EXTENSION

Feeding Programs with Long Stem Hay and Supplements

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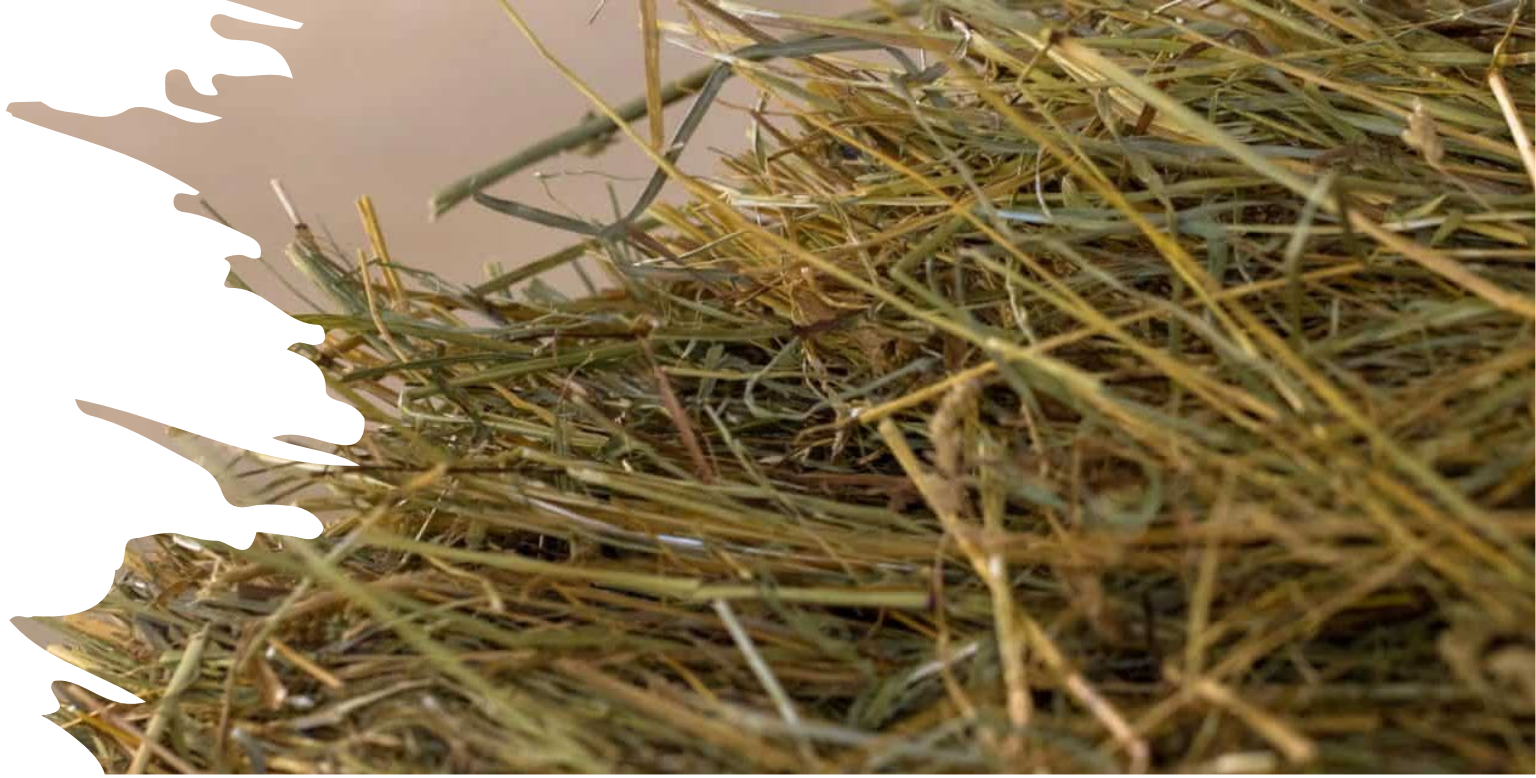
Hay Quality:

- Stage of Maturity
- Leafiness
- Color
- Foreign Matter
- Fertility
- Weather



How Do You Improve Hay Quality?

- Forage maturity is the most important factor in improving hay/forage quality.

- Fertility and harvest interval have an impact on forage quality.

- Their order of importance varies depending on the forage.

The Round bale

- Anatomy of a bale
- Wrap
- Weather Impacts
- Storage Parameters
- Sampling and Weighing
- Value

