



Feeding Rye or Triticale to Dairy Cattle

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Introduction

Use of cereal grain forages, such as rye and triticale (hybrid of rye and wheat), has become an increasingly important topic, and is especially relevant during years when feed inventory is short. However, it is not without challenges. Timing can conflict with higher priority tasks on the farm such as alfalfa harvest and corn planting in spring, and corn silage harvest and manure application in the fall. Therefore establishing and harvesting rye or triticale can be a challenge. Achieving optimal quality for lactating cows can be another issue because quality declines can happen quickly. Farmers, and their nutritionists, have shared that they need data and guidance to make good decisions. Therefore, the goal of this study was to look at the forage value of rye and triticale and how it could be included in the lactating diet, tracking actual amounts fed and milk production as well as comparing to predicted amounts and milk production using nutritional modeling scenarios. The results and other feeding recommendations are covered in this publication.

Forage and Inventory Storage

It is common to find farms feeding cereal forages to heifers, but it is possible to successfully incorporate these into lactating cow rations. When fed to heifers, ryelage can offer a bulky feed ingredient to help control feed intake and maintain optimal weight

gains. However, some farms may not raise youngstock on site and will need to consider if they should incorporate cereal forages in the dry or lactating cow diets, and if so, how much to feed. The farm should assess its current feed inventory to determine cereal forage needs, which may be helpful in determining the acreage that should be planted and harvested. Estimated yield is about 1 to 2 tons of dry matter per acre, if harvested at boot stage for optimal quality to feed to lactating cows. Some farms may only want to grow enough to feed for part of the year, while others may prefer to have enough ryeilage inventory to feed all year round. In making this decision, it will be important for the farm to assess its feed storage availability. If feed storage is not adequate, the best practice is to use a silo bag if the farm is able. Alternatively, forage could be stored with another feed, either in front of, or in the back of the bunker allowing for access to the other forage. A less desirable strategy is layering the cereal forage with another forage, such as alfalfa, but this can introduce more variability, as there may be concentrated pockets of feed, rather than an even distribution.

Harvest Recommendations

Quality is key if a farm intends to feed rye or triticale silage to lactating cows, and the most important factor affecting forage quality is harvest timing.

Harvest is recommended at boot stage for lactating cows or up to the soft dough stage of grain maturity if feeding to replacement heifers. Wilting to 60% - 70% moisture before chopping is optimal for silage fermentation. If it is too dry, packing can be an issue with adverse effects on silo fermentation. Harvesting too wet can increase seepage from silos and (or) increase silage ammonia and soluble crude protein concentrations too far. A theoretical length of cut setting on forage harvesters of $\frac{3}{8}$ to $\frac{1}{2}$ inch is recommended. If it gets much longer than this, the forage will be too coarse and if it's too short, the forage will not provide much effective fiber and there can be seepage issues, especially if harvested wetter (<30% dry matter). It is important for the farm to work with both their nutritionist and agronomist to decide what is the optimal time to harvest for quality and yield depending on what the farm's goals and needs are for that year.

Rye vs. Triticale

A common question farmers ask is: which is better, rye or triticale? Both have their advantages and disadvantages. In a 2017 focus group study, participants said that rye had a shorter harvest window, took longer to dry, and was harder to pack in the silo compared to triticale, but triticale didn't seem to produce as much tonnage as rye. In 2018, five farms participated in the rye vs. triticale portion of the study. A total of 16 samples were taken--8 triticale and 8 rye. Half of the samples were analyzed fresh and the other half were fermented in laboratory mini-silos for 60 days. Nutrient composition of rye and triticale were very similar with minor differences. Table 1 summarizes average forage quality data from this study.

Fresh vs. Fermented

Farms may need to decide whether to feed immediately or wait for the feed to ferment properly. This decision may be affected by forage inventory

needs and perceptions on quality of fresh vs. fermented forage. In this study, forage samples were taken as it was going into storage, and there was minimal change in fiber digestibility due to fermentation. Overall, rye and triticale fermented samples had higher soluble protein content, and lower pH which is indicative of silage fermentation. For wetter silages, soluble protein levels can get quite high and it's important to analyze not only for crude protein content but also soluble protein as well, so ration adjustments can be made as necessary. However, if feed inventory is in short supply, the farm may not have the luxury of waiting for fermentation to occur. Table 1 summarizes forage quality averages for fresh and fermented samples.

