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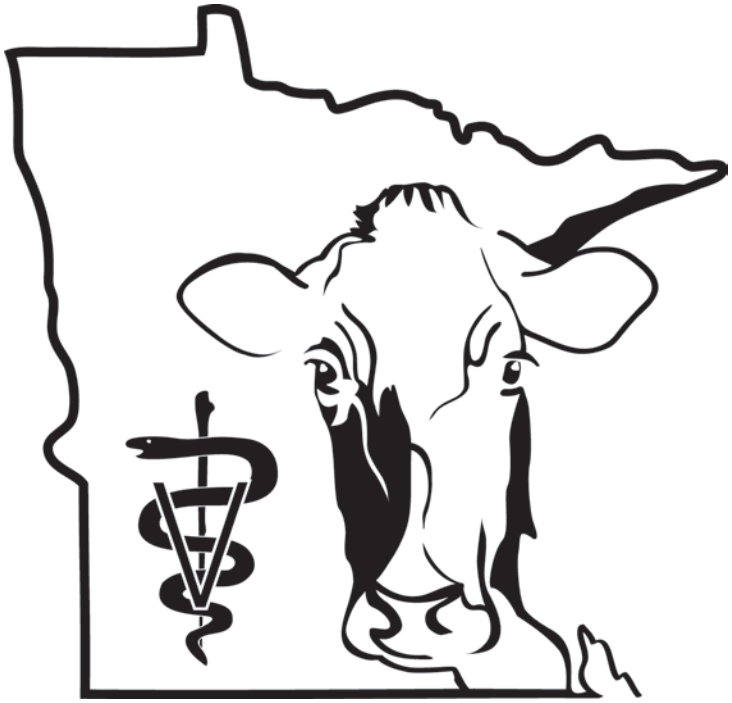

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Fresh Cow Metabolic Diseases – How do we know we got 'em?

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Introduction

Veterinarians engaged in dairy practice strive to provide high quality service to their clients and their patients at both the animal and the herd level. Herd health programs have grown from traditional sick cow work and monthly rectal palpation to include periodic consultation in many traditional and non-traditional areas of veterinary involvement. While herd programs vary among practices, practitioners and herds, many have grown to include at least some consultation in udder health, milk quality, feeding and nutrition. However, the unique qualification that gives veterinarians a distinct advantage over other dairy advisors is their training in the diagnosis and treatment of disease. Therefore, regardless of how broadly we cast our health management net, we must remember that one of the foundations of our herd programs must be health maintenance and disease control.

It has been broadly accepted that a dairy health management program should be based on a feedback cycle with four essential components. These components are 1) the setting of SMART goals, 2) regular monitoring and assessment of herd performance, 3) appropriate information-based intervention and 4) performance outcome assessment. While all four components are critical to the process, veterinarians are most comfortable with, and best compensated for, their activities in step three. These activities include working with the herd owner/manager to identify, diagnose and treat specific groups of animals within the herd that are not performing as expected.