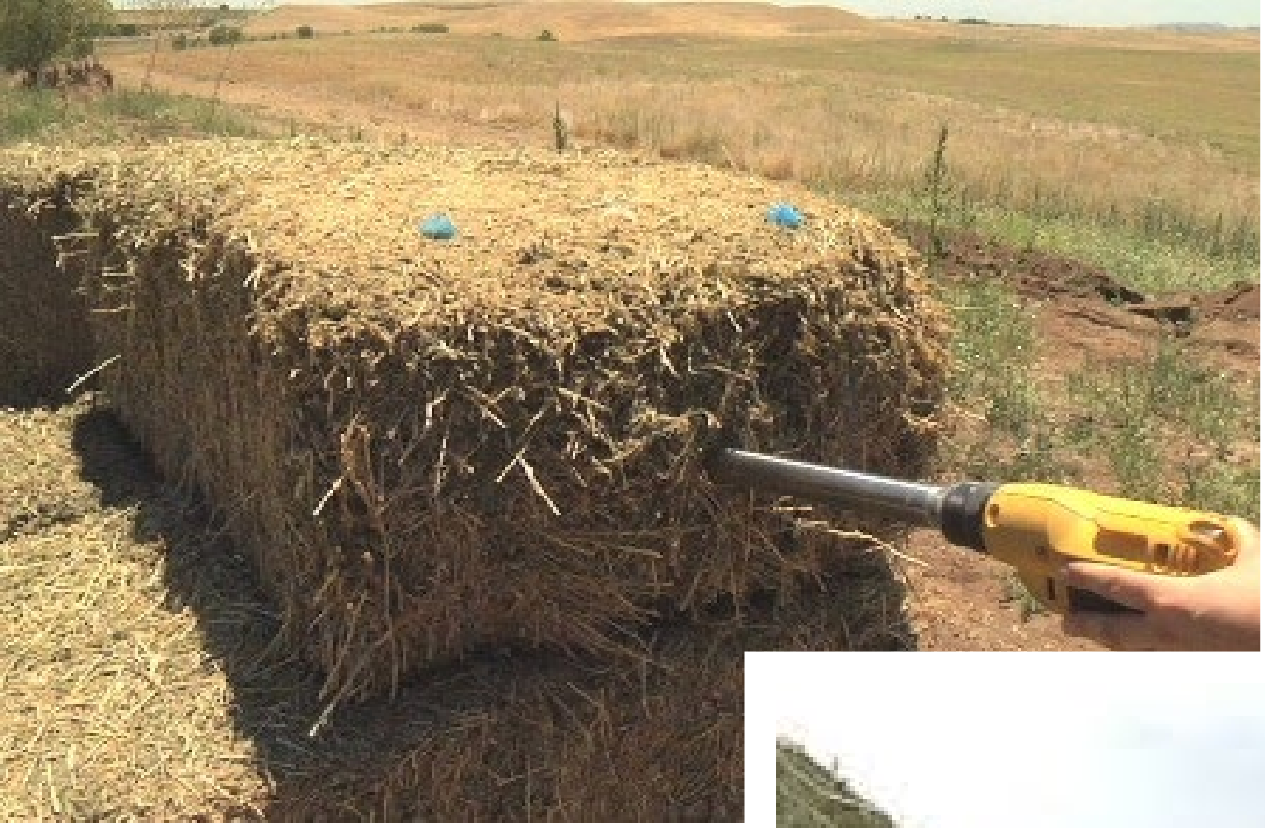
Baling Smart

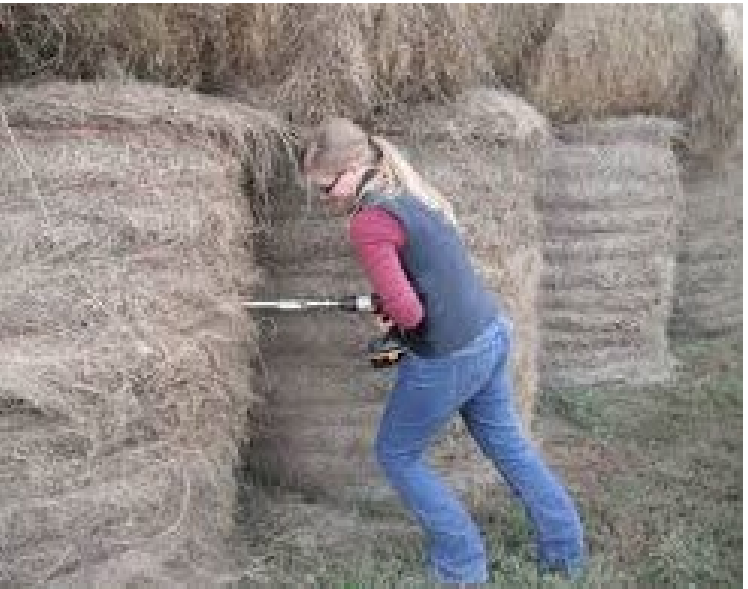
- Dense bale with tight core
- Less Bale Squat
- Leaves Saved
- Net wrap

