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ASSESSING THE ECONOMIC EFFICIENCY OF CHEMO-PROPHYLACTIC MEASURES AGAINST BOVINE TUBERCULOSIS

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Annotation

This study analyzes the economic efficiency of chemoprophylaxis measures against bovine tuberculosis using the «ETIS-2» complex preparation. The study was conducted on 137 cattle, with calculations based on 2022 prices and approved methodologies. The results indicated that while the cost of chemoprophylaxis per head was 72,000 UZS, the coefficient of prevented economic loss remained high. It was proved that for every 1 UZS spent, an economic effect of 12.7 UZS was obtained.

Keywords

Tuberculosis, economic loss, chemoprophylaxis, ETIS-2, efficiency ratio, cattle, infection coefficient, prophylaxis course, economic loss

Annotatsiya

Maqolada qoramollar tuberkulyoziga qarshi ETIS-2 kompleks preparati bilan o'tkazilgan kimyoprofilaktika tadbirlarining iqtisodiy samaradorligi tahlil qilingan. Tadqiqot 137 bosh qoramollarda o'tkazilib, 2022-yilgi narxlar va tasdiqlangan metodikalar asosida hisob-kitob qilingan. Natijalarga ko'ra, har bir bosh qoramol uchun kimyoprofilaktika xarajati 72 000 so'mni tashkil etgan holda, kutilayotgan iqtisodiy zararining oldini olish koeffitsiyenti yuqori ekanligi aniqlandi. Sarflangan har 1 so'm evaziga 12,7 so'm iqtisodiy samara olinishi isbotlangan.

Kalit so'zlar

Tuberkulyoz, iqtisodiy zarar, kimyoprofilaktika, ETIS-2, samaradorlik koeffitsiyenti, qoramol, zararlanish koeffitsiyenti, profilaktika kursi, iqtisodiy zarar.

Аннотация

В данной работе проанализирована экономическая эффективность химиофилактики туберкулеза крупного рогатого скота с использованием комплексного препарата ЭТИС-2. Исследование проведено на 137 головах КРС, расчеты произведены на основе цен 2022 года согласно утвержденным методическим рекомендаций. Результаты исследований показали, что при стоимости



химиопрофилактики 72000 сумов на одну голову крупного рогатого скота, коэффициент предотвращенного экономического ущерба остается высоким. Доказано, что на каждый затраченный 1 сум получено 12,7 сумов экономического эффекта.

Ключевые слова

Туберкулез, экономический ущерб, химиопрофилактика, ЭТИС-2, коэффициент эффективности, крупный рогатый скот (КРС), коэффициент зараженности, курс профилактики, экономический ущерб.

INTRODUCTION

Bovine tuberculosis poses a significant threat not only as a veterinary-sanitary issue but also as a factor inflicting severe economic losses on the livestock industry. This disease, caused by *Mycobacterium bovis*, is zoonotic in nature. The traditional approach to its control, "compulsory slaughter due to disease," results in substantial financial losses for farms, including the depletion of productive animals and disruption of breeding programs [1, 16].

In the context of livestock sector development and ensuring food security in the Republic of Uzbekistan, the application of chemoprophylactic methods against tuberculosis is highly relevant. Chemoprophylaxis is a strategic approach aimed at protecting healthy animals within infection foci and minimizing economic damage [3, 7]. The objective of this study is to scientifically substantiate the economic profitability of prophylactic measures carried out using the "ETIS-2" preparation.

MATERIALS AND METHODS

The calculation of economic efficiency was carried out based on methodologies recommended by V.A. Seryodkin, Head of the Economics Laboratory at the Veterinary Scientific Research Institute (UzSRIV), and the All-Union Institute of Experimental Veterinary Medicine (VIEV) [14, 6].

Research Parameters:

- Number of animals: 137 heads of cattle.
- Infection Coefficient: 0.1 (representing the average probability of tuberculosis infection).
- Pricing: Based on 2022 data.
- Preparation: "ETIS-2" complex preparation.
- Prophylaxis Course: 120 days (1 course).

