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IMPROVING THE REPRODUCTIVE TRAITS OF SOWS TO THE USE OF A FEED ADDITIVE “FOLICO F”

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Modern pork production technology encompasses a variety of innovative methods and approaches aimed at improving product quality, production efficiency and reducing negative environmental impact. In order to increase productivity and minimize the use of antibiotics as growth stimulants and prophylactic antibiotics, herbal remedies and various complex organic preparations are widely used in pork production.

The aim was to investigate the effect of the phytobiotic preparation «FOLICO F» on the reproductive traits of sows and to determine the economic efficiency of the research. In the experiment conducted in 2023, 96 heads of full-grown crossbred sows (2 or more litters) of the combination of Large White (LW) × Landrace (L) breeds were used, inseminated by boars of the «PIC 337» line, which were kept on the farm of PE «Dumitrash», Mykolaiv region. The production of pig products in the conditions of the private enterprise «Dumitrash» meets the production and technical conditions and is organized in accordance with the technological processes of industrial technology. As part of the scientific and economic experiment, the conditions of feeding, watering, housing, care and prevention of experimental animals complied with national legislation.

Due to the introduction of the «FOLICO F» feed additive into the sows' diet based on its innovative composition, the indicators of reproductive traits were increased. A higher farrowing percentage (87.5-95.83%) was characterized by groups of sows receiving the phytobiotic supplement «FOLICO F». In the context of experimental groups, the superiority of sows of group III (OR + 2 kg/t «FOLICO F») in terms of the index of reproductive traits – 54.1 points, which exceeded analogues from group II by 11.35 points ($p < 0.001$) and analogues of group IV by 7.06 points ($p < 0.001$) was proved. It was found that the most optimal dose of feed additive was 2 kg per ton of feed. The analysis of cortisol in the blood of experimental sows demonstrates the anti-inflammatory effect of «FOLICO F» during pregnancy. The highest level of profitability was determined for the use of a feed additive in the diets of idle and pregnant sows in the amount of 2 kg/t (group III) – 125.01%.

Key words: sows, technology, diet, phytobiotics, reproductive traits, cortisol, productivity, economic efficiency.

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Сучасна технологія виробництва свинини охоплює різноманітні інноваційні методи та підходи, спрямовані на підвищення якості продукції, ефективності виробництва та зменшення негативного впливу на навколишнє середовище. З метою підвищення продуктивності та мінімізації використання антибіотиків як стимуляторів росту та профілактичних антибіотиків, у виробництві свинини широко використовують фітонепарати та різні комплексні органічні препарати.

Ставилося за мету дослідити вплив фітобіотичного препарату «FOLICO F» на відтворювальні ознаки свиноматок та визначити економічну ефективність проведених досліджень. В експерименті, що проводився у 2023 р., використано 96 голів повновікових помісних свиноматок (2 і більше опоросів) поєднання порід велика біла (ВБ) × ландрас (Л), за осіменіння кнурами лінії «РІС 337», які утримувались у господарстві ПП «Думітраш» Миколаївської області. Виробництво продукції свинарства в умовах приватного підприємства «Думітраш» відповідає виробничо-технічним умовам і організовано відповідно технологічним процесам промислової технології. В рамках науково-господарського досліді умови годівлі, напування, утримання, догляду та профілактики піддослідних тварин відповідали національному законодавству.

Завдяки введенню в раціон свиноматок кормової добавки «FOLICO F» на основі її інноваційного складу підвищено показники відтворювальних ознак. Вищим значенням відсотку опоросу (87,5-95,83%) характеризувалися групи свиноматок які отримували фітобіотичну добавку «FOLICO F». В розрізі дослідних груп доведено перевагу свиноматок III групи (OP + 2 кг/т «FOLICO F») за показником індексу відтворювальних ознак – 54,10 балів які переважали аналогів з II групи на 11,35 балів ($p < 0,001$) та аналогів IV групи на 7,06 бали ($p < 0,001$). Встановлено, що більш оптимальною є доза уведення кормової добавки – 2 кг на тону комбікорму. Аналіз кортизолу в крові піддослідних свиноматок демонструє протизапальну дію «FOLICO F» протягом поросності. Вищий рівень рентабельності визначено за використання в раціонах холостих і поросних свиноматок кормової добавки у кількості 2 кг/т (III група) – 125,01%.

