Slovak international scientific journal

№47, 2020
Slovak international scientific journal
VOL.1

The journal has a certificate of registration at the International Centre in Paris – ISSN 5782-5319.
The frequency of publication – 12 times per year.
Reception of articles in the journal – on the daily basis.
The output of journal is monthly scheduled.
Languages: all articles are published in the language of writing by the author.
The format of the journal is A4, coated paper, matte laminated cover.
Articles published in the journal have the status of international publication.

1000 copies
Slovak international scientific journal
Partizanska, 1248/2
Bratislava, Slovakia 811 03
email: info@sis-journal.com
site: http://sis-journal.com

CONTENT

BOTANY

PHYSIOLOGY OF ANIMALS

THE OF FEED ADDITIVES EFFECT ON THE SOWS' REPRODUCTIVE QUALITIES

Ovsiienko S.
Candidate of Agricultural Sciences, Associate Professor
Vinnytsia National Agrarian University
Ukraine

Abstract
The article presents data on the sows' productivity fed additionally by feed additives from the plant mass of milk thistle, saponite flour and molasses in the second half of pregnancy and during the lactation period.
Keywords: feed additive, milk thistle, sows, productivity, pregnancy, lactation, anorexia, ketone bodies.

Statement of the problem. The improvement and development of new technologies plays a great role in the intensification. The herd reproduction improving plays is important among zootechnical measures aimed at increasing meat production and its profitability of production. The successful development of the industry should be determined by the livestock rational use, increasing its productive qualities and growing young. The problem of growing and preserving young animals in the early stages of growth is one of the most important problems of zootechnics; it is dependent on sows' milk productivity. The sows' milk yield is a determining factor in the growth and development of suckling piglets achieving the required live weight at early weaning.

Proper organization of herd reproduction should be based on knowledge of the biological characteristics of lactation animals.

Lots of issues remain unresolved despite the great progress made in this area. The features and patterns of pigs' lactation, the impact of milk productivity on changes in piglet growth, the dynamics of milk production in connection with economic and biological characteristics (age, live weight, fertility haven't been researched properly.

Unfortunately, we do not consider sows as dairy animals. They can produce up to 10 liters of milk at the peak of their productivity. A sow puts as much effort as a cow to produce the required amount of milk per hour, we still continue to take a general approach to feeding them.

The modern production involves a group approach to sows, we will have to reconsider our attitude in the future; we mean the farrowing shop, ketosis syndrome can be observed in deeply pregnant sows because of specific nutrients lack (insufficient energy consumption due to unbalanced diet or poor appetite) [1]. However, we can assume that the ketosis syndrome occurs after birth. However, it is wrong; it occurs before sows farrowing due to the intensification of lipolysis, increased intake of free fatty acids. Triacylglycerols are not broken down, oxidized or excreted by the liver, which causes the rapid development of signs of fatty hepatodystrophy. It should be noted that we are not talking about a specific physiological prenatal ketosis, but about the ketosis syndrome causing anorexia (the level of ketone bodies 4 - 8 mmol / l) [1, 2].

The drugs of natural origin have become widely used recently, they avoid many side effects, because the mechanism of their action is significantly different from synthetic, it is based primarily on the activation of the body's natural defenses [3].

That's why, plant-based feed additives containing hepaprotective substances (silibin, silicocristine, silicidamine) need special attention in the above-mentioned problems prevention because they have antioxidant effects, anti-inflammatory properties and prevent the development of connective tissue in liver.

Thus, the use of a multicomponent feed additive composed of hay flour, milk thistle, saponite flour and molasses in the feeding of deep-pregnant and lactating sows is relevant.

An analysis of recent research and publications researching the problem. To obtain and preserve the young born is one of the main factors of high-income animal husbandry, it brings to industrial commodity production. Realization of the genetic potential of pigs is possible only under conditions of optimal content and high adaptive abilities of their body [4].

