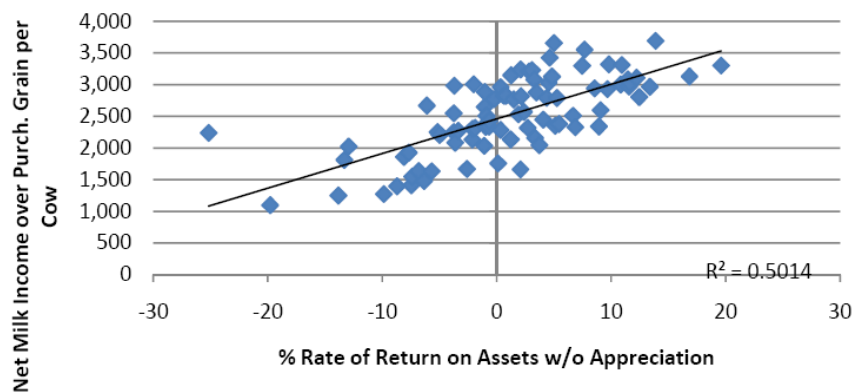


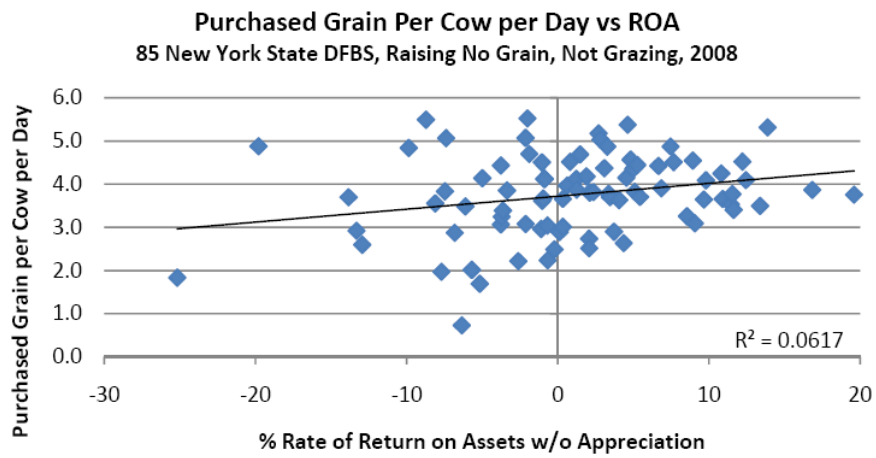
The Financial Impact of High Forage Rations and Modern Crop Rotations

Joe Lawrence, Dairy Forage Systems Specialist – jrl65@cornell.edu
Tom Overton, Professor of Dairy Management – tro2@cornell.edu
Department of Animal Science and PRO-DAIRY
Cornell University

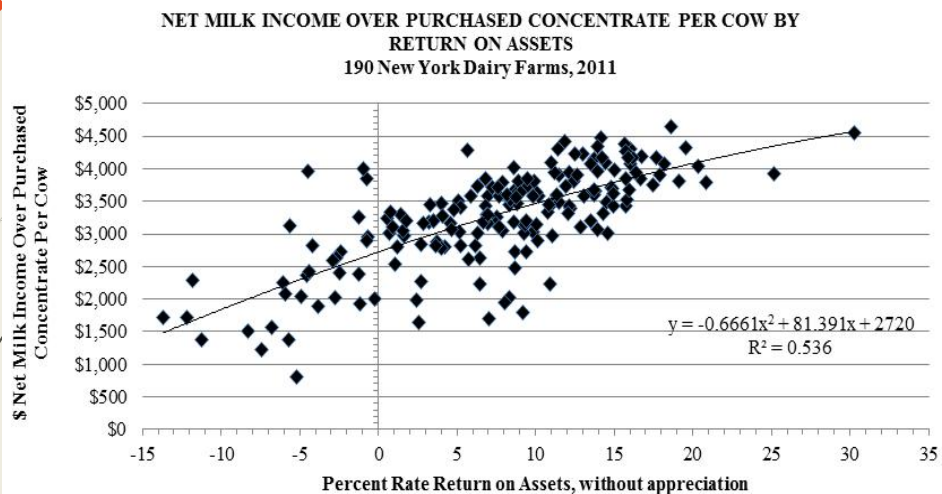
Net Milk Income over Purchased Grain Per Cow vs ROA
85 New York State DFBS, Raising No Grain, Not Grazing, 2008




