Draft Protocol Review Session September 11, 2009
Selection for Residual Feed Intake in Beef Cattle Draft Protocol
ATTENDEES:

Karen Haugen-Kozyra (KHK)	Climate Change Central
Erasmus Okine (EO)	UofA
John Basarab (JB)	Alberta Agriculture
Sheilah Nolan (SN)	Alberta Agriculture
Stephen Moore (SM)	UofA
Amanda Stuparyk (AS)	Climate Change Central
Brian Doig (BD)	Saskatchewan Agriculture
Denny Crews (DC)	Colorado State
Graham Plastow (GP)	UofA
Karen Beauchemin (KB)	AAFC
Xavier Verge (XV)	AAFC
Rob Hamaliuk (RH)	Alberta Environment
Troy Drake (TD)	DVM, CowCalf Health Management Systems
Greg Appleyard (GA)	President, Cattleland Feedyards

** = Outstanding Work Item / Modification to Protocol

1. **Introductions - Climate Change Central**
2. **Why We're Here – Alberta Policy Context**
    1. Alberta Regulatory Framework
    2. Offsets – Carbon Market in AB
    - Projects start after Jan 1, 2002
    - Real, demonstrable, quantifiable
    - Not regulated by law
    - Clearly defined ownership (verifier will seek clear ownership)
    - Generated in Alberta - **investment** / project **undertaken** in Alberta
    - Not double counted (only serialize on one system)
    - Verified by 3rd party (chartered account/certified engineer)
    3. Ex Poste Verification
    4. The Protocols are based on the ISO 14064-2 standard.

3. **Principles to Guide Protocol Decisions/Development**
    1. Environmental Integrity
    2. Usability/Practicability
    3. Adapting Precedents
    4. Life Cycle Analysis

4. **Introduction to the Protocol**
    - Overview of the Protocol
    - Structure of Alberta Protocols

5. **Review of the Protocol - Review of Draft Alberta Protocol: (Section by Section)**

- Run-through of the Protocol elements, basis for the flow diagrams, identification of SSs, rationale for exclusion or inclusion, quantification approaches and appendices, discussion points.

Section 1.0 Protocol Scope and Description

- 1.1. Scope and Description / Protocol Approach
  - Q. on Protocol Applicability to include a 'certified RFI EBV' from outside Alberta (open to everywhere?)
  - Comment: EPD's comparability across animals – not very robust comparability
  - **Recommend not including all outside as unknown reliability (applicable within pedigree animals – within breeds – within contemporary groups across years - within North America) RFI EBVs within breed within NA – would need to be registered (registration certificates will be issued) – GA – this is the recommendation of Beef Improvement Federation guidelines
  - Q. Applicability for post weaning RFI testing
  - JB – young sires are tested for RFI-P (postweaning); then generation of EBV for genetic merit value
  - DC recommendation impact of selection – breeding values removed and map genetic trend (regression) = much more stable estimate of improvement over time
  - Q. KB where is the scientific evidence for heritability of RFI? JB – the Science Discussion Document provides all information in regard to genetics of the RFI
  - EBV Validation Studies have been conducted and proven (sires with known EBVs for trait (RFI) take progeny and work out the mathematics with regression to show relationships
  - **John Basarab – will include a reference to Validation Studies within the Appendix**
  - SM and GP depart

- Flexibility Mechanisms
  - No sustained objection to allow use of NRC and programs like Cowbytes to develop regional databases for determining DMI

- Glossary
  - **Requesting any comments or suggestions may send in email
  - DC – *Accuracy* of EBVs term – not accuracy with North American standards is an Australian – BIF guidelines will have definition
  - **John Basarab to update the definition with some language of confidence value placed on genetic EBV according to BIF recent version
  - DC; JB – Accuracy was agreed upon at the workshop at 50% to allow for project application (have to be practical and conservative for this protocol to allow for implementation)
  - Q. Are bulls with mixed pedigree excluded then from the protocol? No, the EBVs will become regressed phenotype and the pedigree does not influence the accuracy of EBV
  - EO - If you measure your bull for RFI your EBV value would reach accuracy of 60 so this is the minimum.

- **John Basarab will modify to include accuracy of 0.60 within the Protocol Applicability section - JB – to flush out wording (confirm with TD, DC, EO) - include caveat Bulls with breeding values must reach accuracy of the agreed to amount %

- Project and Baseline Process Flow Diagrams
  - **Requesting any comments or suggestions

Q. Page 8 – the RFI definition uses 10 MJ of metabolizable energy, where this from?

JB - This is the accepted standardized intake per kg of DMI; see Appendix C.

