Managing Mortality Losses in Dairy Herds

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INTRODUCTION

Mortality rates in the dairy industry are much higher than those in the cow calf or feedlot industries. Death losses have not been studied very intensively in the dairy industry. Estimates of these death losses are variable. Unless they focus on monitoring cow deaths, dairy producers may underestimate the amount of adult cow death loss on their operations. The USDA:APHIS:VS National Animal Health Monitoring System (**NAHMS**) Dairy 2007 survey reported that 5.7 % of dairy cows die on-farm across the country each year, an increase from 4.8 % of the January 2002 inventory, and 3.8 % of the January 1996 inventory (USDA, 2007a; USDA, 2007b). These rising mortality levels represent a problem both in terms of financial losses and compromised animal welfare.

Information from computerized dairy record systems suggests that mortality rates have continually increased over the last 10 yr. In some states, adult cow mortality exceeds 10 %/yr (DHI Computing Services, 2010; Dechow and Goodling, 2008). Few formal studies have focused on this issue, yet dairy cattle death losses are an extremely important problem. Not only are these losses an economic disaster, they also represent very substantial problems with animal well-being. This would seem to be an issue requiring considerable attention, but at present it does not appear that veterinarians or producers have the information required to manage the problem appropriately.

WHY DO DAIRY COWS DIE?

Most studies of dairy cow mortality have come from outside the United States. The US studies on this issue have been primarily focused on culling and herd turnover rates rather than death losses per se. The 2007 national survey of dairies in the US (USDA, 2007a) showed that approximately 23.6 % of dairy cows left herds permanently during 2007, and that approximately 5.5 % of these cows were sold to other dairies, while 94 % were culled (i.e. sold and not returned to milk production, i.e. sent for slaughter).

The reasons cows were culled included:
- reproductive failure (26.3 % of culled cows),
- mastitis and udder problems (23 %),
- lameness or injury (16 %),
- other disease (3.7 %),
- and poor milk production not related to these other problems (16 %).

Other miscellaneous reasons accounted for about 8 % of culling. Therefore, on average, the overwhelming majority of dairy cows leaving farms are not fit for sale as dairy production animals, and approximately 50 % of these cows leave because of disease or injury problems rather than being selectively removed because of low fertility or milk productivity.

Adult cow death losses appear to be attributable to reasons similar to those for culling cows. A recent literature review identified 19 studies between the years 1965 and 2006 that focused on dairy cow mortality in countries with relatively intensive dairy production Thomsen and Houe, 2006). While 10 of the 19 studies provided information about causes of death, none of the diagnoses were founded on necropsy evaluation. Only a single study discriminated between cows that were euthanized or died unassisted. The categories used to describe causes of death were relatively uniform across studies and were presented as: accidents, calving disorders, digestive disorders, locomotor disorders, metabolic disorders, udder/teat disorders, other known reasons, and unknown reasons. The NAHMS Dairy 2007 survey recorded causes of death similarly to those established through the literature review, documenting the percentage of cow deaths due to: euthanasia due to lameness or injury (20.0 %); mastitis (16.5 %); calving problems (15.2 %); respiratory problems (11.3 %); scours, diarrhea, or other digestive problems (10.4 %); lack of coordination or severe depression (1.0 %); poison (0.4 %); other known reasons (10.2 %); and unknown reasons (15.0 %) (USDA, 2007a).

Cause of death entered in dairy record systems is usually based on producer assessment and diagnosis. It appears that dairy veterinarians are minimally involved in the diagnosis of cause of death, and relatively few U.S. dairy operations perform necropsies in an effort to determine the cause of cow death. The NAHMS Dairy 2007 study reported that necropsies were performed on only 13 % of

operations and only 4.4 % of cow deaths received a postmortem examination (USDA, 2007a). Therefore, historically virtually all studies of dairy cow mortality are based on producer assessment rather than veterinary diagnosis; and the causes of death are described using broad categories that do not provide much information about specific cause. Determining the cause of death provides invaluable information for preventing future deaths and improving herd health (Mason and Madden, 2007).

