

Interpreting Forage Analysis Reports

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Agri-Food
Calgary Edmonton Winnipeg Lethbridge Surrey

Certificate Of Analysis

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Phone: (204) 982-8630
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Lot Number:
Report Number:
NWL Sample ID:
Page:

Bill to:
Report to:

Date Received: Oct 29, 2001
Date Reported: Nov 01, 2001
Sample Retained: Nov 28, 2001
Sample Received Via: Box
Arrival Condition: Acceptable
Project Number:
PO Number:

Phone #:
Fax #:
Client Number:

Feed Analysis

Producer	Client Sample ID	Client Sample Code	Client Comments

Sample Code	Client Sample Description
Alfalfa Hay	Alfalfa Hay

Analyte	Units	As Fed	Dry Basis
Moisture*	%	14.1	
Available Protein*	%	14.5	16.8
Crude Protein*	%	14.5	16.8
Heat Damaged Protein*	%	1.0	1.1
Acid Detergent Fibre*	%	29.0	33.8
Neutral Detergent Fibre*	%	36.5	42.5
Dry Matter*	%	85.9	
NonStructural Carbohydrates*	%	24.9	29.0
Relative Feed Value*			137
TDN (Crude)*	%	53.70	62.60
NE/GAIN*	Mcal/kg	0.59	0.69
NE/LACT*	Mcal/kg	1.22	1.42
NE/MAINT*	Mcal/kg	1.19	1.39
DE*	Mcal/kg	2.36	2.75

Analyte	Units	As Fed	Dry Basis
Calcium*	%	1.46	1.70
Magnesium*	%	0.29	0.34
Phosphorus*	%	0.15	0.18
Potassium*	%	1.95	2.27

Moisture and Dry Matter

- ***As-fed***: the nutrient content as it is fed
 - ***DM*** : moisture free or 100% dry basis
- DM is impt for :**
- **Calculating rations**
 - **Estimating feed intake**
 - **Comparisons**
 - **Potential storage / feeding problems**

Calculating Intakes

- An animal consumes 2-4% of its bodyweight as dry matter.
- A 1400 lb cow eating 2.5% of her BW will consume 35 lbs DM.
- Hay (85% DM) $35/85 \times 100 = 41$ lbs
- Silage (35%DM) $35/35 \times 100 = 100$ lbs

Recommended Moisture Ranges for Forages

- **Baled hay** <15%
- **Alfalfa silage (bunk)** 65-70%
- **Alfalfa silage (upright)** 50-60%
- **Cereal silage(bunk)** 67-72%
- **Cereal silage (upright)** 50-60%
- **Corn silage (bunk)** 68-70%
- **Corn silage (upright)** 62 -65%

Crude Protein

- **Includes true protein and NPN, available and unavailable**
- **Amount of nitrogen X 6.25**
- **Forage protein levels affected by:**
 - **plant type**
 - **fertilizer**
 - **maturity**

Protein Levels in Forage

<u>Forage</u>	<u>%CP, DM basis</u>
Alfalfa hay, early	18+
Alfalfa hay, mature	13-15
Cereal	12-14
Grasses	10-12
Corn silage	9
Straw	4

Beef Cattle Protein Requirements

<u>Animal</u>	<u>%CP</u>
Beef Cow	
Mid Gestation	7
Late Gestation	8
Lactation	10-12
Backgrounding	
600 lb, 2 lbs/d	12
Finishing	
1100 lb, 3 lbs/d	9

Dairy Cattle Protein Requirements

<u>Animal</u>	<u>%CP</u>
Dry Cow	
Far-off	13
Close-up	15
Heifers	
300 lbs	18
550 lbs	14
1000 lbs	14
Lactating	
70 lbs/day	16
110 lbs/day	19

Protein

- **Heat damaged protein**
 - protein may bind to CHOs during heating and become unavailable
- **Available protein**
 - protein available after being corrected for unavailable (heat damaged) protein
 - if %HD protein / CP > 12% use AP value

Soluble Protein

- **Protein which is instantly broken down in the rumen**
- **Silages will contain 55% + SP**
- **Dry hays 30-40% SP**
- **General recommendation - keep SP <30% in dairy rations**

Fibre Values

- **Acid Detergent Fibre (ADF)**
 - contains cellulose and lignin
 - related to feed digestibility
 - used to calculate energy

ADF

30

40

50

60

TDN

66

58

50

42

Fibre Values

- **Neutral Detergent Fibre (NDF)**
 - contains all fibre components (ADF + hemicellulose)
 - related to feed intake and rumen fill

