The Alberta Dairy Hoof Health Project is one of several projects launched under Alberta Milk’s Healthy Dairy Herds Initiative. Financial support from the following entities is gratefully acknowledged:

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Additional copies of this guide and risk assessment questionnaires as well as factsheets and research articles about dairy cattle hoof health are available on the project website: http://www.hoofhealth.ca.
Introduction to the On-farm Lameness Risk Assessment User Guide

Lameness is the dairy industry's most visible and costly animal welfare issue and the launch of Dairy Farmers of Canada's (DFC's) proAction Animal Care module has brought lameness into much sharper focus for many dairy farmers. A prominent feature of the Animal Care module will be mandatory third-party assessments of animal injury, body condition and lameness in all Canadian dairy herds every two years.

Defining Lameness
Lameness is a clinical sign of discomfort or pain as an animal walks. It is characterized most simply as a limp but is variously referred to as impaired locomotion, abnormal gait or reduced mobility. Lameness severity is commonly assessed using one of several systems of locomotion, gait or mobility scoring. The system recommended in Canada's Code of Practice for the Care and Handling of Dairy Cattle is outlined in the table below. A full description of the system is available on the project website: [http://www.hoofhealth.ca](http://www.hoofhealth.ca). For the purposes of proAction Animal Care lameness assessments, scores of 1 and 2 are acceptable; 3 requires monitoring; 4 and 5 require corrective action.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sound Smooth and fluid movement</td>
<td>• Flat back when standing and walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No swinging out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Symmetrical gait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All legs bear weight equally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joints flex freely</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hind-hooves track up to fore-hoof prints</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Head carriage remains steady as the animal moves</td>
</tr>
<tr>
<td>2</td>
<td>Ability to move freely not diminished</td>
<td>• Flat or mildly arched back when standing and walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimal swinging out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slightly asymmetric gait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All legs bear weight equally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joints slightly stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hind-hooves do not track up perfectly but shortened strides are uniform</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Head carriage remains steady</td>
</tr>
<tr>
<td>3</td>
<td>Capable of locomotion but ability to move freely is compromised</td>
<td>• Flat or mildly arched back when standing, but obviously arched when walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Swinging out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Asymmetrical gait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slight limp can be discerned in one limb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joints show signs of stiffness but do not impede freedom of movement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hind-hooves do not track up and strides may be shortened</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Head carriage remains steady</td>
</tr>
<tr>
<td>4</td>
<td>Ability to move freely is obviously diminished</td>
<td>• Obvious arched back when standing and walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Swinging out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Asymmetrical gait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reluctant to bear weight on at least one limb but still uses that limb in locomotion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Strides are hesitant and deliberate and joints are stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hind-hooves do not track up and strides are short</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Head bobs slightly as animal moves</td>
</tr>
<tr>
<td>5</td>
<td>Severely Lame Ability to move is severely restricted Must be vigorously encouraged to stand and/or move</td>
<td>• Extreme arched back when standing and walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Swinging out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Asymmetrical gait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inability to bear weight on one or more limbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Obvious joint stiffness characterized by lack of joint flexion with very hesitant and deliberate strides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One or more strides obviously shortened</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Head obviously bobs as animal moves</td>
</tr>
</tbody>
</table>

source: University of BC Dairy Education and Research Centre, Animal Welfare Program
Past research and on-farm experience has made it clear that most producers significantly underestimate the level of lameness in their herds. A recent DFC-sponsored project that examined cow comfort and lameness in Alberta, Ontario and Québec dairy herds found that, across all 82 Alberta herds surveyed, 19% of cows were lame; within-herd lameness prevalences ranged from 2% to 69%.

Causes of Lameness
Lameness can be caused by a number of different injuries and hoof lesions, although hoof lesions are by far the most common cause. The Alberta Dairy Hoof Health Project (2009-12) identified digital dermatitis (DD) as the most common hoof lesion among 40,000+ cows in 158 Alberta dairy herds, accounting for 40% of all lesions recorded. DD, commonly called ‘hairy heel warts’, ‘Mortellaro’s disease’ or ‘strawberry foot rot’ is a contagious infection caused by bacteria that thrive in moist, low-oxygen (anaerobic) environments such as manure and wet, contaminated bedding. Due to lax biosecurity, DD has spread rapidly throughout the world dairy industry since it was first identified in Europe in the 1970s.

Next in order of prevalence in the Alberta project were four lesions related to ‘claw horn disruption’ (CRD): sole ulcer, white line lesion, sole hemorrhage and toe ulcer. Together these accounted for 43.8% of all lesions recorded. Traditionally, these lesions were thought to result from feeding high-energy diets, leading to ruminal acidosis and laminitis—inflammation of the small blood vessels in the claw-forming tissue of the hoof. More recent research evidence suggests that events around calving may cause structural changes in tissues that suspend the pedal bone inside the hoof or in the digital fat pad that provides a cushion under the bone.

Lameness Risk Assessment
The primary objective of this project is to help dairy farmers to reduce the prevalence of lameness in their herds by working with their management teams (veterinarians, hoof trimmers, nutritionists) to identify specific lameness risk factors in their facilities and management practices. The lameness risk assessment questionnaire (RAQ) provides a focus for the producer and his/her veterinarian to identify facility and management factors that pose the greatest risk for injury and/or infection, allowing recommendations for improvement to be developed and documented in a Lameness Reduction Management Plan (LRMP). Scored responses to RAQ questions facilitate evaluation of the efficacy of the LRMP when revisited in subsequent years.

