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Can you C the grassland?

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UNIVERSITY
OF MANITOBA

National Centre for Livestock and the Environment

- A **multidisciplinary, team-based, whole-system** approach towards finding solutions and creating opportunities within agricultural production **systems**
- It is:
 - research, education, training and public engagement based on whole systems in agriculture
 - people and partnerships
 - needs driven, outcomes oriented



Beneficial Management Practices for GHG Mitigation from Agroecosystems, with Emphasis on Cow-Calf Non-confinement Production Systems in Western Canada

Agricultural Greenhouse Gas Program: 2011-2015

- U. Manitoba: B. Amiro, W. Akinremi, E. Khafipour, K. Ominski, M. Tenuta
- U. Sask: S. Kulshreshtha
- U. Waterloo: G. Dias
- + many collaborators



Net CO₂ exchange and carbon budgets of a three-year crop rotation following conversion of perennial lands to annual cropping in Manitoba, Canada.

Taylor, A.M., B.D. Amiro, and T.J. Fraser. 2013.
Agricultural and Forest Meteorology 182-183: 67-75

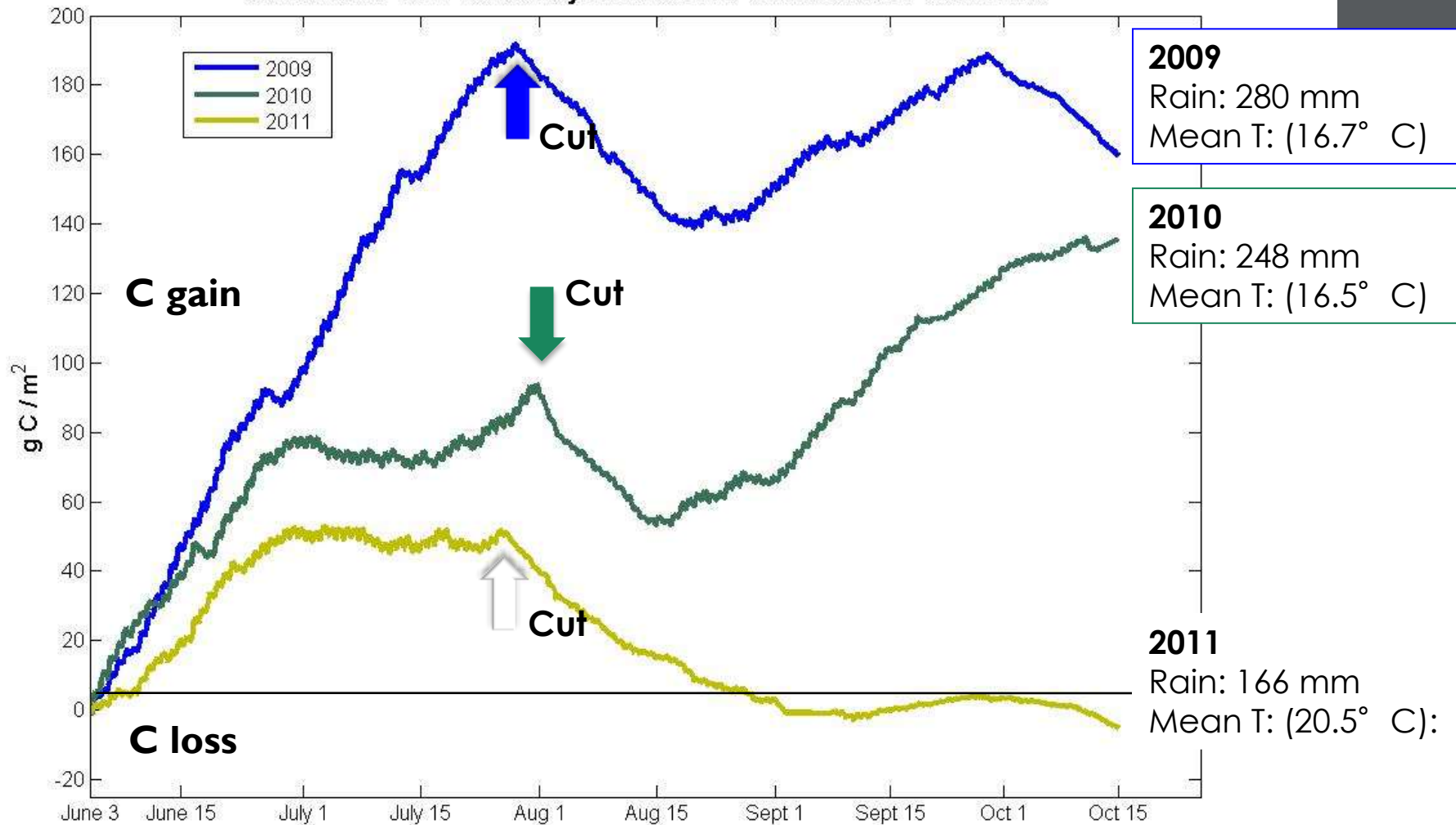


Methods

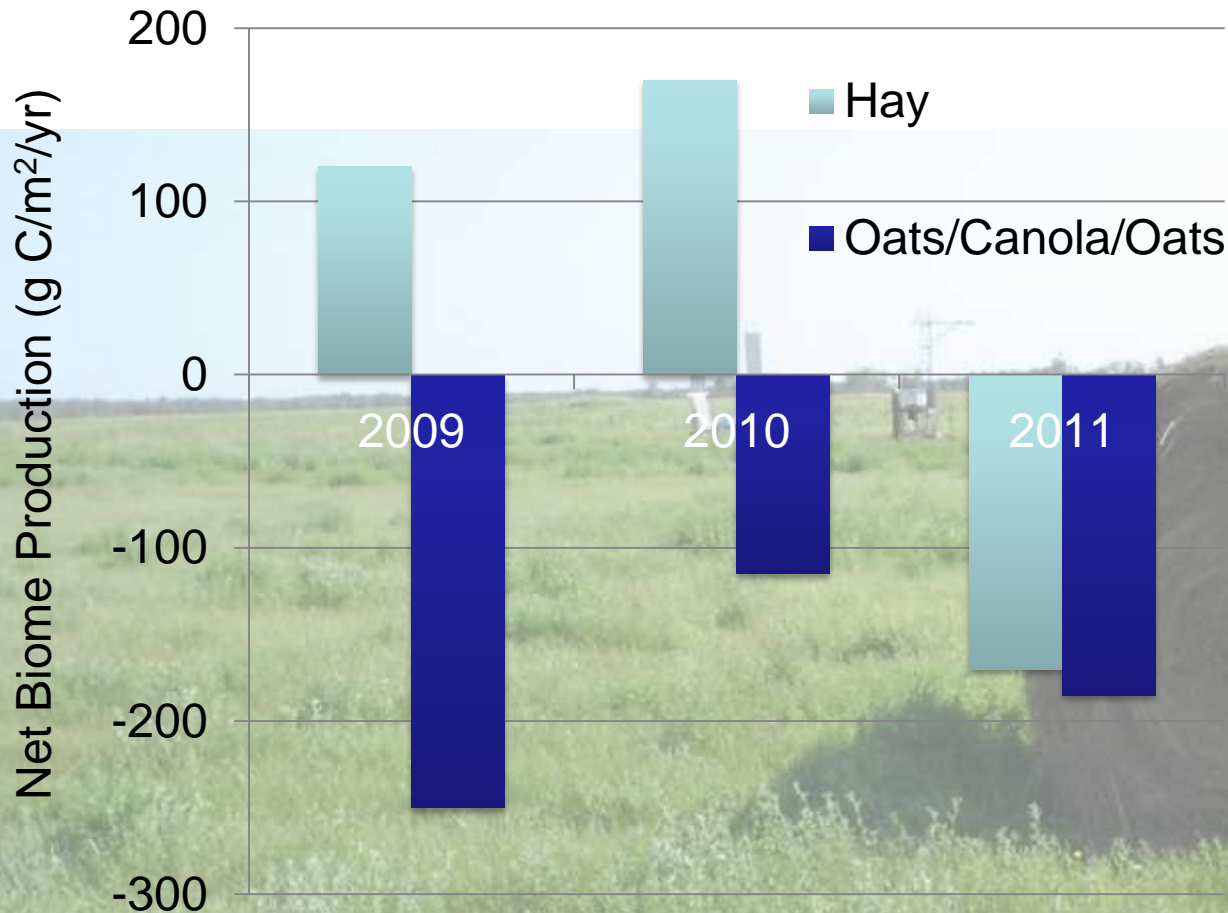
- Eddy covariance flux towers were used to measure net ecosystem production over three adjacent agricultural fields in Manitoba, Canada,
- 2009 to 2011
- Two fields were converted from long-term perennial hay/pasture to annual cropping, while the third field served as a control.
 - Field 1: oat-canola-oat rotation,
 - Field 2: hay-oat-fallow rotation.
 - Field 3: hay/pasture (control)



Cumulative NEP for a Hay Field over 3 Consecutive Summers



Flux towers show C gain by hay and C loss by annual crops in Manitoba (Net C including harvest: Positive is C gain)