The body is in dialectical unity with its environment, the basis of such unity is the metabolism between the organism and the environment. It should be borne in mind that expensive technologies require the application of animals with high genetic potential for viability and productivity in order to obtain high-quality products at relatively low labor costs and production costs. Therefore, the most reliable, effective and environmentally safe way to prevent stress in pigs, along with the selection of stress-resistant breeds, types and lines is to improve their breeding methods, which would be based on age-specific mechanisms of adaptation to adverse environmental factors. Both Ukrainian and foreign researches are an important contribution to solving these problems [4, 5].

The period from birth to weaning is an important stage of the piglets breeding. It is known that piglets are able to digest only the protein and fat of sow's milk, it is their main food until the 20th day. Thus, it is very important that piglets, while protected by the buffering properties of breast milk, learn to recognize nutrients in feeds of different origins and produce specific enzymes for digestion, which is the key to safe weaning, preservation of young and planned growth [6].

The decreased level of appetite is one of the main problems during lactation, it is so-called postpartum anorexia; it occurs against the background of other diseases, stress, poor water supply, etc. The consequence of decreased appetite is the sow weight loss. Weight loss during lactation should not exceed 12% of the total body weight of the sow, it is under such conditions that the piglets will develop properly, and sows will quickly

come to the form after weaning and will have good performance parameters at the next insemination. Some sows lose 12% of weight, on average, this loss ranges from 10 to 30%.

What causes excessive sows weight loss during lactation? Most researchers are sure that the root of the problem lies in lack of energy. The low level of sow consumption of metabolic energy with food during lactation forces the body to use adipose tissue of its own body as a source of energy to meet its needs for milk production [7].

A large number of ketone bodies accumulate in the sows' blood due to the intensive expansion of their own fat; the energy deficit is provided by the development of ketosis syndrome. Ketone elements are highly toxic to the liver, they also have an anorexic effect reducing the sows' appetite. It is so-called vicious circle. On the one hand, lack of energy provokes the use of self-fat and the accumulation of ketone bodies in the blood. On the other hand, the toxic effects of ketone bodies lead to greater appetite worsening the animals' condition of. Animals with genetically determined high thrush and with a large mass nest are at risk because they produce more milk, which requires more energy.

What does sow ketosis syndrome threaten? Firstly, the sow's milk productivity decreases because of decreased appetite and low energy consumption. The result of reduced sow milk production is growth retardation of suckling piglets. Good milk yield is a guarantee of high yield of live piglets. Moreover, there is a direct relationship between the consumption of feed by sows and the weight of piglets, and therefore, with a decrease in the appetite of sows, we will certainly get underdeveloped piglets. Each extra kilogram of feed a sow eats during lactation adds an average of 300 g per day to the growth of the entire nest. Secondly, the sow's production of too fat milk leads to so-called piglets' fat diarrhea. Thirdly, the reproductive abilities of sows deteriorate, this period is prolonged, the number of ovulations and the ability to fertilize is reduced [7, 8].

A team of researchers led by Johnston L. J. observed Western Europe pig farms. They research whether there is a relationship between the weight loss of a sow after farrowing and the length of the period between weaning before hunting. According to the data obtained, it is safe to say that the less sows lose weight, the faster they come to the estrus after weaning [8].

These researchers have also found a dependence between a sows' appetite decrease caused by ketosis syndrome and a deterioration in the reproductive capacity of animals. The relationship between daily energy consumption (mJ) and the time at which the sow comes to the estrus has been presented. The sows that came to the estrus faster after weaning the piglets consumed more metabolic energy than those that did not come to the estrus for a long time. Therefore, stimulating the appetite is one of the main tasks in keeping lactating sows; proper feeding is the key point in the prevention of ketosis syndrome; sometimes it is impossible to solve the problem of energy deficiency through food. It is difficult to accustom the sow to the maximum consumption of food during lactation, because the appetite of animals after farrowing increases disproportionately to energy needs [7].

Feeding affects the amount of milk produced by sows, the development of piglets, their weight at weaning and the productivity of animals throughout their lives. Feeding affects the metabolism of the animal and, accordingly, the level of hormones in the body that affect reproduction.