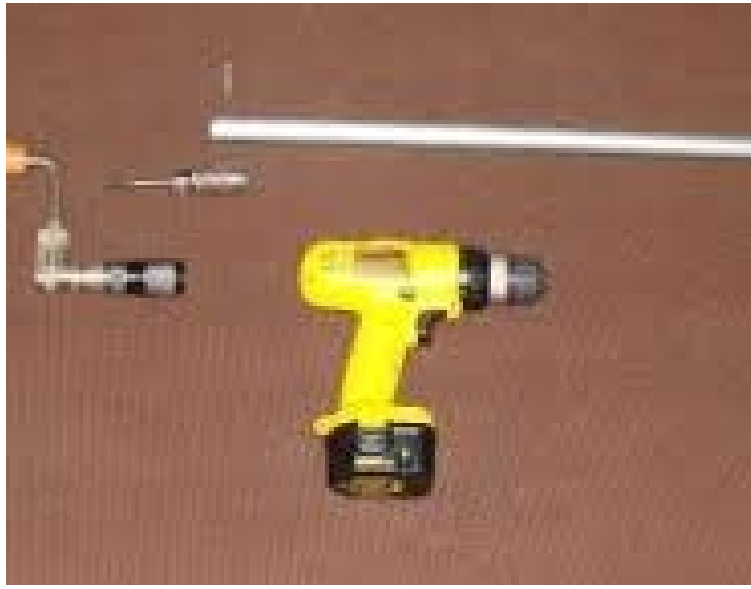
Twine vs Net Wrap

Dry Matter Loss (% of total)		
	1st Cutting (149 days)	2nd Cutting (356 days)
Sisal Twine	16.3_c	22.9_c
Plastic Twine	9.0_b	15.1_b
Net Wrap	6.8_a	8.0_a

Shinners et al., 2007







OKLAHOMA COOPERATIVE EXTENSION SERVICE PSS-2589

Collecting Forage Samples for Analysis

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Oklahoma Cooperative Extension Fact Sheets are also available on our website at: **http://osufacts.okstate.edu**

Forages furnish essential energy, proteins, vitamins, minerals, and fibers in livestock diets. Many factors (e.g. variety, maturity, growing conditions, handling practices, etc.) affect forage quality prior to the time it is fed. As a result, predicting forage quality values from standard books often grossly overestimates or underestimates feeding value. A better way to determine feeding value is to have a representative forage sample tested by a laboratory that uses proven and accepted methods of forage analysis. The first and most important step in obtaining a meaningful analysis is to collect a representative forage sample. This fact sheet describes proper methods for collecting representative samples. If one is not willing to properly sample their forage, the benefits of forage testing will not be realized.

Sampling Equipment

Equipment required for collecting forage samples includes a forage probe, a mixing bucket, and sample bags. If a forage probe is not available, sampling can be done by hand, but increased leaf loss is likely due to shattering. When sampling by hand, use shears or scissors to cut the sample into 2-3" pieces, then subsample the composite sample using the quartering method. Sampling with a probe is preferred since it is faster and a better sample is obtained.

Several types of forage probes can be purchased from farm supply companies. Most are operated using a hand brace or electric drill (Figure 1). Some include a collection canister to make sampling faster. Probe design does not significantly

Sampling Methods

When to Sample

Forage should be sampled as near to the time of feeding or sale as possible. Allow enough time for test results to be returned for inspection by a buyer or for ration formulation. Approximately two weeks should be allotted if submitting samples by mail. Samples take from one to five days to be processed by a laboratory depending on the tests requested, the methods used, and the overall number of samples received. July through October tend to be the busiest times of year for forage analysis. Some laboratories have very short turnaround times (an hour) when everything is analyzed by NIRS (near infrared reflectance spectroscopy).

What to Sample

Extreme variation may occur in hay quality even when harvested from the same field. As a result, a separate forage sample should be tested for each hay "lot." A "lot" refers to a

Quarting a Sample

Quarting is used to reduce a sample to a smaller, more manageable size in an unbiased manner. Prior to quartering, forage samples collected by hand must be cut into 2-3" pieces with shears or scissors and thoroughly mixed. Care must be taken to prevent leaf loss. Cored samples can be mixed as is. Pour the entire sample

https://extension.okstate.edu/fact-sheets/print-publications/pss/collecting-forage-samples-for-analysis-pss-2589.pdf

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OKLAHOMA COOPERATIVE EXTENSION SERVICE PSS-2117

Forage Quality Interpretations

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Oklahoma Cooperative Extension Fact Sheets are also available on our website at: **http://osufacts.okstate.edu**

High quality forages are crucial for the livestock industry. Forages furnish essential energy, protein, vitamins, minerals and fiber. In fact, diets of most domestic livestock consist mainly (if not entirely) of forages.

Forage quality varies not only among different forage species, but also within forage species (among varieties). Furthermore, the forage quality of a specific variety can also vary due to field and management conditions such as soil fertility level, diseases/pests control, maturity stage at harvest and storage conditions. For these reasons, evaluating the quality of forages for animal production is a complex task. However, it can be roughly stated that 1) legumes have higher quality than grasses; and 2) adequate soil fertility, low diseases/pests pressure, early harvest and proper storage will increase forage quality of any forage species.

The best single measure of forage quality is animal productivity, which is the final goal. To ensure animal productivity, assess and modify the animal diet composition before consumption. Evaluating forage quality is an important practice in the livestock industry. Forages have historically been evaluated on physical factors which include color, leafiness, maturity, smell, softness and purity. These factors are still important in assessing forage quality; but if used solely, they are inaccurate because they are very subjective and difficult to standardize. However, forage chemical analysis combined with physical evaluation results in a reliable forage quality assessment.

