



# Lactational response of Holstein cows to brown midrib-3 or leafy-floury corn silage

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<http://whminer.org/adsa2014.html>

## INTRODUCTION

- Corn silage is a major component of most rations in the Northeastern US and can account for 40 to 50% of the total diet
- Silage quality is major concern and selection of hybrids is important for improving nutritional management for dairy farms
  - Neutral detergent fiber (NDF) and NDF digestibility are important components of silage quality and have been targeted in corn variety selection
- Starch from corn silage accounts for a large proportion of fermentable carbohydrates in the diet
  - Kernel vitreousness affects availability of starch in the rumen
- Brown midrib-3 has decreased lignin, increased NDF digestibility and higher proportion of vitreous starch compared to non- brown midrib-3 hybrids
- Leafy corn hybrids have been bred for increased yields and recently more floury starch with promises of improved dry matter (DM) digestibility compared to traditional hybrids

## OBJECTIVE

- To measure the response of lactating Holstein cows to total mixed rations containing either brown midrib-3 (Mycogen F2F387) or an experimental leafy-floury hybrid (Healthy Herd Genetics HHG39HF13)

## MATERIALS AND METHODS

### Crossover Design

- 6 primiparous and 10 multiparous Holstein cows (130 ± 16 DIM)
- Housed in a tie stall, fed 1x/d, and milked 3x/d
- Assigned to one of two dietary sequences with 28-d periods
  - 1:1 replacement (DM basis) of corn silage to evaluate value of experimental hybrid relative to brown midrib-3
    - BMR:** Corn silage in diet only brown midrib-3 (49% of diet)
    - LF:** Corn silage in diet only leafy-floury (49% of diet)

**Table 1.** Chemical and physical composition of experimental corn silages.

Analyses	BMR	LF
DM, %	30.2	31.9
CP, %	7.3	7.8
NDF, %	41.5	42.6
24-h NDF digestibility, %	60.2	47.5
Starch, %	31.0	30.3
7-h starch digestibility, % starch	77.5	73.0
peNDF <sub>Ro-Tap</sub> , %	37.6	38.9

### Data Collection

- During d 22 to 28 of each period
  - Feed ingredients, diets and orts collected daily and analyzed by period for wet chemistry and digestibility
  - Intake and milk yield measured daily
  - Milk composition on d 26 and 27
  - BW and BCS recorded at beginning and end of each period
  - Chewing behavior monitored every 5 min for 72 h on d 25 to 27 by visual observation
  - Fecal analysis of starch, phosphorus, and pH every 9 h for 72 h on d 25 to 27
  - Total tract digestibility on d 25 to 27

### Statistical Analysis

- Data were analyzed using the MIXED procedure of SAS with model effects of diet, sequence, and period, with cow within sequence as a random effect

## RESULTS

**Table 2.** Ingredients, chemical composition, and digestibility of treatment diets.

Item	BMR	LF
Ingredients, % of ration DM		
Leafy-floury corn silage	-	49.00
Brown mid rib corn silage	49.00	-
Haycrop silage	9.80	9.80
Corn meal	11.40	11.40
Corn germ meal	3.97	3.97
Soybean meal	6.53	6.53
Blood meal	1.65	1.65
Canola meal	6.44	6.44
Soybean hulls	3.36	3.36
Other	7.82	7.82
Chemical Composition, %		
CP	17.2	17.8
ADF	20.4	22.0
NDF	32.2	33.5
Acid detergent lignin	3.0	3.5
Starch	24.6	23.0
Sugar	5.7	5.5
Fat	3.6	3.8
24-h NDF digestibility, % NDF	66.9	54.6
7-h starch digestibility, % starch	69.5	71.0

**Table 3.** Intake, milk production, and efficiency of treatment diets.

Item	BMR	LF	SE	P-value
Intake				
DMI, kg/d	29.7	27.2	0.9	<0.001
DMI, % BW	4.35	3.99	0.08	<0.001
NDF intake, kg/d	9.7	9.0	0.3	<0.001
NDF Intake, % BW	1.39	1.29	0.03	<0.001
Starch intake, kg/d	7.3	6.2	0.2	<0.001
Milk production				
SCM, kg/d	47.0	41.7	1.4	<0.001
Fat, kg/d	1.79	1.63	0.05	<0.001
True protein, kg/d	1.50	1.36	0.05	<0.001
Lactose, kg/d	2.32	2.10	0.10	<0.001
Efficiency				
SCM/DMI, kg/kg	1.59	1.54	0.04	0.01

**Table 4.** Chewing, fecal, and total tract digestibility of treatment diets.

Item	BMR	LF	SE	P-value
Chewing, min/kg NDF				
Eating	29	31	2	0.03
Ruminating	55	58	2	<0.001
Fecal				
pH	6.71	6.92	0.03	<0.001
Starch, %	1.15	0.82	0.09	<0.001
Phosphorus, %	0.63	0.53	0.02	<0.001
Total tract digestibility, %				
DM	80.2	76.7	0.6	<0.001
OM	81.4	77.7	0.6	<0.001
ADF	59.4	50.0	1.0	<0.001
NDF	63.8	55.4	0.8	<0.001
Starch	98.9	99.0	0.1	0.28
Cellulose	65.8	57.3	1.0	<0.001
Hemicellulose	70.5	63.7	0.8	<0.001

## CONCLUSIONS

- The LF hybrid assessed in this experiment constrained DMI and milk production compared to the BMR hybrid
- To achieve dietary fermentable carbohydrate content similar to brown midrib-3, a leafy-floury hybrid will require higher NDF and starch digestibility than the hybrid evaluated in this experiment