
Pricing Corn Silage for Sale

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<http://corn.agronomy.wisc.edu/Extension/CC04>

Overview

- Perspectives on Corn Silage Value
- Materials and Methods
- Biology of Corn Silage Quality
 - ✓ Energy Pools
 - ✓ Grain = Starch
 - ✓ Stover = NDF digestibility
- Pricing Corn Silage
 - ✓ Grain equivalents
 - ✓ Silage Value = Base price + Starch + NDFD
 - ✓ RFQ
- Comparison of methods

Perspectives on Corn Silage Value

Corn Producer

- Relative to other forages:
 - ✓ Higher yield
 - ✓ Less labor to produce
 - ✓ Less machinery time
 - ✓ Cost per ton of dry matter is lower
 - ✓ Flexibility, dual purpose
 - ✓ Few established markets
- Relative to corn grain:
 - ✓ Greater nutrient removal
 - ✓ Greater handling & hauling cost
 - ✓ Narrow harvest window
 - ✓ Difficult to achieve conservation requirements on HEL ground

Dairyman

- Relative to other forages
 - ✓ More consistent quality
 - ✓ Very palatable forage
 - ✓ Higher energy content
 - ✓ Manure application
 - ✓ Lower protein
- Relative to corn grain
 - ✓ Higher transportation costs
 - ✓ Expensive storage facilities
 - ✓ Greater storage losses
 - ✓ Few established markets
 - ✓ Maturity and kernel processing

Perspectives on Corn Silage Value

– How is it currently valued?

- Corn silage value = relative feed value of a known market such as corn grain or baled hay
 - ✓ Silage (\$/T) = $\frac{1}{4}$ to $\frac{1}{2}$ value of hay
 - ✓ Silage (\$/T) = 6 to 8 times corn price if in field, 10 times corn price if harvested. i.e. 40% DM \rightarrow 8 x \$2.00 per bu = \$16 per T; 30% DM = 6x
 - ✓ Lower rate for higher forage moisture.
- Corn silage value = what it would cost to replace or substitute another feed.
 - ✓ Calculated using market prices for energy, protein, and digestibility as measured by NE_L , crude protein and NDF. Prices of corn, soybean meal, and legume hay can be used.
 - ✓ Calculated using other feed sources such as clover, alfalfa, lespedeza, ryegrass, etc.
- Corn silage value = contracted price agreed upon between grower and buyer that is above the cost of production (\$275 to \$325 per acre)

Silage Price is Affected by:

- Dry matter content
- Harvesting costs
- Availability and price of alternative feeds
- Hay and hay crop silage can be substitutes for corn silage
- Corn grain price
- Soybean meal price – corn silage requires supplement of protein feeds.

“The Common Ground”

Desirable Forage Characteristics

- What makes a good forage? (Carter et al., 1991)
 - ✓ High yield
 - ✓ High energy (high digestibility)
 - ✓ High intake potential (low fiber)
 - ✓ High protein
 - ✓ Proper moisture at harvest for storage
- Ultimate test is animal performance
 - ✓ Milk2000 is our best predictor for performance (Schwab - Shaver equation)

Perspectives on Corn Silage Value

- Milk per acre and yield are best for determining value and cost of production from the producer perspective
- Milk per ton is best for determining value from the dairyman perspective

Animal Performance Differences

- Little animal performance data available on various hybrid and management differences and what those differences might mean economically.
 - ✓ Hybrid turnover
- Dairy nutritionists have different views on importance of corn silage fiber.
- Recent NCR guidelines have established importance of NDFD (CWD) in formulating dairy rations.

Materials and Methods

- Sought a data set with a wider range for yield
 - ✓ Changing technologies (hybrids)
 - ✓ Numerous environments (1997-2002)
 - ✓ Plant density
 - ✓ Planting date
 - ✓ Row spacing
 - ✓ Interactions
 - ✓ Numerous locations
- Split-plots:
 - ✓ 4 rows → silage
 - ✓ 4 rows harvested later → grain
- Description of data matrix

Description of Data Matrix used for Calculating Relationships for Corn Silage Value (n=1458)

Location	Trial	N	2002	2001	2000	1999	1998	1997
Arlington, WI	02PD	292	36	54	44	38	79	41
Arlington, WI	03DOP	239	36	30	30	48	47	48
Arlington, WI	04PDxDOP	269	53	36	36	36	72	36
Arlington, WI	06PDxRS	172	24	24	32	30	32	30
Ashland, WI	03DOP	46					46	
Fond du Lac, WI	06PDxRS	64				32	32	
Hancock, WI	03DOP	91				44	47	
Marshfield, WI	03DOP	92				47	45	
Sparta, WI	06PDxRS	12					12	
Sparta, WI	WOFT	24						24
Spooner, WI	03DOP	95				47	48	
Valders, WI	06PDxRS	62				30	32	

