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*Image by Mike Dixon.*

## Should we target longevity or extend lactation length for dairy cows?

There is no 'one-size-fits-all' recommendation for targets. Assessing all data available is important when weighing longevity and lactation length.

[Stephen LeBlanc \(/authors/3625-stephen-leblanc\)](#)

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There are discussions in dairy industries in many countries about whether it should be an explicit aim to increase longevity. Some assert that retaining cows for longer lactations or more years contributes to sustainability because fewer replacement animals would be needed, reducing the environmental costs of these non-productive animals. However, the questions should be considered critically. I will outline why longevity is not a measure of animal welfare or profitability, and why we should seek to optimize – not maximize – it for each cow and herd.

The basis of economic decisions should be the most limiting resource for the ability of the business to sell milk to feed people. That is rarely the cow. It is often referred to as a slot on the dairy, or an available space. This could be determined by parlour or robot capacity, water availability, land for nutrient management or milk quota. Accordingly, “How long can a cow live?” is not useful to inform a decision of how long a cow should remain on a dairy. While poor health or management will prevent animals from reaching their optimal time in the herd, the age structure or turnover rate of a herd or the average lifespan of cows are determined by many other factors. Poor calf or transition period management resulting in culling before the optimal time are costly to profit, animal well-being and social license for the dairy industry. These should be high priorities, but should be measured as directly as possible, not by the proportion of old cows in a herd. Rather, achieving good health, fertility and production through management allows for optimal – not always later – replacement.

A long, productive lifespan dilutes the cost of bringing a heifer into the herd, but that does not imply that every cow should be kept as long as possible. The right time to sell a cow is not “only after she has ‘paid for herself.’” Raising or buying heifers is a substantial part of the cost of making milk, especially now with record-high prices for springers and heifers. However, this is a sunk cost – you can’t get it back. Misunderstanding this would lead to a perverse logic that the worst-performing 2-year-olds should be retained the longest to recoup their cost. On average, heifers are genetically superior to the cows already in the herd, but not every heifer should enter the herd or be retained through a full lactation or more.

The best time to replace any animal – young or old – is when their future contribution to profit is less than an available replacement. That time will vary as a function of production, health and fertility, and the prices of milk, market cows and replacements.

The key is that it is a cow-specific optimum that varies over time. One answer – especially not “longer is better” – does not fit all. This extends to the herd: There is no ideal culling rate that all herds should target or that is inherently too high, nor does it make sense to set out to maximize the proportion of older cows in a herd.

Every herd has below-average animals. Excellent management creates the opportunity to apply selection pressure to fill the herd with healthy, high-performing animals, some of which will remain for many lactations. However, neither animal well-being nor herd profitability are

necessarily reflected by having an older herd.

The supply of replacements drives culling rate and average longevity. For the last several years, the price for dairy beef calves has been extraordinarily high, leading managers to seek returns from producing and selling these animals. In some cases, managers overshot and now have too few replacements available to optimize culling. To the extent that heifers are not available or too expensive, the milking herd culling rate will decrease – longevity will increase. This does not reflect an improvement in cow welfare. In fact, cows with chronically high somatic cell count (SCC), long days open or persistent mild lameness may be retained when milk quality, animal welfare and profitability would be improved if they were replaced. This illustrates the disconnection of the average lifespan of dairy cows with health, welfare or herd profit.

Disease is undesirable for cow performance and welfare, and mastitis and lameness especially contribute to the risk of cows being removed from the herd before their economically optimal time. However, the effects of health disorders on culling risk depend on recovery. Farm managers rightly remove animals with low production and retain or allow more inseminations for animals that are high-producing despite prior health disorders.

For example, in our study of 2,070 cows from six herds in Ontario and New York published in the *Journal of Dairy Science* in 2011, if we considered only health events, each of dystocia, twins, retained placenta (RP), ketosis and displaced abomasum (DA) were associated with greater risk of culling by 63 days in milk (DIM). Followed to 300 DIM, ketosis, DA, mastitis and endometritis (we didn't have good data on lameness) were associated with greater odds of culling. However, when we accounted for milk production and pregnancy as well as health disorders, only DA and mastitis remained associated with culling to 300 DIM; production and pregnancy outweighed the associations of other health events with culling.

While these "it depends" relationships are intuitive to dairy managers, they sometimes get lost in research because it is difficult to assemble large datasets that have comprehensive, validated data on health, production, reproduction and culling, let alone the contextual data on prices for milk, replacements and market animals.

Calculating the optimal time of replacement and the optimal length of lactation (at how many days in milk should pregnancy occur?) for a cow is very complex. A few economic models have done this. Even for high-producing persistent cows, these models still suggest that calving every 12 to 13 months is economically optimal. This maximizes the amount of a cow's life spent closer to peak, which is the most profitable. While high-producing or persistent cows can go longer before becoming unprofitable, they are more profitable by having one more peak of lactation in their normally expected herd life than by extended lactation and spending more of their life on the lower end of the lactation curve. Considering profit over 1.5 to several years, there is scant evidence that delayed insemination and pregnancy

are better than the current best practice of maximizing pregnancies between 80 and 125 DIM. A caveat is that many of these models do not account for the risks of going through the transition period. However, the upside of optimizing time to pregnancy argues for investment in excellent management of the transition period, not avoiding it.

We owe our cows good quality of life for as long as they contribute to a high-performance team for feeding people. The goal is to optimize longevity and lactation length, not to uncritically aim for herds of older cows.