Note: 2011 was a drought

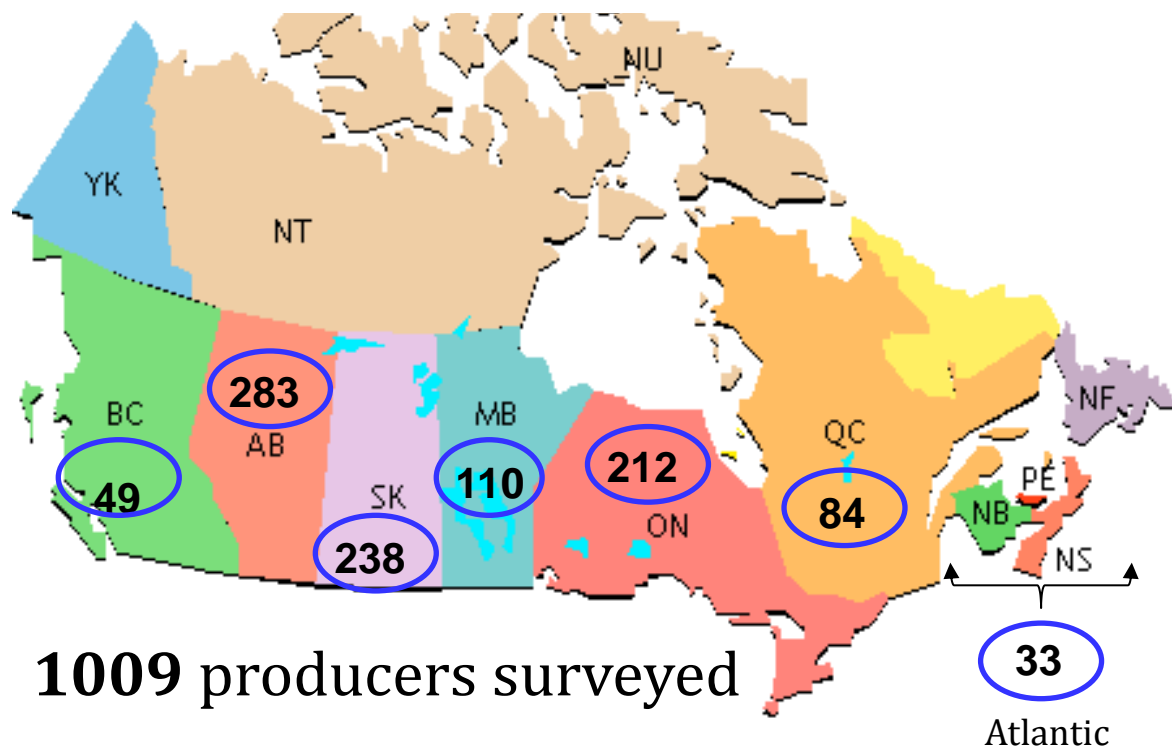


Greenhouse Gas fluxes from a backgrounding steer operation

- Brandon Research Centre: 100 steers; bale grazing, summer pasture, swath grazing; 12 months; CO₂, CH₄, N₂O fluxes measured using micrometeorology method



Canadian Beef Cattle Production Survey: Data being used to identify GHG Beneficial Management Practices



The Survey:

- Basic information on the production system.
- Feeding management.
- Grazing management (winter and summer).
- Seasonal feeding areas.
- Feeding management in barns and feedlots.
- Manure handling, storage and application.
- Use of shelterbelts.

Preponderance of management practices for harvested perennial forages

Pasture management	Perennial	SE
Legume content (% of sward)	42 (n=757)	0.9
Fraction (%) of forage-production land on each operation (n=866) used to produce:		
hay,	73	1.1
silage	7	0.6

Preponderance of summer pasture management practices for tame, native and annual-crop pastures

Pasture management	Tame pasture (n=323)	SE	Native pasture (n=367)	SE
Continuous grazing (% of operations)	25	2.4	35	2.5
Pasture rested (% of operations)	16	2.0	31	2.3
2-3 paddocks (% of operations)	21	2.3	16	1.9
3-4 paddocks (% of operations)	37	2.6	18	2.0

Trace Gas Manitoba (TGAS MAN)

Continuous simultaneous measurement of CO₂ and N₂O over agricultural land.

Numerous publications and collaborations with topics ranging

- N₂O fluxes
- CO₂ fluxes
- Crop rotation contribution to fluxes
- Legume crops
- Residue decomposition
- Modelling of N₂O



Greenhouse gas intensity of six yearling to finish beef systems in Ireland

- Grass silage is the basal diet for winter feeding on farms in Ireland and a key constituent of finishing diets
- Variability in ensilability and quality, interest in whole-crop alternatives
- 12 mo – finish beef systems
- Grass silage, corn silage, whole-crop wheat silage, high grain diets
- Carbon footprint with and without Land Use, Land Use Change
- Economic assessment of finishing strategies

Questions?

