THE ROLE OF THE BIOLOGICALLY ACTIVE PREPARATION IN OPTIMIZING SPERMATOGENESIS IN BREEDING BOARS

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Abstract

The study aimed to evaluate the role of a complex biologically active preparation in optimizing spermatogenesis in breeding boars. The results showed an increase in ejaculate volume in the experimental group (202.5 ± 29.5 ml compared to 168.0 ± 8.5 ml in the control group), as well as an improvement in the qualitative parameters of the semen. Specifically, the percentage of motile spermatozoa increased to 92.4 ± 0.4% compared to 92.0 ± 0.4% in the control group. Additionally, a significant increase in the percentage of progressively motile spermatozoa was observed (72.3 ± 2.8% in the experimental group versus 65.3 ± 2.9% in the control group). Furthermore, the proportion of morphologically normal spermatozoa was higher in the experimental group (78.3 ± 2.9%) than in the control group (69.8 ± 3.4%). Thus, the administration of the complex biologically active preparation optimized the spermatogenesis process in breeding boars by increasing ejaculate volume and improving qualitative parameters (motility, progressive motility, and normal morphology), indicating its potential benefit in supporting reproductive capacity.

Key words: *boars, ejaculate volume, motility, morphology*

INTRODUCTION

The growth and reproduction of swine are of utmost importance in animal husbandry, directly impacting the economic efficiency of agricultural operations [1]. The reproductive capacity of breeding boars is a critical factor in achieving superior productive outcomes, with semen quality directly influencing sow fertility and herd performance.

According to Miclea V., et al., 2010, 2003 [2, 3]; Zahan M., 2017 [4], spermatogenesis is a complex process influenced by numerous endogenous and exogenous factors, including nutrition, housing conditions, metabolic status, and the use of biologically active supplements. In recent years, increasing research has highlighted the role of complex biologically active preparations in stimulating general metabolism and enhancing reproductive functions in farm animals.

The administration of such supplements can optimize semen parameters by increasing ejaculate volume, maintaining sperm motility, and reducing the incidence of morphologically abnormal forms. Furthermore, the use of natural biostimulants represents a sustainable alternative for enhancing reproductive potential without negative impacts on animal health or the quality of animal-derived products [5].

MATERIAL AND METHOD

The experimental study was conducted over a period of 50 days at the Porco Bello swine farm, aiming to evaluate the influence of a complex biologically active preparation on spermatogenesis in breeding boars.

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The manuscript was received: 12.10.2025
Accepted for publication: 19.11.2025

A total of 10 clinically healthy breeding boars were used, divided into two equal groups (n = 5 per group): the control group, which received the standard farm diet without any supplements, and the experimental group, which received the same standard diet supplemented daily with the complex biologically active preparation at a dose of 4 ml/head/day.

Throughout the experiment, the animals were provided with standard housing conditions and a balanced feeding regimen, adhering to zoo-hygiene standards.

Semen collection was performed using the manual method, commonly employed in the evaluation of breeding boars (Fig. 1). Each sample was collected in sterile containers maintained at an optimal temperature to prevent alterations in sperm characteristics.

Fig. 1. - Semen collection from a breeding boar

After collection, the semen samples from the experimental group were diluted according to the experimental protocol. The quantitative and qualitative parameters of the semen were determined using the CEROS (Computer Enhanced Sperm Analysis System) (Fig. 2) computerized system. This program enables automated and objective analysis of sperm characteristics, ensuring high accuracy of the results.

The monitored indicators were: ejaculate volume (ml); total motility (%); progressive motility (%); percentage of spermatozoa with normal morphology (%). The obtained values were expressed as mean ± standard error of the mean (SEM).

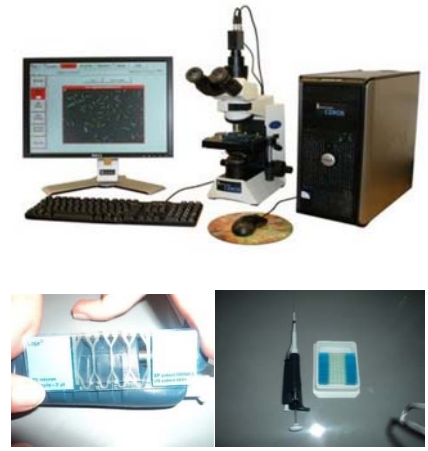

Fig. 2. CEROS System

Comparison of data between the control group and the experimental group, as well as the assessment of changes between the beginning and end of the experimental period, were performed using standard statistical methods in biostatistics to determine the significance of the observed differences.

