Internal parasites in beef cattle
Anthelmintic resistance

“… it would seem obvious that no country or industry group should consider themselves immune from the threat of anthelmintic resistance”

(Sutherland & Leathwick, Trends in Parasitology, 2011)
Why?

Anthelmintic resistance

Internal parasites affect productivity
Economic impacts

- Economic impact of technologies in beef production (Lawrence & Ibarburu, 2007):
  - Parasite control
  - Growth promoter implants
  - Sub-therapeutic antibiotics
  - Ionophores
  - β-agonists
Economic impacts

• Parasite control:
  – greatest impact
    • Cow-calf (23% ↑ weaning rates)
    • Backgrounding ($21/head in breakeven prices)
  – 2nd highest impact
    • Feedlot after growth promotion
      – 5.6% ↑ in ADG
      – 3.9% ↓ in feed-to-gain ratio
Economic impacts

- Kunkle et al., 2013
  - Slow-release, long-acting dewormer vs. control (untreated)
  - Grazing cattle, 3-12 months old

  Significant effect on ADG

  Even low levels of worms (8-24 epg)
Economic impacts

- Few results from Canada

- Western Canada
  - Net benefit of $4-7/treated animal (Bauck et al., 1989; Schunicht et al., 2000)
  
  - WBDC 2012, 2013:
    - Weaning weight ↑ 18-26 lbs (Roy Lewis; Merck Animal Health)
Disease

• Rarely clinical – young stock; first grazing season
  – Off feed
  – Diarrhea
  – Ill-thrift; weight loss

• More likely subclinical
  – ↓ weight gain
  – ↓ feed efficiency
  – ↓ reproductive efficiency
  – ↓ milk production
Many internal parasites
• Roundworms – most common
  – Brown stomach worm (Ostertagia)
Affected by climate & weather conditions

Life Cycle of the Cattle Gastrointestinal Parasite *Ostertagia ostertagi*

- Parasite survives winter in soil/pasture and inside the cow/calf
- Pasture contamination with eggs occurs in spring/summer
- Eggs pass out in feces where they develop to infective L3 larval stage
- Larvae survive winter! 90% in bottom 4”
- Spring pasture contamination

Life cycle figure credit: Matilde Tomaselli and John Gillear; this work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License
Access to pasture = greatest risk for roundworms
Parasite burden in Canadian beef?

• Calves 14 SK cow-calf operations:
  – Significant ↑ in burden during grazing season (Jelinski et al., 2015)
Parasite burden in Canadian beef?

• 54 herds (BC, AB, SK, MB, ONT, QC)
• 20 grazing calves/herd

Image & data credit: John Gillear, UCVM; http://www.beefresearch.ca/research-topic.cfm/internal-parasites-50
The threat

Anthelmintic resistance

= heritable reduction in sensitivity of a parasite population to the action of a drug

→ The more often a dewormer is used the faster resistance develops

→ Suspected when poor response to treatment
Diagnosing parasite resistance

Difficult in early stages

Easier later but too late

Need at least 25% of parasite population in a herd resistant before laboratory diagnosis possible

Figure credit: Matilde Tomaselli and John Gillear; this work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License
Resistance in Canada

- 54 herds (BC, AB, SK, MB, ONT, QC)
- 20 grazing calves/herd

Colors indicate % reduction in fecal egg counts following ML pour-on treatments.
Resistance in Canada

Majority of farms: treatment failure*

Colors indicate % reduction in fecal egg counts following ML pour-on treatments

Image & data credit: John Gilleard, UCVM; http://www.beefresearch.ca/research-topic.cfm/internal-parasites-50
Going forward

Need to:

1. Maximize production; minimize risk of disease – use dewormers

2. Minimize development of parasite resistance – use less dewormers

→ Practical challenges to sustainable internal parasite control
Parasite risk, resistance development varies between operations

Control strategies vary between operations

• Cow-calf operations
6 weeks after turnout
The concept of refugia

Don’t treat entire herd

Leave 10-20% of cattle in best condition untreated

http://evolution.berkeley.edu/evolibrary/article/agriculture_04
Monitor parasite burden
Pasture management
Rotate species or co-graze
Deworm effectively & correctly
Isolate & treat new herd addition
Summary

- Reliance on chemical dewormers becoming unreliable
- Industry needs to be prepared
- Need to have locally derived information
- In the meantime: adopt strategies to slow resistance