HEALTH AND ECONOMIC IMPACTS OF THE ERADICATION OF *Streptococcus agalactiae* IN A SAMPLE OF BRAZILIAN HERDS

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SUMMARY

We evaluated the efficacy of a partial blitz therapy approach to eliminate intramammary infections caused by *Streptococcus agalactiae* in three herds (A, B, C). After antibiotic treatment, milk samples produced no *S. agalactiae*, indicating the effectiveness of the therapy. In one herd (B) we had enough data to assess the economic impact (cost/benefit) of the program. A reduction in the percentage of clinical cases and number of cows with mastitis, and a significant reduction in SCC in the bulk tank milk were observed. However, there was no significant increase in milk production. Laboratory cultures were the main item of cost. The main benefits were the better price of milk due to the dairy's milk quality payment scheme and the reduction of clinical cases of mastitis. Three simulation models were used to evaluate the financial benefits. The economic gains per year were estimated as US$36,238.11, US$20,030.80 and US$8,161.11 respectively for simulations 1, 2 and 3.

INTRODUCTION

Streptococcus agalactiae and *Staphylococcus aureus* are the main mastitis pathogens recovered from Brazilian herds. Both pathogens are associated with high somatic cell counts (SCC) of both individual cows and bulk tank milk (BTM). Eradication of *S. agalactiae* from cows and from herds is attainable with adequate antibiotic treatment even during lactation. Usually a blitz therapy approach is used, in that all mammary quarts of all cows are treated at the same time [1,4,5,9]. Usually the economical benefits justify the costs implied by treatment drugs, veterinary services, laboratory exams, discard of milk and other expenses incurred in the blitz therapy [4,5,9]. *S. agalactiae* has been eradicated from many herds and even from entire regions in developed countries. Despite continuing efforts to control mastitis, *S. agalactiae* is still a cause of high SCC in many Brazilian herds. It is estimated that this pathogen is present in about 50% of these herds. Clearly an approach to reduce substantially the prevalence of *S. agalactiae* and thus reducing the SCC in milk, is needed. This work was conducted to evaluate the economical benefits as well as the feasibility of using the blitz therapy to eradicate *S. agalactiae* from herds kept under Brazilian tropical conditions.

ANIMALS, MATERIAL AND METHODS

Data of three (A, B, C) dairy herds were used in this study. Herds A and B were part of a previous study [3]. SCC and additional data were also obtained from the Holstein Breed Cattle Association of Minas Gerais State. Data from herd C were obtained from [11]. Herd characteristics and procedures of the blitz therapy are presented in Tab. 1. All three herds used a comprehensive program of mastitis control based on teat dipping before and after milking, dry cow therapy, treatment of clinical cases, among other procedures. A partial blitz therapy approach was used. It was based on three consecutive applications of intramammary antibiotics in all mammary quarters of all cows that presented evidence of infection (Tab. 1; [2]). Infected cows were identified when at least one out of three consecutive milk samples produced a positive culture of *S. agalactiae*.

Drugs used for treatment were selected based on previous works and considering a cure rate above 90% and the best rate of benefit/cost. Efficacy of the blitz therapy for herds A and B was assessed by two consecutive milk cultures from all cows, conducted 7 and

21 days after the end of therapy. Cows in these two herds were further surveyed for *S. agalactiae* for 12 months following therapy. The efficacy of therapy in herd C was assessed by milk cultures conducted 14 and 21 days after treatment, and subsequently for 60 days. Clinical mastitis data were obtained from herds A and B 12 months before and 12 months after therapy.

Non-genetic factors contributing to milk production characteristics were corrected using the minimum square method and the generalized linear model. The economical evaluation was conducted considering the treatment costs, loss of production, as well as the resulting gains. Herd B was used as a reference because of the quality of the available data. Monetary values were converted from Brazilian Real to US dollar (at an exchange rate of US$1=R$2.38). A model was adapted to estimate the cost of the eradication program [15]. The program benefits were estimated according to a model described in [8,15]. Published data [5] were used to simulate the economical benefits (simulation 1), and the effects of therapy, considering $p \leqslant 0.1$ (simulation 2) and $p \leqslant 0.05$ (simulation 3). Estimates of bonus for quality payment were considered based on SCC values used by the local dairy industry. Clinical mastitis costs were evaluated considering treatment costs and milk production losses [13].

