October 2013 Blizzard in South Dakota: Ramifications

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Late Fall 2013
- Warmer than normal
- Good moisture
- Implications:
  - Fall forage green-up
  - High moisture
  - High protein
  - Lower energy
  - No need to wean early – calves nursing on pasture
  - Cows still on summer pasture
  - No winter coats yet
Thursday night, Oct.3: Rain

- Rain totals before turning to snow Friday PM:
  - Union Center – 1.26”
  - Cottonwood – 1.64”
  - ~ 10% of annual precipitation

- Implication: Cattle were literally “soaked to the skin”

Observation: Thermoregulation

- **Lower Critical Temperature**: Effective temperature below which an animal expends energy to maintain body heat and metabolism

  - For each 1° below LCT, energy requirements ↑ by 1-2%

<table>
<thead>
<tr>
<th>Coat Condition</th>
<th>Critical Temperature °F</th>
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<tbody>
<tr>
<td>Wet or Summer Coat</td>
<td>59°</td>
</tr>
<tr>
<td>Dry, Fall Coat</td>
<td>45°</td>
</tr>
<tr>
<td>Dry, Winter Coat</td>
<td>32°</td>
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<tr>
<td>Dry, Heavy Winter Coat</td>
<td>18°</td>
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</tbody>
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- Wind chills during storm = as low as 12 – 16 F
- Cows needed to ↑ energy intake by 47 – 94% just to maintain
- Energy deficits + energy expended = hypothermia
Friday afternoon, Oct. 4: Blizzard

- @ Union Center:
  - Hourly average sustained winds = as high as 49 mph
  - Peak wind gust = 62 mph
  - 12” of snow - 3-4’ snowdrifts

- Elsewhere:
  - Many areas 20-30” snow (58” in Black Hills) – 6-7’ drifts
  - 71 mph peak wind gust @ Ellsworth AFB

- Cattle bunched and drifted with wind
- Fences breached
“I don’t have to worry about being a rancher anymore because all my cows are laying dead in elm creek”
Observation: Causes of Death

- Hypothermia
- Entrapment in fences → exhaustion
- Entrapment in mud (creeks and stock dams) → exhaustion
- Drowning in creeks and stock dams
- Exhaustion on dry land
- Pulmonary edema secondary to exertion

Observation: Pulmonary Edema

- Common observation: “gallons of fluid" pouring from nose and mouth of carcasses when moved
  - “Drowned standing up”
- Cold temperatures + exertion + physiologic stress → sympathetic nervous system response
  - Renin – Angiotensin – Aldosterone System activated
    - Blood vessels constrict
    - Increased resistance in systemic arteries
    - Heart has to work harder to pump against resistance
Observation: Pulmonary Edema

- Aldosterone stimulates kidneys to hold on to sodium and water
  - Increased blood volume and blood pressure
- When left heart can no longer pump blood against this resistance, pulmonary edema occurs
  - Fluid enters airways and accumulates
  - Increased difficulty for blood/O$_2$ exchange

“Dryland Drowning”? 

- When freshwater taken into lungs:
  - Water pulled from airways into lung blood vessels by osmosis
- Contrast with saltwater drowning
  - Osmosis pulls water from bloodstream into lungs
15,000-30,000 cattle died in blizzard: S. Dakota vet

October 25, 2013 11:45 am

PIERRE, S.D. (AP) - State Veterinarian
Quade Ostrom says on Oct. 12, he heard what sounded like a small explosion or a loud bang when he was checking on a herd of cattle. When he got closer, he saw that the animals had died.

The National Guard was called in to help identify the cattle that died in the blizzard, which caused damages to the cattle industry.

The South Dakota Department of Agriculture said the blizzard caused damages to the cattle industry, and the state is working to help affected farmers.

The Department of Agriculture has set up a hotline for farmers to call if they have questions about the blizzard or the cattle industry.

