

Forage Inventory Management

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CFGA Conference

November 14, 2019



Agriculture and Land

Why does it matter?

- Impact on profitability \$
 - Quantity
 - Available for intake
 - Spoilage/waste
 - \$ purchase more or \$ sell more
 - Quality
 - Feeding the to stage of production
 - Dry _{vs} lactation _{vs} young feeder _{vs} herd bull
 - “Measure it to manage it” approach
 - “Measure it accurately”

Required forage

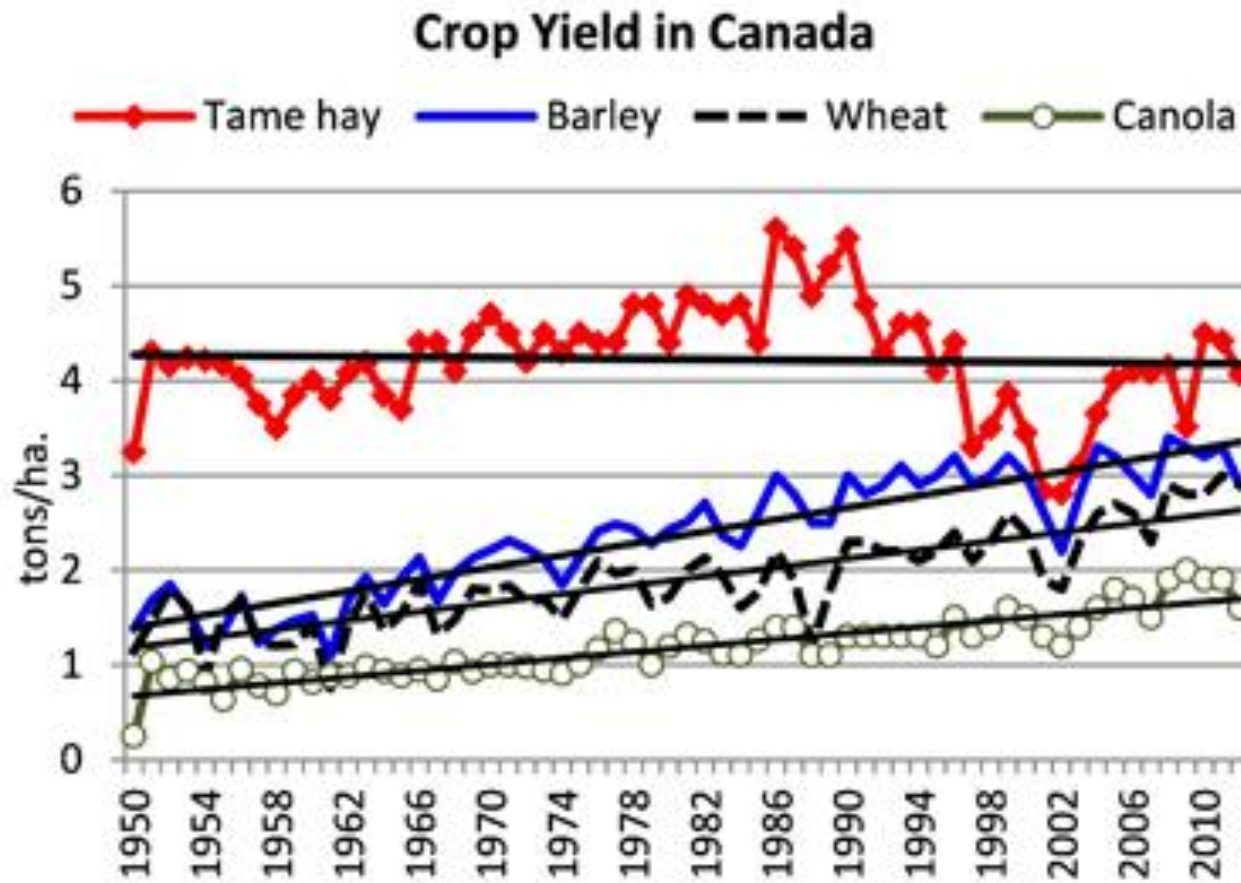
	#	Weight Lbs	Intake % BW	Days on Feed	Required Lbs DM	Required Tonnes	Intake lb/d as fed 55 DM
Cows	50	1450	0.025	210	380625	173	66
Bulls	2	2000	0.025	210	21000	10	91
Heifers	6	750	0.027	210	25515	12	37
Calves	42	550	0.028	30	19404	9	28
				Total	446544		

