

# Evaluating Alternative Organic Dairy Forage Production Systems

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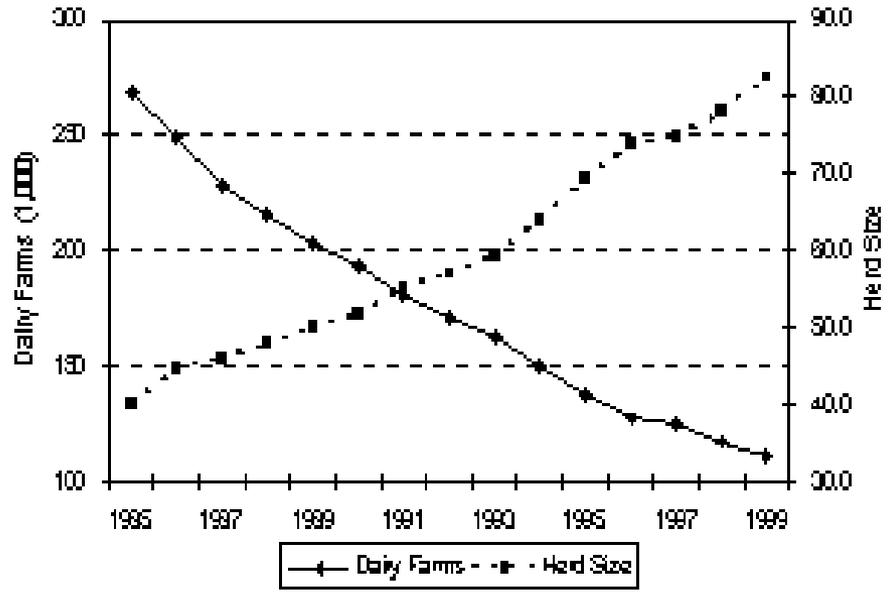


# Challenges facing NE agriculture

Many dairy farms in economic crisis

- Flat commodity pricing (20 yrs)
- Increased competition
- Increasing production costs

Figure 1: U.S. Dairy Farms & Average Herd Size, 1985-1999



# 20% of Maine Dairies ... Organic



A wide-angle photograph of a lush green field filled with numerous small yellow wildflowers. In the background, a dense line of tall, leafy green trees stretches across the horizon. The sky above is a clear, pale blue. The text "Need help with weed management" is overlaid in white, sans-serif font across the middle of the image.

