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Quantification Methodology for Reduced Carbon Intensity of Fed Cattle

Stakeholder Consultation Webinar
September 9, 2013

Agenda

- Introduction and background
  - *Nicholas Martin, American Carbon Registry*
- BIGGS Conservation Innovation Grant and the PSAT process
  - *Garth Boyd, The Prasino Group*
- Quantification Methodology for Reduced Carbon Intensity of Fed Cattle
  - *Karen Haugen-Kozyra, The Prasino Group*
- Q&A

Webinar logistics

- To ask questions:
  - Type questions into '**Chat**' box near bottom of your webinar pane
  - '**Raise Hand**' (in vertical bar at left of your webinar pane) to hold your place in line to ask a question
- Methodology is open for public comment through September 20, 2013
  - All public and webinar comments will be addressed and posted with methodology
- Webinar will be recorded and posted shortly to www.americancarbonregistry.org

American Carbon Registry

Winrock International Institute for Agricultural Development

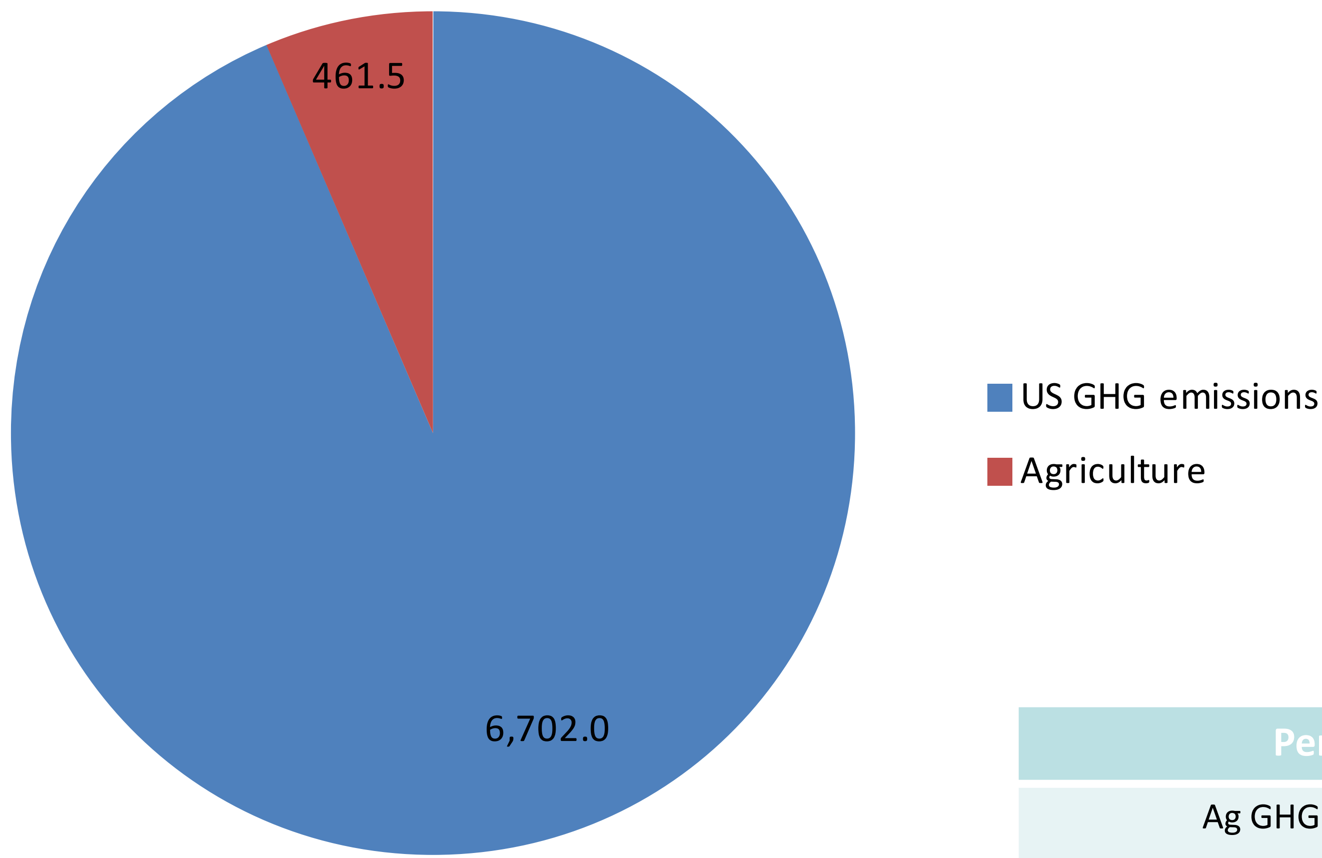
Non-profit organization that works in the U.S. and around the world to empower the disadvantaged, increase economic opportunity, and sustain natural resources

