The Economics of Mastitis Control

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Introduction

Increasingly, veterinarians are interested in the economic impacts of animal disease and disease control programs. As the more dramatic and devastating diseases have been eradicated or controlled, the profession has turned its attention to control of chronic diseases which affect production. Mastitis is one such disease. Because mastitis is often insidious, economic justification for implementing mastitis control programs must be made in order to achieve producer interest in and compliance with a mastitis control program.

In a review of the economics of mastitis, Jansen (1970) found losses in total milk production which ranged from 5.0 to 25.5%. In addition, decreases in the amount of fat, solids-not-fats, lactose and total solids have been documented. Annual loss estimates from mastitis ranged from $23 to $154 per cow prior to implementing control and $28 to $82 after initiating control programs. The benefit-cost ratio from mastitis research has been estimated at 9.6 to 1 (Blosser, 1979).

Considerations for Making Economic Estimates

Partial budgeting provides a straightforward and accurate framework that can be used to estimate the expected impacts of mastitis control programs. Using partial budgeting to estimate the effects of a disease control program involves estimating both the benefits and costs of the program. The benefits or positive impacts of the program include any increased revenues, or decreased costs. The costs or negative impacts of the program include any increased costs, or decreased revenues. The difference between the benefits and costs is then the net return of the program. (Figure 1) Partial budgeting facilitates the conversion of production losses into economic losses. It also forces you to remember that the losses associated with mastitis are not totally recoverable. With current technology and understanding, there will always be losses associated with mastitis, no matter how effective the mastitis control program.

Partial budgeting projections are made for a specific time interval such as annually, semiannually, or quarterly. A projected stream of costs and benefits to accrue over time is estimated. Disease control benefits often accrue substantially later than the costs of the program.

FIGURE 1. The framework of a partial budget to estimate the impact of disease control.

Time interval for projections: _____	
Positive Impacts (or Benefits)	**Negative Impacts (or costs)**
Increased Revenues	Increased Costs
Decreased Costs	Decreased Revenues
Total positive impacts____	Total negative impacts____
net impacts = positive impacts − negative impacts	

Consequently, it is particularly important to discount both costs and benefits. For instance, the control of contagious mastitis organisms using dry cow therapy and teat dipping alone will require 2 to 3 years in the average herd. Discounting is a method of accounting for the value of money over time, and is important because it allows producers to compare investments in mastitis control with other alternative investments for limited capital. Incorporating discounting with projected budgets is sometimes referred to as capital budgeting.

Important Production and Economic Impacts of Mastitis Control

1. *Milk production*

Changes in milk production would result in increased revenues realized because of increased production resulting from decreased discarded milk and decreased subclinical mastitis. The amount of milk which is discarded during treatment of clinical mastitis is only a small part of the production losses associated with mastitis. Subclinical mastitis results in decreased production even though the milk is of acceptable quality. Subclinical mastitis has been shown to be the major economic component of decreasd revenues from loss of milk production (Willett, et al, 1982).

2. *Feed consumption*

Changes in feed consumption is another very important contributor to the economics of the program. It cannot be assumed that by decreasing mastitis in the herd, other things being equal, that production will automatically go up. Projections on the amount of increased feed consumption necessary to realize potential increased milk production from mastitis control are necessary too.

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3. *Treatment costs, and program costs*

Change in mastitis treatment costs and program costs are fairly straightforward to estimate. If there is a decrease in clinical mastitis, a goal of mastitis control programs, this will appear under decreased costs (a positive impact). There will probably be increased costs associated with the control program (a negative impact).

4. *Culling, death loss, and risk to other diseases*

Mastitis is a common reason for culling in dairy herds. The question which must be answered to estimate the economic impacts on culling is "What is the change in average herd life after implementing a mastitis control program?" To my knowledge, this is not known. Previous studies have taken the change in the number of cows culled for mastitis multiplied by the difference between the cull value and milking value to be the net benefit from implementing the program. However, cows saved from mastitis would be at risk for culling due to other diseases. Moreover, there is probably an attributable risk of other diseases associated with mastitis. This same problem exists for estimating the economics associated with death loss. Likewise, if there is increased risk of other diseases as a result of mastitis, then not only would overall changes in culling rate and death loss be important to examine but part of the increased expenses associated with other diseases could be attributed to mastitis.