Need help with weed management



Need help with weed management

Tim Griffin, John Halloran,  
and Peggy Pinette



Rick Kersbergen, Tom Molloy,  
Eric Gallandt, and John Jemison



Heather Darby and Sid Bosworth



Maine Organic Milk Producers

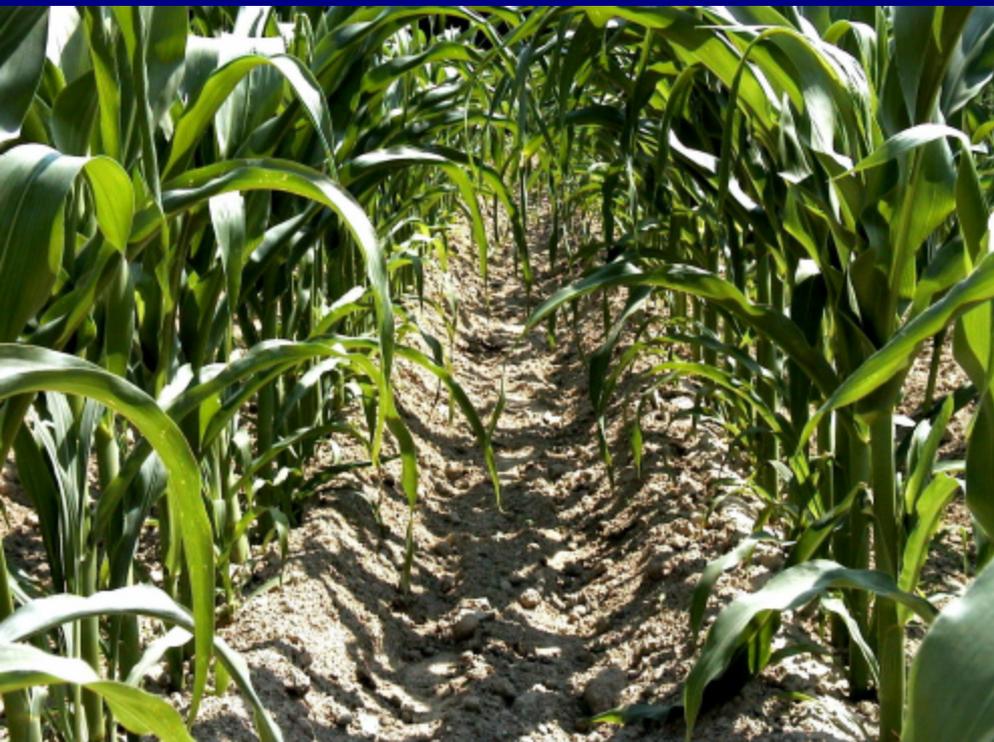
Northeast SARE and USDA OREI Program

# Organic Cropping System Program



Small Grains (winter or spring) + BMR Sorghum Sudan Grass

# Organic corn Weed Control Trials



Same year – different planting date

# Small Grain Evaluation

(Spring Barley as an example)



Advantages:

Plant early on dry fields  
High quality forage  
Occasionally high yielding

# General Yield Range (Barley)

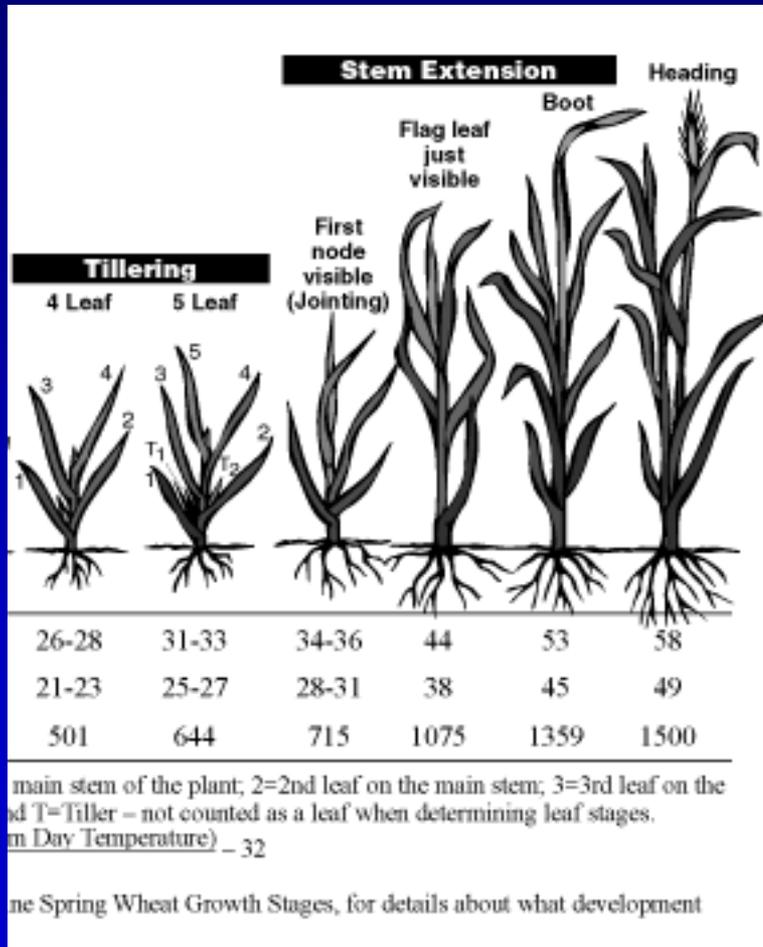
Site*Year	Boot	Soft Dough
	----- DM Yield, tons/acre -----	
Orono ME 2006-1*	1.95	3.08
Orono ME 2006-2	---	1.60
Newport ME 2006	0.76	1.72
Alburg VT 2006	0.82	0.95
Orono ME 2005*	---	1.60
Orono ME 2004*	---	3.10

# Advantages/Disadvantages

- Other spring small grains:
- Harvest: Boot or soft dough ?
  - What does the grower need ?
    - Protein, tonnage, energy
  - What is the double crop ?
- Example yields ...

# Boot Stage Grain

- Growth phase (50 dap)
- High quality forage
  - protein / quality
- Moisture issues



July 8

# Boot Stage Forage Yield

	Newport	Rogers	Newport	Rogers	Alburg
	Wet Yield (t/acre)		-----DM Yield (t/acre)-----		
<b>Barley</b>	<b>4.29</b>	<b>8.45</b>	<b>0.76</b>	<b>1.95</b>	<b>0.82</b>
<b>Hulless Oat</b>	<b>5.84</b>	<b>7.71</b>	<b>0.86</b>	<b>1.73</b>	<b>0.90</b>
<b>Oat</b>	<b>4.98</b>	<b>9.24</b>	<b>0.83</b>	<b>2.09</b>	<b>0.84</b>
<b>Spelt</b>	<b>3.06</b>	<b>6.74</b>	<b>0.53</b>	<b>1.69</b>	<b>---</b>
<b>Triticale (W)</b>	<b>3.08</b>	<b>6.00</b>	<b>0.61</b>	<b>1.47</b>	<b>0.47</b>
<b>Wheat *</b>	<b>2.75</b>	<b>4.77</b>	<b>0.52</b>	<b>1.25</b>	<b>0.87</b>