- 1985 merger of Winrock Int'l Livestock Research & Training Center, International Ag Development Service, and Ag Development Council
- Rockefeller family tradition of agricultural research and extension, yield improvement, global food security
- Seeking ways to connect farmers and ranchers to new markets, enhance competitiveness, maintain/increase yields

American Carbon Registry

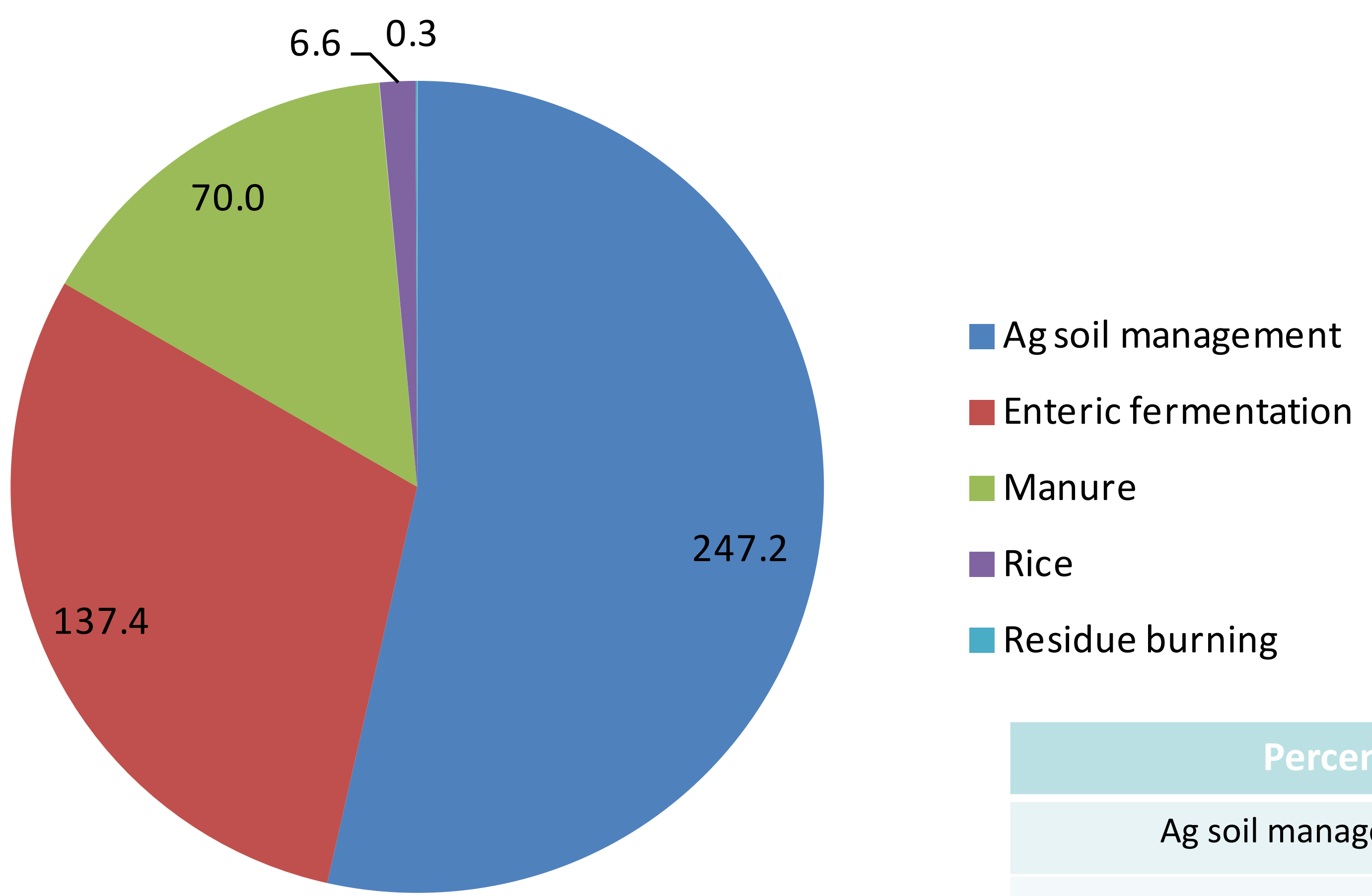
- **First U.S. voluntary carbon registry, founded 1996**
  - 38.6 MMT CO_2e verified carbon reductions since 1996
  - Part of the non-profit Winrock International
- **Registry roles:**
  - Develop and approve carbon protocols
  - Review and register projects
  - Oversee independent verification
  - Transparently track transactions and retirements
- **ARB-approved** Offset Project Registry (OPR) and Early Action Offset Program (EAOP) for the California cap and trade market
- **2012**: Average price of $7.40/tCO_2e$, up from $5.70 in 2011

