

EFFECT OF USING VANILLA SWEET AROMA IN DIETS FOR WEANING PIGS

Vladimir Živković, Marija Gogić, Nenad Stojiljković, Tamara Stamenić, Čedomir Radović, Nikola Delić, Aleksandar Stanojković

¹Institute for Animal Husbandry, Belgrade – Zemun, 11080 Zemun, Serbia
Corresponding author: Vladimir Živković, vladimirzivkovic_87@yahoo.com
Original scientific paper

Abstract: The trial was conducted on 108 piglets of crossbreeds Landrace x Large White. Aim of this study was to determine influence of this aroma on production parameters of growing pigs. Whole trial was in total 57 days, and it was split in three trial periods. Piglets were weaned on day 27, when the trial started. First trial period was 18 days (27-44 day), second was 28 days (45-72 day) and third was 11 days (73-83 day). The control groups received standard farm mixtures, and the trial groups had added aroma Vanilla Sweet in different concentrations (0.02; 0.04%, respectively). During the first period, there was statistical difference ($p < 0.05$) in all three parameters between the groups. Feed intake (FI), average daily gain (ADG) and feed conversion (FCR) differed between C and T1 group. T1 had best ADG of 261.53 g/d and FCR of 1.89 g/g. In the second period statistical significance was noted in FI and ADG, between T1 and other two groups. T1 had lower FI and ADG, but better FCR compared to control group. In the final period second experimental group had the best results in both FI (1309.29 g/d) and ADG (696.43 g/d). And eventually for whole trial T2 had better results in all three production parameters compared to other two trial groups. In general, obtained results showed that use of Vanilla sweet aroma can be recommended in the nutrition of weaned pigs. Further investigation should be conducted to determine the effect of this flavour on fatteners.

Key words: piglets, nutrition, flavour, rearing

Introduction

Pork meat consumption is one of the largest in the world in recent years. In Serbia in 2021, the swine population was approximately 2.9 million heads and the pork meat production is 428 thousand tons (FAO, 2021). The intensive genetic selection of sows has resulted in a greater number of live born piglets per litter but with bigger problems at birth weight and increased animals mortality and productive efficiency (Quisirumbay Gaibor and Vilchez Perales, 2019).

Taste of foods is the problem that comes even from the beginning of domestication of animals. Livestock food has its nutritive value and characteristic smell and it is determined by its quality, composition and type of feeds used. Good feed intake is quite essential for the proper and healthy development of animals. Animals always first will take tasteful food, and only in case of starvation they would consume food they do not like. Pigs have really well developed sense of taste and smell, so the major problems with feed intake almost always occur in younger categories, or with the changes of feed mixtures.

Weaning is a great challenge of the modern swine industry and adjusting correct mixtures to satisfy pig basic functions, growth performance and welfare, is of crucial importance (*Val-Laillet et al., 2016*). Weaning is also the stage of greatest stress for piglets with a consequent decrease in dietary intake and weight loss, due to exposure to factors such as separation from the mother, switch from liquid to solid diet, new social order within the group, change of facilities, health challenge, food competition and other factors (*Barba-Vidal et al., 2018; Escribano et al., 2019*). Previous studies found that prenatal and postnatal flavoring may reduce effects related to stress, influence piglets acceptance and stimulate food intake (*Mennella et al., 2001; Oostindjer et al., 2010*). Some researchers have reported that feeding sows and their piglets with plant based aroma extracts in feed can improve production and also ease the transition in the period of weaning (*Charal et al., 2016; Oostindjer et al., 2011*). For that reason, generally, an optimally functioning gastrointestinal tract is very important to the overall metabolism and performance of pigs of all productive stages (*Pluske et al., 2018*). It has also been investigated that flavors has a tendencies to reduce weight loss of the sows, weaned piglets, and also can increase their survival rate (*He et al., 2017*). Early exposure to some flavors may result in later preference for these flavors. Some investigations has evidenced that flavors has important role later in life and could positively affect the acceptance of food with similar flavor and, therefore, can be beneficial to all production parameters (*Blavi et al., 2016*). Aim of this study was to determine influence of this aroma on production parameters of growing pigs.

