

Transition health – tools for your toolbox

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Abstract

There is an urgent need for dairy practitioners to become more involved in managing the health of transition dairy cows on many large dairies. Veterinarians can become involved at the level of properly diagnosing and treating disease and at the level of disease prevention. Specific tools that veterinarians can use include objectively monitoring transition-cow health with an emphasis on monitoring early lactation death loss, getting into post-fresh pens to observe disease diagnosis and treatment, evaluating on-farm euthanasia procedures, evaluating handling and care of downer cows, encouraging proper recording and monitoring of transition-cow diseases, using on-farm data to identify risk factors for disease, and intensively monitoring key health outcomes such as hypocalcemia, ketosis, and lameness. The veterinarian's role in transition cow health monitoring may be enhanced by establishing ongoing monitoring programs, which provide longer-term involvement than troubleshooting only.

Key words: transition cow health, nutrition, disease recording, disease monitoring, fresh pen evaluations

Résumé

Il existe un urgent besoin d'intégrer les praticiens des fermes laitières dans la gestion de la santé des vaches en transition dans plusieurs grandes fermes laitières. Les vétérinaires peuvent s'impliquer avec un bon diagnostic et un bon traitement des maladies et en prévenant les maladies. Les vétérinaires possèdent de bons outils pour atteindre ce but incluant la surveillance objective de la santé des vaches en transition avec l'accent sur la surveillance de la mortalité en début de lactation, l'observation du diagnostic et du traitement des maladies dans les enclos de vaches récemment vèlées, l'évaluation des procédures d'euthanasie à la ferme, l'évaluation de la manipulation et des soins pour les vaches à terre, l'encouragement à faire de bons relevés et une surveillance méticuleuse des maladies des vaches en transition, l'utilisation des données de la ferme pour identifier les facteurs de risque pour la maladie, et la surveillance intensive d'indicateurs de santé importants comme l'hypocalcémie, l'acétonémie et la boiterie. Le rôle du vétérinaire au niveau de la surveillance de la santé des vaches en transition peut s'élargir en établissant

des programmes de surveillance continus qui favorisent l'implication à plus long terme plutôt que le dépannage.

Veterinarians' Role – Restoring Sick Cows to Health and Productivity

Early lactation death loss in dairy herds is about 2.5% in the first 30 days-in-milk (DIM), and 3.2% in the first 60 DIM.^a About half of all death loss occurs in the first 60 DIM. Overall death loss for any stage of lactation in US herds is about 6%, based on the January 2007 dairy cow inventory.¹⁶ Overall death loss has been increasing steadily in US dairy herds: the National Animal Health Monitoring System reported a 5% death loss for the January 2002 dairy cow inventory,¹⁵ and only 4% for the January 1996 inventory.¹⁴ Recent dairy cow mortality rates are alarming, particularly given that more than 50% of all dairy cow mortality is estimated to be attributable to causes that could be mitigated with proper management.¹¹

Many owners of large dairies have decided that they are capable of managing transition-cow health on their own, despite the fact that early lactation mortality is already too high and is increasing. I commonly find dairies utilizing disease diagnosis and treatment protocols that were derived with minimal to no input from a veterinarian. Many times, these protocols are passed from a herd worker on one dairy to a herd worker on another dairy. The potential value of veterinarians in establishing protocols and overseeing transition-cow health is not apparent to these dairy producers.

A herd situation that illustrates the potential value of veterinarians working directly in fresh pens is presented in Table 1. This herd of about 3,500 cows contracted a local veterinary clinic to conduct nearly all (6 days per week) of the fresh cow disease diagnosis and treatment on the farm. Note that although this herd has many indicators of fresh-cow health problems, including a high overall turnover rate, very low transition cow index (TCI↓), and a moderate rate of displaced abomasum, it has a surprisingly low death loss (1.6%) before 60 DIM. It is reasonable to expect this herd's death loss to be no better than average, which is about 3.2% for the first 60 DIM. Thus, the veterinary involvement in this herd equals about 1.6% of the herd (56 cows) saved per year. If the direct cost of each dead cow is about \$1,500, then the return to the dairy for veterinary service is \$84,000 per year only for the cows saved. This ignores

Table 1. Herd description and indicators of transition cow health in a dairy herd utilizing veterinarians to diagnose and treat early lactation cows. The herd milks approximately 3,500 cows, milks 2 to 3 times daily (depending on stage of lactation), and does not supplement with rbST.