Karszes, 2009



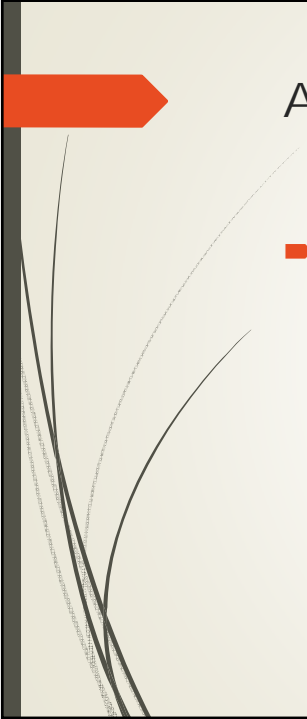
Karszes, 2009






Income over feed cost (IOFC) comparison study

PRO-DAIRY Business Focused
Discussion Group




Approach

- Information collected for August 2014
 - Group production and DMI information (# cows, milk, components, DIM, % heifers, stocking density) for all lactating groups in herd
 - Rations, forage analyses, costs of purchased ingredients
 - Forages and homegrown feeds given standardized costs
 - \$1.25/pt DM haylage; \$1.1/pt DM corn silage (+ 10% for BMR); \$150/ton HMSC; \$120/ton HMEC, \$175/ton grass hay; \$185/ton straw