May 25 planting  
 July 10 harvest  
 10-30% weed

April 22 planting  
 June 13 harvest  
 <1% weed

Flooded (twice)  
 early in season

# Dough Stage Forage Yield

	Newport	Rogers	Newport	Rogers	Alburg
	Wet Yield (t/acre)		----- DM Yield (t/acre) -----		
<b>Barley</b>	<b>4.6</b>	<b>7.8</b>	<b>1.72</b>	<b>3.08</b>	<b>0.95</b>
<b>Hulless Oat</b>	<b>5.9</b>	<b>6.7</b>	<b>2.59</b>	<b>3.59</b>	<b>1.01</b>
<b>Oat</b>	<b>4.5</b>	<b>9.4</b>	<b>2.51</b>	<b>4.15</b>	<b>1.15</b>
<b>Spelt</b>	<b>4.5</b>	<b>7.3</b>	<b>1.84</b>	<b>3.68</b>	<b>---</b>
<b>Triticale</b>	<b>3.5</b>	<b>6.4</b>	<b>1.84</b>	<b>3.12</b>	<b>1.22</b>
<b>Wheat</b>	<b>4.2</b>	<b>7.2</b>	<b>1.73</b>	<b>2.91</b>	<b>0.95</b>

**BIG differences between locations**

# *Project Goals*

- Evaluate intensity/timing of corn cultivation methods
- Compare yield and quality of barley, brown midrib sorghum sudan grass (BMRSS) rotation to best field corn production
- Compare two winter cereal combinations
  - Tritical or Winter Wheat + BMRSS
- Compare weed pressure between systems



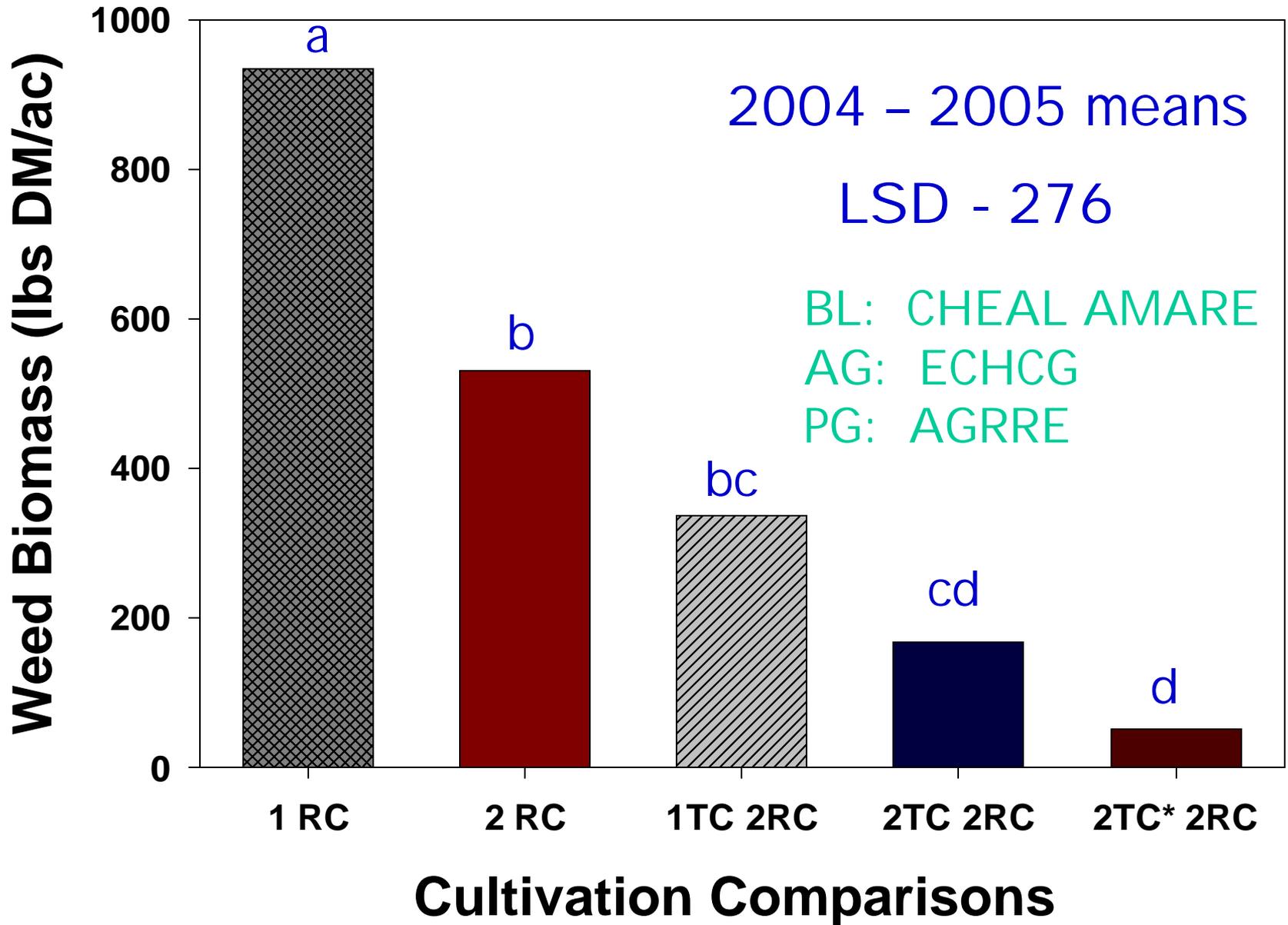
Intensive Cultivation ...  
Tine cultivator

