

The effect of adding a dietary fibre feed supplement on sow welfare, reproductive performance, and farrowing economic indicators

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Abstract. The purpose of the research was to study the effect of including 1.0% of the feed fibre supplement in the diets of pregnant and lactating sows on the course of farrowing, reproductive performance, growth intensity and survival of piglets, as well as the economic efficiency of production. The study was conducted under the conditions of an industrial pig complex on two groups of sows formed according to the principle of analogues. The control group received standard compound feed according to physiological condition, while the sows of the experimental group additionally received the fibre supplement JELUVET® at a dose of 10 kg/t of compound feed. Feed conversion was recalculated per one weaned piglet and per 1 kg of piglet weight gain. It was established that the use of fibre reduced the proportion of farrowings with complications by 2.83% and decreased expenditures on preventive and therapeutic measures by 72.16 UAH per sow (34.4%). Number born alive piglets

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in the experimental group increased by 0.58 (4.1%), and the total number of piglets born per farrowing exceeded the control by 0.51 (3.4%). The average weight of stillborn piglets decreased by 1.07 percentage points, while the litter weight of piglets at birth increased by 1.06 kg (5.7%) and at weaning by 2.92 kg (3.5%), without a negative effect on individual piglet weight gains. The use of the supplement did not increase total feed consumption; however, it reduced feed expenditure per 1 kg of piglet weight gain by 0.21 kg (3.3%) and per one weaned piglet by 1.71 kg (4.2%). Economic evaluation showed that the additional profit per sow amounted to 622.07 UAH, which confirmed the economic feasibility of using the fibre supplement. The obtained results indicated that the inclusion of 1.0% fibre supplement in the diet of pregnant and lactating sows improved the course of farrowing, increased prolificacy and the total productivity of piglet litters, promoted efficient feed utilisation, and ensured a significant economic effect

Keywords: piglets; pregnancy; lactation; dietary fibre; economic efficiency

INTRODUCTION

Intensive pig breeding aimed at increasing reproductive productivity and prolificacy of sows has led to significant changes in their physiology, especially during the critical periods of pregnancy and lactation. Under conditions of modern intensive production, animals are subjected to excessive metabolic stress, which manifests in disorders of the digestive and endocrine systems, an increased incidence of constipation, complications during farrowing, and significant body weight losses during lactation. This, in turn, negatively affects the survival and viability of offspring, reduces the growth intensity of piglets, increases perinatal mortality rates, and creates serious economic and ethical challenges for modern pig production.

Analysis of publications showed that increasing the content of dietary fibre in the diet of pregnant and lactating sows is one of the promising approaches for correcting digestive function, intestinal microbiota, and reproductive performance of animals during periods of increased stress. In their studies, J. Hu *et al.* (2021), D.S. Rosero (2024), and Y. Ji (2025) demonstrated that the inclusion of high-fibre components in the diet contributed to improved intestinal motility and reduced the incidence of constipation in sows during the final phase of pregnancy and in the first days of lactation. This improvement was accompanied by increased voluntary feed intake during lactation, which is a key factor for maintaining energy balance and optimal animal productivity. C.A. Montoya *et al.* (2023) and S. Oh *et al.* (2024) confirmed a positive correlation between a high dietary fibre content in the diet and stabilisation of the intestinal microbiota, which had an indirect effect on reducing oxidative stress indicators and improving reproductive results. The study by C.A. Montoya *et al.* (2023) examined the mechanisms of fibre influence on intestinal microbiota and SCFA (short-chain fatty acid) production. The authors showed that different types of fibre differently modulate microbial

composition, which directly affects the immune status and energy metabolism of sows during periods of pregnancy. This emphasises the importance not only of the total fibre level, but also of its qualitative composition and fermentation properties.

