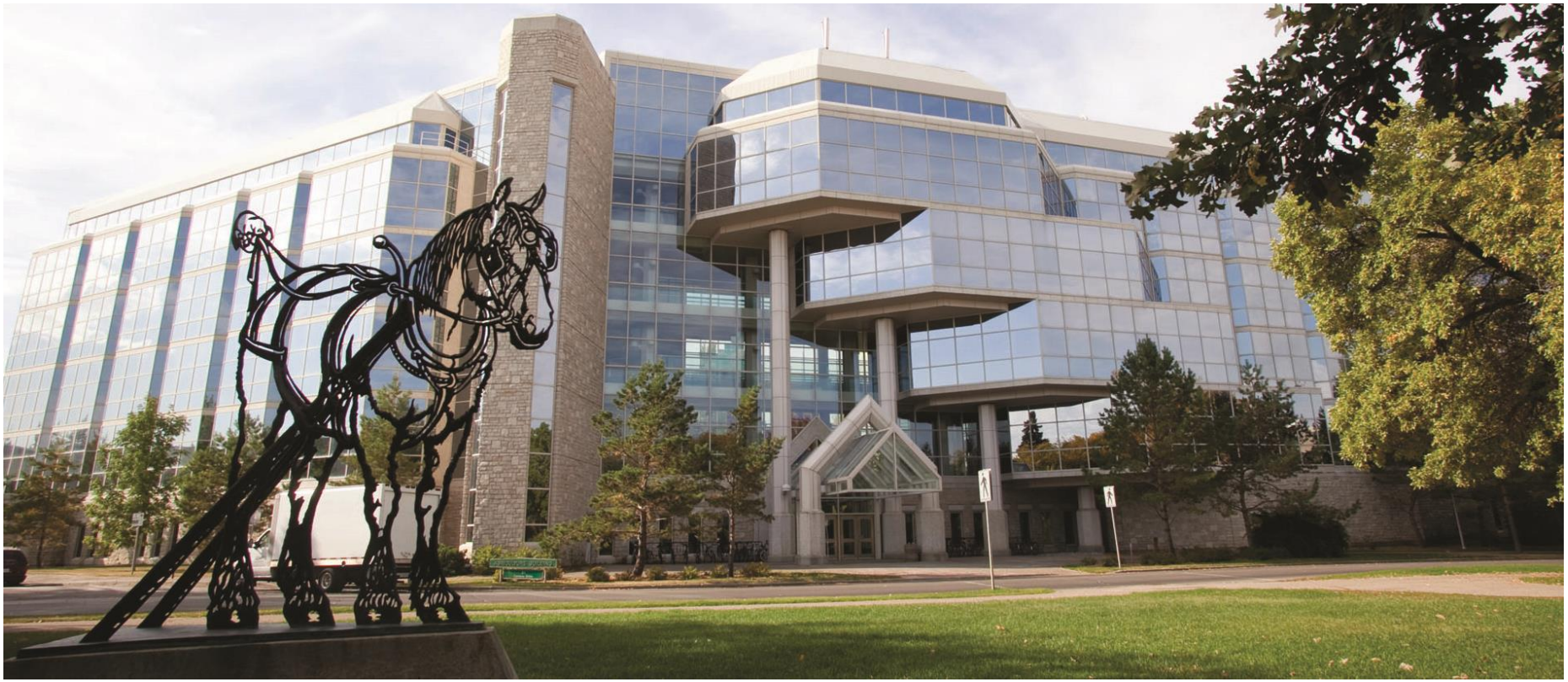


Adoption of new technologies by the forage/beef industry in Canada

Bruce Coulman

University of Saskatchewan

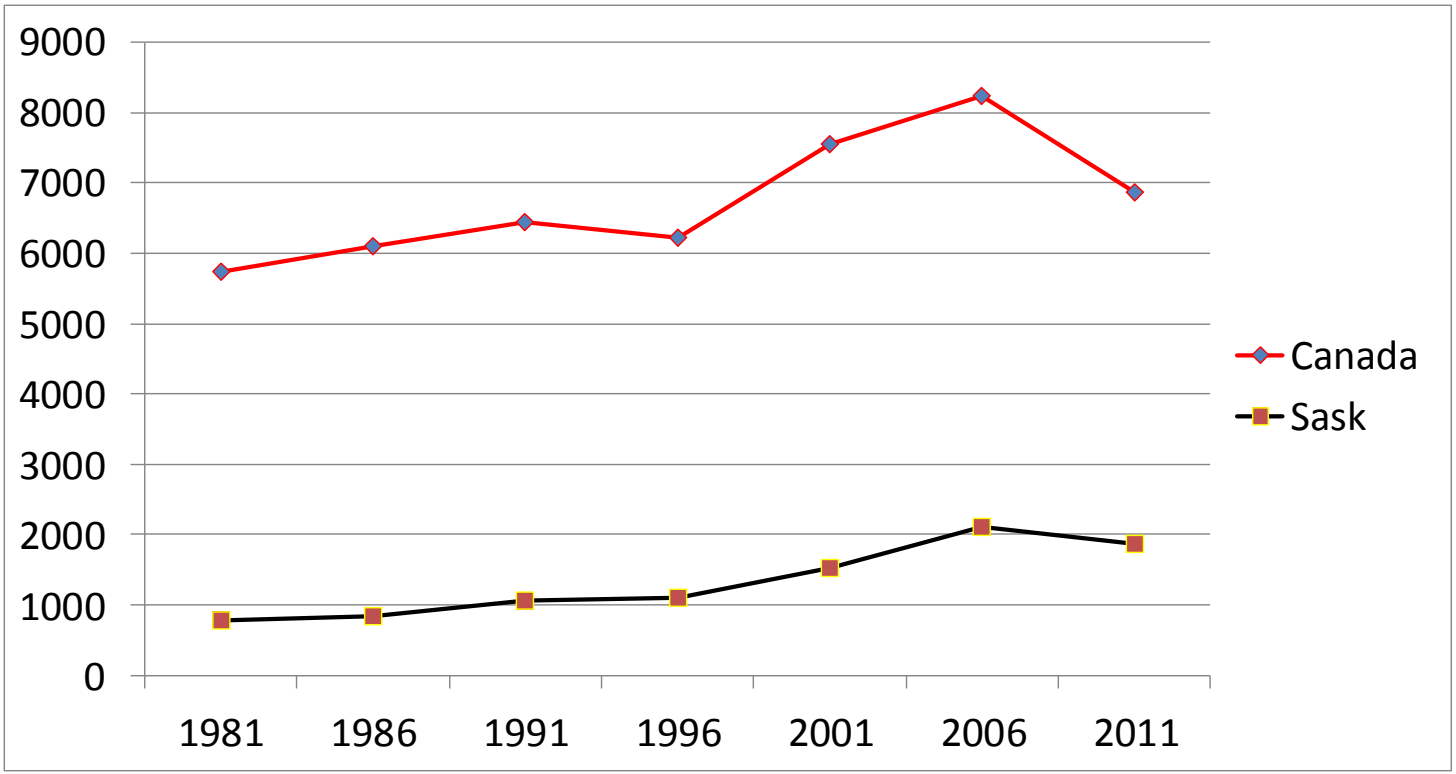
Adoption of New Technologies in Canadian Agriculture 1970 - 2016

- No-till farming
- Reduction in area of summerfallow
- Increased production of canola and pulse crops, and more recently soybean
- Genetically modified canola, corn, soybean