Results

A total of 16 (26.3%), 42 (18.2%) and 40 (35.1%) cows were found to have intramammary infection caused by *S. agalactiae* in herds A, B and C, respectively. *S. aureus* was also found in 11 (18.0%), 109 (47.2%) and 2 (1.8%) cows from herds A, B and C, respectively. Of the 42 cows of herd B that were positive for *S. agalactiae*, 31 presented mixed infection with *S. aureus*. A 100% efficacy was observed following the *S. agalactiae* treatment. New infections were not detected during the observation period of 12 months (herds A, B). In herd B there was a 42% efficacy for elimination of *S. aureus*, in those cows that presented mixed infection.

Tab. 1: Characteristics of herds and the procedures adopted in the blitz therapy

	Herd 'A'	Herd 'B'	Herd 'C'
Number of dairy cows	60	231	114
Average milk production cow/day (kg)	11	21,88	18
Breef cows	15/32 HZ e 15/16 HZ	HPB	½ HPB/ Gir
Antibiotic used (intramammary infusion)	Pirlimycin(51 mg) [1]	ampicillin (75 mg) and cloxacillin(200 mg) [2]	Penicillin (100.000 U.I.) and novobiocin (150 mg)[3]
Range of applications(h)	24	12	12
Withdrawal period	36	72	72

No significant ($p>0.05$) reduction in the number of clinical cases in herd A was observed when the two-years period of observation was compared. For herd B a significant ($p<0.05$) 21% reduction in the number of cows with clinical mastitis was observed, whereas for the total clinical cases there was an 18% reduction. For herd B there was a significant SCC reduction in the bulk tank milk, considering the 12 months before and 12 months following treatment (968,000 to 563,000 cells/ml). For herd C a SCC reduction (829,000 to 513,000) was also observed. On the other hand, milk production was not influenced by treatment ($p>0.05$) (Tab. 2).

Treatment costs per cow amounted to US$73.92. Laboratory exams was the main item of cost (39%) (Tab. 3). Losses related to clinical mastitis amounted to US$96.21/cow/year.

Tab. 2: Milk production of groups of cows submitted to blitz therapy for *S. agalactiae*, in three herds.

Period of observation	Adjusted production (kg milk / day)		
	Herd 'A'	Herd 'B'	Herd 'C'
12 months before	13,5 a	25,2a	-
12 months after	12,7 a	24,0a	-
3 months before	-	-	18,8 a
3 months after	-	-	13,7 a

Means in the same column followed by different letters differ significantly (p <0.05)

Tab. 3: Items of cost of *S. agalactiae* blitz therapy

Variables	US$/cow	%
Microbiological tests	28,71	39
Labor, medicine and hygiene	14,91	20
Dispose of milk	23,10	31
Honorary doctor of veterinary	7,20	10
Total	73.92	100

Tab. 4: Results of simulations of the benefits of the blitz therapy and part of the benefit /cost.

Variables	Simulation 1	Simulation 2	Simulation 3
Payment for quality	4.462,58	4.462,58	4.462,58
Reduction of loss in milk production	28.077,00	11.869,69	-
Reducing the cost of clinical mastitis	2.790,17	2.790,17	2.790,17
Reduction of losses with death / early discharge	908,36	908,36	908,36
Total (US$/year)	36.238,11	20.030,80	8.161,11
The benefit / cost	1 : 11,67	1 : 6,45	1 : 2,63
Benefit equivalent in liters of milk per year	154.448	85.372	34.783

Tab. 4 presents the results of three simulation models for the benefits of blitz therapy (herd B). The economic gains per year resulting from the eradication of *S. agalactiae* were estimated as US$36,238.11, US$20,030.80 and US$8,161.11 respectively for simulations 1, 2 and 3.

