

# Beef and Forage Technical Bulletin



## Forage - Alternative options to feed the cow herd - Ammoniating low quality forages

Producers faced with the problem of storing high moisture feed or wanting to improve the feed value of low quality forages should consider ammoniation. Ammonia (NH<sub>3</sub>), which contains nitrogen, increases the crude protein content and improves the energy by breaking down the poorly digested fibre of mature forages. Ammonia also acts as a preservative of higher moisture feeds by destroying molds and bacteria during the ammoniation process.

### Factors affecting the response to ammoniation

Per cent moisture in the roughage, the time of ammoniation, temperature and the amount of anhydrous ammonia applied are the key factors affecting forage response to the ammoniation process. When using ammonia to improve the protein content of low quality forages, it should be added at three to five per cent of the dry matter weight. As a preservative for high moisture forage, the ammonia level can be decreased to two per cent. Temperature determines the speed at which the reaction between ammonia and the feedstuff occurs, as well as the extent of improved digestibility.

### The application of ammonia provides these advantages:

- increased forage digestibility (TDN) by 10 to 30 per cent
- increased forage intake by 10 to 20 per cent
- increased crude protein content (85 to 125 per cent in past Manitoba Agriculture trials when NH<sub>3</sub> injected at three per cent)

Manitoba Agriculture and Resource Development carried out a forage ammoniation project in the fall of 2020 to improve the feed value of low quality forages. Five different feeds were covered in 5 mil plastic and injected with anhydrous ammonia at 3.1 per cent of dry matter on Oct. 1. The stack was uncovered in late November (covered for seven weeks). Feed tests were taken prior and after ammoniation to determine the change in feed value. On average, the protein increased 65 per cent but the energy dropped 6.6 per cent (3.2 TDN points).



The cost of the ammonia and plastic worked out to 1.59 cents/lb of dry matter and can range from \$30-40/ton (1.5 to 2 cents/lb). The cold October may have impacted the ammoniation process and the change in digestibility (TDN). Based on past work an average increase in digestibility of 10 to 15 per cent can be assumed. Ammoniation is a viable option to improve low quality forages, especially in years when the cost of forage is high.

Product	Protein before NH <sub>3</sub>	Protein after NH <sub>3</sub>	% Increase	TDN (energy before NH <sub>3</sub> )	TDN after NH <sub>3</sub>	% Increase or Decrease
wheat straw	5.9	8.0	36	41.5	39.7	-4.3
wild hay	10.2	18.5	81.4	62.3	57.2	-8.2
alf/grass hay	11.3	17.7	56.6	54.9	53.1	-3.3
canola chaff	6.3	10.6	93.8	38.2	33.9	-11.3
wheat chaff	6.2	9.8	58	47.6	44.8	5.9
<b>Average</b>	<b>8.0</b>	<b>12.9</b>	<b>65.2</b>	<b>48.9</b>	<b>45.7</b>	<b>-6.6</b>

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## Farm Business Management

### What is the value of feed for a beef cow?

What is the value of feed for a beef cow? A question many Manitoba producers try to figure out on different forages with different moistures at different times of the year.

Depending on your area, feed supply could be lower than normal. Supply and demand theory usually indicate that with reduced feed supply, both the demand and the price could be higher than average. Fair enough, but how high is too high? The answer will depend on the price of other feed sources and the comparable value of hay.

Four main formulas will do all the calculations for most producers:

- **Total Digestible Nutrient (TDN) \$/LB** = \$ per unit / (lbs per unit x % dry matter (DM) x % TDN)
- **Equivalent Dry Hay Value (TDN Basis) \$/TON** = 2000 x % hay dry matter x % hay TDN x cost of TDN (\$/lb) for comparable feed on a dry matter basis.
- **Crude Protein (CP) \$/LB** = \$ per unit / (lbs. per unit x % dry matter x % CP)
- **Equivalent Dry Hay Value (CP Basis) \$/TON** = 2000 x hay % dry matter x hay % CP x cost of CP (\$/lb) for comparable feed on a dry matter basis.