This User Guide has been developed to assist veterinarians to consistently conduct a lameness risk assessment as objectively as possible. Use of the RAQ will facilitate a frank discussion with the herd owner leading to development of a farm-specific LRMP. This process will:

- ensure that management practices affecting lameness are thoroughly assessed;
- guide the herd veterinarian and herd owner in discussing lameness risks in a manner specific to that herd and relative to current farm management practices;
- focus discussion and recommendations for improvements in facilities and farm management that will yield the most cost-effective results for the herd owner’s efforts;
- provide a method to objectively evaluate changes in herd management over time through periodic reassessment.

How to Conduct a Risk Assessment
Keeping in mind biosecurity measures that minimize iatrogenic spread of pathogens, the general way to proceed with the on-farm risk assessment is as follows.

With the risk assessment questionnaire on a clipboard, the veterinarian should tour the farm with the herd owner in the following order:

- Pregnant replacement heifers;
- Dry and close up cows;
- Lactating herd.

Assess the facility where each animal group is spending most of their time on the day of your visit. Do not be concerned about facilities used on other days or in other seasons.

† It should be noted that although heel erosion is probably the most prevalent hoof lesion among dairy cattle raised in confinement, this lesion appears to have little effect on locomotion and can be readily trimmed away. Therefore, it is not commonly recorded by hoof trimmers.
All the questions for each animal group should be considered, objectively scoring each in relation to the owner or herdsman’s answers and the veterinarian’s observations. An example of a completed section of the RAQ is shown below.

Section 5: Management Practices for Pregnant Heifers before First Calving

5.1 What percentage of pregnant heifers have their hooves examined and/or trimmed before calving?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>more than 80%</td>
<td>2</td>
</tr>
<tr>
<td>50 to 80%</td>
<td>2</td>
</tr>
<tr>
<td>less than 50%</td>
<td>2</td>
</tr>
<tr>
<td>0%</td>
<td>2</td>
</tr>
</tbody>
</table>

5.2 On average, how often are the hooves of a pregnant heifer trimmed?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>at least once, more than 1 month before calving</td>
<td>1</td>
</tr>
<tr>
<td>once, within 1 month of calving</td>
<td>1</td>
</tr>
<tr>
<td>never</td>
<td>3</td>
</tr>
</tbody>
</table>

5.3 How do you decide when to examine pregnant heifers for injuries or hoof lesions?

<table>
<thead>
<tr>
<th>Decision</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>when limping or at scheduled exam</td>
<td>1</td>
</tr>
<tr>
<td>only when an animal is seen to be limping</td>
<td>1</td>
</tr>
<tr>
<td>only at scheduled examination</td>
<td>3</td>
</tr>
<tr>
<td>animals are never examined</td>
<td>3</td>
</tr>
</tbody>
</table>

5.4 When cows are identified as lame or when a lesion is found, when are they treated?

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>immediately</td>
<td>2</td>
</tr>
<tr>
<td>within 1 week after detection</td>
<td>2</td>
</tr>
<tr>
<td>at next trimmer visit</td>
<td>2</td>
</tr>
<tr>
<td>not treated</td>
<td>2</td>
</tr>
</tbody>
</table>

5.5 Are dry cows and pregnant heifers housed together?

<table>
<thead>
<tr>
<th>Housing</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
</tr>
</tbody>
</table>

5.6 Are pregnant heifers introduced to higher dietary concentrate levels at least 2 weeks before calving to provide a smooth transition from close-up to lactation ration?

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
</tbody>
</table>

Total risk score for non-infectious causes of lameness based on pregnant heifer management: 10

Total risk score for infectious causes of lameness based on pregnant heifer management: 7

✓ Total the scores for each section of the RAQ and enter these on the first page.
✓ Total the scores from all sections to obtain a final score for the entire JDRA.
✓ Based on the answers given, the total and section scores, and the discussions during the assessment, develop a Lameness Reduction Management Plan (LRMP) (last page of RAQ) for the coming year.
✓ Complete the LRMP form by writing the recommendation(s) that both veterinarian and herd owner/herdsman agree are reasonable to implement within the next 12 months; both parties need to sign the form.
✓ If this is not the first lameness risk assessment completed for this herd, compare the results of the current RAQ with those of the previous RAQ(s). Look for evidence that the previous LRMP was implemented. Make a note if a recommendation was not implemented and discuss the reasons for not doing so.
✓ With the herd owner’s permission, send a copy of the completed RAQ and the LRMP addressed to:
  Steve Mason, Project Manager
  Alberta Dairy Lameness Reduction Initiative
  2508 Charlebois Drive NW
  Calgary AB T2L 0T6
  (403)284-5484
  steve@agromedia.ca

Both documents will be photocopied and copies will be returned to both the herd owner and veterinarian.
Background to Risk Assessment Questions

Section 1: General Farm Information

1.1 Date of last Hoof Health risk assessment (leave blank if this is the first RA) (yy mm dd): 

1.2 Type of housing for milking cows:  
- Free stall  
- Tie stall/Stanchion  
- Loose Housing

1.3 Type of milking system:  
- Tie stall / Pipeline  
- Herringbone Parlour  
- Parallel Parlour  
- Rotary Parlour  
- Tandem Parlour  
- Robot  
- Other ________________