GHG emissions from U.S. agriculture (MMT CO_2e, 2011)



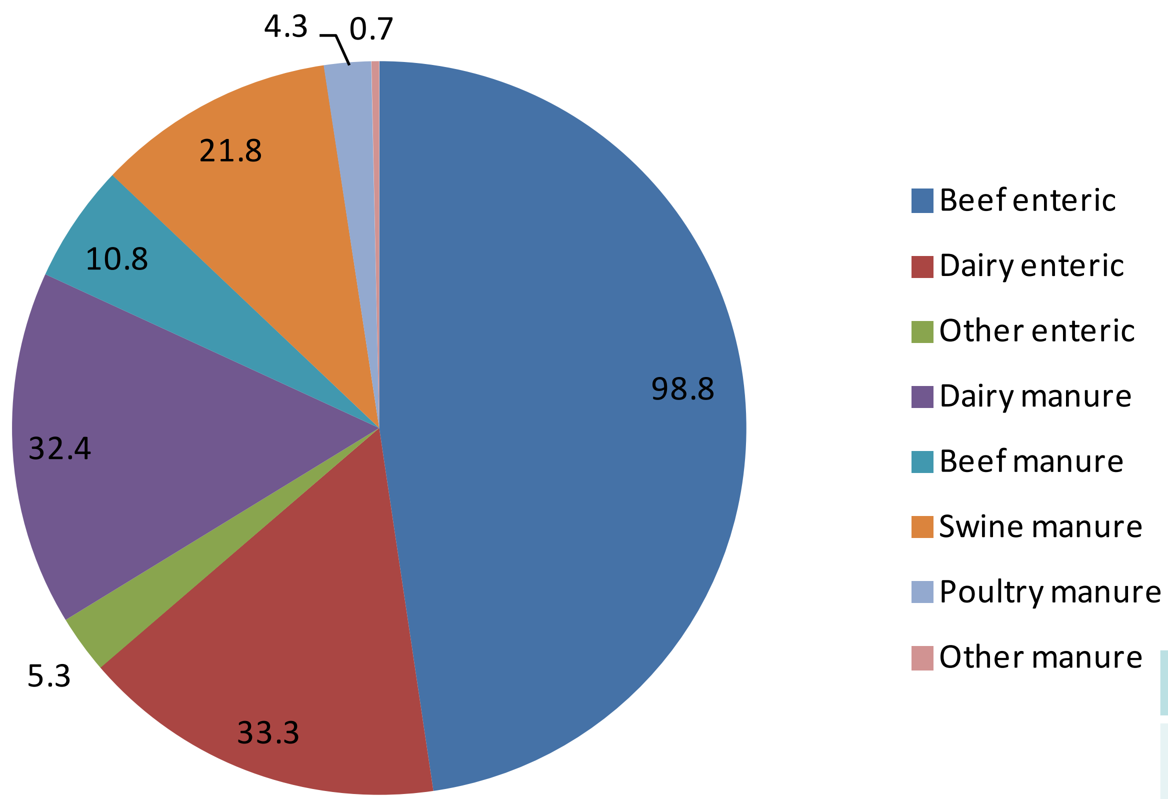
Percent change since 1990:		
Ag GHG emissions	↑	11.5%
Large increases in agricultural productivity		