For example: \$3.50 per bushel barley, which tests 11.5% moisture and 83.1% TDN.  
The cost of TDN \$/lb =  $\$3.50 / (48 \text{ lb} \times 0.885 \text{ DM} \times 0.831 \text{ TDN}) = \$0.099$ .

#### Total Digestible Nutrients

On a TDN basis, the comparable value of alfalfa grass hay, which tests 12.6% moisture, 13.1% CP and 57.6% TDN, can be calculated by multiplying the pounds of TDN of the hay times the cost of TDN for the alternative feed:

$2000 \times 0.874 \text{ dry matter} \times 0.576 \text{ hay TDN} \times \$0.099 \text{ barley cost of TDN} = \$99.67 \text{ per ton.}$

If you can buy this alfalfa grass hay for less than \$99.67 per ton, it is a cheaper source of energy than barley. If it is a higher price, you would be better off buying barley as your feed energy source.

Another example: \$225 per ton corn DDG, which tests 10% moisture and 28% CP.

The cost of CP \$/lb =  $\$225 / (2000 \text{ lb} \times 0.90 \text{ DM} \times 0.28 \text{ CP}) = \$0.446$

#### Crude Protein

On a CP basis, the comparable value for the same alfalfa grass hay, can be calculated by multiplying the pounds of CP of the hay times the cost of CP for the alternative feed.

$2000 \times 0.874 \text{ dry matter} \times 0.131 \text{ hay CP} \times \$0.446 \text{ corn DDG cost of CP} = \$102.13 \text{ per ton.}$

If you bought this alfalfa grass hay for more than \$102.13 per ton, it is a more expensive source of protein than corn DDG.

Knowing the analysis of your feed options and understanding comparable prices is key to making good decisions to feed your livestock in winter. Below is link to farm management tools and resources [www.manitoba.ca/agriculture/farm-management/production-economics/cost-of-production.html](http://www.manitoba.ca/agriculture/farm-management/production-economics/cost-of-production.html)

Manitoba Agriculture's **FeedPlan – Feed Ingredient Cost Calculator** calculates the feed value on a cost-per-pound basis of TDN and CP for various feeds based on their market value. Producers can then use the values to calculate the comparable feed value to determine which feed ingredient has better value.

Manitoba Agriculture's **Forage Purchase Decisions Calculator** calculates the feed value on a dry matter basis for various feeds based on their moisture content. Producers can then use the values to calculate the comparable feed value of dry matter to determine which feed ingredient has better value with different moistures and having freight included. For more information on production costs, Manitoba Agriculture and Resource Development has cost of production worksheets for Hay: Round Bale and Silage Production Costs, as well as for Silage Production Costs.

Successfully managing and planning your business starts with you. Contact your local **Manitoba Agriculture and Resource Development office** for the support, advice and resources you need to make sound decisions for the continued success of your farm business. If you have questions, **email us** and a **farm management specialist** will contact you.



## Feeding Facts:

### The importance of knowing what to feed your cows and when

This article was originally published at

[www.beefresearch.ca/research-topic.cfm/beef-cattle-nutrition-107](http://www.beefresearch.ca/research-topic.cfm/beef-cattle-nutrition-107)



**Knowledge of forage quality and animal requirements is necessary to formulate rations that will support and maintain a high plane of nutrition.** While most producers recognize that grazing forages can provide an economical source of nutrition, the relationship between harvested forage quality and profitability is often unappreciated. Harvested feed quality can change significantly from year to year and from field to field.

