



FEED TESTING – COSTS & CONSIDERATIONS

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Objective

We conducted a survey of western Canadian cow-calf producers (n=324) in Winter 2022/23 and found that uncertainties around collecting and submitting feed samples and interpreting the results are barriers to testing for about 15% of non-testers. This fact sheet touches on collection, submission and interpretation steps in an effort to help producers who want to understand more about what feed testing and ration balancing entails before they adopt the practice.

What We Did

In mid-October 2023 we collected samples from four typical feeds – grass/alfalfa hay, oat greenfeed, wheat straw and corn silage - and submitted them for wet chemistry analysis at four labs commonly used for feed testing. This fact sheet provides specifics on the tools and protocol used to collect samples, how and when samples were submitted, test package selections, testing costs and days until results received. We also share the averaged four-lab test results compared to book values in CowBytes (cowbytes.ca).

Sampling

Feeds were sampled from the side of each bale using a Uni-Forage Sampler by [Star Quality Samplers](#) (Irricana, AB) mounted to a cordless drill (see Figure 1). The sampler retails for \$250 CAD. Note: Saskatchewan producers can borrow forage probes from the SK Ministry of Agriculture Regional Offices.

For each baled feed:

- bale cores were randomly taken from 10% of the bales to ensure a representative sample of the feed was submitted to the lab.
- Each bale core was emptied into a small pail.
- A large resealable bag was labeled using a permanent marker with producer name, type of feed, and location/lot
- The bale cores were hand mixed in the pail prior to filling the resealable bag, air was squeezed from the bag and then sealed close.
- The name written on the bag was also noted on the form submitted with the samples shipped to the lab.

For silage:

- A probe extension was used to collect samples from the top of the silage pit
- Holes in plastic were patched with duct tape after collecting sample

[Video on Sample Collection](#)

[Recommended Principles for Proper Hay Sampling by Dan Putnam \(UC Davis\)](#)

- Silage samples were kept in a cooler and then frozen until they were shipped. The samples were shipped on ice (i.e., two frozen water bottles).

Submission to Lab

There are [several labs](#) across Canada to choose from. Respondents in the survey most commonly used Central Testing, A&L Canada, Down to Earth and Cumberland Valley. To provide information on cost and timing we submitted replicate samples of each feed to these four labs. We collected samples on a Wednesday, but did not ship them until Monday to reduce the chance of the silage sample sitting in transit and spoiling. Samples were couriered to labs using 2-day shipping. Each lab has submission forms that need to be completed and placed in the box with the samples. When the lab receives the sample they send an email confirmation.



Sampler mounts to cordless drill using ½" attachment. Take core sample from side of bale. Be sure to spread netwrap.



An extension can be used to take samples from top of silage pit.



For each feed to be lab tested collect samples from 10% of the bales in a random pattern. Empty the cores into a small, clean bucket. Mix cores well in pail to create a representative sample.



Fill a large resealable bag with a representative sample of each feed needing lab testing. Clearly label the bag using a permanent marker (ex. 50/50 Alfalfa/Grass Hay – North field) with the type of feed (and even location if sending in multiple samples of the same feed type).

Figure 1. Baled forage and silage sample collection using a forage probe

Test Package Selection Feed samples can be lab tested using wet chemistry or NIR (near infrared spectroscopy). NIR is lower cost, but it is not accurate for assessing mineral content or for mixed and unconventional feeds. Some labs offer NIR testing with a wet chemistry option for minerals. Each lab will have its own test package offerings that vary by the amount of analysis that will be done (Table 1 shows the tests ordered). Some labs offer add-on tests for pH (recommended for silage) or nitrates (recommended for frost or drought stressed feeds).

Results

All samples arrived within 3 d of shipping from Humboldt, SK. Test results started to arrive via email within 5 d and full results were received within 8-24 d of shipping (Table 1). The full results took 11 d from Cumberland Valley because samples need to enter the US through a satellite location in BC. Full results took 24 d from Down to Earth (which was unexpected and due to lab equipment failure).

