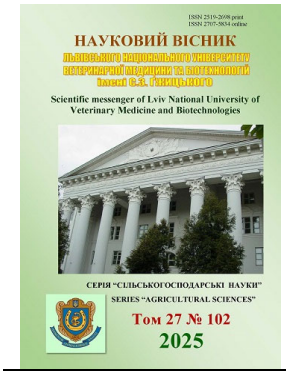

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Enhancing the working capacity of sport horses under the influence of an immunomodulator

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Under the conditions of martial law and post-war recovery in Ukraine, improving the working capacity of sport horses has become a relevant objective. This can be achieved through the implementation of modern approaches to support immune status and adaptation to physical exertion. The aim of this study was to determine the effect of the immunomodulator "Canvit Amino Sol" on the activity, endurance and physiological stability of Ukrainian Saddle Horses under competitive load. The study was conducted on 18 horses aged 5 to 7 years, kept at an equestrian sports school in Dnipro, Ukraine. Horses in the experimental group received "Canvit Amino Sol" orally for 14 consecutive days. Performance capacity was assessed by indicators of activity, penalty scores, as well as haematological and biochemical parameters recorded before and after the competition. It was found that the proportion of horses with optimal activity in the experimental group was nearly twice as high as in the control group (83.3 % versus 44.4 %). Simultaneously, the number of performances with faults was reduced by 75 %, and penalty points decreased by 66.7 %. Measures of body temperature, haemoglobin, calcium and glucose levels indicated a lower degree of stress and better adaptation to physical load in the experimental group. Therefore, the inclusion of "Canvit Amino Sol" in the diets of sport horses contributes to improved endurance, reduced physiological stress during competitions and enhanced overall performance efficiency. Future research should aim to expand the sample size, compare effects across different breeds and assess the dynamics of prolonged supplementation.

Key words: *Ukrainian Saddle horse, immunomodulator, working capacity, endurance, homeostasis, physiological adaptation.*

Introduction

Modern conditions for the development of equestrian sport in Ukraine, particularly against the backdrop of military conflict and post-war recovery, necessitate the revision and optimisation of approaches to the use of sport horses. Under difficult socio-economic circumstances, the need to improve the functional potential of horses becomes especially relevant. This includes their working capacity, speed, endurance, adaptability to physical loads, and long-term use both in sport and in breeding programmes (Borovkov et al., 2024).

Equine breeding, as a strategic branch of agriculture and sport, requires the implementation of innovative technologies based on advancements in sports hippology, animal husbandry, and veterinary medicine. The development of performance traits in horses is a multifactorial process that depends on rearing conditions, genotype, type of training, feeding, management, and the system of performance testing. Observance of a technological sequence, from the early training of young horses to their participation in competitions, promotes the effective expression of natural potential and enables objective assessment of their future performance (Krytsia, 2016).

The physiological ability of horses to perform work is determined by their constitutional type, conformation, health status, and level of physical endurance. Higher performance levels are generally observed in riding horses with well-balanced body structure, well-developed musculature, and strong limbs (Maksymovych, 2016). Alongside training, the structure of the diet plays a crucial role, particularly the provision of biologically active substances that can positively influence immune reactivity and the animal's adaptive capabilities (Dynnikova et al., 2022).

Systematic observations confirm that the response of a horse's body to physical exertion depends on individual physiological characteristics and the composition of the feed. Working qualities are formed as a set of traits that ensure stable performance under competitive conditions (Lesnovskay & Dinnikova, 2017). In many cases, the effectiveness of horses is linked to the introduction of specialised supplements into their diets, which influence both the duration and quality of performance depending on the distance or task type.

In this context, the use of immunomodulators represents a promising direction. Research indicates that such preparations can activate the body's natural defence mechanisms, maintain homeostasis, and reduce the consequences of physiological stress (Cequier et al., 2022). Physical and emotional exertion during training and competitions leads to changes in haematological and biochemical parameters, which may serve as objective indicators of working capacity in horses (Bayeva, 2016; Chekhichyn et al., 2024).