Nutritional requirements of beef cattle are influenced by the stage of production. This production cycle, which is based upon a well-managed, healthy cow in good condition (Body Condition Score = 3) maximizes profitability by producing a calf every 365 days. The annual production cycle, based upon ideal length of time for each phase, includes:

1. Calving, postpartum, early lactation (day 0 to day 82)
2. Conception, early gestation, late lactation (day 83 to day 199)
3. Mid gestation (day 200 to day 274)
4. Late gestation, pre-partum (day 275 to day 365).

**Phase 1** - begins at calving. This is the period of greatest nutritional demand for the cow. She must lactate, repair her reproductive tract, resume heat cycles, breed, and if she is a young cow, she must also continue growth and development. Her voluntary feed intake is highest at this point and she requires a high energy and protein diet of at least 62% TDN and 11% CP. If not fed to meet nutritional needs, she will lose weight and may not rebreed.

**Phase 2** - begins with conception. The cow is now supporting herself, her calf (through lactation) and her fetus. Nutritional demands are still high as she reaches peak lactation but are lowered by eight to 13 percent compared to the first phase. Cows that produce more milk will have higher nutrient requirements. The fetus is small, and its growth is slow, but cows and heifers often lose weight during this time.

**Phase 3** - is when the cow is in mid-gestation. Immediately after calves are weaned, nutritional needs are at their lowest due to the end of lactation. Energy and protein requirements drop by up to 35 percent when compared to the peak demand. Fetal growth remains slow, and voluntary feed intake is the lowest during this period. This is the best time to put weight back on cows to help them gain condition.

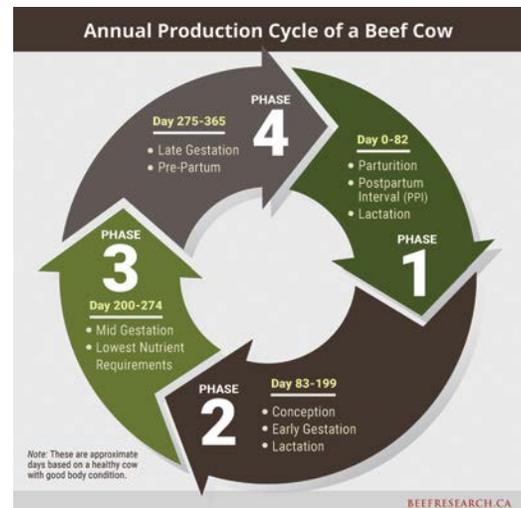
**Phase 4** - is the final phase prior to calving, and cows must be in good body condition to give birth to a healthy calf, produce milk and re-breed quickly. Energy and protein needs increase by 20% compared to mid-gestation. During this period, the fetus can gain up to 60 pounds and the placenta is growing as well. Nearly 75 percent of fetal growth occurs during this phase. Cows need to gain 0.5 kg (1 lb) to 0.68 kg (1.5 lbs) per day, while weight gain for heifers should target twice that amount. The cow has reduced rumen capacity due to the growth of the calf, so a reduction in feed intake usually occurs in the latter portion of this phase.

**Producers often modify their feeding strategies during the annual production cycle of the beef cow to align with her energy and protein needs as she moves through the cycle.** For example, lower quality feeds such as straw reduce costs during Phase 3, when the cow's nutritional requirements are at her lowest. In Phase 4, as the rumen has less room for feed due to the growing fetus, she will benefit from higher quality feed such as good quality alfalfa hay or some grain to provide

extra energy. A common rule of thumb is 55-60-65% for total digestible nutrients (TDN) and 7-9-11% for crude protein (CP) for early, mid and late gestation.

Producers also often divide the herd into different feeding groups to tailor feeding programs to provide an adequate levels of nutrition.

**Group 1 - Mature cows in good condition** - Average quality hay supplemented with grain or pellets, minerals, fortified salt and vitamins, will generally meet the nutritional needs of this group.