Technology Adoption and Research Support in the Forage Sector

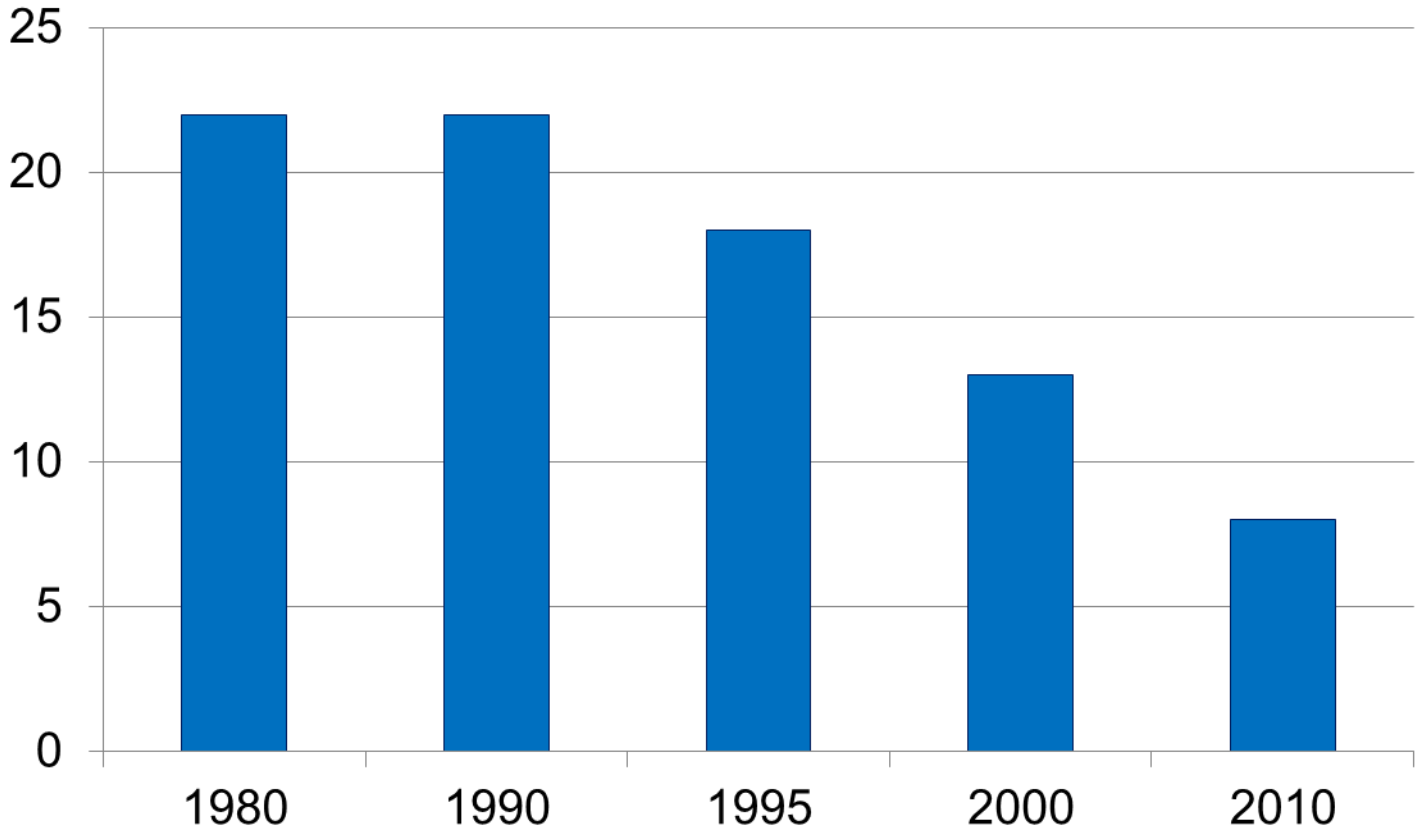
- It was often stated that industry did not adopt new technologies from forage research programs, thus little impact
- Support for public forage research declined between 1980 and 2010
  - Loss of two thirds of forage scientists
- Recent increase in support and hiring of forage scientists

Tame hay ('000s ha) 1981-2011



Census of Canada

Number of Forage Researchers in Western Canada



Source: J. Clarke, 2011

So, what has changed since the 1970s? What technologies have been adopted and what has been the contribution of public research programs?

- Use of new varieties and species
- Round bale silage
- Fall and winter grazing

What are the changes since the 1970s in what producers are growing in their perennial forage fields?

- New crop types
- New varieties

Ninety-Four Years of Perennial Grass Breeding Program

- University of Saskatchewan/Agriculture and Agri-Food Canada, Saskatoon
  - Began in 1922
  - R.P. Knowles (1941-1998)
- Agriculture and Agri-Food Canada, Swift Current
  - Began in 1947
  - T. Lawrence (1954-1989)
- These programs developed most of the cultivars used by producers in the region

Bob Knowles

Tom Lawrence

Significant cultivars released from the Saskatoon and Swift Current perennial grass breeding programs.

