

Corn silage for beef cattle

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Over the next 35 minutes or so...

- Corn silage
 - Process
 - Benefits
 - Risks
 - Nutrient deficits
- Best management practices
 - Variety selection
 - Harvest stages and conditions
 - Use of inoculants
 - Storage and handling
- Specific uses
 - Cows
 - Growing cattle

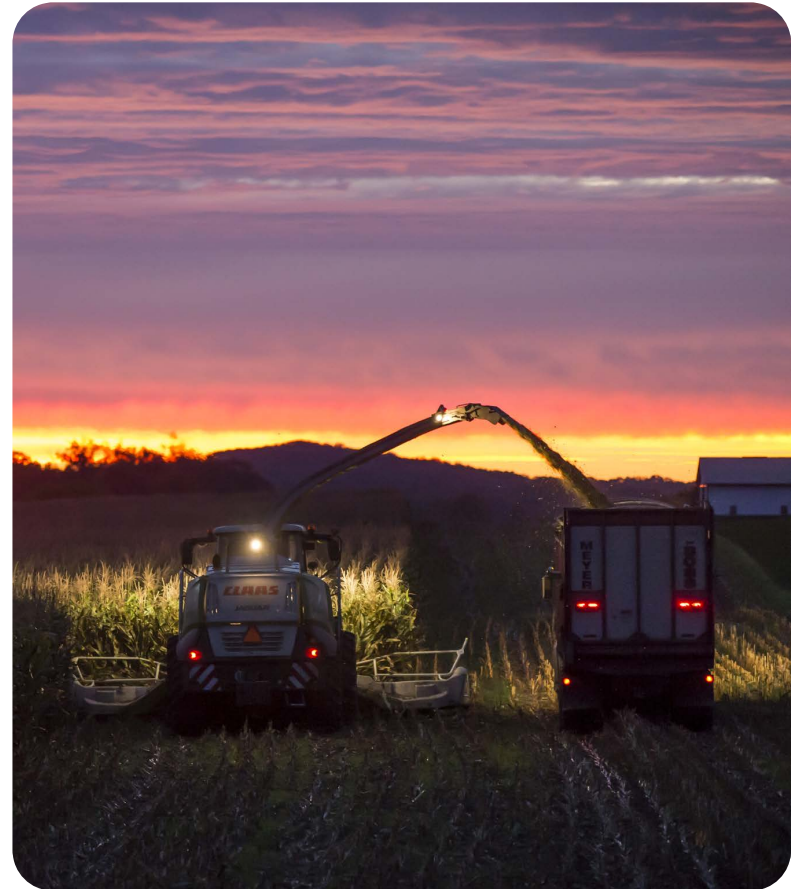


Photo courtesy of Pioneer

What is corn silage?

- Whole plant corn that has been...
 - Processed (chopped)
 - Facilitates access by microorganisms
 - Packed
 - Removes air and facilitates contact
 - Sealed
 - Keeps the air out
 - Fermented
 - Ideally for 4 – 8 weeks prior to opening

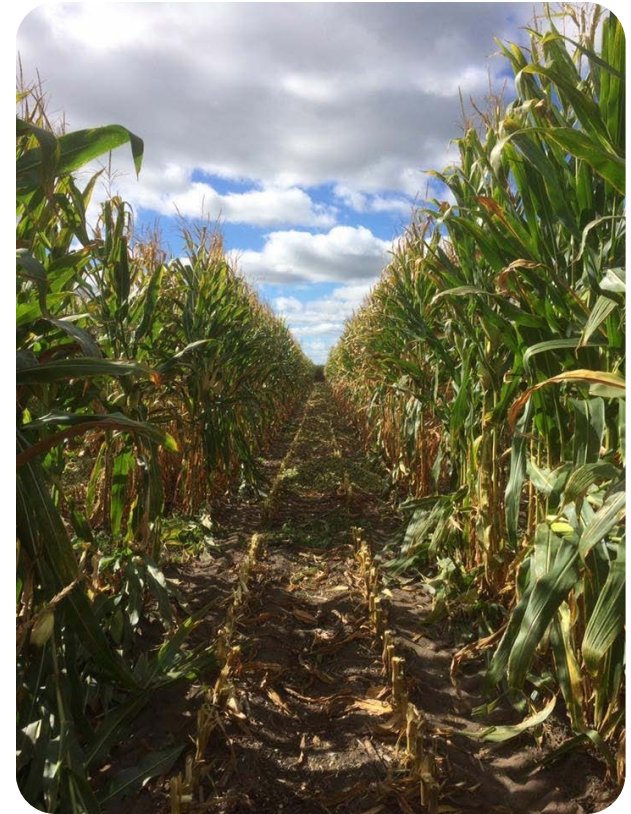


Photo courtesy of Cornell University

Why corn silage?

