

Longevity impact on sustainability and welfare

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Introduction

Recently, there have been increased discussions about both sustainability and longevity in the dairy industry. Sustainability has a goal of minimal use of resources (land, air, water, etc.) per unit of milk (and meat) produced. Longevity is determined solely by the replacement rate. Dry matter intake (DMI) is a proxy for resources used in dairy production. Because the dry matter intake for maintenance metabolism is relatively constant, more milk components per cow per day will dilute maintenance. If we assume older cows will produce more milk, then increasing the longevity of the herd is an important component of sustainability. However, the impact of age on milk yield can be overestimated. The objective here is to examine the relationship between milk production and successive lactations in a convenience sample of herds, with some inference to sustainability.

Materials and methods

To collect pilot data, we stratified a local farm by lactation group (1, 2 and older), and by decile of 305-day milk yield within each group. We compared the difference in milk between the lowest decile and the average milk for each lactation group, and the difference between milk in successive parties. We also estimated the incidence of mastitis and lameness as a function of lactation number.

To further study these effects, 1,000 cows were randomly selected from 15 different herds. We modeled the increased profit resulting from replacing half of the lowest 10% of first lactation cows at 75 days in milk (after the second test results were available).

Within the larger data set of 15, 2 herds were studied that had body weights at freshening. The outcome was the gain in 305 energy-corrected milk between the first and second lactation.

Results

The difference in milk from the lowest decile to the mean was about 3,000 pounds, which was approximately 3-fold greater than the adjusted difference in milk due to a cow in the next lactation. Most (80%) of the gain due to increasing lactation number was between the first and second lactation.

Older cows were more likely to be lame and more likely to be diagnosed with mastitis.

The increase in milk between the first and second lactation was decreased by 50% for those heifers which were heavier at freshening. Across the range of weights at first calving, each additional lb of body weight was associated with 4-8 lb more 305M.

Replacing half of the lowest 10% of lactation 1, cows with an “average replacement heifer” for the herd based on second test 305 d milk and forecasting across the remainder of projected lifetimes for each animal resulted in a positive economic return for the herds, even after including the increased raising costs to have sufficient replacements.

Significance

The expected increase in milk due to age can be overestimated in these herds:

1. It is likely that heifers calving with lower weights (perhaps poorly fed) partition more nutrients toward weight gain instead of milk production
2. There can be selection bias due to lower milk cows being more likely to be replaced prior to the next freshening.

Models that assume cows will produce more milk as they age need to be reevaluated as to the magnitude of this effect.

We conclude that striving solely for longer lifetime longevity might not be a solution for sustainability, dairy farm profit, and animal welfare based on the empirical data from these herds.

