

Invited Review: Culling: Nomenclature, Definitions, and Recommendations

J. Fetrow,^{*1} K. V. Nordlund,[†] and H. D. Norman[‡]

^{*}College of Veterinary Medicine, University of Minnesota, St. Paul 55108

[†]School of Veterinary Medicine, University of Wisconsin, Madison 53706

[‡]Animal Improvement Programs Laboratory, Agricultural Research Service, USDA, Beltsville, MD 20705-2350

ABSTRACT

Replacing cows on a dairy is a major cost of operation. There is a need for the industry to adopt a more standardized approach to reporting the rate at which cows exit from the dairy, and to reporting the reasons why cows are replaced and their destination as they exit the dairy. Herd turnover rate is recommended as the preferred term for characterizing the cows exiting a dairy, in preference to herd replacement rate, culling rate, or percent exiting, all of which have served as synonyms. Herd turnover rate should be calculated as the number of cows that exit in a defined period divided by the animal time at risk for the population being characterized. The terms voluntary and involuntary culling suffer from problems of definition and their use should be discouraged. Destination should be recorded for all cows that exit the dairy and opportunities to record one or more reasons for exiting should be provided by management systems. Comparing reported reasons between dairies requires considerable caution because of differences in case definitions and recording methods. Relying upon culling records to monitor disease has been and will always be an ineffective management strategy. Dairies are encouraged to record and monitor disease events and reproductive performance and use this information as the basis for management efforts aimed at reducing the need to replace cows.

Key words: dairy, culling, turnover rate

INTRODUCTION

In advance of the American Dairy Science Association's DISCOVER Conference on "Reducing Culling Rates in Dairy Herds: Creating an Environment for Success" in October 2004, a subcommittee was formed for the purpose of reviewing terms currently in use on dairy farms relating to culling. There was a general feeling that there were too many terms in use for the

same trait, and even that the same terms were sometimes defined differently. This paper is the product of the committee's initial effort along with revisions based on input received from those that attended the conference. In addition to the original charge, the committee chose to add some observations on the general topic of culling in dairy cattle and on appropriate ways to examine the underlying factors surrounding the exit of dairy cows. The committee hopes that this paper will stimulate more thought and encourage the dairy industry to standardize the use of culling terminology, and discontinue the use of other terms. Further, we hope that this discussion will contribute to a wider reexamination of long-held dogma regarding culling in dairy cows.

SIMPLE DEFINITIONS

Culling

Culling (exiting) is the departure of cows from the herd because of sale, slaughter, salvage, or death. In most cases the cow that exits is replaced; thus "replacement" has been a useful synonym for the event. The term "cull" refers to all cows that leave the dairy regardless of their destination or condition at departure. Some may object to including cows that are sold for dairy purposes as part of a general cull category, as the word "cull" generally means to separate off for undesirable reasons. This single nomenclature may cause problems of interpretation for dairies that market adult cows for breeding or milk production, and confound the use of industry benchmarks regarding the number of animals that exit compared with dairies that do not market adults. Nevertheless, a general term is needed, and cull remains the term in wide use in the industry.

The least ambiguous classification of cows removed from herds is based on the destination of the cows after removal and these can be placed into 3 groups:

Dairy Sale. Sale in the context of culling means that the cow was sold alive to another dairy, with the expressed goal of continuing to provide income, such as producing milk, calves, or embryos.

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¹Corresponding author: fetrow001@umn.edu

Slaughter - Salvage. Slaughter means that the cow left the dairy alive to be slaughtered for human consumption. This would be the most common destination for culled cows; it includes cows destined for slaughter through general slaughter markets, sale barns to packing plants, butcher shops, or on-farm use for family or employee consumption. Salvage refers to those animals that leave the dairy alive but are not intended for human consumption; that is, cows rendered or used for purposes other than human food. Such cows may have received antibiotics or other drugs and were in the withholding period when removed, been culled shortly after major surgery, or been culled with diseases that exclude them from human consumption (e.g., neurological conditions, peritonitis, pleuritis, or cancers). Those 2 categories, slaughter and salvage, are merged for practical reporting because often the final destination is not known at the time the cow exits the dairy. Some cows sent to auction for slaughter end up milking in other dairies, but these can be coded as going for “slaughter” because that was the intention when they left the dairy.

Death. Death (died, dead) means that the cow died on the dairy. The newly implemented FDA (2004) rules specifically forbid any part of a nonambulatory cow from entering the human food chain. Coupled with the strong recommendation that nonambulatory cows should not be transported for humane reasons (American Veterinary Medical Association, 2005), downer cows that cannot be successfully treated should be euthanized on the dairy for on-farm disposal or for rendering. Downer cows euthanized on the dairy should be included in the “died” category. This change in FDA rules will mean that more cows will be reported as died than in the past.

Coding for Culling Events

Currently, most culling record systems characterize removals using a mixture of destination and reason for removal (e.g., dairy sale, mastitis, reproduction, death). The mixture of destination and removal reason confounds efforts to quantify risk areas in individual herds. For example, cows may leave a dairy to different destinations but often for the same underlying reason—some die on the farm of mastitis, whereas others are sold to slaughter because of chronic mastitis. A 2-tiered coding system for cow removals of destination first, followed by reasons for removal to any destination second, could make the culling information less ambiguous and more valuable.

Recommendation. The 3 mutually exclusive destinations of cows removed from herds are dairy sale, slaughter (including salvage), and death. Dairy records

system designers should be encouraged to adopt these 3 destination codes as standard terms in their systems.

DEFINING THE MAGNITUDE OF CULLING ON A DAIRY

Quantifying the amount of culling on dairies is highly beneficial in the comparison of herds. From an epidemiologic perspective, culling is a specific event (an incident) in a cow's life on the dairy. Measuring the occurrence of incidents is usually done by measuring the rate (incidence) of the events over a specified period in an at-risk population. A simple count of how many cows were culled last year may be useful to a specific dairy. However, if the magnitude of culling is to be compared between dairies, then some standardization (i.e., percentage of the at-risk population) is needed to account for the difference in herd size, and any calculation should specify a fixed time (e.g., 1 yr).

Culling Incidence Rate

From an epidemiologic point of view, the ideal measure of the amount of culling is a culling incidence rate (Dohoo et al., 2003):

Number culled over a specified time period ÷ population at risk for being culled over the same period.

The number culled is straightforward: simply count those cows that exited within the relevant period. The specified period is typically a year for culling but could be per lactation, per month, or per some other period of interest (e.g., the first 60 d of lactation). The population at risk is often the source of confusion in culling discussions.

One way in which the at-risk population can be determined is by following a predefined cohort of cows over time until all have been culled. A cohort is a group of individuals with some common characteristic when they are assembled or designated and which are then monitored for some period. For each cow, the years of herd life (from start to cull) would be determined, and the years across all cows summed, thereby producing the cow-years at risk. The resulting culling incidence rate would define the risk (per cow per year) of being culled. These calculations are often used in epidemiological or clinical trials.

A second way of determining the at-risk population is to follow all cows on a dairy for a year, and count the number in that cohort that was culled. Like all prospective cohort studies, consideration must be given as to whether the starting cohort (e.g., all cows in the

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