Ключові слова: свиноматка, технологія, раціон, фітобіотики, відтворювальні ознаки, кортизол, продуктивність, економічна ефективність.

Statement of the problem. Nowadays pork production technology covers a wide range of innovative methods and approaches aimed at improving product quality, growing efficiency and reducing negative environmental impact [11, 15, 18]. Relevant changes and innovative approaches are taking place in the technology of feeding, housing and veterinary support of each pig farm.

For a long time, global pork producers have been overwhelmingly focused on increasing gross pork production, paying less attention to quality and safety of livestock products, including pig production. [8, 13, 17]. In order to increase productivity, quality indicators of meat and fat products and minimize the use of antibiotic growth stimulants and antibiotics for prophylactic purposes, phytobiotic compounds and various complex organic preparations are widely used in pork production. So, phytobiotics are natural plant components that have a positive effect on the intestinal microflora of animals, etc. In pig production, phytobiotics are used to improve pig health, boost immunity and improve productivity [10, 15, 20].

In addition, given the growing problem of antibiotic resistance, the use of phytobiotics can reduce the dependence on antibiotics in livestock, particularly in pig production.

Analysis of recent research and publications. According to specialized literature [4, 7, 13] In the pig industry, the term «phytobiotics» is used to describe special plant additives or extracts that are added to the pig diet to improve their health and create nominal conditions for growth and development. These additives may contain biologically active substances such as flavonoids, phenolic compounds, essential oils and other substances that have anti-inflammatory, antioxidant and immunomodulatory properties.

The use of phytobiotics in pig production can help reduce the use of antibiotics in the animal diet, help maintain normal intestinal microflora, improve feed digestion, reduce the risk of disease and increase pig performance. The following supplements can be included in the diet in the form of powders, extracts, aqueous solutions or extracts from plant materials [15].

Phytogetic feed additives, also known as phytobiotics or botanicals, are generally defined as various plant secondary compounds and metabolites that have beneficial effects on animal health and production, including feed and animal products [19].

Herbal products in animal husbandry have a variety of applications, including sensory phytogetic additives, process additives to improve feed quality and safety, and complex additives that promote animal health and welfare, act as immunomodulators, antioxidants, digestive stimulants, and substances that can improve the productivity and quality of livestock products [4, 10, 20].

According to the FAO/WHO, antibiotic resistance in humans caused by their residues in livestock and poultry products due to the widespread use of antibiotics in modern agriculture is of great concern. Indeed, in many cases, the growth of antibiotic resistance in microorganisms [10] associated with the use of antimicrobial growth promoters (AGPs) in livestock led to the ban of AGPs in 2006 in the EU and other countries [15, 16, 19].

According to leading scholars and practitioners [4, 10, 20] essential oils have long been used for their effects on humans and animals. They are widely used for their antibacterial, antiviral, fungicidal, insecticidal, acaricidal, antiparasitic, antipyretic, expectorant, anticancer and cytotoxic effects. [13].

It has been proven that phytobiotics cause a variety of effects of biologically active plant compounds on digestive organs and functions (feed intake, stomach, rumen, intestines, liver), cardiovascular system (heart, lungs, blood vessels) urinary tract (bladder, kidneys), skin, coat, blood counts, immune functions, reproduction (hormones, reproductive behavior, fertility, childbirth) and nervous system (stress, emotions), which has implications for animal health and welfare [13].

Many studies both in Ukraine and worldwide have reported a positive impact of phytogetic drugs on the growth and productivity of animals, including pigs [7].

As noted by N. Puvača et al. [19] note, that the growth-stimulating properties of phytopreparations and essential oils are mainly related to the effect on the gastrointestinal tract, namely: improving the palatability of feed, stimulating the secretion of digestive fluids, improving intestinal morphology, stabilizing the intestinal microbiome and reducing inflammation.

According to O. Osipenko, E. Suyka [10], it was proved that as a result of scientific and economic experiments in Vinnytsia region farms, the use of phytobiotic feed additives in the technology of growing weaned piglets made it possible to obtain a 2.3% higher survival rate of young pigs than the control group (colistin sulfate antibiotic was used for prophylactic purposes), a 1.5-4.5% increase in live weight and a 9% increase in average daily weight gain. Also, a decrease in cases of diarrhea of various etiologies was noted in piglets that consumed phytobiotics through the water supply system with the help of medicines.