Approach

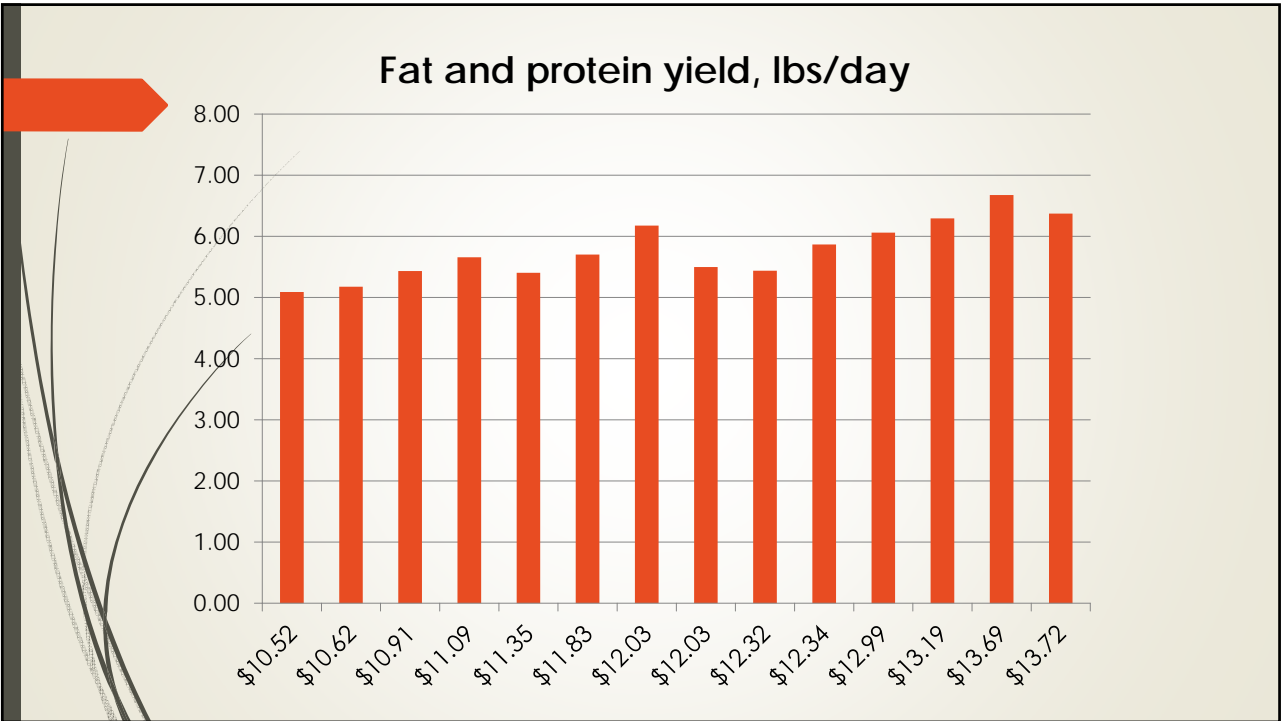
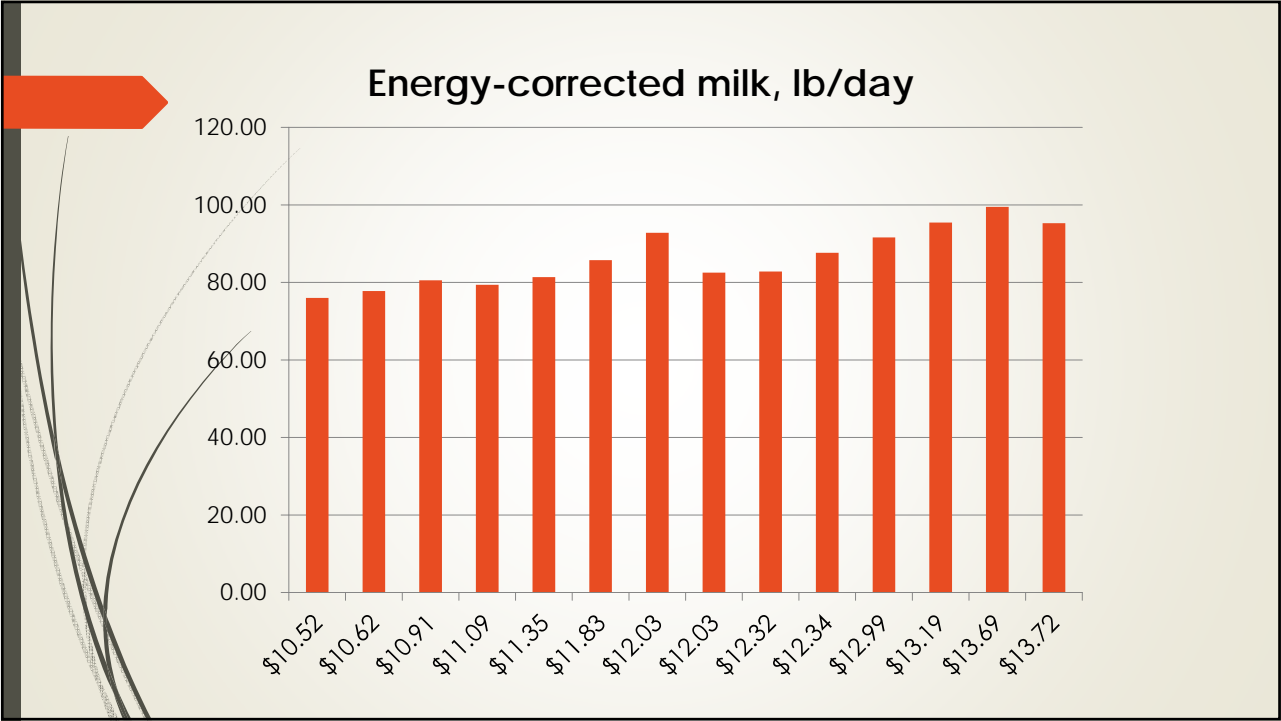
- ▶ All information used to calculate an aggregated single value for each farm for each metrics
 - ▶ Performance and efficiency/cost metrics
- ▶ Outcomes based upon IOFC per cow per day