Methods, Timing

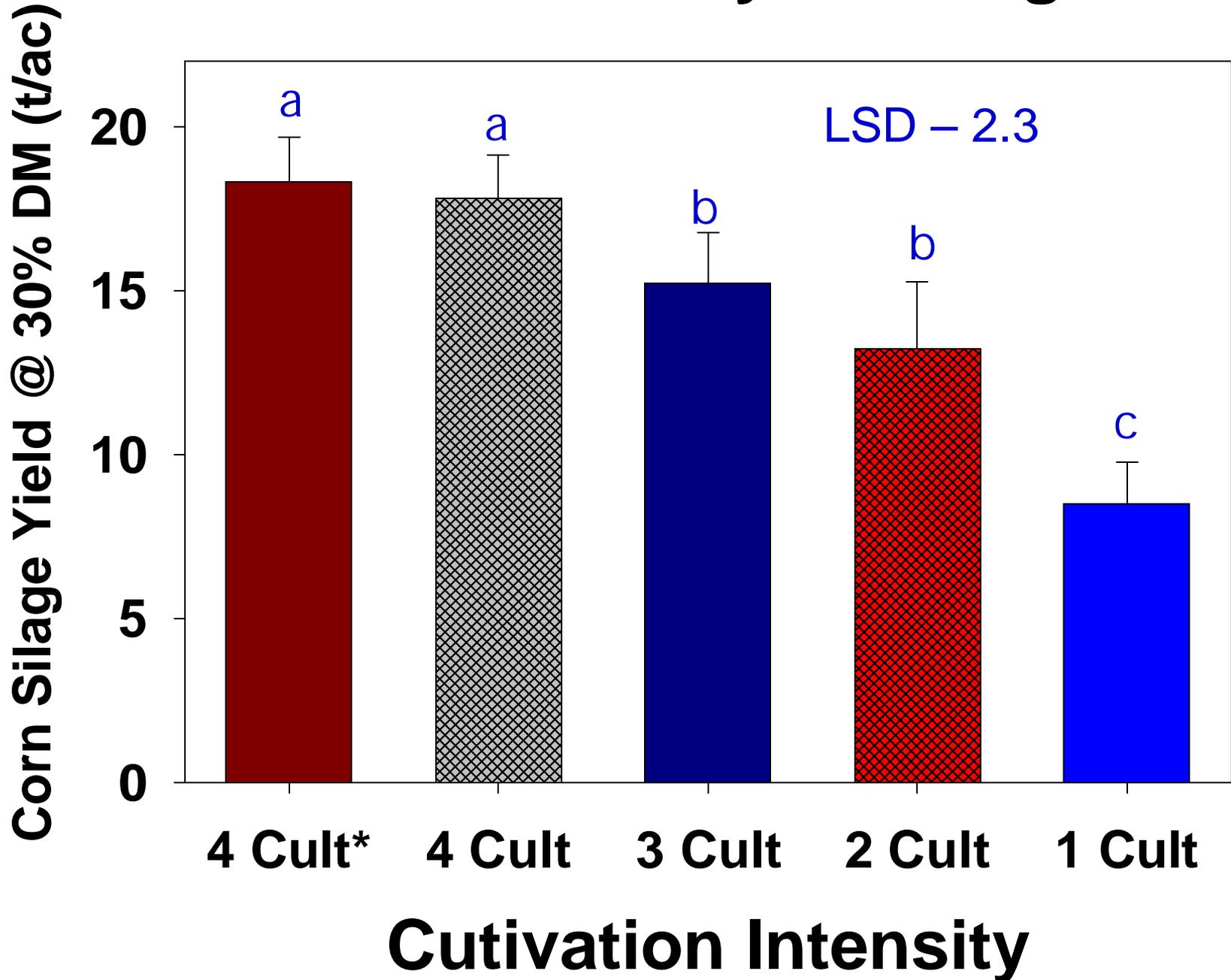
# Row Cultivation (Growth Stages V3 - V6)