In addition to antimicrobial and bacteriostatic effects, phytobiotic preparations stimulate the secretion of digestive enzymes and improve nutrient absorption by increasing their activity. Also, in a number of studies [7, 8, 15] a positive effect on the morphology of the tissues of the small intestine (increase in the length of villi and depth of crypts) was shown.

It is clear that today it is impossible to simultaneously abandon the use of antibiotics for therapeutic purposes in the technological process of the pig industry. Given that the market for feed additives offers a wide range of phytobiotic products, it is necessary to conduct a detailed scientific and production analysis of the use of these additives as an alternative to antibiotic compounds and to conduct research in farms of different capacities.

Therefore, realizing the urgency of this issue, further study and search for innovative technological solutions to increase the productivity of pigs of all sex and age groups through the use of safe complex feed additives and without the use of antibiotics for prophylactic purposes and as growth stimulants are required.

Setting objectives. The aim was to study the effect of a phytobiotic preparation «FOLICO F» on the reproductive traits of sows and to determine the economic efficiency of the studies conducted in the conditions of industrial technology of private enterprise «Dumytrash» Mykolaiv region.

Materials and methods. In the experiment conducted in 2023, 96 heads of full-grown crossbred sows (2 or more litters) of the combination of Large White (LW) × Landrace (L) breeds were used, inseminated with boars of the «PIC 337» line, which were kept on the farm of the private enterprise «Dumytrash» in the Mykolaiv region. The production of pig products at the private enterprise «Dumytrash» meets the production and technical conditions and is organized according to the technological processes of industrial technology.

The experimental sows were kept indoors in accordance with the physiological conditions of the respective technical group. Sows were kept on a concrete slotted floor according to VNTP-APK – 02.05 «Pig enterprises (complexes, farms, small farms)» [2]. When transferred to the reproduction shop at the site of idle sows, where the animals were kept in individual pens (2.1 × 0.6 m) for 30 days until confirmation of pregnancy using an ultrasound scanner and consumed 2.8-3.1 kg of feed per head per day of the «Idle and pregnant sows» type in terms of nutrition: crude protein – 146.4 g/kg; metabolic energy – 2902.6 Kcal/kg [9, 18].

When pregnancy was confirmed, the sows were transferred to the farrowing sow area, where they were kept in individual stalls (2.1×0.6 m) and fed 2.5-2.7 kg per head per day of the «Single and Farrowing Sows» type. 5 days before the expected farrowing date, the gestating sows were transferred to the farrowing shop to the suckling sow section, where they were kept in fixed pens measuring 2.1 × 0.7-0.8 m² and with a suckling piglet pen area of 1.8 m². Sows consumed free-range feed during the suckling period (excluding farrowing day – 1.0 kg/head) using feed of the «Lactating sows» type with the following nutritional value: crude protein – 163.9 g/kg; metabolic energy – 2990.4 Kcal/kg. Acclimatization and feeding of suckling piglets begins at 7 days of age and continues until weaning with starter feed in the form of granules from home-made pellets, nutritional value: crude protein – 185.0 g/kg; metabolic energy – 325.0 Kcal/kg. The duration of the suckling period is 28 days.

The basic diet (BD) is represented by compound feed of own production, for balancing the diets we used premixes and PVMS in the composition of «Single and farrowing sows», (%): wheat shavings – 26.5; barley shavings – 45.0; pea shavings – 10.0; sunflower meal – 15.0; premix – 3.5; «Lactating sows» (%): wheat shavings – 40.0; barley shavings – 40.0; protein-mineral-vitamin supplement – 20.0.

The experimental sows were divided into four groups of 24 gilts each (according to the principle of analogues) according to generally accepted methods [6]. The control group of sows used the basic diet «Single and pregnant sows», «Lactating sows»; sows of group II consumed the basic diet «Single and pregnant sows» with the addition of 1 kg per ton by

weight of feed additive «FOLICO F» (France), sows of group III received the basic diet “Single and farrowing sows” with the addition of 2 kg per ton by weight of feed additive «FOLICO F» and animals of group IV consumed the basic diet “Single and pregnant sows” with the addition of 3 kg per ton by weight of feed additive «FOLICO F» (Table 1).