A simple example might clarify this point. Let's assume an average herd life of 3 lactations before implementing a control program. That means that 33.3% of the lactating herd will be culled each year. Let's also assume that 13.3% are culled annually due to mastitis, and 20% are culled for other reasons. If we decrease the annual percent culled due to mastitis from 13.3% down to say 3.3%, other things being equal we will not decrease the overall cull rate from 33.3% down to 23.3%. This is because the 10% of cows which are not culled due to mastitis are now eligible to be culled for other reasons. All things being equal, the cows culled for other reasons will increase from 20% to 22% [20 + (.2 x .1) x 100], and the overall cull rate will drop from 33.3% to 25.3% or decrease by 8%. If there is an attributable risk associated with mastitis, then it is possible that decreasing mastitis culls might also decrease culls associated with other diseases, and a decrease in mastitis culls from say 13.3% down to 3.3% could cause the overall rate to fall by more than 8% of the cows per year.

5. *Labor, and milk composition*

Changes in labor and changes in milk composition or quality are probably small components to the overall economic picture. Certainly as component pricing of milk becomes more important the influence of this will increase, and/or if the composition/quality of milk is so bad that the producer faces a loss of his/her market, then this is by no means a small economic impact for that individual producer.

6. *Days open*

Changes in days open/calving interval are not normally estimated but are potentially important. However, the economic impact associated with days open is currently unresolved (Holmann, et al, 1984).

Evidence on the Economic Impact of Mastitis Control

Examining the association between somatic cell counts (SCC) and milk production, it has been shown that as the percentage of cows in the low SCC range increases so does the rolling herd average. Cows in their second or later lactation have a decrease in milk production of about 1.5 pounds per day for each increase in the linear SCC score above 2 (Shook, 1982, Raubertas, Shook, 1982). The losses seen in first lactation heifers were about half this amount. An important question to answer in terms of the economics is, "Is this relationship exploitable?" other things being equal.

Crist, *et al,* 1982, showed a dramatic improvement in the level of mastitis in study herds subsequent to implementing a control program, with no increase in milk production. Another study done on 39 identical twin heifers and cows, one of each pair intentionally infected with staphylococcal mastitis strains and the other of the pair with a high level of mastitis control, also had no significant difference in milk production between the 2 groups for mature cows (NZ Jn of Ag, 1983). In both studies, it would appear that the reason for this was that nutrition was probably a factor limiting production.

Nonetheless, several available computer programs indicate that the relationship between mastitis and production as demonstrated by Shook is believed to be fully exploitable. These programs estimate the economic impacts associated with mastitis control and assume that decreasing mastitis can increase production dramatically with no increase in feed costs (Fetrow, 1985, Kirk, 1981, 1984, Lesch, 1983).

There were several problems with these computer programs which can demonstrate dramatic potential returns on investment, in excess of 600%. First, it was assumed that program goals were reached instantly. Second, it was assumed that no increase in feed consumption was necessary to bring milk production up to goal (goal milk production is predicted by converting the herd to the goal SCC or CMT distribution). While mastitis is a factor limiting production, and decreasing mastitis combined then with feeding cows appropriately can move cows toward their genetic potential for milk production, it is very important not to ignore the feed costs when making economic estimates.

A study which did take into account increased feed consumption, demonstrated a much lower return from mastitis control (Willett, *et al,* 1982). This study measured the impact of implementing mastitis control programs in 20 dairy herds in Washington. They evaluated changes in milk

production due to subclinical influences of mastitis, culling, deaths, drugs, labor, veterinary fees, and discarded milk. They compared all of the losses occurring in these categories before implementing the control program to the losses occurring in these categories a year after they implemented the control program. They estimated that annual average benefits per cow associated with mastitis control were $57.65, while average annual costs of the control program were $31.69 ($14.77 per cow for additional feed and $16.92 for program costs). This was a return on investment of about 80%, much lower than those suggested using the above mentioned computer programs, however still a very good return, much better than most alternative investments that a producer has. It is also a figure which is much more believable and hence more likely to be a selling point of mastitis control.