- Waste – spoilage (mold) and feeding 10,15,20%
- Supplementation
 - Grain, protein etc
- Quality
 - For each class of animal

Quantity

- Based on previous years, require x,y,z
 - 750 t
 - 750 round bales
 - Previous year carry-over ??
 - Emphasis was on volume
- 5-10 years ago ample forage supplies around
 - \$ purchase - \$15-20/bale

Quantity



Source: Statistics Canada

Yield Concerns

- Climate – highly variable in all area of Canada
 - Winter kill – Alfalfa, clovers
 - Freeze thaw cycles in January
 - Frost heaving in Spring
 - Losses variable – 10 - 80%
 - Quality and quantity
 - More interest in annuals
 - Pea/Oat
 - Sudan/Sorghum
 - Corn – silage, cob meal & HMC



Typical PEI Nor'easter



Yield Concerns

- Pastures and conserved forage land
- Crop rotations – cash crops
 - Potatoes, corn, barley & wheat
 - Effect on soil health – OM
 - Pest issues – wireworm
 - Forage land → Buckwheat or Brown mustard
 - 15,000 – 20,000 acres

Forage Yield

- Who measures yield at field level?
 - How accurate - DM t/ac
 - OR
 - # bales/ac 4, 6, 8, 10 - size and weight
 - Size of bunkers, piles or bags
 - Size of tower silos
- Proactive on yield and quality

Tools of the trade

Soil probe



Forage probe



Clip Board



Markers



Density probe

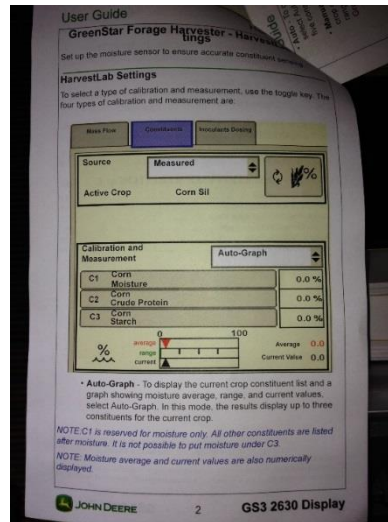


Weighing equipment



Yield

- Chopped silage
 - Yield & Quality monitors
 - Harvester or mower
 - Follow calibration directions



Yield

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

- No yield monitor
- Recording loads in from each field?
- Indication of forage stand health
 - soil probe
- Volume calculations – not complex
- Are you measuring density?



Packing

- Weight, time and patience
- Chop length
 - Harvester DM sensor
- Uneven packing within a bunk
 - Variations on palatability



Packing and Inventory

**Table 1. Dry matter loss as influenced by silage density.
(Ruppel, 1992)**

Density (lbs of DM/ft³)	DM loss at 180 days (% of the DM ensiled)
10	20.2
14	16.8
15	15.9
16	15.1
18	13.4
22	10.0

Forage yield

- # bales ?
- How much does a bale weigh?
- DM content?



$4 \times 5 = 842$
(600 – 950)

$4 \times 4 = 488$
(325 – 625)



Forage waste



- Harvested vs Intake
 - Losses, invisible and visible



Waste

Visible 10 – 40% ???

Fermentation 5% ??