1.4 Number of:  
- Lactating Cows: ______  
- Dry Cows: ______  
- Breeding Bulls: ______  
- Pre-weaned Heifer Calves: ______  
- Weaned to First Calving Heifers: ______  
- Bull Calves: ______

1.5 Is this herd on DHI?  
- Yes  
- No  

If yes, record the herd DHI number ________________

1.6 Average daily milk production per cow: ______ kg/cow/day

1.7 Does the farm have and regularly use its own trimming chute?  
- Yes  
- No

1.8 Which animals are hoof trimmed on a regular schedule?  
- Pregnant Heifers  
- Dry Cows  
- Lactating Cows  
- There is no regular trimming schedule

1.9 Who does the regular (scheduled) hoof trimming?  
- Farm Staff  
- Professional Trimmer

1.10 Who does the emergency hoof trimming?  
- Farm Staff  
- Professional Trimmer

Section 2. Farm Biosecurity Practices

2.1 In the past year, have external cattle been brought onto your farm?  
- No  
- Yes, from 1 source  
- Yes, from multiple sources

Introducing cattle from other herds is one of the primary sources of disease spread between farms.

2.2 If external cattle have been brought onto your farm, were the source herds free of digital dermatitis?  
- Yes  
- No or don’t know

Digital dermatitis (DD) is caused by a number of different bacterial species; the likelihood of these bacteria being introduced from a source herd is significantly reduced if that herd is free of the disease.

2.3 Do you require farm visitors to wear freshly-laundered, disposable or farm-supplied coveralls?  
- Yes  
- No

2.4 Do you require farm visitors to disinfect their footwear when they arrive on your farm or to wear disposable or farm-supplied footwear?  
- Yes  
- No

Clothing and footwear that appears clean may actually be contaminated with pathogenic organisms.

2.5 Are heifers (before first calving) ever exposed to manure from lactating or dry cows?  
- No  
- Yes

Manure from adult animals can contaminate heifer facilities with pathogenic organisms.
2.6  Does your hoof trimmer clean his chute and tools before entering your premises?

0  Yes  1  Don’t know  3  No

2.7  Does your hoof trimmer disinfect his tools after trimming each animal?

0  Yes  1  Don’t know  3  No

"Foot trimming equipment has been implicated as an important transmission route for DD treponemes, which were identified on the knife blade both before and after disinfection in some cases." (1)

Section 3: Animal-based Measures

From proAction Animal Care Assessment performed by third party on date (yy mm dd):

The proAction Animal Care Program requires that every Canadian dairy herd must have a certified third-party assessor examine a sample of the cattle in that herd every 2 years. Animals are assessed for body condition, hock, knee and neck injuries and lameness. All of these measures, except neck injuries, can affect an animal's mobility. If an assessment has not yet been done, skip questions 3.1 to 3.4. Otherwise, record the scores from the previous proAction Animal Care assessment.

3.1  % of assessed cattle scoring 'Requires Corrective Action' for Body Condition: ____ ____ %

0  less than 5%  1  5% to 15%  2  16% to 25%  3  more than 25%

A Cornell University study found digital cushion thickness (DCT) to be a strong predictor of lameness and DCT was highly associated with body condition score, increasing gradually as body condition score increased (2). In a Canada-wide study, the odds of lameness were 1.6 times greater in cows with low body condition score (≤2.5) than in cows with a higher body condition score (3).

3.2  % of assessed cattle scoring 'Requires Corrective Action' for Hock Injuries: ____ ____ %

0  less than 5%  1  5% to 15%  2  16% to 25%  3  more than 25%

In an Alberta study, injured hocks were associated with 1.4-fold increased odds of being lame (3). In a Canada-wide study, lame cows had 1.46 greater odds of hock injury than nonlame cows (5). Higher prevalence of hock injuries was also related to increased lameness in northeastern US dairy herds (4).

3.3  % of assessed cattle scoring 'Requires Corrective Action' for Knee Injuries: ____ ____ %

0  less than 5%  1  5% to 15%  2  16% to 25%  3  more than 25%

3.4  % of assessed cattle scoring 'Requires Corrective Action' or 'Monitor' for Lameness: ____ ____ %

0  less than 5%  1  5% to 15%  2  16% to 25%  3  more than 25%

As described on page 3, for the purposes of proAction Animal Care lameness assessments, scores of 1 and 2 are judged 'Acceptable'; 3 advises 'Monitor'; 4 and 5 'Requires Corrective Action'. However, if lameness mitigation is the goal, score 3 cows should be treated immediately to prevent their lameness from becoming more severe. If lameness assessment is reported as the number of assessed cattle in each lameness category (i.e., 1, 2, 3, 4, 5), calculate the percentage of lame cattle as the percentage scoring 3, 4 and 5, as follows:

\[
\text{Percent Lame} = \frac{(\text{score 3 cattle} + \text{score 4 cattle} + \text{score 5 cattle})}{\text{total number of cattle assessed}} \times 100
\]
Are hoof trimming records kept?

0 Yes (answer questions 3.5a and 3.5b) 3 No (go to section 4)

If the herd hoof trimmer uses a computerized hoof lesion recording system (e.g., Hoof Supervisor®), he will be able to provide data to answer the following questions. Encourage the producer to obtain these data before doing the risk assessment. Skip questions 3.5a and 3.5b if no data are available.