Research data from Y.K. Adi *et al.* (2022) and Y. Liu *et al.* (2022) showed that the addition of dietary fibre to the diet during the final phase of pregnancy reduces the incidence of constipation and contributes to shortening the duration of farrowing, which positively affects animal welfare and reduces the likelihood of complications. Simultaneously with the above-described positive effects of fibre supplementation, T. Feyera *et al.* (2021) and R. Boonprakob *et al.* (2024) reported in their works a positive effect of high-fibre diets on reducing the proportion of stillborn piglets and increasing postnatal survival rates, but they emphasised the high variability of results depending on the type of fibre, its level, and duration of application. These studies highlight the potential of differentiated use of fibres, but at the same time indicate the complexity of optimising such practices in farm management. Correction of the fibre composition of the diet, as noted by T. Pedersen *et al.* (2020) and D. Lu *et al.* (2022), contributes to increased satiety, improved intestinal microbiota, and increased production of short-chain fatty acids (SCFA), which ensures a reduction in farrowing duration by 5-12% and a decrease in the incidence of complications by 2-4%, increasing piglet viability and voluntary feed intake by sows during lactation.

Thus, the analysis of modern publications from 2020-2025 shows that although most studies are devoted to the influence of dietary fibre on digestive function and certain reproductive indicators of sows, the issues of the optimal combination of soluble and insoluble fibres, taking into account their fermentation properties, dietary energy density, and long-term effects on sow productive cycles and the economic

efficiency of pork production remain insufficiently studied. In addition, there are insufficient studies evaluating the economic aspects of introducing specific fibre sources into industrial practice while maintaining or increasing reproductive productivity, which determined the relevance of conducting this research. Therefore, its aim was to study the effect of adding the feed supplement as a source of dietary fibre to the basal diet of pregnant and lactating sows on the course of farrowing, reproductive performance, growth and survival of piglets during the suckling period, as well as on the economic efficiency of pork production.

MATERIALS AND METHODS

The study was conducted under the conditions of Re-producer No. 2 of the Limited Liability Company (LLC) "Scientific and Production Enterprise 'Hlobyne Pig Complex'" of Kremenchuk District, Poltava Region, Ukraine, during the period from February 6 to July 4, 2025. All animal handling procedures fully complied with the requirements of Council Directive 98/58/EC (1998). The research protocol was approved by the Bioethics Commission of Sumy National Agrarian University (certificate No. BT2025/07/19-02), in accordance with the standards of good clinical practice regarding the protection and humane treatment of experimental animals. To accomplish the assigned tasks, two groups of sows were formed according to the principle of paired analogues, taking into account age, live weight, and farrowing number. The number of animals in the experiment in each group was 320 heads, which corresponded to one weekly technological group. During pregnancy and the suckling period, the sows of the experimental group received standard compound feed for pregnant and lactating sows with the addition of the feed product JELUVET® in the amount of 10 kg per 1 ton of compound feed, in accordance with the recommendations of the supplier company.

Animals of the control group received compound feed with similar nutritional value, but without the addition of JELUVET®. Throughout the entire experimental period, all technological, veterinary-preventive, and zoohygienic measures were carried out according to the same scheme for both groups of animals in accordance with the housing technology adopted at the enterprise. During the pregnancy and suckling periods, daily clinical monitoring of the health status of the sows was conducted, with recording of cases of physiological disorders. During the farrowing period, the operator of the farrowing unit registered in the stall card near each stall, with subsequent transfer to the research journal, the number of farrowings with complications, as well as their main causes. Simultaneously, upon completion of

farrowing in each stall, which was determined by placenta expulsion, the total number of piglets born was recorded, including live-born, weak (non-registered), stillborn, and mummified piglets.

After the birth of piglets, sow prolificacy was determined as the number of live-born piglets, and their live weight was also determined by weighing the litter using automatic scales of the Dutch company MS Pigscale (MS Schippers) with a division value of 0.005 kg. Supplementary feeding of piglets from the 2nd day of life until weaning at 21 days was carried out using the liquid milk replacer Optikee Milk with the help of the Cullina Mix Pro feeding kitchen. Throughout the entire suckling period, the number and body weight of piglets that were removed were recorded, with indication of the reasons for removal. At weaning, the number of piglets in each litter was recorded, and the litter weight was determined using MS Pigscale, on the basis of which the average body weight of piglets was calculated separately for the control and experimental groups. Based on the number of born alive piglets and the number of piglets at weaning, the survival rate until weaning was calculated by dividing the number of piglets at weaning by the number of born alive piglets at birth, which was expressed as a percentage. Recording of compound feed consumption by sows during the pregnancy and suckling periods was carried out daily using torsion scales installed under the feed temporary storage bunker.

