Scientific Papers. Series D. Animal Science. Vol. LXI, Number 2, 2018
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

THE INFLUENCE OF IMPROVED FEED ON THE PRODUCTIVE PERFORMANCES OF PREGNANT AND LACTATING SOWS

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Abstract

The profitability of breeding sows is determined by their rational feeding, knowing that in the pig cost price of the delivered feed represents approx. 70-80%. Consequently, achieving efficient and consistent productions in pig farms depends on the quantitative and qualitative assurance of feeds, which are used both to ensure their own vital functions and to increase their production. For efficient feeding of pregnant and lactating sows, the morpho-physiological features of this species should be taken into account, testing the use of improved herbaceous species such as Turda maize, 21-1G barley, Tudor peas. The weight of pregnant sows and the consumption of compound feeds were influenced by the digestibility of nutrients, mainly by protein. During the lactation period, the consumption of compound feeds of sows varied according to the number of piglets and the body weight of the sows.

Key words*: sows, nutritive substances, hybrids of maize, barley, peas*

INTRODUCTION

Ensuring a balanced diet for sows is a complex problem because in a relatively short time the sow goes through different physiological stages in which its metabolism is profoundly altered.
Since gestation is an extremely delicate stage due to hormonal transformations in the sows that prepare the uterus to ensure the development and protection of fetuses, the maintenance and feeding system must be adapted to meet these requirements and to prevent factors which may influence gestation negatively (Cuc et al., 2006).
The application of quantitative and qualitative nutritional deficiency is harmful, negatively affecting the growth and development of embryos and fetuses as well as the production of milk from the future lactation (Rekiel et al., 2015).
The abundant diet that leads to the fattening of the sows is also detrimental, resulting in a dystocia calving, low number of piglet during birth, low birth weight, and low milk production in the future lactation that negatively impacts the development of piglets.
The quality of colostrum milk, which provides the antimicrobial protection of newborn piglets, as well as milk itself, plays an important role in the survival and development of piglets.
Sow milk is characterized by a high content of dry substance 19.4%, fat 7.2%, protein 6.1% and moderate in lactose 4.8% (Cuc et al., 2006). It also contains important amounts of minerals and vitamins.
During breastfeeding the sows will lose weight due to the fact that by the production of milk they are exported a great amount of energy and nutrients that cannot be provided only by food (Nel, 2017). Therefore, it is indispensable to apply a correct diet to limit these weight losses to only 13-15% of the weight after calving in the case of an 8-week lactation.
The aim of the paper is to test the improved hybrid plants to increase the production of milk for the weaning of a large number of piglets on the sow, to develop them well, and to keep the sow in a better state of maintenance.

MATERIALS AND METHODS

The biological material was represented by sows of the Great White breed, respectively 40 gestating sows in the second month, which were divided into 4 batches. The batches were made of sows with the closest sowing data, age

and body weight, being uniform as much as possible.

The testing on the sows took place during the gestation and lactation period.

The sows have been maintained in the same box from sowing to breeding. In this way it can be established a behavior adapted to each sow and to prevent accidents and mechanical abortions.

In order to formulate recipes for compound feeds intended for the feeding of pregnant and lactating sows, energetic raw materials, vegetable proteins, animal proteins, mineral ingredients, vitamin-mineral premixes (Table 1 and Table 2) were used. In a previous research iron and copper were used in the young swine organism (Marin et al., 2013).

The content of the compound feed can be tested at different environmental conditions using molecular dynamics in order to adapt to the needs (Marin et al., 2017) using the graphics processing unit and multi-core systems (Marin et al., 2016).

The improved tested plants were Turda corn, 21-1G barley and Tudor peas.

For the prevention of piglets loss during the gestation period, particular attention was paid to the rational feeding of pregnant sows.

For this purpose pregnant sows should be fed with rations containing all the nutrients and recommended amounts for the physiological state of gestation. Thus, the ratio of the pregnant sows should contain enough amounts of digestible protein, mineral salts and vitamins, to ensure a sufficient volume for the animal to feel full and to be made of tasty and varied fodder (Drăgotoiu et al., 2014).

For pregnant sows combined feed was used at which the crude protein was of 14.11-14.17% and the metabolizable energy 2882-2945 kcal/kg.

The structure of the compound feed recipes for pregnant sows included cereals (corn, barley) 60-70%, vegetable fodder feeds (soybean and sunflower meal, wheat bran, fodder peas) 23.50 - 35.50%, synthetic lysine 0.04 -0.18%, mineral feed (salt, dicalcium phosphate, calcium carbonate) 3.56-3.82 %% and vitamin-mineral premix 0.5%.