GHG emissions from U.S. agriculture (MMT CO_2e, 2011)



Percent change since 1990:		
Ag soil management	↑	8.5%
Enteric	↑	3.5%
Manure	↑	52.5%

GHG emissions from U.S. livestock ($MMT\ CO_2e$, 2011)



Percent change since 1990:		
Beef enteric and manure GHGs	↑	4.4%
Beef production	↑	16%
Dairy enteric and manure GHGs	↑	32%
Dairy production	↑	33%

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History of the Methodology

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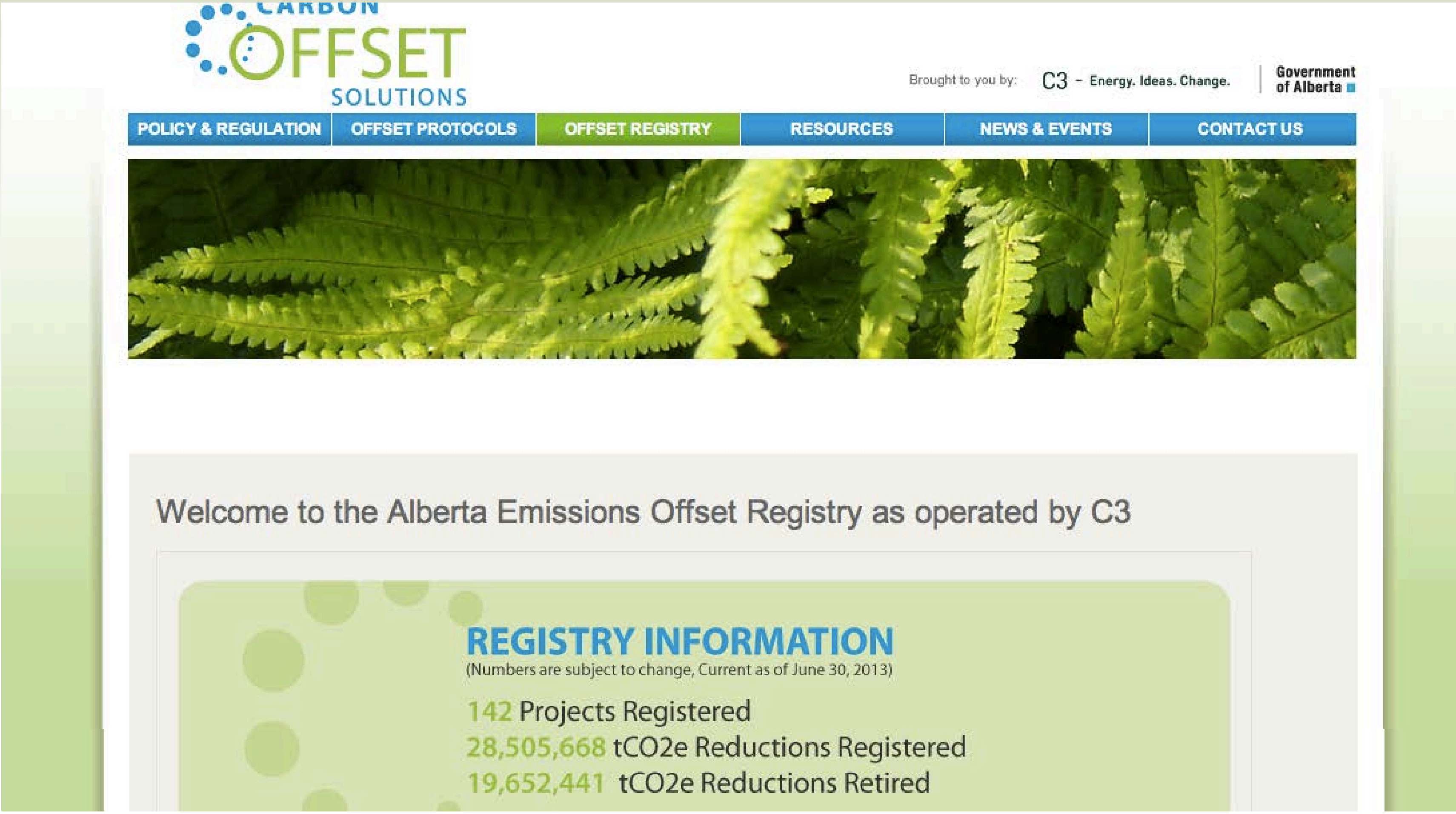
Alberta: Compliance-Based Offsets*



