

Health Protocol to Identify Lactating Dairy Cows with Metritis in Dairy Herds

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The case study below was developed for educational purposes only and to illustrate common logistic challenges when implementing health and management protocols taking into account facilities and human resources available within the calendar week. Please note that the information from this particular case study may or may not be applicable to other situations.

QUESTION: A large conventional dairy herd (milking approximately 2,000 cows; DC305 is used to keep records) would like to screen all fresh cows for metritis 3 times per week (6, 8, and 10 DIM; each fresh cow would have 3 health screening opportunities). All cows are milked three times per day at approximately 8-hour intervals (6:00 am, 2:00 pm, and 10:00 pm) and headlocks are available in the fresh pen (1-25 DIM). The fresh pen is the first to enter the parlor at each milking time. The TMR is delivered twice per day at 6:00 am and 6:00 pm (feed push up every 2 hours). Due to labor scheduling conflicts and to minimize a drop in DM intake in postpartum cows (e.g., compromise lying time), the owner would like to perform the health screening protocol only during the week days (from Monday to Friday).

Specific request: Please develop the protocol (from screening to treatment) for metritis and place it into the calendar week. For this case situation, you can be flexible and schedule cows for metritis screening as “±1 DIM”.

ANSWER: The protocol to identify lactating dairy cows with metritis and the subsequent treatment guidelines are available at <https://vet.osu.edu/extension/dairy-resources/protocols> (English and Spanish versions). Producers should consult with their veterinarians regarding treatment protocols. An editable Veterinary-Client-Patient-Relationship form (VCPR) developed by the OVMA Drug Use Task Force is available at <https://vet.osu.edu/extension/general-food-fiber-animal-resources>.

• Using the calendar week (5 days), what day(s) of the week would you be screening cows for metritis?

ANSWER: In practice, all postpartum cows should be screened for metritis within the first 21 days in milk (DIM). Metritis is defined as the inflammation of all layers of the uterus characterized by foul-smelling, brown-red, watery vaginal discharge and systemic signs of illness (e.g., fever, anorexia, decreased milk yield, dehydration) within the first 21 DIM. It is important to note that the assessment of metritis should include a complete physical examination of the cow: eating/rumination behavior, hydration status, rectal body temperature (RT), and palpation of the uterus per rectum to evaluate uterine discharge (or intravaginal gloved hand technique). A study found that about 60% of postpartum dairy cows diagnosed with metritis were not always accompanied by fever (≥ 103 °F; Benzaquen et al., 2007). Although RT is widely used to identify sick animals, it is influenced by many factors such as type of

thermometer or the procedure itself (Burfeind et al., 2010), parity, month of calving, and type of disease diagnosed (Wenz et al., 2011). This finding suggests that diagnosis for puerperal metritis should include the type of uterine discharge (foul-smelling or not), the hydration status of the cow, and eating/rumination behavior combined with measurement of two biological makers (RT and milk yield). Postpartum dairy cows experiencing metritis became depressed and consequentially less active; thus, reducing feeding time (Huzzey et al., 2007) and milk yield (Dubuc et al., 2011; Piñeiro et al., 2015). Although metritis could occur at any time following calving, most of the cases (about 90%; 513/571) occur between 4 and 14 DIM with a peak at 6-10 DIM (Figure 1). Therefore, post-partum dairy cows could be scheduled for metritis screening at 6, 8, and 10 DIM (± 1 DIM) with follow up observations until 21 DIM. For this specific example, this approach would require the assessment of postpartum cows on three days within the calendar week: Mondays, Wednesdays, and Fridays (Table 1). The remaining days of the week, Tuesdays and Thursdays (including Saturdays and Sundays), could be used to follow up with treated cows (administration of antimicrobial and fluid therapy to correct dehydrated cows) and visual observation within pens plus monitoring milk yield at the parlor for any new cases.

Figure 1. Distribution of 571 metritis cases within the first 21 DIM relative to calving from four Ohio dairies.

