

*BMR Silages:
Yield, nutritive value, disease
resistance and lodging*

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Challenges

- ✓ The climate in the SE makes producing high quality forage more challenging
 - Hot and humid
 - More constant day length
- These conditions produce forage that has higher fiber and lignin concentrations and is less digestible

NDF Digestibility

- Increasing NDF digestibility reduces fill and increases passage rates which allows higher dry matter intake.
- 1 unit increase in NDF digestibility
 - + 0.37 lbs DMI
 - + 0.50 lbs milk yield
 - + 0.55 lbs 4% FCM

Brown midrib forages

- ✓ Brown midrib (BMR) is a natural mutation that occurs in corn, sorghum, sudangrass, and pearl millet.
- ✓ Plants with the BMR gene exhibit a reddish-brown pigmentation of the leaf midrib, rind and pith. Coloring disappears on the leaves as the plant grows, but remains in the stalk.
- ✓ BMR varieties have significantly lower lignin concentrations which allow greater NDF digestibility.

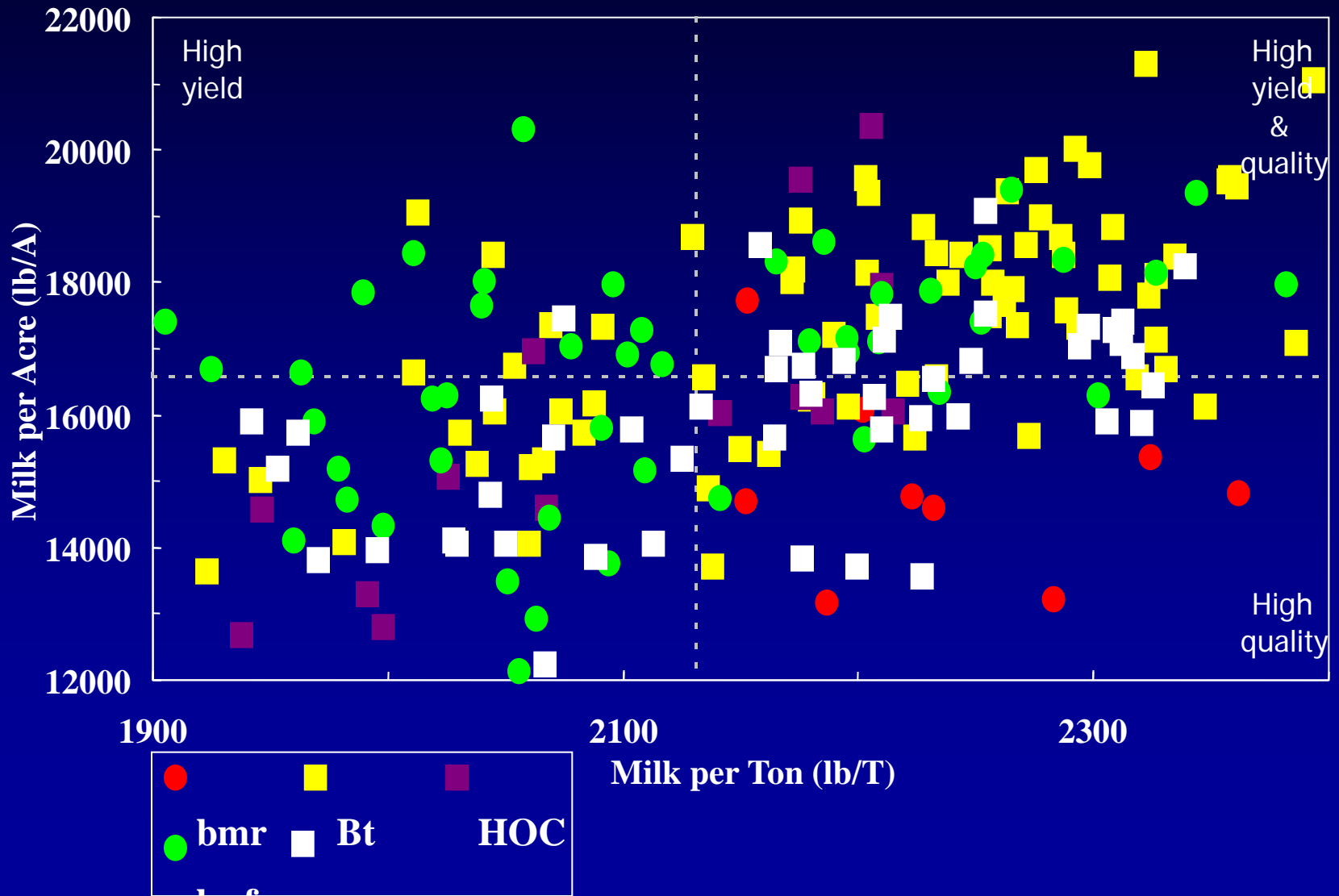
Brown midrib forage

- ✓ Have consistently support higher DMI:
 - Greater ruminal NDF digestibility
 - Faster ruminal turnover or passage rate
 - Improved microbial protein synthesis
 - Starch digestibility tends to be higher in lower tract, but total digestibility is not changed
- ✓ Improved nutrient intake and flow should provide additional nutrients to support higher milk yield