Heating means loss of DM and palatability



Forage Waste





Sealing

Side wall plastic is a must

Top cover and weighted down or tie straps



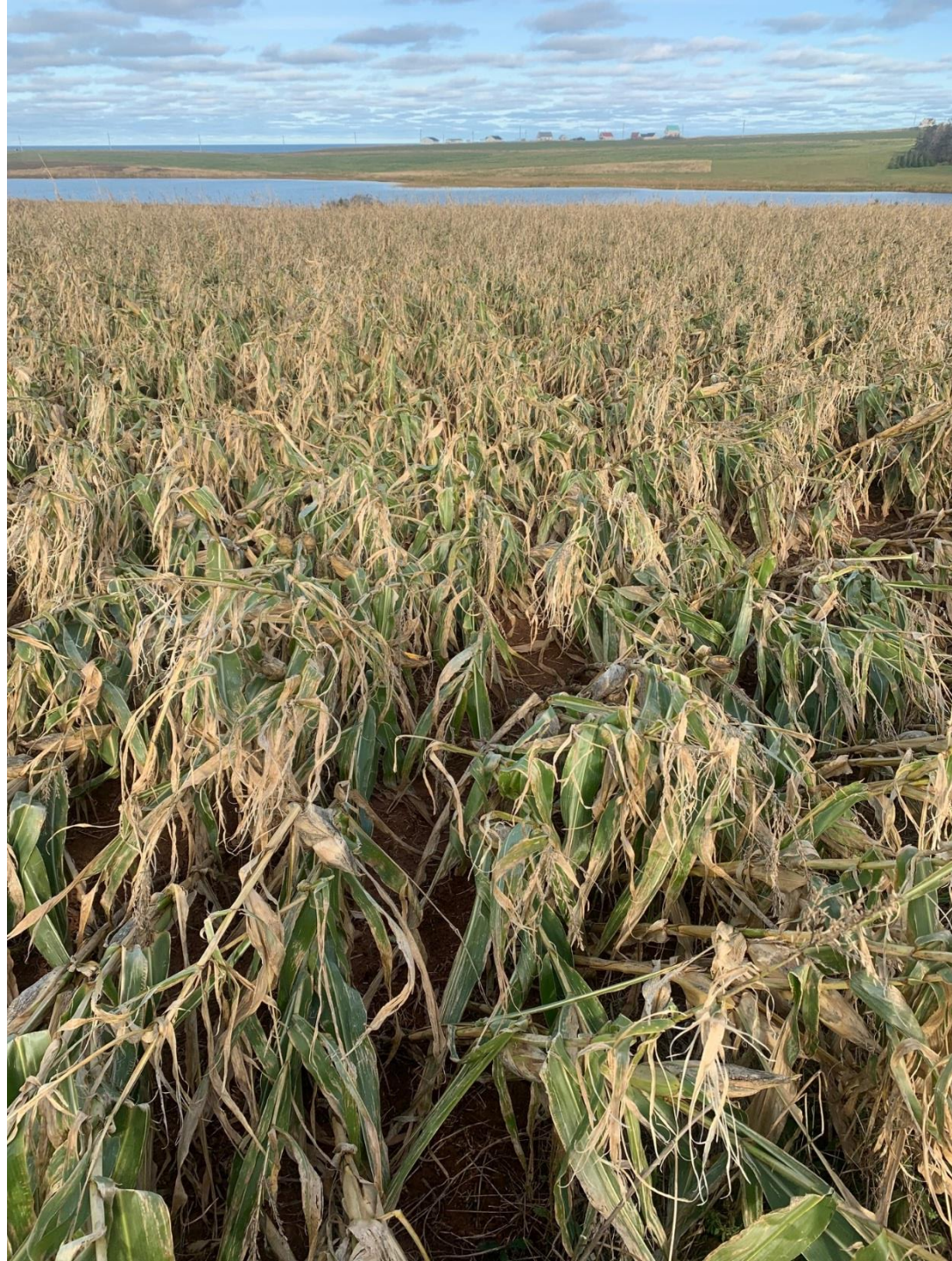
Waste reduction



Quality

- Do you test feed and soil and how often
- Do you field records
 - Forage composition
 - Quantity #
- Storage map for bales
 - What - when - how many
- Bunker/tower/bag silage
 - Field source
 - Load count
- What do you do with the analysis

