

Nutrient Loading Calculator

Manure Management Update 2015

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Objectives are to:

- Introduce the **NLC and its purpose**
- Briefly **explain** how it works and how it can be used





Background / Purpose



Background & Purpose

- Developed cooperatively
 - ARECA members
 - Alberta Agriculture,
 - Manitoba Agriculture,
 - Saskatchewan Agriculture,
 - Agriculture Canada,
 - Industry

Background & Purpose

- It is an Excel-based tool.
- For imported, in-field feeding systems
 - **Bale Grazing**



Background & Purpose

- Bales unrolled or processed feed is fed in **windrows** on the snow.



Guaranteed to Start



Background & Purpose

- Hay or processed feed fed in **feeders, bunks or troughs.**



Background & Purpose

- Assist with planning a feeding system
- **Estimate nutrient additions**
 - **N, P, K S**
- Goal:
 - To take advantage of the Nutrients!
 - Minimize impacts



What's in that Feed?

	Bale Density (bales/ac)				
	22 45'x45'	27 40'x40'	36 35'x35'	48 30'x30'	70 25'x25'
Nitrogen load (lbs/ac)	570	700	933	1244	1814
Phosphorus load (lbs/ac) (P₂O₅)	45 (103)	55 (125)	73 (167)	98 (224)	143 (327)

Using the Calculator

1. Cow Management		My Own Values
Number of cows	100	
Average cow weight (lbs)	1300	
Daily feed requirement of cow (lb dry matter/day)	33.8	
Area of land used for feeding (acres)	10.7	
Number of feeding days	120	
Cow Days per Acre	1121	
Animal Unit Days per Acre	1458	
Net feed density (tons dry matter/acre)	18.9	

2. Primary Bale Type		My Own Values
Hay_Perennials		
Brome		
Dry matter content of feed (%)	90	
Protein content of feed (% dry matter basis)	10.6	
Nitrogen content of feed (% dry matter basis)	1.70	
Phosphorus content of feed (% dry matter basis)	0.17	
Potassium content of feed (% dry matter basis)	1.50	
Sulfur content of feed (% dry matter basis)	0.14	
Percent of total bales provided by primary type	75	
Average bale weight (actual lbs)	1300	
Percentage of primary feed on a dry matter basis	76.6	
Feed wastage of primary bale type (%)	10	

3. Secondary Bale Type		My Own Values
Straw		
Wheat		
Dry matter content of feed (%)	89	
Protein content of feed (% dry matter basis)	3.9	
Nitrogen content of feed (% dry matter basis)	0.62	
Phosphorus content of feed (% dry matter basis)	0.08	
Potassium content of feed (% dry matter basis)	1.40	
Sulfur content of feed (% dry matter basis)	0.12	
Percent of total bales provided by secondary type	25	
Average bale weight (actual lbs)	1200	
Percentage of secondary feed on a dry matter basis	23.4	
Feed wastage of secondary bale type (%)	10	

4. Supplementary Feed Type		My Own Values
Grain		
Barley		
Dry matter content of feed (%)	89	
Protein content of feed (% dry matter basis)	12.5	
Nitrogen content of feed (% dry matter basis)	2.00	
Phosphorus content of feed (% dry matter basis)	0.38	
Potassium content of feed (% dry matter basis)	0.54	
Sulfur content of feed (% dry matter basis)	0.14	

5. Supplementary Feed Management		My Own Values
Amount of feed provided at one time (lbs)	300	
Number of feedings per day (eg. 2 = twice per day)	1	
Contribution to daily feed requirement of cow (lbs dry matter/day)	2.66	
Total supplementary feed needed (actual tons)	18.0	
Supplementary feed density (tons dry matter/acre)	1.49	

6. Whole Bale Management		My Own Values
Feed density (tons dry matter/acre)	19.2	
Bale density (#/acre)	33.6	
Number of bales needed	360	
Bales fed per day	3.0	
Bale spacing		
-within row (feet)	36	
-between row (feet)	36	

