RESEARCH ARTICLE

Application of the parcial budget method on hypothetic vaccination to blue tongue disease in cattle

ELVANA ZHEZHA[1], RUZHDI KEÇI[2]

[1]PhD Student, Faculty of Veterinary Medicine, Agricultural University of Tirana, Kodër Kamëz, Tirana

[2]Faculty of Veterinary Medicine, Agricultural University of Tirana, Kodër Kamëz, Tirana

*Corresponding author; E-mail: elvana.zhezha@bccd.al

Abstract

Partial budgeting is an efficient technique of economic cost-benefit analysis. During the outbreak of bluetongue in Albania in 2014, vaccination against bluetongue has not been carried out, hence the work is based on a hypothetical situation of vaccination application, as a new way of managing cattle in Tirana Region. The calculations made for this purpose indicate a significant difference between increased earnings and reduced costs because of managerial change (vaccination) and economic loss as results costs for vaccines and vaccination program itself. In total, cost benefit analyses indicate that benefits are 23% higher than costs. This leads to the conclusion that vaccination to prevent the blue tongue disease is a profitable and totally justified strategy from the economic point of view.

Keywords: Economics; blue tongue; vaccination; strategy cost/benefit analyzes; partial budgeting.

1. Introduction

The management of animal health and diseases, which in itself is a relatively new scientific direction and has originated about 5 decades ago, has been studied very little in Albania. An important part of the economic analysis based on the cost-benefit criterion is also the method of partial budgeting in a given livestock management system. Since in the last eruption of blue tongue disease, vaccination has not been applied in our country, hypothetical research has been carried out on the financial effect of a possible vaccination campaign in the district of Tirana, through the partial budgeting technique. Considering the application of vaccination against blue tongue as a change in the traditional cattle management, the study aims to determine the usefulness and economic justification of a possible vaccination campaign at the level of this region.

2. Material and Methods

The work is based on the number of cows and other production indicators of the Tirana district officially reported by INSTAT, other data related to the disease from sources of the National Epidemiological Unit for the outbreak of blue tongue disease in 2014 in the cattle of Tirana, as well as from the data provided by other studies of this nature regarding the impact of the disease on lowering production. Mainly the data relate to the economic impact of the disease, depending on its prevalence, converting it to monetary values (ALL). The applied methodology is simple, based on the implementation of the partial budgeting technique according to the corresponding equation of the report of the four major components resulting in the introduction of vaccination, assumed as managerial change. The components are symbolized by letters A and K, namely with A1 (additional income as a result of vaccination), K1 (decreased costs as a vaccine effect), A2 (increased costs as a result of vaccination) and K2 (self-vaccination costs). The above data converted in ALL value are incorporated into the equation $(A1 + K1) > (A2 + K2)$ to determine whether the benefits from the increased income and reduced costs as a result of managerial change (vaccination) are bigger than losses from increased costs as a result of vaccination and self-vaccination [2; 3]. This methodical line leads to the conclusion that if the equation leads to such results, the application of vaccination is a reputable process and completely justified from the economic point of view. We

clarify that methodically the effect of the vaccine on the inhibition of the disease is assumed to be 80%, which means that the prevalence of the disease and related economic losses are expected to decrease, or the increase of the indicators affected by the appearance of the disease is estimated, or other calculations. In order to calculate the real losses as a result of the disease, the data of the National Epidemiological Unit for the disease prevalence (0.4%) and for lethality (17.8%) were used, averaging and extrapolating to the county's livestock population. Meanwhile, based on the literature data [4] and our veterinary practice, we describe the constituent elements of the average vaccine cost per cattle unit, such as average vaccine dose, material costs, veterinarian fees, and costs of registration.

3. Results and Discussion

The table no. 1 shows the number of heads and the production of milk and meat expressed in tonne / year, at the district and region level, which belong to the normal production period without the presence of the disease.

Table 1. Number of animals and annual production in tons of milk and meat for the cows of Tirana district

	No. animals (caws)	Milk production (ton/year)	Meat production (ton/year)
Region	**39,459**	**119,408**	**4,868**
Kavaja	17,150	67,455	2,250
Tirana	22,309	51,953	2,618

According to available data [1, 5], production differentials were calculated as the effect of the disease in affected heads, veterinary costs and disorders in the reproductive sphere, as well as the number of deaths by blue tongue. All of these are converted to ALL values and are reflected in Table No. 2 as an economic loss by voice but also as a total.