The amount of fed pig milk replacer was recorded automatically according to the data of the feeding kitchen processor. Based on the obtained indicators of sow productivity and piglet survival in the control and experimental groups, the economic efficiency of using the feed product JELUVET® was calculated, taking into account the cost of the preparation, feed expenditures, piglet output, and survival in accordance with the methodology for determining the economic efficiency of scientific research in pig production (Khmelnychyi *et al.*, 2023). For this purpose, based on the research data on the quantity of feeds of different formulations and the price excluding value-added tax per unit of feed of the corresponding formulations provided by the farm accounting department for the research period, the cost indicators of feeds, milk replacers, and feed additives were determined. Based on these data, the feed cost of maintaining one sow was calculated (by dividing the gross cost of all feeds consumed by the sow by their quantity at the end of the study); similarly, the feed cost of a piglet litter, one weaned piglet, and a unit of weight gain were calculated.

Expenditures on preventive and therapeutic measures were determined by dividing the gross expenditures

on these measures in a specific technological (experimental) group obtained from primary zootechnical and accounting records by the number of sows, piglets, and their gross weight gain. To test the null hypothesis regarding the absence of differences between the control and experimental groups of pigs, Student's t-test for independent samples was used. At the same time, estimates of arithmetic means and their statistical errors were determined. Differences between group means were considered significant at the following significance levels: $p < 0.05$ for the first level, $p < 0.01$ for the second level, and $p < 0.001$ for the third

level. Statistical processing of the obtained data was performed using methods of variation statistics (Kramarenko *et al.*, 2019) with the help of the MS Excel spreadsheet editor.

RESULTS AND DISCUSSION

The addition of 1.0% of a fibre feed supplement to the diet of pregnant and lactating sows significantly affected the course of farrowing, the health status of sows, and the level of production costs compared to the control group, which received a standard diet according to physiological condition (Table 1).

Table 1. Proportion of farrowings with complications and expenditures on preventive and therapeutic measures for sows under different feeding strategies

Indicator	Group	
	I control	II experimental
Number of sows at the beginning of the experiment, heads	315	314
Proportion of farrowings with complications, %	11.7	8.9
Expenditures on preventive and therapeutic measures per sow, UAH	209.97	137.81
Expenditures on preventive and therapeutic measures per piglet, UAH	17.87	15.45
Piglet survival during the suckling period, %	93.37 ± 1.131	93.64 ± 1.071

Source: developed by the authors

The proportion of farrowings with complications in the sows of the experimental group decreased by 2.8 percentage points. The obtained data indicate a positive effect of the fibre supplement on the course of the parturition process, which is consistent with the results presented in Table 2 regarding the reduction in the proportion of stillborn piglets. The decrease in the frequency of complicated farrowings was directly reflected in the level of expenditures on preventive and therapeutic measures. Thus, expenditures per sow in the experimental group decreased by 72.16 UAH or 34.4%. A similar trend was observed when calculating expenditures per piglet: in the experimental group they were 2.42 UAH or 13.5% lower. The piglet survival rate during the suckling period in both groups was high and did not differ statistically; however, it showed a tendency to increase in the

experimental group-being higher by 0.27 percentage points. Despite the absence of a significant difference, the combination of slightly higher survival and higher prolificacy in the experimental group ensured an overall increase in piglet output per sow. Taken together, the obtained results indicate that the inclusion of a fibre additive in the diet of sows during pregnancy and lactation improves sow welfare by reducing the proportion of complicated farrowings, improving the overall physiological state of the animals, and significantly reducing expenditures on veterinary preventive and therapeutic measures without negatively affecting piglet survival. This emphasises both the biological and economic feasibility of using dietary fibre in sow feeding. The addition of dietary fibre also indirectly affected the reproductive performance of sows (Table 2).

