Fresh Cow Monitoring on Day Three Post-partum and Lactation Milk Production

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Introduction

Assessment of udder health is one component of fresh cow monitoring programs. Both on-farm efforts and research studies have considered the use of milk culture, the California Mastitis Test (CMT), and/or somatic cell counts for monitoring udder health post-partum. The purpose of this study was to determine if various measures of udder health evaluated on day 3 post-partum were associated with lactational milk production.

Materials and Methods

A total of 124 Holstein, Jersey, or Jersey X Holstein cows calving in a single dairy in North Carolina were used for the study. This herd was enrolled in a monthly DHIA testing program, with records analysis by the Dairy Records Management Systems. Cows eligible for study were those without recent treatment for udder health issues or other peri-parturient diseases. On day 3 post-partum, milk from all cows was examined on a quarter basis by CMT-scoring, analysis of total cell and differential cell count of milk, and aseptic milk sampling for microbiological culture. Measures evaluated were CMT results with a cut-off of 1-plus or more, somatic cell counts with cut-offs of 300,000 and 400,000/ml, milk culture results of no growth vs. any growth (minor or major pathogens), measures of differential cell counts (neutrophils at 30, 35 and 40% of total cells; total absolute neutrophil counts of 200,000/ml and 250,000/ml), and presence or absence of any health event. Milk production was assessed using standardized 150-day milk and summit milk. Standardized 150-day milk was defined as expected milk/day at 150 days-in-milk (DIM). Standardized 150-day milk removes variation due to stage of lactation and allows comparison of production on one test day to another. Also, because adjustment is performed for age and breed, one cow can be compared to another. Two standardized 150-day milks were obtained: a first 150-day milk, which was the first one calculated by DHIA in a given lactation and a second 150-day milk, that being the one determined closest to 120 DIM. Summit milk is the average milk weight of the two highest of the first three tests in a cow's lactation, and is closely correlated to overall production in a lactation. Analysis of the association of variables of interest with the three measures of milk production was performed using the Wilcoxon rank sum test (npar1way procedure; SAS Institute, version 8.2, 2001); statistical significance was set an alpha value of 0.05.

Results

Significant differences in second 150-day milks were observed for cows below and above a cut-off for neutrophils of 40% and for absolute neutrophil counts of 200,000 and 250,000/ml. Mean milk production was highest in the group below the cut-off. Means for both 150-day milks were statistically different for neutrophils at a cut-off of 35%. There were no differences in milk production for the CMT with a cut-off of 1-plus, somatic cell concentrations at cut-offs of 300,000 and 400,000/ml, milk culture and neutrophils at a cut-off of 30%. Health events, neutrophils at a cut-off of 40%, and total absolute neutrophils at 200,000 and 250,000/ml did not differ for either first 150-day milk or summit milk. As an example of the magnitude of the differences, cows with no health event (n=85) had higher mean second 150-day milk of 55.6 lb (25.3kg)/day vs. those experiencing a health event (n=41), with a mean of 46.0 lb (20.9kg)/day. For % neutrophils at a cut-off of 40%, cows below the cut-off had mean second 150-d milk of 55.9 lb (25.4kg)/day, vs. a mean of 49.3 lb (22.4kg)/day for those above the cut-point. For total absolute neutrophils at a cut-off of 200,000/ml, those below the cut-off produced significantly higher second 150-day milks of 55.9 lb (25.4kg)/day, vs. those above the cut-off at 48.1 lb (21.9kg)/day.

Significance

These results indicate that differential cell counts of milk on day 3 post-partum are associated with lactational milk production, in contrast to CMT and somatic cell counts, which are not. This indicates promise for the use of differential cell counts on day 3 post-partum to predict lactational production.