Table 1

**Scheme of use of the feed additive «FOLICO F» for sows
of the experimental groups**

№	Group	Breed		Feeding conditions
		sows	boar	
I	Control	LW × L	PIC 337	Ration «Single Sows and Gestation Sows», «Lactating Sows»
II	Experimental	LW × L	PIC 337	Ration «Single Sows and Gestation Sows » + 1 kg/t by weight of feed additive «FOLICO F»* and Ration «Lactating Sows»
III	Experimental	LW × L	PIC 337	Ration «Single Sows and Gestation Sows » + 2 kg/t by weight of feed additive «FOLICO F»* and Ration «Lactating Sows»
IV	Experimental	LW × L	PIC 337	Ration «Single Sows and Gestation Sows » + 3 kg/t by weight of feed additive «FOLICO F»* and Ration «Lactating Sows»

Note: * – Experimental feed additives were introduced into the diet directly in the farm’s feed shop during the preparation of these recipes.

In order to study the effect of the feed additive «FOLICO F» on the productivity of sows during critical periods of pregnancy, blood samples were taken for laboratory testing for the content of the hormone cortisol in the blood serum on the 15th, 45th, 75th and 105th day of pregnancy. For this purpose, 10 ml of blood was taken from the jugular vein of five cows from 4 experimental groups at 6:00 am. The analysis of blood samples was carried out in the multidisciplinary diagnostic laboratory of LLC «Expert Center «Biolights» (Kyiv). In the blood serum of experimental pigs, the concentration of cortisol was determined by standard methods using an ELISA kit (EIA-1887, «Cortisol ELISA», USA) [3, 5].

The patented composition of the innovative feed additive «FOLICO F» manufactured by IDENA (France) includes special phytogenic components, extracts with estrogenic effects, vitamin E, beta-carotene, and calcium carbonate and dextrose as fillers. The reproductive traits of sows of the experimental groups were evaluated by the following indicators: total number of piglets at birth (heads), number of piglets born (heads), the proportion of stillborn piglets (%), piglet nest weight at birth and weaning (28 days); live weight of each piglet at birth and weaning (28 days) (kg), conditional milkiness (kg), the number of piglets in the nest at weaning (heads), average daily growth of suckling piglets (g), and safety (%) [6].

To summarize the reproductive characteristics of sows of the experimental groups, an evaluation index was calculated for a limited number of traits (modified by M. D. Berezhovsky) [6]:

$$I = B + 2W + 35G,$$

where I – is the index of reproductive qualities; B – is the number of piglets at birth, head; W – is the number of piglets at 28 days of age, head; G – is the average daily weight gain of piglets before weaning, kg.

Within the framework of the scientific and economic experiment, the conditions of feeding, watering, housing, care and prevention of experimental animals complied with the national legislation «Requirements for the welfare of farm animals during their keeping» (Law of Ukraine «On Veterinary Medicine», 2021) [14].

Economic efficiency of research results on the effect of feed additives «*FOLICO F*» (IDENA, France) on the reproductive qualities of sows were determined according to the methodological recommendations of S. Smyslov, M. Povoda et al. [6].

The experimental data were processed using computer equipment and application software packages with the use of methods of variation statistics [1].

Presentation of the main research material. Due to the introduction of a feed additive into the diet of lactating and gestation sows «*FOLICO F*» (IDENA, France) on the basis of innovative composition provided an opportunity to obtain higher reproductive performance of sows of experimental groups (Table 2).

Table 2

Reproductive qualities of sows, $\bar{X} \pm S_{\bar{X}}$

Indicator	Group			
	I	II	III	IV
<i>n</i>	24	24	24	24
Percentage of farrowing, %	83,33	87,50	95,83	91,67
Total number of piglets at birth, heads	14,20 ±0,210	14,63 ±0,230	16,91 ±0,312***c	15,04 ±0,251*
Number of piglets born, heads	13,20 ±0,132	13,68 ±0,212	15,96 ±0,290***bc	14,13 ±0,334*
Proportion of stillborn piglets, %	7,04 ±0,811	6,49 ±1,320	5,62 ±0,440*	6,05 ±0,700
Nest weight of piglets at birth, kg	18,74 ±1,200	18,88 ±0,261	22,98 ±0,360**c	19,78 ±0,308
Live weight of each piglet at birth, kg	1,42 ±0,016	1,38 ±0,016	1,44 ±0,017	1,40 ±0,020
Conditional milkiness, kg	55,13 ±1,162	65,19 ±0,844***	92,44 ±1,371***c	68,61 ±1,684***
Number of piglets at weaning at the age of 28 days, heads	12,00 ±0,140	12,68 ±0,138**	14,90 ±0,204***ac	13,10 ±0,208***
Average live weight of one piglet at weaning of 28 days, heads	5,70 ±0,080	6,45 ±0,114***	7,87 ±0,162***c	6,58 ±0,150***
Live weight of a nest of piglets at weaning of 28 days, kg	68,40 ±1,174	81,79 ±1,288***	117,26 ±1,680***c	86,20 ±1,602***
Average daily gain of piglets in the suckling period, g	158,52 ±2,620	187,78 ±3,284***	238,15 ±4,068***bc	191,85 ±3,820***
Safety of piglets, %	90,91 ±1,020	92,69 ±1,200	93,36 ±1,140	92,71 ±1,320
Index, points	42,75 ±0,280	45,61 ±0,342***	54,10 ±0,424***c	47,04 ±0,563***

