

THE EFFECTS OF DIFFERENT PRE-MIXTURES IN NUTRITION OF SOWS AND PIGLETS

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Abstract: In the last ten years we have been witnesses to import of numerous premixes produced by various producers and of different quality in regard to concentration of ingredients which are their main components. There is relatively few data on the effects of their nutritive value in pigs, so this research was carried out with objective to verify the effects of several different imported premixes and those produced according to domestic concept, in nutrition of sows, suckling piglets and weaned piglets. Research was performed on private farm in the vicinity of Šabac in Serbia. Obtained results showed that there was no significant difference in losses of body masses and food consumption in sows during lactation period. Nutrition of suckling piglets using mixture which contained adequate premix of domestic production improved the growth rate by 7.6%. Cost of food when domestic premixes were used in nutrition of sows and piglets was by 5.3% lower, and value of realized piglets by approx. 26.0% more favourable when domestic premixes were used in nutrition of sows and suckling piglets. Piglets in rearing were fed mixtures containing imported premixes showed no significantly important effect on gain, but had poorer feed conversion by 6.2% compared to animals fed diets containing domestic premix. Domestic premix in mixtures reduced the cost of mixtures by 3.4% and reduced the cost of gain of piglets in rearing by 9.9% compared to nutrition with diets containing imported premixes. In general, obtained results shoed that use of both types of compared premixes can be recommended, but it is more economically efficient to use domestic premixes in nutrition of sows and piglets.

Key words: imported and domestic premixes, sows, piglets

Introduction

In modern pig production it is necessary to add certain vitamins, microelements and different additives by way of so called vitamin-mineral pre-mixtures or premixes. The role and importance of vitamins and microelements in

nutrition have been pointed in the early nineties (*Zlatic, 1983*) and late nineties (*Cmiljanić et al., 1996; Živković et al., 1996*). With the increase of the intensity of pig production and their concentration on one location on the farm, role and importance of premixes in nutrition for the purpose of improvement of production and preservation of good health condition became more important from year to year (*Živković and Kovčín, 1983*).

Absence of premixes from mixtures causes very distinct production depressions, lower gain up to 35% and lower food conversion by approx. 20% (*Jakobčić et al., 1983*). Today, composition of premixes varies depending on the producer and question is how these differences in dosages of vitamins, microelements and additives can influence production results in pig nutrition.

In the last twenty years we have been witnesses to import of numerous premixes from different producers and of different quality in regard to concentration of ingredients which are their main components. There is relatively few data on the effects of their nutritive value in pigs, so this research was carried out with objective to verify the effects of several different imported premixes and those produced according to domestic concept, in nutrition of sows, suckling piglets and weaned piglets.

Materials and Methods

Investigation was carried out on private pig farm of the family Fencaroš in Platičevo in the vicinity of Šabac. Trial included total of 14 sows divided into two nutrition treatments. Criteria for division of sows were origin of the animal, parity, and origin of semen used for their insemination.

Approximately ten days before farrowing all pregnant animals were moved to farrowing stable. Sows of the first group - control and the second group – experimental, were fed mixtures for lactating animals, and investigated imported premixes for sows and piglets were included in control mixtures, and in experimental mixtures, premixes produced according to domestic technologies were included (Table 1). In case of all investigated mixtures, levels of crude proteins were equal, pointing out that during lactation sows were fed individually, whereas other pig categories, suckling piglets and piglets in rearing, were fed as group, and in all categories in trial nutrition was ad libidum.

After farrowing, at the age of 8 days, piglets were creep fed mixtures, control group mixtures with adequate imported premixes, and piglets of the other group had domestic premix in their diet. After weaning, groups were formed consisting of suckling piglets, and it was strictly taken into account that piglets of experimental group received domestic premix in their mixtures, whereas control group received diet of same composition but with imported premix (Table 3).

For evaluation of obtained results the following parameters were used: body mass of sows prior to farrowing and at weaning, loss of body mass in sows during lactation, food consumption of sows during lactation, number of equalized piglets per litter, number of weaned piglets, average body mass of piglets at birth and weaning, average daily gain of piglets during lactation and in rearing, as well as economical justification for the use of studied premixes through cost of kg of gain.

Obtained results were processed statistically using variance analysis, and differences between averages using t-test.