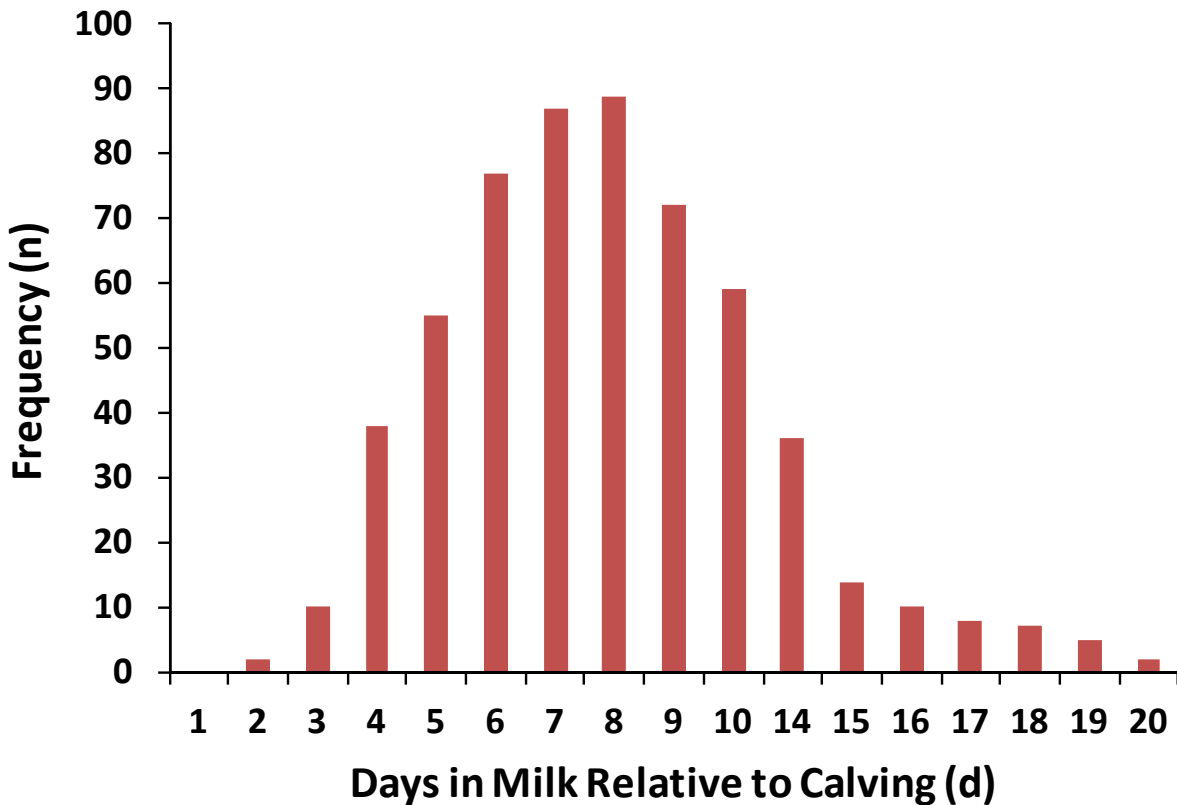


Table 1. Distribution of post-partum cows by DIM within the calendar week. For a 2000-cow herd, a total of ~42 post-partum cows would be available for metritis screening on Mondays, Wednesdays, and Fridays (assuming an average of 5-6 calvings per day). It is important to note that the calving frequency (number of births per unit of time) will likely change from week to week, ranging from 10 calvings in one week to 54 calvings in another week. Postpartum cows highlighted in yellow would be at 5-7 DIM, green at 7-9 DIM, and orange at 9-11 DIM. You can download the entire excel spreadsheet at <https://vet.osu.edu/extension/dairy-resources/protocols>.

	Date	6/6/2016	6/7/2016	6/8/2016	6/9/2016	6/10/2016	6/11/2016	6/12/2016	6/13/2016	6/14/2016	6/15/2016	6/16/2016	6/17/2016	6/18/2016	6/19/2016	6/20/2016	6/21/2016	6/22/2016	6/23/2016	6/24/2016
	Day of Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	Mean																			
Week	(calvings per day)																			
1	6	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	6		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	6			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	6				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	6					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	6						1	2	3	4	5	6	7	8	9	10	11	12	13	14
	6							1	2	3	4	5	6	7	8	9	10	11	12	13
2	6								1	2	3	4	5	6	7	8	9	10	11	12
	6								24	1	2	3	4	5	6	7	8	9	10	11
	6										1	2	3	4	5	6	7	8	9	10
	6										36	1	2	3	4	5	6	7	8	9
	6												1	2	3	4	5	6	7	8
	6													42	1	2	3	4	5	6
	6														1	2	3	4	5	6
3	6															1	2	3	4	5
	6															42	1	2	3	4
	6																	1	2	3
	6																	42	1	2
	6																			1
	6																			42
	6																			

- Which cows and how many would you be screening each day assuming there is an average of 6 calvings per day?