2019 crop
year

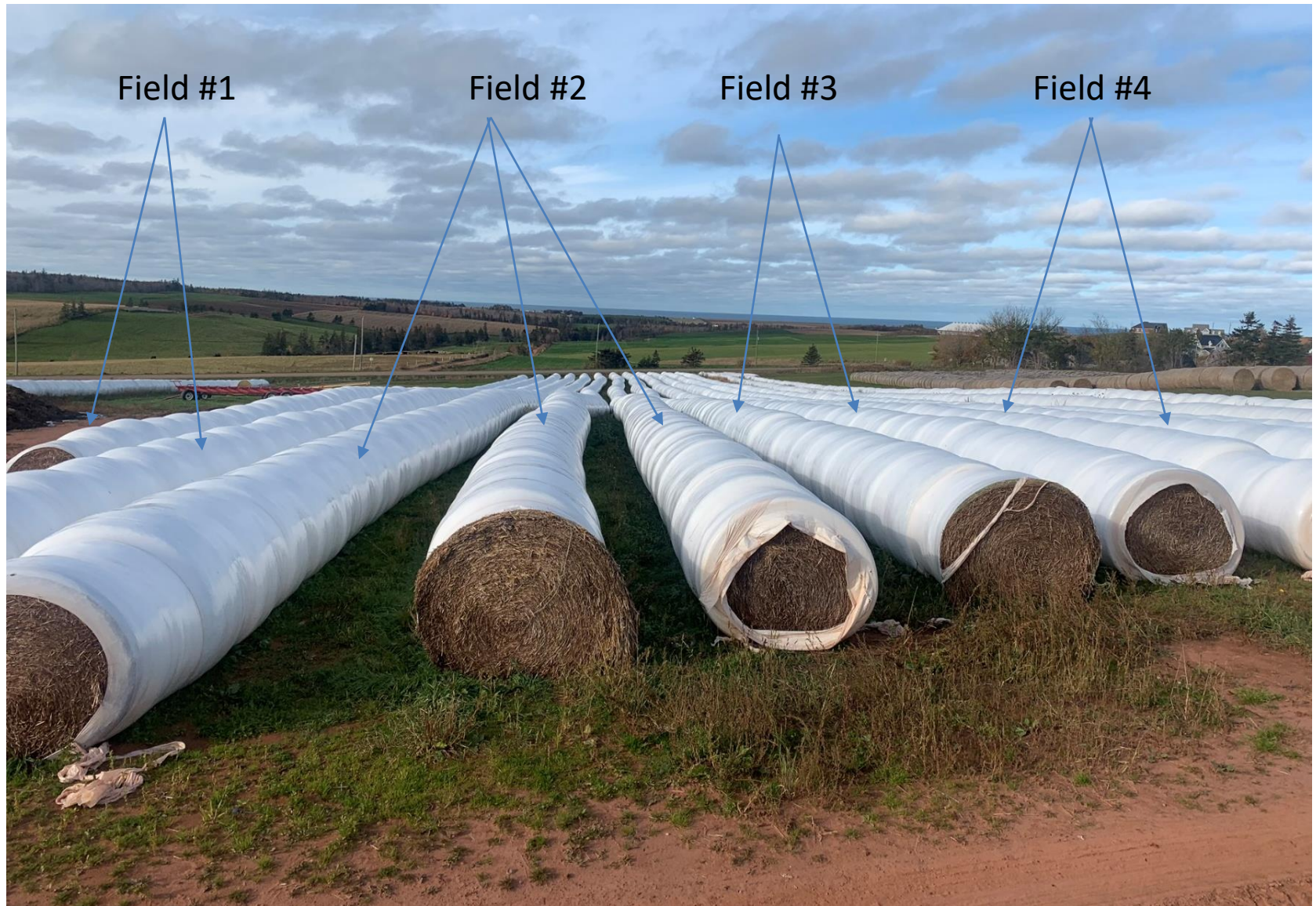


- How to partition forages
 - Lactating
 - Late gestation
 - Dry
 - Age
- Supplementation
 - Grains, proteins, min/vits
 - Are By-products suitable

Animal Performance



Sampling lots?



Analyses	Result		Units
	Dry	As Fed	
Forage Type	Mixed Silage		
*Ash	7.47	2.85	%
*Dry Matter		38.1	%
Protein NIR	9.60	3.66	%
Net Energy Lactation (fact)	5.92	2.26	MJ/kg
Net Energy Lactation Mcal/100lb	59.9	22.8	Mcal/100lb
Net Energy Lactation Mcal/kg	1.32	0.503	Mcal/kg
Net Energy Lactation MJ/kg	5.53	2.11	MJ/kg
Crude Fat NIR	4.00	1.52	%
Acid Detergent Fiber NIR	35.1	13.4	%
Non Structural Carbohydrates	30.0	11.4	%
IF	57.8	22.0	%
Potential Digestibility	80.4	30.6	%
NDF(OM) NIR	50.7	19.3	%
*Sodium	0.0316	0.0120	%
*Calcium	0.501	0.191	%
*Phosphorus	0.240	0.0915	%
*Magnesium	0.165	0.0629	%
*Potassium	1.92	0.732	%
Sulfur	0.144	0.0549	%
ADFN NIR	10.4	3.96	%
A Fraction	42.7	16.3	%
B Fraction	17.3	6.59	%
D Fraction	10.9	4.15	%
G Fraction	29.6	11.3	%
K2	4.66	1.78	
K9	1.95	0.743	
Acid Detergent Fiber Lignine NIR	4.70	1.79	%
Lactic Acid	1.47	0.560	%
Acetic Acid	1.49	0.568	%
Forage Quality Index	123	46.9	
Relative Feed Value	109	41.5	
NDF-ADF Spread	15.6	5.95	%

