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A practical interactive dairy management tool for cow replacement to assess herd profitability and herd life

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Improving herd profitability is of vital importance for the modern dairy industry and it is important to assess an animal's lifetime contribution to herd profitability. Dairy producers face thereby a decision-making challenge in assessing the need for cow replacement. A cost-benefit assessment can be a valuable tool in dairy management and help make timely decisions regarding cow replacement. We developed a user-friendly decision-making support tool to visualize and assess the impact of costs and revenues on herd and cow level. The dataset included production costs (feed costs, costs of breeding services, costs of health events, additional costs due to health events and extra breeding services) and revenues (milk value, margin over feed costs, margin over all costs) cumulated on lactation and lifetime basis. Choices of variables and visualization resulted in an iterative development process over one year conducted with 16 producers, their associated veterinarian (5) and Valacta DHI adviser (5). The interactive tool was developed with the Shiny add-on package in R. The dashboard consists of two panels with a built-in drop-down list for costs and revenues. Herd-level data allow users to compare herd performance to that of the rest of the population. Integrated benchmarking tools facilitate the comparison with specific cohorts, such as region, management system and calving year. In addition, cow-level data allow monitoring individual cow performance and contribution to herd profitability. A comparison across lactations between the top and bottom 25% herds in terms of cumulative milk yield indicated a 4.5-fold larger cumulative milk value. Yet, cumulative disease costs and cumulative additional costs due to health events and extra breeding services were 5.4-fold and 4.2-fold greater, respectively. A lifetime cost-benefit assessment has thus the potential to inform producers on making informed culling decisions by considering cumulative costs and revenues. Visualizing the magnitude of the impact of cumulative costs, in particular that of health and reproduction costs, on lifetime profitability should stimulate dairy producers to consider cumulative events in their decision-making process in keeping the most profitable cows in their herd, and to keep detailed on-farm records affecting lifetime profit. Our dashboard tool offers a user-friendly interactive interface that allows producers, veterinarians and advisory services nationwide to make timely decisions to improve herd profitability.

Keywords: decision support tool, dashboard, longevity, welfare, dairy herd improvement