

# A Fresh Cow Health Monitoring System

*Amanda Sterrett, Donna Amaral-Phillips, and Jeffrey Bewley, Animal and Food Sciences, and Michelle Arnold, Veterinary Diagnostic Laboratory*

## Introduction

Calving causes cows to endure many physiological changes that require good nutrition, time, and adequate rest for recovery. Upon calving, cows are introduced into the lactating herd, where they consume high amounts of a new ration and have to adapt to a new feeding and milking routine. Lactation requires more support from the diet than pregnancy and weight maintenance, particularly in fresh cows calving in with a negative energy balance. Additionally, the social hierarchy within the herd is re-established every time a new cow enters the group, which can cause stress, especially for timid and weak cows. For these reasons, cows become immunosuppressed, making them more susceptible to illness. Although many cows seem to adapt quickly and adequately to this new period, underlying issues are often present that are sometimes difficult to notice.

Cows with clinical disease show outward signs of the disease. Cows with subclinical diseases, which are more common than clinical diseases, will not display any abnormal signs. Subclinical diseases often affect animals more than clinical diseases because they usually go undetected and, therefore, untreated. Producers are usually able to detect moderate to severe clinical diseases within their herds, but many fresh cow diseases occur in sequence of one another and either the primary or the subsequent diseases go unnoticed. For example, a cow with a retained placenta may develop metritis, which will cause her to eat less, resulting in ketosis and a displaced abomasum. This cow may only show symptoms of the displaced abomasum while the metritis and ketosis go undetected. In a case like this, the displaced abomasum and ketosis may have been prevented if her metritis had been detected early enough to intervene successfully.



All illnesses play a negative role in a cow's future. Even when a disease is treated and cured, the effects of the disease are ongoing throughout the cow's lactation. For example, mastitis decreases milk production and metritis decreases fertility rates. Therefore, a cow that was sick in her fresh period will not reach her full lactation potential. The longer she is sick and the more illnesses she develops, the worse the ongoing effects will be.

Producers see their cows multiple times a day, but usually only while walking through the lot, which makes it challenging to notice small changes occurring in individual animals. To ensure that fresh cows get the best possible start to their lactation, a producer should closely examine them daily for the first three weeks of lactation. Routine fresh cow health monitoring exams should just take a few extra minutes per fresh cow each day, but may allow producers to recognize illnesses that they may miss by walking through the pens. Fresh cows can be brought up with the cows to be bred, or examined around milking and feeding times when the cows are more likely to be active and easy to view.

Researchers at the University of Kentucky combined existing disease detection systems to produce a fresh cow examination system that may help producers detect diseases earlier by monitoring subtle changes every day during a cow's fresh period. The following pages include definitions and recording systems that have proven helpful in the detection of the following diseases: displaced abomasum, mastitis, metritis, milk fever, and ketosis. Compiling daily information about each animal will enable producers to notice changes in health that may otherwise have been overlooked. These records may help producers detect illnesses early, thus reducing the long-term effects (reduced milk production or fertility) and costs (re-treatment, milk loss, or death) of a disease. Learning what diseases are common on a particular farm can focus producers' efforts towards preventive measures specific to their operation. Preventing disease, rather than treating, can save producers time and money and can improve overall cow well-being.

## Disease Detection Systems

### Calving Problems

Cows with difficult deliveries are at a greater risk for fresh cow problems (i.e. retained placenta and metritis). Keeping a record of calving ease will help a producer know which cows to monitor more closely. The Calving Sheet can be used to record calving information for all cows within the herd to look for herd trends and to monitor retained placentas in individual animals. Most cows in all herds should calve in with a score 1, using the scoring system in Table 1. Although difficult deliveries will occasionally occur, a producer should contact his or her veterinarian and nutritionist if a producer notices an increase in the number of cows that need assistance delivering.

**Retained placenta** is when the fetal membranes (placenta or afterbirth) are visible at the vulva or can be identified by vaginal examination in the uterus or vagina 24 hours post-calving. Cows with retained placentas are at a substantially greater risk of contracting metritis and endometritis.

**Table 1.** Calving ease scoring system.




1	2	3	4	5
No problems; cow calves on her own without the assistance of humans.	Slight problem; cow seems uncomfortable and is in labor for hours, but delivers the calf on her own.	Needed assistance; calf may need repositioning, but the cow delivers the calf safely after initial human help.	Considerable force needed; chains needed to pull calf.	Extreme difficulty; caesarean section is needed.

**Metritis** is an inflammation of the uterus resulting in systemic signs of sickness, including fever, red-brown watery foul-smelling uterine discharge, anorexia, elevated heart rate, and low production. Metritis is often associated with a uterine bacterial infection.

