What About Feeding Straw to Dairy Cows?

Is bedding the only role for straw or can it be used as a feed ingredient for the dairy herd? A typical analysis for straw would reveal nutrient levels that are much lower than average quality dry hay.

NUTRIENT	STRAW	MIXED HAY
Crude Protein %	3.75	15.00
Energy Mj/kg	4.50	5.25
Acid Detergent Fibre (ADF) %	54.00	35.00
Neutral Detergent Fibre (NDF) %	78.00	46.00
Non-Structural Carbohydrates (NSC) %	12.00	22.00
Calcium %	0.40	0.90
Phosphorous %	0.08	0.25
Magnesium %	0.12	0.24
Potassium %	1.60	1.65

The primary role for straw in the lactating diet is for its fibre or "cud chewing". Many rations "on paper" are adequate for dietary fibre but the dairy herd exhibits symptoms of low fibre – displaced abomasum, low butter fat, inconsistent intakes and manure.

The effective fibre in a ration can be affected by length of cut, forage variety, moisture content or mixing in the TMR. If the diet is low in fibre then a longer cut, drier forage will benefit the dairy cow. This will enhance the rumen fibre mat and encourage proper rumination. Straw may be a good choice because of ease of handling and availability. The amount of chopped straw fed should be between .25 - .50 kgs/head/day. Higher amounts of straw may reduce intake and will adversely effect the nutrient density of the ration.

Straw can also play a role for dry cows and heifers. The incorporation of 1-2 kgs of chopped straw in a heavy corn silage heifer program has two key benefits:

Straw "bulks out" the TMR. This allows for "full feeding" versus restricted feeding of a corn silage based TMR.

Straw lowers the TMR "quality" by reducing the energy impact of the corn silage. This may prevent excessive weight gain on heifers.

When feeding straw to the dry cows you need to be careful. The close-up dry cow has a high demand for both energy and rumen available carbohydrates – both of which are limiting in straw. Another concern is the potassium levels in straw – excess potassium is implicated in a host of metabolic disorders such as milk fever. The main advantage of feeding straw to the dry cow is to "bulk out" or reduce the density of the TMR. Recommendation: Feed less the 0.5 kgs/head/day.

Remember: straw is a low quality high fibre forage. When it is incorporated into the feeding program it will reduce the overall nutrient density of the diet. What we are doing is turning extra high quality forages into high or medium quality forages.

Shur-Gain & Hypred Canada:

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Shur-Gain and Shur-Gain-franchised outlets in Ontario enjoy an exclusive partnership with Hypred Canada to present a unique line of sanitation products to dairy producers.

Hypred Canada: Your Sanitation Partner

Hypred Canada, is the Canadian subsidiary of Hypred based in France, and is a European market leader in on-farm dairy sanitation. Hypred Canada has been working successfully with Shur-Gain dealers in Quebec serving needs of dairy producers in that province for the past 2 years.

Shur-Gain & Hypred: A Full-time Partnership

Paul Hart, territory manager for Hypred Canada, is available full time exclusively to Shur-Gain franchised outlets across Ontario to assist with dairy sanitation requirements.

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A New Service: For Ontario Dairy Producers

Hypred's expertise in Dairy sanitation, combined with Shur-Gain nutrition and health programs will provide Ontario dairy producers the ability to achieve maximum results from their operations.

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Hyproderm - soft and soapy udder wash - does not dry teats **Prepost** - liquid product - to spray or to dip - good skin conditioner - strong cleaning properties	**Prepost** - liquid product - dipping/spraying - good cosmetic effect - moisturizing and protecting effects **Sanidip** - liquid product - based on chlorhexidine - to dip or to spray - good cosmetic effect on teats **Trempex Iodine** - barrier product - iodine based - dipping only - high protection effect - strong conditioning effect on teat skin	**Podocur SV** - strong surfactant effect - copper, zinc and aluminum formulation - used with a mat or sprayed **Podo-Mat** - ideal in free stall - easy to use for Podocur SV

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IN THIS ISSUE:

Feeding Higher Levels of Corn Silage

by Bill Woodley,
Shur-Gain Ruminant Technical Services Supervisor

Feeding higher levels of corn silage to lactating cows, dry cows and heifers offers some advantages over traditional haylage programs but may also present some challenges that need to be addressed.