Table1 . Performance of the sows and suckling piglets in the experiment

Group	1 control	2 experimental
Imported premix in the mixtures	+	-
Domestic premix in the mixtures	-	+
Gestating sows		
Feed/head/day, kg	3.0	3.0
Body mass of sows before farrowing, kg	265.1	298.1
Body mass of sows at weaning, kg	212.3	232.9
The losses of body mass of sows, %	19.70	21.53
Lactating sows		
Average daily feed intake, kg	5.24	5.25
Compared to the control group, %	-	+ 0.19
Suckling piglets		
Duration of the lactation period, days	36.6	37.3
Number equalized piglets/litter	12.00	11.57
Number of stillborn piglets/litter	0.4	1.4
Number of weaned piglets/litter	9.29	10.43
Average body mass of piglets at the farrowing, kg	1.35 ^{***}	1.65 ^a
Compared to the control group, %	-	+ 22.22
Average body mass of piglets at weaning, kg	9.01	10.11
Compared to the control group, %	-	+ 12.21
Average body mass of litter at weaning, kg	83.7	105.4
Compared to the control group, %	-	+ 25.92
Average daily gain, g	210	226
Compared to the control group, %	-	+ 7.62
Consumption of prestarter/litter, kg	11.2 ^B	13.1 ^B
Compared to the control group, %	-	+ 16.96

^{*}) – Equalization of piglets per litter includes transferring of piglets from one litter to another within the group after the colostrum had been sucked

^{**}) The same small letters in the row over the average values mark statistical difference on the level $P < 0,05$, and the big ones on the level $P < 0,01$.

Results and Discussion

a) Period of lactation

In the trial, nutritive value of domestic contrary to imported premixes was investigated in nutrition of sows in lactation, suckling piglets and rearing piglets.

Obtained results showed that sows of the first group – control, fed mixture with imported premixes lost during lactation 19.70% of their own body mass. Trial group of sows fed mixtures with domestic premix lost 21.53% of their own body mass during lactation period (Table 1).

There was no significant difference in food consumption between sows in both groups during lactation.

When litters were equalized immediately after birth, after colostrum had been sucked, it was registered that sows fed imported premix had farrowed in average 12.00 of farrowed piglets/litter, whereas in trial group of sows fed domestic premix that value was 11.57 animals/litter.

Control group of piglets fed mixture containing imported premix realized 9.29 weaned piglets per litter which is less in average by 1.14 animals or 12.27% compared to group of animals fed mixtures based on domestic premixes. Nutrition of trial group of piglets using pre-starter containing domestic premix caused improvement of growth rate in lactation by average 16 g or 7.62% than in control group of piglets, and also to increased consumption of pre-starter in average by 16.96% per litter.

Table 2. Economic analysis of the use of different premixes in the nutrition of sows and suckling piglets in the experiment

Group	1 control	2 experimental
Imported premix in the mixtures	+	-
Domestic premix in the mixtures	-	+
Lactating sows		
The price of the diets, %	100.00	92.55
Suckling piglets		
The price of feed/weaned piglets, %	100.00	99.79
Total price of feed till weaning of piglets		
Total price of the diets, %	100.00	94.65
Total the price of produced piglets, %	100.00	125.98
Compared at the control group, %	-	+ 25.98

Economical analysis of use of studied premixes showed that (Table 2) value of food for sows in lactation was by 7,45% lower compared to group fed mixture of same composition but with imported premix included. There was no significant difference in value of mixtures for nutrition of piglets in trial, so total cost of food used in group of animals fed domestic premixes was by 5,35% lower than parameters realized by sows and suckling piglets fed mixtures containing imported premixes. Total value of realized piglets at weaning was by 25,98% higher in piglets fed domestic premixes compared to value realized when imported premixes were applied in mixtures.

b) Period of rearing of piglets

In the rearing period, during 42 feeding days, piglets of control group fed imported premixes realized average daily gain, 315 g (Table 3). Introduction of investigated domestic premixes into iso-protein mixtures had no significant effect (difference of 6 g or 1,9%) on piglets growth. However, nutrition of piglets in rearing with mixtures containing domestic premixes caused improvement of feed conversion by 0.13 kg or 6.22% compared to nutrition of piglets with mixtures containing imported premixes.

Table 3. Performance of weaned piglets in the experiment

Group	1 control	2 experimental
Weaned pigs		
Imported premix in the mixtures	+	-
Domestic premix in the mixtures	-	+
Number of piglets at the beginning of experiment, kg	34	34
Number of piglets at the end of experiment, kg	34	33
Body mass of piglets at the beginning of experiment, kg	9.73 ^{A*}	10.47 ^a
Body mass of piglets at the end of experiment, kg	22.98	23.47
Duration of experiment, days	42	42
Average daily gain of piglets, g	315	309
Compared to control group,%	-	- 1.90
Average daily feed intake, kg	0.659	0.609
Compared to control group,%	-	- 7.59
kg/Feed conversion ratio, kg	2.09	1.96
Compared at the control group,%	-	+ 6.22

* The same letters in the row over the average values mark statistical difference on the level $P < 0,01$.

Use of domestic premix in mixtures reduces the cost of food by 3.41% so with slightly more favourable feed conversion, cost of gain of piglets in group receiving mixtures with domestic premix was more favourable by 9.86% compared to control group of animals fed imported premixes, which justifies the use of this type of premixes from nutritive and economical stand point of view in case of this pig category (Table 4).