Direct chemical tests are usually accurate, but are some-

Measured Forage Quality Factors

Forage quality analyses (using direct chemical analysis, or NIRS) normally measure three different attributes: neutral detergent fiber (NDF), acid detergent fiber (ADF), total nitrogen (TN). Sometimes the concentrations of certain minerals (e.g., calcium and phosphorus) and nitrates are also determined. Other forage quality factors listed in forage analysis reports are calculated from the these measured attributes (Figure 1).

Neutral Detergent Fiber (NDF, %)

NDF is the whole fibrous fraction (cellulose, hemicellulose and lignin) plus a small amount of silica and minerals that constitute most of the plant cell wall. It contains the slowly digestible and indigestible portions of the plants. For example, 100 pounds of 48 percent NDF forage contains 48 pounds of slowly digestible and indigestible forage, and the remaining 52 pounds contain mostly soluble carbohydrates and will be rapidly digested. Therefore, the higher the NDF, the lower the digestibility, and the lower the forage intake. Therefore, **NDF estimates how much forage will be consumed.**

Acid Detergent Fiber (ADF, %)

ADF is a sub-fraction of NDF, composed mainly of cellulose, lignin and a minor amount of silica and minerals. Cellulose is still slowly digestible; however its digestibility var-

https://extension.okstate.edu/fact-sheets/print-publications/pss/forage-quality-interpretations-pss-2117.pdf

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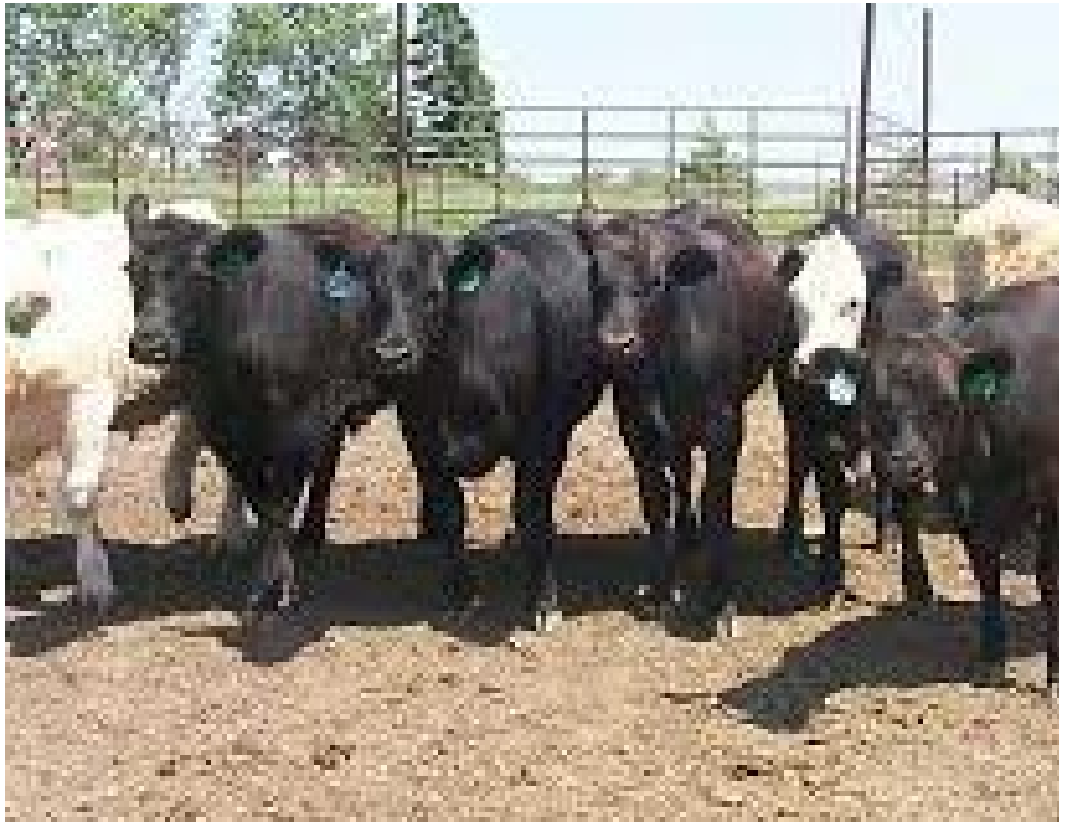
Value of a Round Bale???