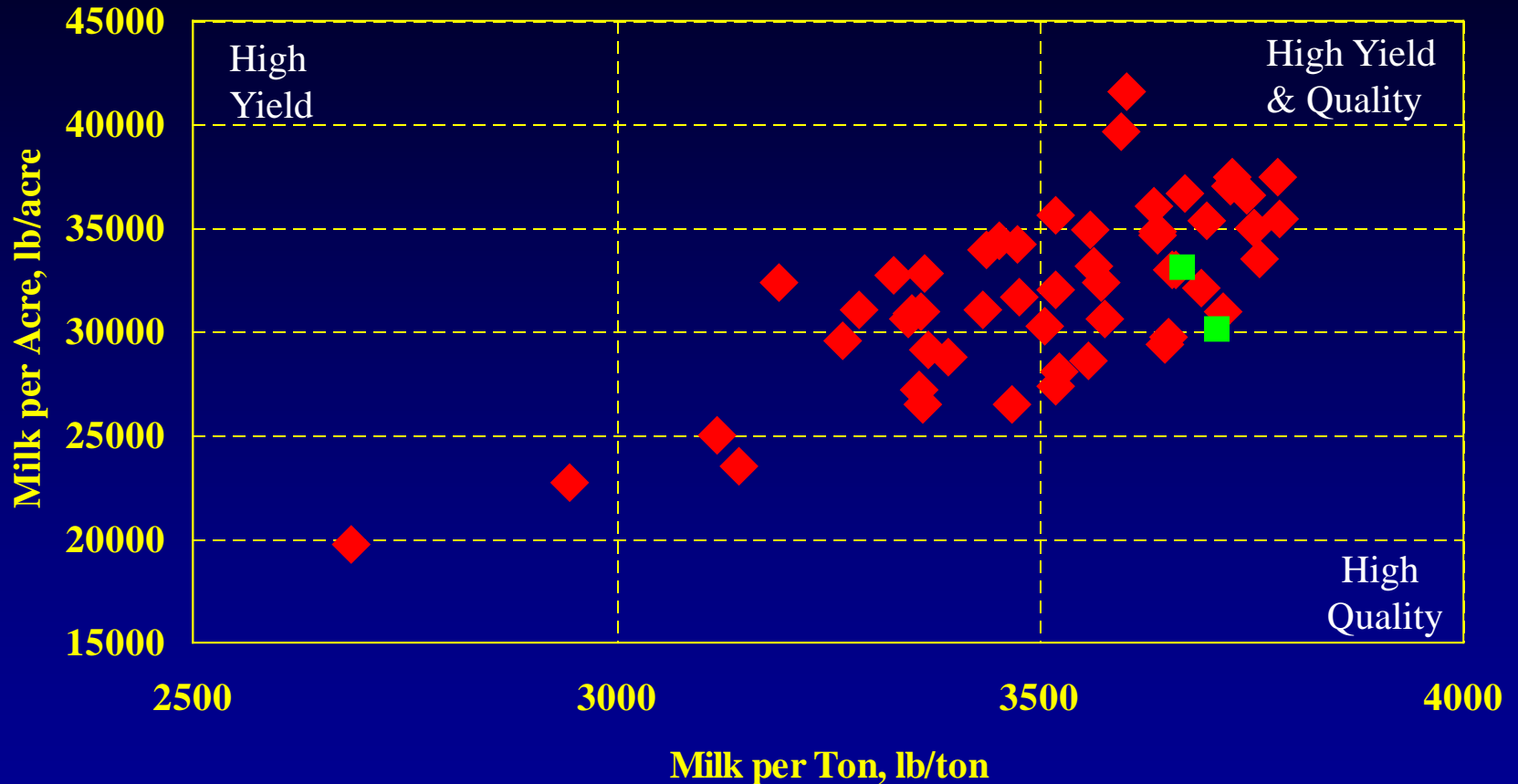
Brown midrib forage

- ✓ BMR varieties have approximately 10% lower DM yield than normal varieties.
- ✓ Lower lignin concentrations result in greater chance of lodging. Greater problem in forage sorghum, but can be a problem if corn is left to mature for grain.
- ✓ BMR varieties tend to have poor early season vigor compared with normal varieties.
- ✓ Number of BMR varieties is limited, so opportunity for selection of disease resistance and other traits is more limiting.

Wisconsin Corn Specialty Hybrid Silage Yield and Quality, 1990-1999



2008 UFL Corn Variety Trial



DM yield of BMR varieties was 9.8% lower than the average which is consistent with results from other test.

Where do BMR varieties work?