RESULTS AND DISCUSSIONS

The reproductive performance of boars represents a determining factor in the efficiency of swine farms, having a direct impact on productivity and farm profitability. The quality of the semen plays a crucial role in the success of artificial insemination and, consequently, in the farrowing rate and the number of piglets obtained per litter. In this context, optimizing spermatogenesis and maintaining a high reproductive potential become major priorities in swine reproduction management.

Research has focused on the use of biologically active preparations that can exert beneficial effects on cellular metabolism, stimulate gonadal function, and improve sperm parameters. These contribute to increasing the ejaculate volume, enhancing sperm motility and progressivity, and reducing morphological

abnormalities-factors of practical importance in controlled reproduction.

The present study aims to evaluate the role of a complex biologically active preparation in optimizing spermatogenesis in breeding boars, through a comparative analysis of the quantitative and qualitative parameters of semen, highlighting its potential to support and improve reproductive capacity. The comparison between the experimental group and the control group allowed the identification of significant differences, supporting the role of the preparation in optimizing the spermatogenesis process. The ejaculate volume represents an essential parameter in evaluating semen quality in boars, having direct implications for fertility and the success of artificial insemination in animal husbandry. This indicator varies depending on factors such as breed, age, health status, environmental conditions, and nutritional management of the animal. Studying this parameter allows the optimization of boar selection for reproduction and the improvement of artificial insemination protocols.

The ejaculate volume is presented in Fig. 3.

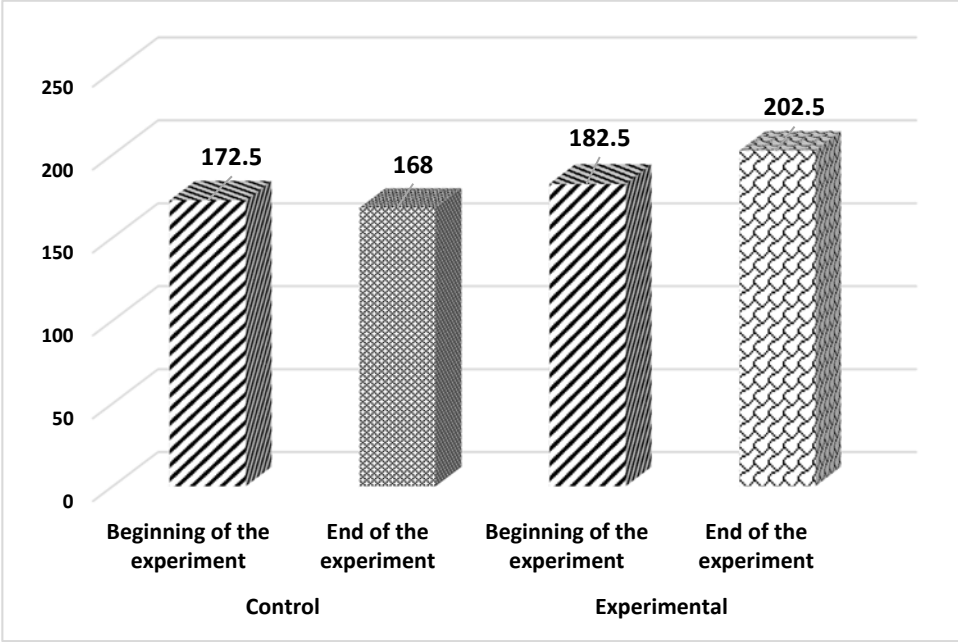

Fig. 3. Ejaculate volume, ml

Based on Fig 3, the study conducted on the influence of the biologically active preparation administered in the boars' feed revealed significant differences in ejaculate volume between the experimental group and the control group. At the beginning of the experiment, the experimental group showed an average ejaculate volume of 182.5 ml, which increased to 202.5 ml by the end of the testing period, representing a 10.96% increase. This improvement suggests that the biologically active preparation had a positive effect on the reproductive capacity of the boars, possibly by stimulating physiological processes involved in sperm production or by improving the overall health of the animals in the experimental group.

