

**QUANTIFICATION PROTOCOL FOR
INCLUDING EDIBLE OILS AND/OR
INCREASING CONCENTRATES
IN CATTLE FEEDING REGIMES:**

ABRIDGED

Submitted to:

Alberta Environment

and

Alberta Agriculture, Food and Rural Development

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Acknowledgements

The following protocol document was prepared for Alberta Environment and Alberta Agriculture and Food. The document has undergone a round of technical review and a broader round of stakeholder review through April and May, 2007. This version of the protocol document incorporates the feedback from the previous review and has been revised based on stakeholder input such that the technical and stakeholder review is being repeated to address the modifications.

Disclaimer

The following document presents an abridged version of the Including Edible Oils and/or Increasing Concentrates in Cattle Feeding Regimes protocol prepared for Alberta Environment and Alberta Agriculture, Food and Rural Development which has completed an initial round of technical review. This document has been prepared as a means of supporting a broader stakeholder consultation process. As such, this document should not be used as a quantification protocol.

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1.0 Project and Methodology Scope and Description

The opportunity for generating carbon offsets with this protocol arises from the direct and indirect reductions of greenhouse gas (GHG) emissions resulting from modification of the finishing diet for cattle to include of edible oils and/or including a higher percentage of concentrates.

This quantification protocol is written for the beef farm operator or project developer. Some familiarity with, or general understanding of, the operation of a beef farm and associated practices is expected.

For this protocol to be applicable, edible oils in the range of 4% to 6% (by dry weight) must be included in the cattle feeding regime and/or the percentage of concentrates in the diet must increase from below 90% to greater than 90% (by dry weight). The protocol quantifies the reduction in enteric methane emissions from cattle as a result of changes in the finishing diet. **FIGURE 1.1** offers a project element life cycle chart for a typical project.

This protocol does not prescribe the feeding regime for beef production. Rather, it serves as a generic ‘recipe’ for project developers to follow in order to meet the requirements for measurement, monitoring and GHG quantification. This Protocol quantifies emissions reductions on the basis of for groupings of cattle by incoming and outgoing weight. Thus, the starting point for all quantification is the number, weights, diets (quantity and composition), and days on feed for the cattle produced in the project.

The baseline condition for projects applying this protocol is defined as the operating conditions at the project farm prior to the change in feeding practises. The baseline condition would be defined as a feeding regime that does not include edible oils in the range of 4% to 6% (by dry weight) and/or where the percentage of concentrates in the diet was below 90% (by dry weight) within a three year period prior to project implementation for given weight groupings. **FIGURE 1.2** offers an element life cycle chart for a typical baseline configuration.

The boundary of the Beef Feeding Protocol encompasses the feedlot where the cattle are finished, the facility where manure is stored, and the land where the manure is spread. The project may include a number of individual pens and structures, and a variety of enterprises, but all project farms will address the activities within the boundary of this Protocol.

To demonstrate that a project meets the requirements under this protocol, the project developer must supply sufficient evidence to demonstrate that:

1. All farms in the project are currently storing manure and applying manure or custom applying manure to land as confirmed by an affirmation from the project proponent;

2. All farms in the project can demonstrate a change in practice in terms of edible oils and/or concentrates in the feeding regime for their cattle confirmed by operational records; and
3. The quantification of reductions achieved by the project is based on actual measurement and monitoring (except where indicated in this protocol) as indicated by the proper application of this protocol.

Flexibility in applying the quantification protocol is provided to project developers in four ways:

1. Farms that do not have three years of baseline data as per the days on feed for cattle of specific incoming weights may establish a baseline condition based on a combination of available data and industry practise in their region or operation;
2. Farms that manage to reduce the length of the feeding regimes for finishing cattle may also apply the Days on Feed protocol in parallel with this protocol should it be applicable;
3. Farms where the incoming weights and days on feed vary across groups of animals, these animals can be grouped in discreet units and tracked individually. In this case, the baseline condition may need to be calculated relative to the groups of animals with similar characteristics of incoming and finishing weights; and
4. Site specific emission factors may be substituted for the generic emission factors indicated in this protocol document. The methodology for generation of these emission factors must ensure reasonable accuracy.

If applicable, the proponent must indicate and justify why flexibility provisions have been used. Please note, this Protocol can complement the Reduced Age to Slaughter Protocol in this series of standards.

