Biotechnology in Animal Husbandry 29 (2), p 269-275 , 2013
Publisher: Institute for Animal Husbandry, Belgrade-Zemun
ISSN 1450-9156
UDC 619:616.24'632
DOI: 10.2298/BAH1302269B

MASTITIS THERAPY-DIRECT AND INDIRECT COSTS

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Original scientific paper

Abstract: One of the most important problems in milk production, causing great economic loses is certainly mastitis. In order to minimize economic losses from mastitis dairy farms introduce different mastitis management programs. These programs include mastitis therapy and prevention. In mastitis control prevention is most important and when mastitis occurs cost of therapy and milk discharge is very important. In our study we examined cost of mastitis treatment and milk loss in different mastitis management programs. We concluded that most costly are mastitis caused by specific pathogens. Cost of milk loss is 2.4 times bigger than cost of drug consumption. Applying of tit-dipping has great importance in reduction of mastitis caused by specific pathogens and less importance for conditional saprophytes. In total, cost of mastitis treatment on whole farm was almost the same for all mastitis management programs, while the effect of the program on farm C was the most expensive in the cows with the finding of specific pathogens.

Key words: mastitis, therapy cost, pathogens, saprophytes

Introduction

Dairy production on modern farms is very intensive because of genetic predisposition of animals and optimal conditions of feed and husbandry. Health disorders who are common in dairy cows affect production and quality of milk and lastly on economic results. Mastitis is one of the most costly health problems in the dairy industry. Nationally, mastitis is estimated to cost dairy producers approximately 6% of the value of production in United States *(Wells and Ott, 1998)*. Reduced milk production is the major cost associated with subclinical mastitis and a substantial cost associated with clinical mastitis (*Eberhart et al*., *1987*). A review by *Schepers and Dijkhuizen* (*1991*) indicated that mastitis caused a 40 to 50% decrease in the economic net margin per cow, with the largest part of this loss due to a 5 to 7% decrease in milk yield per lactation. Estimates of milk yield loss range from 100 to 500 kg/cow per lactation (*Erb et al., 1985; Firat,*

1993; Hortet and Seegers, 1998). When clinical mastitis occurs, additional costs result from discard of abnormal milk, drugs, and veterinary services. Antibiotics are commonly used to treat clinical mastitis episodes *(Ziv, 1992)*. Administration of antibiotics usually requires a withdrawal time, during which milk is unmarketable and must be discarded or fed to calves (*Plummer et al., 1984*). This cost can be substantial and is used as justification for avoiding antibiotic use. Those results suggested that antibiotic therapy was beneficial in terms of cow health and welfare, but economic factors were not reported. The recovery of milk yield, the amount of unmarketable milk, and drug costs all may have been affected by treatment protocols. Mastitis reduces dairy farm profitability, with losses stemming from milk production decreases and discarded milk and costs of treatment and culling (*Gröhn et al., 2005*). The specific inflammatory response from a mastitis incident is dependent on the bacterial species involved (*Bannerman, 2009*). Depending on the pathogen involved, the effect may vary, so studies determining which pathogens have the greatest impact on cow health, production, and profitability are valuable (*Gröhn et al., 2004*). In our study we examined impact of different types of bacterial infection of udder and different management on losses from mastitis.

Materials and Methods

Study was conducted on three dairy farms with approximately same number of cows during one year period. All farms had different management in treating mastitis problem. First farm, (farm A) was using tit-dipping and treating of clinical mastitis in lactation and subclinical mastitis in dry period. Second farm, (farm B) was using treating of clinical mastitis in lactation and subclinical mastitis in dry period but without tit-dipping. Third farm, (farm C) was using tit-dipping and treating of clinical mastitis in lactation and blanket-therapy in dry period. Mastitis detection in cows was conducted by determining sings of mastitis, such as milk from one or more glands was abnormal in color, viscosity, or consistency, with or without accompanying heat, pain, redness, or swelling of the gland, or generalized illness. From cows with sings of mastitis milk samples were taken with applying asepsis. Samples were then stored in refrigerator and transported in laboratory for detection of microorganisms. Each sample was inoculated on plates with substrates. Substrates are marked with number of samples and put in thermostat on incubation at 37 º C. Incubation lasted for 48 hours, with one reading after 24 hours and one at the end of incubation.

When reading the plates a special attention was given to the presence of microbial growth, size, shape, color and arrangement of colony-forming and particularly in the presence of hemolysis. For the differentiation of certain types of bacteria special tests are used. After differentiation was done all bacteria were divided in two groups. First group was specific pathogens containing

Staphylococcus aureus, *Streptococcus agalactiae* and *Escherichia coli.* Another group was conditional saprophytes containing *Micrococcus* spp, coagulase negative *staphylococcus* and *Corynebacterium bovi*s.

Data on drugs consumption and milk loss per mastitis treating were gathered on farms by interviewing veterinarians. To calculate cost of drugs for treating mastitis average price of milk was used.

Statistical analysis

Correlation coefficient between number of mastitis cases and cost of therapy and milk loss was calculated using program "Statistica version 10".

Results and Discussion

Data collected on farms in experiment showed appearance of mastitis on all three farms during whole year. Calculation of cost of mastitis treatment on farms showed differences between farms. Costs of mastitis treatment and milk loss due to antibiotic presence on all three farms are shown in tables.

