

A Case of Acute Coliform Mastitis in a Periparturient Holstein Cow

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Abstract:

A 9 year old, 7th lactation Holstein cow was presented at the farm for acute mastitis in the right front quarter, 4 days after freshening. Within two weeks of initiating treatment the cow was normal upon physical examination, but had lost the use of the affected quarter and milk production from the other three quarters was negligible.

Introduction:

Coliform mastitis is a familiar and frustrating disease for veterinarians and farmers alike as it is the most common cause of severe clinical mastitis on a dairy farm (2). Additionally, 10-15% of severe cases result in mortality (3). The severity associated with coliform mastitis cases is due to the lipopolysaccharide endotoxin (LPS) released from coliform bacteria as they are killed by neutrophils (2). The release of inflammatory mediators in response to the endotoxins drives both local and systemic signs of coliform mastitis (1).

The case of severe coliform mastitis described in this report stimulated a discussion of short and long term herd prevention protocols for environmental mastitis.

Case Description:

On arrival at the farm on June 3, 2011 a brief history was taken. The cow was 9 years old and had freshened on May 30th to start her 7th lactation. There had been two previous clinical mastitis cases in past lactations, and the cow had been dry treated with cloxacillin benzathine (Dry-Clox; Boehringer Ingelheim, Burlington, Ontario) at dry off. It should also be noted the cow had never been inoculated with any coliform mastitis vaccine. For prevention of milk fever, 500 mL Calcium Borogluconate (Vétoquinol, Lavaltrie, Québec) was administered subcutaneously (SQ) after calving. On May 31st the cow was observed to be depressed with decreased feed intake, the right front (RF) quarter was swollen and hot, and a retained placenta was present. Special Formula 17900 Forte Suspension (Pfizer Animal Health, Kirkland, Quebec) was administered Intramammary (IMM) in the RF quarter, followed by 25mL 20% Ampicillin (Polyflex; Boehringer Ingelheim, Burlington, Ontario) and 50mL 24% trimethoprim and sulfadoxine (Borgal; Intervet Canada Corp., Kirkland, Quebec) given intramuscularly (IM) on May 31st and June 1st. The 20% Ampicillin was administered to target a possible uterine infection subsequent to the retained placenta. On June 2nd the cow was having trouble rising so Theracalcium (Vétoquinol, Lavaltrie, Québec) was administered SQ. Special Formula 17900 Forte Suspension (Pfizer Animal Health, Kirkland, Quebec) IMM and 50mL 24% trimethoprim and sulfadoxine (Borgal; Intervet Canada Corp., Kirkland, Quebec) IM were administered on June 2nd as well. The right front quarter was hot and hard with abnormal milk throughout this time.

On examination the cow was found to be depressed, dull, weak, 10% dehydrated with 1 weak rumen contraction per minute. The animal was anorexic with a temperature of 37.3C, a heart rate of 68 beats/min and a respiratory rate of 48 breaths/min. The RF quarter contained serosanguinous fluid and was hot and hard to the touch. The other three quarters were normal.

A working diagnosis of acute coliform mastitis was made and guided therapy and follow-up of this case, specifically *Escherichia coli* due to presentation and previous milk culture data collected on the farm.

After examination, 1L Hypertonic saline, 50mL 24% trimethoprim and sulfadoxine (Borgal; Intervet Canada Corp., Kirkland, Quebec) and 30 mL flunixin meglumine (Cronyxin; Bioniche Animal Health, Belleville, Ontario) were administered intravenously (IV) and approximately 20L of water with Bubba Mix (yeast, sodium bicarbonate, epsom salts, calcium propionate, dextrose, potassium chloride, niacin, vitamin E and wheat shorts) administered directly into the rumen on June 3rd.

Follow up treatment was performed by the farmer; 50mL 24% trimethoprim and sulfadoxine (Borgal; Intervet Canada Corp., Kirkland, Quebec) was administered for 3 days IM, Special Formula 17900 Forte Suspension (Pfizer Animal Health, Kirkland, Quebec) was infused in the RF quarter for 5 days and 30 mL flunixin meglumine (Cronyxin; Bioniche Animal Health, Belleville, Ontario) was given IV on June 4th. Killing the RF quarter was discussed but discarded in favour of stripping due to possible stress on the cow. The right front quarter was stripped out at least 2 times per day by the farmer.