Measure	Herd result	Percentile ¹
Rolling herd average, lb/cow/year	22,900 lb	55th
Turnover rate ↑ 60 days-in-milk, %	9.6%	30th
Displaced abomasum, % of average herd size	5.1%	70th
Transition cow index (TCI↓), lb/cow/305 days	-1,155	<10th
Death loss ↑ 60 days-in-milk, %	1.6%	90th

¹ Approximate percentile among Upper Midwest dairy herds, based on DHI benchmarks and clinical experience of the author. A higher percentile represents better herd performance.

other benefits of improved transition-cow health, such as increased milk yield and improved reproductive performance later in lactation. It is clear that the contributions of veterinarians in managing fresh-cow health have been drastically undervalued by many dairy producers.

Specific Tools for Diagnosing and Treating Transition Cow Diseases

Monitoring Early Lactation Death Loss

Even herds with poor records are likely to have information about death loss and DIM at death. It is important to establish a uniform definition of death loss. I define death loss as any cow leaving the farm for less than full slaughter value. By using this definition, cows euthanized on the farm and cows condemned at slaughter are correctly included in the death loss calculation.

A reasonable goal for death loss before 60 DIM is <2% of average herd size per year. Well-managed, high-producing herds often achieve early lactation death loss below 1%.

It is ideal that accurate reasons for death loss be recorded by the producer. If the herd veterinarian actively monitors herd death loss and the reasons, then it becomes more likely that the producer will accurately record this information.

Performing Necropsies on Dead Cows

The importance of accurately determining the cause of death in dairy cows has been clearly demonstrated.¹⁰ Simply performing necropsies and raising awareness of the importance of mortalities may be the most fundamental step toward controlling its progression.¹¹

Creating a Regular Presence in the Post-Fresh Pens

There is no substitute for direct involvement of veterinarians in the post-fresh pens of dairy herds. Much of the correct diagnosis and treatment of fresh-cow disease is based on subjective criteria. It is essential that these

criteria be observed and critically evaluated while the veterinarian and fresh-cow worker discuss them in the context of an individual cow. Many workers in fresh pens can give the ‘textbook’ answer for how they diagnose and treat sick cows. The challenge to the veterinarian is to determine how they actually do it in the fresh pens.

Besides a lack of formal training in dairy cow health, workers in fresh pens have the additional disadvantage of only seeing cattle within their own herd. Management scenarios or individual cow conditions that they see routinely may become ‘normal’ to them. It takes a veterinarian who has formal training plus experience in many different herd settings to provide an adequate and critical appraisal of how the fresh cows are being managed, diagnosed, and treated. Conversely, veterinarians should convey respect for the large number of sick cows a worker may observe on a large dairy. Veterinarians should also note that workers on a single dairy have the ability to follow every sick cow through to her final outcome.

Few dairy producers will ask their veterinarians to become involved in evaluating their fresh-cow diagnostic and treatment protocols. Instead, dairy veterinarians may need to proactively promote our ability to reduce early lactation death loss, and request the opportunity to observe fresh pen diagnosis and treatments. It may be possible to schedule fresh pen observations in conjunction with existing herd reproductive checks.

It has been my experience that veterinarians need to be present in the fresh pens at least once a week in order to maintain current knowledge of fresh-cow health and the quality of the diagnostic and treatment protocols being used by the fresh pen workers. This weekly involvement in the fresh pen should be done alongside the regular fresh pen workers. Sometimes dairy managers see the veterinarian’s weekly visits as an opportunity to let the veterinarian do all of the fresh pen work that day, freeing up on-farm personnel to do something else. This approach defeats much of the purpose of having veterinarians involved in the fresh pens.