<u>%NDF</u>	<u>DMI, %BW</u>
30	4
40	3
50	2.4
70	1.7

Alfalfa Maturity and ADF/NDF

<u>Forage</u>	<u>% ADF</u>	<u>%NDF</u>
Alfalfa		
Late veg	29	40
Early bloom	31	42
Mid bloom	35	46
Full bloom	37	50

Grass Maturity and ADF/NDF

<u>Forage</u>	<u>% ADF</u>	<u>%NDF</u>
Brome		
Late veg	35	65
Late bloom	43	68
Orchardgrass		
Mid bloom	41	68
Late bloom	45	72

NonStructural Carbohydrates(NSC)

- **AKA nonfibre carbohydrate (NFC)**
- **Starch, sugars, pectin**
- **$NFC = 100 - (NDF + CP + EE + Ash)$**
- **Alfalfa - 20-25% NFC**
- **Corn silage - 30-40% NFC**
- **Ration guidelines (dairy) 35-42% diet DM**

Energy Systems

- TDN, Digestible Energy, Net Energy
- Energy correlated to ADF
- $\text{TDN} = 88.9 - (0.779 \times \text{ADF})$
- $\text{DE (mcal/kg)} = 0.044 \times \% \text{TDN}$
- $\text{NE}_G, \text{NE}_M, \text{NE}_L$

TDN Requirements of Beef Cattle

- **Early/mid gestation 48-52%**
- **Late gestation 58%**
- **Lactation 60-65%**
- **Backgrounding calves (600 lbs)**
 - **1.5 lbs/day 63%**
 - **2.0 lbs/day 68%**
 - **2.5 lbs/day 74%**

Energy Requirements of Dairy Cows

<u>Milk Production</u>	<u>NE_L, mcal/kg</u>
55 lbs	1.37
77	1.47
99	1.55
120	1.61

Relative Feed Value

- **An index for comparing the nutrient value of different forages.**
- **Takes into account ADF(digestibility) and NDF (intake).**
- **Does not include protein.**

Relative Feed Values

<u>ADF</u>	<u>NDF</u>	<u>RFV</u>	<u>Cattle</u>
<30	<40	>140	Lactating dairy cows, young heifers
30-35	40-45	124 - 140	Backgrounding calves, dry dairy cows
36-40	46-50	101 - 123	Late gestation and lactating beef cows
>40	>50	<100	Early and mid gestation beef cows, maintenance

