



# Virtual workshop series: Water quality and aquatic plant management

Natural Resources PFT

Kansas Center for Agricultural Resources and the  
Environment (KCARE)



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Kansas Center for Agricultural  
Resources and the Environment

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# Water quality and aquatic plant management

- Offered as a Professional Development Event in PEARS for county extension agents
- Date/Time: June 16 to June 23, 8:30 am to 9:30 am
- **Zoom Meeting ID: 952 6066 1935**

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**Kansas State University Agricultural Experiment Station and Cooperative Extension Service**  
K-State Research and Extension is an equal opportunity provider and employer.

# Schedule

- **Day 2: Water Contaminants affecting cattle health**
  - Thursday, 6/18, 8:30-9:30 a.m.
  - Presenter: A.J. Tarpoff, Assistant Professor and Extension Beef Veterinarian, Department of Animal Sciences and Industry, K-State
- **Day 3: Blue-green algae and its dangers to livestock and pets**
  - Tuesday, June 23, 8:30-9:30 a.m.
  - Presenters: Steve Ensley, College of Veterinary Medicine, Kansas State University; Scott Fritz, Kansas State University Veterinary Diagnostic Laboratory; Jody Holthaus, Extension Agent, Meadowlark District; and Elizabeth Smith, KDHE Bureau of Water



# Today's format

- If you haven't already, **please mute** your microphones.
- Speakers will present for 30-40 minutes
- Panelists will join the discussion at the end
- Please ask questions through the **chat** function (located at the lower part of your screen).
- Although our “end time” is posted for 9:30 a.m., participants are welcome to remain longer if they want to discuss the topic further.
- Please take a moment to participate in the survey.



# Water quality and aquatic plant management

## Water contaminants affecting cattle health

Thursday, June 18

# Speaker

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## **A.J. Tarpoff**

Assistant Professor and Extension Beef Veterinarian,  
Department of Animal Sciences and Industry  
Kansas State University

# Panelists

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**Jeff Davidson**, KCARE Watershed Specialist

**Michael Holder**, District Director, Flint Hills District

**Dale Lanham**, Extension Agent, Southwind District

**Cade Rensink**, District Director, Central Kansas District

# Water Contaminants that affect Cattle Health

A.J. Tarpoff DVM,MS  
Extension Beef Veterinarian,  
Kansas State University

# Importance

- Water: The most important nutrient!
- Water accounts for 60% of the body composition
- Needed for almost every bodily function



# Water Quantity

- Daily intake is depended on: **Size, age, pregnancy, lactation, ambient temperature, feed, humidity.....**
- Range of consumption for beef cattle
  - ~10 gallons for calves (feeders)
  - Up to 30 gallons for mature lactating COWS

# Water Consumption

- Rules of Thumb (not exact calculations)
  - 3x DMI in Fall, Winter, Spring
  - 5x DMI in Summer
- Perspective:
  - 2x greater water consumption at 90°F compared to 70°F



# Water Availability

- Trough space- 1.5 inches/head
  - 2-3in of linear trough space per head during heat stress
- Volume
  - Many waterers have summer and winter capacity levels
- Water supply lines
  - Pressure and flow capacity
    - Proper refill time to trough
    - Some suggestions say 1.1% body weight of the cattle per hour
      - Or 1.5 gal/hr for a 1000lb animal

# Water Quality

- Contaminants
  - Minerals (total dissolved solids)
  - Manure (coliform)
  - Microorganisms
  - Nitrates
  - Algae
- Appearance, odor, taste, pH



# Why do we care about water quality

- Directly impacts cattle health and performance
- Intake dependent on quality
- Managing and protecting the source is critical



# Water Source

- Pond
- Creek
- River
- Well
- Spring
- Rural water
- Etc.