Table 2. Reproductive performance indicators of sows under different feeding strategies

Indicator	Group	
	I control	II experimental
Total number of piglets born per farrowing, heads	15.16 ± 0.133	15.67 ± 0.171*
Prolificacy, heads	14.08 ± 0.127	14.66 ± 0.162**
Number of stillborn piglets per farrowing, heads	1.08	1.01
Proportion of stillborn piglets per farrowing, %	5.40	4.33
Number of weak non-registered piglets per farrowing, heads	1.14	1.18
Proportion of weak non-registered piglets per farrowing, %	7.52	7.56
Number of mummified piglets per farrowing, heads	0.26	0.33
Proportion of mummified piglets per farrowing, %	1.72	2.11
Birth weight of registered piglets, kg	1.31 ± 0.011	1.33 ± 0.009

Table 2, Continued

Indicator	Group	
	I control	II experimental
Litter weight of born alive piglets at birth, kg	18.44 ± 0.213	19.50 ± 0.196***
Number of piglets in litter at weaning, heads	13.14 ± 0.143	13.73 ± 0.114**
Body weight of one piglet at weaning, kg	6.35 ± 0.071	6.29 ± 0.059
Litter weight of piglets at weaning, kg	83.44 ± 1.191	86.36 ± 1.125

Note: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

Source: developed by the authors

The total number of piglets born per farrowing in the experimental group was higher by 0.51 or 3.4% compared to the control group ($p < 0.05$). A similar trend was observed for prolificacy, which in sows of the experimental group exceeded the control by 0.58 or 4.1% ($p < 0.01$). The key factor contributing to the increase in prolificacy in the experimental group was a reduction in the number and proportion of stillborn piglets. The average number of stillborn piglets per farrowing in sows receiving the tested fibre additive decreased by 6.5%, and their proportion decreased by 1.07 percentage points. Against the background of the reduced number of stillborn piglets, a higher output of live-born piglets was recorded in the experimental group. The number of weak (non-registered) piglets per farrowing did not differ significantly between groups, indicating the absence of a negative effect of the increased fibre level on the viability of newborn animals. A similar pattern was observed for mummified fetuses. The use of the fibre additive led to a tendency toward an increase in piglet birth weight. The average birth weight of registered piglets in the experimental group was 0.02 kg or 1.5% higher than in the control. Against the background of higher prolificacy, this resulted in a significant increase in litter weight of live-born piglets at birth-by 1.06 kg or 5.7% ($p < 0.001$).

In the subsequent suckling period, the positive effect of fibre consumption was also observed. The number

of piglets per litter at weaning in the experimental group was higher by 0.59 or 4.5% compared to the control ($p < 0.01$). At the same time, the average body weight of one piglet at weaning did not differ significantly between groups, indicating the absence of a negative effect of larger litter size on individual piglet growth. However, due to the higher number of piglets per litter, an increase in litter weight at weaning was observed in the experimental group – by 2.92 kg or 3.5% compared to the control group. Thus, the inclusion of 1.0% dietary fibre supplement in the diet of sows during pregnancy and lactation contributes to a reduction in the proportion of stillborn piglets, an increase in prolificacy, and an increase in litter weight at birth and weaning, without adversely affecting individual piglet growth performance. At the same time, it was noted that the addition of the specified supplement did not negatively affect the growth rate of piglets during the suckling period, while leading to certain differences in the distribution of productivity between individual and litter-level indicators (Table 3). The absolute weight gain per piglet in the experimental group was lower by 0.08 kg or 1.6% than in the control. A similar trend was observed for average daily gain and relative growth rate. However, analysis of litter growth indicators as a whole showed the opposite pattern. The absolute weight gain of the piglet litter in the experimental group was higher by 1.87 kg or 2.9% than in the control group.

Table 3. Growth intensity of piglets in litters of sows under different feeding strategies

Indicator	Group	
	I control	II experimental
Absolute weight gain per piglet, kg	5.04 ± 0.073	4.96 ± 0.056
Average daily gain per piglet, g	233 ± 7.2	228 ± 6.1
Relative growth rate per piglet, %	131.59 ± 1.058	130.18 ± 1.003
Absolute weight gain of piglet litter, kg	64.99 ± 1.091	66.86 ± 1.007
Average daily gain of piglet litter, kg	3.01 ± 0.008	3.07 ± 0.011

Source: developed by the authors

A similar trend was observed for the average daily weight gain of the litter, which in sows of the experimental group was higher by 0.06 kg or approximately 2.0%. The revealed differences are primarily

explained by the larger number of piglets per litter in the experimental group, as shown in Table 2. Under conditions of a larger litter size, the average individual weight and growth rate of a single piglet

are naturally somewhat reduced due to competition for maternal milk; however, the total productivity of the litter increases. Thus, the use of the studied fibre additive indirectly contributed to an increase in the total output of live weight of piglets per sow during the suckling period. The obtained results are consistent with physiological concepts regarding the effect of dietary fibre on the course of farrowing, colostrum

secretion, and lactation stability, which collectively ensure better realisation of the reproductive potential of sows even under slightly lower individual piglet growth rates. The addition of dietary fibre to the diet of sows did not lead to an increase in total feed intake over the experimental period, while positively affecting feed conversion indicators in relation to the obtained production (Table 4).