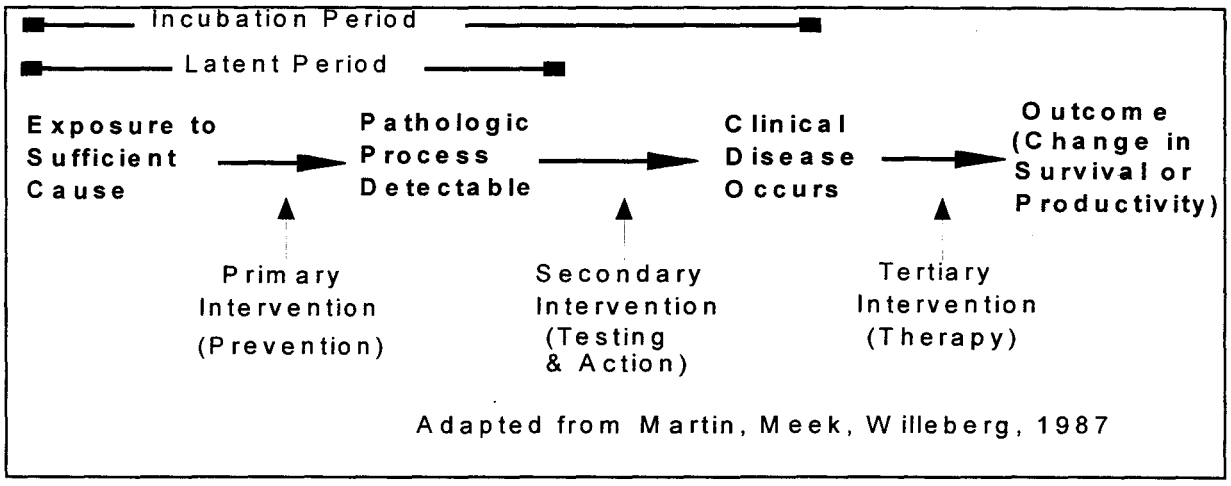
Perhaps the most important, interesting and challenging group of animals to deal with are the fresh cows and heifers. This is the group that traditionally experiences a number of conditions referred to as metabolic diseases, including milk fever, primary ketosis and displaced abomasum, associated with their transition from a non-lactating to a lactating physiologic state. While there has been a tendency to distinguish these diseases from the infectious peri-parturient conditions that affect the same group (metritis and mastitis), this separation is becoming less and less distinct. The complex relationships and dependencies, both direct and indirect, among all of these diseases are the focus of major research efforts and are becoming more clearly understood.

The economic impact of this complex group of peri-parturient diseases is large. The costs include treatment, mortality, pre-mature culling, decreased milk production, lost animal sales, decreased product quality (both meat and milk), increased risk of violative drug residue penalties and labour. For example, given an estimated lactational incidence for displaced abomasum (DA) of 5%, at a cost of $340 US/case (Guard, 1994), the total cost of DA in a 100-cow herd would be about $2,000 annually. Similar estimates can be derived for clinical ketosis ($500), milk fever ($3,500) and retained placenta/metritis ($3,000). One of the challenges and limitations in deriving these estimates is determining the lactational incidence of a given disease. This can only be done if a) the condition(s) is recognized and b) the condition is recorded in a searchable

record or database. The increasing adoption of on-farm herd management software programs, such as DairyComp 305, has facilitated the recording and retrieval of cattle disease data. Unfortunately, the recognition of disease is less consistent. A recent search of the refereed literature published in the preceding 10 years yielded 36 estimates of the incidence of clinical ketosis ranging from 1% to 18% lactational incidence. Careful scrutiny of these publications suggests that some of the variation may be due to differences in geographical region, predominant dairy breed and housing and feeding management. However, the greatest variation among these 36 publications was in case definition of ketosis and in the presentation of the estimated incidence. While the former can vary considerably from person-to-person and farm-to-farm, the latter can be controlled to a large extent by the data user. Since incidence (the number of new cases per unit of time) is a dynamic measure, it means we need to know the number of cases of ketosis recorded and the number of months, years or lactations of risk that the herd(s) contributed.

The complex nature of health and disease must be borne in mind whenever these data are being gathered. The presence or absence of disease, and by extension health, is often considered binary in nature. However, disease is more appropriately described as a continuum, as depicted in Figure 1 (Martin et al., 1987).

Figure 1. The health/disease continuum.



Crucial to the computation of disease prevalence (the presence of the condition at a point in time) and incidence (the rate of occurrence of the condition over time) is establishing a clear and comprehensive case definition. Some diseases are relatively easy to define because they have a short sub-clinical phase, present one or more pathognomonic indicators (signs, substances, responses or tissue changes that are absolute predictors of the presence of the disease or disease agent) that are readily identified with accurate and available tests, have a clear start and finish and seldom occur more than once in the animal's lactation or lifetime. Left displaced abomasum (LDA) is an example of such a relatively simple disease.

Other diseases are more difficult to define. These complex diseases tend to have prolonged sub-clinical phases, eventually manifest vague or no clinical signs, have no standardized tests that accurately and consistently identify their presence, may involve more than one etiological agent, may affect multiple organ systems, and recur sporadically throughout the lactation and in subsequent lactations. Clinical and sub-clinical ketosis is a prime example of such a complex disease. Both of these examples represent disease conditions that are economically important enough to warrant routine identification and recording.