## Nutritional Requirement Guidelines for Beef Cattle

Class	TDN%	CP%	Ca%	P%
Dry Cow, Early to Mid-gestation	48-52	7	0.26	0.16
Dry Cow, Late-gestation	58	9-10	0.27	0.17
Lactating Cow	60-65	11-12	0.31	0.21
Backgrounding 1.5 lb/d	63	13	0.49	0.24
Backgrounding 2.0 lb/d	68	13	0.50	0.24
Backgrounding 2.5 lb/d	74	13	0.50	0.24
Finishing	80	11	0.41	0.22

Nutritional requirements vary with body weight, frame size, predicted ADG and stage of production. All rations should be balanced for energy, protein, vitamins and minerals. Based on values from Nutrient Requirements of Beef 1996.

### Group 2 - Bred replacement heifers and second calf heifers -

Young, growing animals do not compete effectively for feed with mature cows. Heifers require good quality hay, silage or alternative feeds, or grain to meet their needs for growth and development. These animals are still growing and gaining body weight, as well as developing the fetus. These animals may benefit from organic (chelated) or hydroxy trace mineral supplements, which have greater bioavailability, to support growth and reproduction.

**Group 3 - Thin, old cows** - These cows will need extra energy (TDN), particularly during winter months. These cattle may benefit from additional vitamin and mineral programs to avoid deficiencies.

**Group 4 - Yearling steers, bulls** - Steers and bulls will require different feeding programs depending on their size and if they are on a maintenance program or are backgrounding or finishing. If the ration is based on straw or low-quality hay, or if feed intake is limited, it is even more important to separate the herd into different feeding groups to match the nutritional needs of each group.

It is essential to use feed testing and ration balancing software annually, like Cowbytes to determine the appropriate ration and amounts of feed for each group and to know the cost of feeding your animals.



## Livestock

The new beef information calendar for 2021 is now online. This resource provides useful tips and timely management strategies for livestock producers across Manitoba. Expected calving dates are listed, based on the biological/chronological beef cycle and can be found here.

[www.manitoba.ca/agriculture/livestock/pubs/beef-management-calendar.pdf](http://www.manitoba.ca/agriculture/livestock/pubs/beef-management-calendar.pdf)

## Upcoming Stock Talk Webinars

Manitoba Agriculture and Resource Development is offering a series of interesting livestock and forage presentations packed with information and innovative leading experts aimed to help Manitoba beef producers best manage their cattle operations.

### February 25, Marketing Mania

#### 2021 Cattle Market Update & What Buyers are Looking for when Purchasing Cattle

Presented by: Rick Wright, Heartland Order Buying

#### Shrink and the Price Slide

Presented by: Tod Wallace, Livestock Specialist

### March 18, Forage Frenzy

#### Extended Grazing with Stockpiled Forage, Corn, Swath & Bale Grazing

Presented by: Shawn Cabak, Livestock Specialist

#### Improve Livestock and Pasture Performance with Rotational Grazing

Presented by: Pam Iwanchysko, Livestock Specialist

#### Western Livestock Price Insurance and Forage Insurance Programs

Presented by Manitoba Agricultural Services Corporation

### April 15, Forage Frenzy II

#### Growing Enough Cow Chow - Perennial Forage Rejuvenation

Presented by: Tim Clarke, Livestock Specialist

#### Annual Cocktails and Mixtures for Cover Crops

Presented by: Kevin Elmy, Cover Crops Canada



**For more information, call the Manitoba Agriculture Portage office at 204-239-3352 or visit [manitoba.ca/agriculture/online-resources/stock-talk.html](http://manitoba.ca/agriculture/online-resources/stock-talk.html)**

If you would like to be added to our information-sharing list, please email or text Juanita Kopp ([Juanita.Kopp@gov.mb.ca](mailto:Juanita.Kopp@gov.mb.ca), 204-825-4302). Our livestock team will be focusing on the *5% Rules for Productivity and Profitability* as presented by BCRC. We will also present webinars or virtual training in the near future. Your input or topic ideas are always welcome. We will try to address them during the year.