In specialised equestrian schools, particular attention is paid to means that improve adaptation to training without negatively affecting the general physiological condition. The Ukrainian Saddle Horse is considered promising for sport use, which underscores the importance of finding effective ways to enhance its functional activity (Zlamaniuk & Bakshuk, 2022).

The aim of the study

The aim of this study was to evaluate the effect of an immunomodulator on the working performance and physiological resilience of Ukrainian Saddle Horses under conditions of training and competitive load.

Materials and Methods

The study was conducted at the Municipal Extracurricular Educational Institution "Specialized Children and Youth Sports School of the Olympic Reserve in Equestrian Sports" (Dnipro, Ukraine), where Ukrainian Saddle Horses aged 5 to 7 years were kept.

The experiment was carried out in accordance with the principles of the Declaration of Helsinki and in compliance with bioethical standards. The study was approved by the Bioethics Commission of the Dnipro State Agrarian and Economic University.

The animals were housed in individual stalls, received a balanced diet and underwent daily physical training according to the general training schedule. For 14 consecutive days prior to competition, the horses in the experimental group were administered the immunomodulator "Canvit Amino Sol" (Trouw Nutrition Biofaktory Ltd., Czech Republic) at a dose of 50.0 ml per horse per day, dissolved in drinking water. This supplement contains a complex of amino acids and vitamins designed to support the immune system and the general condition of the organism.

To assess working capacity, the following indicators were considered: endurance (duration of physical activity without signs of fatigue), responsiveness (reaction speed and mobility during training and competition), number of performance errors (technical faults or refusals to perform tasks), and total score (accumulated points for performance with penalties deducted). In addition, clinical examination and blood tests were conducted before and after the competition.

Peripheral blood was collected from the jugular vein using puncture, followed by filling 2 ml Vacutainer® tubes containing EDTA (Aichele Medico AG, Basel, Switzerland). Blood analyses were carried out at the Biosafety Center of the Dnipro State Agrarian and Economic University following standard procedures.

The results were processed using Statistica 12 software (StatSoft, Inc., USA). Data were presented as mean values (Mean) and standard error of the mean (SE). The Mann–Whitney U test was used to determine statistically significant differences between independent groups. Differences were considered statistically significant at $P < 0.05$.

Results and discussion

When evaluating the performance of horses based on responsiveness during flat races, significant differences were observed between the control group and the experimental group that received the immunomodulator "Canvit Amino Sol". In the control group, 44.4 % of the animals demonstrated responsiveness within 2.00.1 minutes, which is considered an optimal value for sport horses. Among them, 11.1 % showed enhanced responsiveness, completing the race in less than 1.60.0 minutes.

In the experimental group, the proportion of horses with responsiveness within 2.00.1 minutes was 83.3 %, which was almost twice as high as that in the control group. This indicates a positive effect of the immunomodulator on reaction speed, start dynamics and overall physical activity of the animals (Figure 1).

Additionally, a series of competitions was held during the experiment, in which all test horses participated. To assess performance, the number of runs with errors and the total penalty points were recorded. These indicators allowed for an objective evaluation of task execution quality under competitive conditions (Table 1).

As shown in Table 1, the horses in the experimental group demonstrated significantly better performance results. The proportion of performances with faults was 75.0 % lower compared to the control group, and the number of penalty points was reduced by 66.7 %. These findings confirm the effectiveness of the implemented measures, in particular the inclusion of the immunomodulator Canvit Amino Sol in the animals' diet. This intervention contributed to improved stress tolerance and enhanced performance quality during competitive activities.

To evaluate the endurance of the horses, parameters of internal homeostasis were assessed before and after the competitive load (Table 2).