Discussion

The success of the *S. agalactiae* blitz therapy observed in this study was similar to that described by others [8]. Thus, this method can be applied to Brazilian herds, if a mastitis control program is in place as was the case for the three participating herds in the present trial. As for *S. aureus* our results confirm the poor effectiveness of antibiotic therapy during lactation [8]. SCC reduction following blitz therapy is a common finding in this kind of experiment [8]. A reduction in milk production is one of the main consequences of subclinical mastitis [6,8,15], but the reduction in SCC and the elimination of *S. agalactiae* from the three herds did not result in a higher milk production. It seems that cows may not always recover their production level during the same lactation after a subclinical episode, as has been shown before [14], although in this study infections were caused by different pathogens, and the effectiveness of the therapeutic measures was lower than the one observed in our study. The high prevalence of *S. aureus* (herds A, B) may have contributed to the poor performance of milk production after the blitz therapy in these herds.

Treatment costs of clinical mastitis in our study were higher than those observed by others [6,8]. This may be related to different costs of veterinary drugs, and also to the length of treatment. Laboratory costs represented the most expensive item in the program, as has been reported before [8]. Veterinary drugs were also an expensive item [6]. Thus, these two items should always be considered if one plans to apply a blitz therapy approach. Treatment strategy may vary according to the prevalence of infection, laboratory costs and drugs. Besides the efficacy, antibiotics should be chosen based on costs and the length of time antibiotic residues are eliminated in milk [6,8]. The costs and benefits accounted in our study may not be comparable to those obtained by others. Several factors including pathogen prevalence, herd characteristics, price of milk, veterinary drugs, costs of veterinary services and milkers, treatment efficacy and period of discard of milk may explain these differences. It is also possible that different authors use different variables in their studies [6,8,13].

Conclusion

We demonstrated the possibility of using a partial blitz therapy approach to eliminate intramammary infections caused by *S. agalactiae* under Brazilian tropical conditions. We also demonstrated the economical benefits of this program. Taking into consideration the high prevalence of this pathogen, its influence on SCC, and the financial benefits, we recommend a program of mastitis control that includes similar procedures. This program should consider especially the right choice of antibiotics, pathogen prevalence and laboratory support.

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A COMPARATIV ANALYSIS OF THE CONTAMINATIONDEGREE IN SOME COMBINATION OF MYCOTOXINS IN THE FEED GIVEN TO DAIRY COWS

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Summary

The research consist in a comparative analysis targeting the determination of the contamination degree in some combinations of mycotoxins of 41 fodder samples (1 sample silage, 11 samples fibrous fodders and 29 combined fodders) from 6 different little milk-cows farm from counties of Teleorman (14 samples), Giurgiu (13 samples) and Ilfov (14 samples).
The analysis was performed by means of ELISA for AF, OTA, ZEA, DON, T-2 and FB on 12 samples of concentrated feed and with TLC for AF, OTA, ST and CT on 29 fodder samples.
In the 10 samles with one mycotoxin, the incidence was of 7,31% (3 samples) for AF and AFG_2, 4,87% (2 sample) for OTA and 2,43% (1 sample) for CT and T-2; in the 6 samples with two mycotoxins, the incidence was of 4,87% (2 samples) for the combinations AF+ST and AF+ZEA and of 2,43% (1 sample) for the combination AF+CT and ST+CT; in the 6 samples with three mycotoxins, the incidence was of 4,87% (2 samples) for the following combinations: AF+OTA+ZEA, AF+ZEA+T-2 and AF+ST+CT; in the 2 samples with four mycotoxins, the incidence was of 4,87% (2 samples) for combination AF+OTA+ZEA+DON.

Introduction

Aflatoxins, zearalenone, deoxinivalenole and fumonisine are the most often met and discovered mycotoxins in the fodder administered in milk cows food. When mycotoxins have a similar structure and when they are part of the same species or gender, their toxicity profile is similar and they act quite in the same way [10]. Mycotoxins AF and OTA or AF and T-2, when they are simultaneously ingested, they determine at cubs a toxic synergic effect, both at hepatic and at renal level [7].

It was proved in experiments on pigs that OTA mycotoxin in association with T-2 affects the productive performances and health, the effects being the decrease of the body weight and of the liver weight, immunosuppression phenomena, the deviation from normal limits of some biochemical and hematological parameters [6]. To the same extent, OTA and DON may have an additive effect. A synergic effect between the mycotoxins produced by Fusarium spp., DON, ZEA and FB was seen only when big quantities from these mycotoxins were used [1].

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