Table 2. Economic losses as a result of the disease, according to the affected production voices, for the cows of Tirana district

Damage from the disease	No. of animals	Losses (All/animals)	Losses (ALL at district level)
Deaths	28	160 000	4 480 000
Reduction of milk production	157	14 000	2 198 000
Veterinary expenses	157	15 500	2 433 500
Reproduction disorder	157	3 500	549 500
Total			9 661 000

The above figures are related to the impact of blue tongue disease and the existing state of the livestock management system, but they only fulfill one part of the partial budgeting equation. The other part deals with the calculation of the inevitable costs of the vaccination process as a transition to another cow management system at the regional level. The data of these calculations are given below:

The average price for vaccine dose – 53 ALL

Average cost of materials – 3 ALL

Fee for the veterinarian – 100 ALL

Registration costs – 6 ALL

The cost of the vaccine / animals – 162 ALL

The cost of vaccination for the Region – 6 392 360 ALL

Based on the data presented following is the completion of the components of the formula with the respective calculated figures. Therefore, A_I includes the increase of incomes as an effect of vaccination (80% of the losses displayed in Table No. 2). This increase reaches the value of 7 728 000 ALL. As a result of the vaccination, some of the existing expenditure and costs during the sickness are decreased (the costs of the secure elimination of

insects and the vet costs), which belong to the component K_1 and result in the total of 2 685 500 ALL. The costs increased due to the vaccination (A_2) are considered the increased quantities of food consumption from 157 sick cows (for 2 months with 200 ALL/day), which amount to 1 884 000 ALL. At the end, the costs of the vaccination itself of 6392 360 ALL are added, and they consist in the last component K_2. By substituting the components with the values in ALL, the amount of the first part and of the second part of the equation are respectively:

1. $(r_1 + c_1)$ = (7 728 000 + 2 685 500) = 10 413 500 ALL

2. $(r_2 + c_2)$ = (1 884 000 + 6392 360) =   8 464 760 ALL

The above figures of the equation of the partial budget $(A_1 + K_1) > (A_2 + K_2)$, show that the sum of the first two components is greater than the sum of the two other components. In financial value the equation is represented 10 413 500 ALL>8 464 760 ALL. It means that the application of the vaccination brings greater profits than the costs for its accomplishment. As a consequence, the vaccination is a managerial measure absolutely justified in economic prospective, which also shows a financial benefit of about 23% compared to the existing system of the cattle management. Focusing on this result in the economic optics of cost-benefit financial analysis, we can say with assurance that performing massive vaccination against blue tongue disease is a not only beneficial but also a rewarding practice. The cost-benefit ratio in this case, clearly stands in favor of benefits. On the other hand, this hypothetical situation best illustrates the efficiency of the partial budgeting method as an adequate technique in the performance and financial analysis of a new or different managerial step. The hypothetical case presented is limited to one disease, one species and one circuit, but the result can be generalized at higher and larger levels for other managerial changes before they are taken. Finally, this paper leads us to two main conclusions; first, partial budgeting is a simple, suitable and convenient method of the economic cost-benefit analysis and secondly, in the case of blue tongue disease, the application of vaccination should be considered a useful and economically viable managerial change.

4. References

1. Keçi R: **Some Key Facts About the Economic, Social, and Well-being of animales of blue toungue disease in Dibër County Ruminants" presentation on the scientific day of the research group of infectious diseases of farm animals, wild animals and fish**, 11/04/2017.
2. Ronald D. Smith: **Veterinary Clinical Epidemiology** (second edition), In: A Problem - Oriented Approach 1995; 227-233.
3. Rushton J. **The Economics of Animal Health and Production**, CAB International, London 2009, 74 - 76.
4. Velthuis AGJ, Mourits MCM, Saatkamp HW, de Koeijer AA, Elbers ARW: **Financial Evaluation of Different Vaccination Strategies for Controlling the Bluetongue Virus Serotype 8 Epidemic in the Netherlands in 2008**: 2011.
5. Zhezha E, Keci R, Koleci XH: **Preliminary data on the economic impact of the outbreak of speech disease in 2014 in Albania. Case Study of Has district**. Proceedings of the D-day at the Faculty of Veterinary Medicine, 27.11.2015.