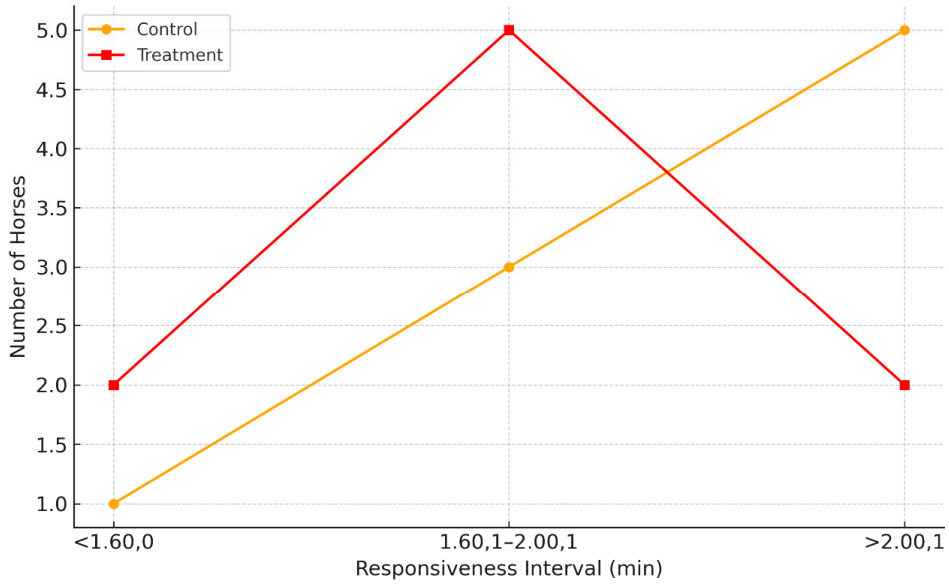

Fig. 1. Distribution of animals in the control and experimental groups according to responsiveness during flat races

Table 1
Competition results for the control and experimental groups

Animal group	Number of performances	Performances with faults (n)	Performances with faults (%)	Penalty points, s
Control	16	4	25.0	6
Experimental	16	1	6.3	2

Table 2
Physiological and haematological parameters of horses before and after competition (M ± m)

Parameter	Control (n = 9)		Experimental (n = 9)	
	before	after	before	after
Body temperature, °C	39.4 ± 0.97	41.1 ± 1.19	39.5 ± 1.23	40.6 ± 1.07*
Erythrocyte count, T/L	6.9 ± 0.62	7.4 ± 1.34	7.1 ± 0.83	7.8 ± 2.32
Haemoglobin, g/L	130.1 ± 1.73	145.3 ± 1.46	142.2 ± 2.34	151.4 ± 0.98*
Leucocyte count, G/L	8.2 ± 0.96	8.8 ± 1.21	8.1 ± 1.12	8.7 ± 1.37
Glucose, mmol/L	4.2 ± 0.23	3.8 ± 0.14	4.5 ± 0.27	4.1 ± 0.33
Calcium, mmol/L	2.0 ± 0.17	1.7 ± 0.21	2.3 ± 0.24	2.1 ± 0.40

* Significant difference between the control and experimental groups after the competition, $P < 0.05$

As a result of the competitive load, an increase in body temperature was observed in both groups. However, the rise was less pronounced in the experimental group: only 2.8 %, compared to 4.3 % in the control group. This indicates more efficient thermoregulation in the animals that received the immunomodulator ($P < 0.05$).

The erythrocyte count in the experimental group increased by 9.9 %, while in the control group the increase was 7.2 %, which may indicate a more intensive oxygen supply to the tissues in the experimental horses. Haemoglobin concentration after the competition was significantly higher in the experimental group ($P < 0.05$), with an increase of 6.5 %, compared to 11.7 % in the control group, where the baseline level was initially lower.

Leucocyte counts increased within the range of 6.9 to 7.3 %, with no significant difference between groups. This suggests a normal immune response to physical exertion. Glucose concentration decreased after the competition by 10.5 % in the control group and by 8.9 % in the experimental group, which may indicate more efficient use of energy resources under immunocorrection. Calcium levels decreased in both groups: by 17.6 % in the control and 8.7 % in the experimental group. This points to less depletion of physiological reserves in the treated animals.

Overall, the horses receiving “Canvit Amino Sol” maintained more stable physiological parameters after physical exertion, indicating better endurance and a more stable homeostatic state.