- One of the most economical roughage sources after factoring in DM and energy production per unit of land mass
 - Highly digestible
 - Equal to or greater in energy than exceptional quality cereal grain or grass hay
 - Palatable
 - Cattle generally love the taste of fermented feeds
 - Can add additional value to a total-mixed ration through conditioning
 - Moisture aids in the mixing process
 - Yields a high amount of dry matter
 - Generally 3-4X that of hay

What are the risks?

- If the proper steps are not taken, adverse fermentations can occur
 - *Clostridium*
 - Generally occur when the moisture content is too high
 - Can be deadly, and the first sign is often dead cattle
 - *Listeria*, mold, and mycotoxins
 - Generally occur when the moisture content is too low, the plant is too mature, or the plant has been stressed
 - Can still cause serious problems, but not as lethal as *Clostridium*
 - Nitrates
 - Generally only high risk in drought-stressed, immature corn

Nutrient deficits

- Corn silage is a great source of highly digestible roughage (energy), but...
 - It is low in protein
 - Benefits from supplementation with a protein source
 - The majority of the protein is rumen degradable
 - Requires supplementation with rumen-undegradable protein
 - Moisture content can be problematic
 - Benefits from supplementation with additional dry matter (DM) to dilute water, slow passage rate, and maximize digestion and absorption

Corn silage varieties

- Brown mid-rib (BMR) varieties have been selected as silage varieties
- Pros of BMR varieties
 - Generally contain less lignin
 - Increases digestibility
- Cons of BMR varieties
 - Generally contain less lignin
 - Less structural support
 - Less resilience to stressors
 - Lower yield than conventional varieties



Photo courtesy of Pioneer

UT corn variety trials (2016)

Variety	DM (% as-harvested)	Yield	
		Tons/acre (as-harvested)	Tons/acre (DM-basis)
1	41	21.5	8.8
2	39	21.3	8.3
3	40	20.5	8.2
4	41	19.5	8.0
5	45	17.8	8.0
6	39	20.5	8.0
7	39	20.3	7.9
8	42	18.6	7.8
9	42	18.3	7.7
10	43	17.9	7.7
11	41	18.5	7.6
12	40	19.0	7.6
13	42	17.6	7.4
AVERAGE	41	19.3	7.9

UT corn variety trials (2016)

Variety	Nutrient composition				
	DM (%)	CP (% of DM)	TDN (% of DM)	NEm (Mcal/lb of DM)	NEg (Mcal/lb of DM)
1	41	7.0	65.6	0.68	0.41
2	39	6.2	60.9	0.61	0.35
3	40	7.0	67.8	0.71	0.44
4	41	7.6	67.3	0.70	0.43
5	45	6.5	64.9	0.67	0.40
6	39	6.5	64.7	0.67	0.40
7	39	6.9	67.9	0.71	0.44
8	42	6.9	65.6	0.68	0.41
9	42	7.1	65.3	0.68	0.41
10	43	6.5	65.1	0.67	0.41
11	41	7.0	66.1	0.69	0.42
12	40	6.9	66.0	0.69	0.42
13	42	6.6	67.4	0.71	0.44
AVERAGE	41	6.8	65.7	0.68	0.41

UT corn variety trials (2016)

Variety	Nutrient yield			
	CP (lbs x 1,000)	TDN (lbs x 1,000)	NEm (Mcal x 1,000)	NEg (Mcal x 1,000)
1	1.23	11.55	11.97	7.22
2	1.03	10.11	10.13	5.81
3	1.15	11.12	11.64	7.22
4	1.22	10.77	11.20	6.88
5	1.04	10.38	10.72	6.40
6	1.04	10.35	10.72	6.40
7	1.09	10.73	11.22	6.95
8	1.08	10.23	10.61	6.40
9	1.09	10.06	10.47	6.31
10	1.00	10.03	10.32	6.31
11	1.06	10.05	10.49	6.38
12	1.05	10.03	10.49	6.38
13	0.98	9.98	10.51	6.51
AVERAGE	1.07	10.38	10.74	6.49

UT corn variety trials (2016)

Variety, tons	Supplemental feed (tons) required per acre				
	DCGF (tons)	DDGS (tons)	Soyhull pellets (tons)	Shelled corn (tons)	14 % commodity pellet (tons)
1	0	0	0	0	0
2	1.18	1.02	1.62	1.32	1.11
3	0.21	0.18	0.38	0.55	0.30
4	0.49	0.43	0.67	0.45	0.46
5	0.80	0.69	1.09	1.25	0.75
6	0.80	0.69	1.09	1.25	0.75
7	0.48	0.42	0.66	0.92	0.51
8	0.87	0.75	1.19	1.01	0.82
9	0.96	0.83	1.31	0.90	0.90
10	1.05	0.91	1.45	1.51	0.99
11	0.95	0.82	1.30	1.10	0.89
12	0.95	0.82	1.30	1.19	0.89
13	0.93	0.81	1.28	1.66	0.91
AVERAGE	0.80	0.70	1.11	1.09	0.77

UT corn variety trials (2016)