7. Nutrient Deposits on Land		Nitrogen	Phosphorus	Potassium	Sulfur
		(lb/acre)			
Nutrient loading from imported feed	615	68.5	583	56.1	
Nutrients removed by cattle weight gain	8.4	2.0	1.2	0.56	
% of time cattle spend outside of feeding area	15				
Net nutrient loading in feeding area from manure and waste feed	515	56.5	495	47.2	

Using the NLC

- Really Created Two Calculators
 - Cow to Feed
 - Feed to Cow
 - Only difference order of input
- Manual to walk through them

1. Cow Management

Number of cows	100	My Own Value
Average cow weight (lbs)	1300	
Daily feed requirement of cow (lb dry matter/day)	33.8	
Area of land used for feeding (acres)	10.7	
Number of feeding days	120	
Cow Days per Acre	1121	
Animal Unit Days per Acre	1458	
Net feed density (tons dry matter/acre)	18.9	

- Feed requirements set at 2.6%
 - Can change this
- Weight Gain set at 0.25 lb/day
 - Cannot change this, only small impact

1. Cow Management

Number of cows

100

My Own

Average cow weight (lbs)

1200

Value

Daily feed requirement of cow (lb dry matter/day)

Based on industry accepted daily feed requirement of 2.6% of a cow's body weight for a balanced ration.

(ie. Cell E15 = Cell E14 x 2.6 / 100)

Area of land used for feeding (acres)

Number of feeding days

Cow Days per Acre

1121

Animal Unit Days per Acre

1458

Net feed density (tons dry matter/acre)

18.9

4. Supplement

Dry matter conte

Potassium conte

Sulfur content of

- Threshold warnings

- Animal unit days /ac – 1800

2. Primary Bale Type	Hay_Perennials	My Own Values
	Brome	
Dry matter content of feed (%)	90	
Protein content of feed (% , dry matter basis)	10.6	
Nitrogen content of feed (% , dry matter basis)	1.70	
Phosphorus content of feed (% , dry matter basis)	0.17	
Potassium content of feed (% , dry matter basis)	1.50	
Sulfur content of feed (% , dry matter basis)	0.14	
Percent of total bales provided by primary type	75	
Average bale weight (actual lbs)	1300	
Percentage of primary feed on a dry matter basis	76.6	
Feed wastage of primary bale type (%)	10	

- Contains book values for feed types
 - Cowbytes
 - **Can replace with your own**

6. Whole Bale Management

Feed density (tons dry matter/acre)	19.2
Bale density (#/acre)	33.6
Number of bales needed	360
Bales fed per day	3.0
Bale spacing	
-within row (feet)	36
-between row (feet)	36

6. Whole Bale Management

Feed density (tons dry matter/acre)	102.6
Bale density (#/acre)	179.5
Number of bales needed	1921
Bales fed per day	16.0
Bale spacing	
-within row (feet)	36
-between row (feet)	7

Values over 25 result in excessive nutrient loading. To lower this value decrease animal unit days per acre as per the comments in cell E19, or reduce the percent of feed waste (cells E33 and/or E46).

• Threshold warnings

○ Feed density – 25 D.M. ton /day

• Some of the Outputs

7. Nutrient Deposits on Land
 Threshold warnings

	Nitrogen	Phosphorus	Potassium	Sulfur
	(lb/acre)			
Nutrient loading from imported feed	615	68.5	583	56.1
Nutrients removed by cattle weight gain	8.4	2.0	1.2	0.56
% of time cattle spend outside of feeding area	15			
Net nutrient loading in feeding area from manure and waste feed	515	56.5	495	47.2

○ Nitrogen loading – 800 lb/ac
 ○ Phosphorus loading – 206 lb/ac

7. Nutrient Deposits on Land
 • Nutrient Loading

	Nitrogen	Phosphorus	Potassium	Sulfur
	(lb/acre)			
Nutrient loading from imported feed	3025	316.9	3045	281.8
Nutrients removed by cattle weight gain	42.0	10.1	6.0	2.80
% of time cattle spend outside of feeding area	15			
Net nutrient loading in feeding area from manure and waste feed	2535	260.8	2584	237.1