For feeding of lactating sows, a compound feed made of cereals (corn, barley) in the proportion of 65.50-72.00%, vegetable fodder feed (soybean meal, wheat bran, fodder peas) 18.50-20.50%, protein fodder animal origin (fish meal) 6%, synthetic lysine 0.09-0.18%, mineral fodder (salt, dicalcium phosphate, calcium carbonate) 2.82-3.12% and vitamin-mineral premix 0.5%.

The compound feed used in the alimentation of sows with piglets had a calorific value of 3062-3080 kcal EM/kg.

Concerning the protein level of the compound feed for lactating sows, it was 17.31-17.43% crude protein with a good biological value, providing all essential amino acids at the optimal level (1% lysine and 0.58% methionine and cystine).

Not ensuring this protein level can cause a decrease in milk production that will negatively influence the weight gain of piglets, as well as the evolution of the sows' body weight.

A special role in the production of milk belongs to the mineral substances such as calcium and phosphorus, their share in sour milk being of 0.25% Ca and 0.16% P. Considering this, as well as the requirements for the maintenance of the maternal body, the calcium level was 1.12-1.14% and the phosphorus level was 0.79-0.81%.

The feeding of sows during lactation is influenced by the milk production, which is implicit in the number of breast-fed piglets. The amount of food administered daily will increase progressively to 7-10 days, after which it remains at a relatively constant level, and 3-4 days before weaning it gradually decreases, so that on the day of weaning it is not given feed.

During the gestation period the weights of sows were recorded in the 2nd and 4th months of gestation, as well as the daily average consumption (Table 1).

Also, the daily average consumption of sows in the lactation period, the number of born piglets and the mortality rates when giving birth, the weight of born piglets, the number of weaned piglet and their weight were recorded.

The piglets were weaned at the age of 21 days, because after 3 weeks since the birth the sow's milk production begins to decline.

Table 1. Experimental scheme

Experimental batch	Number of sows (heads)	Followed objectives
Pregnant sows		- Weight of the sows in the second month and the fourth month of gestation, the average daily consumption; - Daily average consumption of sows during lactation, number of piglets and mortality, weight of weaned piglets, number of weaned piglets and their weight
Control batch	10	
Experimental batch with Turda maize in feed (E1)	10	
Experimental batch with barley 21-1G in feed (E2)	10	
Experimental batch with Tudor pea in feed (E3)	10	
Lactating sows		
Control batch	10	
Experimental batch with Turda maize in feed (E1)	10	
Experimental batch with barley 21-1G in feed (E2)	10	
Experimental batch with Tudor pea in feed (E3)	10	

The obtained results were statistically tested using the Student test to highlight the differences between the environments.

RESULTS AND DISCUSSIONS

In the gestation period there was an increase in saliva weight, physiologically normal (Cuc et al., 2006), which varied between 29.98 kg/head in the sows of the E1 batch, which Turda corn was used in the compound feed, and 32.16 kg/head of batch E2, which barley 21-1G was used in compound feed (Table 3).

This variation can be explained by the fact that the use of barley 21-1G improved the apparent digestibility of crude protein compared to other recipes, these results being obtained in a previous research (Marin et al., 2017).

The amount of compound feed consumed by the sows in the second month of gestation varied on average between 2.12 kg/head/day in the control batch and 2.20 kg/head/day in the experimental batch in which the Tudor pea was introduced (Table 4).

Table 2.Recipes of compound feed for sows used during the experimental period

Specification	Compound feed recipes for pregnant sows				Compound feed recipesfor lactating sows			
	C	E1	E2	E3	C	E1	E2	E3
Maize	50.00	0.00	50.00	40.40	62.00	0.00	62.00	58.00
Turda maize	**0.00**	**50.00**	0.00	0.00	**0.00**	**62.00**	0.00	0.00
Barley	20.00	10.00	0.00	20.20	10.00	8.00	0.00	7.50
Barley 21-1G	0.00	0.00	**20.00**	0.00	0.00	0.00	**10.00**	0.00
Tudor peas	0.00	0.00	0.00	**12.00**	0.00	0.00	0.00	**12.00**
Soya meal	0,00	3.00	0.00	0.00	15.50	17.50	15.50	13.00
Sunflower meal	17.50	14.50	16.50	13.00	0.00	0.00	0.00	0.00
Wheat bran	8.00	18.00	9.00	10.50	3.00	3.00	3.00	0.00
Fish meal	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00
L-lysine	0.18	0.14	0.18	0.04	0.18	0.13	0.13	0.09
Carbonate calcium	1.82	1.80	1.82	1.61	0.80	0.80	0.80	0.81
Dicalcium phosphate	1.50	1.52	1.50	1.45	1.52	1.57	1.57	1.81
Vitamino-mineral premix	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Recipes parameters								
Metabolisable energy (EM kcal/kg)	2944	2883	2945	2913	3078	3062	3080	3076
Crude protein (%)	14.12	14.13	14.11	14.17	17.31	17.34	17.43	17.39
Lysine (%)	0.60	0.62	0.59	0.60	1.01	1.00	1.01	1.01
Methionine+cystine (%)	0.54	0.52	0.53	0.51	0.58	0.58	0.58	0.57
Calcium (%)	1.17	1.17	1.17	1.08	1.13	1.14	1.13	1.12
Phosphorus (%)	0.72	0.78	0.72	0.70	0.79	0.80	0.79	0.81
Brute cellulose (%)	5.87	6.54	6.28	5.86	3.11	3.60	3.34	3.26