Species	Cultivar	Year of release	Characteristics or Use
Crested wheatgrass	Fairway	1932	First Canadian cultivar. Used to revegetate large area of eroded land in 1930s.
Smooth bromegrass	Carlton	1961	High forage and seed yields. Still used.
Intermediate wheatgrass	Chief	1961	Improved forage and seed yields. Still a popular cultivar.
Russian wildrye	Swift	1978	Improved seedling vigor and superior stand establishment.
Meadow bromegrass	Fleet	1987	Improved seed yield and quality. The most widely used cultivar.
Hybrid bromegrass	Knowles	2000	First hybrid brome cultivar. High hay and pasture yields.
Hybrid wheatgrass	Saltlander	2004	High salinity tolerance with high forage nutritive value.

Meadow bromegrass (*B. riparius*)

- Introduced to Canada in 1980
- Faster regrowth and early and late season growth than smooth bromegrass
- Significant improvements made in forage and seed yield
- Now one of the most widely seeded pasture grass in the Canadian prairie region

Introduction and Adoption of Meadow Bromegrass

- 1966 – Release of the variety Regar in U.S.
- 1970s – testing of Regar by Bob Knowles
- 1980 – Regar registered in Canada
- 1987 – the varieties Paddock and Fleet released
- 1993 - Publication of production guide
- 2000 – A leading pasture grass in western Canada
- Late 1990s – tested and recommended in eastern Canada
- 2007,08 – release of Admiral and Armada

Research Leading to Release and Adoption of Meadow Bromegrass

- Evaluation of hay and simulated grazing performance in 1970s – AAFC Saskatoon
- Initiation of breeding program in late 1970s – release of Paddock and Fleet with higher seed/forage yield
- Multi-location evaluation for hay and grazing – Melfort, Swift Current, Lacombe, Beaverlodge and eastern Canada
- Seed production management – importance of fall N fertilization and removal of residue
- Further breeding which resulted in release of Admiral, Armada

Development of Hybrid Bromegrass

- Crosses between meadow (2n=70) and smooth (2n=56) bromegrass
  - Fertile progeny
- Dual purpose type of grass
  - High first cut yield like smooth brome
  - More rapid regrowth like meadow brome
- Two cultivars released
  - AC Knowles and AC Success
  - have been widely adopted

Meadow brome

Hybrid brome
B. riparius X B. inermis

Smooth brome

Research supporting development and adoption of hybrid bromegrass

- Initial crosses made in 1978 by Bob Knowles
- More than 20 years of selection and evaluation
- Regional forage testing
- Grazing trials at WBDC Termuende and AAFC Swift Current
- Release of AC Knowles in 2000 and AC Success in 2003

Baling and Storage of Hay

- Change from small rectangular to large round bales
- Round bale silage


NEW HOLLAND


GEHL 1450


MF
MF
275

Round Bale Silage

- Large round bales are more densely packed so have to be drier
- Good drying conditions less common in eastern Canada
- Methods developed to partially dry hay in field, bale it and cover with plastic to exclude oxygen
- Useful for beef producers as it allow silage storage with no large investment in establishing tower or bunker silos

Research Supporting Development and Adoption of Round Bale Silage

- A number of sites in eastern Canada – 1980s, early 90s
- Evaluation of degree of fermentation in non-chopped forage
- Optimum moisture percentage - 50-60%
- The key was to prevent entry of oxygen

Bale Wrapper

Fall and Winter Feeding of Beef Cattle

- Winter feeding is a significant cost in beef cattle production
- Traditional winter feeding systems provide hay to animals in a feed yard
- Extending the grazing season into the fall and winter has been shown to reduce winter feeding costs
  - More than 50% in some cases


Drylot Pen Feeding

Research in Fall and Winter Grazing Systems

- Early work by Duane McCartney in Melfort
- Vern Baron and Duane at Lacombe
- Bart Lardner, Kathy Larson at WBDC
- Many on farm demonstrations led by provincial forage specialists or applied research organizations
- Many different projects – eg. cutting time, nutritive value, stockpiling time etc.
- Still many active projects

Fall and Winter Grazing Systems

- Swath grazing of barley or oat
- Bale grazing
- Grazing stockpiled perennial forage
- In field grazing of crop residues/chaff
- Grazing standing corn