Potential Problems in Estimating Impacts for Individual Herds

Program compliance by the producer and the length of time expected to achieve program goals are also important. It is only with this information that expected benefits and costs over time can be made discounted to allow knowledgeable judgments.

As previously stated, it is not known how exploitable the relationship between SCC, milk production, and feed consumption is, nor at what economic cost. This information must be determined before accurate estimates on the economic impact of mastitis and/or mastitis control programs can be made.

How expected returns or profits are used to advocate the use of mastitis control programs to individual producers is important. There is a problem in taking average figures obtained from many herds and using these figures to make projections on achievable goals or economic impacts in individual herds. Around any average value there is a distribution and there will be herds above and below the average. Willett's, et al study showed 6 of 20 herds with higher losses associated with mastitis one year after implementing a control program. There is no way to know what these losses would have been had these farms not implemented any control program, however, these cases point out the fact that around any mean value there is a distribution. If a veterinarian goes into a herd promising results of a certain level, some of the time the veterinarian will be commended because the program will be as effective or more effective than claimed. The rest of the time, the herds will not do as well as predicted.

While it is obvious that the key to making economic estimates quickly and easily is through the use of microcomputers or programmable calculators, estimates using them can be misleading. Programs of this type rely to a great extent on the assumptions made. They can easily be inaccurate, and unless evaluated critically, the veterinarian using these programs may make claims which are unlikely to occur. Also, producers might tend to expect too much too soon when they see the outputs generated from some computer program. Communication between the veterinarian and the client is the key to avoiding problems.

Summary

Estimates on the economic value of mastitis control using computer programs may be gross overestimates, depending on the assumptions made in the program. Current evidence suggests that we still do not have enough information to determine the average return from mastitis control with a specific confidence interval. However, we do have enough information to say that basic mastitis control generally is profitable, and probably generates a higher expected return than many alternative investments available to a producer.

Veterinarians need to have economic justification for their recommendations. The estimated average return on investment with a given distribution from mastitis control is important information for producer decision making. Producers must choose between many alternatives for their limited capital and veterinarians need to help provide producers information to make decision. These needs make computer programs which can estimate expected returns very attractive. However, it is important to remember that promises of economic returns of a given level to individual producers should not be made, any more than promises of results from specific treatments or surgeries should be made.

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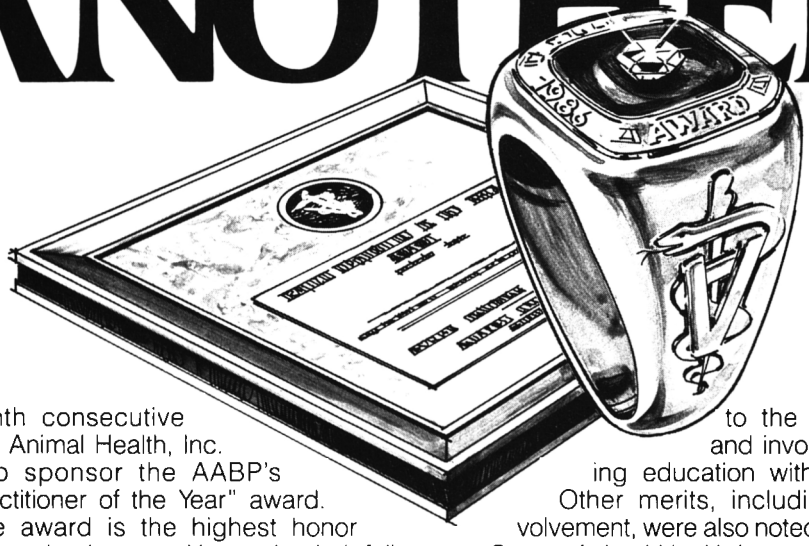

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