Identifying predators involved in livestock loss

Livestock loss in Florida

**Loss**
- Cattle (> 500 lbs) = 30,000; predation = 1,410
- Calves (< 500 lbs) = 35,000; predation = 9,020

**Value**
- Cattle = $48.5 million; predation = $2.3 million
- Calves = $20.5 million; predation = $5.3 million

**Percent of operations**
- Cattle = 28.9%; predation = 4.9%
- Calves = 26.8%; predation = 9.6%

**Percent of inventory**
- Cattle = 2.3%; predation = 0.1%
- Calves = 4.4%; predation = 1.1%
Livestock Loss in Florida

**Loss**
- Cattle (> 500 lbs) = 30,000; predation = 1,610
- Calves (> 500 lbs) = 31,000; predation = 8,020

**Value**
- Cattle = $48.5 million; predation = $2.3 million
- Calves = $20.5 million; predation = $5.3 million

**Percent of operations**
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Livestock Loss Study 2016-2019

Dr. Raoul Boughton and Kelly Koriakin (MSc) supported by Cattle Enhancement Board

Calf loss rate = 13%

Major causes:
dystocia, mineral imbalances, bacterial infections, poor cow health (often multiple issues involved)
Livestock Loss Study 2016-2019

Calf loss rate = 13%

1 of 30 loss events attributed to predation (3.3%)

Percent of inventory lost
Calves = 4.4%

1 of 4 loss events attributed to predation (25%)

Why predator identification is important

1) Rule out other causes of death
   a) Bacterial infections
   b) Birthing difficulties
   c) Viral infections
Why predator identification is important

2) Predator-specific management
   a) Removal efforts
   b) Reducing risk
   c) USDA Livestock Indemnity Program and Florida Panther Compensation Program

Why predator identification is important

3) Improving overall knowledge on the state of livestock predation in Florida
   a) Sharing information with researchers
   b) Sharing information with neighbors

Potential culprits of livestock loss
Potential culprits of livestock loss

Key Goals:
1. Was predation the cause of death?
2. If so, what predator species was involved?
Systematic Field Investigation

Critical for success:

1. Minimize length of time between death and site investigation
2. Collect multiple lines of evidence

Where do these multiple lines of evidence come from:

- **General area around site**
  - habitat
  - signs of struggle or pursuit
  - drag marks, cached
  - animal tracks
  - animal scat

- **Carcass**
  - species
  - adult or juvenile
  - what parts consumed
  - general appearance
  - injuries sustained
  - bite marks
  - hemorrhaging

Some general safety considerations

Displacing some predators can be dangerous

*FL panther and black bear*

Make noise, stay alert, work with another person

The post-mortem health status of an animal is unknown

- Wear latex/nitrile gloves during
carcass handling, tissue collection
- Mask and eye protection can also help minimize exposure
to parasites and bacteria
Sampling kit

<table>
<thead>
<tr>
<th>Essentials</th>
<th>Wish List</th>
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</thead>
<tbody>
<tr>
<td>Camera</td>
<td>Vernier caliper</td>
</tr>
<tr>
<td>Pen and paper</td>
<td>Coin envelopes w/silica desiccant</td>
</tr>
<tr>
<td>Tape measure (at least 6ft)</td>
<td>desiccant for hair samples</td>
</tr>
<tr>
<td>Ruler</td>
<td>Ziplock bags for samples</td>
</tr>
<tr>
<td>GPS</td>
<td>Cooler and ice packs to protect samples</td>
</tr>
<tr>
<td>Tweezers</td>
<td>Blood kit</td>
</tr>
<tr>
<td>Latex gloves</td>
<td>DNA swab kit</td>
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</tbody>
</table>

Five phases of investigation

1. Initial overview of carcass site and its surrounding area
2. Focus on carcass and immediate carcass site
3. Investigate carcass for signs of hemorrhaging
4. Summarize all evidence and their interrelatedness
5. Event classification and strength of evidence

1. Initial overview of carcass site and its surrounding areas

- Avoid the temptation of going immediately to the carcass.
- Attempt to visualize what may have happened from a distance
- Use the archery ring approach
1. Initial overview of carcass site and its surrounding areas

Characterize the habitat around the site (forested, field, edge, near wetland, near fence or other barriers)

Try to determine the prey’s path to where it died

Could an ambush or chase occur here?

Predators have different hunting strategies

Note presence and activity of scavenging birds

Photo: Tim Donovan/FWC

Photo: Flickr/Creative Commons

Photo: Don McCullough

Photo: Nat Edwards
1. Initial overview of carcass site and its surrounding areas

Look for sign
- Hair
- Tracks (size, pattern, stride)
- Scat
- Claw marks

Physical evidence of predator presence

Tracks
- Time sensitive

Measure and photograph
- Include reference in the image (ideally ruler/measuring tape)

Physical evidence of predator presence

Three major types:
- Ursid
  - Black bear
  - 3 ¼ – 5 ½ x 5 – 6 ½
- Canid
- Felid
Physical evidence of predator presence
Florida panther vs bobcat

Florida panther

Bobcat

4 1/4 x 4

1 1/2 x 1 1/8

Photo: Tim Donovan/FWC

Other tracks

31

Physical evidence of predator presence
Florida panther vs bobcat

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Physical evidence of predator presence
Other tracks

Front Track  Hind Track

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### Physical evidence of predator presence

**Scat (size, shape, and texture)**

- Take photographs
- Measure length and diameter prior to collecting

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**Photo:** Mark Lotz/FWC.

