Today's agenda

- Brief discussion of NYSCHAP
- Overview of foot anatomy, lesions and record keeping
- Lameness scoring systems and detection on-farm
- Determining risk factors contributing to lameness
Potential Modifiers of the Herd Health Steady State

On Farm Processes

Input

Output

NYSCHAP Requirements and Incentives

- Incentives
  - Professional voucher
  - Testing discounts – bulk tank, Johne’s

Incentives

- Professional voucher
- Testing discounts – bulk tank, Johne’s
NYSCHAP Modules

- Core
- BVD
- Salmonellosis
- Johne’s Disease
- Mastitis
- Expansion Biosecurity
- Market Cow and Bull Quality
- Bovine leukemia virus
- Foot health

NOTES
Voluntary
Confidential
Individual herd plan
Continuation based on individual improvement

Herd plan based on information collected and team discussion

- Goals
- ID
- Treatment records
- Incoming animals
- Milk production/quality
- Vaccination program
- Employee management
- Calving pen management
- Calf health
- Weaned heifer health
- Transition cows
- Repro
- Lameness
- Culling
- Infectious disease
- Johne’s disease

NYSCAP Herd Plan

<table>
<thead>
<tr>
<th>Interactions</th>
<th>Test</th>
<th>Test</th>
<th>Test</th>
<th>Test</th>
<th>Test</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>Test 2</td>
<td>Test 3</td>
<td>Test 4</td>
<td>Test 5</td>
<td>Test 6</td>
<td>Test 7</td>
</tr>
<tr>
<td>Test 8</td>
<td>Test 9</td>
<td>Test 10</td>
<td>Test 11</td>
<td>Test 12</td>
<td>Test 13</td>
<td>Test 14</td>
</tr>
<tr>
<td>Test 15</td>
<td>Test 16</td>
<td>Test 17</td>
<td>Test 18</td>
<td>Test 19</td>
<td>Test 20</td>
<td>Test 21</td>
</tr>
<tr>
<td>Test 22</td>
<td>Test 23</td>
<td>Test 24</td>
<td>Test 25</td>
<td>Test 26</td>
<td>Test 27</td>
<td>Test 28</td>
</tr>
<tr>
<td>Test 29</td>
<td>Test 30</td>
<td>Test 31</td>
<td>Test 32</td>
<td>Test 33</td>
<td>Test 34</td>
<td>Test 35</td>
</tr>
<tr>
<td>Test 36</td>
<td>Test 37</td>
<td>Test 38</td>
<td>Test 39</td>
<td>Test 40</td>
<td>Test 41</td>
<td>Test 42</td>
</tr>
<tr>
<td>Test 43</td>
<td>Test 44</td>
<td>Test 45</td>
<td>Test 46</td>
<td>Test 47</td>
<td>Test 48</td>
<td>Test 49</td>
</tr>
<tr>
<td>Test 50</td>
<td>Test 51</td>
<td>Test 52</td>
<td>Test 53</td>
<td>Test 54</td>
<td>Test 55</td>
<td>Test 56</td>
</tr>
</tbody>
</table>

Page 63
NYSCHAP Foot health module

Why?
- Lameness major cause of financial loss from milk loss, delayed conception, treatment and culling
- NY herds average economic loss per case = $350
- Studies find range of prevalence from 12-30%
- Cornell research ~30%

Lameness effects on reproduction*

- Cows having a locomotion score of >2
  - 2.8 time more likely to have increased days to first service
  - 15.6 times more likely to have more days open
  - 9.0 times more likely to have increased services/conception
  - 8.4 times more likely to be culled

*Zinpro
Lameness effects on milk yield*

- Cows at Score 2 can have up to 2% milk loss
- Cows at Score 3 can have up to 4% milk loss
- Cows at Score 4 can have up to 9% milk loss
- Cows at Score 5 can have up to 15% milk loss

How much does lameness cost?*

<table>
<thead>
<tr>
<th>Management level</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Score 4</th>
<th>Score 5</th>
<th>Lost revenue per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>50%</td>
<td>30%</td>
<td>15%</td>
<td>4%</td>
<td>1%</td>
<td>$56,940</td>
</tr>
<tr>
<td>Average</td>
<td>40%</td>
<td>25%</td>
<td>22%</td>
<td>10%</td>
<td>3%</td>
<td>$96,360</td>
</tr>
<tr>
<td>Poor</td>
<td>25%</td>
<td>25%</td>
<td>30%</td>
<td>15%</td>
<td>5%</td>
<td>$131,400</td>
</tr>
</tbody>
</table>