Bale width, ft	Bale diameter, ft	Bale volume, ft^3	Estimated bale weight, lb^1
4	4	50	563
4	5	79	880
4	6	113	1,267
5	5	98	1,100
5	6	141	1,584

Strategies:

- Target gains at a rate that at least cover costs, but does not reduce performance when cattle can be placed on high quality forage.
- Target weight gains between 0.5 and 1.5 lbs/day



Supplement Goals:

- Supply protein to enhance roughage intake and digestion
- Supply additional energy above that obtained from the roughage
- Supply other important items in the diet such as vitamins, minerals, and additives

Nutrient Requirements of Growing Calves

		Diet Nutrient Density		Daily Nutrients per animal	
Body Weight	ADG	CP (% DM)	TDN (% DM)	CP (lbs)	TDN (lbs)
400	0.5	8.8	54	0.85	5.2
	1.0	10.4	58	1.07	6.0
	1.5	12.2	63	1.30	6.7
500	0.5	8.4	54	0.97	6.2
	1.0	9.8	58	1.19	7.1
	1.5	11.2	63	1.41	7.9
600	0.5	8.2	54	1.08	7.1
	1.0	9.3	58	1.31	8.1
	1.5	10.6	63	1.52	9.1

NRC

Supplemental protein required (lbs/day) for 300 to 500 lb stockers with varying protein content in forage hay

Daily gain, lbs	Forage crude protein content (DM basis)			
	4%	6%	8%	10%
0.5	0.60	0.40	0.25	0.10
1.0	0.75	0.60	0.45	0.25
1.5	-	0.80	0.65	0.50

Calculated using equations from NRC.

Effect of drylot gain on performance of steers grazing wheat pasture.

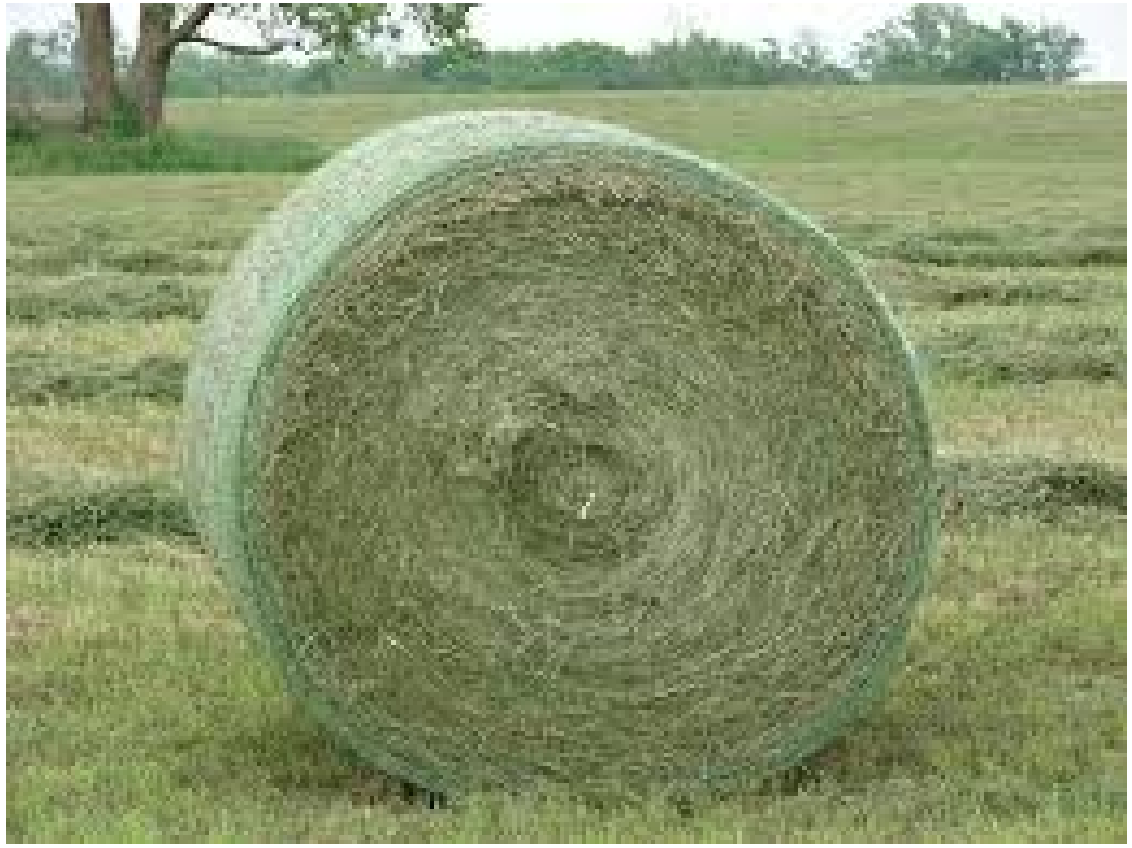
	Initial Weight, lb	Drylot Gain (58 d)	Wheat Pasture Gain (110 d)	Total Gain (168 d)
High Gain	380	88[a] (1.51)	225[a] (2.04)	313[a] (1.86)
Low Gain	380	44[b] (0.75)	255[b] (2.31)	296[b] (1.76)
Difference	0	44	30	17