Table 4. Feed intake of different feed formulations by sows and piglets under different feeding strategies

Indicator	Group	
	I control	II experimental
Amount of feed consumed during pregnancy, kg	362.89	355.31
Average daily feed intake during pregnancy, kg	2.93	2.87
Amount of feed for lactating sows consumed, kg	168.48	171.35
Average daily feed intake during lactation, kg	7.80	7.86
Total feed intake, kg	531.37	526.65
Amount of JELUVET® supplement consumed per sow, kg	0.00	5.16
Total feed substances consumed per sow, kg	531.37	531.81
Feed consumed per weaned piglet, kg	40.44	38.73
Average daily feed intake over the experimental period, kg	3.65	3.65
Feed consumed per 1 kg piglet weight gain, kg	6.37	6.16
Milk replacer consumed per litter of piglets, kg	2.94	3.46
Milk replacer consumed per 1 kg piglet weight gain, g	35.3	40.1

Source: developed by the authors

During the pregnancy period, sows of the experimental group, which were fed a bulkier diet, consumed 7.58 kg or 2.1% less compound feed compared to their analogues in the control group. This occurred due to the greater volume of the compound feed. Accordingly, the average daily feed intake during this period decreased by 0.06 kg or 2.0%. The obtained results indicate more stable functioning of the digestive tract and better satiety of the ration due to structural fibre. During the lactation period, conversely, a tendency toward slightly higher feed intake was observed in sows of the experimental group (by 2.87 kg or 1.7%), which was due to by the larger number of piglets in their litters. The average daily feed intake during this period was also higher in the experimental group (by 0.06 kg or 0.8%), which is physiologically justified given the higher number of piglets per litter and greater nutritional demand for lactation.

Despite these differences, the total amount of feed consumed over the experimental period was practically the same between groups when taking into account the consumption of the feed supplement in the amount of 5.16 kg per sow. An important indicator of feeding efficiency is feed expenditure per unit of production. Feed expenditure per weaned piglet in the experimental group was 1.71 kg or 4.2% lower than in the control group. A similar advantage was observed for feed expenditure per 1 kg of piglet weight gain, which decreased in the experimental group by 0.21 kg

or 3.3%. The average daily feed intake over the entire experimental period was identical in both groups and amounted to 3.65 kg, indicating the absence of an effect of the fibre additive on the overall feeding intensity. The different number of piglets per sow during the suckling period also resulted in different consumption of pig milk replacer. Its consumption in the experimental group was slightly higher – by 0.52 kg or 17.7% compared to the control group. Accordingly, milk replacer costs per 1 kg of piglet weight gain increased by 4.8 g or 13.6%. This is explained by the larger number of piglets in the litters of the experimental group and increased competition for maternal milk, which required partial compensation through supplementary feeding.

Overall, the use of the studied dietary fibre supplement in the feeding of pregnant and lactating sows allows for improved feed efficiency in piglet production, reduced feed costs per unit of output, and ensures stable feed intake without energy overconsumption, which is an important factor in the economic feasibility of such a feeding strategy. Differences in feed intake and its price influenced the economic outcomes of applying different feeding strategies for sows during pregnancy and lactation (Table 5). The use of the additive was accompanied by a certain increase in direct feed costs; however, these costs were partially offset by increased reproductive and production efficiency. During pregnancy, the cost of feed consumed by sows in the

experimental group was 66.7 UAH or 2.1% lower. This is consistent with the data in Table 4 regarding slightly lower feed intake by sows in the experimental group during pregnancy.