Materials and Methods

The trial was conducted on 108 piglets of crossbreeds Landrace x Large White. All piglets were split in three treatments: control (C) and 2 trial groups (T₁, T₂). Each treatment had three replications (pens) with 12 piglets per pen. Weaning took place on day 27, when the trial started. Piglets were held in same environmental conditions, with same temperature, humidity and lighting. Whole trial was in total 57 days, and it was split in three trial periods. First trial period was 18 days (27-44 day), second was 28 days (45-72 day) and third was 11 days (73-83 day). During the observed three periods, three mixtures have been used (Table 1).

The control groups received standard farm mixtures, and the trial groups had same mixtures with added aroma Vanilla Sweet in different concentrations (0.02; 0.04%, respectively). The feed additive (aroma) used in this trial was artificial vanilla flavor from Polar Bear, China.

Table 1. Ingredient and nutrient composition of mixtures used in experiment

Group	Mixture 1 Day 27-44			Mixture 2 Day 45-72			Mixture 3 Day 73-83		
	C	T ₁	T ₂	C	T ₁	T ₂	C	T ₁	T ₂
Ingredients g/kg									
Corn	514.5	514.3	514.1	586.8	586.6	586.4	629.6	629.4	629.2
Wheat flour	-	-	-	25.0	25.0	25.0	50.0	50.0	50.0
Sugar	30.0	30.0	30.0	-	-	-	-	-	-
Soybean meal	205.0	205.0	205.0	182.0	182.0	182.0	165.0	165.0	165.0
Sunflower meal	-	-	-	20.0	20.0	20.0	25.0	25.0	25.0
Ecofish meal	50.0	50.0	50.0	45.0	45.0	45.0	40.0	40.0	40.0
Extruded full-fat soybean semolina	120.0	120.0	120.0	100.0	100.0	100.0	50.0	50.0	50.0
Milk replacer	40.0	40.0	40.0	-	-	-	-	-	-
Calcium carbonate	14.0	14.0	14.0	16.0	16.0	16.0	15.0	15.0	15.0
Monocalcium phosphate	12.0	12.0	12.0	10.0	10.0	10.0	10.0	10.0	10.0
Sodium chloride	2.5	2.5	2.5	3.2	3.2	3.2	3.2	3.2	3.2
Premix*	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
L-lysine	-	-	-	-	-	-	0.2	0.2	0.2
Minazel**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Aroma Vanilla Sweet***	-	0.2	0.4	-	0.2	0.4	-	0.2	0.4
Calculated nutrient composition, g/kg of feed****									
Crude protein	218.00			192.40			178.40		
Lysine	12.90			10.80			9.60		
Methionine	4.00			3.40			3.30		
Cysteine	3.40			3.20			3.10		
Threonine	8.60			7.50			6.90		
Tryptophan	2.50			2.20			2.00		
Crude fiber	45.90			42.60			37.10		
Crude fat	49.80			47.70			41.90		
Calcium	11.55			11.17			10.41		
Phosphorus	7.71			6.78			6.69		
DE content, MJ/kg	16.58			16.41			16.25		

*Added per kg diet: 15,000 IU Vitamin A, 1500 IU Vitamin D3, 40 IU Vitamin E, 1.0 mg Vitamin K3, 2.0 mg Vitamin B1, 4 mg Vitamin B2, 10 mg d-Pantothenic acid, 18 mg Niacin, 70 mg Biotin, 18 mg Vitamin C, 0.03 mg Vitamin B12, 4 mg Vitamin B6, 170 mg Fe: Fe(II) sulphate, 4 mg Cu: Cu(II) sulphate, 16 mg Zn: Zn(II) oxide, 50 mg Mn: Mn(II) oxide, 0.304mg KI, 0.3 mg Se: Se-selenite.