**Endometritis** is the inflammation of the uterus without systemic illness. It is characterized by muco-purulent (mucousy pus-filled) uterine discharge or purulent (pus-filled) uterine discharge associated with a chronic bacterial infection of the uterus. Endometritis often occurs after the fresh period for cows recovering from metritis.

Cows with a score of 1 in the uterine scoring system (Table 2) are considered normal. They are either free of infection or have yet to show clinical signs of infection. Cows with a score of 2 are considered to have mild to severe endometritis. These cows should be closely monitored and corrective action should be taken under the supervision of a veterinarian. Cows with a score of 3 are considered to have mild to severe metritis. Discharge appearance varies greatly between cows, but the offensive odor is the key component of this score. Cows with this score will not likely recover on their own so a veterinarian should be contacted for treatment advice.

**Table 2.** Uterine scoring system.





1	2	3
 <p>Thick, viscous discharge; clear, opaque or red to brown in color; no odor or mild, non-offensive odor.</p>	 <p>White or yellow pus; moderate to thick discharge; no odor or mild, non-offensive odor.</p>	 <p>Pink, red, dark red, or black watery discharge; detectable offensive odor, possibly intolerable.</p>

**Calving Sheet**

<b>Cow no.</b>	<b>Date</b>	<b>Approximate times of labor</b>	<b>Location (maternity pen/field)</b>	<b>Calving ease score (1-5)</b>	<b>Calf no.</b>	<b>Calf sex</b>	<b>Live/dead</b>	<b>Time of placental passing</b>



**Table 3.** Behavioral scoring system.

1	2	3	4
 <p>No systemic signs of ill health (looks normal); eyes bright and alert; perky ears.</p>	 <p>Additional signs of illness; looks mildly depressed; droopy ears; dull eyes.</p>	 <p>Looks moderately depressed; droopy ears; dull and sunken eyes; lethargic.</p>	 <p>Looks extremely depressed; droopy ears; dull and very sunken eyes; lethargic; anorexic; often refuses to stand; uninterested in surrounding environment.</p>

**Behavior**

Cows often display behavioral changes with illness. The severity of depression they display usually corresponds to the severity of the disease(s) they are experiencing. Cows usually progress through the behavioral scoring system slowly (taking a few days to progress from a 1 to a 4), giving a producer time to take action. Because the progression is often slow, producers not recording daily fresh cow






evaluations can easily overlook the subtle signs of scores 2 and 3 and only notice when a cow becomes a score 4, which is sometimes too late to take effective action. However, subtle changes in behavior may be more noticeable when a producer examines each cow and records a score each day in the Fresh Cow Evaluation Sheet. Behavioral changes can serve as a signal that a cow is sick, but these signs will not pinpoint what disease a cow is suffering from. Cows with a score greater than 1

should be closely evaluated for other signs to determine the cause.

**Manure**

Illness can affect digestion and feed intake, causing changes in manure consistency. In the manure scoring system (Table 4), a score of 1 represents watery diarrhea and is common in cows with an infectious disease. A thorough physical exam should occur and a veterinarian should be contacted for any cow with this score.

**Table 4.** Manure scoring system.

1	2	3	4	5
 <p>Feces are watery thin and not truly recognizable as feces.</p>	 <p>Feces are thin custard-like; fecal structure can be recognized. At dropping they splash wide out on the floor.</p>	 <p>Feces are thick and custard-like. They make a light plopping sound when being dropped on the floor. They make a well-circumscribed pad that spreads and has the thickness of about 2 cm.</p>	 <p>Stiff feces are observed. They make a heavy plopping sound when being dropped. They make a well-circumscribed pad that piles in rings and spreads out very little.</p>	 <p>Stiff feces in balls, looks like horse feces. A boot sole profile is left when stepped on.</p>

A score of 2 is often associated with lush spring pasture or a ration imbalance. If multiple cows within a herd fall under this score, the ration should be re-evaluated. If only one cow possesses this score, she should be given a thorough physical exam and a veterinarian should be contacted if illness is detected. A score of 3 is the ideal score for lactating cows with a proper ration. A score of 4 is common in heifers and dry cows, but implies an improper ration for lactating cows. The ration should be re-evaluated if cows possess this score. A score of 5 is usually representative of a ration imbalance and is usually only

observed in dry cows and heifers. Animals often have difficulty defecating with manure of this score and the ration should be re-examined. This score can also be observed in cows with milk fever.

