THE USE OF DIAGNOSTIC LABORATORY DATA TO MONITOR MASTITIS

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Introduction

The concept of disease monitoring in veterinary medicine has been discussed for decades. Its importance becomes more apparent as diseases that cause catastrophic illness are less prevalent and the main health challenge facing the animal production industry is low productivity. Disease monitoring schemes are proposed and discarded on a regular basis. In 1975, an international conference on disease monitoring was held. One of the participants, M.E. Hugh-Jones commented: "At any conference on disease monitoring there is usually one articulate, optimistic speaker who has the perfect system. This computerized philosopher's stone is not quite ready, but within a few months it will be working perfectly, turning mercury into gold. Little more is heard of these schemes, but occassionally an older and wiser man emerges to breifly describe his experiences."(1) With this caveat, the objective of this paper is to describe a system for mastitis monitoring. This system was developed using diagnostic laboratory data as the core information. These data integrate with other record systems to provide a method to monitor herd performance over time and allow interpretation of trends to suggest interventions to improve herd performance.

Background

Bovine mastitis is an intensely studied problem and is reputedly the most costly disease seen on a dairy farm.(2) In several states such as New York, unique mastitis or udder health programs have been developed and have at their core a strong diagnostic laboratory. Nationally, programs such as Dairy Herd Improvement Associations (DHIA) have accumulated a large body of production, genetic and indirect health information which can be used to evaluate components of udder health. These systems store tremendous amounts of data, but these data have not been integrated so dairy practitioners can effectively utilize them for helping clients make decisions for improving herd productivity through a tailored mastitis control plan.

A majority of the samples that are received in a mastitis diagnostic laboratory represent single cases from herds that may not represent the actual herd profile of mastitis. The results reported by the diagnostic laboratory represent only a single diagnosis at a point in time which is unrelated to other data

describing the herd. The diagnostic results are another piece of paper that must be related to other paper records (or memory) of clinical signs and other records such somatic cell count and production data. Diagnostic results may prove useful in treating the individual cow but in their present form may not provide any information that could improve herd productivity.

Data available for monitoring mastitis, strengths and weaknesses

Data from diagnostic laboratories--One strength of mastitis diagnostic laboratory information is that the data represent reliable diagnoses. Another strength is these data represent a spectrum of cases covering a wide geographic and temporal space. These strengths make the diagnostic database, if it is retrievable, a unique resource of information on historical and spatial distribution of mastitis pathogens and their antibiotic sensitivities. The weakness of mastitis diagnostic laboratory data is that it cannot rigorously describe disease trends. It lacks several key components to make unbiased epidemiologic inferences. The most glaring deficiency is the selectivity of the submissions compared to the denominator or population of interest, i.e. the general dairy cow population. This selectivity is a result of two factors: 1. diagnostic difficulty, i.e. only the most difficult to treat cases may be sampled for laboratory diagnosis, and 2. A non-random client base for the laboratory.

Data from DHIA --The strength of DHIA is that it is a well documented and utilized system for monitoring a number of production parameters. It also provides a regular system for data collection and reporting. Its weakness parallel those noted for diagnostic data. The participants in DHIA may not represent the general dairy population. DHIA data excludes dairies that have adapted on-farm recording and monitoring systems and those that cannot see the need for routine monitoring. Another potential weakness of DHIA is inaccurate data. Errors may occur because some of the data collected may not be viewed as providing valuable output and are therefore not recorded properly.

Clinical history--This piece of data, usually kept by the submitting clinician, will often provide the best perspective to aid rational interpetation of the diagnostic results. The clinical information provides data describing the nature of the clinical case and how the case fits into the herd profile for mastitis. When this information is provided it is not often included in the diagnostic laboratory database to be available for later analyses.

Application of data to a mastitis reporting and monitoring system

Three broad goals can be defined for a system to monitor and report mastitis diagnostic data. The first goal is to provide accurate and timely diagnostic data that can be coupled with production and clinical data which can be related to an individual submission and report. Providing accurate and timely diagnostic data is the traditional role of diagnostic laboratories. The logical extension of this role is to integrate the diagnostic results with the description of the case clinical presentation and records of production and disease. These data are available from

DHIA, laboratory submission forms and historical records of the diagnostic laboratory.

The second goal is to provide historical and geographic perspective to the diagnostic reports to aid the clinician in developing a herd plan or alert them to a change in herd mastitis status and antibiotic sensitivities of the pathogens. These data are available in the diagnostic laboratory database, rates and profiles of types of mastitis historically diagnosed in the individual, herd and region serve as the contrast for current results. Production and somatic cell count information contrasting the case (or cases) to current and historical trends for the herd can be obtained from DHIA.

The third goal for the system is to provide a spatial and historical record of types, severity and rates of mastitis. The purpose of this data would be to highlight statewide changes and monitor progress in control of mastitis. These data would derive primarily from the diagnostic laboratory database and could be applied to directing educational and research efforts.

Implementation of a mastitis system

The effectiveness and value of this system is directly related to the quality of the submissions to the laboratory and access to production data. The value of the system is that reports to clinicians will incorporate historical data with current diagnostic results. The success of the system will depend on having reliable, representative submissions for cows, herds and regions. These points will be discussed and the implementation demonstrated.

References

1. Hugh-Jones, M.E. Some pragmatic aspects of animal disease monitoring. In: *Animal Disease Monitoring*, edited by Ingram, D.G., Mitchell, W.R. and Martin, S.W. Springfield: C.C. Thomas, 1975, p. 20-36. 2. Sischo, W.M., Hird, D.W., Gardner, I.A., et al. 1990. Economics of disease occurrence and prevention on California dairy farms: A report and evaluation of data collected for the National Animal Health Monitoring System, 1986-87. *Prev Vet Med* 8:141-156

Summary

The concept of disease monitoring in veterinary medicine has been discussed for decades. Its importance becomes more apparent as diseases that cause catastrophic illness are less prevalent and the main health challenge facing the animal production industry is low productivity. The objective of this paper is to describe a system for mastitis monitoring. This system was developed using diagnostic laboratory data as the core information. These data integrate with production and clinical record systems to provide a method to monitor herd and animal performance over time and allow interpretation of trends to suggest interventions to improve herd performance.