*34 Quantification Protocols; 8 Agricultural – based on ISO 14064:2 Standard and Intergovernmental Panel on Climate Change Quantification Methodologies

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BIGGS* Conservation Innovation Grant

Adapting 5 Alberta Protocols
(4 Beef, 1 Dairy)

The Team:
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Erasmus Okine, Uof Alberta
Garth Boyd, Matt Sutton Vermuelen
And Karen Haugen-Kozyra, The Prasino Group

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*Bovine Innovative Greenhouse Gas Solutions (BIGGS)

Protocol Scientific Adaptation Team

- 4 Scientific Innovations/Improvements to Alberta quantification equations
  - Nitrogen Retention Equations for Dairy/Beef Cattle
  - Meta-Analysis on use of Ionophores
  - Meta-Analysis on fat content of diets and effect on enteric methane emissions factor
  - Relationship between forage quality and effect on enteric methane emissions factor based on NDF content

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Scope and Eligible Activities

- Intended for beef cattle feedyards
- US-wide applicability
- Range of practices to reduce carbon intensity
  - Examples of feeding practices
  - Examples of manure management practices

*Note that the methodology does not prescribe practices

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Applicability Requirements

- Sufficient data and project documentation detailing content and quantity of feed per animal grouping
- Animal grouping criteria must be similar between baseline and project calculations
- Manure must be managed according to a *Manure Management Plan*

*Others: sampling of project animals is allowed; use measurement/estimation/monitoring described in methodology; emission reductions occur in US; and meet ACR eligibility criteria

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Animal Groupings – Key Parameter

- Feedyard operators typically group animals based on similar characteristics:
- Sex, production system, weights entering the feedlot, for example
  - Heifers or Steers
  - Calf-Fed (fall, 7 to 8 months of age)
  - Yearling-Fed (spring, 11 to 12 months of age)
- Diets customized to these for performance purposes – so the animal grouping becomes the significant stratification parameter for quantification

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Performance Standard Baseline

Static Historic Performance Standard Baseline

- What is the performance standard baseline?
  - Innovative methodology
    - How it works in comparison to actual monitoring kg CO_2/kg carcass weight
- Who created the baseline?
- Why was this method chosen?
- When and who will update it?

Table 3: Performance Standards for US Cattle (2000 – 2011)

	kg CO_2e/kg carcass weight											
	Steers						Heifers					
	Groupings (In Weights - 100 lb Increments)											
Year	500-599	600-699	700-799	800-899	900-999	1000+	500-599	600-699	700-799	800-899	900-999	1000+
2000	1.40	1.20	1.00	0.80	0.61	0.51	1.12	1.12	0.89	0.66	0.44	0.32
2001	1.42	1.21	1.01	0.81	0.61	0.51	1.15	1.15	0.92	0.69	0.46	0.34
2002	1.40	1.21	1.02	0.83	0.64	0.55	1.13	1.13	0.91	0.69	0.47	0.37
2003	1.39	1.20	1.00	0.81	0.62	0.52	1.10	1.10	0.88	0.66	0.45	0.34
2004	1.42	1.22	1.03	0.83	0.64	0.54	1.14	1.14	0.91	0.69	0.46	0.35
2005	1.42	1.23	1.04	0.84	0.65	0.56	1.13	1.13	0.91	0.69	0.47	0.36
2006	1.38	1.20	1.02	0.84	0.66	0.57	1.14	1.14	0.93	0.72	0.51	0.40
2007	1.44	1.25	1.06	0.88	0.69	0.60	1.18	1.18	0.96	0.74	0.53	0.42
2008	1.44	1.26	1.08	0.89	0.71	0.62	1.22	1.22	1.00	0.79	0.58	0.47
2009	1.41	1.24	1.06	0.88	0.71	0.62	1.17	1.17	0.97	0.77	0.56	0.46
2010	1.42	1.24	1.06	0.88	0.69	0.60	1.15	1.15	0.94	0.73	0.52	0.42
2011	1.40	1.22	1.04	0.87	0.69	0.60	1.16	1.16	0.96	0.75	0.55	0.45