Foot Anatomy

*Zinpro
Foot Anatomy

Main Causes of Lameness

- Two Categories
  - Non-infectious
    - Laminitis and related lesions including:
      - White line disease
      - Sole ulcers
  - Infectious
    - Digital dermatitis (heel warts)
    - Interdigital dermatitis
    - Foot rot

Laminitis

- Many times this is an underlying problem and the classic acute lameness is not seen
- Two main areas to consider
  - Nutrition
    - feeding management
    - feeding behavior – slug feeding
    - change in body condition score
  - Environment
White line disease

Lesion can present as:
- Fissure
- Hemorrhage
- Abscess

Outer claw of rear foot is most commonly affected

Sole ulcers

Usually on sole, although can be in the toe or heel

Outer claw of rear foot is most commonly affected

Caused by a disruption in normal horn-producing cells

Infectious Causes

Primary consideration is to keep all cow areas as clean and dry as possible
Digital dermatitis
(Heel warts)

- Infectious disease thought to be related to an infection from spirochete in the genus *Treponema*
- Most commonly presents on rear foot

Interdigital dermatitis

- Very common chronic infectious disease of the skin around the claws and often presents as ‘pitting’ of the heels
- The primary causal agent is *Dichelobacter nodosus*
- Spreads from cow to cow through the environment and particularly through manure
- Often all four feet are involved

Foot rot
(Interdigital Phlegmon)

- Infectious disease caused primarily by two bacterial organisms (*Fusobacterium necrophorum* and *Bacteroides melaninogenicus*)
- Typically have symmetrical swelling above both claws and necrosis of the skin in the interdigital space
Claw Trimming

Keep records of trim events including:
- Cow ID
- Foot affected
- Type of lesion
- Treatment

Foot trimmers record sheet
- Does your trimmer have one?
- Consistent records
- Review on a periodic basis

Is there someone to trim a lame cow the first day she is detected as lame?
If an outside trimmer is used do they have enough time to address both lame cows and routine trims?
How often are they on the farm?

Lameness Detection

Who is responsible for lameness detection?
Are they properly trained to detect lame cows early?
- Locomotion Scoring
- Tiestall evaluation
How do they record this information and who is accountable for following up on these cows?
Free stall or tie stall – Doesn’t matter, still important
Locomotion Score Recording sheet
Tie stall evaluation

5 behaviors associated with lameness

1. Regular, repeated shifting of weight from one foot to another
2. Rotating the foot beyond the midline of the body
3. Standing on the curb of the stall
4. Resting a foot while standing
5. Uneven weight bearing between feet when moving from side to side; rapid movement of one foot to relieve another or reluctance to bear weight on a foot

Reference: Leach, KA, et. al., J. Dairy Sci. 92:1567-1574
### Process to score

1. Cows that were lying down were made to stand up (for at least 3 minutes)
2. Standing posture of the cow was evaluated for the 5 behavioral indicators
3. Cow was then made to move from side to side
4. Standing posture was re-evaluated
5. Any cow demonstrating at least 2 of the behavioral indicators at any point in the evaluation was scored as lame

### Risk Evaluation Process

- Examine all areas in the farm that will impact foot health using the risk evaluation form
- Identify areas of concern
- Team meeting to determine action items
  - Team may include producer, key managers, herd veterinarian, NYSCHAP veterinarian, nutritionist, hoof trimmer
Cow Comfort Assessment Tool

**Rumination**
Rumination enhances saliva flow, providing buffers that act to raise rumen pH. This, in turn, reduces the risk of rumen acidosis and laminitis, and enhances ruminal digestion.

On average throughout the day, you should expect to see 50 to 60% of cows ruminating while lying in the stall. There are times throughout the day when this percentage will be higher or lower. Observe at least 20 cows that are neither eating nor sleeping.

**Heat Stress**
In barns with inadequate cow cooling, respiratory rates increase about 1.5 beats per minute (bpm) per deg. F. as temperatures move above the upper limit of a cow’s thermoneutral zone, which is approximately 68 deg. F., depending on humidity. Cows will exhibit increased standing as their rectal temperature exceeds 102 deg. F.

Target goals to control heat stress are:
- Maximum respiratory rates of 70 bpm
- Rectal temperatures below 102 deg. F.