Feeding lactating cows

Forage quality will greatly affect feeding recommendations. Computer modeling scenarios suggest that feeding 5 pounds of high quality rye silage on a dry matter basis should not negatively affect milk production. To achieve high quality rye silage, harvest at boot stage and store at the proper moisture content. When harvested at boot stage, triticale silage was found to contain about 50% NDF, 12-15% protein, and 65-70% TDN, depending on the year (Coblentz et al., 2018). It is not recommended to feed high amounts of rye or triticale silage to dry cows due to their potential for high potassium contents. There would be a risk of developing milk fever due to an electrolyte imbalance. As expected, computer modeling scenarios run on two farms in this study predicted lower milk production with decreasing rye silage quality. Modeling scenarios were run for each farm and results suggest high quality rye silage could replace a portion of the alfalfa silage in the diet, and higher inclusions of corn silage had a beneficial effect. Therefore, it may be more advantageous to replace alfalfa silage than corn silage with high quality rye silage. Consult with your nutritionist before making any changes to the ration.

Feeding replacement heifers

Cereal grain forages can make up 50 to 100% of the heifer diet. The analyses from Table 1 suggest rye or triticale silage would meet protein and energy needs for post-breeding heifers. Depending on quality, some corn silage may need to be included to balance diet energy content. Inclusion rates of cereal grain silage discussed in focus group sessions ranged from $\frac{1}{3}$ to $\frac{2}{3}$ of the diet dry matter for heifer diets. Feeding could allow the farm to extend other forage inventories, but may not be likely that a farm could feed at high inclusion rates year round. Farms should work with their nutritionist to develop a balanced ration.

Summary

Rye or triticale silage can be a high quality forage source if it is harvested at the proper stage. Feed inventory needs and storage capacity on farm should be assessed to determine how much should be planted and harvested. Deciding whether to feed seasonally or year-round will also be an important decision. The findings of this research project suggest 5 lb dry matter per cow per day could be fed as a starting point for lactating cows and 50 to 100% of heifer diets. The farm's nutritionist should be involved in the conversation of feeding rates and forage inventory management.

Table 1. Forage analysis results

	Rye Fresh	Rye Fermented	Triticale Fresh	Triticale Fermented
Dry matter, % as fed	26.8	24.9	28.9	28.3
pH	5.7	5.2	5.7	5.0
Crude Protein, % DM	13.7	13.2	13.6	13.7
Soluble Protein, %CP	51.2	66.3	53.5	60.6
ADF, %DM	38.1	41.0	37.9	39.1
aNDF, % DM	63.7	63.1	61.4	62.2
aNDFom, %DM	60.9	60.1	58.2	58.9
Lignin, %DM	3.6	4.3	3.6	3.7
NDFD 30, %NDF	66.9	61.4	67.2	66.0
uNDFom 240, % DM	10.7	13.7	11.1	12.2
Fat (EE), % DM	3.2	4.4	3.2	3.8
Ash, % DM	10.9	11.9	11.2	11.6
Calcium, %DM	0.3	0.4	0.3	0.4
P, %DM	0.4	0.4	0.4	0.4
Mg, % DM	0.2	0.2	0.1	0.1
K, %DM	3.3	3.4	3.5	3.3
Sulfur, %DM	0.2	0.2	0.2	0.2
Sugar (WSC), %DM	9.5	6.9	10.5	7.4
NFC, %	14.0	13.7	16.3	14.8
RFQ	120.3	105.2	126.5	119.5
NDF kd rate Van Amb (%/hr)	4.5	4.1	4.7	4.5
TDN 1x (Mcal/cwt), % DM	57.1	55.0	57.6	56.8
NEL 3x (Mcal/cwt) – OARDC	58.1	55.8	58.6	57.8
NEg (Mcal/cwt) – OARDC	31.1	28.1	31.6	30.8
NEem (Mcal/cwt) – OARDC	56.9	53.6	57.5	56.6

References

Binversie, L., H. Johnson, R. Shaver, and K. Shelley. Planting cover crops after corn silage for spring forage harvest: Opportunities and challenges as told by dairy farmers and their consultants in Wisconsin. University of Wisconsin-Madison Division of Extension. Retrieved from https://ipcm.wisc.edu/download/pubsNM/CoverCropsSummary_FINAL.pdf.

Caputo Oliveira, R., R. Shaver, K. Shelley, L. Binversie, H. Johnson, and M. Akins. High-quality cereal rye silage as a forage alternative for lactating dairy cows. University of Wisconsin-Madison and Division of Extension. Retrieved from <https://www.nacaa.com/journal/index.php?jid=954>.

Coblentz, W.K., M.S. Akins, K. F. Kalscheur, G. E. Brink, and J. S. Cavadini. 2018. Effects of growth stage and growing degree day accumulations on triticale forages: 1. Dry matter yield, nutritive value, and in vitro dry matter disappearance. J. Dairy Sci. 101:8965-8985.