# Cultivation Intensity on Weed Biomass



# Cultivation Intensity on Silage Yield



# Current Recommendations

- Use tine cultivator (2x minimum)
  - blind (5 – 7 days after planting)
  - again 5 – 7 days later
- Use row cultivator 3 leaf stage
- Again approaching canopy closure
- Minimum ...
- Rotate after one year in corn

A photograph of a field with four distinct rows of cereal crops. From top to bottom, the rows are: winter rye (tallest, thin stalks), spring barley (medium height, dense), winter wheat (medium height, dense), and winter barley (shortest, dense). The background shows a line of trees under a clear sky.

Winter rye

Spring barley

Winter Wheat

Winter  
Barley

Harvested Small Grains  
at Soft Dough Stage





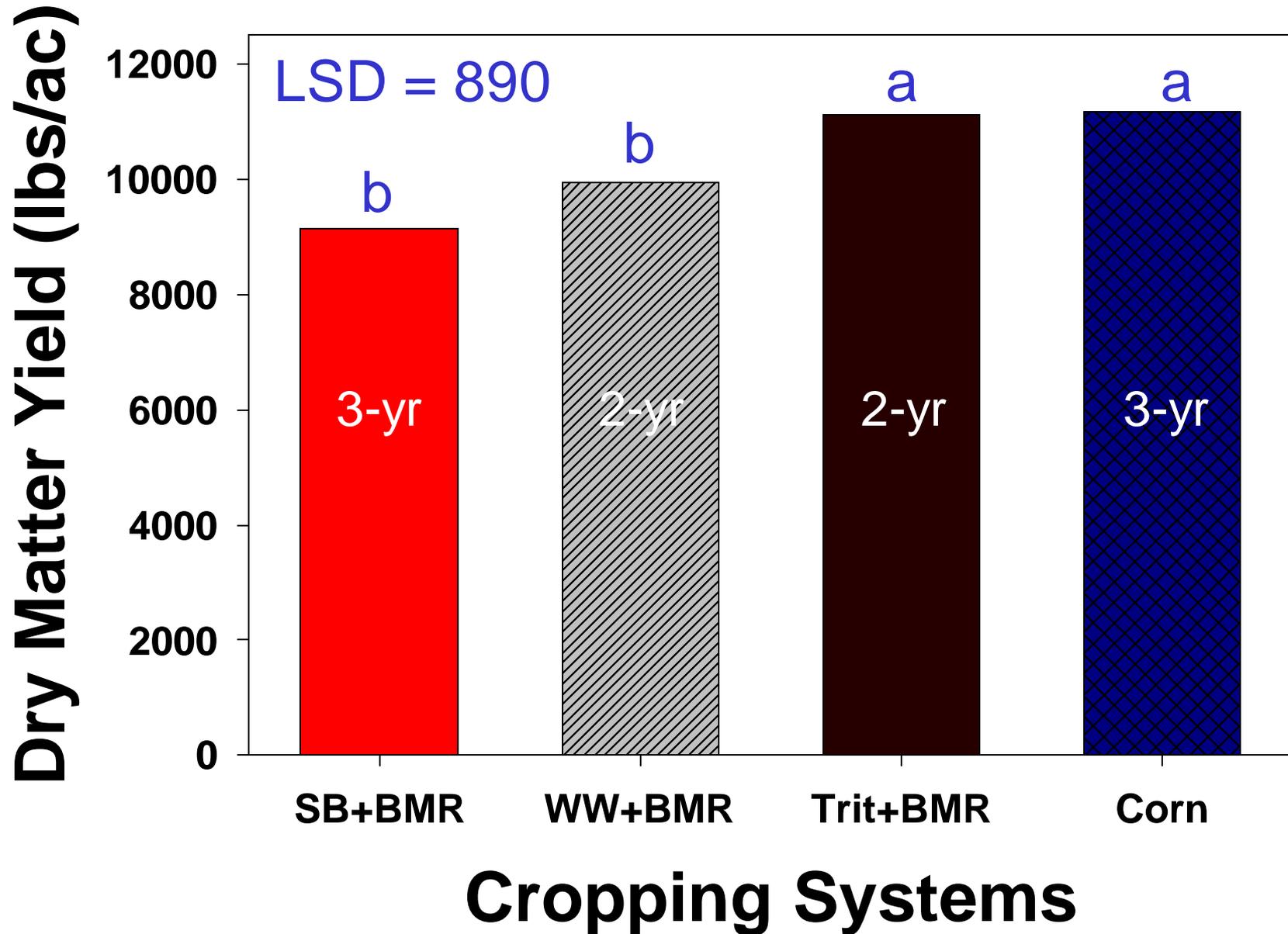
# Cropping System Comparisons

- Spring barley + BMRSS (3-years)
  - Two season double crop (BMR 1 cut max )
- Winter wheat + BMRSS (2-years)
  - four season double crop (2 cut BMRSS possible)
- Triticale + BMRSS (2-years)
  - four season double crop (2 cut BMRSS possible)
- Compare to organic corn silage (3-years)

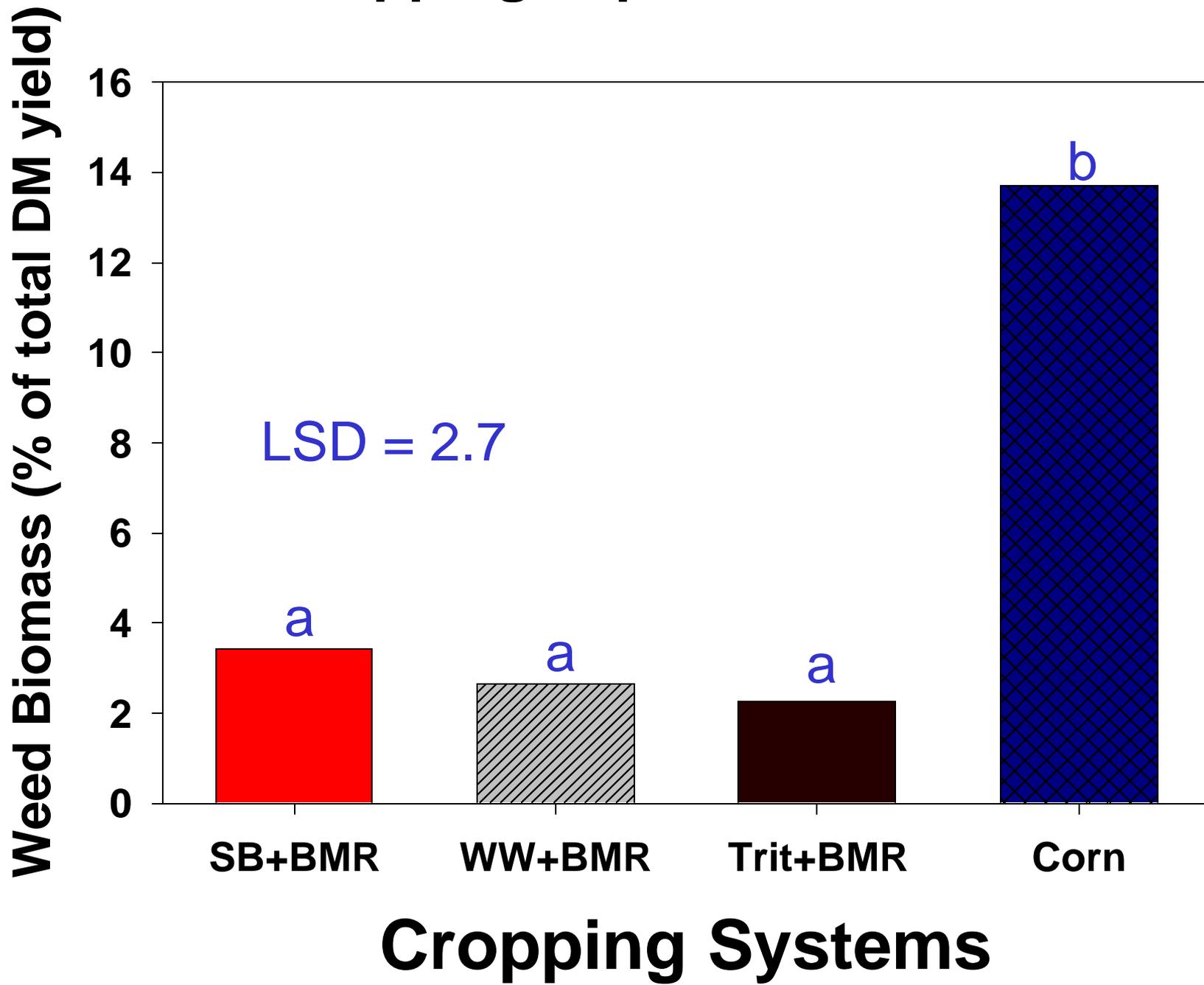
# Cropping System Comparisons

- Yield
- Weed Biomass
- Forage Quality
  - Crude protein, NDF, ADF, TDN, NSC, NEL
  - CP<sub>y</sub>, NDF<sub>y</sub>, ADF<sub>y</sub>, TDN<sub>y</sub>, NSC<sub>y</sub>, and NEL<sub>y</sub>
- Compare to organic corn silage
  - Same criteria