In contrast, the control group, which did not receive supplementation with the

biologically active preparation, recorded a decrease in ejaculate volume-from 172.5 ml at the beginning of the experiment to 168 ml at the end-representing a 2.61% reduction. This decrease may be attributed to natural variations, environmental factors, or physiological stress, which were not counteracted in the absence of supplementation. The difference between the two groups highlights the beneficial effect of the biologically active preparation, which not only prevented a decrease in ejaculate volume but also contributed to a significant increase in the experimental group.

These results have important practical implications for animal husbandry, particularly in the context of artificial insemination, where a higher ejaculate volume can enhance the efficiency of the reproductive process. The increase in ejaculate volume in the experimental group may indicate an improvement in the reproductive health of the boars, which could lead to greater productivity in swine farms.

Ejaculate volume represents a key quantitative parameter in evaluating semen quality in boars, offering an indication of the animal's reproductive capacity. However, semen quality depends not only on volume but also on the qualitative characteristics of the ejaculate-among which the percentage of motile spermatozoa (Figure 2) is a critical indicator. Sperm motility reflects their ability to move efficiently toward the ovum and is a determining factor in the success of artificial insemination. A large ejaculate volume can be advantageous, but reproductive efficiency is maximized only when it is accompanied by a high percentage of motile spermatozoa, ensuring an optimal conception rate. The percentage of motile sperm in the ejaculate is an essential indicator of semen quality in boars, as it reflects the sperm's ability to move and fertilize the ovum. A higher proportion of motile sperm increases the chances of success in artificial insemination.

The experimental results are presented in Fig. 4. Based on the data presented in Figure 4, in the control group, the percentage of motile spermatozoa was 91.9% at the beginning of the experiment and increased slightly to 92% at the end, representing a minor improvement of 0.1%**.** This small variation suggests that, without the biologically active preparation, sperm motility remained almost constant.

In the experimental group, the percentage of motile spermatozoa was 88.8% at the beginning and increased to 92.4% by the end of the experiment, showing an improvement of 3.6%**.** This more substantial increase indicates a positive effect of the biologically active preparation on semen quality, enhancing the spermatozoa's ability to move effectively.

When comparing the two groups, it is evident that the experimental group showed a greater increase in the percentage of motile spermatozoa (3.6% compared to 0.1% in the control group). This result demonstrates that the biologically active preparation contributed to better semen quality in the experimental group. The administration of the biologically active preparation in the boars' feed had a clearly positive effect on the percentage of motile spermatozoa. In the experimental group, sperm motility increased by 3.6% (from 88.8% to 92.4%), compared to an insignificant increase of 0.1% in the control group (from 91.9% to 92%). These results suggest that the biologically active preparation improves semen quality.

The percentage of progressive spermatozoa in the ejaculate represents a key indicator of semen quality in boars, expressing the proportion of sperm cells that move actively in a linear or directed manner. Unlike motile spermatozoa, which include all types of movement, progressive spermatozoa are those capable of advancing efficiently toward the ovum, making them essential for successful fertilization. A high percentage of progressive spermatozoa is associated with superior fertility and is a critical parameter in artificial insemination.

Evaluating this indicator helps determine semen viability and optimize the selection of boars for reproduction.

The experimental results are presented in Fig. 5.