Table 5. Cost of feed consumed by sows and piglets under different feeding strategies

Indicator	Group	
	I control	II experimental
Cost of feed consumed during pregnancy, UAH	3,193.4	3,126.7
Cost of lactation feed consumed, UAH	1,988.1	2,021.9
Cost of JELUVET® additive used, UAH	0.0	290.0
Cost of all feed consumed per sow, UAH	5,181.5	5,438.6
Cost of milk replacer per litter, UAH	331.13	389.25
Cost of milk replacer per weaned piglet, UAH	25.20	28.35
Cost of milk replacer per 1 kg piglet weight gain, UAH	5.09	5.82
Cost of all feed consumed by sow and piglets per litter, UAH	5,512.6	5,827.8
Cost of all feed consumed by sow and piglets per weaned piglet, UAH	419.5	424.5
Cost of feed consumed per 1 kg piglet weight gain, UAH	84.8	87.2
Total feed and veterinary costs, UAH	5,722.60	5,965.65

Source: developed by the authors

At the same time, during the lactation period, feed costs in the experimental group increased by 33.8 UAH or 1.7% compared to the control group. Additionally, the cost of the used feed supplement must be taken into account, which amounted to 290.0 UAH per sow, whereas such costs were absent in the control group. As a result, the total cost of all feed consumed per sow in the experimental group was 257.1 UAH or 5.0% higher than in the control group. A similar difference was observed for the indicator of feed cost consumed by the sow and piglets per litter, which in the experimental group was 315.2 UAH or 5.7% higher than in the control group. However, when recalculated per unit of production, the difference between the groups was much less pronounced. The cost of feed consumed per weaned piglet in the experimental group was only 5.0 UAH or 1.2% higher than in the control group. Similarly, the cost of feed per 1 kg of piglet weight gain increased by 2.4 UAH or 2.8%. Costs associated with the use of milk replacer were higher in the experimental group, which corresponds to the data presented in Table 4. The cost of milk replacer per litter increased by 58.12 UAH or 17.6%, and per weaned piglet by 3.15 UAH or 12.5%. Milk replacer

costs per 1 kg of piglet weight gain also increased by 0.73 UAH or 14.3%. The summarising indicator of the economic assessment was the total cost of feed and veterinary preparations, which in the experimental group was 243.05 UAH or 4.2% higher.

Thus, the use of the dietary fibre supplement led to a moderate increase in direct costs associated with feeding and management; however, considering the reduction in the proportion of complicated farrowings, lower expenditures on veterinary measures, and a higher output of viable piglets, such costs are economically justified. The obtained results indicate the appropriateness of evaluating the effectiveness of fibre additives not only based on absolute costs but also using integrated indicators of reproductive and production performance, since the outcome of commercial pig production is not only physiological parameters and animal welfare but also the concrete economic feasibility of using a particular feeding strategy. Therefore, the data in Table 6 are relevant, summarising the economic results of using the dietary fibre supplement in the feeding of pregnant sows and reflecting the integrated impact of changes in reproductive, productive, and cost indicators.

Table 6. Economic efficiency of using the dietary fibre additive

Indicator	Group	
	I control	II experimental
Market value of weaned piglet litter, UAH	24,697.9	25,563.1
Additional value of weaned piglet litter, UAH	0	865.12
Additional costs for feed and veterinary preparations, UAH	0	243.05
Additional profit per sow, UAH	0	622.07
Additional profit per weaned piglet, UAH	0	45.31
Additional profit per 1 kg of piglet weight gain, UAH	0	9.13

Source: developed by the authors

The market value of the weaned piglet litter in the experimental group increased to 25,563.1 UAH, which provided an additional litter value of 865.12 UAH or +3.5%. The obtained increase in value was primarily due to the higher number of weaned piglets and the greater total litter weight, as shown in Tables 2 and 3. At the same time, the application of the supplement was accompanied by additional costs for feed and veterinary preparations in the amount of 243.05 UAH per sow, which corresponds to the results presented in Tables 4 and 5. The main components of these costs were the price of the supplement itself, slightly higher expenditures on lactation feed and milk replacer, as well as total preventive measures costs. However, despite the higher costs associated with the use of the additional fibre additive, the comparison of additional revenues and costs indicates a clearly expressed positive economic effect of its use. Thus, the additional profit per sow in the experimental group amounted to 622.07 UAH, which exceeds the additional costs by more than 2.5 times. Per unit of production, this provided an additional income of 45.31 UAH per weaned piglet and 9.13 UAH per 1 kg of piglet weight gain.

