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Original article

The Influence of Herbal Supplement on the Productivity and Health Condition of Fattening Pigs[1]

Gergana Yordanova [a, *], Radka Nedeva [a], Nadezhda Palova [b] & Danail Kanev [a]

[a] Institute of Agricultural, Shumen, Bulgaria.
[b] Scientific Center of Agriculture, Sredets, Bulgaria.

Abstract

A scientific and economic experiment with 26 swine of the breed combination ♀Dunabe White Swine x (English Landrace x Pietrain) x ♂Danish Landrace was carried out in Agricultural Institute – Shumen. The animals were divided into two groups of 13, raised in separate boxes. The experiment was divided into two sub-periods, starting at an average live weight of 30.63 kg and ending at 110 kg live weight. During the first sub-period (30 to 60 kg live weight), the swine from first group were given a combined feed containing 16.4% crude protein, 0.80% lysine, 0.87% calcium and 0.66% phosphorus, and during the second period (from 60 to 110 kg live weight) – 15.5% crude protein, 0.85% lysine, 0.64% calcium and 0.45% phosphorus. Animals from the second group were given the same combined feed, accordingly for the first and second sub-periods, with the addition of herbal supplement (30% nettle leaves, 5% dandelion, 5% hawthorn, 10% goosegrass, and 50% rosehip flour) at 10g per day. The usage of herbal supplement in the compound feed for fattening pigs from the Dunabe White breed, from 30 to 110 kg live weight, does not significantly affect the growth rate and feed conversion ratio per kg gain. The animals from the experimental (II) group have a higher average daily increase during the period from 60 to 110 kg live weight with 4.34% in comparison to those from group I, but all differences are statistically insignificant. There is a tendency for slightly better fat characteristics in animals receiving the herbal supplement. The usage of the tested herbal supplement needs additional studies to detect the effects on fattening pigs.

Keywords: Fattening pigs, Compound feed, Health condition, Herbs.

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* **Corresponding author:**

Gergana Yordanova, Institute of Agricultural, Shumen, Bulgaria.
Email: gergana22241@abv.bg

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INTRODUCTION

In recent years, organic production systematically and convincingly has concurred its territory globally. That excludes the use of all kinds of artificial supplements, enhancers and genetically modified organisms.

Public concerns regarding the use of antibiotics in livestock breeding have increased, due to the emergence of resistance of some bacteria, which can pose as a threat to human health. This in turn requires considerable efforts for identifying alternatives of antibiotics, such as growth stimulants in the animal industry (Park et al., 2014).

Plant extracts are used in livestock breeding, because of the antimicrobial (Namkung et al., 2004; Brambilla and De Fillippis, 2005; Costa et al., 2007), the anti-inflammatory and antioxidant (Botsoglon et al., 2002; Miura et al., 2002) and the anti-parasitic activity (Magi et al., 2006). It has been established that the content of some natural ingredients in herbs is due to their immunological and pharmacological action. (Laine et al., 2008)

When conducting the research, Namkung et al. (2004) has established that nutritional essential oils (thymol and cinnamaldehyde) boost performance and reduce diarrhea, by improving the immune status, intestinal ecology and digestion of nutrients.

Inclusion of VemoHerb (herb combination) in a dose of 150g/kg decreases the cost of fodder per unit of growth in adolescent pigs with 20%, compared to animals that did not receive the growth stimulant ($P<0.01$), and compared to the positive control, the difference varies between 8 and 14% ($P<0.005$). With fattening pigs, VemoHerb leads to a significantly better utilization of fodder, amounting to 18% ($P<0.05$) Zapryanova (2011).

The inclusion of the biologically active supplement Spirulina platensis in rations increases the percentage of lean meat by 12.60% ($P\leq0.05$) and decreases the thickness of the dorsal lard with 14.29% - 37.13% (Yordanova et al., 2012).

The addition of fermented herbs enhances growth, nutrient absorption, serum antioxidant status and the positively modified fatty acid profiles in LM (Xin Jian Lei et al., 2018).