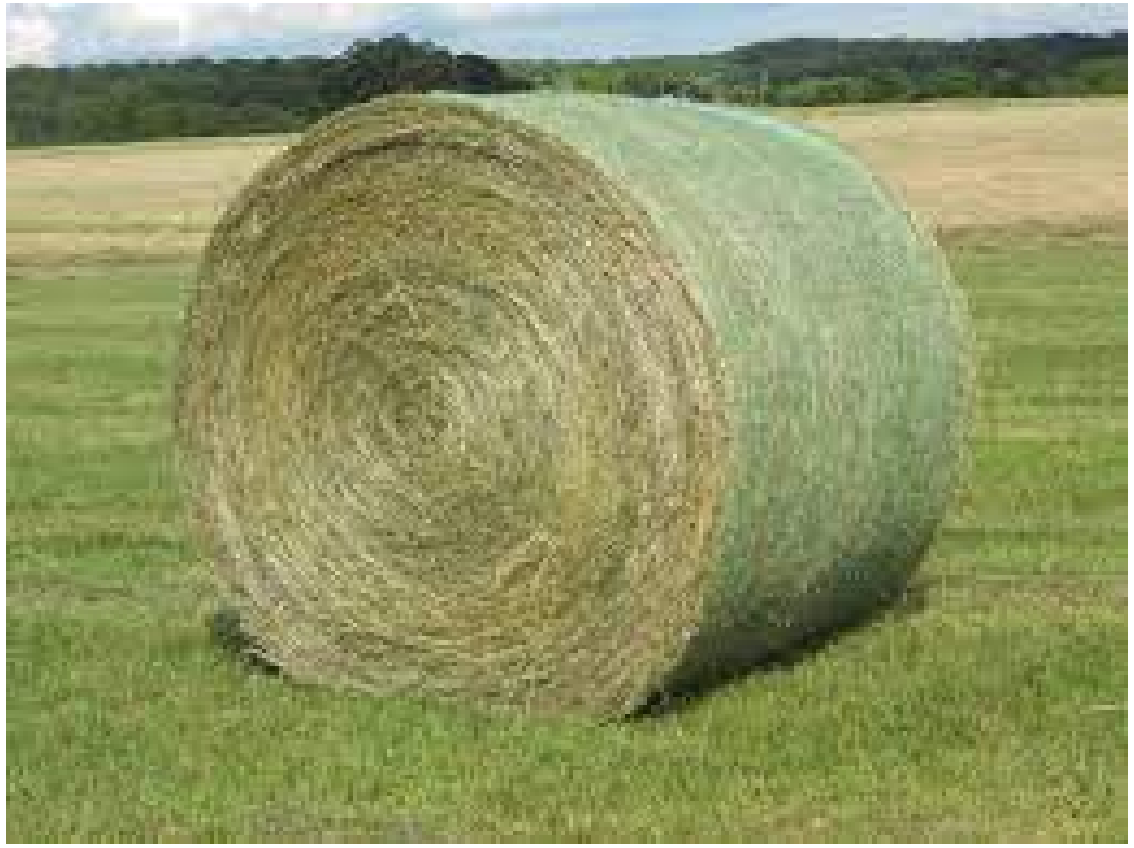
Highfill et al.

Ration Alternatives

- Feed resources
  - Pasture
  - Hay
  - Grain
  - Local byproducts
- Feeding equipment, storage, facilities and labor