# Yield of Different Cropping Systems



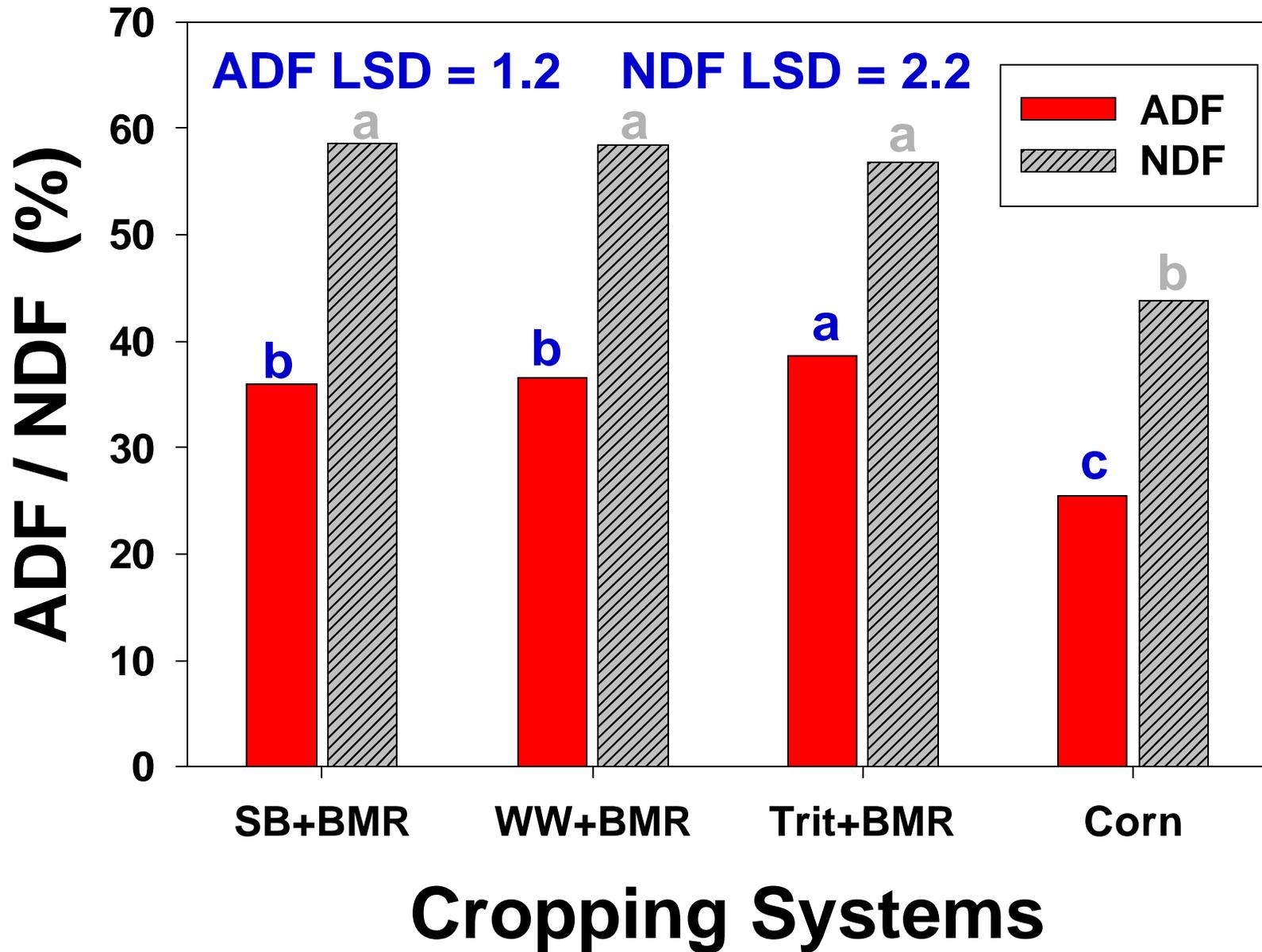
# Double Cropping Impact on Weed Pressure



# Forage Quality

- ADF – measure of cellulose / lignin
  - Relate to forage digestibility – lower better
- NDF – measure of total cell wall
  - As NDF increases – DM intake decreases