Notes: * – $p < 0.05$; ** – $p < 0.01$; *** – $p < 0.001$ (when comparing experimental groups to the control). a – $p < 0.05$; b – $p < 0.01$; c – $p < 0.001$ (when comparing the II, III and IV experimental groups).

It was found that under different management of the experimental feed additive to the main diet of pregnant and lactating sows in the conditions of private enterprise «Dumytrash», significantly different indicators of reproductive qualities were obtained.

Considering that in the context of the experimental groups, the highest value of farrowing percentage (87.5-95.83%) was characterized by the groups of sows receiving phytobiotic supplementation «*FOLICO F*» (*IDENA, France*) can be said to provide a better environment for embryos in the uterine mucosa, thanks to endocrine regulation and improved uterine nutrition due to the innovative composition of the product. The use of the experimental feed additive in the diet of pregnant and gestating sows created better conditions for fertilization of eggs, implantation of the embryo and for the development of fetuses in general.

The total number of piglets at birth and, in fact, the rate of multiplicity were higher in sows of the III and IV experimental groups – 16.91 and 15.96 heads and 15.04 and 14.13 heads, respectively. Addition of 2 kg/t of supplement to the sow diet «*FOLICO F*» influenced the decrease in the proportion of stillborn piglets, thus, a positive reaction of the experimental animals to the components of the phytobiotic preparation can be noted. Animals of group III were characterized by the lowest proportion of stillbirths – 5.62%, which is significantly less than the control by 1.42% ($p < 0.05$). Indicators of productivity and offspring development are directly related to the oxidative status of the sow [19], «*FOLICO F*» contains plant extracts with strong antioxidant properties.

The indicators of large fertility did not have a significant difference in the control and experimental groups, but the higher value of nest weight of piglets at birth in the third group of sows allowed to obtain the highest value of nest weight at birth – 22.98 kg.

It should be noted that the use of a feed additive in the diets of pregnant and sow «*FOLICO F*» has a positive effect not only during farrowing, but also in the future, affecting the growth and development of suckling piglets. The conditional milkiness of sows, which is calculated on the basis of data on the live weight of piglets and their number at the age of 21 days, was significantly higher in sows of the experimental groups. Thus, the conditional milkiness for sows of group III was 92.44 kg and exceeded the analogues from the control group by 37.31 kg ($p < 0.001$); group II by 27.25 kg ($p < 0.001$) and group IV by 23.83 kg ($p < 0.001$), respectively.

Use of the feed additive «*FOLICO F*» in the conditions of industrial technology in groups of gestating and pregnant sows made it possible to increase the live weight of piglets at weaning and their number. Taking this into account, we note that the weight of the piglet nest at weaning was higher in sows of the III experimental group (OR + 2 kg/t «*FOLICO F*») – 117.26 kg, analogues of the II group (OR + 1 kg/t «*FOLICO F*») had a value of 81.79 and IV group (OR + 3 kg/t «*FOLICO F*») – 86.20 kg and exceeded the control group (I) by 48.86 kg ($p < 0.001$); 13.39 ($p < 0.001$) and 17.80 kg ($p < 0.001$), respectively.

The analysis of the growth energy of suckling piglets showed a significant difference in the experimental groups. Thus, the values of average daily growth were the lowest in piglet nests where sows consumed the main diet (group I) – 158.52 g and were inferior to the nests of sows of experimental groups. Piglets from the III experimental group were characterized by a higher weight gain – 238.15 g.

In the experimental groups, we also note higher values of piglet survival to weaning. Thus, sows of group II had a piglet survival rate of 92.69%, group III – 93.36% and group IV – 92.71%.