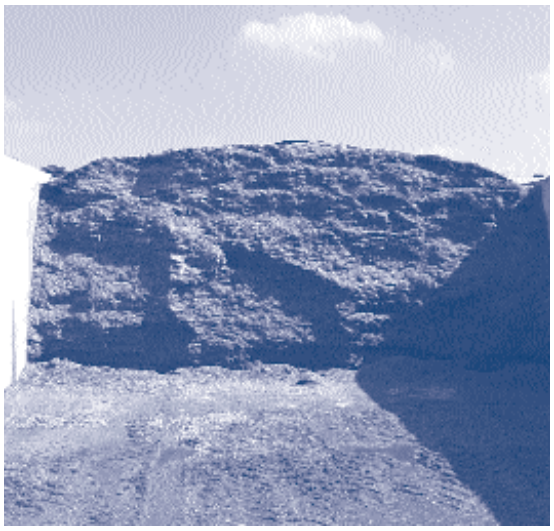
What are the advantages of corn silage programs?

Consistency – in many cases, corn silage is harvested during a much smaller "window" then haylage. Producers often struggle with changing diets as they move through the different cuts of haylage. Higher corn silage diets minimize the changes.

Protein Levels – the total dietary protein levels for lactating dairy cows tends to decrease as corn silage levels increase. Lactating dairy cows need a combination of degradable protein and escape protein to produce milk and milk protein. Haylage programs often provide more degradable protein then required by the rumen microbes. The lactating dairy cow still has a requirement for escape protein that is usually met with purchased ingredients – regardless of the protein level found in the haylage.

Tonnage –there is generally a harvested dry matter tonnage advantage for corn silage versus haylage. This is an important consideration when herd size increases.

Grain Levels – corn silage contains between 25-40% of its dry matter as kernel corn. Feeding 8 kgs of dry matter (20-24 kgs as fed) from corn silage will translate to 2-3 kgs of high moisture corn. Added grain levels will decrease as corn silage levels increase.



Corn silage bunk

Economics of Corn Silage Programs

Feeding elevated levels of corn silage does not change the feeding costs dramatically. There is not a large difference between the cost of a 1/3 corn silage program to a 2/3 corn silage program. The attached chart illustrates some of the difference between programs with varying levels of corn silage added to the diet.

Assumptions: Feed Costs ($/dry matter tonne):
Haylage ($125.00), Corn Silage ($75.00), Dry Hay ($125.00), H.M. Corn ($140.00)

Dry Matter Tonnage/Acres Estimates:
Dry Hay (3.5), Haylage (4.5), Corn Silage (6.5), H.M. Corn (3.0)

	ALL HAYLAGE	2/3 HAYLAGE 1/3 C.SILAGE	1/2 HAYLAGE 1/2 C.SILAGE	1/3 HAYLAGE 2/3 C.SILAGE	ALL C.SILAGE
Dry Hay *(kgs DM)*	0.87	0.87	0.87	0.87	0.87
Haylage *(kgs DM)*	9.69	6.69	5.16	3.59	0.00
Corn Silage *(kgs DM)*	0.00	3.29	5.11	7.26	12.15
H.M. Corn *(kgs DM))*	8.63	8.44	7.91	7.02	5.15
Supplement *(kgs DM)*	2.81	2.71	2.96	3.26	3.84
Total DMI *(kgs)*	22.00	22.00	22.00	22.00	22.00
Crude Protein *(%)*	17.97	17.36	17.10	16.77	16.00
Forage DM *(% of DMI)*	48.00	49.44	50.63	53.29	59.18
Total $/Cow/Day	$3.86	$3.80	$3.80	$3.80	$3.83
Total Acres/100 cows	193.00	185.00	175.00	165.00	140.00

Note: Acreage estimate only includes milking cow requirements.

Corn Silage Challenges

Low fibre, high energy corn silage – The feed analysis of this corn silage would have lower ADF levels (< 20%), lower NDF levels (<40%) and higher NSC levels (>40%). Providing adequate fibre will be the biggest challenge in this feeding scenario. The addition of "cud-chewing" fibre such as chopped hay or straw would be essential especially if this low fibre corn silage was put through a kernel processor.

High fibre, low energy corn silage – This corn silage had moderate stalk growth but poor cob and kernel development. The feed analysis would have higher ADF levels (>30%), higher NDF levels (>50%), lower NSC levels (<30%) and may have higher protein levels (>9%). Higher grain levels would be needed to support the carbohydrate requirements. If poor fibre digestibility was a concern, than the addition of degradable fibre sources such as beet pulp and soyhulls may be recommended.

Feeding Corn Silage to Dry Cows

Corn silage is an ideal forage for far-off and close-up dry cows – but too much of a good thing may lead to problems! Corn silage provides a low potassium forage for the dry cow. Feeding too much corn silage could lead to excess body weight gain. Limit corn silage to 9-13 kgs (as fed)/head/day.

Corn silage programs for dry cows generally require supplemental calcium, magnesium and protein as compared to more traditional programs. The far-off dry cow may need additional soymeal to bring the dietary crude protein to a minimum of 12-13%.

