



# Dairy Briefs



The Latest Information  
on Dairy Cattle Nutrition

## Harvesting High-Quality Haylage

Laura Martin, M.Sc

Harvesting high-quality haylage is important to a successful dairy operation. Optimizing protein in haylage crops can help reduce off-farm protein costs. Taking steps when it comes to field fertility, harvesting and storage of haylage can greatly affect the quality of the haylage and the protein that it contains.

The first step in producing high quality haylage happens early in the growing cycle. Taking soil samples to check the fertility of the field when it comes to nitrogen (N), phosphorous (P), potassium (K), and trace minerals is key to preparing for a good harvest. Fertilizer strategy will depend on what variety of crop is being grown – alfalfa, grass and corn crops all have very different nutrient needs. OMAFRA noted last year that soils may be becoming more sulphur deficient now that acid rain incidences have decreased. Alfalfa stands may benefit from the addition of sulphur to the fields in the spring. Alfalfa and grasses uptake soil potassium easily. High potassium haylage (or hay) does not make good forage for dry cows, but will make excellent feed for milk cows.



Plants uptake soil nitrogen and turn it into plant protein. Grasses fertilized with 120 lbs/ac of N resulted in 1.5% higher protein compared to grasses not fertilized with nitrogen (Cuomo et al., 1996). Soil nitrogen taken up by plants stays as degradable protein which is digested rapidly

in the rumen. Most of the protein in haylage is rapidly degraded in the rumen. To optimize milk production in cows

Cont. >>

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*Harvesting High-Quality Haylage*

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degradable and undegradable (bypass) protein needs to be balanced. It is important to note that extremely high protein levels in haylage are not the goal in producing high-quality haylage. Fibre is also a necessary component in dairy diets and much of that requirement is supplied through haylage in the diet. Bypass protein is also required and is more easily found in off-farm sources of protein supplementation.



After optimizing field fertility there is not much that can be done, other than hoping for good weather, until it is time to harvest the haylage crop. Timing of first cut is important as it will impact the cutting cycle for the rest of the season. Table 1 shows the ideal maturities to harvest different crops at to maximize quality. As plants mature the protein gets bound up in the plant cell walls and become less digestible (Table 2); this doesn't necessarily mean that this "bypass" protein will be available to the animal though, as it may be indigestible to the point where it just passes through the cow. Grass or alfalfa harvested past the ideal stage of maturity loses 0.5% in crude protein every day (Schroeder, 2013). A 3 day delay in harvesting would reverse the protein increase effect of adding nitrogen to the field. Research has shown that this increase in maturity can also impact milk production. For each day past late-bud stage in alfalfa crops production can decrease by almost 0.4 kg per cow per day (Schroeder, 2013). On the other hand, consistently cutting alfalfa crops before they reach the bud stage is not ideal. Alfalfa stands can be damaged by this harvest scenario, reducing yields in subsequent years. Plant moisture at harvest also impacts quality of the haylage. Harvesting haylage too dry risks high leaf loss, which translates to reduced protein in the haylage. Haylage that is too wet risks losing nutrients, including protein to run-off. Ideal moisture depends on how the crop will be stored after harvest (Table 3).

The fermentation process can greatly impact forage quality. As forages ferment plant protein is broken down and degradable protein increases. Haylage that is harvested too dry, or isn't packed well after harvest can heat. This heating can damage the protein, rendering it indigestible to the cow. Haylage that is dark-brown or black, with a caramelized smell should be assessed carefully for digestible protein levels. As bunkers are packed, or silos are filled, using Silo Guard II can help create a high quality end product. Silo Guard II helps remove pockets of oxygen from the fermenting forage. This helps stop mould and yeast growth common in the first stages of fermentation. Enzymes in Silo Guard II speed up fermentation by providing naturally occurring fermentation bacteria with energy. Faster fermentations mean that more nutrients are preserved in the fermented forage and less dry matter is lost to bacteria during the ensiling process. Research has shown a dry matter recovery of 5-7% with Silo Guard II on haylage and dry hay. This improvement in dry matter recovery is often enough to cover the cost of treating your

forage with Silo Guard II. Even after accounting for the cost of the product, the benefits of using Silo Guard II are clear. Not only is there less dry matter loss but the forage at feed-out is a higher quality as less nutrients have been lost. Research has shown that this higher quality feed actually translates into improved milk production in dairy cows. Packing and covering haylage stored in bunks is an important step to preserving forage quality.

Producing high quality forages can be a lot of work, but can help reduce off farm protein costs if done right. There are many steps along the way to a successful growing season and harvest of the crop. Ensuring that the haylage stores well until feed-out will make all the hard work pay off and deliver a quality feed to the cows that they can turn into milk.

Table 1: Recommended Maturity at Harvest for Common Haylage Crops

Crop	Maturity at Harvest
<b>Legumes</b>	
1C Alfalfa	Pre bud to 1/10 bloom
2C Alfalfa	1/10 to 1/4 bloom
3C Alfalfa	1/4 to 1/2 bloom
Sweet Clover	1/2 bloom
<b>Perennial and Annual Grasses</b>	
Cool Season Grasses	Before grass heads emerge
Sudan and Sorgham Grasses	Boot to early head
Small Grains (Oats, Wheat, Barley)	Boot to early dough stage

Source: J. Schroeder 2013. Haylage and Other Fermented Forages.

Table 2: Effect of Maturity on Alfalfa Digestibility

Maturity	Digestibility (%)
Pre Bud	66.8
Bud	65
Early Bloom	63.1
Mid Bloom	61.3
Full Bloom	59.4
Late Bloom	57.5
Mature	55.8

Source: J. Schroeder 2013. Haylage and Other Fermented Forages.

Table 3: Moisture Guide for Preserving Forages

Moisture (%)	Ideal Use
< 15	Safe for hay, some leaf loss
15 - 25	Ok for hay, little leaf loss, forage preservative recommended
25 - 45	Too dry for haylage, too wet for hay, fire danger
45 - 60	Best for upright, sealed silos; may heat
60 - 65	Best for upright silos and bags
65 - 72	Best for bunkers and piles
> 72	Too wet for silage harvest - run off, sour silage

Source: J. Schroeder 2013. Haylage and Other Fermented Forages.

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