

End-to-end sustainability

### The Role of Forages In Environmental and Carbon Policy

Karen Haugen-Kozyra, MSc, PAg. Eighth Annual CFGA Conference Nov 14-16, 2017 Guelph, ON



# Viresco Core Business

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Note: Helped to establish Alberta's now 10 Year Old Carbon Offset Market in 2007; to date over 50 Million tonnes of Carbon Reductions/Credits generated across all sectors, and in the Ag Sector, 12 million tonnes of sequestered carbon for a revenue injection of \$150 to \$170 million

### Canada's Carbon Cycle Bio-based Opportunities to Reduce, Remove and Replace



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# National Beef Sustainability Assessment



CCEMC Funded Analysis (UofA) 2012-2017 (Bork, Carlyle et al):

Annual increase in grazed lands in AB:

- 0.5% per year
- Potential over 10Mt CO2 eq in additional offset credits in Alberta every year from grazing lands

•If regulatory frameworks in Canada were to put a price on carbon. Estimate based on conversion of carbon to CO, eq. at \$15/ tonne low range from AB. BO. Find the facts at www.crsb.ca

# Biological Carbon Canada – 30% of the Potential Reduction FCRN (2011)

#### Reduction Potential to 2020

#### Canadian Constrained Potential Emission Reductions (Mt CO2e/yr)



#### SUMMARY Grazed and confused?

Food Climate Research Network

Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question – and what it all means for greenhouse gas emissions



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Sources: http://ccemc.ca/wp-content/uploads/2012/12/Enhancing-wivenmental Change Institute University of Oxford and http://www.ico2n.com/about/ico2n-research/the-delphi-and-ico2n-studies Please see the full reports for additional information on assumptions

# Pan Canadian Framework on Climate Change

- Identifies 44 MT of  $CO_2$ e reductions between now and 2030 agriculture, forestry and municipal waste (3.8 MT per year)
- "Continued innovation and clean technology in agriculture will build on past GHG reduction successes of decreasing emissions per unit of production"
- Carbon Pricing Schedule Federal Regulatory Backstop tax, cap and trade or a hybrid approach \$50 tonne by 2022.



Prime Minister Justin Trudeau and First Ministers in Vancouver.

### Pan Canadian Patchwork



## Forage-Based Protocols

- Three Kinds GHGs reduced or avoided from
  - -Land Use Change (annuals to perennials)
  - -Practice Change new practices
  - -Avoided Land Use Change (financial pressure to convert)
- Two Types of Programs:
  - -Compliance-based markets (Canada, California)
  - –Voluntary Programs (American Carbon Registry- ACR, Climate Action Reserve - CAR, Verified Carbon Standard -VCS
  - \*Only 1 protocol exists for changes in grazing practices under the Verified Carbon Standard, but no uptake has occured

# Forage/Grasslands Protocol Space

### 1. Compliance-Based – Canada (developing)

- a. ON/QUE Avoided Conversion of Grasslands
- Alberta land use change DRAFT Cropland Conversion to Perennial Forage

### 2. Voluntary – US and Global

- a. CAR Avoided Conversion of Grassland Project Protocol (GPP)
- **b.** ACR Avoided Conversion of Grasslands and Shrublands to Crop Production (Ducks Unlimited; 40,000 tonnes in N. Dakota)
- c. ACR Methodology for Grazing Land and Livestock Management
- **d.** VCS Methodology for Sustainable Grassland Management (practice change)
- e. VCS Methodology for the Adoption of Sustainable Grasslands through Adjustment of Fire and Grazing
- f. USDA 2015 Grant– Terra Global Capital/Climate Action Reserve scoping a Rangeland Management Protocol

# Protocols

- Designing initial protocol approach
  - Rules too complex = few projects, little learning
  - Rules too loose = false credits, less reductions; credibility issues
  - Strong Science Basis is the Key
  - Start with something practical (First Generation Protocols)
  - Learn by doing, revise/update in 5 years

Don't let the perfect be enemy of the good

## Based on ISO 14064:2 – Guided by Principles/Offset Definitions

#### Tying Scientific Links between BMPs and GHG Quantification



### Dr. Brian McConkey, AAFC – Complexity has held back Practice Change in National Emissions Inventory

- For practice-based estimtates we need:
- 1. Categorization of practice
- 2. Time series data on the use of that practice category
- 3. Science for C change for that practice
  - Grazing practices of interest are complex with multiple paddocks having different plant species and productivity and are highly adaptable depending on weather, pasture condition/carryover, alternate feeding opportunities, herd characteristics, manager's economic goals, etc.

# Drs Bork-Carlyle (UofA) Recent & Current Research Underway

- 2012 15 Carbon benchmarking study\* (107)
- 2012 15 Agroforestry impacts on C and GHG (36)
- 2014 17 Litter decomposition in grasslands\* (15)
- 2015 18 Comparative GHGs in relation to grazing\* (15)
- 2014 18 Beef and biodiversity (LS) (>100)
- 2014 17 Pollinators and rangelands (35)
- 2015 19 Drought x defoliation study on EG&S (7)
- 2016 20 AMP grazing and EG&S# (LS) (24)
- 2016 19 Microbes and GHGs# (LS) (24)

# Global Research Alliance on GHGS in Agriculture – 5 y AGGP in Canada

### 1. CFGA Project (Canada-wide):

- -C Sequestration Quantification Protocol for Canada
- -BMP Implementation Manual for forage producers, researchers, extenders

-Pilot the Protocol/extension workshops

### 2. UofA Project (3 Prairie Provinces):

- Compare grazing practices (AMP vs non-AMP) 36 ranches
- Measure SOC, GHG flux, Albedo, Vegetation, Water Infiltr'n, Biodiversity,
  Key Microbial Indicators
- Calibrate a bio-geochemical, predictive GHG model (DNDC)
- Develop draft grazing management protocol\*

\*(Large Team – Mark Boyce (lead); Ed Bork, Cam Carlyle, Scott Chang, Bharat Sureshta, Karen Thompson (UofA), Viresco Solutions, Ray Desjardins, Ward Smith, (AAFC) Dr. Bill Salas (DNDC), Steven Apfelbaum, Ry Thompson (AES), Richard Teague (Texas A&M)<sub>TIONS</sub>

### Dr. McConkey - Grasslands and Pastures <u>Not</u> Included in Inventory Except for Exchange with Cropland

Conversion to/from annual cropland has a factor in the inventory – we can work with this!

However C change on pasture itself has issues with:

- 1. Complexity
- 2. Quantification

But –the numbers are there to support a Protocol!



Avoided Conversion of Grasslands Ontario-Quebec Protocol Adaptation Process

Based on CAR Grasslands Protocol V1

- Test 1 are your lands suitable for annual cropping (CLI/LSRS 1 to 4; maybe 5 to 6)
- Test 2 Are your lands under financial pressure to convert (appraisals for value of crop vs forageland)

-Determine the 'Crop Premium' thru real estate appraisals

 Quantification Method - Compile the National Emissions Inventory Emission Factors for Soil Carbon Change and N<sub>2</sub>O emissions from fertilizer applied to crops – Ecoregion level

### Thank-You!

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