FIGURE 1.1: Project Element Life Cycle Chart

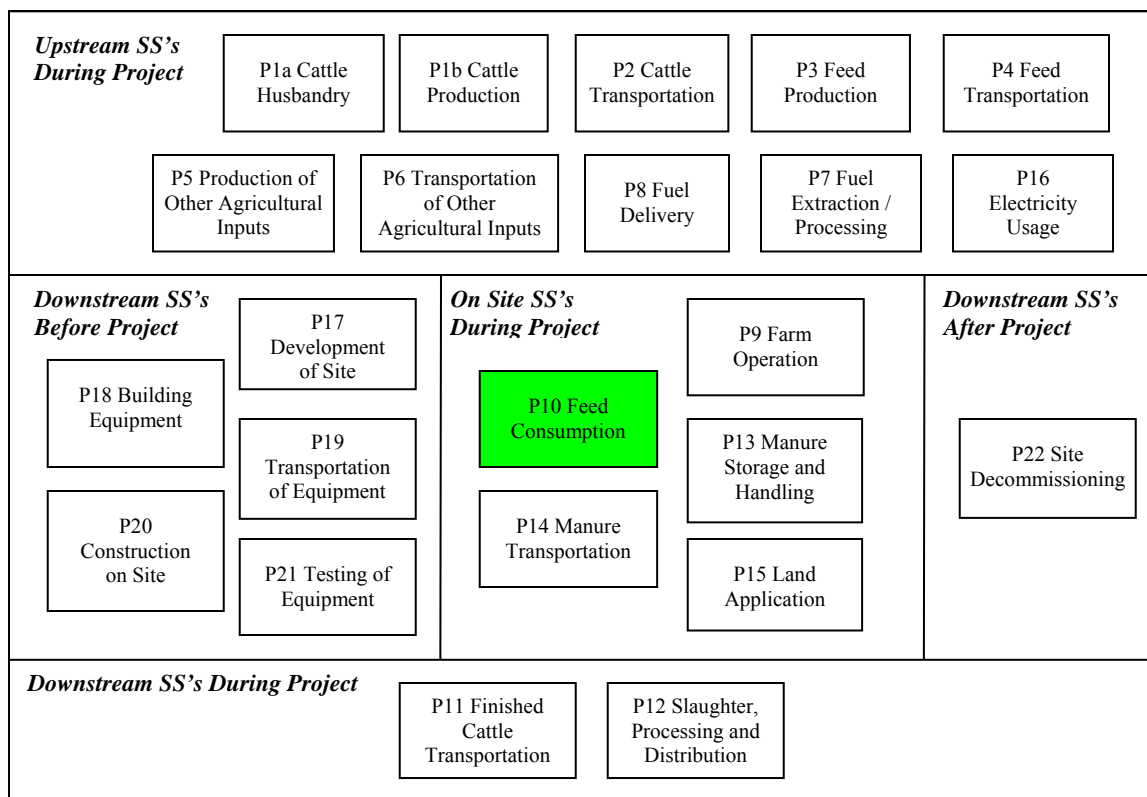
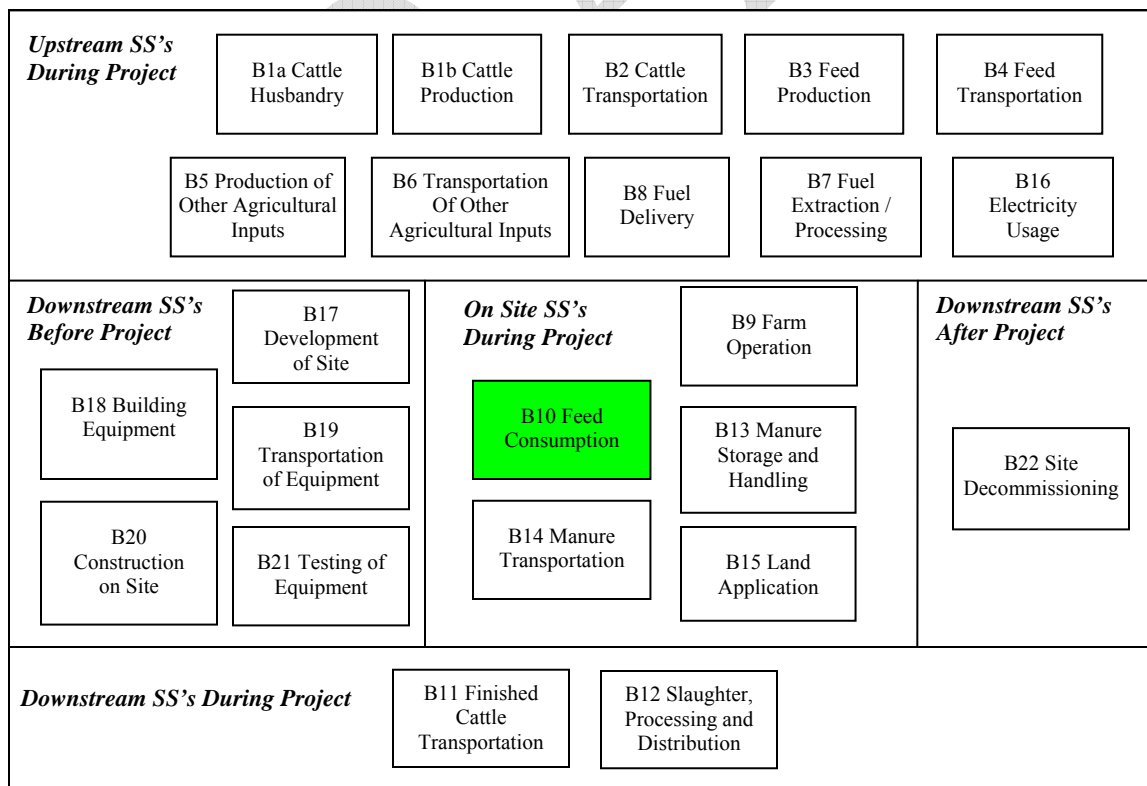


