piglets).

Two days before the weaning the control group was receiving a standard blend produced on the farm, based on components from own production and purchase (Table 1), while the experimental group was receiving a blend enriched with the addition of the experimental herbal mixture in the amount of 1250 grams per tonne. The additive consisted of the following ingredients: white willow (extract) 30%, pomegranate (extract) 20%, dandelion (root extract) 20%, chamomile (flower extract) 20%, liquorice (extract) 10%.

According to the manufacturer, this additive is meant to replenish electrolytes, enhance the development of microflora and the absorb toxins in order to reduce the occurrence of diarrhea.

Table 1. Formulation of the complete feed for the piglets in the control group
Tabela 1. Skład recepturowy mieszanki pełnoporcjowej dla prosiąt z grupy kontrolnej

Raw material/ Surowiec	Share/ Udział (%)	Quantity/ Ilość (kg)
Barley/ Jęczmień	35.0	350
Wheat/ Pszenica	20.0	200
Corn/ Kukurydza	20.0	200
Post-extraction soya meal > 46% Śruta poekstrakcyjna sojowa > 46% b.o.	8.0	80
Premix 4%	4.0	40
Fishmeal 70%/ Mączka rybna	4.0	40
Milk replacers/ Preparat mlekozastępczy	7.5	75
Soyabean oil / Olej sojowy	1.0	10
Acidifier/ Zakwaszacz	0.5	5
Sum/ Suma	100	1000

The additive has been incorporated into the mix with a masterbatch consisting of the premix and mineral supplements to increase the efficiency of mixing such a small amount of feed in relation to the other components. The supplement that was applied did not affect the analytical composition of the mix for piglets (Table 2).

Table 2. The analytical composition of the complete feed for piglets
Tabela. 2. Skład analityczny mieszanki paszowej pełnoporcjowej dla prosiąt

Composition Skład	Content Zawartość (g)	Demand Zapotrzebowanie (g)	Coverage Pokrycie (%)
Lysine/ Lizyna	13.10	13.50	97
Methionine + Cysteine Metionina + Cysteina	8.00	8.10	98
Crude protein/ Białko surowe	172.00	180.00	95
Calcium/ Wapń	8.00	7.50	105
Phosphorus/ Fosfor	6.21	6.00	103
Fibre/ Włókno	29.00	30.00	99
Energy/ Energia	13.85 MJ	14.00 MJ	99

The experiment lasted 14 days, during which the average weight of the piglets for each group was being determined. The weighting was taking place on the day of weaning from the mother and subsequently in 7 and 14 days after weaning, and determined the average daily gains. Additionally, through direct observation and using ethogram the condition of piglets and possible disease symptoms were described. The results were statistically analyzed using Statistica vs. 5.0 calculating the arithmetic mean, standard deviation, and determining the significance of differences between groups using one-way analysis of variance (Duncan test).

RESULTS AND DISCUSSION

The impact of the use of plant origin feed additives on the pigs usability is determined primarily by the composition and amount of additive. Windisch *et al.* [2008] in their studies showed that the phytogetic feed additives, among other things, cause the improvement in the taste and smell of the feed. That is why they also increase the need of consumption. In addition, biologically active ingredients contained in the mixes increase the activity of the digestive enzymes and absorption of nutrients from the feed, which leads to higher daily growth [Cho *et al.* 2006, Lien *et al.* 2007, Li *et al.* 2012]. At the same time, there are also studies showing that the addition of herbs, among others, essential oil of thyme oregano, fennel or caraway reduces feed intake of the piglets weaned and thus reduces the daily gains and body weight, which is disadvantageous for economic reasons [Schone *et al.* 2006, Jugl-Chizzola *et al.* 2006].

Table 3 presents data on the weight of piglets in the analyzed periods of rearing. On the day of weaning weight of the piglets in the control group was 5.5 kg, and 6.21 kg in the experimental group (Table 3) which is comparable to the data presented in the paper of Škorjanc *et al.* (2007). Although the piglets from the experimental group weighed on average 0.8 kg. more than the piglets from the control group (difference statistically highly significant $P \leq 0.01$) in 7 days after weaning the difference was reduced, which was caused by their smaller daily growth. On day 7, after the weaning, the average daily growth in the experimental group was 36 g ($P \leq 0.01$), whereas the control group more than twice – 87g. In relation to the day of weaning weight of the piglets of the control group at day 7 has increased by 11.45%, while in the experimental group only by 3.54%. The probable cause was the occurrence of diarrhea (Fig. 1).