Table 4. Economic analysis of the use of different premixes in the nutrition of weaned pigs in the experiment

Group	1 control	2 experimental
Weaned pigs		
Imported premix in the mixtures	+	-
Domestic premix in the mixtures	-	+
The price of the diets, %	100.00	96.59
Feed conversion ratio, %	100.00	93.78
The price of the weaned piglets, %	100.00	90.14
Compared to the control group, %	-	+ 9.86

Differences stated in literature references about needs/requirements of certain micro ingredients in pigs are very different, and among other things depend on genetic potential, housing and environment conditions, health condition, etc. (Kovčín, 1992; Kasalica, 1995; Jokić, 1996; Šefer and Sinovec, 1999). If pigs are of adequate genetic potential, increased concentration of vitamins and micro elements in premixes leads to better gain by 4.4% (Pupavac et al., 1998) i.e. by 4.6% (Živković et al., 2005) and more favourable feed conversion by 3.5% (Pupavac et al., 1998) and even to 5.2% (Živković et al., 2005). Beside concentrations, one of very important parameters of the quality of premixes is choice of carriers (Filipović et al., 2000). When premixes are formulated, use of non-organic sources of micro elements, it is preferable to apply more free "security" requirements in vitamins (Shurson et al., 1997), although, in regard to freedom in final fattening period of pigs, it is not necessary to include premixes into mixtures (Lee and Kim, 2002).

In case of pregnant sows, application of products from two producers caused significant increase of litter size at birth from 9.37 to 10.08 piglets/litter (Uremović et al., 1985), and by use of premixes with increased content of micro ingredients smaller number of "irregular" farrowing is realized, also not so vital piglets, and higher number of vital piglets with greater litter mass (Pupavac et al., 2000). In production of premixes, the most frequent are variations in concentrations of recommended amounts of vitamins and cost of product which can vary from 2 to 10 dollars per tonne of complete food (Rea and Veum, 1993), so in general, when formulating mixtures for realization of maximum production, nutrition is always searching for new knowledge about nutritive value of vitamins and microelements in premixes (Pomar et al., 2009).

Conclusion

The effects of the use of vitamin-mineral pre-mixtures (premixes), imported and of domestic origin were investigated in nutrition of sows in lactation, suckling piglets and piglets in rearing.

Research was performed on private farm Fencaroš in Platičevo near Šabac. Obtained results showed that:

There was no significant difference in regard to loss of body mass and food consumption in sows during lactation;

Feeding of suckling piglets with mixture containing adequate premix of domestic origin improved the growth rate in average by 7.6%;

Cost of food when domestic premixes were used was by 5.3% higher and value of realized piglets by approx. 26.0% less favourable using imported premixes;

In piglets in rearing, utilization of imported premixes had no significant effect on gain, but feed conversion was lower by 6.2% compared to domestic premixes;

Domestic premix in mixtures reduced the cost of mixtures by 3.4% and reduced the cost of gain in rearing of piglets by 9.9% compared to nutrition with diets containing imported premixes.

In general, obtained results showed that the utilization of both types of compared premixes can be recommended, but it is more economically efficient to use domestic premixes in nutrition of sows in lactation, suckling piglets and rearing piglets.

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Efekti različitih premiksa u ishrani krmača i prasadi

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Rezime

Poslednjih deset godina svedoci smo uvoza mnogobrojnih premiksa raznih proizvođača različitog kvaliteta u pogledu koncentracija ingredijenata koji ulaze u njihov sastav. Relativno je malo podataka o efektima njihove nutritivne vrednosti kod svinja, zbog čega su ova ispitivanja i izvedena sa ciljem da se provere efekti

palette premiksa iz uvoza i onih proizvedenih po domaćem konceptu čiji je idejni tvorac prvoimenovani autor ovoga rada, u ishrani krmača, prasadi na sisi i prasadi u odgoju. Istraživanja su izvedena na privatnoj farmi svinja u Platičevu u okolini Šapca u Srbiji.

Dobijeni rezultati su pokazali da nije bilo bitne razlike u gubicima telesnih masa i u konzumaciji hrane kod krmača u periodu laktacije. Ishrana prasadi na sisi smešom u kojoj je korišćen odgovarajući premiks domaće proizvodnje poboljšala je brzinu porasta prasadi u proseku za 7,6%. Cena hrane korišćenjem domaćih premiksa je bila za 5,3% niža, a vrednost realizovane prasadi za oko 26,0% nepovoljnija korišćenjem premiksa iz uvoza. Prasad u odgoju hranjena smešama gde su korišćeni uvozni premiksi nisu iskazala bitan efekat na prirast ali su reagovala pogoršanom konverzijom hrane za 6,2% u poređenju sa životinjama na obrocima sa premiksom domaće proizvodnje. Domaći premiks u smešama je umanjio cenu smeša za 3,4% i pojeftinio cenu prirasta prasadi u odgoju za 9,9% u poređenju sa ishranom obrocima sa uvoznim premiksima. U celini dobijeni rezultati su pokazali da se preporučuje korišćenje obeju vrsta upoređivanih premiksa, ali je ekonomičnije koristiti domaće premikse u ishrani krmača, prasadi na sisi i odgoju.

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