FIGURE 1.2: Baseline Element Life Cycle Chart



* Sources, sinks and reservoirs selected for measurement and monitoring under this protocol are highlighted

2.0 Quantification of Identified Sources, Sinks and Reservoirs

Quantification of the reductions, removals and reversals for the sources, sinks and reservoirs selected for measurement and monitoring under this protocol will be completed using the methodologies outlined in **TABLE 2.1**, below. These calculation methodologies serve to complete the following three equations for calculating the emission reductions from the comparison of the baseline and project conditions.

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Cattle}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Cattle}}$$

Where:

$\text{Emissions}_{\text{Baseline}}$ = sum of the emissions under the baseline condition.

$\text{Emissions}_{\text{Cattle}}$ = emissions under SS B10 Feed Consumption

$\text{Emissions}_{\text{Project}}$ = sum of the emissions under the project condition.

$\text{Emissions}_{\text{Cattle}}$ = emissions under SS P10 Feed Consumption

TABLE 1.1: Quantification Procedures

1.0 Project / Baseline SS	2. Parameter / Variable	3. Unit
Project SS's		
P10 Feed Consumption	$\text{Emissions}_{\text{Cattle}} = \sum (\text{Number}_{\text{Production } i} * \text{DOF}_i * \text{DMI}_i * \text{GE}_{\text{Diet}} * (\text{EF}_{\text{Enteric } i} / 100\%) / \text{EC}_{\text{Methane}})$	
	Enteric Emissions from Cattle for each feed regime within each weight grouping / Emissions _{Cattle}	kg CH ₄ / day / per weight grouping
	Number of Cattle in Grouping i / Number _{Production i}	Head
	Days on Feed for Each Feed Regime for Cattle in Grouping i / DOF _i	Days
	Dry Matter Intake for Each Feed Regime for Cattle in Grouping i / DMI _i	kg _{dry matter} / head / day
	Default value: Gross energy content (GE) of the diet GE _{Diet}	MJ / kg _{dry matter}
	Emission Factor for Enteric Emissions for Each Feed Regime in Grouping i / EF _{Enteric i}	%
	Energy Content of Methane / EC _{Methane}	MJ / kg _{methane}
Baseline SS's		
B10 Feed Consumption	$\text{Emissions}_{\text{Cattle}} = \sum \sum (\text{Number}_{\text{Production } i} * \text{DOF} * \text{DMI}_i * \text{GE}_{\text{Diet}} * (\text{EF}_{\text{Enteric } i} / 100\%) / \text{EC}_{\text{Methane}})$	
	Enteric Emissions from Cattle for each feed regime within each weight grouping / Emissions _{Cattle}	kg CH ₄ / day / per weight grouping
	Number of Cattle in Grouping i / Number _{Production i}	Head
	Days on Feed for Each Feed Regime for Cattle in Grouping i / DOF _i	Days
	Dry Matter Intake for Each Feed Regime for Cattle in Grouping i / DMI _i	kg _{dry matter} / head / day
	Default value: Gross energy content (GE) of the diet GE _{Diet}	MJ / kg _{dry matter}
	Emission Factor for Enteric Emissions for Each Feed Regime in Grouping i / EF _{Enteric i}	%
	Energy Content of Methane / EC _{Methane}	MJ / kg _{methane}

APPENDIX A: Glossary of New Terms

The following definitions are critical to the appropriate interpretation of this quantification protocol.

Concentrates: A broad classification of feedstuffs which are high in energy and low in crude fibre (<18% CF).

Edible Oils: Oils derived from plants that are composed primarily of triglycerides. Although many different parts of plants may yield oil, in commercial practice oil is extracted primarily from the seeds of oilseed plants. Whole seeds can be applied as a feed ingredient so long as the oil content is calculated on a dry matter basis to achieve the 4 to 6% content in the diet.

Enteric Emissions: Emissions of methane from the cattle as part of the digestion of the feed materials.

Land Application: The beneficial use of the agricultural material and/or digestate applied to cropland based upon crop needs and the composition of agricultural material as a source of soil amendment and/or nutrition.

Weight Groupings: Animals are considered to be in specific weight groupings based on incoming and outgoing weights. Within a specified class, each of the ranges of incoming and outgoing weights must be within 25 kg intervals. As an example, animals coming on feed between 225 and 250 kgs, leaving between 600 and 625 may be a weight class for a given project site. However, another project site may use an incoming weight range of 210 to 235 kgs, and outgoing weight range of 575 to 600kgs as a weight class.