Rations utilizing different quality of hay



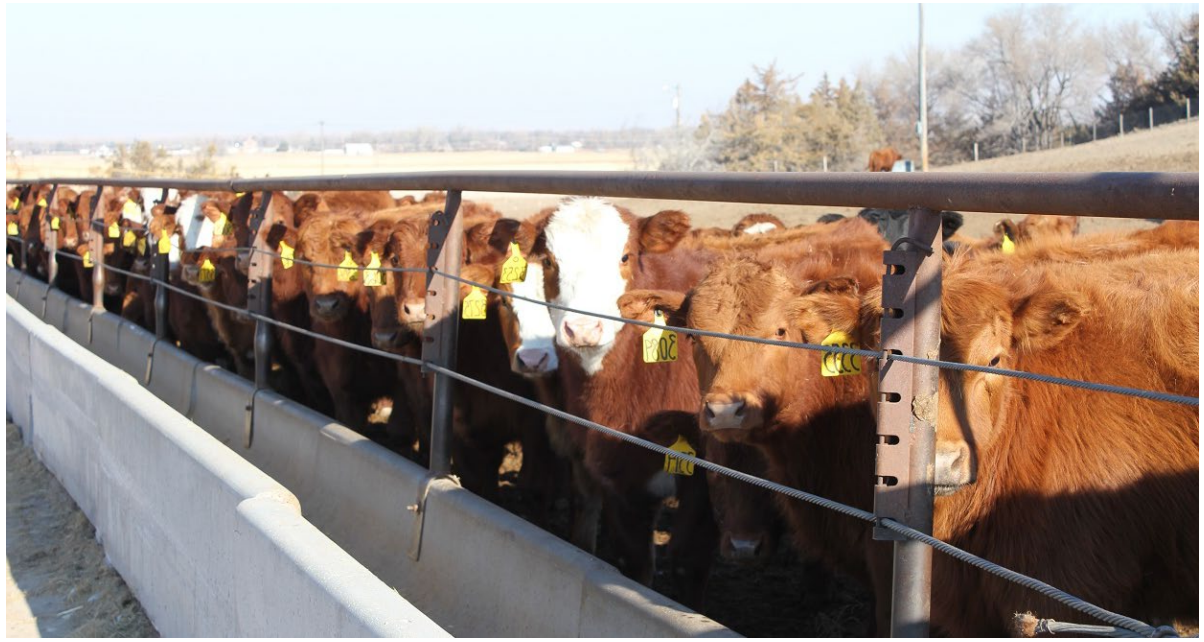


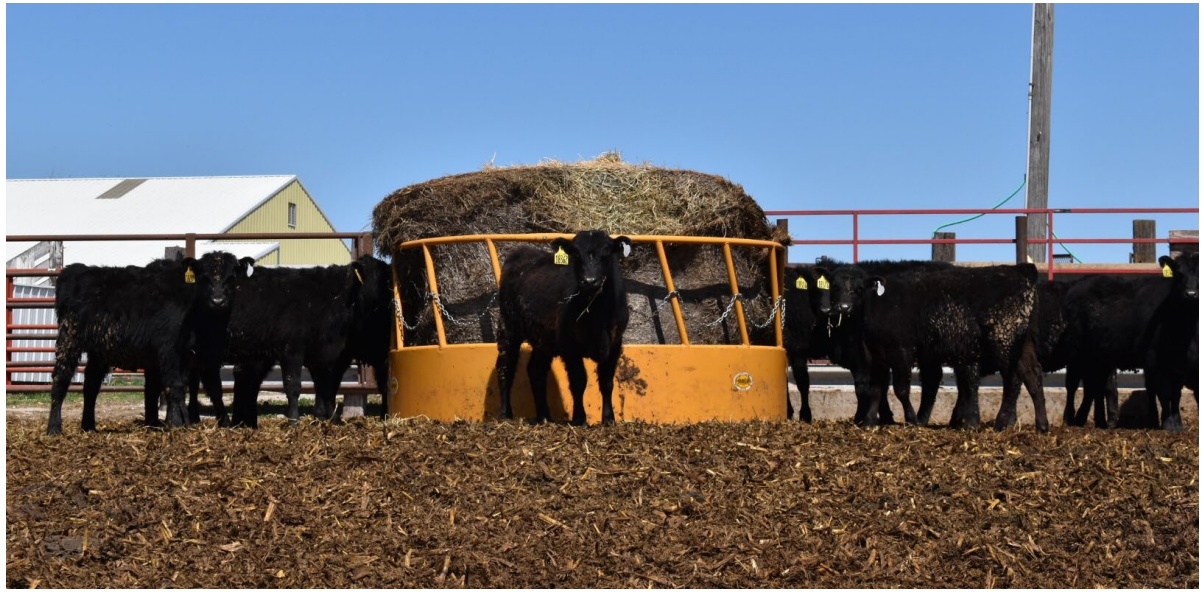
	Level of performance		
	1.0 lb/day	1.5 lbs/day	2.0 lbs/day
Mid bloom alfalfa (17% CP and 58% TDN)			
Supplementation rate, lbs/day	-	1.0	3.5
Supplement composition, % as-fed basis			
Cracked Corn	-	97.0	99.6
Dicalcium phosphate	-	3.0	0.4
Salt/mineral mix	Free choice salt only	Free choice salt only	Free choice salt only