# Cattle Preference?

- Cattle preference to drink from
  - Tank water from well or spring
  - Tank water from pond
  - Pond
  - Pool in stream
  - Flowing stream



# Contaminants

- Microorganisms
  - Fusobacterium, Leptospira, salmonella
- Dissolved Solids (minerals)
  - Salt, Sulfur
- Nitrate



# Microorganisms

- Fusobacterium:
  - Footrot!, laryngitis (wheezier), liver abscesses
  - Passed in manure. Can live in environment for 1-10 months
  - Skin damage provides portal for infection



# Fusobacterium

- Damp conditions predispose feet to damage
- **Ponds are a prime location**
- Water itself softens the skin of the foot



# Leptospirosis

- Many different serovars (5-way vaccine)
- Can cause abortions/mastitis in cows
- Can cause death and severe anemia in calves
- Spread in the **urine** of carrier animals



# Leptospirosis

- Transmitted by rodents, wildlife, carrier animals
  - (carriers replicate the pathogen in their kidneys for long periods of time)
- Transmission to cattle occurs primarily by ingestion of contaminated water



# Salmonella

- Causes many issues in cattle
  - Septicemia, diarrhea, acute death, etc
- Carrier animals shed bacteria in manure
- Rodents, waterfowl, flies, cats, dogs, raccoons can all spread this disease
- Consumption of contaminated water!



# Salmonella

- Can survive 4-5 years in soil and water
- Zoonotic!
- Difficult to manage once on an operation
- Typhoid Mary

# Other Coliform Bacteria

- E. Coli O157-H7
- Cryptosporidium
- Zoonotic potential!!

# Contaminants

- All of these pathogens are spread through manure and waste
- **Fencing off ponds** and having controlled access can help reduce the risk
- **Managing external parasites (stable flies)** can help minimize time animals spend in ponds





# Total Dissolved Solids

- TDS (dissolved salts and metals: calcium, magnesium, potassium, sodium etc.)
  - Depresses water intake, weight loss, diarrhea
  - Under 3000 mg/L considered satisfactory
  - Performance hindered above 5000 mg/L
  - >10,000 mg/L should not be used for cattle



# Salt Toxicity? (Salinity)

- Excessive sodium intake (feed or water) or
- Out of water events (mechanical failure, frozen source, unpalatable)
- Cattle clinical signs:
  - Neurologic (seizures, paralysis)
  - Colic/diarrhea
  - Possible death
- General recommendation: <0.5% total salt for livestock

# Sulfur

- Polioencephalomalacia (Polio or PEM)
- Neurologic disease
- Sulfur- $\rightarrow$  Hydrogen Sulfide in rumen
- Interferes with cellular energy usage- brain damage
- Cattle on pasture consuming water  $>1,000$ ppm at risk



# Nitrates

- Nitrate gets reduced to Nitrite in the rumen
- Nitrite inhibits hemoglobin in blood from carrying oxygen
- Blood turns brown!
- Comes from fertilizer runoff and improper manure management
- **Concentration during drought situations!!**
- Levels >300 ppm nitrate nitrogen considered toxic

# Safe Levels of Water Contaminants for Livestock

Element	Safe Upper Limit of Concentration
	(ppm or mg/L)
Aluminum	5.0
Arsenic	0.2
Barium	10
Cadmium	0.05
Calcium	1,000
Chromium	1.0
Copper	0.5
Fluoride	2.0
Lead	0.1
Molybdenum	0.5
Nickel	1.0
Nitrate	100
Nitrite	33
pH	5.5 to 9.0
Selenium	0.05
Sodium	1,000
Sulfate	500 to 1,000
Vanadium	0.1
Zinc	25.0

# Documented Production Effects

- 23% greater weight gain in heifers consuming well or spring water compared to pond water (Willms et. al.)
- Cattle avoid consuming water with .005% fresh manure (Willms et al.)
- 76% of the time cattle drink from a tank rather than pond with access to both
- Increased water consumption, dry matter intake, daily gain, and feed efficiency, decreased morbidity/mortality when offered rural water (1019ppm TDS), vs well water (4835ppm TDS). Patterson et. al 2003



# Water quality and aquatic plant management

**Upcoming session:** Tuesday, June 23, 8:30am

**Topic:** Blue-green algae and its dangers to livestock and pets

**Presenters:** Steve Ensley, K-State College of Veterinary Medicine; Scott Fritz, K-State Veterinary Diagnostic Laboratory; Jody Holthaus, Meadowlark District Extension Agent; and Elizabeth Smith, KDHE Bureau of Water

**Hosted by:** Natural Resources PFT and KCARE