Considerable variation in results from research trials. Some of the variation is related to:

- Selection of varieties for comparison
 - Non-BMR isogenic comparison vs top variety
- Nutrient requirements of animals used in trials
 - Transition or fresh cows versus mid or late lactation
COWS

BMR Forage Sorghum

- ✓ Research trial at Nebraska compared BMR forage sorghum with normal forage sorghum or corn silage.
- ✓ BMR forage sorghum had similar concentrations of fiber but lower concentrations of lignin.

BMR Forage Sorghum

Item	Normal	BMR	Corn	Alfalfa	SE
	Sorghum	Sorghum			
Composition					
DM, %	36.8	34.8	35.5	47.6	
	----- % of DM -----				
CP	9.1	9.7	9.5	20.5	
ADF	33.2	32.0	28.1	36.2	
NDF	49.9	47.9	48.6	43.0	
Lignin	7.1	6.1	5.8	7.7	
30-h NDF digestibility					
NDF	40.1 ^a	49.2 ^b	51.6 ^b	47.8 ^b	0.5

^{a,b}Means differ (P < 0.05)

Aydin et al. 1999. JDS 82:2127-2135.

BMR Forage Sorghum

Item	Normal Sorghum	BMR Sorghum	Corn Silage	SE
DMI, lb/d	52.2	55.3	54.6	2.2
Milk, lb/d	74.5 ^b	79.4 ^a	76.3 ^{ab}	1.5
Fat, %	3.54	3.59	3.57	0.14
4% FCM, lb/d	69.2 ^b	74.5 ^a	71.4 ^{ab}	1.5
Efficiency	1.30 ^b	1.36 ^a	1.31 ^b	0.03

^{a,b,c}Means differ ($P < 0.05$)

Aydin et al. 1999. JDS 82:2127-2135.

BMR Forage Sorghum

- ✓ Results indicate that BMR forage sorghum can support similar milk production as observed with feeding corn silage.
- ✓ Potential application:
 - Forage production on dry-land or with land with limited irrigation capacity.
 - Cropping systems in which corn can't be planted as early as desired
 - Remember – lodging will most likely be a problem

BMR Corn silage

Item	Normal	BMR
CP	8.4	8.2
NDF	44.7	43.8
Lignin	2.8	1.7
IVDMD, 30 h	73.8	78.0
IVNDF, 30 h	41.5	49.9

Allen et al. 1997. JDS 80(Suppl. 1):157. (Abstr.)

Production Response

Item	Normal	BMR	<i>P</i>
DMI, lb/d	51.8	56.2	<0.0001
Milk, lb/d	85.8	91.7	<0.0002
Fat, %	3.46	3.43	NS
Protein, %	2.98	2.99	NS
3.5% FCM, lb/d	84.7	90.2	<0.0005

Oba and Allen. 1997. JDS 80(Suppl. 1):157. (Abstr.)

BMR and dietary NDF content

	Low NDF (29)		High NDF (35)	
	BMR	Control	BMR	Control
Corn silage	35.8	32.1	55.9	50.5
Alfalfa silage	8.1	7.7	12.6	12.2
Corn	26.2	29.2	0	5.6
Concentrate	29.9	31.0	28.4	31.7

Oba and Allen. 2000. JDS 83:1333-1341.

BMR and dietary NDF content

	Low NDF		High NDF	
	BMR	Control	BMR	Control
DMI, lb/d	54.5	52.7	50.5	47.4
Milk, lb/d	81.4	73.9	74.3	67.0
Fat, %	3.28	3.67	3.86	3.90
Efficiency	1.49	1.40	1.47	1.41

Oba and Allen. 2000. JDS 83:1333-1341.

BMR corn silage for transition cows

Item	BMR	Control	SE	P
Prepartum				
DMI, lb/d	31.5	29.1	0.8	0.03
Postpartum				
DMI, lb/d	44.5	40.1	0.9	0.001
Milk, lb/d	100.1	95.0	2.0	0.07
Fat, %	3.90	3.85	0.07	0.7
Protein, %	3.01	3.06	0.11	0.72
ECM, lb/d	95.2	89.5	2.3	0.08
ECM/DMI	1.79	1.78	0.04	0.84

Diets fed for 3 wk prepartum and 3 wk postpartum. All cows were fed same diet w/o BMR from wk 3 through 15. Intake data represent 2 wk prepartum and 3 wk postpartum and production data represent first 15 wk postpartum.

Stone et al. 2008.

BMR Corn Silage

- ✓ Results indicate that BMR corn silage will support improved DMI and milk production for cows in early lactation and during heat stress.
- ✓ Potential applications:
 - If silage can be segregated, feed BMR corn silage to close-up and transition cows to improve intake and performance.
 - Feed BMR corn silage during heat stress to improve DMI

Summary

- ✓ The NDF in BMR forages is more digestible than normal varieties which supports higher DMI.
- ✓ Cows in early lactation respond to BMR corn silage with improved milk production more consistently than cows in later lactation.
- ✓ BMR forage sorghum can support similar milk production as normal corn silage, but has a greater potential for lodging than BMR corn varieties.