Variety, \$	Cost (\$ per acre) of providing supplemental protein and energy				
	DCGF (tons)	DDGS (tons)	Soyhull pellets (tons)	Shelled corn (tons)	14 % commodity pellet (tons)
1	0	0	0	0	0
2	182	174	234	212	266
3	32	31	55	88	72
4	76	72	98	72	111
5	124	118	159	200	180
6	124	118	159	200	180
7	74	71	95	148	122
8	135	128	173	162	197
9	148	141	190	145	216
10	163	155	210	241	239
11	147	139	188	175	214
12	147	139	188	191	214
13	145	138	186	266	219
AVERAGE	124	118	161	174	185

Other considerations for selecting the most appropriate variety

- Conventional vs. BMR
 - Benefits of BMR generally do not outweigh the detriments
- Insect, disease, and drought tolerance
 - What conditions have you experienced in the past?
- Herbicide resistance
 - Glyphosate, etc.
- Growing season length
 - Options are available that range from ~ 70 to > 130 days in length
- Industry support
 - How much support can (will) that seed company provide you?

Harvest stage

- Corn for silage should be harvested when...
 - Kernel reaches the $\frac{1}{2}$ milk-line stage
 - DM = 32-38 %
 - Moisture = 62-68 %
- Harvesting earlier...
 - Increases the risk of adverse fermentation
 - Sacrifices yield
 - Decreases aerobic stability
- Harvesting later...
 - Decreases protein content and nutrient digestibility (energy value)
 - Decreases aerobic stability



Photo courtesy of Lallemand Animal Nutrition

Harvest specifications

- As height of cut increases...
 - Yield decreases
 - Nutrient content increases
 - Optimum ~ 8 inches
- As chop length decreases...
 - Packing density and fermentation potential increases
 - Optimum ~ ½ inch
- Kernel processing increases digestibility
 - Important when DM > 38 %



Photo courtesy of Progressive Dairy

Use of inoculants

- Inoculants act as an economical source of insurance for a fermentation
 - Benefit for marginal quality corn silage
 - Will not convert poor quality to good quality corn silage
 - Little to no benefit for corn silage harvested at, ensiled, and stored under optimal conditions
- Two main types:
 - Lactic acid-producing bacteria
 - Speed up fermentation process
 - Other organic acid-producing bacteria
 - Help to maintain aerobic stability



Photos courtesy of Hay and Forage Grower Magazine and AgTalk, respectively

Storage conditions

- Key concepts:
 - Pack it, then pack it some more
 - Seal it tight
 - Keep it sealed until feed-out
- Bag
 - $\geq 13 \text{ lb/ft}^3$ (as-harvested)
 - Brake set at 400-450 psi, and adjusted as conditions change
 - Vent gas if necessary using a vent valve
- Bunker/drive-over pile
 - $45 - 75 \text{ lb/ft}^3$ (as-harvested)
 - Line with plastic prior to filling
 - Consider inoculating surfaces



Photos courtesy of Hay and Forage Grower Magazine and Pioneer, respectively

Handling and feed-out

- Expose the least amount of the “face” to air as possible
 - Remove ≥ 6 inches per day
 - Aerobically-stable silage generally will not heat when removed
 - Unstable silage will
 - Heating, DM losses and reduction in palatability
 - Mold growth after extended periods of time
- Avoid opening and re-ensiling
 - Can be done successfully with high quality silage
 - DO NOT do this with marginal or low quality silage



Photos courtesy of Field Crop News and NDSU, respectively

Corn silage for beef cows

- Can serve as an effective replacement for all or a portion of the hay in the ration
 - Will not meet the protein requirements of any class of cow without exceeding energy requirements
 - They get fat
 - Best when included in a TMR or limit-fed
 - Best when limit-fed and supplemented with a source of rumen-undegradable protein
 - Distiller's dried grains
 - Moisture content can be problematic
 - Dilute the water with an additional source of DM, such as hay offered on the side
 - Will not meet mineral requirements
 - Requires supplementation

Corn silage for growing cattle

- Corn silage ALONE is not a good option for growing and finishing cattle
 - Substantially deficient in protein
 - Expect somewhere between 1 and 1.5 lb/d ADG if un-supplemented
 - DDGS: 2 lbs/hd/d = + 0.5 lb/hd/d ADG @ 600 lbs
 - DCGF: 3 lbs/hd/d = + 0.5 lb/hd/d ADG @ 600 lbs
 - CSM: 1.5 lbs/hd/d = + 0.5 lb/hd/d ADG @ 600 lbs
 - SBM: 1.2 lbs/hd/d = + 0.5 lb/hd/d ADG @ 600 lbs
- Same rules of thumb for cows
 - Free-choice complete mineral supplement
 - Dry hay on the side

To sum it all up...

- Corn silage is a viable roughage source for many beef cattle producers
 - Exceptional amount of DM and energy per unit of land
 - Variety matters
- Less flexibility in harvest and storage than dry hay
- Nutrient deficiencies should be corrected in order to minimize cost of maintenance or gain

Questions?