Table 3. The average weight of the piglets on the day of weaning from the sow, 7th and 14th days after weaning (kg) and daily growth during the period of the blend application (g/day)

Tabela 3. Średnia masa prosiąt w dniu odsadzenia od matki oraz w 7. i 14. dniu po odsadzeniu (kg) oraz przyrosty dobowe w okresie podawania mieszanki (g/dzień)

Specification Wyszczególnienie	Group Grupa	Mass/ Masa (kg)		Daily growth (g/day) Przyrosty dobowe (g/dzień)	
		\bar{x}	SD	\bar{x}	SD
On the day of weaning W dniu odsadzenia	C	5.50 ^A	0.41	–	–
	E	6.21 ^B	0.39	–	–
7 days after weaning W 7. dniu po odsadzeniu	C	6.13 ^A	0.52	87 ^A	7.90
	E	6.43 ^B	0.48	36 ^B	4.00
14 days after weaning W 14. dniu po odsadzeniu	C	7.33 ^A	0.53	129 ^a	9.54
	E	7.83 ^B	0.37	117 ^b	8.87

C – control group/ grupa kontrolna; E – experimental group/ grupa doświadczalna.

The values of different letters are statistically different at the $p \leq 0.05$ (a, b ...); $P \leq 0.01$ (A, B ...)

Wartości oznaczone różnymi literami różnią się statystycznie dla $p \leq 0,05$ (a, b...); $P \leq 0,01$ (A, B...)

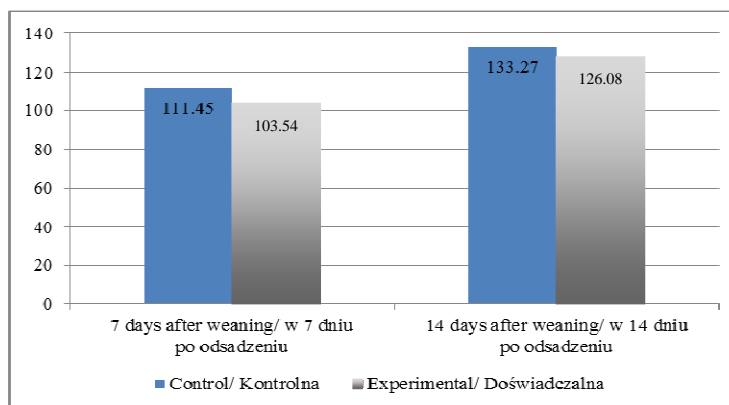


Fig. 1. The mass ratio at 7th and 14th day after weaning in regard to the weight at the day of disconnection (%)

Rys. 1. Stosunek masy w 7. i 14. dniu po odsadzeniu względem masy w dniu odłączenia (%)

The results show how big influence on the growth and development of piglets has a factor of the disease, which is diarrhea. According to Pejsak and Truszczyński [2005] a consequences of this disease in piglets is worse feed utilization and reduced daily gains, which leads to the longer period of fattening. In addition, diarrhea, through veterinary treatment, increases the cost of maintaining the animals. When performing a second measurement of weight, i.e. 14 days after weaning, piglets showed no disease symptoms. In relation to the 7th day after weaning piglets in the control group and the experimental weighed respectively 19.58% and 21.77% more (Fig. 2). It was also observed that smaller differences in daily gains in relation to the day of weaning (Table 3), resulted in a smaller variation of average body weights of piglets in both groups.