The studies made by a number of authors in Bulgaria (Zapryanova, 2011; Ivanova-Peneva, 2010; Ivanova-Peneva et al., 2006; Kunev, 2002; Ivanova, 2012) are contradictory.

The beneficial influence of herbs and plant extracts on the gastrointestinal micro flora established by a number of authors (Oetting et al., 2006; Moon et al., 2006; Santoro et al., 2007) is mainly connected to the inhibitory effect on intestinal pathogenic microorganisms.

A selection of effective herbs, their standardization and studying their potential synergistic effect when combined is necessary.

The aim of this experiment was to establish the effect of herb supplements (30% nettle leaf, 5% dandelion leaf, 5% hawthorn, 10% goosegrass, 50% flour from rosehip), on the productivity and health condition of fattening pigs.

Material and Methods

A scientific and economic experiment with 26 swine of the breed combination ♀Dunabe White Swine x (English Landrace x Pietrain) x ♂Danish Landrace was carried out in Agricultural Institute – Shumen. The animals were divided into two groups of 13, raised in separate boxes. The experiment was divided into two sub-periods, starting at an average live weight of 30.63 kg and ending at 110 kg live weight. During the first sub-period (30 to 60 kg live weight), the swine from first group were given a compound feed containing 16.4% crude protein, 0.80% lysine, 0.87% calcium and 0.66% phosphorus, and during the second period (from 60 to 110 kg live weight) – 15.5% crude protein, 0.85% lysine, 0.64% calcium and 0.45% phosphorus. Animals from the second group were given the same compound feed, accordingly for the first and second sub-periods, with the addition of herbal supplement amounting to 10g per head per day (Table 1).

Table 1. Experiment Scheme

I group (13 pigs)		**II group (13 pigs)**	
I sub-period	II sub-period	I sub-period	II sub-period
Crude protein – 16.4	Crude protein – 15.5	Crude protein – 16.4	Crude protein – 15.5
		10g per head per day herbal supplement	

The herbal supplement was provided by the company “Viola organic” Ltd., with the following composition: 30% nettle leaf, 5% dandelion leaf, 5% hawthorn, 10% goosegrass, 50% flour from rosehip. The chemical composition of separate components is presented in Table 2.

Table 2. Chemical composition of the herbal supplement

Indicators / **Components**	**Herbs (Nettle leaf dandelion leaf, hawthorn, goose grass, rosehip)**
Water, %	8.16
Dry matter, %	91.84
Organic substance,%	83.13
Crude protein, %	11.27
Crude fats, %	-
Crude fibers, %	32.36
NFE	39.50
Mineral substance, %	8.71
Ca, %	3.22
P, %	0.223

During the experiment, the following indicators were controlled:

Feed intake – daily; live weight– at the beginning and at the end of the experiment, individually; fodder cost per kg growth – by sub-periods and for the entire experimental period; health condition – daily.

When the pigs gained 100 kg of body weight, the content of lean meat in the carcass was in vivo determined by apparatus PIGLOG 105 using of following regression model:

$LM = 63.8662-0.4465x_1 - 0.5096x_2 + 0.1281x_3$ where: LM is the percentage of lean meat in the carcass; x_1 - the thickness of the lard, measured between 3-4 lumbar vertebrae at 7 cm lateral (mm); x_2 - the thickness of the fat measured between the 3-4th last ribs at 7 cm laterally (mm). x3 - the thickness of MLD between 3-4th last ribs at 7 cm lateral (mm).

When finalizing the experiment, blood was drawn from seven pigs from each group for analyzing the complete blood count (CBC).

The results were processed using the variation statistics method.

Results and Discussion

The analysis of the results show that during the first and second sub-period, as well as the entire experimental period, major differences about the received fodder, exchange energy, protein and lysine between the two test groups are not observed. During the second sub-period, there was a minimal, but unproven variation in the protein-admitted indicator with 6.43% more than the swine from second group verses the animals from control group (I).