Evaluating Diagnostic and Treatment Protocols for Common Fresh Cow Diseases

The Food Animal Production Medicine Section at the University of Wisconsin-Madison has conducted more than 100 detailed fresh pen evaluations on large dairy herds. In the process of doing this, we have established a number of criteria that represent excellent health management by on-farm personnel. Note that these criteria are intended to be applied to fresh pen diagnosis and treatment by non-veterinarian workers from the farm. These criteria must, by necessity, be relatively simple and quick to evaluate. Veterinarians diagnosing and treating sick cows are afforded more time and have a different skill set than on-farm workers. Thus, it is reasonable for veterinarians to use different and more sophisticated criteria to diagnose and treat sick fresh cows.

The fresh pen evaluation process starts by determining how the on-farm personnel screen cows to determine which ones require additional evaluation. The best approach is to evaluate cows based on attitude and appetite. An evaluation of cow attitude is subjective and includes noticing the cow's posture, ear carriage, eyes, and behavior. These skills should be developed and encouraged in fresh pen workers.

For group-housed cattle, the fresh pen must be locked up once a day (preferably to fresh feed after the first milking of the day) in order to evaluate attitude and appetite. This obviously requires that there be enough bunk space (>30 inches (>75 cm) per cow) so that all of the cows can eat at once. Cows can be expected to use only 80% of available headlocks when the headlocks are 24 inches (61 cm) wide. After all cows are back from the parlor, individual cow feed intakes and attitude can be evaluated by walking down the front of the cows. Cows needing additional evaluation can be noted at this time.

Physical facilities for fresh cows are often the first limiting factor in optimizing fresh-cow health. For example, workers on herds without headlocks or without adequate bunk space in their post-fresh pens cannot evaluate individual cow appetites or easily examine cows identified as sick. Some herds utilize palpation rails for fresh-cow diagnosis and treatment; however, it is impossible to evaluate individual cow appetites from a palpation rail. Additionally, it is very difficult to adequately examine and treat cows standing in a palpation rail. Likewise, it is difficult for both the cow and the fresh pen worker when individual cows must be moved to a chute for diagnosis and treatment. A pen with adequate bunk space and headlocks is the only option that works well for fresh-cow disease diagnosis and treatment.

It is important that fresh cows be locked up less than 1 hour per day for diagnosis and treatment. Sufficient labor must be dedicated so that the fresh pen work

can be accomplished within this time period. Groups of cows within a single segment of head locks can be released as soon as they are evaluated and treated. Some headlock systems are designed to allow selected cows to remain locked up after all of the others are released. If necessary, cows requiring more extensive examination or more lengthy treatments may be moved to a separate treatment area with individual cow restraint.

Once cows have been evaluated from the front for attitude and appetite, they should then be evaluated and examined (if necessary) as the worker enters the pen and walks behind the cows. The left paralumbar fossa is an excellent site to evaluate for rumen fill, which is a general indicator of appetite as well. Encourage fresh pen workers to palpate this area if it does not appear to be normal.

Milk production can be used as an adjunct to evaluating cow attitude and appetite. However, much of the time it appears that milk yield in sick, early lactation cows decreases 2 or 3 days after the onset of disease. It should be the goal of the fresh pen workers to detect sick cows before their milk yield drops. Still, it is useful to evaluate milk yield, either as pre-milking udder fill or as daily milk weight deviations, as a part of the evaluation of the fresh cows. However, veterinarians should be diligent to discourage fresh pen workers from relying on milk yield alone as a means of detecting sick cows.

Once sick cows are identified, fresh pen workers should perform a limited physical exam on the cows. This should include a thorough evaluation of the left paralumbar fossa, auscultation for a displaced abomasum (DA), evaluation for vaginal discharges, evaluation for mastitis (recognizing that this is best done in the parlor, but may not always be adequately done there), a cowside ketone test (blood, milk, or urine test), rectal temperature, and evaluation of respiratory rate and effort. Details about these evaluations are presented in the following paragraphs.