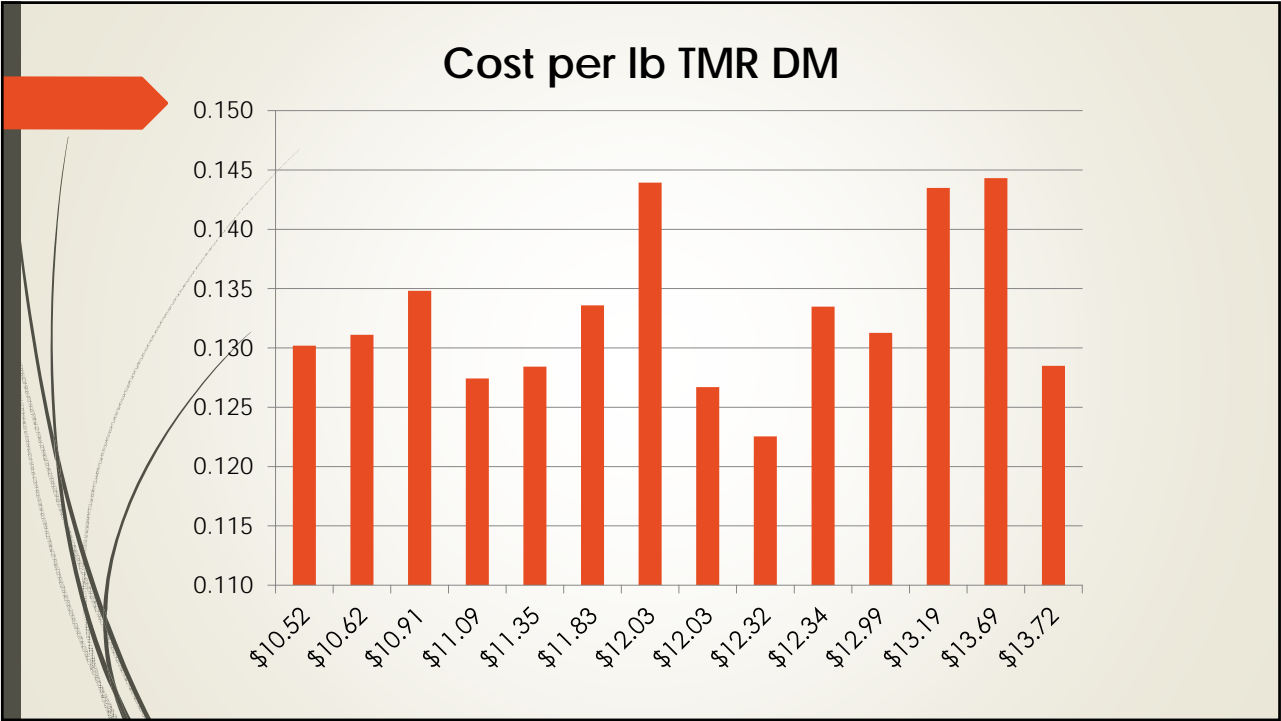
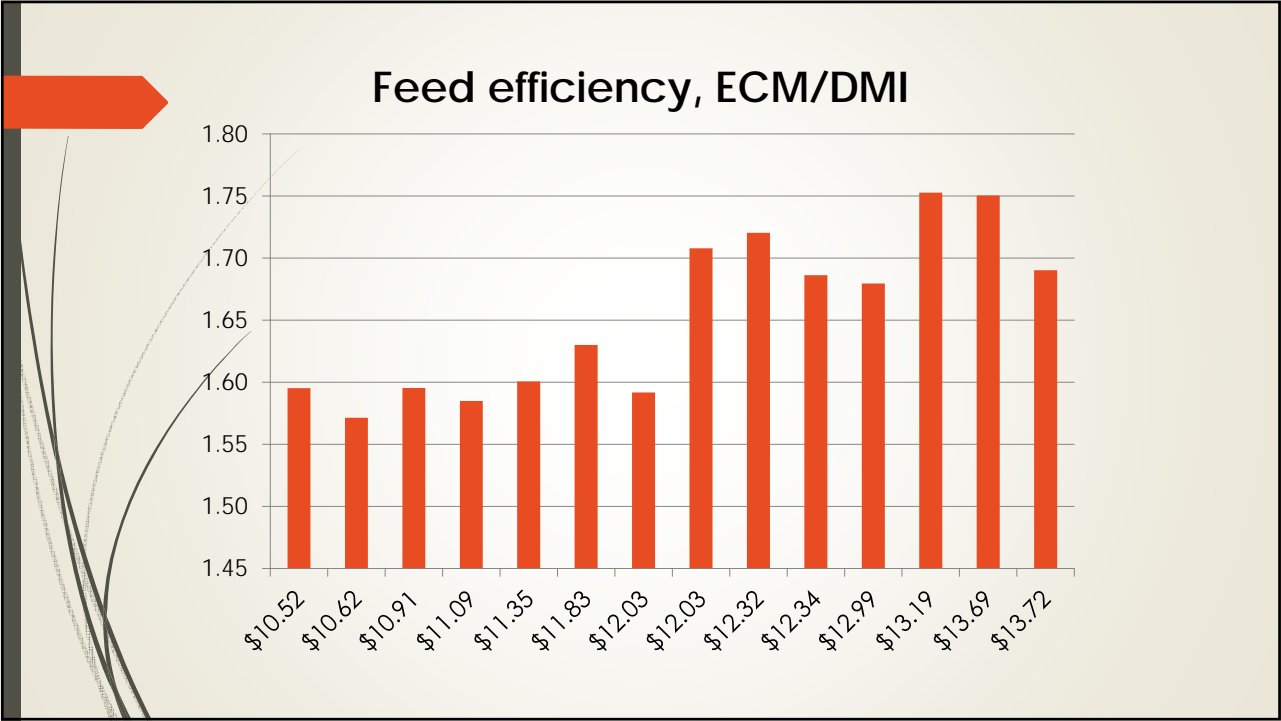
- 
- ▶ September 2012 similar analysis conducted for another discussion group