Project Boundaries

- Encompasses:
  1. the feedyard operation where cattle are raised and fed
  2. Facility where manure is stored/handled

*project may include a number of feedyards

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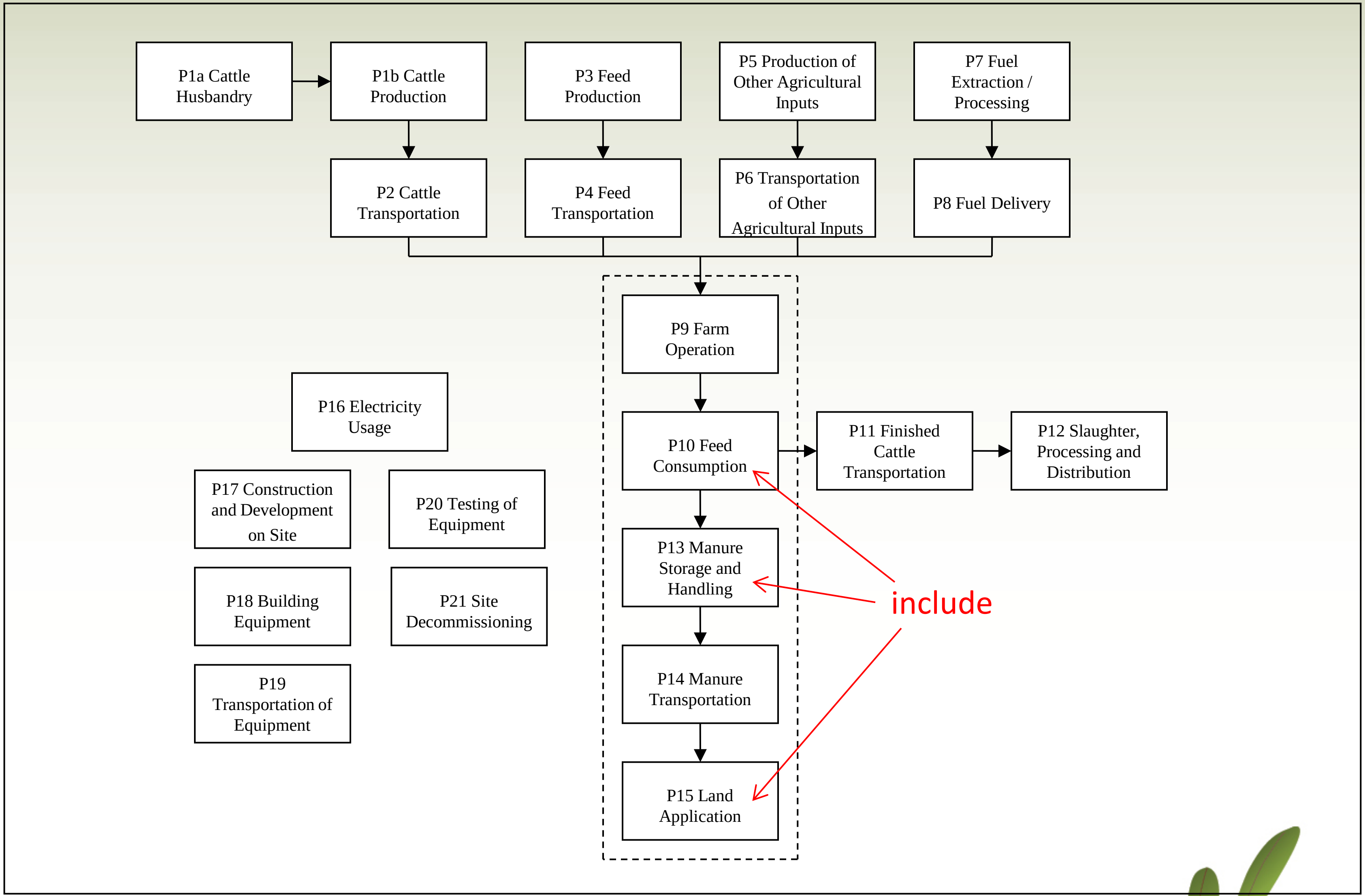
P1a Cattle Husbandry
P1b Cattle Production
P3 Feed Production
P5 Production of Other Agricultural Inputs
P7 Fuel Extraction / Processing
P2 Cattle Transportation
P4 Feed Transportation
P6 Transportation of Other Agricultural Inputs
P8 Fuel Delivery
P9 Farm Operation
P16 Electricity Usage
P10 Feed Consumption
P11 Finished Cattle Transportation
P12 Slaughter, Processing and Distribution
P17 Construction and Development on Site
P20 Testing of Equipment
P13 Manure Storage and Handling
P18 Building Equipment
P21 Site Decommissioning
include
P14 Manure Transportation
P19 Transportation of Equipment
P15 Land Application