Feeding Corn Silage to Growing Heifers

To obtain the ideal weight and height for a growing heifer, proper levels of both protein and energy must be carefully incorporated into the diet. Over conditioned heifers are a concern on many operations. Excess body condition may be due to:

Access to high, quality fermented forages. Both haylage and corn silage are high energy forages. The addition of a supplementary protein source is usually required for a "heavy" corn silage program.

Access to TMR refusals. Feeding TMR refusals to growing heifers may present both a bio-security and nutritional challenge to these young animals. Limit the daily intake of TMR refusals (<20% of total intake) to prevent excessive weight gain.

Reduced dry hay feeding. A number of producers have shifted to TMR feeding for the dairy heifer with limited access to dry hay. Check the energy level of the TMR. Feeding restricted TMR with free-choice dry hay may improve body condition score.

Grouping Strategy. Many heifers are housed together in large groups that vary in weight and age. The larger heifers tend to be more aggressive and gain weight accordingly. Split the heifers into smaller groups of animals of similar age and size.

Conclusion

Corn silage is excellent forage for the entire dairy herd. Corn silage is palatable, consistent and high energy – but like any forage, it should be carefully accessed and balanced to ensure optimum performance.

Spoiled Silage Costs More Than You Think

by Brian Tarr,
Shur-Gain Ruminant Nutritionist

No matter how well bunkers are packed and sealed, there is always some degree of surface spoilage. This is often included in the feed at feeding time. The necessity to discard spoiled silage has been demonstrated in research carried out at the University of Wisconsin, Minor Institute, Kansas State University and analyses at Shur-Gain.

The keys to good silage are to chop, pack and seal. The importance of packing adequately cannot be over emphasized. Table 1 demonstrates that dry matter losses were related to the packed density of silage (Wisconsin study on 168 bunker silos).

Table 1. Silage density and dry matter loss

Silage density (lbs DM / cu. ft.)	% Dry Matter loss at 180 days
10	20.2
14	16.8
15	15.9
16	15.1
18	13.4

At Minor Institute silage samples were taken monthly for a year and submitted for analysis. Included in the samples was material that was visibly spoiled but they excluded the black spoilage layer on the top of the silage. The "spoilage" sampled would typically be included in the feed for livestock. The results are presented in Table 2.

Table 2. Comparison of "normal" and spoiled corn silage and alfalfa-grass silage

	CORN SILAGE NORMAL	CORN SILAGE SPOILAGE	ALFALFA GRASS SILAGE NORMAL	ALFALFA GRASS SILAGE SPOILAGE
NDF (%)	43.4	50.2*	35.6	55.2**
NSC (%)	42.2	29.2**	21.5	17.2*
Ammonia (%)	0.37	1.09	1.27	2.05
pH	4.0	5.9**	4.7	5.5***
DON (ppm)	1.9	3.3**	2.8	2.7

* P< 0.10; ** P< 0.05; *** P< 0.01 Minor Institute 1996

There were significant differences in fibre, NSC and pH between the normal and spoiled silage. These values reflect substantial differences in forage quality and would markedly affect how rations would be balanced. Vomitoxin was significantly higher in the spoiled corn silage.

Silage Spoilage

At KSU they evaluated the impact of feeding spoiled silage to rumen cannulated steers in four treatments: 1) 100% normal silage; 2) 75% normal ; 25% spoiled; 3) 50% normal : 50% spoiled and 4) 25% normal : 75% spoiled. Feeding spoiled silage to cattle decreased organic matter, Crude Protein, ADF and NDF digestibility (Table 3).

Table 3. Protein, ADF and NDF digestibility (%) of the four rations

% digestibility of:	Rtn # 1	Rtn # 2	Rtn # 3	Rtn # 4
Crude Protein	74.6^{a}	70.5^{b}	68.0^{b}	62.8^{c}
Acid Detergent Fibre	56.1^{a}	46.2^{b}	41.3^{b}	40.5^{b}
Neutral Detergent Fibre	63.2^{a}	56.0^{b}	52.5^{b}	52.3^{b}

Means differ, P<0.05 KSU study

Table 4 illustrates an almost linear reduction in feed intake as the proportion of spoiled silage in the diet increased. The intake on ration 2 with 25% spoiled silage was significantly lower than on ration 1 (normal silage) – it does not take much spoiled silage to significantly reduce digestibility and dry matter intake.