- Section 2.0 Quantification

Q. on inclusion of Land Application of manure as SSs for this project (if the animals produce less manure then there is the possibility of the usage of additional nitrogen sources for fertilizer – how account for the N2O?)

- EO – RFI reduces the amount of manure which is needed in general in Alberta
- KB – credit for less manure from the animal (and therefore methane) but that is it – how make assumptions upstream and usage of manure
- GA – in a feedlot there in only a specific amount of space for manure – animals eat less etc. there is an assumption that the lot will acquire more animals
- Include methane emissions from the manure (question of Nitrogen)
- KHK – a couple of options to pursue - restrict measure for Flexibility Mechanism demonstrate same amounts of manure to same fields to be able to include the N component of quantification (is very restrictive for implementation)
- SN – perhaps the land use component could be addressed in other protocols that are being developed
- Or exclude the Land Application as a quantified source (equations 4,5,6,7,8) EO – agree with stopping there but leave the equations in not worry about applications (manure nitrous oxide direct, storage (not include from volatilization and leaching)) XV – volatilization is included maybe not leaching
- JB – EO - Removal of leaching will be minimal (<5%) – conservative to include in protocol quantification
- **will require more discussion** -see discussion later on the call.

- Figures 2.1 and Table 2.2 Project Life Cycle Chart and SSs

- Section 2.2; 2.3 Baseline Scenario assessment
- Table 2.2 Assessment of Baseline Scenarios
  - Any questions or comments on accepting the usage of performance standard and use of databases to calculate DMI use the best practice (like CowBytes)
  - Agreement that sources like CowBytes are acceptable and this is acceptable for the protocol

- **KHK to draft some language to clarify this applicability

- Figures 2.2 and Table 2.3 Baseline Life Cycle Chart and SSs
  - **Requesting any comments or suggestions

- Table 2.4. Comparison of SSs for Project and Baseline
  - More discussion on the nitrogen quantification
  - May be conservative to exclude the Manure component?
  - Is there any way to adjust the Land Application component
  - Can we include a Protocol Applicability criteria to apply the same rate of manure per hectare in baseline and project condition and must be proven to be equivalent?
  - XV separate pasture and paddock into percentages of time spent on each – this is extremely variable even on a project by project basis would be arbitrary
  - Important to be consistent with other protocols and best practice guidance (i.e. IPCC)
  - The current protocol as written is consistent with all the IPCC equations and other approved protocols and therefore even though the amount of reduction will be lower it is important to include all the equations to quantify the emissions reduction from manure
  - Committee noted that the assumptions behind the protocol is it will be implemented across many operations. So the Feed production sources/sinks are unlikely to be impacted greatly by the introduction of low RFI animals into the beef herd….the probability that feed sourced will continue across the same feed production systems as before without causing a major shift in the related sources of GHG holds.
  - Thus, as in the above, those remaining on the call, after much discussion, arrived at the same consistent conclusion for manure storage, management and application. The introduction of Low RFI cattle into an operation, across many operations, is unlikely to affect the way manure is stored, managed or applied. The concern by Xavier Verge that operators would need to supplement synthetic fertilizer N due to decreased manure production was resolved because in the cow-calf operation, fertilization of pastures is not typically done, and in the confined animal situations (feedlot/backgrounder) two things are at play here that justify the approach in the protocol as proposed:
    i. Manure is spread on only 5% of the land base in Alberta. The distance that manure is hauled from the confined operation is very limited due to economic constraints. This means that the same lands are typically receiving the manure –within the N limits defined in the Ag Operations Practices Act. It is unlikely they will add any supplemental N to satisfy crop demand.
    ii. The incremental reduction in manure (and Manure N) between the baseline animals and the RFI animals is very low. It is unlikely to impact to the degree that an operator would think about adding supplemental N.