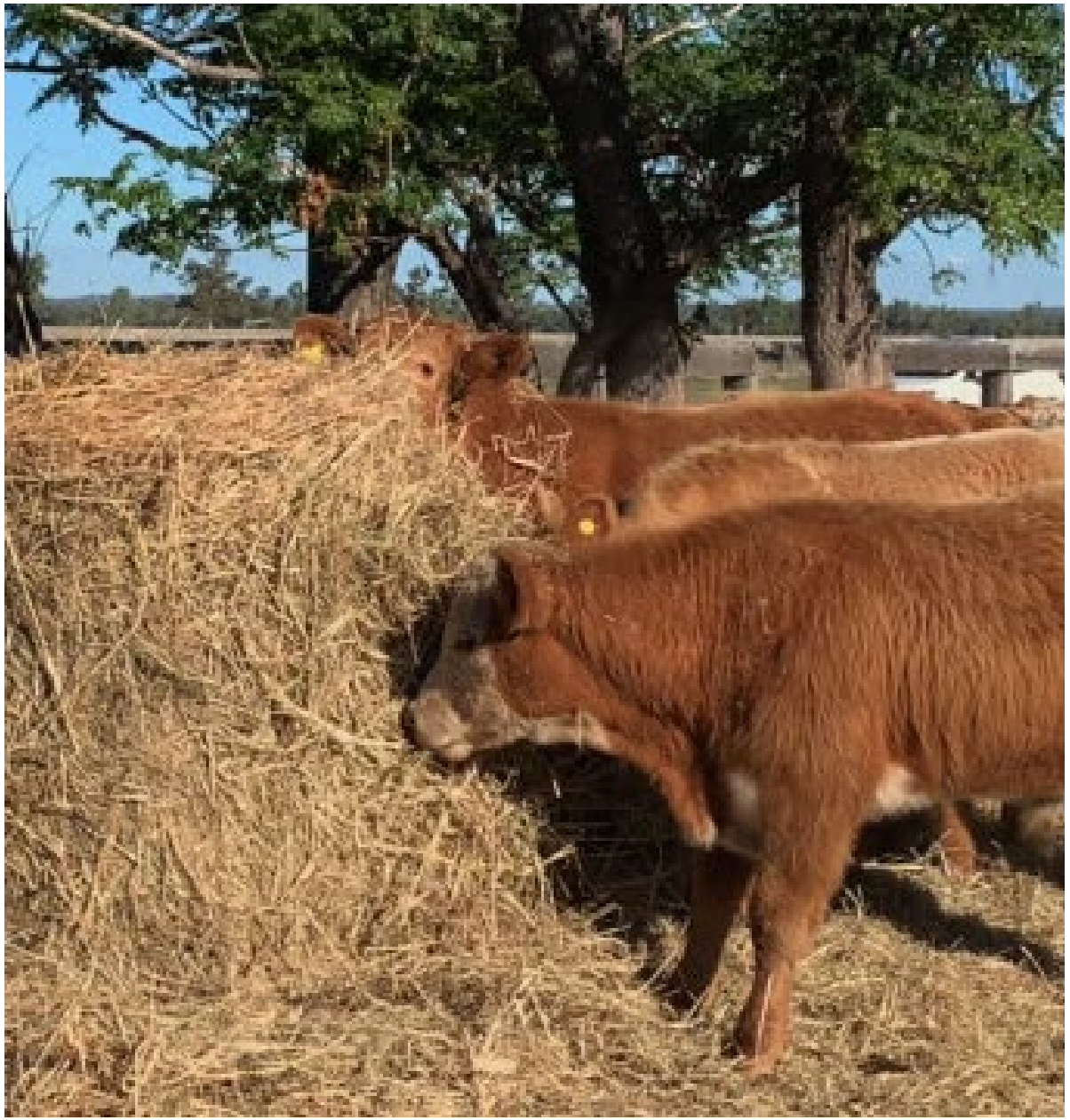
Beef Cattle Manual

	Level of performance		
	1.0 lb/day	1.5 lbs/day	2.0 lbs/day
Grass Hay (10% CP and 56% TDN)			
Supplementation rate, lbs/day	0.6	3.5	5.2
Supplement composition, % as-fed basis			
Cottonseed Meal	100	14.3	32.8
Soybean Hulls	-	-	36.1
Cracked Corn	-	85.7	31.1
Salt/mineral mix	Free choice complete mineral	Free choice salt only	Free choice salt only

	Level of performance		
	1.0 lb/day	1.5 lbs/day	2.0 lbs/day
Grass Hay (7% CP and 52% TDN)			
Supplementation rate, lbs/day	2.3	4.0	6.6
Supplement composition, % as-fed basis			
Cottonseed Meal	66.4	26.7	32.8
Soybean Hulls	33.6	27.0	40.3
DDGS	-	46.3	26.9
Salt/mineral mix	Free choice complete mineral	Free choice complete mineral	Free choice complete mineral



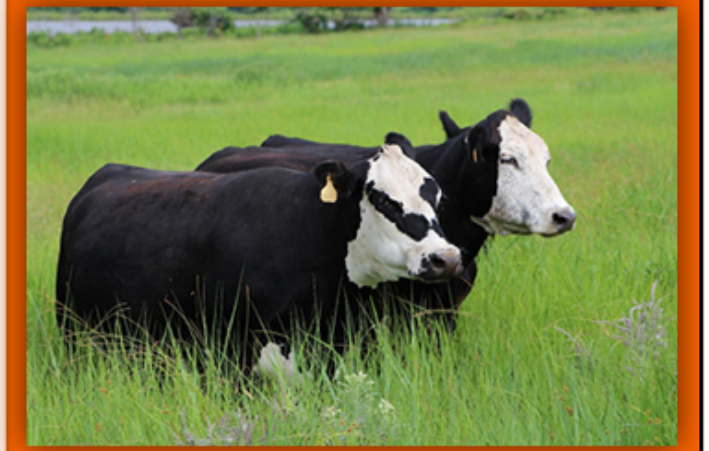




Cowculator

Cowculator is designed to evaluate and formulate diets for beef cattle. Classes of cattle include cows, bred heifers, growing and finishing cattle, and bulls. Cowculator does not perform least-cost formulation.

- White cells are intended for user inputs.
- Feed list values are intended as a starting point and can be completely customized.
- To get started, click on the "Cattle" button or tab to enter details about the type of cattle and management that applies to your situation.
- Feed intake, protein, energy and mineral requirements are dependent on an accurate estimate of mature weight and body condition score for cows and harvest weight for growing cattle (representing weight at about 0.6 inches of backfat)



Cattle | Balancer | Feed List | Summary

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