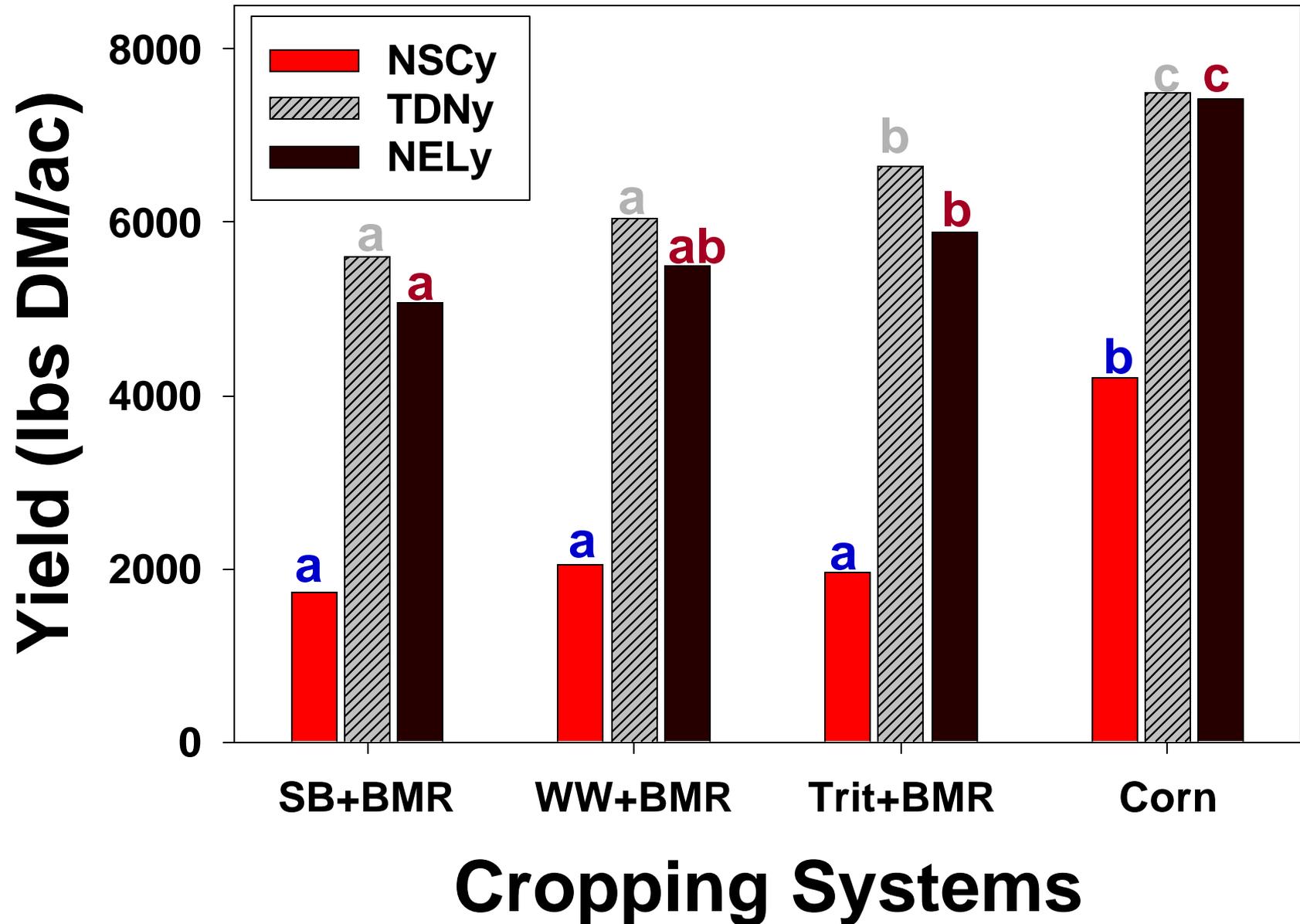
# Double Crop Forage Quality



# Other Forage Quality Measures

<b>Systems</b>	<b>TDN</b>	<b>NSC</b>	<b>NEL</b>
SB+BMRSS	61.4	19.0	0.56
WW+BMRSS	61.4	20.4	0.56
Trit+BMRSS	60.1	17.3	0.53
Corn Silage	67.2	38.6	0.67
LSD-0.05	1.22	2.8	0.02

# Forage Quality Yield



# Lessons Learned

- Corn silage important feed component
- Intensive weed management is essential
- Nothing else provides level of energy
  - Quality or yield
- WW/Triticale + BMRSS yield is good
  - Quality okay ...
- Need to look at winter cereals double cropped with short season corn hybrids



Questions ... ?