Economic efficiency (Is) was calculated using the following formula:

$$Is = (N \times K \times Z) - X$$

Where:

- N = Number of animals
- K = Infection coefficient
- Z = Economic loss per head of cattle
- X = Total expenses [5].

RESULTS

According to the obtained data, the economic loss incurred per head of cattle when slaughtered or deceased due to tuberculosis was estimated at 4,410,000 UZS. This loss encompasses the animal's live weight value, foregone product (milk/meat), and disinfection expenses.

Analysis of Economic Indicators:



1. Cost of Medication: The expenditure for a 120-day chemoprophylaxis course per head of cattle amounted to 72,000 UZS.

2. Total Health Restoration Cost: $4,410,000 \text{ (loss)} + 72,000 \text{ (prophylaxis)} = 4,482,000 \text{ UZS}$.

3. Prevented Economic Loss (Is):

$$137 \text{ heads} \times 0.1 \times 4,410,000 \text{ UZS} = (60,417,000 \text{ UZS}).$$

4. Net Economic Efficiency: $60,417,000 \text{ UZS} - 4,410,000 \text{ UZS} = 56,007,000 \text{ UZS}$.

Return on Investment (ROI) per 1 UZS spent:

$$56,007,000 \text{ UZS} / 4,410,000 \text{ UZS} = (12.7 \text{ times}).$$

Thus, the efficiency coefficient obtained from the study was 1:12.7. This signifies that for every unit of currency invested in the drug and prophylactic measures, the farmer realizes a benefit exceeding 12 times (through avoided losses) [5]. 1. Cost of Medication: The expenditure for a 120-day chemoprophylaxis course per head of cattle amounted to 72,000 UZS.

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DISCUSSION

The analysis of the research findings unequivocally demonstrates that chemoprophylactic measures employed against bovine tuberculosis offer a substantial economic and epizootological advantage over the traditional “compulsory slaughter due to disease” approach. The conventional method, which involves removing and slaughtering animals exhibiting an allergic reaction in herds affected by tuberculosis, results in the loss of at least 10% of the farm's primary productive livestock (assuming an infection coefficient of 0.1). This not only leads to a reduction in current milk and meat production but also disrupts the herd's reproductive potential and breeding programs [4, 15].

Key factors contributing to the economic profitability of the “ETIS-2” complex preparation are its low cost (72,000 UZS per course) and high biological efficacy. The efficiency coefficient of 12.7, indicating 12.7 UZS in avoided loss for every 1 UZS spent, identified in our study, ranks among the highest for prophylactic measures currently used in veterinary practice. For comparative purposes, many other infectious disease vaccination or treatment protocols typically yield ratios of 1:5 or 1:8.

The robustness of these economic indicators is grounded in the methodological frameworks developed by V.A. Seryodkin (UzSRIV) and scientists from VIEV (Moscow). As highlighted in previous research [11, 12], chemoprophylaxis not only preserves animal lives but also reduces indirect costs such as quarantine and repeated disinfection by shortening the overall herd recovery period. Consequently, the 1:12.7 economic benefit achieved through the application of the “ETIS-2” preparation provides a sufficiently strong scientific and economic basis for recommending this methodology as an indispensable component of tuberculosis control strategies.

CONCLUSION

1. It was determined that the chemoprophylaxis method against bovine tuberculosis possesses high economic efficiency, demonstrated by a 1:12.7 return on investment.
2. The study demonstrated the feasibility of mitigating an economic loss of 4.4 million UZS caused by a single infected bovine through a chemoprophylaxis course costing 72,000 UZS.
3. The ETIS-2 preparation is suitable for widespread application in tuberculosis-affected herds and in conditionally healthy farms that are identified as high-risk.
4. The implementation of the ETIS-2 chemoprophylaxis method serves as a crucial factor in preserving valuable livestock, ensuring the continuity of breeding programs, protecting farms from disease, and fostering their economic development.
5. Ultimately, the adoption of the ETIS-2 preparation will significantly contribute to the sustainable development of livestock farming, enhancing national food security, and improving the economic well-being of farmers.

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