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**Photo:** Flickr/Creative Commons

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**Photo:** Tim Donovan/FWC

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**Photo:** Don McCullough

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<table>
<thead>
<tr>
<th>Description</th>
<th>Bobcat</th>
<th>Florida Panther</th>
<th>Black Bear</th>
<th>Coyote</th>
<th>Domestic Dog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken cords with short tails</td>
<td>½ – 1 inches</td>
<td></td>
<td></td>
<td>½ – 1 ¼ inches</td>
<td>~1 inches</td>
</tr>
<tr>
<td>Thick cords with blunt ends</td>
<td>1 – 1 ½ inches</td>
<td>1 – 2 ½ inches</td>
<td></td>
<td>1 – 2 ½ inches</td>
<td></td>
</tr>
<tr>
<td>Thick occasionally folded cords with pointed tail</td>
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Where they deposit them

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**Photo:** National Tracks of North America

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**Photo:** Florida Panther

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**Photo:** Coyote

---

**Photo:** Domestic Dog

---

**Photo:** Broken cords with short tails

---

**Photo:** Thick cords with blunt ends

---

**Photo:** Thick occasionally folded cords with pointed tail

---

**Photo:** Where they deposit them

---

**Photo:** ½ – 1 inches

---

**Photo:** 1 – 1 ½ inches

---

**Photo:** 1 – 2 ½ inches

---

**Photo:** ½ – 1 ¼ inches

---

**Photo:** ~1 inches

---

**Photo:** ½ – 1 ¼ inches

---

**Photo:** ~1 inches

---

**Photo:** ½ – 1 ¼ inches

---

**Photo:** ~1 inches

---

**Photo:** ½ – 1 ¼ inches

---

**Photo:** ~1 inches

---

**Photo:** ½ – 1 ¼ inches

---

**Photo:** ~1 inches
Physical evidence of predator presence

Scratch marks are left by Florida panther, bobcat, and black bear.
Look for them on trees near the site or cache.

1. Initial overview of carcass site and its surrounding areas

Look for signs of struggle:
- ambush vs pursuit

Look for blood:
- blue light is helpful

Look for drag trails.

2. Focus on carcass and immediate carcass site

Reaching carcass quickly is critical.

Decomposition complicates investigations and eliminates evidence.
2. Focus on carcass and immediate carcass site

Scavenging also eliminates evidence

Scavenging can produce signs and evidence that is misinterpreted as predation

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2. Focus on carcass and immediate carcass site

Condition at time of death
There can be both immediate and gradual causes of death at play

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Qualitative characteristics of kill sites

<table>
<thead>
<tr>
<th>Tidy</th>
<th>Messy</th>
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</thead>
<tbody>
<tr>
<td>Photo by D. Onorato/FWC</td>
<td>Photo: Flickr/Creative Commons</td>
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<tr>
<td>Tidy Photo:</td>
<td>Messy Photo:</td>
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<td>Tim Donovan/FWC</td>
</tr>
<tr>
<td>Don McCullough</td>
<td>George Agasandian</td>
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Length of pursuit

- Short
- Long

Carcass moved or cached

Bed Sites

- up to 200m from cache at base of tree or rocks
- near or on top of cache
- many in vicinity
3. Investigate carcass for hemorrhaging

Hemorrhaging occurs from injury and can only occur when the animal is alive.

Blood resulting from bleeding from the muscle is usually found between muscle and skin.

Swelling around puncture holes indicates hemorrhaging – area may be discolored.
3. Investigate carcass for hemorrhaging

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3. Investigate carcass for hemorrhaging

![Diagram showing bite marks of different animals]

3. Aspirated blood

Blood found in the nose, mouth, or trachea

This indicates an injury that allowed blood to enter respiratory system during a prolonged pursuit or struggle

4. Summarizing all evidence

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<tr>
<td></td>
<td>hemorrhaging</td>
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Determining weight of evidence

What is the majority of evidence telling you?

How confident are you in your conclusion?

Definitive, probable, possible, unknown
Event Classification: Predation or not

- **Direct evidence**
  - Hemorrhaging with bite marks
  - Aspirated blood
  - Signs of pursuit or struggle
  - Direct observation

- **Indirect evidence**
  - Multiple lines
  - Scavenging dominance

- **Evidence of scavenging**
  - Unable to or scavenging signs of death other than predation

- **Definitive**
- **Probable**
- **Possible**
- **Unknown**
- **Other, not predation**

Acknowledgments

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Questions?