Swath Grazing

Bale Grazing

Grazing Crop Residues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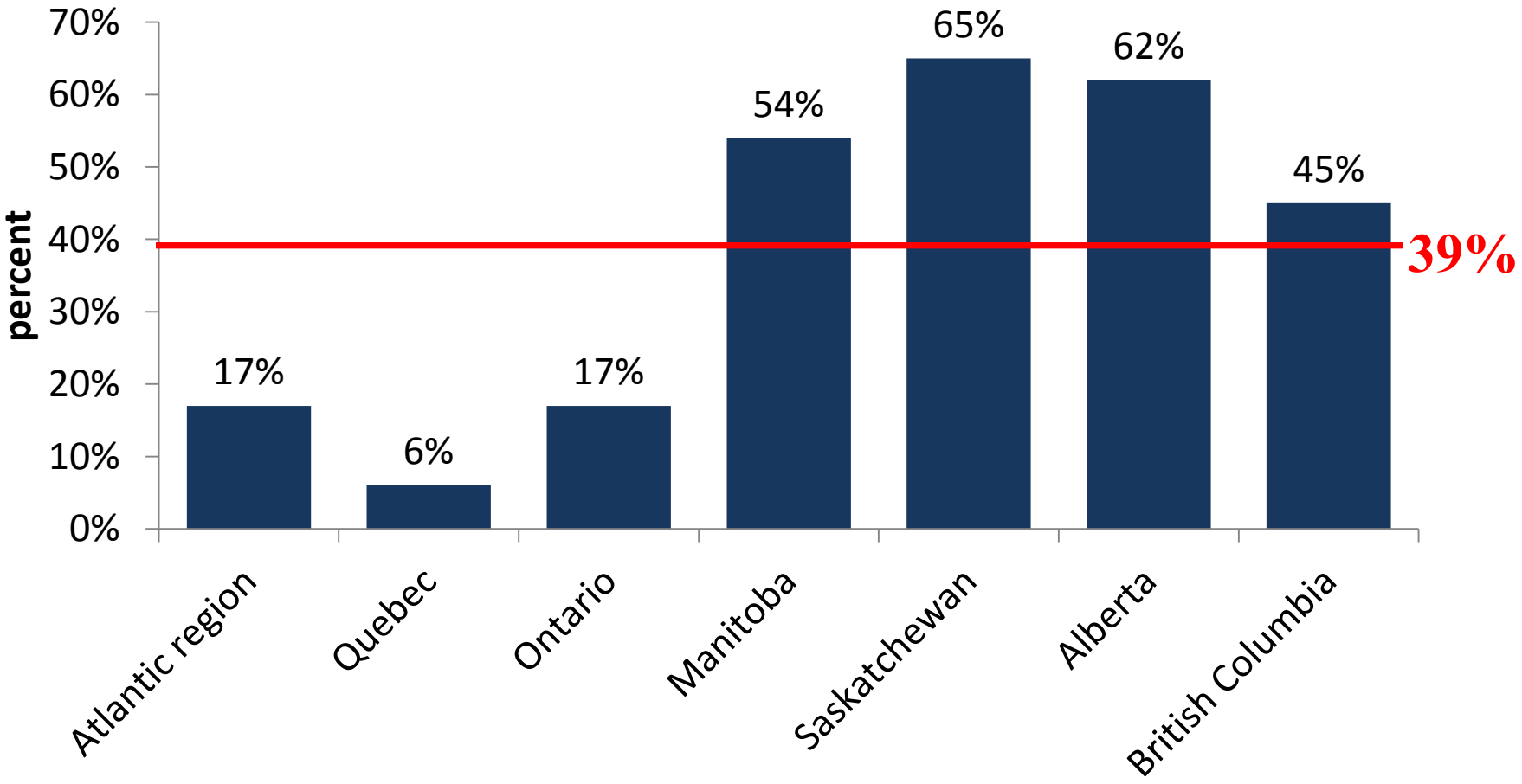
Farm Env Mgt Survey (FEMS)