Table 1. Test Packages and Prices for Four Commonly Used Feed Testing Labs

	A & L Canada Laboratories	Central Testing	Down to Earth	Cumberland Valley
Location	Strathroy, ON	Winnipeg, MB	Lethbridge, AB	US via BC
Submission Form	Form	Form	Form	Form
Test Package(s) Ordered	FD2	2FF ; 14FF (Silage); 13FF (Greenfeed)	FD14	Standard
Method	Wet Chemistry	Wet Chemistry	Wet Chemistry	Wet Chemistry
Test Cost, \$ CAD (Fall 2023 pricing)	49.20	63 (2FF) 71 (14FF) 74 (13FF)	77	46.25 (Hay/Straw) 63 (Greenfeed) 55.75 (Silage)
Add-on Tests, \$ CAD	15.40 Nitrate 10.50 pH		17 Nitrate	
Days to Arrive, d	3	2	3	3
Days till First Results, d	8	7	11	9
Days till All Results Received, d	8	8	24*	11

* Nitrate test results were received within 1 day of the Down to Earth receiving greenfeed sample (4d after shipping), first results were not received for 11 d and an equipment failure led to full results (ADF/NDF) not being received for 24 d. For the inconvenience the lab offered discount pricing for 1 year.

Table 2 reports the results for seven [common values](#) (on Dry Matter basis) found on feed test results compared to CowBytes book values. The table also reports the differences between the two values to illustrate why annual feed testing is recommended rather than relying on book values or previous years' results. Hay, greenfeed and silage had adequate TDN for mid and late gestation, but only corn silage could meet TDN requirements during lactation. Only the alfalfa-grass hay had crude protein that met lactation requirements. Knowing the feed quality is important to build rations that meet nutritional requirements for each stage of production.

RULE OF THUMB
Mid Gestation – Late
Gestation - Lactation

TDN 55-60-65%
Crude Protein 7-9-11%

Table 2. Four-Lab Average Test Results Compared to CowBytes Book Values

Feed/%DM Measures*	Results	Book Value	Difference	% Difference
50/50 Alfalfa-Grass Hay				
Dry matter	88.08	87.90	0.17	0.2%
TDN	59.79	61.50	-1.71	-2.8%
Crude Protein	11.46	18.20	-6.75	-37.1%
NDF	52.10	47.00	5.10	10.9%
ADF	36.52			
Calcium	0.97	1.52	-0.55	-36.0%
Phosphorus	0.15	0.24	-0.09	-38.5%
Oat Greenfeed				
Dry matter	83.62	85.8	-2.18	-2.5%
TDN	59.18	58.4	0.78	1.3%
Crude Protein	7.19	9.9	-2.71	-27.4%
NDF	54.76	61	-6.24	-10.2%
ADF	35.10			
Calcium	0.31	0.31	0.00	-0.8%
Phosphorus	0.22	0.2	0.02	8.7%
Nitrate (N03 %)	0.10			
Straw				
Dry matter	87.32	89.1	-1.78	-2.0%
TDN	49.19	44.57	4.62	10.4%
Crude Protein	4.47	3.9	0.57	14.5%
NDF	76.68	72.5	4.18	5.8%
ADF	50.77			
Calcium	0.36	0.13	0.23	176.9%
Phosphorus	0.10	0.08	0.02	21.9%
Corn Silage**				
Dry matter	38.47	35	3.47	9.9%
TDN	69.16	64	5.16	8.1%
Crude Protein	7.43	10	-2.57	-25.7%
NDF	41.01	50	-8.99	-18.0%
ADF	25.34			
Calcium	0.20	0.28	-0.09	-30.4%
Phosphorus	0.27	0.26	0.01	2.9%
pH	3.92			

*TDN – total digestible nutrients, NDF – neutral detergent fibre, ADF – acid detergent fibre

**Two year old corn silage

Using Feed Test Results

Single Feed Evaluation Tool

The Beef Cattle Research Council's (BCRC) Single Feed Evaluation Tool (beefresearch.ca/feedtest) uses seven values (Dry Matter basis) from a feed test to determine its suitability for different classes of cattle. Figure 2a/2b shows the adequacy of the alfalfa/grass hay for a 1300 lb, mature cow in mid gestation (2a) and lactation (2b). Nutrition rules of thumb are used to determine suitability. Green indicates adequate, yellow within range and red inadequate. The alfalfa/hay is adequate for mid-gestation but TDN insufficient for a lactating cow. This tool does not replace ration balancing as ration balancing can incorporate multiple feeds, plus the water and mineral.

