

Milk yield and survival analysis in Holstein dairy cows after removing a quarter from production

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Introduction

Mastitis is a costly disease of dairy cattle due to therapeutic interventions, labor, and reduced premiums secondary to elevated bulk tank somatic cell counts. In addition to antibiotic treatments and supportive care, refractory cases of mastitis can be managed by removing the affected quarter from production. Currently, there is a paucity of data on the impact of a 3-teat event in lactating dairy cows. Inadequate record keeping likely contributes to this lack of information. Interestingly, one herd in northeastern Wisconsin has documented 3-teat events over the past several years. Therefore, the objective of this retrospective study was to describe the population of animals affected by a 3-teat event and the impact of this event on lactating cow performance and survival.

Materials and Methods

A commercial dairy with 3,670 lactating cows was used for this retrospective study. Animals were housed in free stall barns, milked 3X in a rotary parlor, received rBST, and were bedded on manure solids. Data were collected from Dairy-Comp 305 software, selecting cows within a 2-year period from 6/4/12 through 6/4/14 that had a single 3-teat event. According to protocol, quarters were removed from production after 3 consecutive cases of mastitis or one case of toxic mastitis. Methods included infusion of chlorhexidine diacetate for 6 days, infusion of iodine for an additional 6 days, or surgical removal of the teat. Severity of mastitis determined treatment. Outcomes of interest included parity, day in milk (DIM) at 3-teat event, 305-d mature equivalent milk production (305ME), and days to removal. The effect of parity on the risk and timing of a 3-teat event was evaluated using relative risk and Wilcoxon rank sum. The impact of a 3-teat event on 305ME and survival were evaluated using the t-test and time-to-event analysis. All analyses were univariable. Alpha was set at $P < 0.05$.

Results

During the study period, 1,036 lactating animals (primiparous, $n=407$; multiparous, $n=629$) had a single 3-teat

event. The risk of a 3-teat event was greater for multiparous animals compared to primiparous animals (RR=1.28; 95% CI: 1.15- 1.45). The median DIM at 3-teat event was 99 (IQR: 18 - 210) for primiparous animals and 145 (IQR: 86 - 220) for multiparous animals ($P < 0.001$). Primiparous animals were at greater risk for a 3-teat event in the first month of lactation compared to multiparous animals (RR=4.5; 95% CI: 3.25-6.30; $P < 0.001$). Overall, normal animals had a greater 305ME than animals with a 3-teat event (normal, $n=6,315$, 305ME=29,351, SD=5,912 vs. 3-teat, $n=1,036$, 305ME=27,791, SD=5,784; $P < 0.001$). For those animals that completed their lactation during the study period, normal animals produced more milk compared to those animals with a 3-teat event (normal, $n=2,528$, 305ME of 31,930, SD=4,528 vs. 3-teat, $n=519$, 305ME=of 30,566, SD=4,712; $P < 0.001$). Of those animals leaving the herd, the 3-teat animals were 31% less likely to leave the herd at any single point in time compared to normal animals (HR 0.69; 95% HR CI: 0.62-0.77). The DIM at removal was greater for those animals affected by a 3-teat event compared to normal animals (3-teat DIM 219, IQR: 138 - 299 vs. normal 124, IQR: 43 - 234; $P < 0.001$).

Significance

To the authors' knowledge, this is the first study evaluating the impact of a 3-teat event. In this univariable analysis, although 305ME was negatively associated with removing a quarter from production, the change was minimal and should not be considered a deterrent. Additionally, those affected did not leave the herd faster than normal animals. These inferences should only be made to animals managed in a similar fashion as the study population. The impact of removing quarters from production on milk quality and the potential for pain were not assessed in this study and should be evaluated in future studies. Regulations regarding extra-label drug use should also be considered when removing quarters from production as part of a management protocol.