

Factors Affecting Ketosis on a Large Southern Ontario Dairy Farm

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Introduction

- **Ketosis** is a metabolic disorder caused by an increased level of circulating ketone bodies especially during early lactation (diminished appetite, hard or dry feces, decreased milk yield, rapid weight loss)
- **Subclinical Ketosis (SCK)** is defined as a condition marked by increased levels of circulating ketone bodies without the presence of clinical signs of ketosis

Physiology

Negative Energy Balance + Low DMI



Low serum concentrations of glucose & insulin



Mobilization of body fat stores for energy



Release of NEFAs into bloodstream



Increases serum β -hydroxybutyrate (BHBA)

Introduction

- Ketosis can be primary or secondary
- Causes economic losses in herd by decreasing milk production and indirectly increases the risk of other periparturient diseases
 - DA, fatty liver, endometritis, mastitis, RP, infertility

Farm Description

- 150 cow well-managed Holstein dairy herd in Southern Ontario (July 8th - August 30th), milked in a double 12 parallel parlor and housed in a 4 row free stall mattress barn
 - **Herd production** (June 2010):
 - 36kg, 3.5% Butterfat, 3.1% Protein, 21% Pregnancy Rate
- **Fresh cow ration:** haylage, corn silage, straw, protein supplement, mineral
- **Dry cow ration:** straw, corn silage, protein, mineral

On Farm Cow Movement

Close up Group: moved 3 weeks before calving, straw pack with self-locking headgates, slatted floor along feed bunk



Immediately after calving: Dams are moved to fresh pen



14 days post-calving: move to free stall barn with milking herd (unless treatments needed)



Far Away Group and Milking herd: Free stall barn

Study Methods

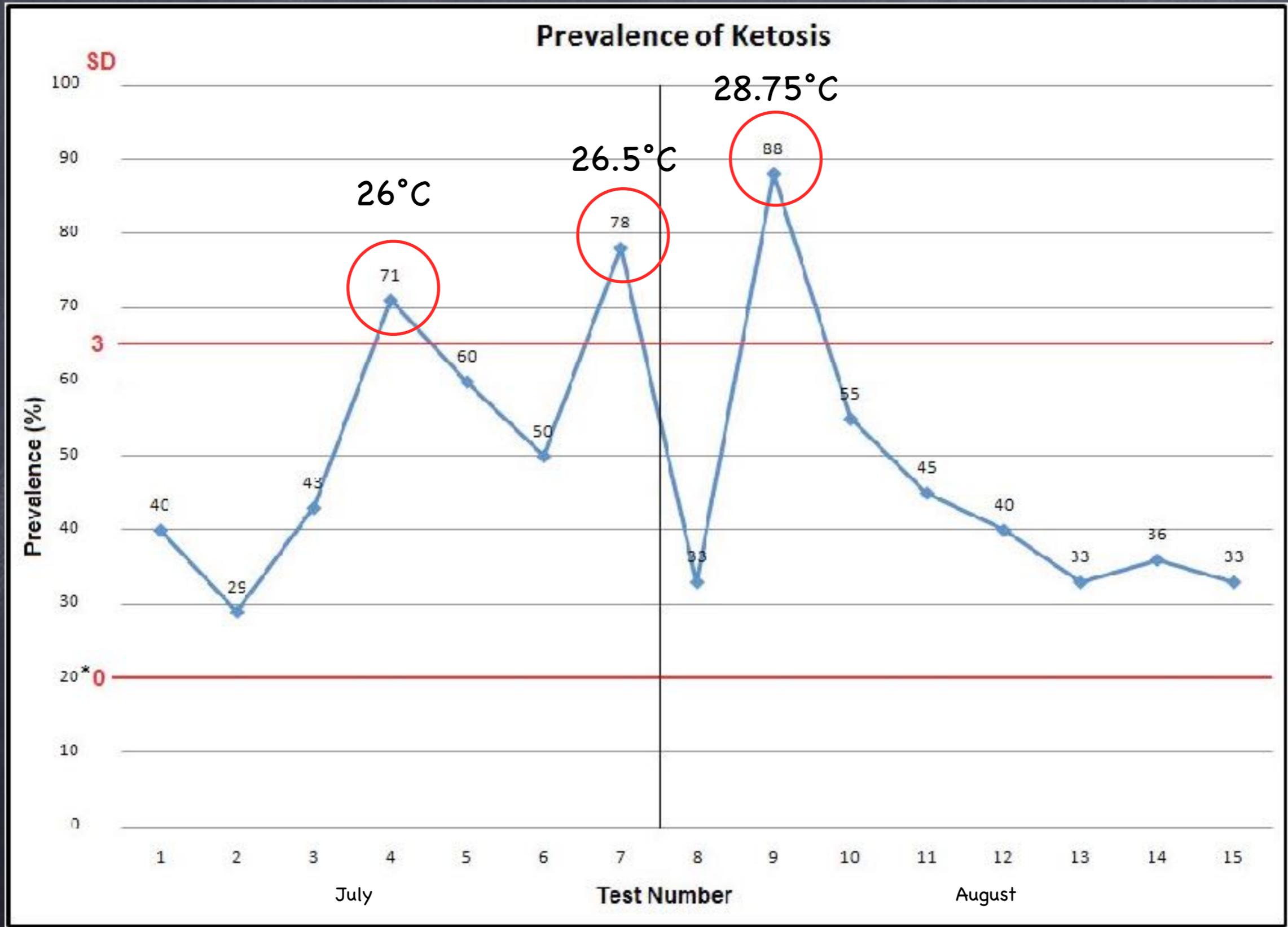
- Cows 0–14 days fresh were tested bi-weekly (minimum 4 tests/cow)
 - Physical exam with rectal temperature
 - Milk Keto-Test[®] strip (Elanco Animal Health)
- Results of $100\mu\text{mol/L}$ were drenched with 300mL of glycol or Ketamalt[®] (SCK)
- Results of $200\mu\text{mol/L}$ or greater were treated with IV dextrose and Vitamaster (Vetoquinol), pump with water + fresh cow energy blend + glycol or Ketamalt