Case Definition for Peri-Parturient Disease

Since diseases of dairy cattle vary from the simple to the complex, the identification and classification of these diseases also varies. A number of classification systems based on etiology, severity, epidemiology, duration and target system(s) have evolved. Ultimately, it is important to understand and refine the level of classification relative to the intended use of the disease data.

If the decision is made to record cases of ketosis in a dairy herd, there should be agreement among the herd owner/manager, farm staff and herd veterinarian regarding case definition. For example, will ketosis be recorded simply as a binary event (yes/no) or on the basis of clinical progression (no ketosis, sub-clinical ketosis, clinical ketosis)? Does there need to be a distinction between primary ketosis and ketosis secondary to disease conditions such as DA? Will the recording of ketosis be based on a definitive diagnosis of the disease condition by the herd veterinarian, or the treatment of a putative ketosis case by the herd owner/manager or farm staff? Will the diagnosis be based on cow-side tests (milk or urine tests) or laboratory tests (blood)? Which cow-side test(s) will be used (breath, powder, tablet, strip) and what do we know about the sensitivity and specificity of the test(s)? Which ketone body (acetone, acetoacetate or Beta-hydroxybutyrate) will be measured and which body fluid will be used (urine, milk or blood)? Should there be a distinction between a mild case (off-feed) and a severe case (nervous ketosis)? Is the recording of a case being triggered by a diagnosis and treatment, or simply by the preventative treatment of a cow considered at risk for developing ketosis? Should all treatments be recorded and counted as unique and individual events, or should only the first in a string of treatments for a unique case be recorded? How does one distinguish when a second diagnosis of ketosis in the same animal during the same lactation is a new case as opposed to a relapse or continuation of an existing case? When summarizing the data do we consider all cows equally at risk of developing ketosis, or is there a parity consideration? Should all lactating cows be considered at risk of developing disease, or are cows only at risk for clinical ketosis during the first 4 weeks post-partum? All of these questions must be asked and answered before a uniform and consistent case definition can be developed for a herd. In addition, if the data is to be pooled or compared across farms, then there must be consistency of definition across all herds and herd staff.

Disease coding and standardization of nomenclature is an important area of discussion both in human and veterinary medicine (Case, 1994). Less attention has been directed towards the standardization of disease definitions and recording protocols. The International Dairy Federation (IDF) has established a set of international guidelines for bovine mastitis (Osteras et al., 1996), the American Association of Bovine Practitioners has made recommendations for

reproductive performance (Fetrow et al., 1994) and standard definitions for eight clinically and economically significant diseases of dairy cattle are currently under discussion in Canada (Kelton et al., 1997). While some classification guidelines are being developed, there is still a general lack of utilized standard disease definitions and recording guidelines.

Practical Recommendations

If veterinarians and producers believe that they need to know about metabolic (or other) diseases in their dairy herds, and if they want to track these events for the purpose of summarizing them for monitoring or surveillance purposes, then there are some basic steps that need to be taken.

1. On a herd-by-herd basis, decide which diseases are of enough importance to the producer that they will be recorded consistently. The objective is not to create additional work for the herd owner or his staff, but to expend time and energy that will yield a net return in the form of productive intervention on the part of the veterinarian.

2. Establish a practical and consistent case definition for each disease and be sure that everyone involved in the identification and recording of disease events understands and accepts that definition. Be sure that the level of recording detail is sufficient to provide useful information, yet not too trivial to invalidate the process.

3. Establish a practical and consistent means of recording and summarizing the disease events that are recorded. That might involve a paper record with subsequent entry into a computerized herd management program, or direct computer entry. In developing a summary parameter (prevalence or incidence), be sure that you clearly define which events are to be counted in the numerator and which animals are considered at risk and should be included in the denominator.

4. Provide positive reinforcement by evaluating the disease data on a routine basis and making comment about it to the producer as part of your regular health management program. Be prepared to act in response to changes in the parameter(s) being monitored.

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