3.5a Percentage of all cows trimmed in the past year that were treated for the following claw horn lesions:
   Sole ulcer: ________ %  Sole Hemorrhage: ________ %  Toe Ulcer: ________ %
   White Line Lesion: ________ %  Total Claw Horn Lesions ________ %

Total Claw Horn Lesions:
0 less than 5% 1 5% to 15% 2 16% to 25% 3 more than 25%

3.5b Percentage of all cows trimmed in the past year that were treated for the following infectious claw lesions:
   Digital Dermatitis: ________ %  Interdigital Dermatitis: ________ %
   Foot Rot: ________ %  Total Infectious Claw Lesions ________ %

Total Infectious Claw Lesions:
0 less than 5% 1 5% to 15% 2 16% to 25% 3 more than 25%

Section 4: Facilities for Pregnant Heifers before First Calving

4.1 What type of facility are pregnant heifers housed in?
   0 pasture, corral or loose housing (no stalls) 2 tie stalls or free stalls

4.1a If loose housing (no stalls), what type of foundation (under bedding) are pregnant heifers housed on?
   0 stone-free ground, sand, bedded pack or pasture 1 rubber
   2 concrete 3 rough frozen or stoney ground N not applicable

Smooth, resilient walking surfaces are less likely to damage the hooves than hard, rough textured surfaces. Interpret ‘stone-free’ to mean relative free of protruding stones that might damage hooves.

4.2 On average, how deep is the bedding in loose housing areas or stalls?
   0 pasture or more than 10 cm (4 in) 1 6 to 10 cm (2.5 to 4 in)
   2 2 to 5 cm (1 to 2 in) 3 less than 2 cm (1 in)

It is generally accepted that deep bedding provides a comfortable lying surface that affects the lying behaviour of lame cows, influencing their recovery and thus decreasing the risk of lameness (3).

4.3 How wet is the bedding and/or ground in the pregnant heifer facility?
   0 dry 1 damp 2 moderately wet 3 very wet

Wet bedding softens hooves and provides an environment for proliferation of pathogens. Subjectively judge bedding wetness based on experience.
4.4 How slippery is the flooring or ground?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>not at all</td>
</tr>
<tr>
<td>1</td>
<td>slightly</td>
</tr>
<tr>
<td>2</td>
<td>moderately</td>
</tr>
<tr>
<td>3</td>
<td>very</td>
</tr>
</tbody>
</table>

Cows exposed to very slippery floors had 2 times the odds of being lame compared with cows exposed to nonslippery floors (3). Either subjectively judge floor slipperiness based on experience or assess by observing whether cows slip, slide or fall when walking.

4.5 Score the amount of dried manure on the outside of one hind leg of each of 10 heifers, referring to the sketches below:

<table>
<thead>
<tr>
<th>Heifer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
</table>

The amount of dried manure on the lower legs is an indicator of the cleanliness of the environment to which the animal is exposed. Results of a French study indicated cows had a 1.67 times risk (hazard ratio) of digital dermatitis when 25-49% of cows had a leg cleanliness score of 3; the risk increased to 2.44 times when 50% or more of cows had a leg cleanliness score of 3 (6).

4.6 Are pregnant heifers housed in loose housing (no stalls) moved to free-stalls or tie-stalls after calving (i.e., are they expected to immediately adapt to using stalls)?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

When heifers housed in stall-free loose housing during pregnancy are moved to free-stalls or tie-stalls after calving, they often spend an inordinate amount of time standing as they try to adapt to their new environment. Excessive standing time is a considered a risk factor for claw horn lesions leading to lameness (7).

Section 5: Management Practices for Pregnant Heifers before First Calving

5.1 What percentage of pregnant heifers have their hooves examined and/or trimmed before calving?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>more than 80%</td>
</tr>
<tr>
<td>1</td>
<td>50 to 80%</td>
</tr>
<tr>
<td>2</td>
<td>less than 50%</td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
</tr>
</tbody>
</table>

Pre-partum digital dermatitis (DD) in heifers significantly reduces post-partum milk production and reproductive performance (8). In an Alberta study, 14 of 28 farms examined had no detectable DD in their pre-calf heifers; in the other 14 farms, prevalence ranged from 1% to 17% (9).

5.2 On average, how often are the hooves of a pregnant heifer trimmed?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>at least once, more than 1 month before calving</td>
</tr>
<tr>
<td>1</td>
<td>once, within 1 month of calving</td>
</tr>
<tr>
<td>3</td>
<td>never</td>
</tr>
</tbody>
</table>

The more frequently an animal is examined and trimmed, the more likely it is a lesion will be identified (11).
5.3 How do you decide when to examine pregnant heifers for injuries or hoof lesions?

- [ ] when limping or at scheduled exam
- [x] only when an animal is seen to be limping
- [ ] only at scheduled examination
- [ ] animals are never examined

Early identification, recording and treatment of clinical cases, in association with routine trimming, is a critical aspect of digital dermatitis control (10). The same strategy will prevent mild claw horn lesions such as sole hemorrhages and white line separation from progressing to major sole ulcers and white line lesions.

5.4 When cows are identified as lame or when a visible lesion is seen, when are they treated?

- [ ] immediately
- [ ] within 1 week after detection
- [ ] at next trimmer visit
- [ ] not treated

Prompt treatment of lesions will prevent their development into more serious or chronic problems.