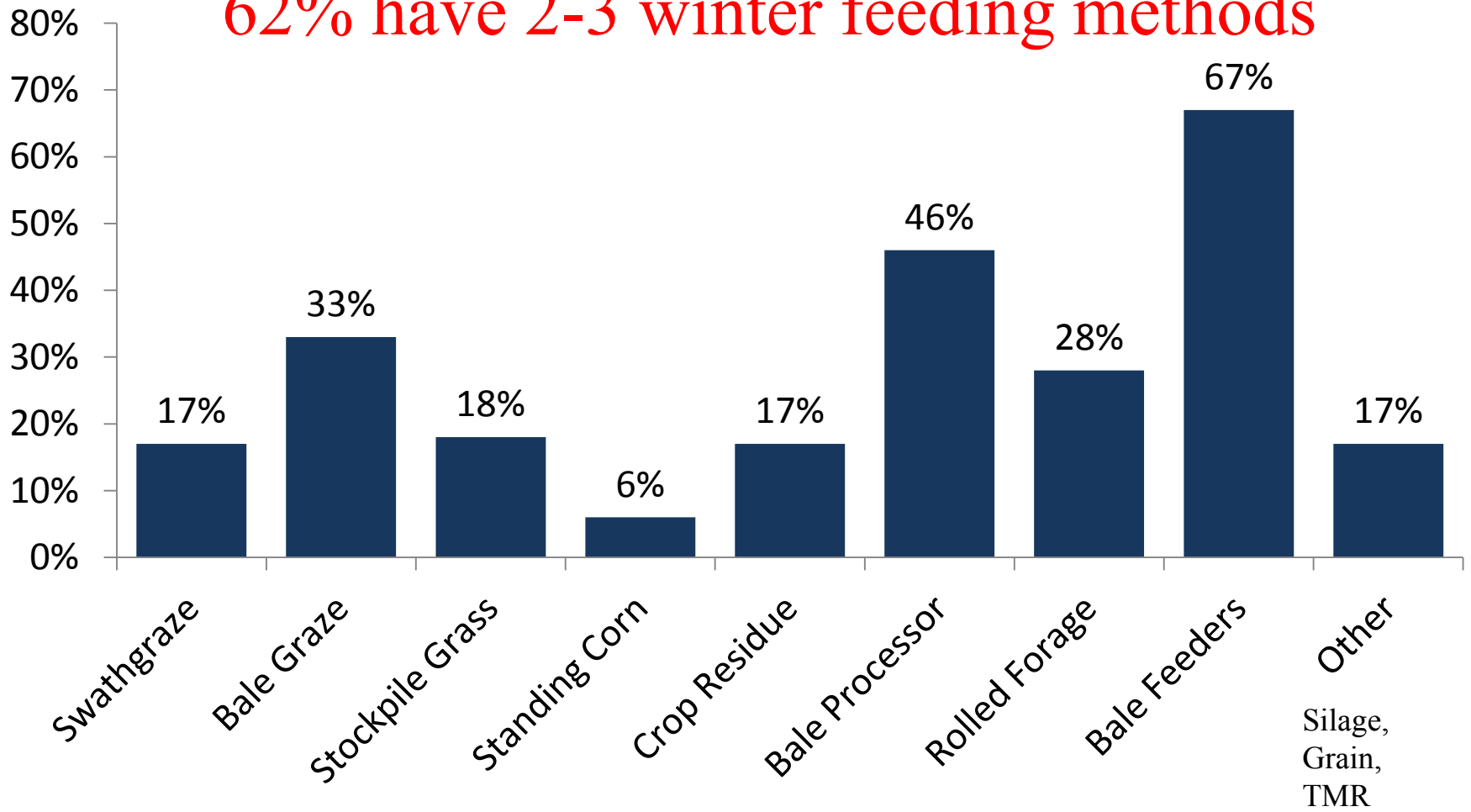
- ~40% of Canadian farms use extended grazing