Table 4. Dry matter intake on rations with increasing levels of spoiled silage

	Rtn # 1	Rtn # 2	Rtn # 3	Rtn # 4
Dry Matter Intake (lbs/day)	17.5^{a}	16.2^{b}	15.3^{b,c}	14.7^{c}

At Shur-Gain we sampled a typical corn silage bunker. The samples were taken at 4 points each down the side and the middle of the bunker. Sample A was taken from the top 12 to 15 inches, Sample B from the next 12 to 24 inches down, Sample C from half way down the face and Sample D 12 to 15 inches off the bottom of the bunker. The average for each pair of samples was calculated and presented in Table 5.

Table 5. Average analyses for corn silage taken across the bunk face.

	Sample A	Sample B	Sample C	Sample D
Dry matter (%)	25.90	35.35	30.35	29.25
Protein (%)	14.21	9.31	8.84	9.24
Nel (MJ / kg)	6.16	7.00	6.85	7.00
ADF (%)	26.43	17.34	21.92	17.25
NDF (%)	46.80	30.65	39.45	30.53
ADF-N (% TN)	4.86	2.19	2.57	2.36
PH	6.3	3.8	3.7	3.7

There was visible spoilage in the top layer of the silage in the bunker. The silage was warm to the touch. This spoilage is confirmed by the analyses. The differences in these analyses would result in substantial differences in protein and carbohydrate fractions used in the Shur Gain ration formulation model. This would affect the way the ration is balanced as well as have an impact on the cost. Clearly, it is important to get a representative sample of the material to be fed.

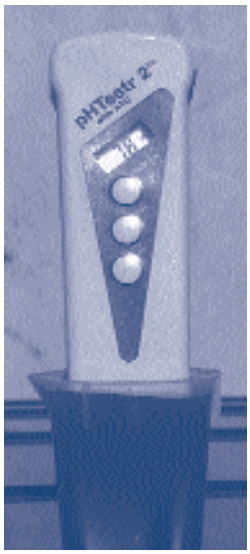
What's the problem with poorly packed silage?

Dry matter losses increase substantially at lower silage density compared to higher silage density (greater than 15 lbs / cu. ft.).

The Miner Institute found significant differences in NDF, NSC and pH comparing normal to spoiled silage. The corn silage spoilage had significantly higher vomitoxin levels.

Dry matter intake and digestibility are significantly reduced with the addition of spoiled silage in the feed.

The forage or fiber mat in the rumen was disrupted / partially destroyed in steers fed the spoiled silage. This has a negative effect on rumen motility, rumen microbes and rate of passage.



pH Tester

Our results show analytical differences in the silage samples from different parts of the bunk face. This emphasizes the necessity to adequately sample the material that will actually be used in the rations.

The most important points to come out of these studies and observations are:

- Minimize losses and spoilage by packing correctly
- Make sure you have a representative sample for analysis
- Don't feed the spoilage

What's the key to quality silage making?

The key to successful silage making is to chop the forage the appropriate length at the correct maturity and moisture, fill, pack and seal. Of these, moisture, maturity and packing seem to be the greatest factors affecting forage quality. Packing is one variable that producers do have control over.

Five ways to improve silage packing:

1) Layer the cut silage in 6 inches or less for proper packing. Use a tractor with a blade to spread new loads of silage out evenly.

2) Use more tractors and / or add weight to the packing tractor(s). The following equation demonstrates the impact of time and weight to packing density. Hours packing x tractor weight (lbs) / area packed (top of bunker) (sq.feet) = hr-lbs / sq. foot.

- Minimum packing rate = 120 hr-lb / square foot yielding approximately 15 lbs DM / cu. ft.
- Ideal packing rate = 200 hr-lb / square foot yielding approximately 17 lbs DM / cu. ft.

Another practical guideline is to ensure 1 to 3 minutes of packing time per ton of as fed forage delivered. The tires must pass over the entire silage surface before the next layer is spread.

3) Reduce the rate of filling to the bunker. One of the biggest problems is delivery rate to the bunker at harvest time. Delivery rates can exceed to capacity of the packing tractors to do an adequate job of packing. The following equation can help to keep this on track. Tractor weight (lbs) / 800 = tons as fed / hour or Tractor weight (kg) / 363 = tonnes as fed / hour.
If you pack with one 20,000 lb tractor, then the maximum delivery rate is 25 tons as fed / hour.

4) Increase the depth of silage in the bunker. The density is related to the height of the silage, which means there is some "self compaction" in bunkers. However, silage height is a farm safety issue. The type of equipment used to remove silage and the risk of silage "avalanches" must dictate the reasonable height of the silage. The height of the bunker sides ultimately dictates the height possible. The ideal bunker width to height ratio is < 5 : 1.

So what do we do with the spoilage?

The spoilage should be removed each day from the amount of the face that will be fed out. Dump the spoiled silage in a separate pile to allow for further composting prior to spreading back on the land. Spoiled silage is not suitable for feeding to any classes of livestock on a dairy or beef operation.