Minerals

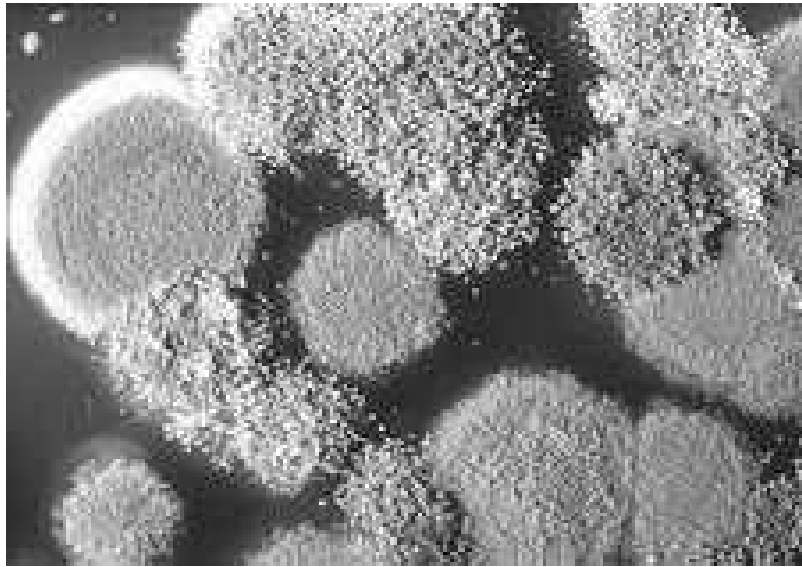
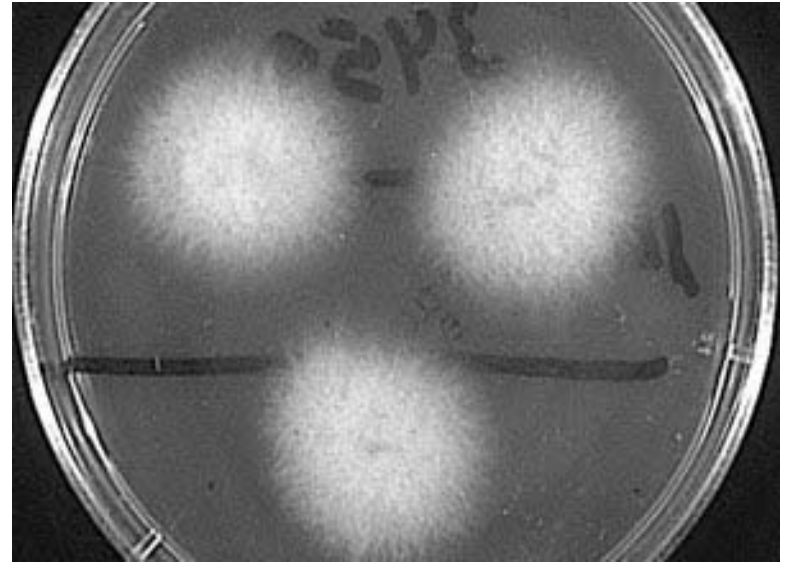
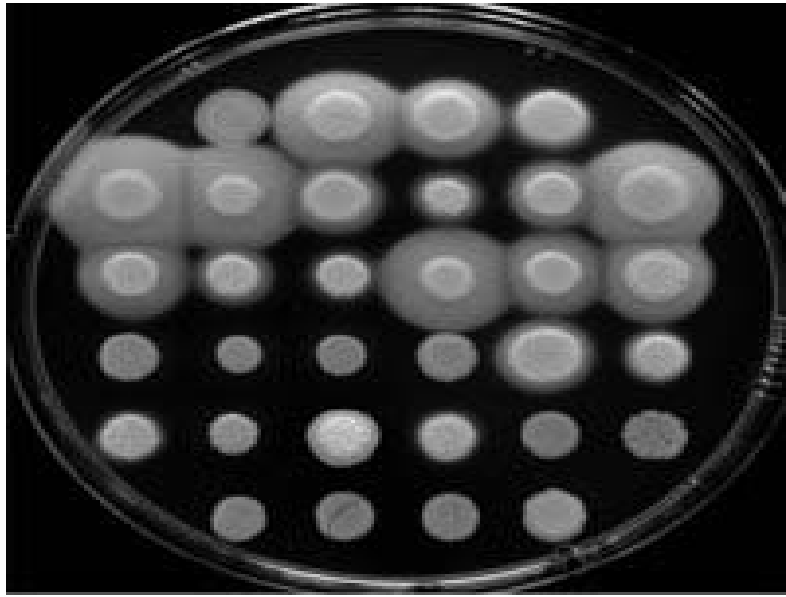
- **NIR is not an accurate method of determining mineral content.**
 - **OK for free choice feeding of minerals**
- **Macrominerals - analyzed routinely by wet chem if minerals are balanced**
- **Microminerals - analyzed once per year**

Miscellaneous Tests

- **Silage fermentation analyses**
- **Mold identification**
- **NDF digestibility**
- **Relative feed quality**

Typical Fermentation End Products

End Product	LS (45-55%)	GS (30-35%)	CS (30-40%)
pH	4.7-5.0	4.3-4.7	3.7-4.2
Lactic (%)	2-4	6-10	4-7
Acetic (%)	0.5-2.0	1-3	1-3
Propionic (%)	<0.1	<0.1	<0.1
Butyric (%)	0	0.5	0
Ethanol (%)	0.5	0.5-1.0	0.2-2.0
Ammonia-N (% CP)	<12	8-12	<10



NDF Digestibility

- **2001 NRC for dairy incorporates forage (NDF) digestibility**
- **dairy cows eat more and produce more milk with higher NDF digestibility forages**
- **now available by NIR**

Relative Feed Quality

- **An advance on RFV taking into account changes in 2001 NRC Dairy**
- **Similar equations except uses digestible fibre**
- **Appropriate for all forages except corn silage**
- **More representative of performance**

What Information is Necessary for Ration Formulation

- **NIR vs Wet Chemistry??**
- **Beef Cattle**
 - **Dry matter, crude protein, ADF (TDN), calcium, phosphorus**
- **Dairy Cattle**
 - **Dry matter, CP, ADF, NDF, NFC, NE_L, Ca, P, K, Mg, soluble protein (silages)**
- **Consider trace minerals, fermentation analyses, mold detection, NDF digestibility**

THANK YOU!

QUESTIONS?