

Antibiotic Infusion for Prevention of New Mastitis Infections in Cows

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Story in Brief

Bovine mastitis is responsible for greater economic loss than any other single disease affecting dairy cattle. Reduced milk yield, altered milk composition, veterinary fees, cost of drugs, and increased herd replacement costs all contribute to the loss encountered.

One of the more promising approaches to reducing the incidence of mastitis in dairy herds is that of preventing new infections during the non-lactating period of the production cycle. This study was conducted to evaluate the effectiveness of infusing a synthetic penicillin, benzathine cloxacillin, into all quarters of cows at drying-off in preventing new mastitis infections.

Infusion of each quarter of the udder at drying-off with 500 mg. benzathine cloxacillin significantly reduced the rate of new mastitis infection in cows up to 4 to 10 days after calving. Rate of new infection was 18.8 percent in control cows compared to 4.6 percent in infused cows. Seventy-five percent of the new infections in cows and 66.7 percent in quarters were detected only by bacteriological examination. No increase in the less common species of mastitis-causing bacteria occurred as a result of dry cow infusion.

Infusion of all quarters of all cows in a dairy herd after the last milking of each lactation with an effective antibiotic preparation can reduce infection rate in a dairy herd. Use of acceptable technique in infusing an antibiotic preparation into the udder of cows is an extremely important factor in obtaining the benefit possible with this management practice.

Introduction

Efforts in the past to prevent or eliminate mastitis infections during lactation were only partially successful for a number of reasons. Most

mastitis causing bacteria (*Staphylococcus aureus*, *Streptococcus uberis*, *Strep. dysgalactiae*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella species* and *Corynebacterium pyogenes*) are widely distributed in the environment, so that complete eradication appears to be impossible. *Strep. agalactiae* is limited to the mammary gland, yet many opportunities exist for transfer from cow to cow. In effect, the udder of a dairy cow is constantly exposed to bacteria potentially capable of causing mastitis. The practice which appears to be of greatest value at present in preventing new infections during lactation is that of immersing the teats with an effective bactericidal solution ("teat dipping") after each milking.

More recently, attention has focused on elimination of existing infections or prevention of new infections during the non-lactating period. It is estimated that 50 to 80 percent of all new mastitis infections begin during the dry period; therefore, prevention of new infections during this period would substantially reduce the mastitis problem.

The purpose of this study was to evaluate the effectiveness of antibiotic infusion into all quarters of cows at drying-off in preventing new infections under the environmental and management conditions prevailing in the Southwest. A more detailed report of the results was published in the *Bovine Practitioner*, Nov. 1974.

Materials and Methods

Prior to drying-off, quarter milk samples from all cows in the O.S.U. dairy herd were examined for presence of mastitis causing bacteria. Cows found to be negative (59 Ayrshires, 13 Guernseys, 23 Jerseys, and 77 Holsteins) were grouped on the basis of number of lactations completed and assigned to treatment groups. The treatments were: (a) control, no infusion and (b) infusion of 500 mg. benzathine cloxacillin¹ into each quarter of the udder after the last milking of the lactation period.

All cows in both groups were teat dipped with an iodine solution having 10,000 ppm available iodine once a day for seven days after drying off. Afterwards, the cows were maintained in a pasture separate from the milking herd and periodic examinations of udders by visual observation and palpation were made for any indication of infection during the dry period.

Routine management procedures for the milking herd included proper maintenance of milking equipment, use of strip cup for detection of clinical mastitis, drying each udder with single service paper towels, acceptable milking technique, and teat dipping with an iodine solution after each milking.

¹ Bristol Laboratories, Division of Bristol-Meyers Co., Syracuse, New York.

Infection status was determined by bacteriological examination of quarter milk samples at drying off, 4 to 10 days after calving, and whenever clinical mastitis was detected. Procedures for identifying specific groups or species of mastitis causing organisms, and the criteria for classifying a quarter infected, were those outlined by the Research Committee of the National Mastitis Council.

Results and Discussion

Infusion of benzathine cloxacillin into the udder of cows at drying-off significantly reduced the number of cows developing new mastitis infections during the dry period and the initial 4 to 10 days of the next lactation (Table 1). The number of previous lactations did not significantly influence the effectiveness of antibiotic infusion in preventing new infections. Thus, in a program of dry cow infusion for preventing mastitis, infusion of all quarters of all cows, without regard to age, appears to be indicated.