ANSWER: For a 2000-cow herd, a total of ~42 post-partum cows would be available for metritis screening on Mondays, Wednesdays, and Fridays (assuming an average of 5-6 calvings per day). Each screening day of the week (Mondays, Wednesdays, or Fridays), a group of approximately 12 to 18 post-partum cows would be at 5-7 DIM (yellow), at 7-9 DIM (green), and at 9-11 DIM (orange; Table 1).

- How many workers are needed to implement the health protocol assuming 1 hour is available for each day?

ANSWER: For this particular example, postpartum cows are grouped by parity for the first 25 DIM (1 pen for primiparous cows and another contiguous pen for multiparous cows). To be able to implement the metritis screening protocol, a team of 2 or 3 fully trained workers would be needed to identify cows with metritis and administer the subsequent treatment to sick cows. Eligible postpartum cows could be subjected to the following scoring system (scale 0-3; Figure 2): 1) assessment of two biological markers (rectal body temperature [RT] and milk yield), 2) assessment of dehydration and eating/rumination behavior, and 3) assessment of vaginal discharge. Since the fresh pens are the first to enter the parlor starting at 6:00 AM, milk yield could be assessed (1 worker) at the parlor by looking at the udder fill (yes/no) or by assessing the % drop in milk yield from the previous 6:00 AM milking. Once cows return to the pens, fresh TMR is already delivered and cows could be locked up for screening health events (max of ~1 hour per pen). It is important to identify cows at high risk of metritis (experiencing dystocic births, retained fetal membranes, and birth of twins) around parturition using color chalks. This information could be very used for the fresh cow team to assess metritis at examination.

Figure 2: Protocol describing the scoring system (0-3 scale) to identify cows with metritis.

Scores			
0	1	2	3
Rectal Body Temperature (°F)			
100-101.5	101.6-102.4	102.5-103.5	≥103.6
Milk Yield (% drop)			
<5%	8-11%	15-25%	>30%
Udder Fill: YES		Udder Fill: NO	
Dehydration			
0	1	2	≥3
Eating/Rumination Behavior			
0	1	2	3
Vaginal Discharge			
No discharge or mucus brown-red without smell	Muco-purulent, brown-red without smell	Muco-purulent or brown-red watery, foul-smelling	Brown-red watery, foul-smelling

Each group of postpartum cows would have 1 hour available to complete the screening and subsequent treatments (1 hour for primiparous and 1 hour for multiparous). One worker would need to be walking at the feedbunk, managing the list of eligible cows and scores/records, and

checking for signs of dehydration and eating behavior. One or two additional workers would be walking inside the pen assessing vaginal discharge and RT. First, all postpartum cows are screened for metritis (or any other metabolic diseases), sick cows marked with a color chalk (head), and then treatments administered to sick cows. Since post-partum cows are grouped by parity, this process is repeated again for the second pen. Table 3 provides a description of metritis scoring criteria for 6 postpartum cows by DIM. For each cows, the following scoring criteria was used: 1) assessment of vaginal discharge (score of 2 or 3 are considered abnormal), 2) assessment of signs of illness by monitoring RT and/or milk yield (if monitored both parameters, use whichever is higher), and 3) assessment of eating/rumination behavior and/or dehydration scores (if monitored both parameters, use whichever is higher). For instance, cows 2222, 2210, and 2200 had vaginal scores of 2 or 3 with systemic signs of illness (\uparrow RT or \downarrow milk yield) and also were off-feed/dehydrated (total scores of 6, 5, and 9, respectively). Cows 3211 and 1022 had a vaginal score of 0 or 1 (considered normal) without systemic signs of illness. Finally, cows 4211 had an overall score of 5 (vaginal score of 1), but presented systemic signs of illness (score of 3 for RT or milk yield). This cow should be assessed for ketosis and/or any other concurrent diseases (e.g., Pneumonia). Information from treated cows should be recorded and cows marked using color chalks for ease identification during the follow up.

Table 3: Description of metritis scoring criteria in postpartum dairy cows.