As a result of the study, it was established that the addition of dietary fibre to the diet of pregnant and lactating sows had a positive effect on the course of farrowing. A reduction in the proportion of complicated farrowings was observed, which in turn led to a decrease in the number of stillborn piglets. The addition of dietary fibre indirectly affected the reproductive performance of sows. Animals receiving this feed supplement had higher prolificacy by 0.58 (4.1%; $p < 0.01$), a higher number of piglets at weaning by 0.59 (4.5%; $p < 0.01$), and higher litter weights at birth and at weaning by 1.06 kg (5.7%; $p < 0.001$) and 2.92 kg (3.5%), respectively, compared to their counterparts that did not receive the supplement. These results are consistent with the findings of B. Liu *et al.* (2021) and G. Cong *et al.* (2025), who showed that increased fibre content in the late gestation phase contributes to reduced farrowing duration, decreased incidence of constipation, and increased prolificacy. The obtained results also align with studies by Y. Adi *et al.* (2022), Y. Liu *et al.* (2022), and R. Boonprakob *et al.* (2024), which demonstrated that increasing dietary fibre content during late gestation and early lactation was associated with a 3-8% reduction in constipation incidence, a shortening of farrowing duration by 0.5-1.2 hours, and an increase of 0.3-0.7 live-born piglets. In experiments by T. Feyera *et al.* (2021), fibre supplementation reduced perinatal piglet mortality by 3.9%, while Y. Li *et al.* (2021) reported an increase in litter weight of born alive piglets by 1.1 kg at birth and 2.9 kg at weaning. Researchers

T. Pedersen *et al.* (2020) and D. Lu *et al.* (2022) also noted improved nutritional status of the fetus and offspring health with increased fibre intake.

The results of B. Liu *et al.* (2021) and A. Grahofer & K. Plush (2023) also confirmed that an increase in litter size, under adequate nutritional support, does not reduce total litter productivity. The addition of dietary fibre to sow diets positively affected feed conversion efficiency, while the total feed intake over the experimental period did not differ significantly between groups. Improvements in feed conversion and stabilisation of feed intake during lactation due to structural fibre, which influences intestinal motility, microbiota formation, and sow appetite, were confirmed by the findings of H. Jo & B. Kim (2023). At the same time, no negative effects of dietary fibre supplementation were observed, such as those reported by Y. Li *et al.* (2021) and X. Liu *et al.* (2024) – namely reduced dietary energy density and feed palatability, which negatively affect fetal growth and litter parameters. Despite positive physiological effects, the economic aspects of fibre inclusion remain insufficiently studied. P. Zhou *et al.* (2025) noted the need to evaluate costs of ingredients, fibre inclusion, and long-term benefits such as reduced piglet mortality, increased lactation feed intake, and improved productivity in subsequent reproductive cycles.

H. Jo & B. Kim (2023) described interconnected mechanisms of fibre action, including the mechanical effect of insoluble fibre, which increases satiety and reduces behavioural stress. J. Moturi *et al.* (2022) reported that fermentation of soluble and partially fermentable fibres in the large intestine produces SCFAs (acetate, propionate, butyrate), which regulate metabolism, appetite, and inflammatory processes. Similarly, R. Jha *et al.* (2019) and E. Rinninella *et al.* (2019) noted that modulation of the gut microbiota increases the abundance of *Prevotellaceae* and *Ruminococcaceae*, altering SCFA profiles and inflammatory markers, thereby supporting optimal performance during late gestation and milk production. Overall, the results of the study confirm the conclusions of the aforementioned researchers, indicating the economic feasibility of rational dietary fibre inclusion to optimise costs and increase profitability of pork production. Thus, the use of 1.0% dietary fibre supplement in sow feeding is an effective strategy for improving their health and reproductive performance, especially during late gestation and early lactation.