Chemical analysis can be highly detailed depending on the lab

Total Mixed Ration

Tool to provide a balance of nutrients to animals using multiple feed sources – by-products



Caution

- Used to disguise unpalatable feeds
- Over processing
- Feed separation related moisture content

A Tool for Evaluating Feed Test Results

This tool evaluates the ability of a single feed to meet basic nutritional requirements of different classes of cattle in different stages of production under normal circumstances. These results will not apply if cows are in poor condition, if the weather is extremely cold, wet, or windy, nor does it account for the extra energy expenditure associated with swath grazing. It is not intended for use in ration balancing, but rather to alert you to potential issues with individual feed ingredients. It is strongly recommended that the user seek advice from a qualified professional to develop a balanced ration, or familiarize yourself with ration balancing software like CowBytes.

Step 1: Select Cattle Class - options are Backgrounding, Replacements, Mature Cows, and Mature Bulls.

Step 2: Select Average Daily Gain in lbs/day (for Backgrounding), or Stage of Production (for Replacements, Mature Cows, Mature Bulls).

Step 3: Enter Weight of cattle in lbs - acceptable ranges for Growing and Finishing are between 500 and 1000 lbs; for Replacements are 850 to 1150 lbs, for Mature Cows are between 1100 and 1600 lbs, for Mature Bulls are between 1800 and 2500 lbs; mid-ranges will round down, e.g. 550 rounds to 500.

Step 4: Enter your own feed test results on a dry matter basis, starting with Dry Matter (DM,%).

Select Cattle Class

Mature Cows ▼

Select Stage of Production

Lactation ▼

Enter Weight (lbs)

**Enter weight between 1100 and 1600 lbs.*

1400

Enter Test Feed Data

Dry Matter (DM,%)	Total Digestible Nutrients (TDN, %)	Crude Protein (CP, %)	Calcium (Ca,%)	Phosphorus (P, %)	Ca:P Ratio	Potassium (K, %)	Magnesium (Mg, %)	Tetany Ratio
50 %	60 %	11.5 %	0.65 %	0.2 %	3.25:1	1.9 %	0.12 %	1.15:1

Calculate Single Feed Data

Interpretation:

Suitability of the feed is indicated by a color coded response. **Green** indicates that the nutrient is adequate to meet nutritional requirements. **Yellow** is within +/- 2.5% of TDN requirements, +/- 5% of CP requirements and 0.05% below mineral requirements..

Red indicates the feed does not meet animal requirements.

Way of flagging issues

Call nutritionist before too far in to a problem

Evaluating other feeds

Bold green cells in borders are for user inputs.

Reference Feeds :

Name	\$/tonne, As Fed	DM, %	TDN (% DM basis)	CP (% DM basis)
Barley Grain	\$ 240.00	87%	80%	12.00%
Soybean M	\$ 580.00	88%	84%	54.00%

Target Feeds:

	Asking Price \$/tonne, As Fed	DM, %	TDN (% DM basis)	CP (% DM)	Nutrient Value \$/tonne, As Fed	Impact on feed cost \$/tonne, As Fed	
RBS	\$ 100.00	60%	52%	12.50%	\$ 132.75	Positive	32.75
RBS	\$ 80.00	40%	50%	8.50%	\$ 72.53	Negative	(7.47)
Corn Silage	\$ 55.00	35%	64%	9.00%	\$ 75.37	Positive	20.37
Pea Screen	\$ 170.00	88%	60%	16.00%	\$ 237.04	Positive	67.04
Potatoes	\$ 15.00	20%	72%	8.50%	\$ 45.55	Positive	30.55
Extruded SB	\$ 552.00	94%	88%	42.00%	\$ 526.82	Negative	(25.18)
Cob meal	\$ 120.00	65%	78%	9.00%	\$ 159.17	Positive	39.17
Corn grain	\$ 325.00	90%	90%	9.50%	\$ 247.19	Negative	(77.81)
Canola Meal	\$ 460.00	90%	75%	40.00%	\$ 463.66	Positive	3.66
DDGS	\$ 340.00	90%	74%	30.00%	\$ 381.45	Positive	41.45