- ▶ IOFC per cow per day
 - ▶ Average -- \$7.78
 - ▶ Range -- \$6.68 to \$9.66

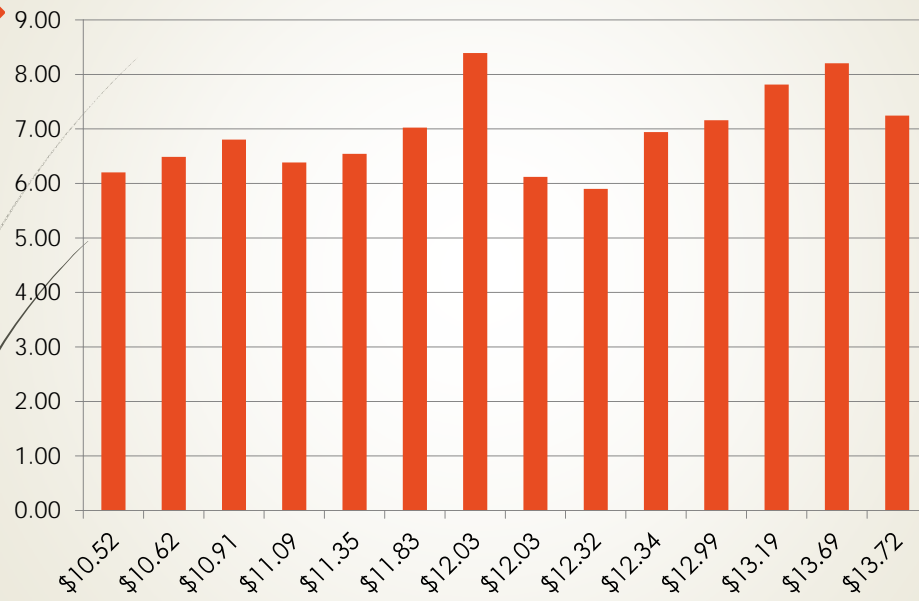
- ▶ August 2014

- ▶ IOFC per cow per day
 - ▶ Average -- \$12.00
 - ▶ Range -- \$10.52 to \$13.72

