

Evaluation of New Diagnostic Tests to Predict Hypocalcemia in Mature Dairy Cows

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An observational study was conducted in 79 mature Holstein cows from 28 dairy farms selected from Ontario Veterinary College, Ruminant Field Service clients that participated in a monthly herd health program. The objectives were to describe the prevalence of hypocalcemia, to evaluate the history and the physical examination findings to predict hypocalcemia and to evaluate the power and the positive predictive value of the Withers Pinch Reaction (WPR) test as a new screening test. All eligible third plus lactation cows entered the study if the calving occurred between February 15 and May 15, 1992. All cows were examined and WPR tested by a veterinarian within the first 24 hours after parturition. A standard questionnaire and physical examination sheet was completed for every cow. At the end of the evaluation, a serum sample was taken from the caudal vein with a vacutainer vial.

Milk fever or parturient paresis, caused by hypocalcemia, generally affects high producing dairy cows in their third or greater lactation. Substantial economic loss to dairy producers results from the treatment of clinical milk fever and a complex of milk fever associated diseases. A syndrome of reduced appetite and poor production in early lactation cows caused by subclinical hypocalcemia may be included in this complex. Early diagnosis, treatment and prevention are therefore required to reduce the cost of milk fever.

Upon physical examination, some cows had been observed to hold their mouth open and sometimes to protrude the tongue. This was considered by the first investigator to be a unique clinical sign and it was found that it could be stimulated by forcibly pinching the withers area by hand while simultaneously applying xiphoid pressure. This withers pinch reaction (WPR) seemed to correspond with clinical stage I milk fever or subclinical hypocalcemia when it was the only significant finding on physical examination of poor performing postpartum dairy cows.

Hypocalcemia was defined on laboratory findings as a total calcium (TCa) level below 2.0 mmol/L. The WPR

test was done twice on each side of the animal without a halter. The response was positive when the cow opened her mouth (with or without sticking out her tongue) during the withers pinch's test. The frequency of a positive reaction was noted between 0 and 4 and then dichotomized as present or absent.

Based on the clinician's final decision to treat the examined cows, this study had an incidence of clinical milk fever of 41.8% (33/79). This study demonstrated a higher incidence rate of clinical milk fever compared to most previous studies because the study population included only cows in their third lactation or greater. In addition, every cow in this study was evaluated twice within 48 hours of parturition by a veterinarian. These evaluations gave the opportunity to treat some clinical and subclinical cows that would have been considered normal to most dairy producers and consequently increased the lactational incidence rate of milk fever.

Subclinical milk fever is less well understood than clinical milk fever. If we exclude down cows at the first evaluation, defining a hypocalcemic cow as one having a serum level of total calcium (TCa) of less than 2 mmol/L, this study had a prevalence of 71.6%. A study by Oetzel *et al.* (1988) using a similar definition had a prevalence of 67%. Of those hypocalcemic cows based on TCa, 43.8% were considered by the veterinarian as having clinical milk fever compared to only 17% in Oetzel *et al.* (1988).

This study demonstrated that a complete physical examination performed by a veterinarian increased the ability to detect hypocalcemic cows.

A positive WPR test was obtained in 35% of the study population by forcibly pinching the withers area by hand. If we used 2 mmol/L as a threshold value for the total serum calcium level to determine hypocalcemia, the WPR test had a sensitivity, specificity, positive and negative predictive values of 45%, 83%, 87% and 38% respectively.

The questionnaire gave us the opportunity to evaluate selected history criteria and other clinical signs for the early diagnosis of hypocalcemia (<2mmol/L) (Table 1).

Table 1. Sensitivity, specificity, positive (PPV) and negative predictive values (NPV) of various tests to detect hypocalcemia (total serum calcium < 2 mmol/L) in Holstein cows of more than 2 lactations.

Tests	Sensitivity	Specificity	PPV	NPV
Previous Milk Fever (PMF)	35%	100%	100%	40%
Dystocia	47%	39%	64%	23%
Decreased Appetite	39%	83%	85%	35%
Cold Ears	33%	68%	73%	29%
Decreased Rumen Motility	50%	72%	81%	37%
Decreased Ability to Defecate	60%	74%	84%	45%

The history of having a previous milk fever (PMF), a decreased appetite and clinical signs of decreased rumen motility or decreased ability to defecate demonstrated good to excellent positive predictive values to detect cows with low calcium but poor negative predictive values. By using the PMF and the WPR tests in parallel or in series, we were able to increase the negative predictive values (>50%) compared to each test used separately (Table 2).

Table 2. Sensitivity, specificity, positive (PPV) and negative predictive values (NPV) of 2 tests (Previous milk fever and WPR test) used in Parallel and in Series to detect hypocalcemia (total serum calcium < 2 mmol/L) in Holstein cows of more than 2 lactations.

PMF & WPR	Sensitivity	Specificity	PPV	NPV
Parallel	68%	86%	92%	52%
Series	12%	100%	100%	68%

The high prevalence of hypocalcemia found in this study demonstrates the importance of this disease in mature Holstein cows. Scientists are well aware that prevention of milk fever is much more profitable than treatment of individual cases once they occur. By accepting the concept that cows with a total serum calcium of less than 2 mmol/L can be more at risk of developing postpartum diseases such as milk fever, retained placenta, metritis, ketosis, left displaced abomasum and subsequently decreased appetite and poor production, we were able to evaluate tests that can be used in dairy cows to improve producers' and veterinarians' abilities to detect hypocalcemic cows.

Abstract

Insemination of cattle with semen from a bull transiently infected with pestivirus

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When 73 heifers (60 of which were seronegative to pestivirus) were inseminated with pestivirus-contaminated semen from a transiently bull, the conception rate to a single insemination was found to be normal (65 percent). Only three animals became systemically infected, as determined by viraemia and seroconversion. Pestivirus was isolated from the reproductive tracts of

two of these heifers when they were slaughtered 42 or 43 days after insemination. Although the initial incidence of infection was low, a cycle of secondary transmission occurred approximately 29 days after insemination, with a further eight heifers (all seronegative) becoming infected from one group of 11 seronegative and four seropositive animals.