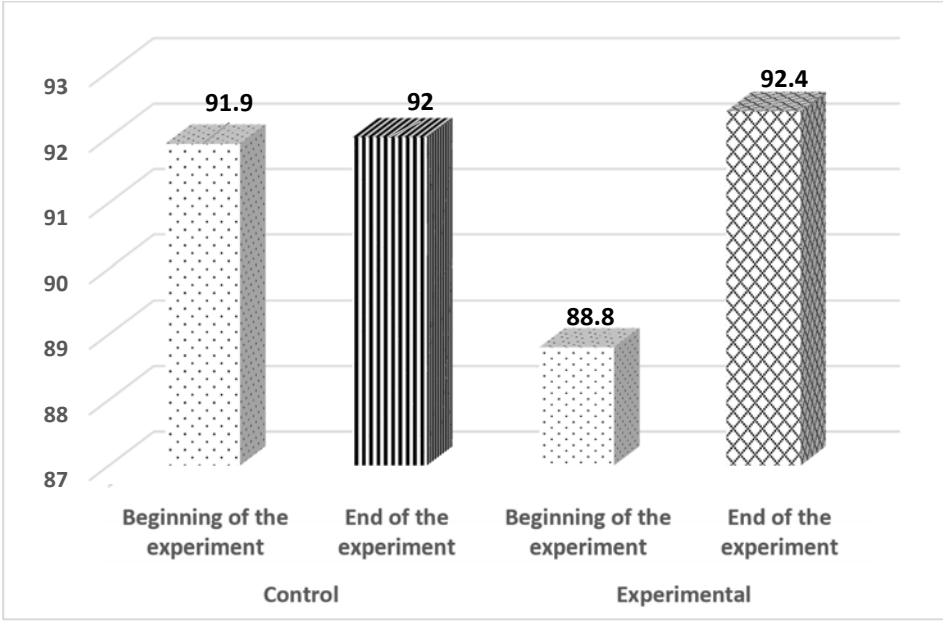

Fig.4. Motile spermatozoa in the ejaculate, %

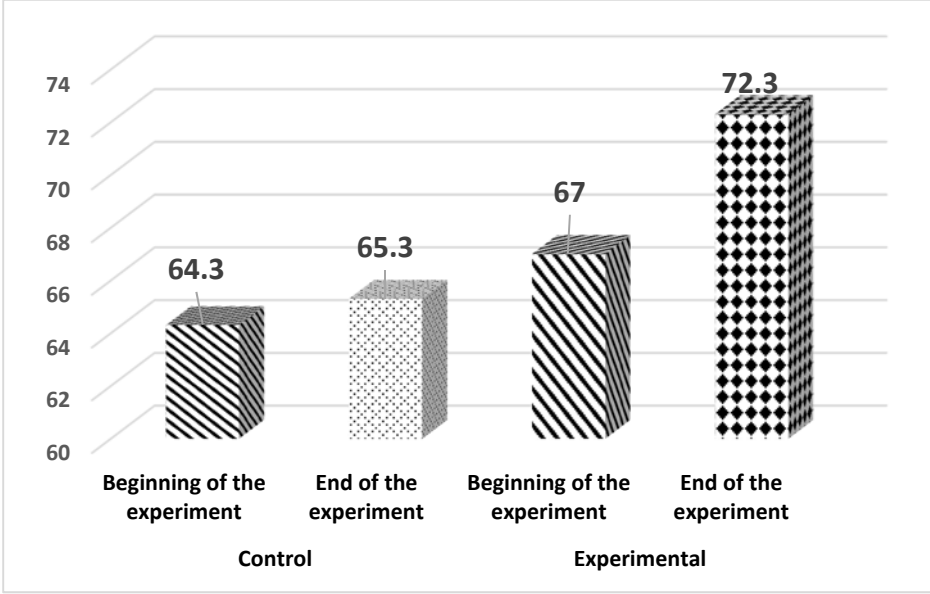

Fig. 5. Progressive spermatozoa in the ejaculate, %

The results obtained (Fig. 5) highlight notable differences between the control and experimental groups regarding the percentage of progressive spermatozoa in the ejaculate. In the control group, the percentage of progressive spermatozoa increased slightly from 64.3% at the beginning of the experiment to 65.3% at the end, representing a minor improvement of 1.56% (an absolute difference of 1 percentage point). This modest increase suggests that, in the absence of the biologically active preparation, progressive sperm motility remained relatively stable, with no significant influence from the standard experimental conditions.

In contrast, the experimental group, which received the biologically active preparation in their feed, showed a substantial improvement. The percentage of progressive spermatozoa increased from 67% at the beginning of the experiment to 72.3% at the end, equivalent to a 7.91% increase (an absolute difference of 5.3 percentage points). This positive evolution indicates a beneficial effect of the biologically active preparation on semen quality, particularly on the spermatozoa's ability to perform effective progressive movements, which are essential for fertilization.