Veterinarians should take the initiative to train on-farm personnel to correctly auscultate a DA. This starts with a careful evaluation of the left paralumbar fossa. About half of all cases of left displaced abomasum (LDA) can be presumptively diagnosed by noticing that the rumen is pushed away from the left body wall, and that the last rib may be sprung outward. Auscultation of the typical pinging sound then confirms the diagnosis. Do not assume that on-farm workers have good auscultation skills; continually evaluate these skills and make sure that they spend adequate time checking for a DA in suspect cows.

Fever is defined as rectal temperature $\geq 103.0^{\circ}\text{F}$ (39.5°C), or if $\geq 1.5^{\circ}\text{F}$ (-16.9°C) above group average temperature during heat stress. Not all fresh cows need to have their temperature evaluated, only those cows already identified as being sick. The presence of

fever alone should not automatically trigger a decision to initiate antibiotic treatment. There must be some other abnormality in the cow (hopefully leading to a diagnosis) before antibiotics are administered. Cows with a moderate fever exhibiting no other clinical signs can be evaluated again the next day.

An evaluation of respiration should include noticing cows with an elevated respiratory rate, nasal discharge, and increased expiratory effort. Bronchopneumonia causes increased expiratory effort. In contrast, cows undergoing heat stress will exhibit thermal panting with increased inspiratory effort but normal expiratory effort.

The best cowside test for ketosis is a handheld meter^b that measures blood beta-hydroxybutyric acid (BHBA) from a small drop of blood. This blood should be collected from the tail vein only; blood from the mammary vein contains altered proportions of BHBA and acetoacetate.⁴ The cowside blood BHBA system has excellent sensitivity and specificity for diagnosing ketosis.³ Cows with ≥ 1.2 mmol/L blood BHBA should be treated for ketosis. Urine test strips and milk cowside test strips for BHBA can be used for cowside ketosis testing. These tests have somewhat lower sensitivity and specificity for diagnosing ketosis.¹²

Early detection and treatment of ketosis has been clearly shown to decrease the risk for DA, decrease the risk for early lactation culling, and increase early lactation milk production.^{6,7} The best approach for the intensity of ketosis detection and treatment depends on the existing incidence of ketosis in the herd. For herds with a typical incidence of ketosis (15 to 50% of cows affected), the best economic benefit was achieved evaluating blood BHBA for all cows twice between 3 and 9 DIM.⁹

Fresh pen workers should be taught to evaluate cows for dehydration using the skin tent test in the neck region. Cows with a slow skin tent response (> 2 seconds) may be dehydrated and require oral electrolyte administration or additional treatments for toxemia.

Specific criteria for diagnosing and treating 7 common fresh-cow diseases are listed in Table 2. Although clinical mastitis may be detected and treated in the fresh pen, it is usually detected and treated in the parlor, and thus is not included in this list of fresh cow diseases. The diagnostic criteria listed for each disease are based on the system described above for screening and examining cows. Keep in mind that these criteria are meant for non-veterinarians working in the fresh pens. They are relatively simple, quick, and repeatable systems. They assume a veterinarian's opinion is available for atypical, severe, or non-responsive cases.

Evaluating the Handling of Downer Cows and Euthanasia

The subject of handling downer cows and euthanasia is a difficult one. Dairy producers rely on veterinarians to provide input and evaluation of these issues, yet producers rarely ask for assistance with them. Veterinarians should be proactive in asking dairy producers how they handle downer cows or cows needing euthanasia, and offer to provide assistance and training as needed. Approved methods of euthanasia in dairy cattle have been published.¹ Depending on the method of euthanasia chosen on a farm, it may be prudent for veterinarians to participate in euthanasia to make sure that the producer is comfortable with the procedure and is carrying it out correctly.

Veterinarians' Role – Monitoring and Preventing Transition Cow Diseases

Besides promoting accurate diagnosis and good treatment for transition cow diseases, veterinarians also need to be involved in direct monitoring and prevention of these diseases. The general principles of preventing transition cow diseases include providing adequate eating space, adequate resting space, excellent nutritional management, and good vaccination protocols. In addition to these prevention strategies, veterinarians may also use each herd's own data to objectively monitor transition cow performance, identify potential risk factors for disease, and to identify high-risk cows within the herd.