Regarding the average daily gain (Table 3), there were no differences between the groups during the period of 30 to 60 kg of live weight. During the second period (from 60 to 110 kg live weight) the

pigs in the experimental group II had a higher growth rate of 4.34%, compared to those of the first group. The difference is statistically unproven and the slightly higher growth rate can only be considered as a tendency.

This minimal effect can be connected with the presence of bioactive substances in the supplement and their influence on the metabolism of the pigs. However, the difference was minimal and summarized over the entire test period (from 30 to 110 kg), adding the herbal mixture in the compound feed to the test group did not have a significant effect on the growth intensity.

Research from a number of authors (Yan et al., 2011) show a positive effect from the addition of various herbs and herbal substances on the intensity of growth and health condition of pigs.

Günter and Bossow (1998) reported better digestion and regulation of gastrointestinal metabolism through the high anti-microbial activity of Escherichia coli, Salmonella spp. and other bacteria including the herbal supplement Origanum vulgare in pigs.

Using the herbs *Origanum vulgare* and *Potentilla Erecta Raus* in compound fodder for suckling pigs improves the growth rate (with 11% - $P<0.01$) for the suckling period (1-34 days) and live weight at weaning (7.500kg verses 6.883kg and 6.944kg) (Ivanova and others, 2010).

Swine morbidity in the two periods (from 30 to 60 kg and 60kg to 110 kg) is as follows: Group I – 1.056% and 0.65% and Group II – 1.51% and 0.00%. Probably, the lack of disease in the test group also has a positive effect on the growth rate.

The feed conversion ratio, energy and nutrients per kg gain are practically the same in both groups during the different sub-periods (Table 3). The differences are minimal and insignificant.

The lack of a credible influence on the growth in our research may be linked, on the one hand, to the dosage of the supplement and the number of treatments.

With pigs from test group (II), the values of the indicator of the back fat and the groundsel fat (x_1 and x_2) are lower, accordingly with 0.21% and 8.94% compared to those of control group (I) (Table 4). Higher values of MLD (3.51%) and the percentage of lean meat (0.94%) are observed in swine from the (II) test group, compared to animals from the control group.

Including the biologically active supplement Spirulina platensis in rations increases the percentage of lean meat with 12.60% ($P\leq0.05$) and decreases the thickness of the back fat with 14.29% - 37.13% (Yordanova et al., 2012).

The addition of fermented herbs enhances growth, nutrient absorption, serum antioxidant status and the positively modified fatty acid profiles in LM (Xin Jian Lei et al., 2018).

Although insignificant, the differences in all fat characterizing indicators signs indicate, that the addition of herb supplements in rations has a positive influence on the lipid and protein exchange in the organism, increases the percentage of deferred meat and decreases that of the fat.

The analysis of the blood count (Table 5) show minimal and unreliable variations, regarding the RDW indicators (deviation of erythrocytes) and PCT (thrombocrit), respectively with 14.29% and 21.3% between the two tested groups. Due to large individual variations of all other indicators, reliable differences were not established between the groups.

Yan et al. (2011) show higher values of lymphocytes, RBC and WBC with fattening pigs, fed with added herbal mixture. Perhaps, however, the higher growth rate of these animals has had an effect on these blood levels.

Table 3. Productivity indicators of fattening pigs

Groups / **Indicators**	**I group**	**II group**	**Sig.**
	$\acute{x}$	$\acute{x}$	
	30kg–60kg live weight		
Admitted fodder on average per day. kg	2.030	2.035	-
Average daily gain. g	0.597	0.598	P = 0.493
Fodder cost per kg gain	3.501	3.453	P = 0.416
	60kg–110kg live weight		
Admitted fodder on average per day. kg	3.187	3.216	-
Average daily gain. g	0.951	0.993	P = 0.174
Fodder cost per kg gain	3.382	3.330	P = 0.368
	30kg–110kg live weight		
Admitted fodder on average per day. kg	2.584	2.601	-
Average daily gain. g	0.767	0.788	P = 0.255
Fodder cost per kg gain	3.403	3.326	P = 0.261