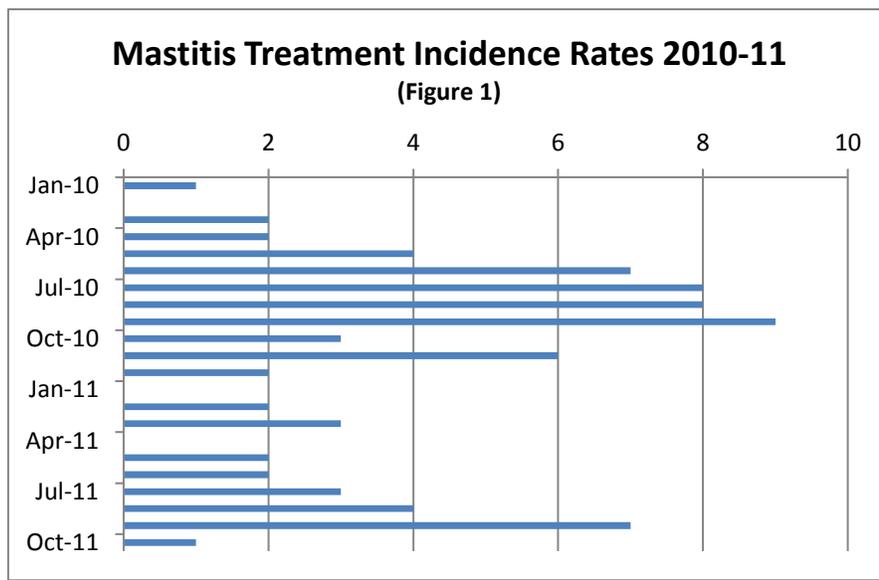
Within 2 weeks the cow was eating well and normal on physical exam, with the exception of her mammary gland. Unfortunately the RF quarter was no longer functional with only a small amount of serosanguinous fluid present when stripped. At this time the milk production from the other three quarters was minimal and it was decided to dry up the cow. The cow is currently dry, not pregnant and attempts to rebreed her are planned due to her genetic value to the farmer.

Economics of Treatment:

A frequent question that comes up when treating a case of severe coliform mastitis is whether treatment is a worthwhile endeavour or would it be more rational from a benefit-cost perspective for farmers to cut their losses on these severe cases and euthanize the cow? This is a question which should be answered on a case by case basis, as case severity and the value of the cow vary. In this case, the farmer will tell you it was worth the cost and labour to save this cow. Although this is an older cow, she has been an above average producer for the herd, has had a calving interval of 13.8 months, and is genetically valuable to the farmer. The cost of treatment to the farmer (not including labour) was approximately \$400. Even if the cow never breeds back and is culled, beef price should cover the cost of treatment and feed.

Farm Discussion & Prevention:

By analyzing farm DHI data, mastitis treatment incidence, culture results and overall farm environment it is evident more vigorous environmental mastitis prevention would be an economic benefit. In the last twenty-two months mastitis treatment incidence (cases treated per month/number of cows milking) was 9%. See Figure 1 for the seasonal distribution of treated mastitis cases in 2010 and 2011. The heat and humidity present in an older style bank barn with limited cooling ability and a pasture which can get muddy with rainfall are the two most prominent reasons for the seasonal increase in clinical mastitis cases.



The higher SCC counts in the summer and fall months are reflected in herd SCC DHI data as well. In 2010, a bad year for mastitis according to the farmer, there was multiple months over 500,000 SCC on DHI. Milk culturing has been performed sporadically over the years, with the vast majority of cases coming back for environmental pathogens. *Escherichia coli* was the most commonly cultured pathogen in the summer of 2011. These culture results and the seasonality of clinical mastitis cases suggests most mastitis, and resulting high SCC cases, are environmental in origin on this operation.

Observations made on farm point to a few key issues leading to an increased incidence of clinical mastitis. Due to housing constraints, dry cows and bred heifers are housed off site eight months of the year. This results in a variable transition period in terms of cleanliness and nutrition, as they are often transported home a few days before calving. In the summer dry cows are pastured, this results in mud contamination when it's a wet summer. Bred heifer housing, both off farm and on farm are subpar for cleanliness which leads to heifers calving in with high linear scores and clinical mastitis.

Milking protocol, technique and equipment were also observed. Equipment was in good repair, inspected annually by the local supplier and kept clean throughout milking. The prepping protocol is: predip, wait 60 seconds, wipe dry with paper towel and attach milker. Post dip is applied after milking. No strip cup is used for early clinical mastitis detection and over milking of cows was observed.

These observations and results would indicate cow environment, particularly cleanliness, and proper milking protocol would be areas of improvement to prevent environmental mastitis in the future.

Prevention Strategies

Short term, low financial investment strategies specific to this farm would be to improve heifer housing cleanliness, through increased use of straw and frequency of pen clean out. As well, a decrease bacterial contamination of the udder can be achieved by ensuring clean calving pens and transition cows are not in the muddy pasture right before calving. From the standpoint of milking procedure this farm does a very good job of keeping milkers clean and has good udder preparation protocols but does leave milkers on too long. Over milking causes damage to teat ends and increases the chances of liner slip, leaving teats more susceptible to bacteria invasion (4). The efficacy of *Escherichia coli* mastitis vaccines are well proven for decreasing severity of coliform mastitis and this farm would be a good candidate for implementation(5).

This operation fully recognizes heifer cleanliness, off site housing cleanliness and a seasonally muddy pasture are not ideal and can lead to increased environmental mastitis cases. There are currently plans to improve pasture condition through rotation for next summer to help decrease mud contamination on udders. Long term plans for the farm also include the construction of dry cow and heifer housing on site with easy to clean facilities via tractor and not a pitch fork.

References:

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