No specific reason has been identified for the increase in dairy cow death rates. Producers and veterinarians appear to have attributed increasing death rates to a variety of causes. Some have questioned whether the new federal regulations regarding down dairy cows and neurologic disease may have artificially increased recorded death rates. While this will contribute to recorded mortalities, death rates were increasing prior to the implementation of this rule. Furthermore, if euthanized down cows represent more than a small fraction of dairy mortalities, we need to ask why there are so many down cows that need to be euthanized. Others have suggested that specific disease problems, such as hemorrhagic bowel disease, may be increasing death rates; but the increased mortality rates far exceed the incidence of any specific disease problem. Any conjectures on the cause of increased mortality are difficult to validate without specific diagnoses.

Dairy record systems appear to be an unreliable source of information concerning cause of death. We have been studying the phenomenon of dairy cow mortality over the last several years. Our findings suggest that dairy producer assessment of the proximate cause of death is inaccurate approximately 50 % of the time. Our results also show that there are multiple causes of dairy cow death (McConnel et al., 2009). Mortalities tend to occur much more frequently in the early part of lactation, coincident with increases in other health problems (Dechow, 2008). Increased disease rates on dairies appear to be closely related to increased death rates (Bascom and Young, 1998; McConnel et al., 2008). It seems reasonable to suggest that numerous health problems in dairy cows are not recognized early enough or not treated properly to promote an optimal outcome. Furthermore, without good descriptors and records of the reasons that cows die, preventive measures that should decrease disease and death are not modified or improved to address the problem.

Although record systems as they are currently designed and used are not helpful in managing adult cow death losses, they do demonstrate some associations between high death rates and herd health problems. Our analyses of large data sets demonstrate that herds with high rates of disease and culling also have higher death rates. More specifically, high mortality in dairy herds is related to high rates of lameness and a high proportion of cows removed due to lameness or injury. Death losses are also related to occurrence of respiratory disease, diarrhea, and mastitis (McConnel et al., 2008). These findings should not be surprising, as they suggest that herds that have poor ability to control lameness, injury, and infectious disease also have increased likelihood of cow death. The problem for the producer and dairy consultants lies in how to determine specific actions that decrease disease prevalence and risk of death.

WHAT CAN BE DONE TO DECREASE DAIRY COW DEATHS?

Most decisions in a low-cost production dairy model are made with input cost as the primary driving force, and potential negative impacts on the animals in the production system are seen as problems that must be managed as a consequence. For example, it is common that large scale expansion of a dairy will capture production cost efficiencies, but often with the caveat that expansions are accompanied by substantial problems with animal health. During the time that large numbers of animals are being imported to the herd it is routine that disease introduction is occurring. Numerous animal health problems are prevalent and even increase with time (Faust et al., 2001; Weigel et al., 2003). Because there are compelling reasons for dairies to expand, there is a real need for the dairy industry and dairy veterinarians to re-evaluate dairy management systems with a focus on optimum animal health.

An overview of the health challenges faced by dairy cows needs to recognize that some changes in the modern dairy industry may result in systematic problems with animal care. The labor force on most dairies is primarily composed of low wage workers without extensive, pre-existing dairy cow management skills. The ability of dairy personnel to adequately identify disease in individual animals and respond with prompt individual animal attention is limited by the extent of their experience and training. The overwhelming majority of sick cows on dairies are identified, diagnosed, and treated by farm workers rather than veterinarians. Poor outcomes could be an issue of poor clinical disease management in addition to any pre-existing problems with cow physiology. Furthermore, record keeping

systems are not focused on assessment of health challenges or causes of cow health problems. While these systems are very good at generating *to-do* lists and monitoring cow production and cow status in the herd; they are not designed to assess cause and effect of health problems. Therefore, most producers do not have good access to the information they need to monitor health performance and to identify effective management changes that would improve cow health outcomes. Components of a program for decreasing dairy mortality would include education of the workers in the system, monitoring of processes that are used, and analysis of outcomes to identify trends.