If sow lose10 kg of weight during lactation, the weight of piglets during weaning is reduced by 0.5 kg, the size of the new nest is reduced by 0.5 piglets and the estrus interval is extended by three days.

The sow needs the maximum increase in feed from the fifth to the seventh day of lactation because milk secretion increases during this period that. If you do not provide the sow with enough food, then lactation will decrease. The amount of feed should be increased in the first days of lactation, and before the end of feeding according to appetite. Such feeding reduces embryonic mortality and promotes good fetal development [9].

However, ketosis syndrome can occur due to a lack of specific nutrients. This is due to insufficient energy intake caused by an unbalanced diet (primary ketosis) or poor appetite caused by the disease (secondary ketosis).

Milk production is reduced mainly due to the lack of glycogen precursors with nutrient deficiency (low feed intake). Later, there is an insufficient level of glucose for the mammary glands due to insufficient synthesis of glucose in the liver [1].

It is important to remember that the mammary glands require a lot of glucose as a precursor to lactose. However, the mammary glands continue to produce milk through hormonal stimulation and, consequently, the use of glucose. This leads to hypoglycemia.

The clinical manifestation of the disease depends on the strength and duration of action on the body of ketogenic factors, the degree of ketonogenesis, adaptive capacity and individual characteristics of the animal.

The disease manifests itself in a latent (subclinical) form. The symptoms are erased and inconspicuous. Both changeable appetite and depression are observed.

The ketosis clinical form is accompanied by a disorder and hyperesthesia. The disorder is soon replaced by depression, the animals become lethargic, sleepy. Tachycardia is observed, body temperature is usually within normal limits.

Carrying out treatment it is necessary to balance a diet on the basic nutrients, macro- and microments. The diet includes foods rich in high-quality fiber, rich in NDF (neutral detergent fiber). The ratio of CID-Lysine to net energy in the diet of a pregnant sow should be 0.66 g / MJ. The level of clean energy is 8.9-9 MJ in the diet. The minimum level of essential fatty acid is 18: 2 (Linoleic) 1%.

Glucose is used in the form of 10-20% solution intravenously 1-2 times a day for 2-3 days (in combination with insulin). Sick animals are prescribed methionine, B vitamins, vitamin C, they are given sugar or other glycogenic drugs.

Milk thistle (Carduus marianus L., genus Silybum Adans L., family Asteraceae) is one of the most popular

plant hepatoprotectors. Silymarin is taken from its mature fruits; it is part of many drugs, the mechanism of action of which is the destruction of toxic compounds coming from outside or those formed in the body before they enter the hepatocytes, this substance can stimulate the synthesis of own phospholipids repairing cell membranes.

Researches have shown that silymarin can be used in combination therapy for poisoning by the pale toadstool. Clinical pharmacology of hepatoprotectors has collected data that milk thistle has an antioxidant effect, it prevents the development of connective tissue in the liver, it has anti-inflammatory properties. Milk thistle affects the liver and gastrointestinal tract. Milk thistle should be used in powder form because it works at the micro level cleansing liver cells. The leaves, roots and seeds of milk thistle have medicinal properties. The seeds contain fats and essential oil, vitamin K, resins, mucus, tyramine, both macro and micronutrients [10].

Plant extracts of milk thistle (Silybum marianum (L.) Gaertn), extract of roots and herbs of purple coneflower (Echinacea purpurea L.) are used as part of a biologically active agent, packaged in a shell of phospholipids, intended for the prevention of colic. The water-soluble medicine is added to the feed increasing the resistance of the bird to infectious diseases [11]. Today it is a promising area for procurement, production of modern medicines and medical applications in the form of galenic drugs [12].

The research aim was to investigate the effectiveness of feed additives based on biologically active compounds of plant and mineral origin for the prevention of ketosis in pregnant and lactating sows and its effect on reproductive performance.

Materials and methods of research. Two groups-analogues of pregnant sows of large white breed were selected taking into account age, live weight, fatness and physiological condition. Keeping and feeding conditions for sows of both groups were identical and met veterinary and zootechnical requirements.