Specific Tools for Preventing Transition Cow Diseases

Evaluating Herd Disease Recording

Once a veterinarian is thoroughly familiar with a herd's disease diagnostic and treatment protocols, it is appropriate to then evaluate the integrity of the recording systems used for these on the farm. The current state of disease recording on US dairies is disappointing.¹⁹ It is important that dairy producers record all cases of disease, even if they are mild and untreated. It is also important that disease treatments be distinguished from disease diagnoses in the herd records. Finally, it is essential that cows removed from the herd (sold or died) due to a disease event also have a separate disease event recorded in their record. A detailed summary of the criteria necessary for good disease recording is available online.¹⁸

Identifying Risk Factors for Health Events

Once disease events have been properly recorded on a dairy for about a 1-year time period, veterinarians

Table 2. Diagnostic and treatment protocols for 7 common diseases in early lactation dairy cattle. These protocols are intended for non-veterinarian workers in fresh pens and assume that a veterinarian is available to diagnose and treat atypical, severe, or non-responsive cases.

Disease	Diagnostic protocol	Treatment protocol
Pneumonia	2 or more of the following: cough, colored nasal discharge, or fever ¹	There are numerous on-label choices for pneumonia treatment. Examples include Excenel®RTU (1.0 mg/lb subcutaneously once a day for 3 days) or Polyflex® (2 to 5 mg/lb IM once daily for up to 7 days).
Clinical milk fever	Typically lactation 2+ cows just before or <48 hr after calving; normal udder secretions; cold ears; shuffling of feet; quiet heart sounds with rapid heart rate; muscle tremors / fasciculations; mild hypothermia; loss of anal and tail tone; weakness; ataxia that progresses to sternal recumbency (Stage 2) or lateral recumbency and coma (Stage 3)	Stage 1: oral calcium supplement (2 doses 12 hours apart) Stage 2 or 3: collect pre-treatment blood sample; administer 500 mL 23% Ca gluconate (10.8 g Ca) IV; administer the IV slowly while monitoring heart rate; give oral calcium supplement (2 doses about 12 hours apart) after cow is up and alert to reduce the risk for a hypocalcemic relapse
Metritis	Cows between about 5 and 10 days-in-milk with a brown, serous, or foul-smelling vaginal discharge plus 1 or more of the following: fever ¹ , decreased appetite, or decreased milk yield	There are several on-label choices for metritis treatment. Examples include Excenel®RTU (1.0 mg/lb subcutaneously once a day for 5 days) or Excede® (3.0 mg/lb subcutaneously in the ear, repeated in the opposite ear about 72 hours later).
Ketosis	Early lactation cow with decreased appetite, decreased milk yield, rapid body condition loss, no other disease condition found; confirmed by a positive cowside ketosis test (preferably the Precision Xtra↓ blood BHBA test)	If blood BHBA 1.2 to 2.9 mmol/L: administer 240 to 300 mL oral propylene glycol or glycerol (or 1 lb calcium propionate) once daily; If blood BHBA ≥ 3.0 mmol/L: administer 250 mL 50% dextrose IV once, followed by oral glucose precursor as above; continue treatment until blood BHBA is <1.2 mmol/L
Displaced abomasum	Early lactation cow with decreased appetite, decreased milk yield, decreased rumen fill, rumen pushed away from left body wall, last rib pushed out, characteristic high-pitched ping heard during auscultation	Use DVM for surgical correction.
Enteritis	Severe diarrhea (may be bloody) plus increased rectal temperature initially and dehydration (slow skin tent response)	Oral rehydration (10 to 15 gallons of an electrolyte solution orally); consult with DVM for possible antibiotic treatment.
Toxemias (metritis, enteritis, or pneumonia)	Signs of the underlying metritis, enteritis, or pneumonia, plus dehydration (slow skin tent response), rapid heart rate, either hyperthermia (>104°F) or hypothermia (<100°F), weakness progressing to sternal recumbency.	Appropriate treatment for the underlying metritis, enteritis, or pneumonia, plus 2 L hypertonic saline IV followed by oral water (drink or pump), and flunixin meglumine (0.5 mg/lb IV, 1 treatment only), and oral rehydration solution (15 gallons pumped orally)