Table 4. Thickness of fat and percentage of lean meat

Groups / **Indicators**	**I group**	**II group**	**Sig.**
	$\acute{x}$	$\acute{x}$	
Fat thickness $x_{1, \%}$	11.692	11.667	P = 0.449
Fat thickness $x_{2, \%}$	10.308	9.462	P = 0.164
MLD, %	41.615	43.077	P = 0.214
Lean meat, %	58.723	59.277	P = 0.203
Live weight, kg	105.8	107.5	-

Table 5. Indicators of blood count of fattening pigs

Groups / Indicators	I group	II group	Sig.
	$\acute{x}$	$\acute{x}$	
WBC, G/L(leukocytes)	23.11	22.24	P = 0.303
LYM (lymphocytes), G/L	12.1	12.13	P = 0.489
MID (monocytes), G/L	1.5	1.72	P = 0.264
GRAN (granulocytes), G/L	9.76	8.28	P = 0.236
RBC (erythrocytes), T/L	6.81	6.69	P = 0.306
HGB (hemoglobin),g/L	124.57	125.57	P = 0.407
HCT (hematocrit),L/L	0.42	0.42	P = 0.5
MCV(average exchange of erythrocytes),fl	61.74	61.43	P = 0.437
MCH (average hemoglobin content in erythrocytes),pg	18.3	18.77	P = 0.167
MCHC (average concentration of hemoglobin in erythrocytes) g/L	276.71	298.71	P = 0.278
RDW (deviation of erythrocytes),CV	0.16	0.14	P = 0.083
PLT (thrombocytes),G/L	399.71	449.71	P = 0.179
MPV (average exchange of thrombocytes),pl	9.74	10.38	P = 0.102
PCT (thrombocrit),L/L	0.24	0.30	P = 0.088
IgG	10.43	10.84	P = 0.302

Conclusions

1. Using the herbal supplement (30% nettle leaf, 5% dandelion leaf, 5% hawthorn, 10% goosegrass, 50% flour from rosehip), in the compound fodder for pig fattening from the Dunabe White breed from 30kg to 110kg live weight does not have any significant influence on the growth intensity and the feed consumption per kilogram of growth.
2. There is a tendency for a higher average daily gain in the period between 60kg and 110kg live weight in swine from the (II) test group with 4.34%, compared to those from group (I).
3. There is a tendency for thinner lard in animals, which received the herbal supplement at L1 with 8.2%, compared to those from the control group.

REFERENCES

Botsoglon, N.A., P.Florou-Paner, E.Chiristaki, Fletouris and A.B.Spais, (2002). Effect of dietary oregano essential oils on performance of chickens and on iron-induced lipid oxidation of breast, thigh and abdowinal fat tissue, Br. Poult. Sci., 43, 223-230.

Brambilla, G. and S.De Filippis (2005). Trends in animal feed composition and possible consequences on residue tests. Analytica Chimica Acta, 529, 7-13

Costa, L.B., M.L.Panhoza Tse and V.S.Miyada (2007). Herbal extracts as alternatives to antimicrobial growth for weanling pigs. Braz. J. Anim. Sci., 36, 589-595.

Gunter, K. D. And H. Bossow (1998). The effect of etheric oil from Origanum vulgaris (Ropadiar®) in the feed ration of weaned pigs on their daily feed intake, daily gains and food utilization (abstract). Proceedings of 15-th International Pig Veterinary Society Congress, Birmingham:223.

Ivanova-Peneva, S. (2012). Application of herbs to prevent and treat post-weaning diarrhea, stimulating growth and improving comfort in growing pigs. Animal Sci., 6, 34-42.

Ivanova-Peneva, S., E. Gineva and R. Nedeva (2010). Effect of using the Origanum vulgare and Potentilla Erecta Raus on the productivity and health condition of piglets. Animal Sci., 4, 32-42

Ivanova-Peneva, S., E.Gineva and R.Nedeva. Effect of Organum vulgare and Potentilla Erecta Raus on the productiveness and health condition of suckling piglets. J. Animal Sci., 4, 32-42.

