

## Modeling postmortem evaluation findings to describe dairy cow deaths

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Dairy cow mortality levels in the U.S. are excessive and increasing over time. This is a growing concern for dairy producers, both because of the obvious economic liability it represents and because of ethical and welfare dimensions. An important step in defining cause and effect and combating rising mortality lies in more clearly defining the reasons that cows die through a thorough necropsy-based postmortem evaluation. This study focused on organizing information generated from postmortem evaluations into a monitoring system based on the fundamentals of modeling and potentially translatable into current on-farm relational databases.

This observational study was conducted on three high producing (approximately 11,500 kg milk/cow/year), commercial dairies in northern Colorado, U.S. Throughout the study period a thorough postmortem evaluation was performed by a veterinarian on cows that died on each dairy. Postmortem data included necropsy findings, life history features (e.g. birth date, lactation number, lactational and reproductive status), clinical history and treatments, and pertinent aspects of operational management that were subject to change and considered integral to the poor outcome. Findings were recorded on standardized necropsy forms and through digital imaging.

During the course of this study 174 postmortem evaluations were performed on the three participating dairies. Each death was viewed in the context of the web of factors influencing the dairy and the cow. Results from the postmortem evaluation were conceptually modeled based on an "entity-relationship" approach. In this model, the entity "cow" was defined by a number of concrete attributes. Similarly, the entity "dairy" consisted of a number of potentially influential dynamic attributes. Categories were then formulated in an effort to create a monitoring system describing mortality in terms of functional characteristics potentially amenable to easy performance evaluation, management oversight, and research. In total, 23 death categories with 7 category themes were created based on the model guidelines.

Reducing dairy cow mortality is an important challenge for the U.S. dairy industry. Without a thorough understanding of the cause and effect underlying individual deaths, and a means for monitoring those deaths within a population, there is no way to establish accountability. Current methods for monitoring dairy mortality are variable, often inconclusive and founded on assumptions without the benefit of detailed postmortem evaluations, and fail to address the problem as a whole. The complexity inherent in U.S. dairy operations necessitates the incorporation of database models that can rationalize the dairy system and direct database schemes to more effectively monitor dairy cow mortality. Until causes of dairy cow mortality can be appropriately classified, recorded, and reliably monitored there is little hope for establishing the systemic accountability necessary to direct change, and every indication that this challenge will continue to afflict the U.S. industry.