Table 1. Cost of mastitis treatment and milk loss on farm A

bacteriological findings	Farm A					
	number of cows		drug consumption calculated in milk		milk loss due to antibiotic presence	
	number	%	by cow	total	by cow	total
negative	58	23,39	17,82	1034	37,79	2191
specific pathogens	68	27,42	86,86	5907	209,19	14274
conditional saprophytes	122	49,9	11,63	1419	31,74	3827

Data showed in table 1 indicate that drug consumption and milk loss were biggest when mastitis was caused by specific pathogens on farm A. By comparing milk loss due to antibiotic presence and drug consumption calculated in milk, on farm A average ratio is 2.41. Total milk loss and drug consumption for all mastitis types is 28 652 kg.

Table 2. Cost of mastitis treatment and milk loss on farm B

bacteriological findings	Farm B					
	number of cows		drug consumption calculated in milk		milk loss due to antibiotic presence	
	number	%	by cow	total	by cow	total
negative	48	19,36	6,87	330	16,29	782
specific pathogens	102	41,12	69,02	7040	164,81	16811
conditional saprophytes	98	39,52	10,10	990	27,55	2700

Data showed in table 2 indicate that drug consumption and milk loss were biggest when mastitis was caused by specific pathogens on farm B. By comparing milk loss due to antibiotic presence and drug consumption calculated in milk, on farm B average ratio is 2,49. Total milk loss and drug consumption for all mastitis types is 28 653 kg.

Table 3. Cost of mastitis treatment and milk loss on farm C

bacteriological findings	Farm C					
	number of cows		drug consumption calculated in milk		milk loss due to antibiotic presence	
	number	%	by cow	total	by cow	total
negative	78	31,45	33,98	2651	81,35	6345
specific pathogens	31	12,50	106,45	3300	229,82	7124
conditional saprophytes	139	56,05	17,33	2409	49,09	6823

Data showed in table 3 indicate that drug consumption and milk loss were biggest when mastitis was caused by specific pathogens on farm C. By comparing milk loss due to antibiotic presence and drug consumption calculated in milk, on farm C average ratio is 2.45. Total milk loss and drug consumption for all mastitis types is 28 652 kg.

Correlation coefficient between number of mastitis cases and cost of therapy and milk loss was 0.14, so positive correlation was calculated.

When a cow contracts mastitis, the dairy farmer needs to decide whether treatment is warranted, and if so, what treatment is most appropriate. Ideally, these decisions are made based on the organism causing mastitis. In determining how to treat a cow, one common way of grouping these organisms is to separate them into gram-positive and gram-negative. These two groups of organisms cause mastitis of different symptoms and severity, and this classification can form the basis of on-farm treatment protocols (*Hertl et al., 2010*). In our study we have divided organisms on specific pathogens and conditional saprophytes in order to describe their ability to cause mastitis rather than their staining characteristics. On all three farms cost of treating mastitis and milk loss were highest when specific pathogens were isolated from milk. Also on all farms milk loss due to antibiotics was bigger than cost of antibiotics for treating. Average ratio between these two costs on farm A was 2.41, so on every kg of milk given for antibiotics 2.41 kg were wasted because of antibiotic residuals. On farm B average ratio was 2.49, and on farm C average ratio was 2.45. On all three farms it was approximately the same ratio between cost of antibiotics and milk loss due to antibiotic residuals. Similar results were obtained by *Shim et al 2004*. who claim that costs for milk loss is several times bigger than cost for antibiotic treatment. If we compare cost for treatment

between farms we can see from tables that cost per one mastitis case is greater in farms A and C who used tit-dipping than in farm B because of counting in costs for tit-dipping, but farms A and C had lesser number of mastitis especially those caused by specific pathogens. Applying of tit-dipping has decreased number of pathogens much more than number of conditional saprophytes, these findings are accordant to results given by *Bobos, (1991)*. Correlation between number of mastitis cases and cost of therapy and milk loss for all three farms was positive and points that number of cases on big farms is more important than type of mastitis. By counting costs of mastitis in total-including specific pathogens, conditional saprophytes and negative findings on all three farms total count is approximately the same. This result indicates that in economic aspect all three management of mastitis on farms give almost the same effect.

Conclusion

On all three farms biggest milk loss and cost of drugs consumption was in mastitis caused by specific pathogens. Ratio between milk loss and cost of drugs consumption calculated in milk was almost the same on all farms. Total costs of mastitis on all three farms were approximately the same regardless to different mastitis management programs.

Acknowledgment

Research was financed by the Provincial Secretariat of Science and Technological Development, Republic of Serbia, project number 114-451-2230/2011 and grant TR31084 and grant III 43007 from Serbian Ministry of Education, Science and Technological Developmment.

Terapija mastitisa -direktni i indirektni troškovi

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Rezime

Jedan od najvažnijih problema u proizvodnji mleka, koji izaziva velike ekonomske gubitke svakako je mastitis. Da bi se smanjili ekonomski gubici zbog mastitisa farme muznih krava uvode različite programe kontrole mastitisa. Ovi program uključuju terapiju i prevenciju mastitisa. U kontoli mastitisa prevencija je najvažnija i kada se pojavi mastitis veoma je značajan trošak terapije i odbacivanja mleka. U našoj studiji ispitali smo trošak terapije mastitisa i odbacivanja mleka u

različitim programima kontrole mastitisa. Zaključili smo da je najveći trošak zbog mastitisa izazvaniih sa specifičnim patogenima. Trošak odbacivanja mleka je u proseku 2,4 puta veći od troška lekova. Primena potapanja sisa ima veliki značaj na smanjenje mastitisa izazvanih sa specifičnim patogenima i manji značajna smanjenje mastitisa izazvanih sa uslovno saprofitima. U ukupnom zbiru trošak terapije mastitisa i odbčenog mleka je približno isti u svim programima kontrole mastitisa, dok je efekat primene programa na farmi C bio najskuplji u krava sa nalazom specifičnih patogena.

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Received 13 June 2013; accepted for publication 26 June 2013