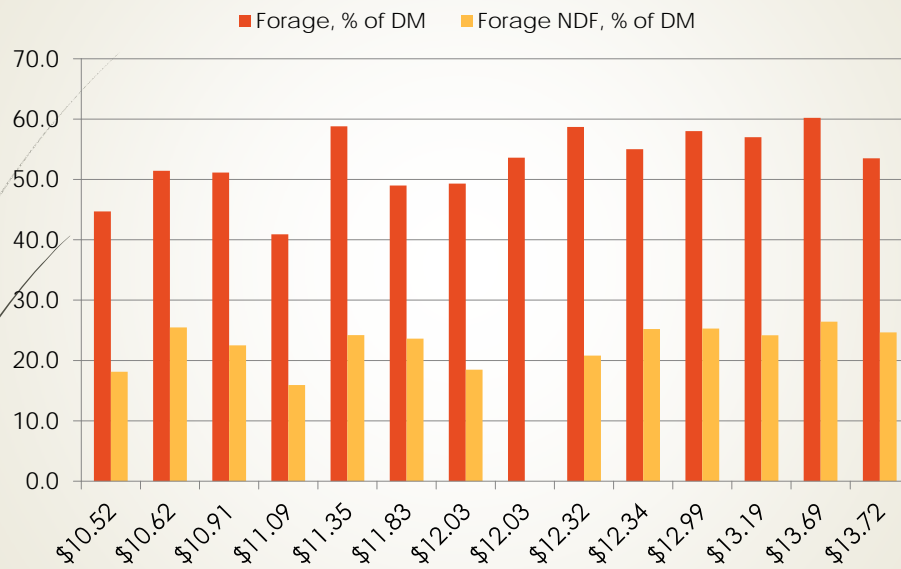




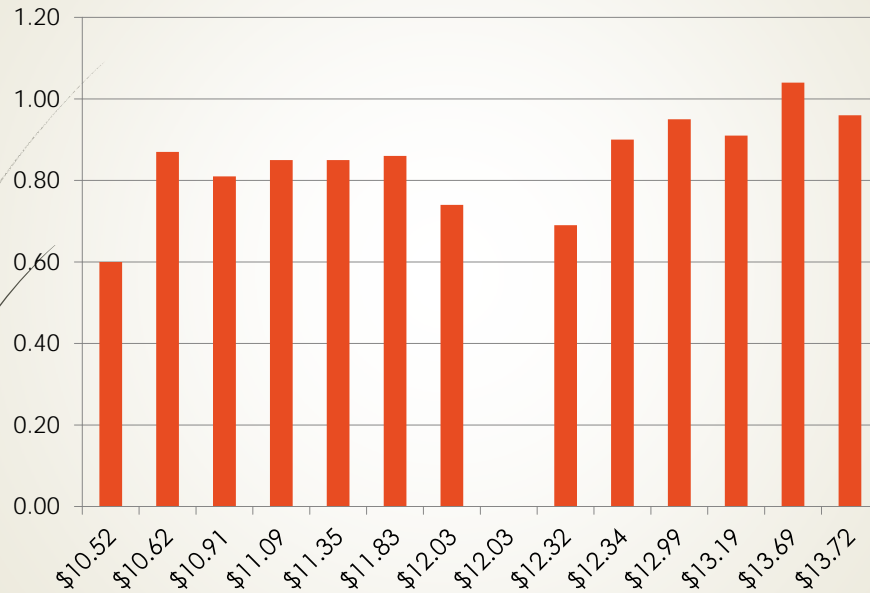
Cost per head per day



Forage % and Forage NDF % of ration DM



Forage NDF intake, % of BW



4 herds with IOFC > \$12.99 per cow per day

	1	2	3	4	Average
High ECM	95.5	95.3	99.5	91.6	95.48
High Fat and Protein per cow per day	6.29	6.37	6.68	6.06	6.35
Higher Feed Efficiency (ECM/DMI)	1.75	1.69	1.75	1.68	1.72
Higher cost/cow per day	7.81	7.24	8.2	7.16	7.60
Lower stocking density, % of stalls	101	108	79	105	98
Higher Forage NDF intake, % of BW	0.91	0.96	1.04	0.95	0.97
Similar milk fat %	3.59	3.96	3.94	3.7	3.80
Similar milk protein %	2.91	3.05	3.09	2.99	3.01
Slightly higher cost per lb DM	0.143	0.128	0.144	0.131	0.137

3 herds with IOFC < \$11.00 per cow per day

	1	2	3	Average
Lower ECM	77.8	80.5	76	78.10
Lower Fat and Protein per cow per day	5.18	5.43	5.09	5.23
Lower Feed Efficiency (ECM/DMI)	1.57	1.6	1.6	1.59
Lower cost/cow per day	6.49	6.8	6.2	6.50
Higher stocking density, % of stalls	132	115	94	114
Lower Forage NDF intake, % of BW	0.87	0.81	0.6	0.76
Similar milk fat %	4.08	3.84	3.76	3.89
Similar milk protein %	2.94	3.14	3.11	3.06
Slightly lower cost per lb DM	0.131	0.135	0.13	0.132



Home grown forages

Offers favorable **Income over Feed Cost** with financial and production resiliency.

Achieved through:

- Crops and cropping systems that fit resources & management
- Forage (types & quality) that match herd needs
- Tight management of:
 - Production cost
 - Harvest schedules
 - Feed shrink
- Ability to routinely achieve targets
 - Optimization of Yield & Quality
 - Crop Stage at Harvest



Production Cost

Crop production carries a large number of fixed cost so it is vital to optimize returns on these inputs.

- Field preparation
- Seed*
- Plant Nutrients*
- Planting
- Harvest*
- Storage*

*These cost are significantly fixed though there will be some variability with yield

Production Cost

Yield per acre and crop stage at harvest significantly influence cost per ton of forage dry matter.