Rations

COWBYTES 5.32 ARD - FULL VERSION

File Edit Feed Table Reports Yardage Calculator Help

Canadian units

Feeders and Replacements - 850lbs, Steer, ADG:2.6lbs

Ration Animal Feed Table Feeding Feed Mixes Client Info Water Modification Config Diagnostics Calculator

Feed Name	DM Fed %	As fed (lbs)	DM fed (lbs)	DM %	NEt Mcal/lb	NEg Mcal/lb	Protein %	Calcium %	Phosphorus %	Cost \$/unit	lbs /unit	Magnesium %	Potassium %	Sulphur %	Sodium %	Chloride %	Salt %
GRASS HAY	0.0	0.000	0.000	89.9	0.55	0.29	8.2	0.53	0.17	60.00	2205	0.17	1.32	0.18	0.02	0.00	0.1
CORN SIL 483	11.2	8.000	2.400	30.0	0.75	0.47	8.0	0.22	0.24	45.00	2205	0.14	1.14	0.12	0.03	0.00	0.2
SILAGE 560	23.1	15.000	4.950	33.0	0.59	0.33	10.9	0.60	0.25	40.00	2205	0.20	1.96	0.16	0.02	0.00	0.2
Barley 9902	0.0	0.000	0.000	87.0	0.92	0.62	8.8	0.07	0.47	210.00	2205	0.15	0.54	0.14	0.02	0.00	0.0
CORN GRAIN	33.3	8.000	7.120	89.0	0.99	0.68	10.0	0.03	0.29	6.30	56	0.13	0.37	0.12	0.03	0.00	0.0
HMC	0.0	0.000	0.000	68.0	1.05	0.73	9.1	0.60	0.27	180.00	2205	0.15	0.90	0.15	0.02	0.35	0.0
POTATOES	18.7	20.000	4.000	20.0	0.89	0.60	9.5	0.04	0.24	15.00	2205	0.14	2.17	0.09	0.09	0.00	0.0
BREWERS GRAIN	12.2	10.000	2.600	26.0	0.68	0.41	25.7	0.13	0.45	25.00	2205	0.12	0.08	0.33	0.10	0.00	0.0
SOYBEAN MEAL	0.0	0.000	0.000	90.0	0.98	0.67	54.0	0.29	0.71	450.00	2205	0.33	2.36	0.48	0.01	0.00	0.0
UREA	0.4	0.080	0.079	99.0	0.00	0.00	281.0	0.00	0.00	21.90	55	0.00	0.00	0.00	0.00	0.00	0.0
ATL	1.1	0.250	0.238	95.0	0.00	0.00	0.0	24.21	3.37	29.00	55	2.11	0.00	0.32	6.32	9.47	15.7
Bell Mineral	0.0	0.000	0.000	99.0	0.00	0.00	0.0	15.70	0.39	23.00	55	2.55	3.25	3.22	6.31	9.71	16.0
FORT TM SALT	0.0	0.000	0.000	99.0	0.00	0.00	0.0	0.00	0.00	7.50	55	0.00	0.00	0.00	37.37	0.00	94.9
LIMESTONE	0.0	0.000	0.000	99.0	0.00	0.00	0.0	38.38	0.00	180.00	2205	0.00	0.00	0.00	0.00	0.00	0.0

Dry Matter Intake	Maximum	Recommended	Supplied	As Fed (lbs)	Pred. ADG (lbs)	BCS Days
24.4	21.4	21.4	(lbs)	61.3	3.4	

Results Ratios Methane - Manure

Description	DM %	NEt Mcal	NEg Mcal	Protein grams	Calcium grams	Phosphorus grams	Cost \$/lb	Magnesium grams	Potassium grams	Sulphur grams	Sodium grams	Chloride grams	Salt grams
Recommended Nutrients per Day		8.15	4.33	1132	38	21							
Supplied from Ration		8.15	5.80	1231	45	31	1.75	10	58	15	8		19
Description		Mcal/lb	Mcal/lb	%	%	%		%	%	%	%	%	%
Diet Concentration (DM)	34.9	0.80	0.52	12.7	0.47	0.32		0.17	1.12	0.15	0.12	0.11	0.24

Ration: JA650brewMar.cml

Feed Table: system

Summary

- Forage inventory not just about volume
- Proactive in yield monitoring
- Begins with the soil
- Partition forage to stage of production
- Spoilage and waste are the enemy
- Information is king – document
- Little things make a big difference
- Plan early & plan often
- Opportunity feeds usually available
- Efficiency and margins should be on your side



Questions?