- **AS/KHK - Will need to clarify the justification within the protocol and the technical protocol plan to be submitted to Alberta Environment

- Section 2.6 Quantification

Table 2.5 Quantification Procedures

Q. 3.5% enteric methane factor, where other beef protocols use 4.0%

JB – current default IPCC value is the 3.0% (2006 value for greater than 90% concentrates) so the 3.5% is based on combination of Alberta Research (best available science by Beauchemin et al) and IPCC 2006), the 4% used in other protocols was previously chosen due to the current data and papers available at that time (it was the 2001 IPCC guidelines then)

- **The Committee landed on the usage of 3.5% for concentrates and 6.5% for less than 90% concentrates as a compromise between IPC 2006 and Alberta-based research.
- John B to add in the Beauchemin study in Table 2.5.

- Table 2.6 Contingent Data Collection
- Appendix A – Emission Factors
- Appendix B – Sample Calculation
  - **Requesting any comments or suggestions
- Appendix C – Testing criteria
  - **Requesting any comments or suggestions

6. Next Steps

- Comments on any aspect of protocol by reviewers by Monday September 14th

COMMENTS/SUGGESTIONS THROUGH EMAIL:

Sent: Wednesday, September 16, 2009 1:01 PM
To:
Subject: Re : First Round Technical Review for the Selection for Residual Feed Intake in Beef Cattle Protocol (Draft)

Hi …

I revised the equations Tables 2.5 and the calculations Tables B1 and B2 (for methane only) and I got the same results.

It was longer than I thought because I first calculated CH_4 from enteric fermentation using the net energy equations… but actually you're using directly DMI for calculating GE. This means that for enteric fermentation the only data needed is actually DMI (everything else is default value).

For manure management no problem (again I only checked methane). Just one thing: I find the second equation (for VS calculation) very complicated… it finally works but, maybe, the following (developing from the IPCC 2006 equation) would be easier to read: VS = DMI x [(1 – DE/100) + UE] x (1 – ASH/100) …and it works too!

Selection for Residual Feed Intake for Beef Cattle
Quantification Protocol
Technical and Policy Issue Summary

The following technical and policy issues may be considered as part of the technical and stakeholder review processes:

1.0 Protocol Scope and Description

-where do we need to be more and less prescriptive??

Protocol Approach
-functional equivalence – kg of feed (DM basis) per day

Project Additionality / Incrementality
-add this section to protocol?

Protocol Applicability
-measurement and testing to determine RFI to get 'certified' EBV to quantify (at central facility? Mandatory?)
-are we specifying amounts of animals to be tested?
-progeny can be 'assigned' RFI EBV equal to mean of parents?
-assumption of zero RFI EBV for untested animals valid on an industry-wide basis?
-RFI for postwean and finishing cattle are considered different traits and must be determined separately
-preventing double-crediting -
-protocol can be used in combination with other approved practice change GHG emission reduction projects for beef industry (i.e. protocols can be bundled; reduced days on feed; lifecycle)?
-all cattle on RFI tests must have a registered RFID with identification agency
-applicability for imported RFI EBV semen from outside Alberta?
-crediting period (8 year Alberta) or 2 generations?
-baseline? 1 year?

Protocol Flexibility
-flexibility to conduct own RFI testing/measurement?? Prescribe GrowSafe automated??

Process Flow Diagram for Project Condition
-Are all source sinks accounted for in project?

Process Flow Diagram for Baseline Condition
-Are all source sinks accounted for in baseline?

Glossary of New Terms
-add any terms?

2.0 Quantification Development and Justification

Identification of Sources and Sinks (SS's) for the Project

Project Element Life Cycle Chart

The equation of Blaxter and Clapperton (1965) as corrected by Wilkerson et al. (1995) was used to predict how much methane should have been produced from each steer during each measurement period:

$$\% GE = (1.3 + (0.112 \cdot \% \text{ digestibility} / 100)) + ((\text{ME intake/maintenance requirement for ME}) \cdot (2.37 - (0.05 \cdot \% \text{ digestibility} / 100))),$$

where % GE is the percentage of GE intake lost as methane, and % digestibility is the apparent digestibility of dietary energy, for which DM digestibility was taken as a proxy.

2.2 Baseline Scenario

Identification and Assessment of Possible Baseline Scenarios

TABLE 2.2: Assessment of Possible Baseline Scenarios

2.3 Selection and Justification of Baseline Scenario

Identification of SSs for the Baseline

Baseline Element Life Cycle Chart

2.5 Selection of Relevant Project and Baseline SS's

TABLE 2.4: Comparison of SS's

2.6 Quantification of Reductions, Removals and Reversals of Relevant SS's

Quantification Approaches

TABLE 2.5: Quantification Procedures

Contingent Data Approaches