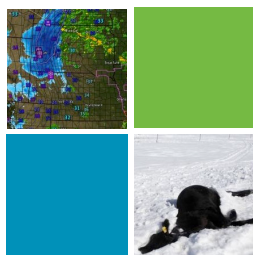


Animal Health Effects of the October South Dakota Blizzard: Observations



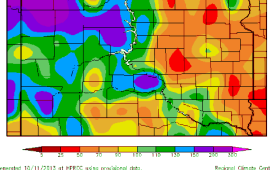
SDSU Extension

Russ Daly, DVM, MS, DACVPM
Extension Veterinarian
South Dakota State University

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Late Fall 2013

Percent of Normal Precipitation (%)
7/1/2013 - 9/30/2013



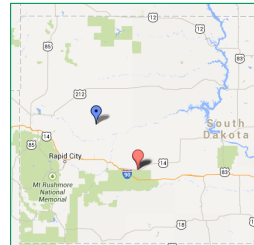
- Warmer than normal
- Good moisture
- Implications:
 - Fall forage green-up
 - High moisture
 - High protein
 - Lower energy
 - No need to wean early – calves nursing on pasture
 - Cows still on summer pasture
 - No winter coats yet

Generated 10/11/2013 at NCEM using provisional data. Regional Climate Center

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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 are literally "soaked to the skin"



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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%

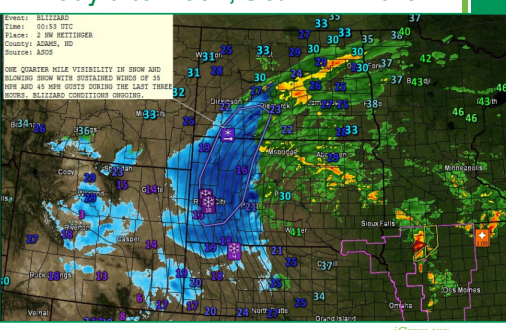
Coat Condition	Critical Temperature °F
Wet or Summer Coat	59°
Dry, Fall Coat	45°
Dry, Winter Coat	32°
Dry, Heavy Winter Coat	18°

Ref: Ames, DR; 1978

- 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

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Friday afternoon, Oct. 4: Blizzard



Event: BLIZZARD
Time: 00:00 UTC
Place: 2 NM WESTLINGER
Country: AMNO, SD
Source: ADOG

ONE QUARTER MILE VISIBILITY IN SNOW AND BLOWING SNOW WITH SUSTAINED WINDS OF 35 MPH AND 49 MPH GUSTS FOR THE LAST THREE HOURS. BLIZZARD CONDITIONS ONGOING.

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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

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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

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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

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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/O₂ exchange

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"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

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13-17889

LOPSY FORM

South Dakota State
Animal Disease Research & Diagnostic Lab
Box 2175, North Campus Drive
Brookings, SD 57007
email: sdsu.adrd@sdstate.edu website: http://sdstate.edu/vs
605.688.5171 605.688.6063 (fax)

DVM _____
Clinic Northern Hills Vet CL
Address 751 Pine View Dr
City Susquehanna
State SD Zip 57285
Phone 605-347-3806 Fax 605-720-1317


SPECIES Bovine # In Herd 120
Breed Angus # Dead 100
Age 3 Sex F # Sick _____
Animal ID Number(s) _____

CHECK ANY THAT APPLY:
 Diarrhea Pneumonia Lameness
 Abortion CNS Other _____
 Vaccinations _____

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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



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Observations: Following the Storm


- Bloating in calves
 - Disruptions in feeding
 - Rapid resumption afterwards → acidosis?
- Exertional rhabdomyolysis ("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



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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 vaccines
- Pinkeye



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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 = ??



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Lessons

- Be prepared for sequelae
 - 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



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