When comparing the two groups, it is evident that the experimental group achieved a more than fivefold greater increase in the percentage of progressive spermatozoa (7.91% versus 1.56% in the control group). This contrast underscores the positive impact of the biologically active preparation, which not only maintained but also significantly improved progressive sperm motility. Moreover, at the end of the experiment, the experimental group reached a percentage of 72.3%, higher than that of the control group (65.3%), suggesting superior semen quality in the group that received the supplement.

The results demonstrate that administering the biologically active preparation in the feed of boars in the experimental group had a clearly positive effect on the percentage of progressive spermatozoa in the ejaculate. The 7.91% increase (from 67% to 72.3%) observed in the experimental group, compared to a 1.56% increase (from 64.3% to 65.3%) in the control group, indicates that the supplement significantly improved semen quality by enhancing the spermatozoa's ability to move directionally toward the ovum. This improvement has important practical implications for animal husbandry, as a higher percentage of progressive spermatozoa can increase the success rate of artificial insemination, leading to greater reproductive productivity in pig farms.

The positive effect of the biologically active preparation suggests that it may act on physiological processes involved in sperm development and function, possibly by optimizing the overall health of the boars or by directly stimulating the reproductive system.

The percentage of normal morphologies in the ejaculate represents the proportion of spermatozoa with a correct anatomical structure, free from defects that could affect functionality. This parameter is essential in evaluating semen quality in boars, as sperm with normal morphology have a higher fertilization potential due to their proper structure for movement and penetration. Morphological defects-such as abnormalities of the head, tail, or midpiece-can reduce fertility and negatively affect the success of artificial insemination. A high percentage of spermatozoa with normal morphology is therefore a key indicator of the reproductive health of boars and the efficiency of reproductive processes. Evaluating this parameter assists in selecting animals for breeding and optimizing reproductive management strategies. The results obtained from figure 6 indicate clear differences between the control and experimental groups regarding

the percentage of spermatozoa with normal morphology. In the control group, the percentage of normal morphologies remained almost constant, decreasing slightly from 69.9% at the beginning of the experiment to 69.8% at the end, representing an insignificant reduction of 0.14% (an absolute difference of 0.1 percentage points). This stability suggests that, in the absence of the biologically active preparation, the morphological quality of the spermatozoa was not significantly influenced by the experimental conditions, remaining at a relatively constant level.

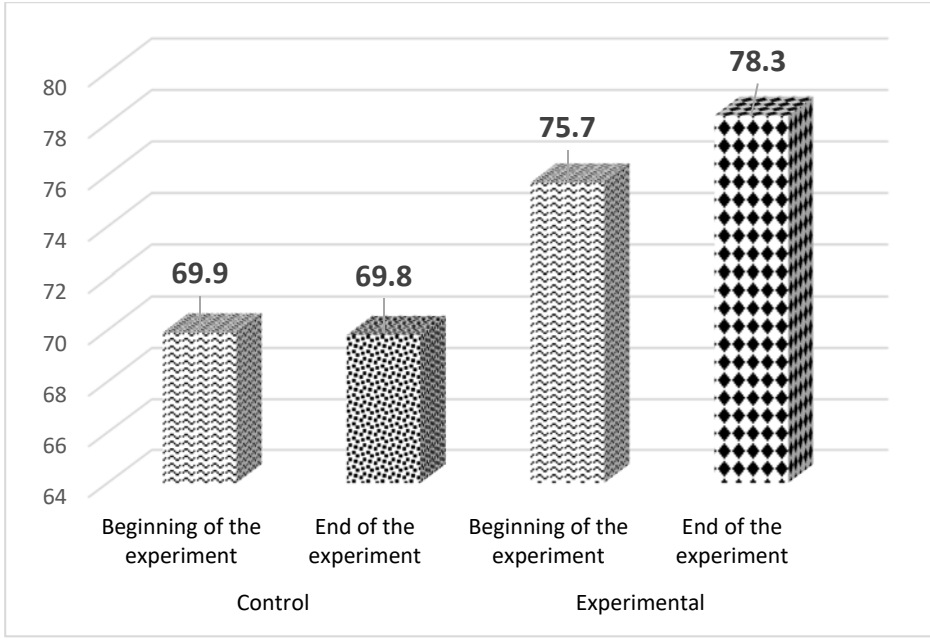

Fig.6 Normal sperm morphologies in the ejaculate, %

In contrast, the experimental group, which received the biologically active preparation in their feed, recorded a notable improvement. The percentage of normal morphologies increased from 75.7% at the beginning of the experiment to 78.3% at the end, equivalent to a 3.43% increase (an absolute difference of 2.6 percentage points). This positive trend indicates a beneficial effect of the biologically active preparation on semen quality, improving the structural integrity of spermatozoa and, consequently, their ability to contribute to fertilization.