Ivanova-Peneva, S., R.Nedeva and M.Kirov **(**2006). Preliminary studies on the effect of herbs on the growth and health of suckling piglets. Proceeding of Joint Organic congress "Organic Farming and European Rural Development, May 30-31, Odense, Denmark, 558-559.

Zapryanova-Boeva, I. A. (2011). Effect of plant extracts on pig performance indicators. PhD Thesis, Plovdiv, 2011, p. 97.

J. H. Ch., S. Jan and I. H. Kim (2012). Effects of antibiotic herbs on growth, digestive ability of food and quality of pig meat, Asian-Aust. J. Anim. Sci., 25 (11), 1595-1604.

Park, J.C., S.H. Lee, J.K. Hong, J.H. Cho, I.H. Kim and S.K. Park (2014). Effect of dietary supplementation of procyanidin on growth and immune response in pigs. Asian-Aust. J. Anim. Sci., 27 (1): 131-139.

Kanev, D., P. Petrov and R. Nedeva **(**2002). Effect of using the Ropadiar preparation in mixtures for suckling pigs. Journal of Mountain Agriculture on the Balkans, 5 (3), 226-234.

Laine, T.M., T.Lyytikainen, M.Yliaho and M.Anttila **(**2008). Risk factors for post-weaning diarrhoea on piglet producing farms in Finland. Acta Vet. Scand., 50, 21.

Magi, E., T.Jarvis and I.Miller **(**2006). Effects of different plant products against pig mange mites. Acta Veterinaria Brno, 75, 283-287.

Miura, K., H. Kikuzaki and N. Nakatani (2002). Antioxidant activity of chemical components from sage (Salvia officinalis L.) and oregano (Thumus vulgaris L.) measured by the oil stability index method. J. Agri. Food Chem., 50: 1845-1851.

Moon, T., J.Wilkinson and H.M.A.Cavanagh **(**2006). Antiparasitic activity of two Lavandula essential oils against Giardia duodenalis, Trichomonas vaginalis and Hexamita inflate. Parasitol. Res., 99, 6, 722-728.

Namkung, H., M. Li, J. Gong, H. Yu, M. Cottrill and C. F. M. Lange (2004). Impact of feeding blends of organic acids and herbal extracts on growth performance, gut microbiota and digestive function in newly weaned pigs, Can. J. Anim. Sci., 84, 697–704.

Oetting, L.L., C.E.Utiyama, P.A.Giani, U. D.Ruiz and V.S. Miyada (2006). Effects of herbal extracts and antimicrobials on apparent digestibility, performance, organs mor-phometry and intestinal histology of weanling pigs. Braz. J. Anim. Sci., 35, 1389-1397.

Santoro, G., M.Cardoso, L.L.Guimaraes, A.Sigado, F.S.R. Menna-Barreto and M.J.Soares (2007). Effect of Oregano and thyme essential oils on trypanosome cruise growth and ultrastructure. Parasitol. Res., 100 (4), 783-790.

Xin Jian Lei,Hyeok Min Yun and In Ho Kim (2018). Effects of dietary supplementation of natural and fermented herbs on growth performance, nutrient digestibility, blood parameters, meat quality and fatty acid composition in growing-finishing pigs. Pages 1-10, Received 24 Jul 2017, Accepted 16 Jan 2018, Published online: 09 Feb 2018.

Yan, L. And I.H. Kim (2011). Effect of dietary grape pomace fermented by saccharomyces boulardii on the growth performance, nutrient digestibility and meat quality in finishing pigs. Asian-Aust. J. Anim. Sci., 24 (12), 1763-1770.

Yordanova, G., R. Nedeva, J. Nakev, E. Kistanova, A. Shimkus and A. Shimkiene (2012). Effect of the supplement Spirulina platensis on the productivity, some blood indicators and percentage of lean meat in fattening pigs. Animal Sci., 6, 26-33.