The sows of the experimental group additionally received multicomponent hay pellets from the vegetative mass of milk thistle 80 grams per head for the day during the last 21 days of pregnancy and 21 days of suckling period.

Feeding rations were adopted in accordance with the periods of sows' physiological condition for our scientific experiment.

Pregnant sows of the control and experimental groups were fed by basic diet consisting of concentrated feed (compound feed was made with the inclusion of 10% concentrate for pregnant sows).

Suckling sows of the control and experimental groups were fed a basic diet consisting of concentrated feed of their own production, from which compound feed was made with the inclusion of 15% concentrate.

The sows of the experimental group were fed additionally by granulated hay flour from milk thistle at 80 grams per head per day together with compound feeds. The granular feed additive contains 94% of hay flour from milk thistle and 3% of saponite flour and molasses. Suckling sows were fed at the rate of 3-4 kg of basic feed with the addition of 0.3 kg per piglet per day and taking into account their fatness and the number of piglets in the nest.

Research results and discussion. According to scientific publications, it is rather difficult to accustom a sow to the maximum consumption of food during lactation because the appetite of animals after farrowing increases disproportionately to energy needs [13]. Our observations of weekly feed intake and the average for the entire lactation period show that due to better appetite in the first two weeks and the entire lactation period in the experimental group, its consumption was higher by 3.5%. The sows of the experimental group received additionally feed additive from milk thistle hay flour after farrowing, there was less weight loss during the suckling period. This fact is clearly related to the better appetite of food consumption in this group.

The feed additive stimulates appetite of pregnant and lactating sows, it prevents weight loss compared to the control group in the period when sows feed newborn piglets. The feed additive consisting of milk thistle spotted flour prevents the manifestation of anorexic effects of ketone bodies in the body of lactating sows leading to higher feed consumption during lactation. The positive effect of the feed additive is also caused by its other components. Saponite flour has a sorption capacity; it is a source of mineral elements including metals with variable valence leading to increased activity of antioxidant enzymes. The additional number of mineral elements reduces the nutritional stress of sows by normalizing mineral metabolism.

Molasses is used as a technological binder; it is also a source of additional energy and mineral nutrition enhancing the positive effect on the intensive metabolic processes in the sows' body.

80 grams of additive contains 0.63 g of crude protein, 0.33 g of crude fat, 2.42 g of crude fiber, 1.3 g of crude ash, 3.34 g of nitrogen-free extractives and 0, 64 MJ of exchange energy.

Researches were aimed to analyze the effect of multicomponent milk thistle hay pellets on pregnant sows' reproductive quality. Fertility, number of piglets and nest weight at weaning, safety of piglets are of great importance. They depend on many factors of breed, age, individual characteristics and normalized feeding of animals. The obtained research results are shown in table 1.

Table 1

Average fertility rates of sows (M±m, n=10)

Indicator	Group	
	control	experimental
Fertility, heads	9.8±0.20	10.7±0.23
Large offspring, kg	1.05±0.03	1.10±0.05
Nest weight at birth, kg	10.29±0.35	11.77±0.41
Milk production, kg	255.4±3.65	334.6±4.02
Number of 28-day piglets, heads	8.7±0.47	10.2±0.62
Nest weight at 28-day age, kg	62.3±2.31	81.6.0±3.01
Head weight at 28-day age, kg	7.5±0.09	8.0±0.08
Survival of piglets, %	88.8±2.75	95.3±2.34
Complex indicator of reproductive qualities, points	34.67±1.03	39.66±1.72

The obtained results (Table 1) show the sows of the experimental group have the highest reproductive indicators, their diet included multicomponent hay pellets (80 g per head a day). Thus, the fertility was 10.7 piglets per sow in this group, it is by 9.2% more than in the control group. A similar pattern is observed for high fertility. Piglets from sows of the experimental group had a higher live weight at birth by 4.8% compared with piglets born in the control group.