### Metabolic Problems

**Rumen fill** is associated with feed intake; as a cow eats more, her rumen fill increases. Decreased feed intake is often an indication of disease and can contribute to further diseases like ketosis and displaced abomasum. Using the Rumen fill scoring system (Table 5), the fill of an animal's paralumbar fossa (explained in

Table 5) can be evaluated from the left side of the animal. Cows with a score of 1 will have typically eaten little or not at all because of illness. A score of 2 is often observed in normal cows in the first week of lactation. When the score does not improve after this period, the cow likely has poor feed intake. A score of 3 is the desired score for lactating cows with adequate dry matter intake. Dry cows and cows in late lactation should show a score of 4 or 5.

**Displaced abomasum (DA)** occurs when the abomasum becomes displaced to the left and top of the rumen when the muscle loses tone and the stomach fills

**Table 5.** Rumen fill scoring system.

	1	2
 <p>Transverse process</p> <p>Paralumbar fossa</p>	 <p>The paralumbar fossa looks very empty; the paralumbar fossa cavities more than a hand's width behind the last rib and a hand's width inside under the transverse processes. The fossa looks like a rectangle when observed from the left side of the cow.</p>	 <p>The paralumbar fossa cavities a hand's width behind the last rib and to a lesser extent inside under the transverse processes. When the observer stands at the left side of the cow, this area looks like a triangle.</p>
 <p>The paralumbar fossa cavities less than a hand's width behind the last rib and falls about a hand's width vertically downwards from the transverse process and then bulges out.</p>	 <p>The paralumbar fossa skin is covering the area behind the last rib and arches immediately outside below the transverse processes due to an extended rumen.</p>	 <p>The rumen is quite distended and nearly obliterates the fossa; the last rib and the transverse processes are not visible.</p>
3	4	5



**Table 6.** Clinical milk fever scoring system.

Stage 1	Stage 2	Stage 3
<ul style="list-style-type: none"> <li>• Mild excitement</li> <li>• Nervousness or hypersensitivity</li> <li>• Decreased appetite</li> <li>• Rapid heart rate (&gt;70 beats per minute)</li> <li>• Weakness or weight shifting</li> <li>• Involuntary muscle contraction without relaxation</li> </ul>	<ul style="list-style-type: none"> <li>• Struggle to stand</li> <li>• Depression</li> <li>• Muscle tremors</li> <li>• Rapid heart rate</li> <li>• Cold ears</li> <li>• Pupils dilated and unresponsive to light</li> </ul>	<ul style="list-style-type: none"> <li>• Struggle to stand progressing to loss of consciousness</li> <li>• Severe bloat</li> <li>• Failure to defecate</li> <li>• Rapid heart rate</li> <li>• Pulse difficult to detect</li> </ul>

with gas. The entrance and exit to the stomach then become slightly kinked, causing food to pass more slowly and intake to decrease further. Signs include a decreased appetite accompanied by an audible ping produced by percussion of the left abdominal wall between the ninth and 12th ribs. A veterinarian should be called for all cows suspected of having a DA. This condition is often fatal unless a veterinarian performs surgery to correct the displacement. Although left DAs are more common, right DAs are possible and should be evaluated if cows show signs of DA.

**Ketosis** is an energy deficiency and is common in fresh cows. The first signs of ketosis are reduced feed intake, reduced milk production, sweet-smelling breath, lethargy, and an empty appearing abdomen. Cows are also usually dehydrated, and sometimes will have other physical irregularities like abnormal licking, chewing incessantly on inanimate objects, incoordination, gait abnormalities, aggression, and bellowing. Cow-side blood, urine, and milk tests exist to evaluate ketosis status in cows. Ketosis may progress into fatty liver, a more serious disorder.

**Fatty liver** occurs when blood non-esterified fatty acid concentrations (NEFAs) are elevated. A liver biopsy is the only reliable method to determine severity of fatty liver in dairy cattle. However, fatty liver has been associated with low milk production, increased clinical mastitis, poor reproductive performance, and often accompanies milk fever. Because feed intake is especially important in fresh cows to help prevent ketosis and DAs, it is included in the fresh cow exam. Many farms are not designed to monitor individual cow feed intake, but can monitor how often a cow is at the feed bunk. If this, too, is not possible, a producer may rely more heavily on rumen fill score as it is related to feed intake.

**Milk fever**, or hypocalcemia, is a disease caused by a calcium deficiency. Lactation requires the mobilization of calcium and sometimes depletes a cow's supply after calving. Cows often recover quickly when their calcium supply is replenished through a calcium drench or intravenous drip. The scoring system outlined in Table 6 can be used to detect the disease in the beginning stages. Sub-clinical milk fever is only verifiable with a blood calcium check.