**Lameness & Hocks**
You can most easily score lameness when cows are moving, such as walking to the parlor. The prevalence of lameness is influenced by a number of variables – the major ones being stall usage, standing time on concrete, the ration, control of infectious diseases, and hoof trimming programs.

You can best score hocks when cows are standing or lying down. Generally one hock per cow is scored. Inadequately bedded stalls often create hock problems. Cows kept in stalls deeply bedded with sand or manure solids typically have good hock scores, while those with a stable surface (e.g. mat or mattress) and minimal bedding will produce elevated scores.

Evaluate lameness and hock scores in your herd at different times of the year and use the targets provided on the chart.

**Herd Bunching**
Cows will bunch together when stable flies are biting and when they are heat stressed.

Determine if flies are causing the bunching by looking for twisting tails or tail stubs, stamping legs, or the occasional fly on the lower part of the legs.

**Floors**
Injuries can easily occur when housing floors are too slippery, and hoofs can wear thin when floors are too rough.

Grooves in concrete should be 0.5 in. deep and wide. Parallel grooves should be spaced 2-3 in. on center; grooves in a diamond pattern should be spaced 4-6 in. Concrete surfaces should be smooth, while the grooves should be cut at right angles and not have rough edges.

Soft rubber or well-grooved rubber belting can be used to improve the floor surface.
Resource List

**General Dairy Facilities Resources:**

Navigate these web sites to find information on all areas of cow comfort, including stalls, flooring, ventilation, heat stress, and foot and leg health.

PRO-DAIRY: [http://www.ansci.cornell.edu/prodairy](http://www.ansci.cornell.edu/prodairy) (Click on “Dairy Facilities Engineering”)

Penn State Ag & Bioengineering Plans: [http://www.age.psu.edu/extension/ip/ipindex.html#DairyPlans](http://www.age.psu.edu/extension/ip/ipindex.html#DairyPlans)


**Supplemental Resources in Specific Areas:**

**Cow Comfort Evaluation:**


“Using Indices of Cow Comfort to Predict Stall Use and Lameness”:


**Ventilation:**

[http://www.vetmed.wisc.edu/dms/fapm/fapmtools/ventilation.htm](http://www.vetmed.wisc.edu/dms/fapm/fapmtools/ventilation.htm)

**Flooring Surfaces:**

New Concrete: [http://www.bae.umn.edu/extens/ennotes/enwin98/dairycow.html](http://www.bae.umn.edu/extens/ennotes/enwin98/dairycow.html)

**Lameness:**


**Time Budgets:**


**Stable Fly Control:**

[http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=547](http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=547)

Use of Locomotion Scoring as a Management Tool

Locomotion Scoring System
(Sprecher, et. Al, Theriogenology 47:1179, 1997)

<table>
<thead>
<tr>
<th>Lameness Score</th>
<th>Clinical Description</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>The cow stands and walks with a level-back posture. Her gait is normal.</td>
</tr>
<tr>
<td>2</td>
<td>Mildly lame</td>
<td>The cow stands with a level-back posture but develops an arched-back posture when walking. Her gait remains normal.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately lame</td>
<td>An arched-back posture is evident both while standing and walking. Her gait is affected and is best described as short-striding with one or more limbs.</td>
</tr>
<tr>
<td>4</td>
<td>Lame</td>
<td>An arched-back posture is always evident and gait is best described as one deliberate step at a time. The cow favors one or more limbs/feet.</td>
</tr>
<tr>
<td>5</td>
<td>Severely lame</td>
<td>The cow additionally demonstrates an inability or extreme reluctance to bear weight on one or more of her limbs/feet.</td>
</tr>
</tbody>
</table>

Using locomotion scoring as a management tool:
- Goal—no more than 15% of each animal management group (lactating cows, dry cows, heifers) locomotion score >2.
- Be sure to have a regular hoof trimming program.
- One person on the farm should be designated as the point person for the lameness program. This person should be trained to identify lame cows and have the ability to make prompt decisions regarding these animals. It is recommended that all cows be scored weekly; record any animal with a score greater than 1.
- All farm personnel working with the cattle should be trained to recognize early signs of lameness on a daily basis.
- Use the definitions above and the Zinpro locomotion scoring chart to determine the locomotion scores of the cows. Be certain to score cows in an area where they can walk in a straight line at a comfortable pace on a flat surface with good footing.
- Those cows that score a 3, 4 or 5 need prompt treatment according to farm protocols. Inspect the foot to determine the problem and appropriate treatment. Contact the veterinarian as needed.
- Cows with a locomotion score of 2 should be noted. Determine if there are other health reasons that the cow might be walking with an arched back. If not, examine the feet. If nothing obvious is found monitor the cow several times a day for the next week.
Foot Baths – Key Points

1. Locate the foot bath in an area regularly traveled by cattle. The exit lanes from milking parlors work well.

2. Foot baths should be 8 to 10 feet long and approximately 3 feet wide with a depth of 6 inches. Locate foot baths on a level surface.