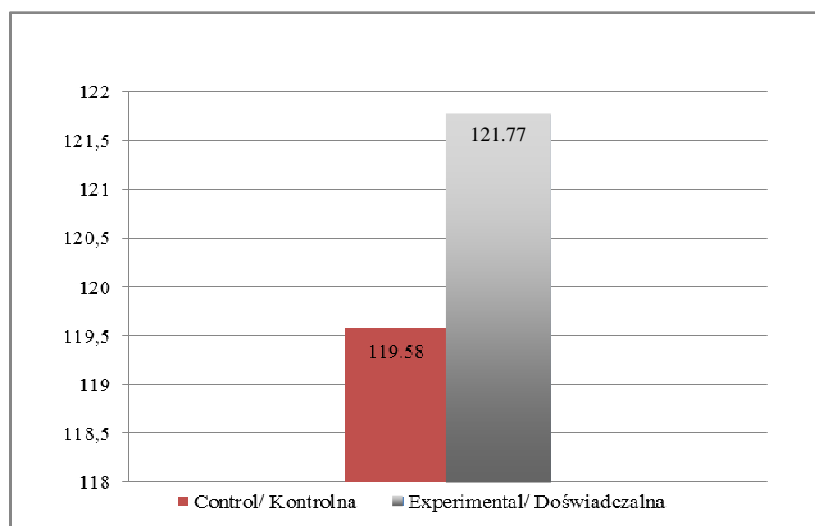


Fig. 2. The mass ratio at 14th day after weaning in regard to the weight at the 7th day after weaning (%)
Rys. 2. Stosunek masy w 14. dniu po odsadzeniu względem masy w 7. dniu po odsadzeniu (%)

Using the direct observation the behaviour of piglets was also monitored. On the first day after weaning, piglets showed greater mobility, which was associated with the act of looking for the mother. On the third day after weaning in both groups the first signs of diarrhea started to occur. The result of the disease, which took 45% of the pigs of the control group and 60% of the experimental group was lethargic behaviour of piglets. During this period, piglets spent most of the time on lying, which was caused by the weakening body. Piglets, in which no disease symptoms were observed acted vigorously throughout the whole experiment. Moreover, it was observed that piglets had the desire to penetrate the immediate surroundings as they were playing with the litter. They were also more eager to eat feed than pigs with the disease symptoms. The condition of the piglets after the occurrence of diarrhea decreased significantly in both groups, and herbal supplement did not affect the experimental group. In the control group the improvement of health and disappearance of symptoms in affected individuals were observed only after prophylactic vaccination of piglets. During the observation in the experimental group, while no possibility of improving health by only giving the additive, the vaccina-

tion was also performed. In both groups the treatment has been performed on the 6th day of weaning, and it was conducted in two stages. The first vaccination of all litters with symptoms of diarrhea took place in the morning on the sixth day after weaning. The second safety injection was carried out on 8th day. At this time, all piglets showed a good overall physical condition without symptoms of diarrhea.

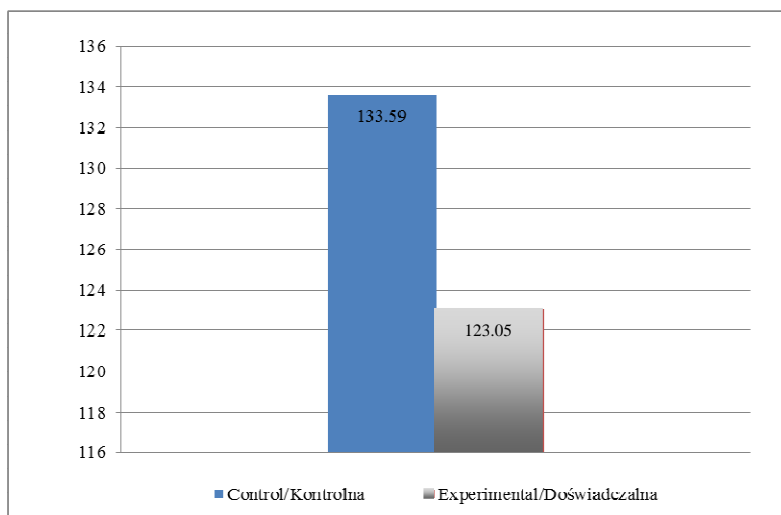


Fig. 3. The weight ratio of the piglets that have not experienced diarrhea regarding the weight of piglets which have experienced diarrhea (%)

Rys. 3. Stosunek masy prosiąt, u których nie wystąpiła biegunka, względem masy prosiąt, u których wystąpiła (%)

Table 4. An average weight of piglets at 14th day after weaning, considering the occurrence of diarrhea