¹Fever is defined as rectal temperature ≥103°F, or if ≥1.5°F above group average during heat stress.

may identify risk factors for specific diseases that are a problem within the herd. Herd-health events and basic data can be downloaded from the herd records system in a text file format that can then be uploaded into a spreadsheet or statistics program. The risk for specific diseases of concern can then be evaluated by time (usually month of calving), parity (usually compressed into first, second, and third or greater lactation groups),

single birth vs twin births, dry period length, gestation length, previous lactation length, and perhaps other factors specific to the farm. Analysis of the disease data for these risk factors may reveal underlying deficiencies in herd management. These analyses may also allow the dairy producer to identify high-risk cows immediately after calving, and then to allocate special management (e.g., prophylactic treatments, a different post-fresh

group, or a different milking frequency) to cows at the highest risk for post-calving difficulties.¹⁷

Monitoring Ketosis Prevalence

Rigorous herd monitoring for ketosis prevalence (blood BHBA ≥ 1.2 mmol/L) can be particularly beneficial in many dairy herds. The average prevalence of ketosis in early lactation dairy cows is about 15%. A reasonable goal for dairies is $<10\%$ prevalence. The peak incidence and prevalence of ketosis is at 5 DIM.⁸ The incidence of ketosis in a herd is about 2.4 times its prevalence.¹²

The prevalence of ketosis can vary considerably within a herd over time (Figure 1). The optimal strategy for early detection and treatment of ketosis depends upon the pre-existing incidence of ketosis in the herd.⁹ Additionally, knowing the current ketosis prevalence in the herd also provides relevant information about transition cow management and nutrition.

Monitoring Hypocalcemia Prevalence

Hypocalcemia around the time of calving is an important gateway disease that increases the subsequent risk for metritis, ketosis, and displaced abomasum. A cutpoint of about 8.6 mg/dL total calcium around the time of calving has been established.^{2,5} Over 50% of second and greater lactation cows will likely have hypocalcemia at this cutpoint, even when anionic salts are fed to create an acidogenic diet.⁵ Without anionic salts, the prevalence of hypocalcemia will be over 60%.^c Perhaps the greatest value of monitoring herds for hypocalcemia is demonstrating to herd owners that hypocalcemia is a very prevalent problem that deserves additional management attention. Routine oral calcium supplementation in bolus form^d around calving has been shown to be beneficial for many cows.¹³