A statement from the Department of Agriculture says, "We are working with the cattle industry to help them through this difficult time."
Observations: Following the Storm

- “Transport tetany”
  - Signs = Hyperexcitable → tremors → recumbency
  - Long-term feed & water deprivation
  - Rapid resumption of feed and water
  - Exacerbated by hypomagnesemia (grass tetany)
  - Fall green-up of pastures

- Bloating in calves
  - Disruptions in feeding
  - Rapid resumption afterwards → acidosis?

- Exertional rhabdomyolysis (“tying up”) in horses
  - Prolonged muscular exertion
  - Muscle cell damage → myoglobin release into bloodstream
  - Potential for kidney failure in extreme cases

- Behavioral changes – aggression in cows
Weeks Following the Storm

- Any long-term stress event:
  - Increased blood cortisol levels
  - Shift immune system towards Th-2 response (antibodies) & away from Th-1 response (CMI)
  - 2 weeks after storm

- Increased susceptibility to BRDC – especially native viruses

- Diminished response to vaccines

- Pinkeye

Weeks Following the Storm

- Changes in management
  - Weaning calves – starting on feed

- Reproduction
  - Fetal losses in very stressed animals
  - No evidence to suggest fetal losses will be widespread
  - Sublethal effects on fetus = ??
Lessons

- Be prepared for follow-up
  - Tetany conditions
  - Bloat
  - Pinkeye

- Manage feed resumption?

- Adjust management to allow for stress levels in cattle
  - Vaccines

- Animal ID

- Good management and proper animal care may not always be enough

What Came Afterwards?

- Tremendous support from throughout the World
Community Gatherings

- October 17: 1st event, City of Sturgis sponsored a steak dinner at Union Center
  - About 900 attended

- October 25 – November 2: Ranch Family Community Gatherings, Union Center, Faith, New Underwood, Belle Fourche, Hot Springs, Philip


- April 14-15: Livestock Disaster Program Community Gatherings, Hermosa, Eagle Butte, Interior, Union Center
Donations

- Rancher Relief Fund
- Heifers for South Dakota

Rancher Relief Fund

- Established October 8 by SD Stockgrowers, SD Cattlemen’s, SD Sheepgrowers
- Priorities:
  - Help hardest hit
  - Financial assistance to as many as possible
- Black Hills Area Community Foundation, SD Volunteer Organizations Active in Disasters, Lutheran Social Services, Catholic Social Services
- Accepted applications by or nominations of impacted producers
Rancher Relief Fund

- Results as of April 17:
  - Livestock losses reported: ~43,000 and counting
    - ~36,000 cattle/calves
    - ~6,500 sheep
    - ~500 horses
  - More than $5 million donated
  - ~$4.2 million distributed to 600 producers in January
  - Steering committee to distribute ~$1 million remaining in near future

Heifers for South Dakota

- Donations:
  - Quality breeding stock
  - Monetary
    - North Central Resource Conservation and Development Association of SD
  - Focused on young families and those starting out
    - 15-20 head to each
  - October 19: 350 head pledged, $11,000 donated
Heifers for South Dakota

- Donations as of January 18
  - 714 head of cattle delivered to 68 families
  - 176 head (mostly replacement heifers) to be delivered after AI
  - Value of donated cattle > $1.25 million
  - $265,000 monetary donations
    - Transportation costs
    - Purchased cattle to donate

Farm Bill

- Livestock Indemnity Program (LIP)
- Livestock Forage Loss Program (LFP)
- Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program (ELAP)
Acknowledgements

- SDSU Extension
  - Russ Daly
  - Dave Ollila
  - Warren Rusche
  - Dennis Todey
  - George Perry
  - Adele Harty
- SDSU Vet & Biomed Sciences
  - Dale Miskimins
  - Regg Neiger
- Colorado State University
  - Joe Neary
- SD Animal Industry Board
  - Dustin Oedekoven
  - Todd Tedrow
  - Mendel Miller
- South Dakota veterinarians
  - John Allan, Hermosa
  - Ethan Andress, Lodgepole
  - Scott Cammack, Sturgis
  - Vicki Cook, Rapid City
  - Erica Koller-Ross, Edgemont
  - Stephanie Stevens, Edgemont
- West River ranchers