**Natural mycotoxin adsorbent.

*** Polar Bear, China, 100% Vanillin;

**** Difference between groups within one mixture is irrelevant

Piglets were fed *ad libitum*. Average daily feed intake (FI) was calculated by subtracting unconsumed feed at the end of trial from the pre weighed amount and splited by the days. Body mass were weighted at start and at the end of trial. Piglets were weighed at the beginning and at the end of the experiment and the average daily gain (ADG) were calculated with the following equation:

$$\text{ADG} = \frac{\text{Final weight} - \text{Initial weight}}{\text{Duration of the experiment (days)}}$$

Feed conversion (FCR) was also calculated:

$$\text{FCR} = \frac{\text{Daily feed intake}}{\text{Daily weight gain}}$$

All statistical analyses were performed using R-project software. For the purpose of production performance analysis one way ANOVA was used while the Tukey test served to determine the statistical significance of the differences between individual means values.

Results and Discussion

Production performances were shown in Table 2. During the first period, there was statistical difference ($p < 0.05$) in all three prameters between the groups. Feed intake (FI), ADG and FCR differed between C and T₁ group. T₁ had best ADG of 261.53 g/d and FCR of 1.89 g/g. In the second period statistical significance was noted in FI and ADG, between T₁ and other two groups. T₁ had lower FI and ADG, but better FCR compared to control group. In the final period second experimental group had the best results in both FI (1309.29 g/d) and ADG (696.43 g/d). And eventually for whole trial T₂ had better results in all three production parametars compared to other two trial groups. There was no mortalities in trial.

Table 2. Production performance (mean \pm SE) of post-weaning piglets fed with (T₁ and T₂) or without (C) added aroma in the feed

	Treatments		
	C	T ₁ 0.02%	T ₂ 0.04%
First period (27-44d)			
FI, g/d	387.11 \pm 0.016 ^b	426.64 \pm 0.023 ^{ab}	494.29 \pm 0.026 ^a
ADG, g/d	171.29 \pm 0.018 ^b	212.26 \pm 0.018 ^{ab}	261.53 \pm 0.023 ^a
FCR, g/g	2.26 \pm 0.045 ^b	2.01 \pm 0.025 ^{ab}	1.89 \pm 0.005 ^a
Second period (45-72d)			
FI, g/d	955.63 \pm 0.011 ^a	739.06 \pm 0.026 ^b	869.39 \pm 0.009 ^a
ADG, g/d	461.66 \pm 0.024 ^a	367.69 \pm 0.045 ^b	477.69 \pm 0.036 ^a
FCR, g/g	2.07 \pm 0.031	2.01 \pm 0.068	1.82 \pm 0.099
Third period (72-83d)			
FI, g/d	1217.99 \pm 0.023 ^b	1219.05 \pm 0.087 ^b	1309.29 \pm 0.036 ^a
ADG, g/d	615.15 \pm 0.078 ^b	603.49 \pm 0.036 ^b	696.43 \pm 0.036 ^a
FCR, g/g	1.98 \pm 0.011	2.02 \pm 0.045	1.88 \pm 0.059
Whole trial (27-83d)			
FI, g/d	822.86 \pm 0.015 ^a	732.29 \pm 0.069 ^b	810.58 \pm 0.035 ^a
ADG, g/d	386.32 \pm 0.016 ^b	362.52 \pm 0.023 ^b	431.16 \pm 0.026 ^a
FCR, g/g	2.13 \pm 0.022	2.02 \pm 0.051	1.88 \pm 0.013
Mortality, %	-	-	-

SEM, Standard error of the means; FI, feed intake; ADG, average daily gain; FCR, feed conversion rate; ^{a, b, c}In a row, the least squares means with a different superscript differ significantly ($p < 0.05$)

Low nutrient intake of piglets during the first few days after weaning is a serious problem which influences intestinal integrity and later performance (*Spreeuwenberg et al., 2001*). Adding certain flavours during lactation period could enhance diet acceptance in later life, can improve ingestion, and to improve adaptability to conditions after weaning (*Langendijk et al., 2007*).