5.5 Are dry cows and pregnant heifers housed together?

- [ ] No
- [x] Yes

In a herd afflicted with infectious hoof lesions, dry cows are very likely to transmit pathogens to heifers through environmental contamination.

5.6 Are pregnant heifers introduced to higher dietary concentrate levels at least 2 weeks before calving to provide a smooth transition from close-up to lactation ration?

- [ ] Yes
- [ ] No

A rapid change from a high forage diet to a high concentrate lactation ration can cause digestive upset (e.g., acidosis) leading to metabolic disorders that can affect claw horn quality and the integrity of the suspensory apparatus of the hoof (commonly, but incorrectly, referred to as laminitis) (12).

---

### Section 6: Facilities for Dry Cows

6.1 What type of facility are dry cows housed in?

- [ ] pasture, corral or loose housing (no stalls)
- [x] tie stalls or free stalls

6.1a If loose housing (no stalls), what type of foundation (under bedding) are dry cows housed on?

- [ ] stone-free ground, sand, bedded pack or pasture
- [x] rubber
- [ ] concrete
- [ ] rough frozen or stoney ground
- [ ] not applicable

Hard, rough textured walking and standing surfaces increase the risk of hoof injury.

6.1b If loose housing (no stalls), how much area is provided for each dry cow?

- [ ] more than 120 ft² (11.2 m²)
- [ ] 100 - 120 ft² (9.3 - 11.2 m²)
- [x] less than 100 ft² (9.3m²)
- [ ] not applicable

High stocking densities result in cows spending more time standing. Excessive standing time is a considered a risk factor for claw horn lesions leading to lameness (7).

Area per cow = \( \frac{\text{number of animals in pen}}{\text{pen length} \times \text{pen width}} \)

If pen dimensions are not known by producer or measured, use best estimate.
6.1c If tie stalls or free stalls, what is the stall base (immediately under bedding)?

- 0 sand or soil
- 1 geotextile mattress or resilient mat (e.g., gel mat)
- 2 hard rubber or waterbed
- 3 concrete
- N not applicable

Hard, rough textured walking and standing surfaces increased the risk of hoof injury.

6.1d If free stalls, how do stall widths compare with the standards below?

- 0 equal to or greater than standard
- 3 less than standard
- N not applicable

6.1e If free stalls, how do stall bed lengths compare with the standards below?

- 0 equal to or greater than standard
- 3 less than standard
- N not applicable

<table>
<thead>
<tr>
<th>Free Stall Dimension Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Dry Cow Body Weight (lb/kg)</td>
</tr>
<tr>
<td>Measurement</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Ideally, stalls should be large enough to allow cows to lie down, rise and rest comfortably without contacting stall hardware (neck rail, brisket locator, bedding retainer or stall partitions) but not so large that cows can contaminate bedding with manure (13). It is generally accepted that comfortable stalls promote increased lying time which reduces the risk of hoof injury and contamination from manure-borne pathogens. In a Canadian study, wide stalls were associated with increased lying time (14).

Stalls may vary widely in size, therefore estimate dimensions of stalls that are representative of the majority of usable stalls. If there is no brisket locator, measure bed length from the rear edge of the neck rail to the rear curb.

6.1f If free stalls, what is the stocking density for dry cows?

\[
\frac{\text{Total number of dry cows: } \_ \_ \_ \_ \_}{\text{Total number of stalls: } \_ \_ \_ \_ \_} = \_ \_ \_ \_ \_ \text{dry cows per stall}
\]

- 0 less than 1
- 1 1 to 1.1
- 2 more than 1.1 to 1.2
- 3 more than 1.2
- N not applicable

High stocking densities result in cows spending more time standing. Excessive standing time is a considered a risk factor for claw horn lesions leading to lameness (7).

6.2 On average, how deep is the bedding in loose housing areas or stalls?

- 0 pasture or more than 10 cm (4 in)
- 1 6 to 10 cm (2.5 to 4 in)
- 2 2 to 5 cm (1 to 2 in)
- 3 less than 2 cm (1 in)

It is generally accepted that deep bedding provides a comfortable lying surface that affects the lying behavior of lame cows, influencing their recovery and thus decreasing the risk of lameness (3).
6.3 How wet is the bedding and/or ground in the dry cow facility?

<table>
<thead>
<tr>
<th></th>
<th>dry</th>
<th>damp</th>
<th>moderately wet</th>
<th>very wet</th>
</tr>
</thead>
</table>

Wet bedding softens hooves and provides an environment for proliferation of pathogens. Subjectively judge bedding wetness based on experience.

6.4 What type of floor surface is in the alleys in the dry cow facility?

<table>
<thead>
<tr>
<th></th>
<th>stone-free ground, sand or bedded pack</th>
<th>rubber</th>
<th>concrete</th>
</tr>
</thead>
</table>

6.5 What type of floor surface is on animal side of dry cow feeders?

<table>
<thead>
<tr>
<th></th>
<th>stone-free ground, sand or bedded pack</th>
<th>rubber</th>
<th>concrete</th>
</tr>
</thead>
</table>

Hard, rough textured walking and standing surfaces increased the risk of hoof and leg injuries.

6.6 How slippery is the flooring in dry cow traffic areas?

<table>
<thead>
<tr>
<th></th>
<th>not at all</th>
<th>slightly</th>
<th>moderately</th>
<th>very</th>
</tr>
</thead>
</table>

Cows exposed to very slippery floors had 2 times the odds of being lame compared with cows exposed to nonslippery floors (3). Either subjectively judge floor slipperiness based on experience or assess by observing whether cows slip, slide or fall when walking.