When comparing the two groups, it is evident that the experimental group showed a significant increase in the percentage of normal morphologies **(**3.43%**),** while the control group remained practically unchanged (–0.14%). Furthermore, at the end of the experiment, the experimental group reached a percentage of 78.3%**,** higher than that of the control group (69.8%), emphasizing the superior semen quality in the group that received the supplement. It is noteworthy that the experimental group started with a higher initial percentage (75.7% compared to 69.9% in the control group), but the observed increase suggests that the biologically active preparation amplified this pre-existing quality.

Data analysis demonstrates that administering the biologically active preparation in the feed of boars in the experimental group had a positive effect on the percentage of spermatozoa with normal morphology. The 3.43% increase (from 75.7% to 78.3%) in the experimental group, compared with the minor 0.14% decrease (from 69.9% to 69.8%) in the control group, indicates that the supplement contributed to improving the morphological integrity of spermatozoa. The positive effect of the biologically active preparation suggests that it may influence physiological processes involved in spermatogenesis, possibly by optimizing the overall health of the boars or by supporting the proper formation of sperm structures.

CONCLUSIONS

1.Ejaculate volume measures the amount of sperm produced, an important factor for artificial insemination. In the control group, the volume decreased from 172.5 ml to 168 ml, a reduction of 2.61% **(**4.5 ml**)**, likely due to physiological variations or environmental conditions. In the experimental group, which received the biologically active preparation, the volume increased from 182.5 ml to 202.5 ml, an improvement of 10.96% **(**20 m**l)**. This result indicates that the preparation stimulated sperm production, increasing the availability of seminal material for reproduction.

2.Percentage of motile spermatozoa indicates the proportion of sperm capable of movement, essential for fertilization. In the control group, the percentage remained almost constant, from 91.9% to 92% (+0.11%, i.e., 0.1 percentage points**)**, suggesting stability without the influence of the supplement. In the experimental group, the percentage increased from 88.8% to 92.4% **(**+4.05%, i.e., 3.6 percentage points**)**. This significant improvement demonstrates that the biologically active preparation enhanced sperm vitality, improving semen quality.

3.The percentage of progressive spermatozoa reflects the proportion of sperm exhibiting directional movement, which is crucial for reaching the ovum. In the control group, the percentage increased slightly, from 64.3% to 65.3% (+1.56%, i.e., 1 percentage point), indicating minor variation. In the experimental group, the percentage rose from 67% to 72.3% (+7.91%, i.e., 5.3 percentage points**).** This substantial increase shows that the biologically active preparation improved the spermatozoa's ability to move efficiently, enhancing fertilization

4.The percentage of normal morphologies measures the proportion of sperm with a correct anatomical structure, which is essential for fertilization. In the control group, the percentage remained almost constant, from 69.9% to 69.8% (-0.14%, i.e., 0.1 percentage points), indicating no significant influence. In the experimental group, the percentage increased from 75.7% to 78.3% (+3.43%, i.e., 2.6 percentage points**)**. This result demonstrates that the biologically active preparation improved the morphological quality of the spermatozoa.

REFERENCES

1. Mann T., C. Lutwak-Mann, Male reproductive function and semen. 1981, New York: Springer.
2. Miclea V., Zahan M., Miclea I., Reproducţia animalelor de fermă. 2010, *Editura. Accent*, Cluj-Napoca, 334 p.
3. Miclea V. Însămânţarea artificială la animale de fermă. *Ed.Agronaut*. Cluj-Napoca, 2003.
4. Zahan M.,. Conservarea resurselor genetice în zootehnic. *Accent*, 2017. Cluj-Napoca p. 34-35, 225.
5. VK Milovanov - Biology of Reproduction and Artificial Insemination of Animals: Biological and Zootechnical Monograph, 1962, Selkhozizdat. c696.