Tabela 4. Średnie masy prosiąt w 14. dniu po odsadzeniu z uwzględnieniem wystąpienia biegunki

Specification Wyszczególnienie	Group Grupa	\bar{x}	SD
The average weight of the piglets in which diarrhea occurred (kg) Średnia masa prosiąt, u których wystąpiła biegunka (kg)	C	6.40 ^A	0.52
	E	7.20 ^B	0.56
The average weight of the piglets in which diarrhea did not occur (kg) Średnia masa prosiąt, u których nie wystąpiła biegunka (kg)	C	8.55 ^a	0.64
	E	8.86 ^b	0.57

C – control group/ grupa kontrolna; E – experimental group/ grupa doświadczalna

The values of different letters differ statistically at $p \leq 0.05$ (a, b...) and $P \leq 0.01$ (A, B...)

Wartości oznaczone różnymi literami różnią się statystycznie dla $p \leq 0.05$ (a, b...), dla $P \leq 0.01$ (A, B...)

Table 4 shows the weight of piglets which were divided into those which passed the symptoms associated with the occurrence of diarrhea and those that remained healthy throughout the rearing period. The highest average weight on the day of the last measurement (8.86 kg), that is 14 days after weaning obtained piglets from the experimental group showing no signs of diarrhea. This value was higher by 310 g ($p \leq 0.05$) compared to the control group. Piglets that were receiving herb supplemented feed also gained an advantage in body weight in the case of piglets which had diarrhea. Final body weight was 7.2 kg, i.e. up to 1.65 kg less compared to healthy pigs, as well as 0.6 kg more than the piglets in the control group showing symptoms of diarrhea. The results were within the limits of the weight of 5 weeks piglets of varying birth weight, presented in the paper Milewska *et al.* [2016]. With respect to the groups of piglets with diarrhea, piglets in the control group were characterized by the higher weight ratio of 10% (133%) than piglets from the experimental group (123.05%).

CONCLUSIONS

On the basis of observations made on the farm for weaned piglets, it has been found that the addition of complementary herbal mixture did not wipe out diarrhea. Both the control group (approx. 45%) as well as the group treated with the herbal supplement (approx. 60%) animals showed symptoms of disease. In addition, piglets from the experimental group had lower daily gain factor in the course of the experiment than the control group. Therefore, despite the initial weight advantage they did not receive a significantly higher final weight.

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Streszczenie. Celem pracy było określenie wpływu stosowania ziołowej mieszanki uzupełniającej w profilaktyce prosiąt odsadzonych. Doświadczenie zostało przeprowadzone na prosiątach odsadzonych od matek w 21 dniu życia. Prosięta, mieszańce towarowe ras pbz i pietrain, zostały podzielone na dwie grupy: doświadczalną oraz kontrolną, każda złożona z 5 miotów. Żywienie odbywało się w systemie „do woli”, mieszanką suchą, sypką, przygotowywaną w gospodarstwie na bazie surowców własnych oraz kupionych. Prosięta posiadały stały dostęp do świeżej wody. Gracie doświadczalnej podano dodatek mieszanki ziołowej w ilości 1250 g na 1 t mieszanki paszowej pełnodawkowej. Suplementacja dawki miała na celu ograniczenie występowania biegunek u prosiąt odsadzonych lub całkowitą eliminację jej występowania. Doświadczenie przebiegało od odsadzenia prosiąt i trwało 14 dni, w czasie których wykonane zostały pomiary masy ciała oraz obserwacje wartości biologicznej prosiąt. W analizie uwzględniono: masę prosiąt w dniu odsadzenia od matki, masę prosiąt w 7. dniu po odsadzeniu, masę prosiąt w 14. dniu po odsadzeniu, przyrosty dobowe w ocenianych przedziałach czasu, obserwacje behawioru oraz ewentualnie objawów chorobowych występujących w obu grupach.

Uzyskane wyniki badań wskazują, że dodatek ziołowej mieszanki uzupełniającej nie wpłynął na ograniczanie występowania biegunek, a tym samym na poprawę wartości biologicznej miotu.

Słowa kluczowe: świnię, prosięta, żywienie, dodatki paszowe, zioła