6.7 How much feeder space is provided per dry cow?

6.7a If dry cows are at pasture:

<table>
<thead>
<tr>
<th></th>
<th>pasture</th>
</tr>
</thead>
</table>

6.7b If dry cows are fed at a post and rail feeder:

Total linear feeder space: \[ \text{cm} + \text{Total number of dry cows \text{head}} \]
\[ = \text{feeder space, cm/head} \]

<table>
<thead>
<tr>
<th></th>
<th>more than 60</th>
<th>46 to 60</th>
<th>30 to 45</th>
<th>less than 30</th>
</tr>
</thead>
</table>

6.7c If dry cows are fed at headlocks:

Total number of dry cows \[ \text{head} \] + Total number of headlocks \[ \text{headlocks} \]

\[ = \text{dry cows/headlock} \]

<table>
<thead>
<tr>
<th></th>
<th>less than 1.0</th>
<th>1.0 to 1.1</th>
<th>1.11 to 1.2</th>
<th>more than 1.2</th>
</tr>
</thead>
</table>

Inadequate feeder space results in cows spending more time standing, waiting to feed. Excessive standing time is considered a risk factor for claw horn lesions leading to lameness (7).

6.8 Score the amount of dried manure on the outside of one hind leg of each of 10 dry cows, referring to the sketches below:

<table>
<thead>
<tr>
<th></th>
<th>Dry Cow Score 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
</table>

Score 0 | Score 1 | Score 2 | Score 3

<table>
<thead>
<tr>
<th></th>
<th>total 5 or less</th>
<th>total 6 to 10</th>
<th>total 11 to 20</th>
<th>total 21 to 30</th>
</tr>
</thead>
</table>

12
The amount of dried manure on the lower legs is an indicator of the cleanliness of the environment to which the animal is exposed. Results of a French study indicated cows had a 1.67 times risk (hazard ratio) of digital dermatitis when 25-49% of cows had a leg cleanliness score of 3; the risk increased to 2.44 times when 50% or more of cows had a leg cleanliness score of 3 (6).

Section 7: Management Practices for Dry Cows

7.1 What percentage of dry cows have their hooves examined and/or trimmed just before dry-off or between dry-off and calving?

- [ ] 0% more than 80%
- [ ] 1% 50 to 80%
- [ ] 2% less than 50%
- [ ] 3% 0%

The more cows that are examined and trimmed (if necessary) in this period, the lower the risk of having a lesion progress to a more serious stage and of carrying a lesion into the subsequent lactation.

7.2 How do you decide when to examine dry cows for injuries or hoof lesions?

- [ ] 0% when limping or at scheduled exam
- [ ] 1% only when an animal is seen to be limping
- [ ] 2% only at scheduled examination
- [ ] 3% animals are never examined

Early identification, recording and treatment of clinical cases, in association with routine trimming, is a critical aspect of digital dermatitis control (10). The same strategy will prevent mild claw horn lesions such as sole hemorrhages and white line separation from progressing to major sole ulcers and white line lesions.

7.3 When cows are identified as lame or when a visible lesion is seen, when are they treated?

- [ ] 0% immediately
- [ ] 1% within 1 week after detection
- [ ] 2% at next trimmer visit
- [ ] 3% not treated

Prompt treatment of lesions will prevent their development into more serious or chronic problems.

7.4 Do dry cows walk through a disinfectant foot bath at regular intervals (e.g., once a week)?

- [ ] 0% Yes
- [ ] 3% No

Regular dry cow foot bathing can reduce the risk of these animals contracting an infectious hoof lesion.

7.5 Are dry cows introduced to higher dietary concentrate levels at least 2 weeks before calving to provide a smooth transition from close-up to lactation ration?

- [ ] 0% Yes
- [ ] 3% No

A rapid change from a high forage diet to a high concentrate lactation ration can cause digestive upset (e.g., acidosis) leading to metabolic disorders that can affect claw horn quality and the integrity of the suspensory apparatus of the hoof (commonly, but incorrectly, referred to as laminitis) (12).
Section 8: Facilities for Lactating Cows

8.1 What type of facility are lactating cows housed in?

- [ ] pasture or loose housing (no stalls)  
- [ ] tie stalls or free stalls

8.1a If loose housing (no stalls), what type of foundation (under bedding) are lactating cows housed on?

- [ ] stone-free ground, sand, bedded pack or pasture  
- [ ] rubber
- [ ] concrete  
- [ ] stoney ground  
[ ] not applicable

Hard, rough textured walking and standing surfaces increased the risk of hoof injury.

8.1b If loose housing (no stalls), how much space is provided for each lactating cow?

- [ ] more than 120 ft² (11.2 m²)  
- [ ] 100 - 120 ft² (9.3 - 11.2 m²)
- [ ] less than 100 ft² (9.3m²)  
[ ] not applicable

High stocking densities result in cows spending more time standing. Excessive standing time is a considered a risk factor for claw horn lesions leading to lameness (7).

\[
\text{Area per cow} = \frac{\text{number of animals in pen}}{\text{pen length} \times \text{pen width}}
\]

If pen dimensions are not known by producer or measured, use best estimate.

8.1c If tie stalls or free stalls, what is the stall base (immediately under bedding)?