Cow ID	DIM at Exam	*RT or Previous Milk Yield Scores (whichever is higher)	Eating/Rum Behavior or Dehydration Scores (whichever is higher)	Vaginal Discharge Scores	Total Score
2222	6	2	2	2	6
3211	8	0	0	0	0
4211	9	3	1	1	5
2210	6	2	0	3	5
2200	11	3	3	3	9
1022	6	1	1	1	3

Interpretation of SCORES:

Total score for cows with vaginal score of 2 or 3:

≤ 3 = Normal, 4 = Watch/Recheck, and ≥ 5 = Sick/Treat

(*RT = Rectal body temperature)

Assuming that the screening process takes on average 2 minutes per cow (at least two workers), screening all postpartum cows would require approximately 84 minutes (42 cows x 2 minutes). Assuming that 12% out of 42 cows are experiencing metritis (~5 cases) and each case takes approximately 10 minutes to administer the treatment (antimicrobial and pain medication for all cows, including the fluid therapy for ~30% of cases), it takes about 50 additional minutes to successfully deliver the treatments. Therefore, the fresh cow team would need ~2.5 hours to complete the screening process and administer treatments. It is important to note that for every percentage point increases in metritis (from 12 to 13%), it adds an additional ~15 minutes to the entire treatment protocol. The higher the prevalence of metritis, the longer it takes to treat sick

cows with the subsequent risk for non-compliance due to increased workload and personnel fatigue. Optimizing cow comfort (and DM intake) and preventing metabolic diseases (hypocalcemia and ketosis) should be the top priority of the transition cow program. For instance, daily resting time (hours per day of lying) of pre- and post-partum cows are significantly associated with a drop in DM intake; dairy cows have a strong behavioral need to rest (Munksgaard et al., 2005). This drop in DM intake prior to parturition or early lactation may lead to an increased negative energy/calcium balance (NEB) and metabolic diseases (hypocalcemia and ketosis) with the subsequent negative effect on the immune system. Therefore, the status of the immune system will likely determine the prevalence of uterine diseases. It is well documented that metabolic and uterine diseases (e.g., metritis) contribute to ovarian dysfunction at 26 ± 3 DIM (e.g., smaller follicle size, lower plasma estradiol concentration, reduces the proportion of functional CL, and increase the proportion of cysts; Sheldon et al., 2009; Maquivar et al., 2015). Furthermore, lactating dairy cows that develop uterine diseases (e.g., metritis, clinical endometritis) had reduced conception and increased risk for pregnancy losses (Maquivar et al., 2015), regardless of the reproductive program implemented (Brick et al., 2012; Maquivar et al., 2015).

• How would you print the list of fresh cows by DIM from DC305?

ANSWER: The following DC305 command would provide the list cows between 5 and 11 DIM:
SHOW ID FDAT PEN DIM LACT for DIM=5-11

ID	FDAT	PEN	DIM	LACT	Metritis Score
1878	8/25/2014	5	7	4	
2348	8/24/2014	5	8	6	
3030	8/22/2014	5	10	4	
3597	8/27/2014	5	5	3	
4162	8/24/2014	5	8	3	
4241	8/22/2014	5	10	5	
4250	8/26/2014	5	6	5	
4308	8/22/2014	5	10	3	
4340	8/25/2014	5	7	2	

Assessment of Hydration Status of Lactating Dairy Cows

The most common indication for fluid therapy in lactating dairy cows is to correct fluid losses and electrolyte abnormalities due to dehydration associated with concurrent diseases. In adult dairy cattle, the rumen represents a major reservoir of water. The amount of water intake depends on the body size of cow, milk yield, quality of DM consumed, environmental temperature/humidity, season (temperature of water), and quality of water. A lactating dairy cow (1,500 lbs of live body weight) that produces 60 lbs/day of milk with an estimated DM intake of 48 lbs/day would require 23.5 gallons per day of water (at 50 °F, environment temperature; Looer and Waldner, 2002). Since milk is 87% water, lactating cows have strong need to drink

abundant water to avoid dehydration. Therefore, lactating dairy cows experiencing metritis are at increased risk for dehydration due to decreased water intake (likely associated with fever and pain) and the continue water loss in milk. Lactating dairy cows with signs of dehydration (score of 2 or greater) should receive fluid therapy (oral and/or IV) to restore the hydration status of the animal and optimize the kidney and cardiovascular homeostasis.

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