## Mastitis

Cows are most susceptible to mastitis during the first few weeks of the dry period and right around calving. Reasons for this increased vulnerability include increased milk leakage and therefore easy entrance into the teat canal, decreased flushing of bacteria out of the teat by milking, lack of pre- or post-dipping to kill any bacteria on the teat skin, and suppressed immune systems. Mastitis decreases production, even after a bacterial cure. Therefore, starting a cow's lactation with mastitis is detrimental to her success in the herd.

The Parlor Mastitis sheet can be posted in the parlor to record information on clinical mastitis so cows can be monitored throughout their treatment and recovery period. The stages refer to a scoring system developed by A.J. Bradley and M.J. Green and indicate the severity of the disease. This sheet would be particularly useful when combined with culture results to determine what major pathogens are infecting the herd. Understanding the pathogen causes in the herd will enable producers to make management improvements to compensate. For example, if environmental pathogens are the culprit of many fresh cow mastitis cases, producers should evaluate the cleanliness of the dry pen, maternity pen, and fresh pen.



## Fresh Cow Evaluation

The Fresh Cow Evaluation Sheet may be used to record daily information about fresh cows to monitor changes in behavior, uterine discharge, rumen fill (using the above scoring systems), along with respiration and rectal temperature.

A healthy cow will have a temperature from 101°F to 103°F, with higher temperatures indicating illness. However, rectal temperatures vary based on ambient weather conditions, the technique of the observer, and time around defecation.

Rectal temperatures are often higher in the summer and after defecation. When the probe is not fully inserted into the rectum, temperatures will appear lower.

A healthy cow will have a respiration rate of 24 to 48 breaths per minute. Both heat stress and illness will often increase a cow's respiration rate. Respiration rate can be measured by standing on either side of the cow and watching her sides move out with each inhale. In the winter, respiration rate can also be measured by watching the cow's breath from the nose. The number of breaths can be recorded

for 15 or 30 seconds and then multiplied by four or two to calculate the respiration rate per minute.

Producers can perform a secondary exam if they are suspicious that a cow may be becoming ill, and want to re-examine her before the next scheduled fresh cow exam. Additional observations and notes from that secondary exam are particularly helpful if there are multiple people performing the fresh cow exams so that each person knows specific observations of the person who did the check the day before.



**Fresh Cow Evaluation Sheet**

Days 1-21										
Cow no. _____										
DIM	Behavioral score	Manure score	Rectal temperature (°F)	Rumen fill score	Respiration rate (breaths/ min)	Uterine score	Feed intake	Additional observations	Notes from secondary exam	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										

## **Disease Records**

The following sheets can be used for recording additional information on each animal if a disease is detected. The scoring systems explained in the above sections can be used to place an objective score on each clinical event. Accumulation of these records will indicate if there is a herd problem. Your veterinarian and nutritionist can also evaluate these records and determine whether changes need to occur in the ration or in preven-

tive health measures. They also keep track of treatment and withdrawal times, making antibiotic use easier to follow and monitor.

## **Conclusions**

Fresh cow health and preventive disease measures are some of the most important aspects to a dairy farm. Starting a cow off on the right hoof is imperative for a successful lactation where all cows are meeting or exceeding their full

potential. Examining animals daily in their fresh period will enable producers to notice subtle changes in a cow's behavior. Keeping records of all the illnesses occurring on the farm will help producers objectively evaluate where there is room for improvement in fresh cow care and disease prevention. Disease prevention can save time and money and can improve overall cow well-being.











## References

- Bradley, A. J. and M. J. Green. 2001. Aetiology of clinical mastitis in six Somerset dairy herds. *Vet. Rec.* 148(22):683-686.
- Burfeind, O., P. Sepúlveda, M.A.G. von Keyserlingk, D.M. Weary, D.M. Veira, and W. Heuwieser. 2010. Technical note: Evaluation of a scoring system for rumen fill in dairy cows. *J Dairy Sci.* 93(8):3635-3640.
- Kelton, D.F., K.D. Lissemore, and R.E. Martin. 1998. Recommendations for recording and calculating the incidence of selected clinical diseases of dairy cattle. *J Dairy Sci.* 81(9):2502-2509.
- LeBlanc, S.J. 2008. Postpartum uterine disease and dairy herd reproductive performance: A review. *Vet. J.* 176(1):102-114.
- The Merck Veterinary Manual. 2011. C. M. Kahn, ed. Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Whitehouse Station, NJ.
- Sheldon, I.M., G.S. Lewis, S. LeBlanc, and R.O. Gilbert. 2006. Defining postpartum uterine disease in cattle. *Theriogenology* 65: 1516–1530.
- Zaaijer, D. and J.P.T.M. Noordhuizen. 2003. A novel scoring system for monitoring the relationship between nutritional efficiency and fertility in dairy cows. *Irish Veterinary Journal.* 56(3) 145-156.