- [ ] sand or soil  
- [ ] geotextile mattress or resilient mat (e.g., gel mat)
- [ ] hard rubber or waterbed  
- [ ] concrete  
[ ] not applicable

Hard, rough textured walking and standing surfaces increased the risk of hoof injury.

8.1d If free stalls, how do stall widths compare with the standards below?

- [ ] equal to or greater than standard  
- [ ] less than standard  
[ ] not applicable

8.1e If free stalls, how do stall bed lengths compare with the standards below?

- [ ] equal to or greater than standard  
- [ ] less than standard  
[ ] not applicable

<table>
<thead>
<tr>
<th>Free Stall Dimension Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Lactating Cow Body Weight (lb/kg)</td>
</tr>
<tr>
<td>1000/454 1200/545 1400/636 1600/726 1800/817</td>
</tr>
<tr>
<td>Measurement</td>
</tr>
<tr>
<td>Stall width (divider centre to centre)</td>
</tr>
<tr>
<td>Bed length (rear curb to brisket locator)</td>
</tr>
</tbody>
</table>

Ideally, stalls should be large enough to allow cows to lie down, rise and rest comfortably without contacting stall hardware (neck rail, brisket locator, bedding retainer or stall partitions) but not so large that cows can contaminate bedding with manure (13). It is generally accepted that comfortable stalls promote increased lying time which reduces the risk of hoof injury and contamination from manure-borne pathogens. In a Canadian study, wide stalls were associated with increased lying time (14).

Stalls may vary widely in size, therefore estimate dimensions of stalls that are representative of the majority of usable stalls. If there is no brisket locator, measure bed length from the rear edge of the neck rail to the rear curb.
8.1f If free stalls, what is the stocking density for lactating cows?

\[
\text{Total number of lactating cows: } \square + \text{Total number of stalls } \square = \square \text{ lactating cows per stall}
\]

- 0 less than 1
- 1 1 to 1.1
- 2 more than 1.1 to 1.2
- 3 more than 1.2
- N not applicable

High stocking densities result in cows spending more time standing. Excessive standing time is a considered a risk factor for claw horn lesions leading to lameness (7).

8.2 On average, how deep is the bedding in loose housing areas or stalls?

- 0 pasture or more than 10 cm (4 in)
- 1 6 to 10 cm (2.5 to 4 in)
- 2 2 to 5 cm (1 to 2 in)
- 3 less than 2 cm (1 in)

It is generally accepted that deep bedding provides a comfortable lying surface that affects the lying behavior of lame cows, influencing their recovery and thus decreasing the risk of lameness (3).

8.3 How wet is the bedding in loose housing area or stalls?

- 0 dry
- 1 damp
- 2 moderately wet
- 3 very wet

Wet bedding softens hooves and provides an environment for proliferation of pathogens. Subjectively judge bedding wetness based on experience.

8.4 What type of floor surface is in animal alleys?

- 0 stone-free ground, sand or bedded pack
- 1 rubber
- 2 concrete

8.5 What type of floor surface is on animal side of lactating cow feeders?

- 0 stone-free ground, sand or bedded pack
- 1 rubber
- 2 concrete

8.6 What type of floor surface is in the pre-milking holding pen?

- 0 rubber
- 2 concrete
- N no holding pen

8.7 What type of floor surface is in the area where cows are milked?

- 0 rubber
- 2 concrete or metal

Hard walking and standing surfaces increased the risk of hoof and leg injuries.

8.8 How slippery is the flooring in lactating cow traffic areas?

- 0 not at all
- 1 slightly
- 2 moderately
- 3 very

Cows exposed to very slippery floors had 2 times the odds of being lame compared with cows exposed to nonslippery floors (3). Either subjectively judge floor slipperiness based on experience or assess by observing whether cows slip, slide or fall when walking.

8.9 Are cows required to make any sharp turns as they travel to or from milking or feeding?

- 0 No
- 2 Yes

Sharp turns on rough surfaces put excessive mechanical stress on the sole-horn junction which can lead to white line separation, allowing introduction of pathogens.
8.10 How much feeder space is provided per lactating cow?

8.10a If lactating cows are at pasture:

| pasture | 0 | 1 | 2 | 3 |

8.10b If lactating cows are fed at a post and rail feeder:

Total linear feeder space: \( \text{ } \text{ cm} + \text{ Total number of dry cows } \text{ } \text{ head} \)

\[ \text{feeder space, cm/head} = \frac{\text{Total number of dry cows \text{ } \text{ head}}}{\text{Total number of dry cows \text{ } \text{ head}}} \]

8.10c If lactating cows are fed at headlocks:

Total number of lactating cows \( \text{ } \text{ head} + \text{ Total number of headlocks \text{ } \text{ head}} \)

\[ \text{lactating cows/headlock} = \frac{\text{Total number of lactating cows \text{ } \text{ head}}}{\text{Total number of headlocks \text{ } \text{ head}}} \]

Inadequate feeder space results in cows spending more time standing, waiting to feed. Excessive standing time is considered a risk factor for claw horn lesions leading to lameness (7).

8.11 Score the amount of dried manure on the outside of one hind leg of each of 10 lactating cows, referring to the sketches below:

<table>
<thead>
<tr>
<th>Cow</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>total 5 or less</td>
<td>1</td>
<td>total 6 to 10</td>
<td>2</td>
<td>total 11 to 20</td>
<td>3</td>
<td>total 21 to 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The amount of dried manure on the lower legs is an indicator of the cleanliness of the environment to which the animal is exposed. Results of a French study indicated cows had a 1.67 times risk (hazard ratio) of digital dermatitis when 25-49% of cows had a leg cleanliness score of 3; the risk increased to 2.44 times when 50% or more of cows had a leg cleanliness score of 3 (6).