When calculating the generalized index of reproductive qualities of sows, it was found that all experimental groups where the phytobiotic feed additive «*FOLICO F*»

was used in addition to the main diet were superior to the control. In terms of experimental groups, the superiority of sows of group III (OR + 2 kg/t «*FOLICO F*») was proved – 54.10 points, which exceeded analogues from group II by 11.35 points ($p < 0.001$) and analogues of group IV by 7.06 points ($p < 0.001$). Based on the study, it can be argued that the most optimal dose of feed additive is 2 kg per ton of feed, and this has been confirmed experimentally.

In the practice of modern pig breeding, the level of the hormone cortisol is used as an indicator of various inflammatory phenomena [3]. An increase in cortisol levels indicates that the mechanism of counteracting inflammation is being triggered. As part of our scientific and economic experiment, we determined the level of the hormone cortisol in the blood serum on the 15th, 45th, 75th and 105th day of farrowing. The results show that cortisol levels increase during pregnancy (Figure 1). At the end of pregnancy, its level is almost 2 times higher than at the beginning, which is an absolute physiological norm. And, as a rule, after farrowing, its level stabilizes on its own.

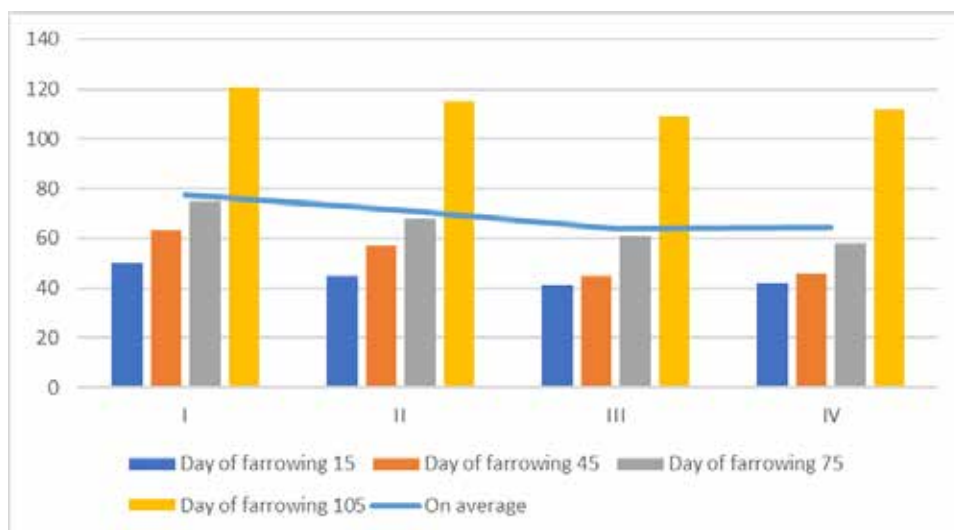


Figure 1. Cortisol concentration in blood serum of experimental sows, nmol/l

A visual representation of the results of cortisol values in blood serum shows that sows of the control group were characterized by an increased content of cortisol in different periods of pregnancy from 50 nmol/l to 121 nmol/l, which may indicate a state of chronic stress. The lowest levels of cortisol in the blood serum were observed in sows of the III experimental group, regardless of the period of farrowing, which indicates the «accumulation effect» and stable action of the active substances of the phytobiotic feed additive «*FOLICO F*».

Thus, we conclude that, based on the analysis of cortisol in the blood serum of experimental sows, it demonstrates anti-inflammatory effect «*FOLICO F*» in the experiment.

Increasing the economic efficiency of pork production involves increasing production volumes while reducing labor and capital costs per unit of growth, i.e., ensuring the intensification of the industrial pig industry. Results of the economic efficiency of the phytobiotic preparation «*FOLICO F*» on the reproductive traits of sows is presented in Table 3.