Farm necropsy examinations should be an invaluable tool to help assess cause of adult cow death (Mason and Madden, 2007). Necropsy of dead animals to assess and monitor cause of death is rarely performed on dairies (USDA, 2007a). This is in sharp contrast to other intensive livestock management systems, including poultry, swine, and feedlot enterprises; where necropsy monitoring is routine. Most dairy veterinarians focus considerable effort on dairy reproduction, but little time on mortality evaluation. This presents a very significant liability to the dairy industry because efforts to effectively decrease mortality losses are hampered by a lack of monitoring and information that provide accurate assessment of the problem. We believe that dairy workers could be trained to more effectively monitor death losses, and to perform on-farm necropsy examinations in consultation with veterinarians when the veterinarian cannot be present to perform the examination on a recently deceased animal. We have presented this recommendation to producer groups and produced an on-line training program for that purpose on our website (Severidt et al, 2002) .Very few producers or veterinarians have pursued this approach, attesting to the notion that monitoring actual cause of death has not been seen as a valuable pursuit.

Necropsy examinations will provide good information, but we also need to develop new recording systems that allow the necropsy results to be recorded as usable information. On their own, necropsy diagnoses provide great detail about the specific cause of death, but do not necessarily provide information about why that specific cause occurred. Therefore necropsy information needs to be combined with other historical information about the affected animals to help direct management changes (McConnel et al., 2010). Our studies suggest that more than 50 % of cow death losses are attributable to causes that could be mitigated with proper management (McConnel et al., 2010).

Because of the complex nature of dairy management systems a variety of causes are responsible for high disease and mortality rates, with different rates of occurrence on different operations. The wide range of lactational incidence risk for common diseases (milk fever: 0.03 % - 22.3 %; RP: 1.3 – 39.2 %; metritis: 2.2 - 37.3 %; ketosis: 1.3 - 18.3 %; LDA: 0.3 - 6.3; lameness: 1.8 – 30) attests to the complexity of the system (USDA, 2007a). To adequately address such a complex problem requires more accurate information about current losses, followed by management alterations that address the underlying problems. This will require changing the nature of information used in dairy management systems. An example of mastitis prevalence can illustrate this point. The specific infectious organism that causes a clinical mastitis episode can have a dramatic impact on outcome; and appropriate preventative or therapeutic measures need to be tailored to the specific cause, e.g. gram negative vs. gram positive, environmental vs. contagious, *Escherichia coli* vs. *Staphylococcus aureus*. Assessments and record systems that track *mastitis* without identifying other specific details do not provide sufficient information to promote effective interventions. Similarly, monitoring death losses with generic terms such as *lameness* or *mastitis* and performing this monitoring on the basis of presumption will not allow correction of management problems that may underlie the death.

We have proposed an approach to monitoring death losses that should help producers identify management changes to improve cow health and survival (McConnel et al., 2010). The first step is to identify the magnitude of the problem on a dairy and commit to improving outcomes. Second, we recommend performing necropsy examinations to identify specific causes of death. This information needs to be considered along with other cow information such as preceding health problems, treatments, and individual cow circumstances as part of a complete post mortem evaluation. We have developed a conceptual model to help assign cause of death to categories that have more meaning than simply those categories that assign cause of death to an organ system that the owner perceives was affected by disease. Necropsy is a key tool for assigning cause of death, if the information obtained is also matched with other animal information. Dairy workers who are involved in animal care should be included in the discussion of the necropsy and cause of death. The monitoring and focus on cause of death as an important component of dairy animal monitoring increases owner and worker focus on the actions needed to prevent future death losses.

CONCLUSIONS

There will not be a single simple answer to the problem of high mortality on dairies. Steps toward managing this challenge will require recognizing and defining the problem, improving information systems to provide details necessary to take action, and monitoring appropriate metrics that promote ongoing attention to management corrections.

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