Dry Matter (DM, %)	Total Digestible Nutrients (TDN, %)	Crude Protein (CP, %)	Calcium (Ca, %)	Phosphorus (P, %)	Ca:P Ratio	Potassium (K, %)	Magnesium (Mg, %)	Tetany Ratio
88 %	60 %	11.5 %	0.97 %	0.15 %	6.47:1	1.76 %	0.27 %	0.64:1

Figure 2a. BCRC Single Feed Evaluation Calculator with Alfalfa/Hay Feed Test Values – Mature Cow, Mid Gestation, 1300 lb

Dry Matter (DM, %)	Total Digestible Nutrients (TDN, %)	Crude Protein (CP, %)	Calcium (Ca, %)	Phosphorus (P, %)	Ca:P Ratio	Potassium (K, %)	Magnesium (Mg, %)	Tetany Ratio
88 %	60 %	11.5 %	0.97 %	0.15 %	6.47:1	1.76 %	0.27 %	0.64:1

Figure 2b. BCRC Single Feed Evaluation Calculator with Alfalfa/Hay Feed Test Values – Mature Cow, Lactation, 1300 lb

Ration Balancing

BCRC sells the ration balancing program CowBytes for \$60 CAD (includes shipping) (cowbytes.ca). Producers can learn how to use CowBytes through [online tutorial videos](#) and producer workshops.

Alternatively, producers can rely on individuals with expertise in ruminant nutrition to develop rations from their feed test results. Over 60% of the feed testers in the survey reported they let third parties develop rations from their feed test results. In Saskatchewan, Ministry of Agriculture Livestock and Forage Extension Specialists will assist producers with feed testing and ration balancing. Ruminant nutrition services are also offered through feed or mineral providers, private consultants and some vet clinics (e.g. [BeefSmart Consulting](#), [BullsEye Feeds](#), [BlueRock Animal Nutrition](#), [Yaremicio Ag Consulting](#), [Coaldale Vet Clinic](#)).

REPORT NO.
C23299-30002
ACCOUNT NUMBER
[REDACTED]

A&L CANADA LABORATORIES INC.

2136 Jetstream Rd, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664



TO: KATHY LARSON
3D34-51 CAMPUS DRIVE
SASKATOON, SK S7N 5A8

Phone: 306-[REDACTED]

CERTIFICATE OF ANALYSIS

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LAB NUMBER: 2993003
SAMPLE ID: [REDACTED] HAY
SAMPLE MATRIX: Hay
SAMPLE CUT:
TEST CODE: FD2

DATE SAMPLED: 2023-10-11
DATE RECEIVED: 2023-10-26
DATE REPORTED:
DATE PRINTED: 2023-10-31

PARAMETER	RESULTS		UNIT	METHOD
	AS FED	DRY		
DRY MATTER				
Moisture	9.61	0.00	%	AOAC 930.15
Dry Matter	90.39	100.00	%	Calculation
PROTEIN				
Crude Protein	9.0	10.00	%	AGR-G-002*
Soluble Crude Protein	51.50	51.50	% of CP	Wet Chemistry
ADF-CP	0.61	0.68	%	Wet Chemistry
NDF-CP	1.32	1.46	%	Wet Chemistry
UIP (Bypass Protein)	24.25	24.25	Est % CP	Wet Chemistry
FIBRES				
Acid Detergent Fibre	31.73	35.10	%	Wet Chemistry
Neutral Detergent Fibre	45.62	50.47	%	Wet Chemistry
Total Digestible Nutrients	55.64	61.56	%	Calculation
ENERGY				
NE Lactation	1.26	1.39	MCal/Kg	Calculation
NE Gain	0.71	0.78	MCal/Kg	Calculation
NE Maintenance	1.36	1.50	MCal/Kg	Calculation
MINERALS				
Calcium	0.70	0.77	%	AGR-G-004 *
Copper	4.65	5.14	ug/g	AGR-G-004 *
Phosphorus	0.14	0.16	%	AGR-G-004 *
Potassium	1.57	1.74	%	AGR-G-004 *
Sulphur	0.15	0.17	%	AGR-G-004 *
Magnesium	0.21	0.23	%	AGR-G-004 *
Zinc	20	22.02	ug/g	AGR-G-004 *
Iron	75	83.52	ug/g	AGR-G-004 *
Manganese	22	24.70	ug/g	AGR-G-004 *
Sodium	0.01	0.01	%	AGR-G-004 *
CALCULATION				
NFC	25.34	28.03	%	Calculation
Relative Feed Value	113.46	113.46		Calculation

Figure 3. Screenshot of Alfalfa/Grass Hay Test Results from A&L Canada

Funding Acknowledgement

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