Only 2 of 25 new infections in quarters were detected by clinical observation during the dry period. Presumably, at least part of the other 23 infections first detected 4 to 10 days after calving also occurred before calving. The first few days after calving has been reported to be one period when cows are particularly vulnerable to new infections. However, since benzathine cloxacillin would be expected to persist in the udder for only four weeks of the dry period, it would be difficult to account for its effectiveness in preventing new infections in this trial had they occurred after calving.

A surprisingly small number of experiments have been reported in which new infection rate in cows infused with antibiotic at drying-off was compared to a control group without infusion. Moreover, a large amount

Table 1. Number of New Infections Developing During the Dry Period

Item	Cows		Quarters	
	Control	Infused	Control	Infused
Number of experimental units	85	87	339 ¹	347 ¹
Clinical infections detected during dry period	1	0	2	0
Additional infections detected up to 4 to 10 days post-calving	15	4	20	5
Total new infections	16	4	22	5
Percent new infections ²	18.8	4.6	6.5	1.4

¹ One blind quarter.

² Difference between groups statistically significant for cows ($P < .01$) and quarters ($P < .001$).

of variation in the effectiveness of antibiotic infusion may be noted in a summary of these experiments. Some workers have reported reductions in new infection rate similar to that found in this study, whereas less favorable results have been obtained by others. The particular antibiotic used and time of infusion in relation to drying-off are factors which appear to influence the results obtained. In experiments where antibiotic infusion plus teat dipping after the last milking was compared to controls having neither of these, reductions in rate of new infection from 45 to 82 percent have been reported.

Considering all the experiments in which antibiotic infusion at drying-off has been evaluated, there was no definite relationship between level of infection in the herds, as measured by rate of infection in the control group, and effectiveness of antibiotic infusion in reducing new infection rate. Thus, the practice of infusing cows at drying-off can be beneficial even under conditions where a relatively low new infection rate is expected. Whether or not all cows in a herd should be infused depends upon the feasibility of sampling every cow near drying-off to determine infection status, number of new infections expected during the dry period, cost of the drug, and likelihood that the antibiotic infusion would be done in an acceptable manner.

The majority of the new infections up to 4 to 10 days post-calving were determined by bacteriological examination of quarter milk samples (Table 2). Ninety percent of the new infections in cows were determined in this manner, whereas only one-fourth were clinical cases of mastitis. On a quarter basis, 77.8 percent of the infections were detected by bacteriological examination, and only 33.3 percent by observation of clinical mastitis. Thus, it appears that quarter milk samples from all freshened cows would need to be examined bacteriologically to detect a large major-

Table 2. Infections Determined by Bacteriological or Clinical Means up to 4 to 10 Days Post-calving

Method of Detection	No. of Cows or Quarters	Percent Detected By Method Designated
Cows		
Bacteriological	15	75
Bacteriological and clinical	3	15
Clinical only	2	10
Quarters		
Bacteriological only	18	67
Bacteriological and clinical	3	11
Clinical only	6	22

ity of new infections. Otherwise, the majority of new infections would advance to a greater degree of severity, possibly causing severe damage to the secretory tissue before detection during the ensuing lactation.

In the infused cows which did develop infections during the dry period or during the first month of lactation, the same species of common mastitis producing organisms were isolated as were present in the herd prior to initiation of this experiment. There was no evidence of an increase in the occurrence of the less common species of bacteria which occasionally cause mastitis.

Considering only cows free of mastitis at 4-10 days after calving, infusion before the dry period did not appear to influence susceptibility to infection during the first month of lactation. During this period, there was a similar percentage of new infections in cows which had been infused during the previous dry period and control cows (10.8 vs. 8.7 percent, respectively). New infection rate in the treated and control quarters was 3.6 and 2.2 percent, respectively. No evidence was obtained in the present study to support the idea that untreated quarters which possess non-pathogenic bacteria at drying-off may have a lower rate of new infection than treated quarters in the ensuing lactation.

Studies on Wheat Pasture Flavor in Milk

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Story in Brief

Unmanaged handling of dairy cows grazing wheat pasture will permit milk to be produced containing an undesirable flavor and odor. Feeding sorghum silage at the rate of two percent of body weight just prior to grazing the wheat pasture for two hours had the effect of slightly reducing the intensity of the wheat flavor in the milk. This method of handling the feeding program was compared to feeding the silage after the wheat-grazing period and after the evening milking. The wheat flavor was not completely eliminated by feeding silage at either time. Feeding