Table 6. Impact of yield and dry matter (DM) percentage on cost per ton of dry matter for corn silage produced at a cost of \$568 per acre.

Silage Moisture (% DM silage)	Yield=10 tons/acre	Yield=15 tons/acre	Yield=20 tons/acre
	\$ per Ton DM		
28	217	145	109
33	184	123	92
35	174	116	87
38	160	107	80

Source: Calculated by the authors from the NCSU corn silage enterprise budget.

<https://content.ces.ncsu.edu/forage-economics>

Focus on what has impact

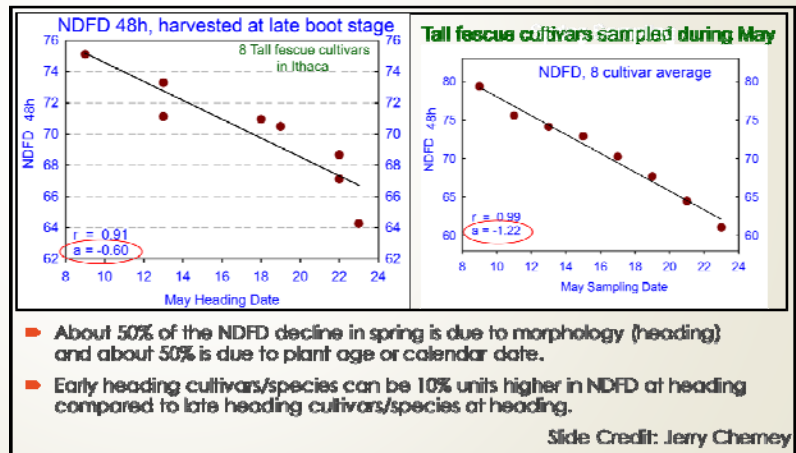
Major Factors Affecting Forage Quality

1. Maturity (harvest date)
2. Crop Species
3. Harvest and storage
4. Environment (climate)
5. Soil fertility
6. Variety (cultivar)

- Dr. Marvin Hall, Penn State Forage Specialist

Focus on what has impact

Fiber Digestibility and Harvest Timing



Focus on what has impact

Seed Cost

A high quality alfalfa and premium grass could have seed cost \$80-100 per acre greater than an average alfalfa and grass but this should not deter a grower from choosing the high quality option as the value more than makes up for the added cost.

- Jerry Cherney, 2017 Oneida Co Crop Congress

- Average alfalfa + Timothy: \$80-100/acre
- Low Lignin Alfalfa + Meadow Fescue: \$170-190/acre

Focus on what has impact

Good Silage Management

	Losses w/ Good Management		Losses w/ Poor Management	
	Hay	Corn	Hay	Corn
Value Lost	\$11,204	\$8,572	\$18,649	\$14,992
Total		\$19,776		\$33,571

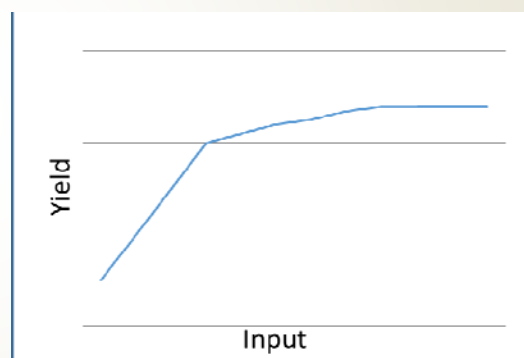
- 100 cow herd with replacements
- Hay Silage Value = \$125/TDM Corn Silage Value = \$100/TDM

Source U. of Wisconsin Team Forage

Focus on what has impact

Law of Diminishing Return

- Fertilizer
- Seeding rates
- Years of production



Focus on what has impact

Fertility Management

- 4 R's
 - Right Place
 - Right Time
 - Right Source
 - Right Rate
- Example
 - 1st year corn after sod
 - N in the starter band = Yes
 - Additional N beyond Starter: No

1st yr Corn after Sod

On-farm Trials			
N Sidedress Rate	Silage Yield (35% DM)	Milk per ton	
lbs N/acre	tons/acre	lbs/ton	
0	21.7	a	3193 a
50	22.2	a	3234 a
100	22.4	a	3214 a
150	22.4	a	3211 a

Research Station Trials			
N Sidedress Rate	Silage Yield (35% DM)	Milk per ton	
lbs N/acre	tons/acre	lbs/ton	
No Starter	19.6	b	3199 a
0	21.1	ab	3195 a
50	21.5	a	3257 a
100	22.6	a	3194 a
150	22.1	a	3168 a

A Resilient System

Dairies have a great opportunity in their cropping system to build a high level of resiliency.