The work capacity of horses is assessed by the change in the speed at which they perform tasks before and after a training period. Physical exertion leads to changes in physiological parameters, including heart rate, respiratory rate and haematological indicators. In our study, an increase in erythrocyte and haemoglobin levels was observed in animals from both groups following competition, indicating the activation of oxygen metabolism under load, as previously reported by other researchers (Maksymovych, 2016; Rudak, 2019).

Physical activity also resulted in changes in the biochemical composition of the blood, specifically a reduction in glucose and calcium concentrations. In animals

from the experimental group receiving "Canvit Amino Sol", these changes were less pronounced, which may indicate a more stable homeostatic state and improved physiological adaptation to stress (Dynnikova et al., 2022). Similar trends in metabolic responses under exercise-related immune modulation have been reported in previous studies (Rush & Flaminio, 2000; Varkholiak et al., 2021; Borovkov et al., 2024).

The positive post-competition dynamics in leucocyte levels, without excessive elevation, indicate a physiological rather than pathological immune response. This confirms the stabilising effect of the administered immunomodulator. These findings are consistent with previous studies on the effectiveness of immunostimulants in equine sports medicine (Krytsia, 2016; Cequier et al., 2022).

Behavioural parameters, including responsiveness, faults, and penalty points, showed clear differences between the groups. The proportion of horses with a responsiveness time under 2 minutes was nearly twice as high in the experimental group. Furthermore, the number of performances with faults decreased by 75 % and the total number of penalty points dropped by 66.7 % in this group. These results indicate better reactivity, improved stress tolerance and higher readiness for competitive workloads. Similar findings regarding the correlation between performance capacity and response to physical exertion have been reported (Zlamaniuk & Bakshuk, 2022; Cheban, 2024; Chekhichyn et al., 2024).

It is essential to consider individual characteristics of horses when designing training programmes. At this stage, adaptive mechanisms are formed, which determine the effectiveness of subsequent physical loads (Kabasova & Petryshko, 2021). An individualised training approach that takes into account temperament, recovery rate, type of exercise, and dietary composition allows for optimisation of performance outcomes (Lesnovskay & Dinnikova, 2017; Pyatnychko et al., 2021).

A number of studies have demonstrated the effectiveness of feed additives based on amino acids, vitamins, and herbal ingredients in enhancing adaptive traits in horses (Dynnikova et al., 2020; Dinnikova et al., 2022). In our study, the use of "Canvit Amino Sol" produced similar effects, including reduced energy expenditure, stabilised body temperature, and maintenance of calcium levels compared to the control group.

In conclusion, the obtained results confirm that incorporating the immunomodulator "Canvit Amino Sol" into the diet of Ukrainian Saddle horses improves endurance, supports internal homeostatic stability, reduces stress responses, and enhances performance efficiency under competitive conditions.

Conclusions

The results of this study indicate the advisability of using the immunomodulator "Canvit Amino Sol" in Ukrainian Saddle horses during the pre-competition training period. Horses that received the supplement demonstrated greater endurance, improved responsiveness, and enhanced stability when completing competition courses. The analysis of internal homeostasis parameters revealed a less pronounced physiological stress response following exertion, particularly in terms of a more stable body temperature and blood biochemical profile. These findings suggest a more efficient physiological adaptation to physical workload under conditions of immunomodulatory support.

Conflict of interest

The authors declare no conflict of interest.

References

Bayeva, T. I. (2016). Influence of physical and emotional activity on the metabolic profile of blood serum of dressage horses of the Ukrainian riding breed. Odesa National University Herald. Biology, 21(2(39), 121–129. DOI: 10.18524/2077-1746.2016.2(39).81208.

Borovkov, S., Borovkova, V., & Suetskyi, O. (2024). The state of the immune system of horses in conditions of stress. The Scientific and Technical Bulletin of the Institute of Animal Science NAAS of Ukraine, 131, 32–39. DOI: 10.32900/2312-8402-2024-131-32-39.

Cequier, A., Vázquez, F. J., Romero, A., Vitoria, A., Bernad, E., García-Martínez, M., Gascón, I., Barrachina, L., & Rodellar, C. (2022). The immunomodulation–immunogenicity balance of equine Mesenchymal Stem Cells (MSCs) is differentially affected by the immune cell response depending on inflammatory licensing and major histocompatibility complex (MHC) compatibility. Frontiers in Veterinary Science, 9. DOI: 10.3389/fvets.2022.957153.