Results

Prevalence of Ketosis

- Prevalence in the fresh cows was calculated for each test date and examined over two months (July + August)
- Elanco Animal Health data sheet
 - Criteria that suggests ketosis is an issue on the farm that requires investigation
 - Herd prevalence 3 std devs above the 20% prevalence on one test date
 - 8 consecutive herd tests above 20% prevalence

Prevalence of Ketosis



Laboratory Data

• Feed Samples

- Butyric acid level of 5.7% x 4.5kg Dry Matter
- Ensiled the haylage at 27% dry matter

• NEFA testing in close up dry cows

- All cows within normal limits

Disease Incidence

- 2 deaths in fresh cow group
- Slightly increased incidence of metritis in the fresh COWS
- 2 LDAs that were diagnosed and corrected with right flank pyloro-omentopexy

Discussion

Haylage containing Butyric Acid

- Clostridial fermentation of silage → butyric acid and protein degradation products
- Daily levels over 50–100g/head/day → can cause ketosis
- Daily levels over 200g/head/day → severe ketosis
- On this farm level was 250g/head/day → increase prevalence of ketosis but does not explain the peaks

Discussion

Heat Stress

- **Thermoneutral zone** for dairy cows: ambient temperatures of 5°C–25°C
- As milk production increases susceptibility to heat stress also increases
- On this farm the large peaks in the prevalence of ketosis seem to correlate to **multiple days of 26°C or greater temperatures**

Conclusions

- Fresh cow monitoring was a valuable tool as treatment of positive cows decreased the incidence of disease as a result of severe clinical ketosis in most cases
- **Methods to cope with heat stress:**
 - sprinklers at the feed bunk and parlor, appropriately placed fans, open curtains, avoid overcrowding of pens
- **Methods to deal with butyric acid fermentation:**
 - Divert, dilute or destroy the contaminated haylage
 - Can remove haylage from bunk 12–24 hours before feeding because butyric acid is volatile

Thank You!!!!



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