Note: Before leaving the barn, measure footbath length and liquid depth so you will not have to return to answer questions 9.4a and 9.4b.

Section 9: Management Practices for Lactating Cows

9.1 When are lactating cows examined for injuries or hoof lesions?

| when limping or at scheduled exam | 0 | 1 | 2 | 3 |

Early identification, recording and treatment of clinical cases, in association with routine trimming, is a critical aspect of digital dermatitis control (10). The same strategy will prevent mild claw horn lesions such as sole hemorrhages and white line separation from progressing to major sole ulcers and white line lesions.
9.2 When cows are identified as lame or when a lesion is found, when are they treated?

- [ ] immediately
- [ ] within 1 week after detection
- [ ] at next trimmer visit
- [ ] not treated

Prompt treatment of lesions will prevent their development into more serious or chronic problems.

9.3 In the course of a year, how many times does each cow have her hooves examined and, if necessary, trimmed?

- [ ] 3 times
- [ ] twice
- [ ] once
- [ ] never

The more frequently an animal is examined and trimmed, the more likely it is a lesion will be identified (11).

9.4 Do lactating cows routinely walk through a footbath containing disinfectant solution?

- [ ] Yes (answer questions 9.4a to 9.4f)
- [ ] No (go to question 9.5)

Routine foot bathing is aimed at reducing the incidence of infectious hoof lesions through improvement of hoof hygiene. Many different cleaning agents and antibacterial products are used in foot baths (16), with copper sulfate and formalin being the most common in Alberta, but little quality research has been done on which to base recommendations for the most effective. However, it is clear that routine use of well designed foot baths is probably more important than the solution used. Current design recommendations are based on Wisconsin research (17).

9.4a Footbath length:

- [ ] more than 3 m (10 ft)
- [ ] 2 to 3 m (6.5 to 10 ft)
- [ ] less than 2 m (6.5 ft)

The probability of each rear foot receiving at least two immersions reached 95% at a bath length of 3.0 metres, and a significant increase in the frequency of three and four immersions per foot was observed between 3.0 and 3.7 metres. To optimize the number of foot immersions per cow pass, while limiting the footbath volume, a bath 3.0–3.7 metres long and 0.5–0.6 metres wide with a 28 cm step-in height is recommended (17).

9.4b Footbath liquid depth:

- [ ] more than 10 cm (4 in)
- [ ] 6 to 10 cm (2.5 to 4 in)
- [ ] less than 6 cm (2.5 in)

The footbath solution should be deep enough to immerse the hoof up to the dew claws.

9.4c Can cows step around the footbath to avoid immersion?

- [ ] No
- [ ] Yes

Foot bathing will be ineffective if cows can avoid immersion.

9.4d Do you rinse cows' feet before they enter a footbath?

- [ ] Yes
- [ ] No

The cleaning or disinfectant solution will be more effective if hooves are clean before entering the bath.

9.4e How often does each cow walk through a footbath?

- [ ] more than 4 times/week
- [ ] 2 to 4 times/week
- [ ] from once/week to once/month
- [ ] less than once per month
Foot bathing frequency is usually dictated by the prevalence of infectious hoof lesions in the herd, although the practice should be considered preventative rather than a treatment for infections (16). As a rough guideline, if more than 10% of cows are affected with infectious lameness, foot bathing should be done at least 2-3 times/week. Another strategy is to use leg hygiene score (refer to question 8.9) to guide foot bathing frequency, as follows (18):

<table>
<thead>
<tr>
<th>% of cows scoring 3 or 4</th>
<th>&lt; 25%</th>
<th>25-50%</th>
<th>50-75%</th>
<th>&gt;75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggested foot bathing frequency</td>
<td>once per week</td>
<td>2 days/week</td>
<td>5 days/week</td>
<td>7 days/week</td>
</tr>
</tbody>
</table>

9.4f How often do you depart from your routine foot bathing schedule?

0 never 1 seldom 2 sometimes 3 often

Consistency is important in an effective foot bathing program.

9.4g How many cows pass through a foot bath before you renew the treatment product?

0 fewer than 100 1 100 to 200 2 201 to 300 3 more than 300

The more frequently the footbath solution is renewed, the more effective it will be. However, given the cost of product and labour, the amount of manure contamination in the bath will usually guide renewal frequency.

9.5 On average, during the course of a day, how long are cows required to stand where they cannot lie down (e.g., pre-milking holding pen, lockups for preg checking, etc.)?

0 30 minutes to 1 hour 1 1 to 2 hours 2 2 to 3 hours 3 more than 3 hours N not applicable

9.6 Do cows ever become overheated to the extent that they spend additional time standing to dissipate heat?

0 No 2 Yes 3

Excessive standing time is considered a risk factor for claw horn lesions leading to lameness (7).

9.7 Are first-calf heifers mixed with older cows when they begin their lactations?

0 no, first calf heifers are grouped separately 2 yes

Mixing fresh first calf heifers with dominant older cows can stress the younger, less dominant animals to the extent that they spend excessive time standing while they determine where they can feed or lie down.
References