Source: http://www.statcan.gc.ca/pub/21-023-x/2013001/part-partie1-eng.htm

Winter Feeding Methods

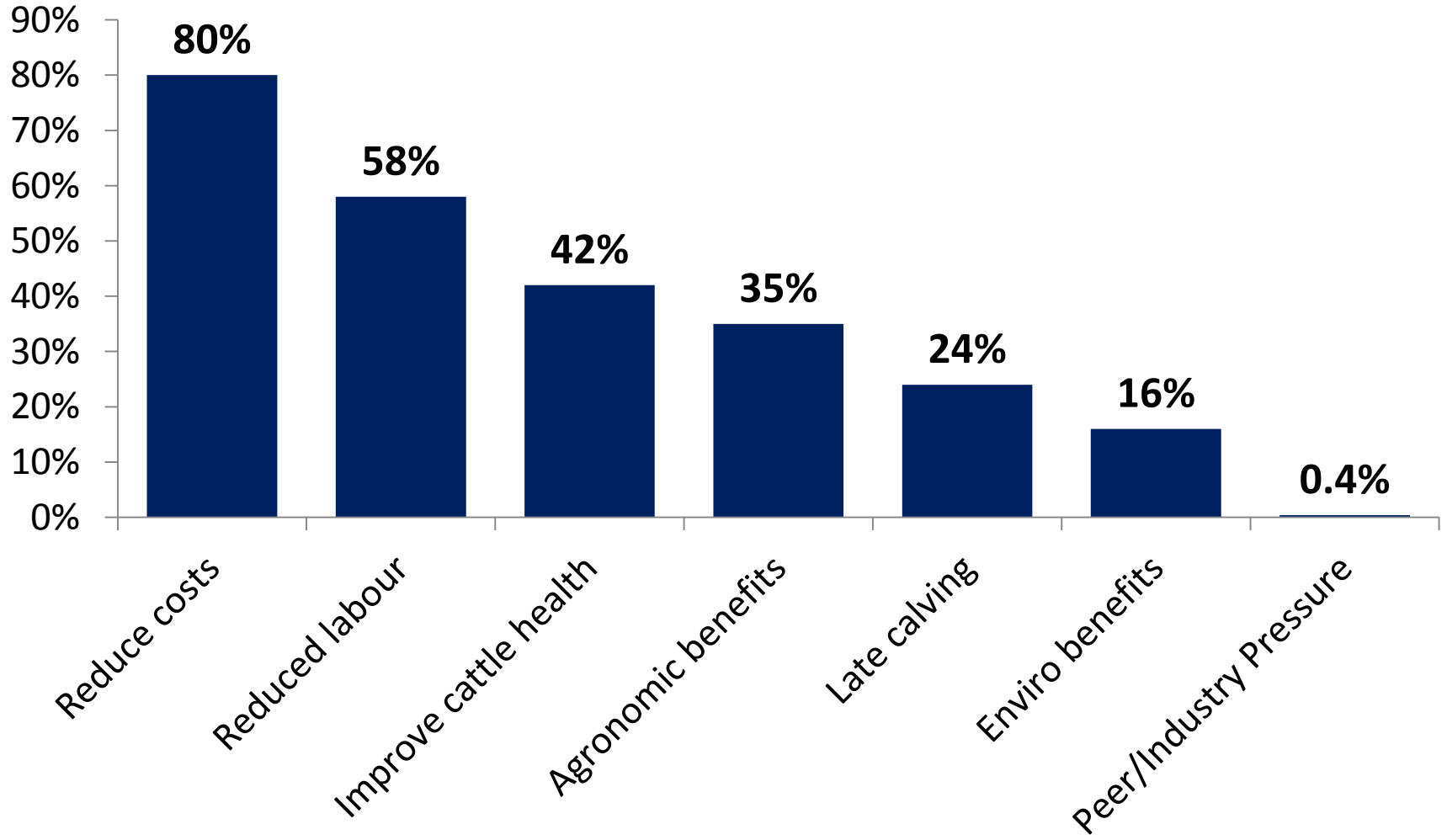
62% have 2-3 winter feeding methods



Source: WCCCS 2015

Sheppard et al, 2015

- Reasons to Winter Graze:



In Summary: Adoption of New Technologies

- New varieties of perennial grasses
- New crop types
- Round bale silage
- Fall and winter grazing systems

What is on the Horizon for the Next 40 Years?

- Increased adoption of fall/winter grazing systems
- Availability and adoption of bloat-free alfalfa
- Increased use of non-bloating legumes
- Adoption of improved varieties developed through the use of genomic analysis in plant breeding programs
- Multi-species cover crops?

Acknowledgements

Kathy Larson and Bart Lardner

Western Beef Development Center