Table 3

Economic efficiency of the conducted research (per 100 sows)

Indicator	Group			
	I	II	III	IV
Percentage of farrowing, %	83,33	87,5	95,83	91,67
Number of piglets born, heads (per 1 sow).	13,20	13,68	15,96	14,13
Piglets produced per farrowing, heads	1099,96	1197,00	1529,45	1295,30
Number of additional piglets received, heads	-	97,0	429,5	195,3
Number of piglets at weaning at 28 days (per 1 sow), heads	12,00	12,68	14,90	13,10
The number of piglets at weaning at 28 days, heads	999,96	1109,50	1427,87	1200,88
The number of additional piglets obtained at weaning at 28 days, heads	-	109,50	427,91	200,92
Live weight of piglets at weaning, kg	5,70	6,45	7,87	6,58
Additional costs of feed additive for all sows, UAH	-	10491,20	21015,60	31473,60
The gain in live weight of piglets, g	42,80	56,25	91,81	62,21
Cost of 1 kg of live weight gain, UAH.	11940,3	10439,99	9777,52	10018,27
Average selling price per 1 kg of live weight gain, UAH	22000	22000	22000	22000
Cost of piglet live weight gain, thousand UAH	511,02	587,27	897,69	623,19
Average selling price of piglet live weight gain, UAH thousand	941,56	1237,54	2019,86	1368,52
Net profit on sales, UAH thousand	430,54	650,27	1122,17	745,33
Level of profitability, %	84,25	110,73	125,01	119,60

Note: * – at average prices in 2023.

It was found that sows that received an additive in addition to the main diet «*FOLICO F*» had a higher number of farrowings. In the same groups, we also observe increased rates of fertility.

Given the increase in the level of reproductive traits and growth energy of piglets with the use of a feed additive «*FOLICO F*» It became possible to obtain higher values of live weight gain at the time of weaning: group II – 56.25 kg; group III – 91.81 kg and group IV – 62.21 kg, which is 13.45, 45.01 and 19.41 kg higher than the control, respectively. With a higher value of weight gain and a higher number of piglets at weaning, a decrease in the cost of production in these nests was determined.

Even taking into account the additional costs of purchasing a feed additive «*FOLICO F*» net profit from the sale of live weight of piglets amounted to 650.27 thousand UAH in group II; 1122.17 thousand UAH in group III and 745.33 thousand UAH in group IV, which is respectively higher than in the control group by 219.73 thousand UAH; 691.63 and 314.79 thousand UAH.

The highest level of profitability of growing suckling piglets was determined for the use of a feed additive in the diets of gestating and sow sows in the amount of

2 kg/t – 125.01%. We observe that with an increase in the dose of the drug to 3 kg/t, the profitability index decreases by 5.41% and amounts to 119.6%. At the minimum dose of the drug at the level of 1 kg/t, the level of profitability was 110.73%, but higher than the control by 26.48%. It should be noted that at today's selling price for live weight of piglets, the pig industry is absolutely profitable, and with the introduction of various technological solutions (use of feed additives «*FOLICO F*») represents an opportunity to further increase the industry's profitability.

Conclusions and suggestions. It has been established that due to the introduction of a feed additive into the diet of pregnant and lactating sows «*FOLICO F*» (IDENA, France) based on its innovative composition, the reproductive traits of sows are improved.

It has been proved that sows receiving different doses of the complex feed additive were characterized by different levels of reproductive qualities. It has been established that the most optimal dose of feed additive is 2 kg per ton of feed.

A higher value of farrowing percentage (87.5-95.83%) was characterized by the groups of sows receiving the phytobiotic supplement «*FOLICO F*». The use of the experimental feed additive in the diet of pregnant and lactating sows created better conditions for fertilization of eggs, implantation of the embryo and for the development of fetuses in general.

It was found that the weight of the piglets' nest at weaning was higher in sows of the III experimental group (Ration + 2 kg/t «*FOLICO F*») – 117.26 kg, analogues of the II group (Ration + 1 kg/t «*FOLICO F*») had a value of 81.79 and IV group (Ration + 3 kg/t «*FOLICO F*») – 86.20 kg and exceeded the control group (I) by 48.86 kg ($p < 0.001$); 13.39 ($p < 0.001$) and 17.60 kg ($p < 0.001$), respectively. Analysis of cortisol levels in the blood of experimental sows demonstrates anti-inflammatory effect «*FOLICO F*».

Even taking into account the additional costs of purchasing a feed additive «*FOLICO F*» net profit (per 100 farrowings) in the sale of live weight of piglets amounted to 650.27 thousand UAH in group II; group III – 1122.17 and group IV – 745.33 thousand UAH, which is respectively higher than the control group by 195.99 thousand UAH; 637.26 and 287.23 thousand UAH. A higher level of profitability was determined for the use of a feed additive in the diets of gestating and sow sows in the amount of 2 kg/t – 125.01%.

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