Why Cows Die on Dairies

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■ Take Home Messages

‣ On-farm death of adult dairy cows is a significant issue for both economic and animal welfare reasons.

‣ Adult cow mortality losses on dairies have increased in recent years.

‣ Mortality is the end-point of very significant health problems, whether the death is by euthanasia or occurs naturally. Knowing the causes of mortality helps understand the health challenges that face a herd.

‣ Mortality losses and their causes are not carefully monitored or evaluated on most dairies leaving producers and veterinarians without the information needed to manage them.

‣ The reasons cows die are multiple and complex, necessitating an improved approach to diagnosis, information management and analysis.

‣ Necropsy examination of dead animals provides information about the specific cause of death, but is underutilized on most dairies.

‣ Investigation beyond necropsy findings helps determine why specific causes of death occur, so that management can be changed to minimize risks for future problems. Such investigation is rarely performed or tracked on dairies.

‣ Paying attention to causes of death can promote changes that substantially decrease cow health problems and death losses.

■ Introduction

Death losses have not been studied very intensively in the dairy industry. Yet, mortality rates in the dairy industry are much higher than those in the cow calf or feedlot industries. 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,b)

Information from computerized dairy record systems suggests that mortality rates have continually increased over the last 10 years. In some states, adult cow mortality exceeds 10% per year (Dechow, 2008; DHI, 2010). 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.

Adult cow death loss is an issue that should be very important to producers and veterinarians. But rising rates of occurrence across the industry suggests that veterinarians and producers do not have the information required to manage the problem appropriately. The purpose of this presentation is to critique the information we have, consider what information we need, and suggest changes in information gathering for dairy herds that would help diminish losses.

■ Why Do Dairy Cows Die?

Most studies of dairy cow mortality have come from outside the United States. Studies from the US 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, 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%), while 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%).

Let's consider what the preceding information means. First it suggests that historically the careful tracking of causes of mortality on dairies has not been seen as a high priority. Such an attitude would make sense if deaths occur very infrequently and appear to have little to do with the health of the remaining herd. It makes a lot less sense when 5 to 10% of standing herd inventory is lost to death each year. This information also speaks to the diverse health challenges seen on dairies. Dairy cows are complex animals that go through multiple life stages in the course of their residence on a farm. This is very different than a beef feedlot where most of the animals are young and growing, somewhat equivalent to dairy heifers. In these populations infectious respiratory disease is far and away the number one health challenge that predisposes to euthanasia and death. For adult dairy cows there is no single predominant life-threatening disease.

It is also worth noticing that the categorization systems used on dairies and reported in the literature are not very helpful when it comes to instituting corrective actions. For example if you consider the category of lameness as a cause of death, there are so many potential causes of lameness that it would be difficult to institute a specific corrective action that would decrease the numbers in this category. Similarly, consider the wide range of disease problems that could be categorized as digestive death.

■ How Good Is Our Information About Cause Of Death?

Cause of death entered in dairy record systems is usually based on producer assessment and diagnosis. It appears that most 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 almost 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.

Dairy record systems appear to be an unreliable source of information concerning cause of death in individual animals. 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 validate that there are multiple causes of dairy cow death (McConnel et al., 2009). It seems reasonable to suggest that numerous health problems in dairy cows are not recognized early enough or treated appropriately to promote an optimal outcome, but this type of information cannot be retrieved from record systems. 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.

No specific reason has been identified for the increase in dairy cow death rates. In conversation with producers and veterinarians, some have questioned whether the 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 (Miller et al., 2008). 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. This could certainly be true on an individual dairy but the increased mortality rates across the industry exceed the incidence of any specific disease problem.

Any conjectures on the cause of increased mortality are difficult to validate without specific diagnoses. Determining the cause of death would provide invaluable information for preventing future deaths and improving herd health (Mason and Madden, 2007). The fact that very few dairy cow deaths are evaluated by necropsy leaves a serious information gap in any analysis of cow mortality.

■ **Epidemiological Associations With Dairy Cow Mortality**

Although record systems as they are currently designed and used are not particularly helpful in managing adult cow death losses, they do demonstrate associations between high death rates and herd health problems. Analyses of large data sets demonstrate that herds with high rates of disease and culling also have higher death rates (Bascom and Young, 1998; Dechow et al., 2011; McConnel et al., 2008). More specifically, high mortality in dairy herds is related to high rates of lameness and large proportions of cows that are removed due to lameness or injury. Mortalities tend to occur much more frequently in the early part of lactation, coincident with increases in other

health problems (Dechow et al., 2008). Death losses are related to the 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. It is important to recognize that these epidemiologic associations do not inform us of specific causes, and rather show that herds with certain types of problems also have higher rates of death. The problem for the producer and dairy consultant 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 reevaluate 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, preexisting 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 may be an issue of poor clinical disease management in addition to any preexisting problems with cow physiology.

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, or udder health and milk quality, 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 necessary to accurately assess 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 freshly dead carcass. 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 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. 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 dairy systems (Kelton et al., 1998). To adequately address such complexity 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 provide less information than needed to establish 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.

■ Specific Recommendations To Decrease Death Losses

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., 2008). The first step is to identify the magnitude of the problem on a dairy and commit to improving outcomes. Like any other substantial management change on a dairy, if the owner or manager is not committed to change it will not actually happen. Therefore simple analysis of the incidence of on-farm death and an assessment of its importance to the dairy and the well-being of the cows is critical.

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. It is unrealistic to assume that 100% of all dead cows will be examined by necropsy. Our experience suggests that routine necropsy examination is important but that targeting cases is useful. For animals euthanized due to obvious trauma, or where the cause of death is obvious based on priority veterinary assessment, necropsy examination usually will not provide much more information. Alternatively, for unexpected deaths or animals without simple specific antemortem diagnoses, necropsy can help not only define the cause of death but also inform farm workers about the types of problems that occur on the farm.

We have developed a conceptual model to help assign cause of death to categories that have more meaning than those simple 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.

We recommend maintaining hard copy records of each case of death. When a particular category of death is seen to be problematic the details of the individuals in that category can be reviewed. As with all records, they need to be used to inform management if they are to be any use at all. Therefore we recommend periodic meetings between farm managers and veterinarians to consider death losses and what can be done to improve outcomes.

More focus needs to be placed on evaluating subclinical disease problems. One of the problems with current record systems is that health events are only entered when they are obvious and prompt a treatment. Subclinical disease does not fit this category and therefore information about subclinical

cow problems cannot be retrieved to be compared with assessment of death losses. Consider for example the assessment of lameness on dairies. As noted above, high rates of lameness are strongly associated with high rates of death losses. However, most records systems monitor lameness only when cows receive specific treatment. It is unusual for dairies to do routine locomotion scoring that detects cows with more modest degrees of lameness. It is likely that management changes targeted to improving overall cow locomotion will also improve other aspects of cow health and ultimately lead to decrease 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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