Temporal Boundaries

- Project start date defined as:

  “the date the feedyard or group of feedyards began to reduce GHG emissions against the performance standard baseline”

- Typically determined by the Project Proponent through their cooperative work with the feedyard
- Crediting period can span 10 yrs from start date

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Additionality

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- Methodology adopts a performance standard approach to additionality
  - Any project activity that reduces carbon intensity below the static historic performance standard baseline carbon intensity.
  - Project proponent not required to make a project-specific demonstration of implementation barriers.

Quantification

- Methodology enables fed cattle producers to quantify GHGs from enteric fermentation and manure.

$$Emission_{Reduction} = Emissions_{Baseline} - Emissions_{Project}$$

$$Emissions_{Baseline} = Emissions_{Cattle} + Emissions_{Manure}$$

$$Emissions_{Project} = Emissions_{Cattle} + Emissions_{Manure}$$

Calculations used to estimate emissions – IPCC based:

1. Enteric Methane Emissions
2. Manure Methane Emissions for the Project
   – Daily Volatile Solids Excreted in Manure
3. Daily Nitrogen Excreted in Manure
   – Daily Nitrogen Intake
4. Direct N_2O Emissions from Manure
5. Direct N_2O Emissions from Manure Storage
6. Indirect N_2O Emissions from Volatilization of Manure
7. Indirect N_2O Emissions from Manure N Leached in the Soil Profile

Functional Equivalence: Final calculations adjusted for production equivalency in the project as compared to baseline.

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Data Collection

Data Types in the Methodology

1. ***Farm Activity Data –*** for GHG Performance Calculations (per kg of hot carcass weight)
   - FeedYardAnimal Inventory/Performance Data
   - Feedyard Feed/Ration Data
   - Feedyard Manure Data – manure management plans
2. ***Evidence of Practice*** - Farm Records/Third Party Supporting Documentation
   - Feedyard records of the above and 3rd party documentation, where indicated
   - Sign-off by a Professional on the rations used.

Types of Data

- Using the head-days yardage data (weighted):
  - Average Days on Feed
  - Average Dry matter intake/day
  - Average No. of Animals in production
  - Average weights in/out
- Ration Data (DM basis) - % fat, %TDN, % Concentrates, % Crude Protein
- Use and amount of any feed technologies/strategies

Data Procedures

- Written procedures must be documented in a procedures manual and available to third party verifiers.

Procedures include:

- Outline of responsibility
- Timing
- Quality control
- Quality assurance checks
- Record and record location requirements

Leakage

Activity-shifting Leakage

- Methodology follows ISO 14064:2 – a systematic approach to sources, sinks and reservoirs (SSRs)
  - project boundary is defined by the SSRs
  - methodology is different from the usual method of pre-defining boundaries and quantifying the SSRs
- Methodology follows ISO 14064:2 – functional equivalence
  - key requirement for quantifying GHG differences between baseline and project.
  - e.g. per kg of beef produced