CONCLUSIONS

It was established that the inclusion of 1.0% of the fibre feed supplement in the diet of pregnant and lactating sows significantly affects the course of farrowing, reproductive performance, and economic efficiency of

production. The proportion of farrowings with complications in the experimental group decreased by 2.8% compared to the control group, which was accompanied by a reduction in the number of stillborn piglets by 6.5% and a decrease in their proportion by 1.07 percentage points. As a result, prolificacy in the experimental group increased by 0.58 or 4.1%, and the total number of born alive piglets per farrowing increased by 0.51 or 3.4% ($p < 0.05$). The increase in total litter weight at birth amounted to 1.06 kg or 5.7% more, and at weaning by 2.92 kg or 3.5% more than in the control group. Despite slightly lower absolute individual piglet weight gains during the suckling period (-0.08 kg or -1.6% compared to the control), total litter productivity increased. It was found that the total feed intake during the pregnancy period decreased by 7.58 kg or 2.1% in the experimental group, while average daily feed intake decreased by 0.06 kg or 2.0%.

During lactation, there was a tendency toward an increase in feed intake by 2.87 kg or 1.7%, with average daily intake increasing by 0.06 kg or 0.8%, which is explained by the larger number of piglets per litter and the increased nutritional requirements for lactation. Feed expenditure per weaned piglet decreased by 1.71 kg or 4.2%, and per 1 kg of piglet weight gain by 0.21 kg or 3.3%. The economic evaluation showed that direct costs for feed and milk replacer increased by 243.05 UAH or 4.2% per sow. At the same time, the mar-

ket value of the weaned piglet litter in the experimental group increased by 865.12 UAH or 3.5%, which ensured an additional profit of 622.07 UAH per sow and 45.31 UAH per weaned piglet. Thus, the results of the study demonstrated that the inclusion of 1.0% of the fibre supplement in the diet of pregnant and lactating sows increases reproductive performance, improves animal welfare, reduces the proportion of complicated farrowings and stillborn piglets, promotes piglet growth and survival, and enhances feed utilisation efficiency and the economic profitability of production. Promising directions for further research include optimising doses and the ratio of soluble and insoluble fibres in diets, as well as evaluating long-term effects on productivity and production economics.

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CONFLICT OF INTEREST

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Вплив додавання клітковинної кормової добавки на благополуччя свиноматок, їх відтворювальну продуктивність та економічні показники опоросу

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Анотація. Метою досліджень було вивчення впливу включення 1,0 % кормової клітковинної добавки до раціонів поросних і підсисних свиноматок на перебіг опоросу, відтворювальні показники, інтенсивність росту та збереженість поросят, а також економічну ефективність виробництва. Дослідження проведено в умовах промислового свинокомплексу на двох групах свиноматок, сформованих за принципом аналогів. Контрольна група отримувала стандартний комбікорм відповідно до фізіологічного стану, а свиноматки дослідної групи додатково одержували клітковинну добавку JELUVET® у дозі 10 кг/т комбікорму кормової конверсії у перерахунку на одне відлучене порося та на 1 кг приросту поросят. Встановлено, що застосування клітковини зменшувало частку опоросів з ускладненнями на 2,83 % та знижувало витрати на профілактичні та лікувальні заходи на 72,16 грн на одну свиноматку (34,4 %). Багатоплідність у дослідній групі зросла на 0,58 гол. (4,1 %), а загальна кількість народжених поросят на один опорос перевищувала контроль на 0,51 гол. (3,4 %). Середня маса мертвонароджених поросят знизилася на 1,07 в.п., а маса гнізда живих поросят при народженні підвищилася на 1,06 кг (5,7 %), а при відлученні – на 2,92 кг (3,5 %), без негативного впливу на індивідуальні прирости поросят. Застосування добавки не збільшувало загальне споживання кормів, проте зменшувало витрати корму на 1 кг приросту поросят на 0,21 кг (3,3 %) та на одне відлучене порося на 1,71 кг (4,2 %). Економічна оцінка показала, що додатковий прибуток на одну свиноматку становив 622,07 грн, що підтвердило економічну доцільність використання клітковинної добавки. Отримані результати свідчили, що включення 1,0 % клітковинної добавки до раціону поросних і підсисних свиноматок покращувало перебіг опоросу, підвищувало багатоплідність та сумарну продуктивність гнізда поросят, сприяло ефективному використанню кормів і забезпечувало значний економічний ефект

Ключові слова: поросята; поросність; лактація; дієтична клітковина; економічна ефективність