Nest weight is an important criterion for the sows' reproductive capacity. It includes in the fertility of piglets and sows' ability to feed the offspring ensuring the intensity of growth and safety of piglets. The size of the nest depends on genetic factors, i.e. paratypic factors [14]. The live weight of the nest at birth was higher by 14.4% in the experimental group, it is another argument indicating the positive effect of milk thistle hay pellets on the body of sows during pregnancy and lactation periods.

Lactation is an important stage of the reproductive cycle. Sows produce 10-13 liters of milk, their milk contains twice as much fat, protein and minerals than cow's milk. Therefore, sows have a much higher productivity than cows due to the nutrient content of milk and the ratio between body weight and volume of milk produced per day.

Increasing the nest of piglets without increasing the milk productivity of sows does not make sense. Thus, their milk yield should be tightened along with the increase in sows' fertility.

The estimated sows milk yield (4.1 kg of milk = 1 kg of weight gain of piglets in the nest) was 334.6 kg of milk in the experimental group; it was higher by 31% than in the control group. In our opinion, the higher milk yield of sows in the suckling period is caused by the positive effect of feed additives on both milk synthesis and their body. The live weight of one piglet at 28-day age was by 0.5 kg higher; it amounted to 8.0 kg with the preservation of piglets at the level of 95.3%.

The reproductive capacity of sows was also characterized by an evaluation index (a comprehensive indicator of the reproductive qualities). The obtained data show that it was higher by 12.6% in the experimental group; it was 39.66 points against 34.67 points in the control group.

Thus, the results show that the feed additive from hay milk thistle, saponite flour and molasses inclusion in the diet of sows has a positive effect on metabolism in their body 21 days before farrowing and during the suckling period, it is evidenced by higher reproductive characteristics.

The highly preserved breeding stock should also be taken into account. Everyone who tries to have a productive livestock on the farm knows how much modern genetics costs today. The authors of this information emphasize that owners who spend a lot of money on the purchase of repair pigs, do not care how much this sow will give full-fledged farrowing, i.e. two or seven [15].

Table 2

Reproductive abilities of sows after piglets weaning

Indicator	Days of last lactation	Live weight after weaning, kg	Next insemination, days	The difference to the control group, days
I - control	28	246.5±0.95	18±0.78	-
II - experimental	28	267.2±0.72	6±0.54	12

Table 2 shows the reproductive abilities of sows after piglets weaning. The table shows that experimental group sows had a higher live weight; their subsequent insemination took place 12 days earlier than in sows of the control group. Thus, their physiological recovery before the next reproductive cycle had significant differences under equal conditions of keeping and feeding. It gives us reason to argue about the economic feasibility of using hay milk thistle pellets for feeding pregnant and lactating animals.

The economic evaluation of the results is the final element of any scientific development related to agricultural production. The estimated assessment of the hay flour milk thistle feed additive effectiveness in the sows' diets confirmed our expectations. Preventing the anorexic effect of ketone bodies in the body of lactating sows and more intensive milk synthesis and higher preservation of young animals provides a higher net profit at the level of profitability of productive qualities of sows in the experimental group 40.3%, which is higher by 7.7% than control group.

Conclusions.

1. Granular feed additive from milk thistle flour is an additional component of the diet, it prevents the manifestation of anorexic effects of ketone bodies in the body of pregnant and lactating sows, stimulates their appetite, prevents excessive weight loss in the critical period when sows have to feed.

2. The inclusion of 80 grams of feed supplement in the sows' diet has a positive effect on metabolism in their body 21 days before farrowing and during the suckling period, it is evidenced by higher reproductive characteristics.

3. The higher complex reproductive quality (CPV) is provided due to better appetite, greater mass of feed consumed during the lactation period, greater milk synthesis and higher preservation of young animals in the experimental group sows; it is higher by 14.4%; profitability is higher by 7.7%.

References

1. Syndrom ketozu u svynomatok [Ketosis syndrome in sows]. URL:http://pigua.info/uk/post/technologies/sindrom-ketozu-u-svinomatok-uk [in Ukrainian].