3. If practical, locate a foot bath containing water (pre-bath) preceding the treatment foot bath. This will help to clean cows feet prior to entering the treatment foot bath.

4. There should be a gap of 6 to 8 feet between the treatment and water (pre-bath) foot baths. Cows tend to defecate when entering foot baths. The 6 to 8 foot gap between foot baths allows cows to complete defecation prior to entering the treatment foot bath.

5. Foot bath solutions should be 4 to 6 inches deep to ensure adequate coverage of the foot area.

6. Change foot bath solutions after every 150 to 200 cows. This will vary due to reasons such as cow cleanliness, use of a pre-bath, type and concentration of medication used, and weather conditions.

7. Thoroughly drain foot bath and rinse with water before mixing a new batch of solution.

8. Alternate times for replenishing foot baths with fresh solution so each group of cows has access to fresh solution.

9. Cows should enter a clean dry area after passing through the foot bath.

10. Foot baths are most effective for treating diseases of the interdigital skin such as interdigital dermatitis and foot rot.

11. It is recommended that foot baths be used at least 3 to 4 days per week.

12. In arid regions, evaporation will concentrate active ingredients.

13. Formalin is not effective at temperatures below 45°F.

---

Foot Baths are most effective for treating diseases of the interdigital skin such as interdigital dermatitis and foot rot. It is recommended that foot baths be used at least 3 to 4 days per week. In arid regions, evaporation will concentrate active ingredients. Formalin is not effective at temperatures below 45°F.

---

*a* Manure deactivates the chemicals used in a foot bath; therefore, foot baths must be managed properly to achieve maximum effectiveness. A poorly managed foot bath can actually become a vector for certain infectious diseases of the foot.
Foot Bath Options

Maintenance Foot Bath Solutions

<table>
<thead>
<tr>
<th>Product</th>
<th>Mix with water to achieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sulfate</td>
<td>5% - 10% solution</td>
</tr>
<tr>
<td>Zinc sulfate</td>
<td>5% - 10% solution</td>
</tr>
<tr>
<td>Formalin</td>
<td>3% - 5% solution</td>
</tr>
<tr>
<td>Mild soap</td>
<td>1 quart to 25 gallons water</td>
</tr>
</tbody>
</table>

Medicated Foot Bath Solutions

<table>
<thead>
<tr>
<th>Product</th>
<th>Mix with water to achieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline</td>
<td>0.1% solution (1 gram/liter)</td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>0.1% solution (1 gram/liter)</td>
</tr>
<tr>
<td>Lincomycin</td>
<td>0.01% solution (0.1 gram/liter)</td>
</tr>
</tbody>
</table>

Foot Bath Calculations

To Determine Capacity of a Foot Bath

Multiply:
Length (ft) x width (ft) x depth (ft) x 7.46 = Number of gallons

To Convert Gallons to Pounds

Multiply:
Number of gallons x 8.33 = Pounds of water

Example: To achieve a 5% copper sulfate solution in a foot bath that measures 10 ft long, 3 ft wide, and 6 in deep.

10 x 3 x 0.5 x 7.46 = 111.9 gallons
111.9 gallons x 8.33 = 932.1 lbs of water
932.1 x 0.05 (5% solution) = 46.6 lbs copper sulfate
Livestock Welfare Issues

Kathy Finnerty
NYSCHAP Coordinator

Nothing new...

- Upton Sinclair – *The Jungle*, written in 1906
  - Intended to expose "the inferno of exploitation [of the typical American factory worker at the turn of the 20th Century]."
  - Also highlighted animal treatment and food safety issues
  - Lead to Meat Inspection Act

28 Hour Law

- Passed in 1873
- Repealed and reenacted in 1906 in amended form with no substantial changes
- May not confine animals in a vehicle or vessel for more than 28 consecutive hours without unloading in a humane manner for feeding, water and rest for at least 5 consecutive hours