What the NLC Does Not Address



NLC Does Not Address

- Assumes all nutrients left in the field
 - Does not address availability
 - Does not address nutrient loss
- Nutrient distribution
 - Function of feeding system & Mgt
 - Something you can comment on

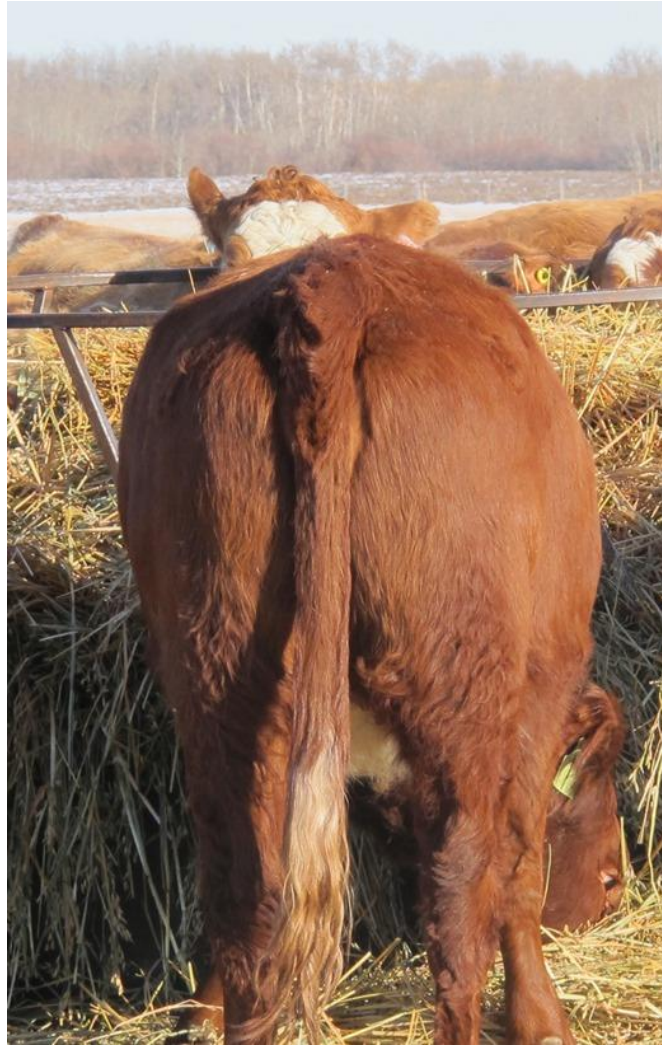


NLC Does Not Address



Summary

- Use the tool to:
 - Estimate N, P, K, S additions
 - Compare & Plan in-field feeding systems
 - Take advantage of the nutrients being imported by in-field feeding systems
 - Minimize impacts of in-field feeding systems



And that's
Just One
Person's point
of View!!

Thank
You





- General Manure Management
 - www.agric.gov.ab.ca/manure
- AOPA legislation
 - www.agric.gov.ab.ca/aopa
- Nutrient Loading Calculator
 - [http://www1.agric.gov.ab.ca/\\$Department/softdown.nsf/main?openform&type=NLC&page=information](http://www1.agric.gov.ab.ca/$Department/softdown.nsf/main?openform&type=NLC&page=information)



- Manure and Compost Handling Listing
 - <http://www.agric.gov.ab.ca/app68/customservices?cat1=Manure+and+Compost+Handling>
- Wintering Site Assessment Tool
 - [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/epw12912/\\$FILE/aafc-wintering-sites-booklet.pdf](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/epw12912/$FILE/aafc-wintering-sites-booklet.pdf)
- Manure Transportation Calculator
 - [http://www1.agric.gov.ab.ca/\\$department/softdown.nsf/main?openform&type=MTC&page=information](http://www1.agric.gov.ab.ca/$department/softdown.nsf/main?openform&type=MTC&page=information)
- Manure and Compost Directory
 - <http://www.agric.gov.ab.ca/app68/manure>