In previous studies of the nutritive value of the aroma *Vanilla butter cream* used in nutrition of suckling piglets, results showed the increase of their weaning mass by 390 g per litter (*Saftić et al., 2003; Živković et al., 2003*). Similar studies also showed that the piglets fed the mixtures containing aromas were heavier by 3.5% (*Ilsley et al., 2002*) and 7.35% (*Piva et al., 1989*) compared to the animals fed with mixtures without supplemented flavours, which concludes with our study. In case of fatteners, aroma influenced the improvement of ADG (*Kwon et al., 2001*) and in case of Apple aroma improvement of ADG by 4.78%, FCR by 3.75%, level of utilization of crude proteins, slaughter yields and lower price for 1 kg of gain by 2.06% (*Saftić et al., 2005*).

Moreno-Santillán et al. (2022) observed that the use of aromas (banana and cinnamon) in the diet of weanling piglets did not improve the weight gain, feed intake, feed/gain ratio after one month of feeding. Similar results were found by other researchers (*Blavi et al., 2016; Wang et al., 2021*). In the study of *Wang et al. (2014)* not all flavours accomplished the purpose of increasing feed intake. Fruit-milk flavour had little effect on the performance of sows and piglets, unlike the fruit-milk-anise flavour that had positive effect on production performance.

Conclusion

The effects of use of Vanilla sweet aroma in the nutrition of weaned pigs were investigated. Obtained results showed that introduction of studied Vanilla sweet aroma in mixtures have positive effects in the following way:

- Better feed intake in trial compare to the control group
- Animals of the experimental groups fed diet containing Vanilla sweet aroma had better ADG than control groups.
- Investigated flavour showed no differences in regard to FCR between the groups for the whole trial.

In general, obtained results showed that use of Vanilla sweet aroma can be recommended in the nutrition of weaned pigs. Further investigation should be conducted to determine the effect of this flavour on fatteners.

Efekat korišćenja arome slatke vanile u ishrani prasadi nakon zalučenja

Vladimir Živković, Marija Gogić, Nenad Stojiljković, Tamara Stamenić, Čedomir Radović, Nikola Delić, Aleksandar Stanojković

Rezime

Ogled je sproveden na 108 prasadi meleza Landras x Veliki Jorkšir. Cilj ovog istraživanja je bio da se ispita uticaj arome slatke vanile na proizvodne parametre prasadi u odgoju. Ceo eksperiment je ukupno trajao 57 dana i bio je podeljen u tri perioda. Prasad su zalučena sa 27 dana, kada je i sam ogled počeo. Prvi period je trajao 18 dana (27-44 dan), drugi 28 dana (45-72 dan) i treći 11 dana (73-83 dan). Kontrolne grupe su dobijale standardnu farmsku smešu, dok je u smešu za ogledne grupe dodavana aroma slatke vanile u različitim koncentracijama (0,02; 0,04%). Tokom prvog perioda postojala je statistička značajnost ($p < 0,05$) za sva tri

proizvodna parametra između grupa. Unos hrane (FI), prosečan dnevni prirast (ADG) i konverzija (FCR) razlikovali su se između C i T1 grupe. T1 je imala najbolji ADG od 261,53 g/d i FCR od 1,89 g/g. U drugom periodu zabeležena je statistička značajnost kod FI i ADG, između T1 i druge dve grupe. T1 je imala niže FI i ADG, ali bolji FCR u poređenju sa kontrolnom grupom. U završnom periodu ogleda, druga eksperimentalna grupa je imala najbolje rezultate u FI (1309,29 g/d) i ADG (696,43 g/d). Kada se na kraju sagleda ceo ogled T2 grupa je imala najbolje rezultate za sva tri proizvodna parametra u poređenju sa druge dve ispitivane grupe. Generalno, dobijeni rezultati su pokazali da se upotreba arome slatke vanile može preporučiti u ishrani odbijenih prasadi. Trebalo bi sprovesti dalje istraživanje kako bi se utvrdio efekat ove arome i na tovljenike.

Ključne reči: prasad, ishrana, ukusi, zalučenje

Acknowledgments

The research was financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia No. 451-03-68/2022-14/200022.

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Received 4 October 2022; Accepted for publication 11 December 2022