Table 3. Variation in body weight of pregnant sows during the experimental period

Specification	Batch			
	C	E1	E2	E3
Initial weight of sows (kg)	428.14 ±17.23	410.23 ±22.57	435.67 ±15.67	409.19 ±19.95
Weight of sows in 4th month of gestation (kg)	458.59 ±22.09	440.21 ±24.74	467.83 ±18.22	437.76 ±14.84
Difference (kg)	30.45	29.98	32.16	28.57

In the third month of gestation sows consumed 2.19 kg/head/day in the 21-1G barley batch in the recipe and 2.22 kg/head/day in the Tudor pea batch. In the fourth month, with the exception of the last 2-3 days of gestation, the compound feed consumption was 2.69 kg/head/day in the 21-1G barley batch in the recipe and 2.80 kg/head/day in the experimental batch in the food to which Tudor peas was used (Table 4).

Table 4. Compound feed consumption of pregnant sows during the experimental period

Specification	Batch			
	C	E1	E2	E3
The average daily consumption of sows in the second month of gestation (kg/head/day)	2.12 ±0.01	2.19 ±0.07	2..18 ±0.07	2.20 ±0.05
The average daily consumption of sows in the third month of gestation (kg/head/day)	2.20 ±0.03	2.21 ±0.05	2..19 ±0.08	2.22 ±0.06
The average daily consumption of sows in the fourth month of gestation (kg/head/day)	2.71 ±0.08	2.75 ±0.06	2..69 ±0.05	2.80 ±0.04

During lactation, sows must receive compound feed to cover the energy and nutrients needed for maintenance and milk secretion (Table 5). As a result, during the period between sowing and weaning (21 days) the sows consumed between 6.35 kg of combined feed/head/day (control batch) and 6.85 kg/head/day in experimental batch E2. The results are similar to those obtained by Sulabo et al. (2007); Kruse et al. (2011), who observed that the sows' compound feed consumption varies according to the number of piglets and body weight of the sows.

The number of piglets per sow ranged between 10.50 in the control batch and 12 in the experimental batch E2. The mortality while giving birth was of 2.50 in the experimental batch 2 and 4.76 in the control batch.

Table 5. Influence of nutrition on the performance of sows in lactation and piglets during the experimental period

Specification	Batch			
	C	E1	E2	E3
Average number of born piglets (heads)	10.50 ±0.09	11.00 ±0.15	12.00 ±0.11	11.50 ±0.07
Average number of alive piglets (heads)	10.00 ±0.07	10.70 ±0.09	11.70 ±0.12	11.10 ±0.04
Average weight of born pigs (kg/head)	1.55 ±0.01	1.42 ±0.02	1.35 ±0.01	1.38 ±0.03
Average weight of weaned pigs (kg/head)	6.18 ±0.02	6.35 ±0.08	6.88 ±0.06	5.99 ±0.08
Average number of weaned piglets (heads)	9.60 ±0.09	10.00 ±0.11	11.20 ±0.14	10.70 ±0.08
Daily average intake of sows in the period from giving birth to weaning (kg/head/day)	6.35 ±0.26	6.45 ±0.17	6.85 ±0.30	6.59 ±0.21

The weight of the piglets was affected by the number of piglets, 1.35 kg/head in the batch E2 and 1.55 kg/head in the control batch.

At the age of 21 days of weaning, the piglets had an average weight of 5.99 kg/head in batch E3 and 6.88 kg/head in batch E2, where the greatest number of piglets were weaned (11.20 heads).

CONCLUSIONS

During the gestation period, the weight of the sows registered an ascending trend, ranging from 29.98 kg/head to 32.16 kg/head, the highest value being obtained by the sows in the experimental batch, which barley 21-1G was used in the compound feed, which improved apparent digestibility of crude protein.

Compound feed consumption of pregnant sows had the lowest value in the third and fourth months of gestation in experimental batch E2.

During the lactation period, the consumption of compound feed of sows varied according to the number of piglets and the body weight of the sows.

ACKNOWLEDGEMENTS

This research work was financed from Project ADER 6.1.1./2015 “Nutritional innovative technologies based on the use in animal feed of raw materials recently improved, with

implications over the safety and quality of products".

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