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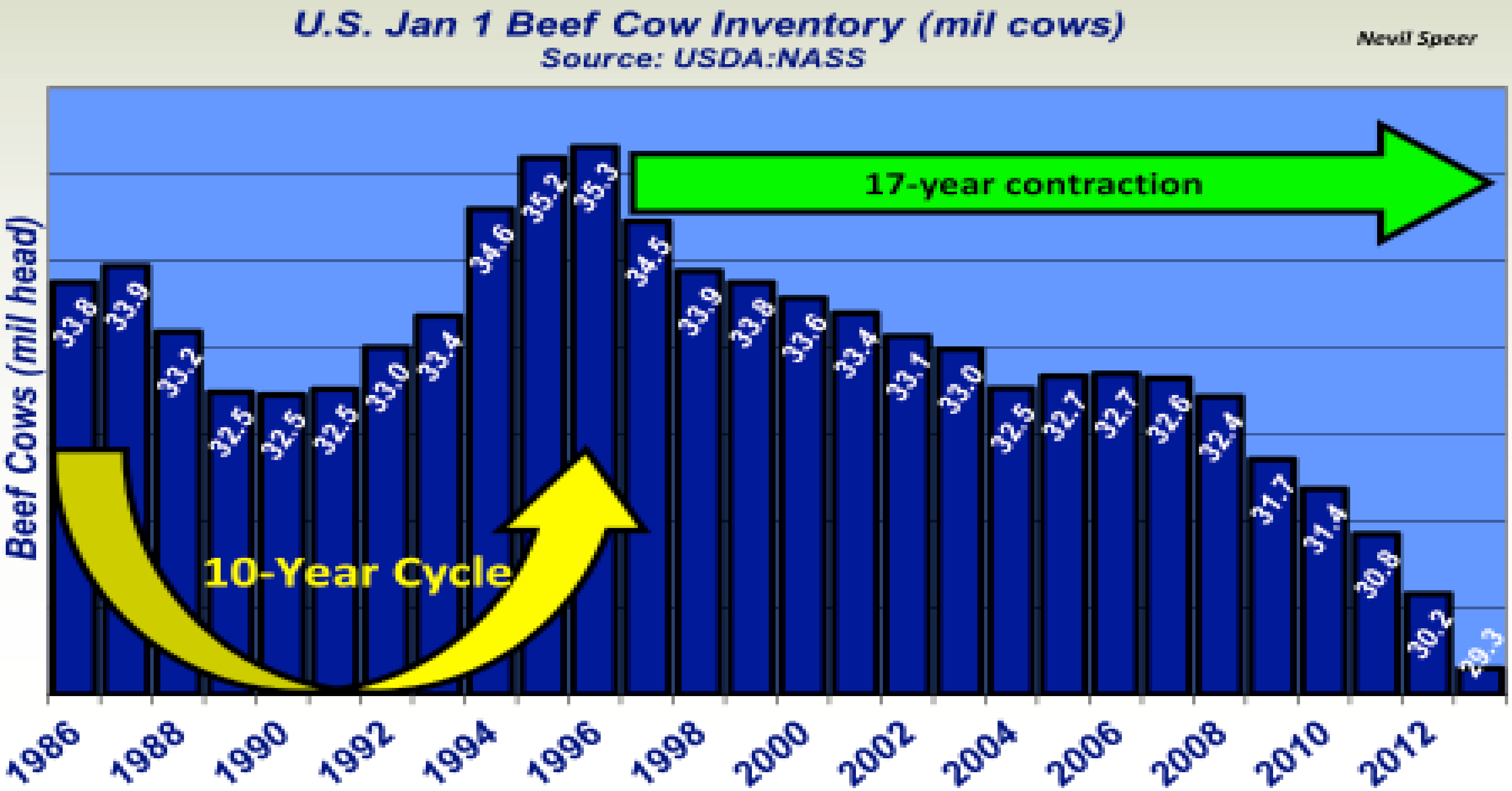
- Risk of activity-shifting having an impact on emissions downstream in the beef feeding sector is low—majority of beef feedyards are concentrated in four or five US states with similar environmental and economic conditions.



- Activity-shifting is thus assumed to be zero in this methodology.

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Market-effects Leakage

- Where baseline output exceeds project output by >3%, then market-effects leakage needs to be calculated.
  - Process:
    - Calculate net GHG emissions reductions by estimating:
      1. difference in output between the baseline and project
      2. additional output due to activity-shifting (assumed to be zero—see previous slide)
      3. Price elasticities of supply and demand (provided by published literature and included in methodology)

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Market-effects Leakage (Positive)

- Note that because the market impact is measured by functional equivalence, it is in theoretically possible that the project output could be greater than the baseline output.
- This would be considered positive leakage and is allowed in the leakage calculation.

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Further information

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Thank You!