2. Syndrom vysnazhennia svynomatok [Syndrome of fecundity of sows]. URL:https://agroexpert.ua/sindrom-visnazenna-svinomatok/ [in Ukrainian].

3. Dvyliuk I.V. (2013) Perspektyvy zastosuvannia probiotykiv z metoiu profilaktyky zakhvoriuvanosti medonosnykh bdzhil [Prospects for the use of probiotics in order to prevent the incidence of honey bees] *Naukovyi visnyk LNUVMBA imeni S.Z. Hzhytskoho – Scientific Herald of LNUWMBA named after S.Z. Gzhytsky*, 15, 3(57), 3, 321-326 [in Ukrainian].

4. Ovsiienko M.A. (2015). Kormova dobavka dlia vidluchenykh porosiat ta yii vplyv na yikh zberezhenist, peretravnist pozhyvnykh rechovyn, biokhimichni i morfolohichni pokaznyky krovi [Fodder additive for excised piglets and its influence on their preservation, digestibility of nutrients, biochemical and morphological parameters of blood]. *Rozvedennia i henetyka tvaryn – Animal breeding and genetics*, 50, 67-73 [in Ukrainian].

5. Stoliuk V. Stresy v svynarstvi [Streams in pig breeding] URL:https://propozitsiya.com/stresi-v-svinarstvi [in Ukrainian].

6. Babenko S. (2011). Rozstavannia zi svynomatkoiu bez stresu [Parenting with a stem without stress]. *Kormy i fakty – Foods and facts*, 5-6 (9, 10), 48-49 [in Ukrainian].

7. Hnatiuk O.S. (2014). Yak mozhna pokrashchyty apetyt ta kondytsiiu svynomatok pid chas laktatsii [How to improve the appetite and condition of sows during lactation]. *Eksklyuzivnyie tehnologii – Exclusive technology*, 2(29), 34-37 [in Ukrainian].

8. Johnston L. J. et al. Relationship between body fat and post weaning intervalt oestrus in primiparous sows / Journal of Animal Science. – 1989. – 67ed. – R. 943-950. [in English]

9. Hodivlia suporosnykh svynomatok [Feeding of pregnant sows]. URL: https://propozitsiya.com/ua/godivlya-suporosnih-svinomatok [in Ukrainian].

10. Balanchuk T. I. (2016). Doslidzhennia aminokyslotnoho skladu roslynnoi syrovyny Carduus nutans L. ta Carduus acanthoides L. flory Ukrainy [Research of the amino acid composition of the plant material of Carduus nutans L. and Carduus acanthoides L. flora of Ukraine]. Aktualni pytannia farmatsevtychnoi i medychnoi nauky ta praktyky – Actual questions of pharmaceutical and medical science and practice, 2, 43-47 [in Ukrainian].

11. Bukov VA, Lutsenko EV, Lutsenko SV, Feldman NB, inventors (2007). Sredstvo dlia profylaktyky kolybakteryoza ptyts [Means for the prevention of colibacillosis of birds]. Russia, no 2355410.

12. Mashkovskyi M. D. (2012). Lekarstvennyie sredstva [Medicines]. Moscow: Novaya volna, 521-524 [in Russian].

13. Pokrashchyty apetyt i kondytsiiu svynomatok pid chas laktatsii [Improve the appetite and condition of sows during lactation]. URL:http://agrotimeteh.com.ua/zhivotnovodstvo/kormlenie/veterinariya [in Ukrainian].

14. Zotko M. (2011). Reproduktyvni yakosti svynomatok riznoi stresostiikosti [Reproductive quality of sows of different stress-resistance]. Tvarynnytstvo Ukrainy – Animal husbandry of Ukraine, 3, 26-28 [in Ukrainian].

15. Povod M. & Hetman V. Utrymannia ta hodivlia kholostykh i porosnykh svynomatok [Keeping and feeding indigents and piglets]. URL:https://propozitsiya.com/ua/utrimannya-ta-godivlya-holostih-i-porosnih-svinomatok [in Ukrainian].