- Financial & Production Resiliency:
 - Control production cost
 - Buffer input cost volatility
 - Buffer weather extremes
 - Buffer environmental impact
- Achieved through:
 - Nutrient Management
 - Soil Health
 - Crop Diversity
 - Careful assessment of land productivity

Long Term Rotation Study in CNY

Treatments

- Fertilizer only
- Manure Solids
 - Low Rate
 - High Rate
- Manure Liquid
 - Low Rate
 - High Rate

- All treatments applied during corn years, no manure during alfalfa years

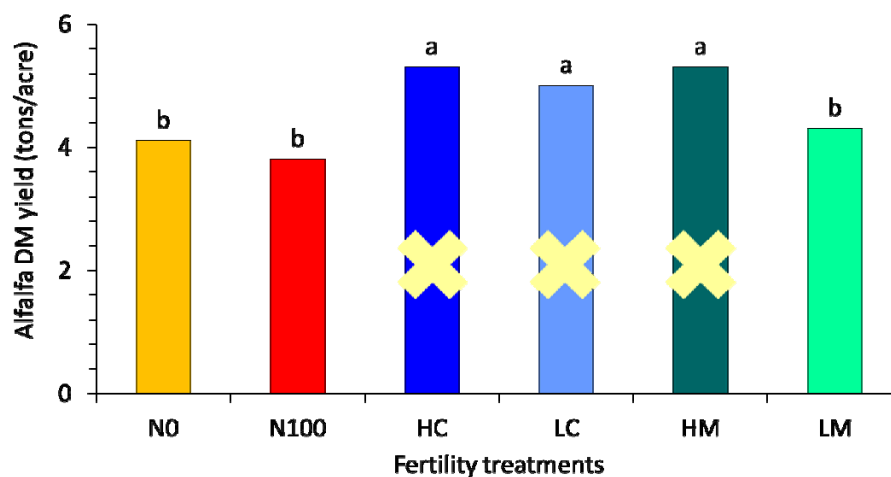
Experimental Site



Slide Credit: Czymmek, Sadeghpour, Ketterings, Nutrient Management Spear Program

Alfalfa DM Yield (Avg. 2006-2010)

Clear benefit of compost and high rate of manure on alfalfa yield.

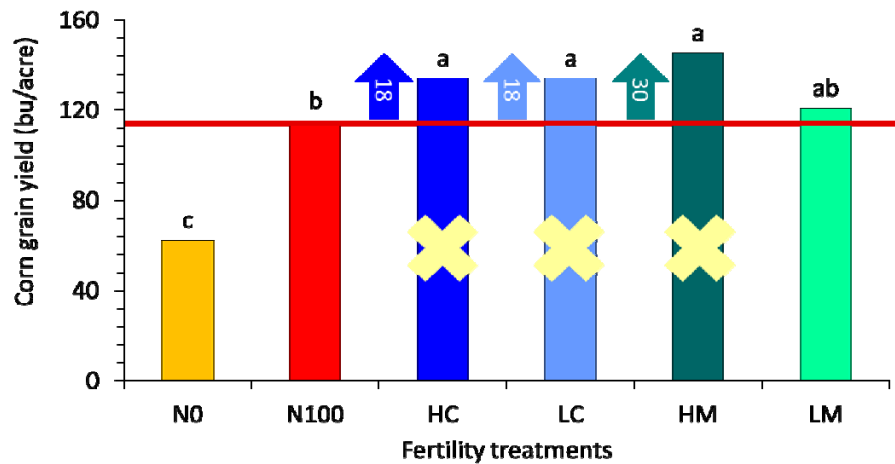


Slide Credit: Czymmek, Sadeghpour, Ketterings, Nutrient Management Spear Program

Corn Grain Yield (2015)



Clear benefit of a resilient soil under severe weather conditions.



Slide Credit: Czymbek, Sadeghpour, Ketterings, Nutrient Management Spear Program

Thank You!



Cornell University PRO-DAIRY

<http://pro dairy.cals.cornell.edu/>