Cheban, V. (2024). Analysis of the working qualities of trotting horses based on the results of tests at Ukrainian racetracks during martial law. Agrarian Bulletin of the Black Sea Littoral, 113, 62–68. DOI: 10.37000/abbsl2024.113.11.

Chekhichyn, A., Tkachova, I., & Liutykh, S. (2024). Factors influencing the speed of trotting horses. The Scientific and Technical Bulletin of the Institute of Animal Science NAAS of Ukraine, 131, 40–56. DOI: 10.32900/2312-8402-2024-131-40-56.

Dynnikova, K. D., Lesnovskay, O. V., Izhboldina, O. O., Sangara, R. A., Mylostyvyi, R. V., & Gutyj, B. V. (2022). Effect of complete pelleted alfalfa forages on growth and adaptation of horses. Theoretical and Applied Veterinary Medicine, 10(3), 27–32. DOI: 10.32819/2022.10014.

Dynnikova, K. D., Lesnovskaya, O. V., Karlova, L. V., & Gavrilina, O. G. (2020). Efficiency of alfalfa granulated feed additive in balanced ration of Ukrainian Riding Horse. Ukrainian Journal of Ecology, 10(3), 173–180. URL: https://www.ujecology.com/articles/efficiency-of-alfalfa-granulated-feed-additive-in-balanced-ration-of-ukrainian-riding-horse.pdf.

Kabasova, I. O., & Petryshko, M. P. (2021). The influence of the training system directed to increase stress resistance on the economic efficiency of sports horses' training. Veterinary Science, Technologies of Animal Husbandry and Nature Management, 8, 12–17. DOI: 10.31890/vttp.2021.08.02.

Krytsia, I. P. (2016). The influence of immunomodulators on the performance of cellular immunity at the foals of saddle breeds. Scientific Messenger of LNU of Veter-

inary Medicine and Biotechnologies, 18(3(71)), 45–49. DOI: 10.15421/nvlvet7110.

Lesnovskay, E., & Dinnikova, K. (2017). The use of the feed additive “Kalfostonyk” and grooming in the horse breeding. Theoretical and Applied Veterinary Medicine, 5(1), 58–63. URL: https://bulletin-biosafety.com/index.php/journal/article/view/80.

Maksymovych, I. A. (2016). Prevalence and characteristics heart murmurs in sport horses. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 18(3(71)), 170–173. DOI: 10.15421/nvlvet7138.

Pyatnychko, O. M., Zhyla, M. I., Shkodyak, N. V., Saliy, O. O., Derkach, M. V., & Kalynovska, L. V. (2021). The efficiency of the drug based on butaphosphane, B vitamins and L-carnitine in the treatment of horses. Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies, 23(101), 31–37. DOI: 10.32718/nvlvet10106.

Rudak, A. N. (2019). Determination of heritability of riding horses in various disciplines of equestrian sport. Animal Breeding and Genetics, 58, 52–57. DOI: 10.31073/abg.58.07.

Rush, B. R., & Flaminio, M. J. B. F. (2000). Immunomodulation in horses. Veterinary Clinics of North America: Equine Practice, 16(1), 183–197. DOI: 10.1016/s0749-0739(17)30126-8.

Varkholiak, I. S., Gutyj, B. V., Gufriy, D. F., Sachuk, R. M., Mylostyvyi, R. V., Radzykhovskyi, M. L., Sedilo, H. M., & Izhboldina, O. O. (2021). The effect of the drug “Bendamine” on the clinical and morphological parameters of dogs in heart failure. Ukrainian Journal of Veterinary and Agricultural Sciences, 4(3), 76–83. DOI: 10.32718/ujvas4-3.13.

Zlamaniuk, L., & Bakshuk, K. (2022). Dynamics of linear growth and performance of two-year-old young tropping horses. Scientific Reports of the National University of Life and Environmental Sciences of Ukraine, 18(6). DOI: 10.31548/dopovidi2022.06.005.