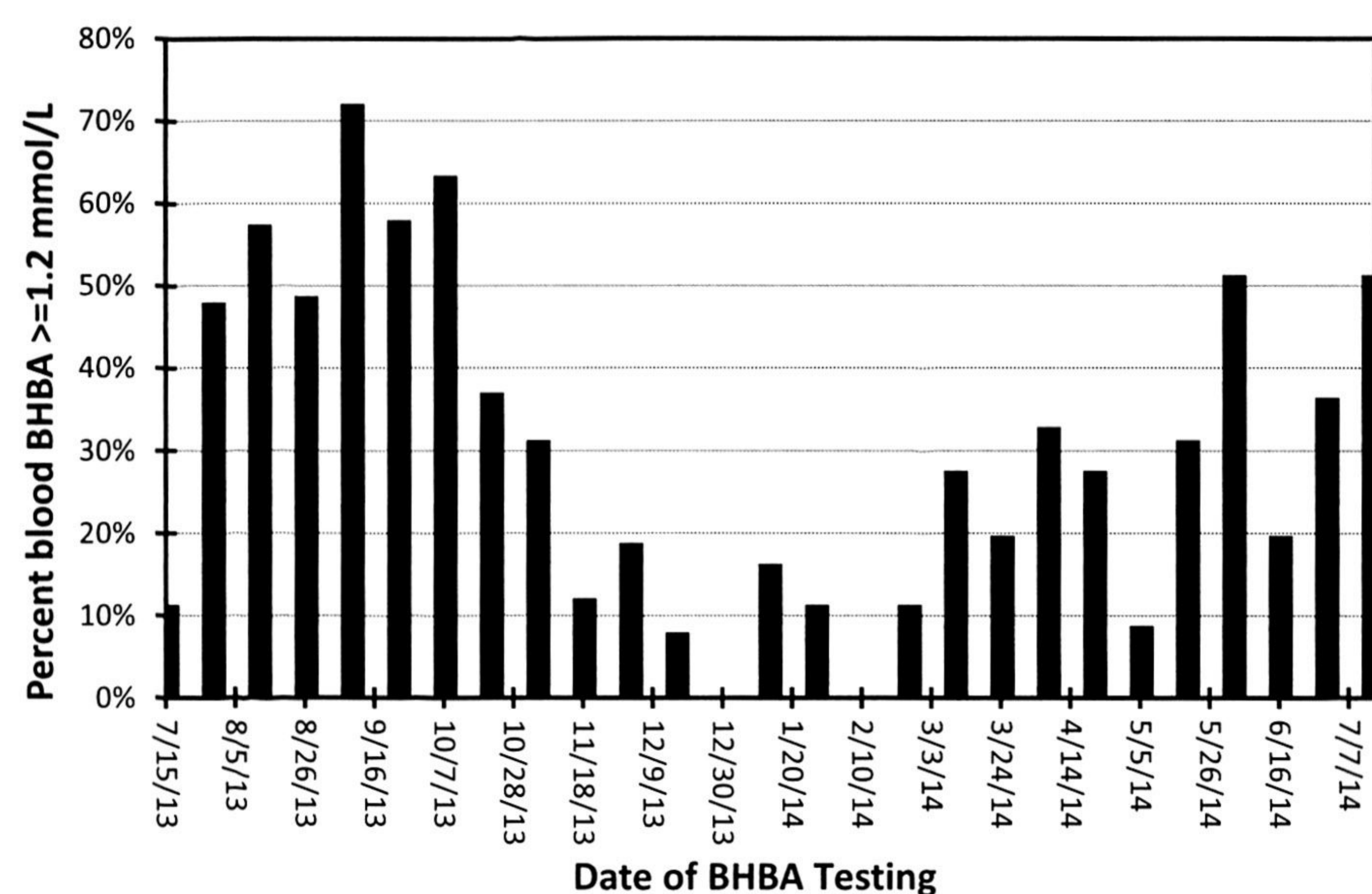


Figure 1. Prevalence of ketosis (blood BHBA ≥ 1.2 mmol/L) in a dairy herd that tested approximately 20 cows once a week during a 1-year time period; data are pooled into 2-week time intervals.

Monitoring Lameness Prevalence in Pre-Fresh Cows

Lameness is often a chronic condition that affects post-calving performance in dairy cows. The pre-fresh time period is an ideal time to monitor herd prevalence of lameness. All cows must pass through the pre-fresh group, although for just a short time period. This makes it most practical to assess the prevalence of lameness at this time. Cows identified as lame should be evaluated and trimmed prior to calving. After calving, they might be handled differently than non-lame cows.

Monitoring vs Troubleshooting Transition Cow Health Problems

Ongoing monitoring of transition cow health problems presents more long-term opportunities for veterinarians than does troubleshooting existing problems. Monitoring creates regular opportunities for veterinarians to become involved in transition cow health and to proactively solve problems as soon as they appear. Troubleshooting typically involves dairy producers calling veterinarians in for assistance only after a problem has persisted for a while. If the veterinarian corrects the problem, then in the producer's thinking there may be no need to utilize the veterinarian again until another problem arises.

Conclusions – Implementation of Transition Cow Tools

It is unlikely that a dairy herd would wish to implement every one of these transition cow tools at once. Different aspects of a transition cow health program can be implemented as herd problems dictate and as the dairy producer is willing to pay for veterinary services. It often works best for veterinarians to look for opportune times to offer these services to clients.

Endnotes

- ^aOetzel, unpublished data from 91 herds, 2014
- ^bPrecision Xtra[↓] Ketone Monitoring System, Abbott Laboratories, Abbott Park, IL
- ^cOetzel, unpublished data, 2014
- ^dBovikalc[®], Boehringer Ingelheim Vetmedica, St. Joseph, MO

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