Biology of Corn Silage Quality

Corn Silage Energy Pools

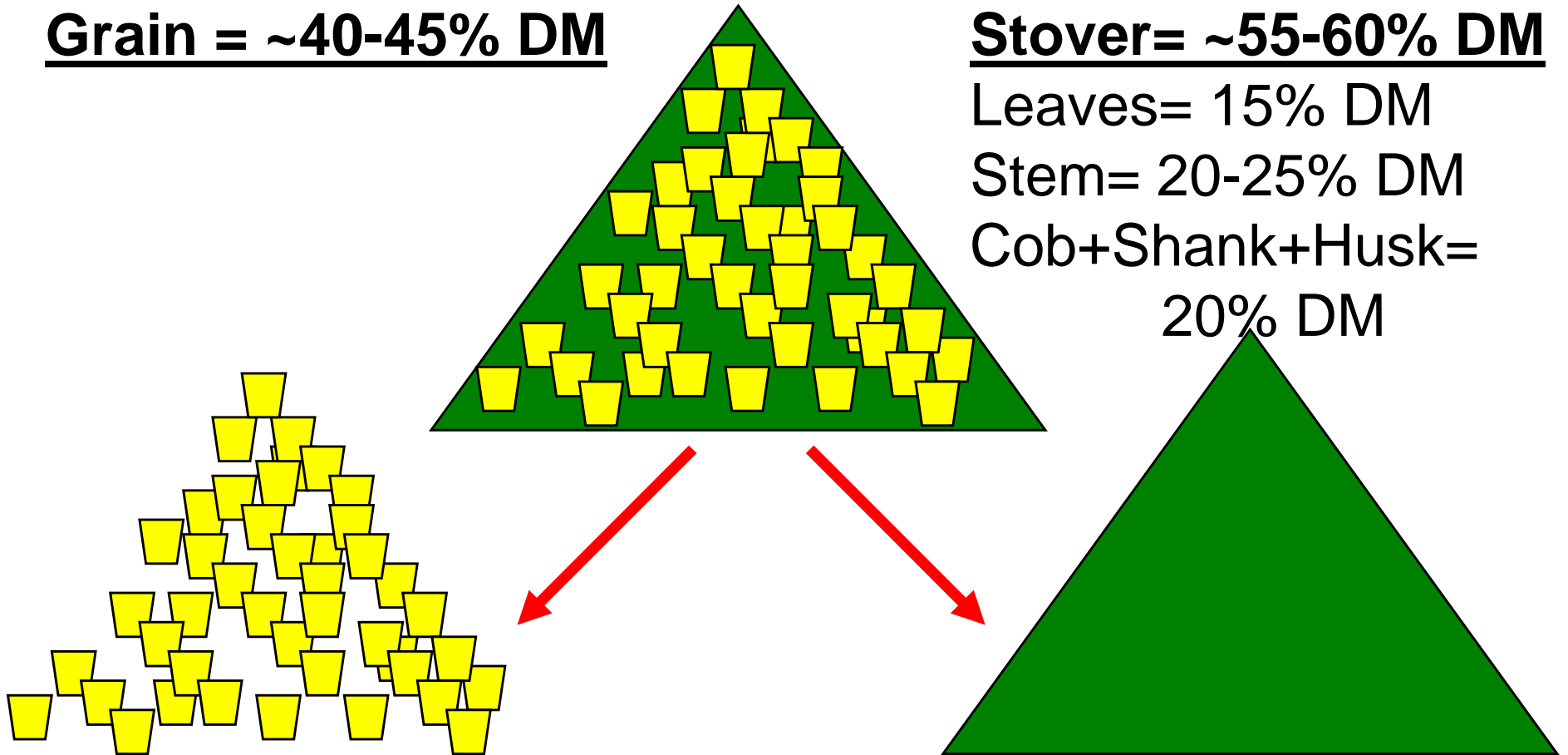
Grain = ~40-45% DM

Stover = ~55-60% DM

Leaves = 15% DM

Stem = 20-25% DM

Cob+Shank+Husk =
20% DM



80 to 100% digestible

- Kernel maturity
- Starch digestibility

40 to 55% digestible

- Cell wall digestibility

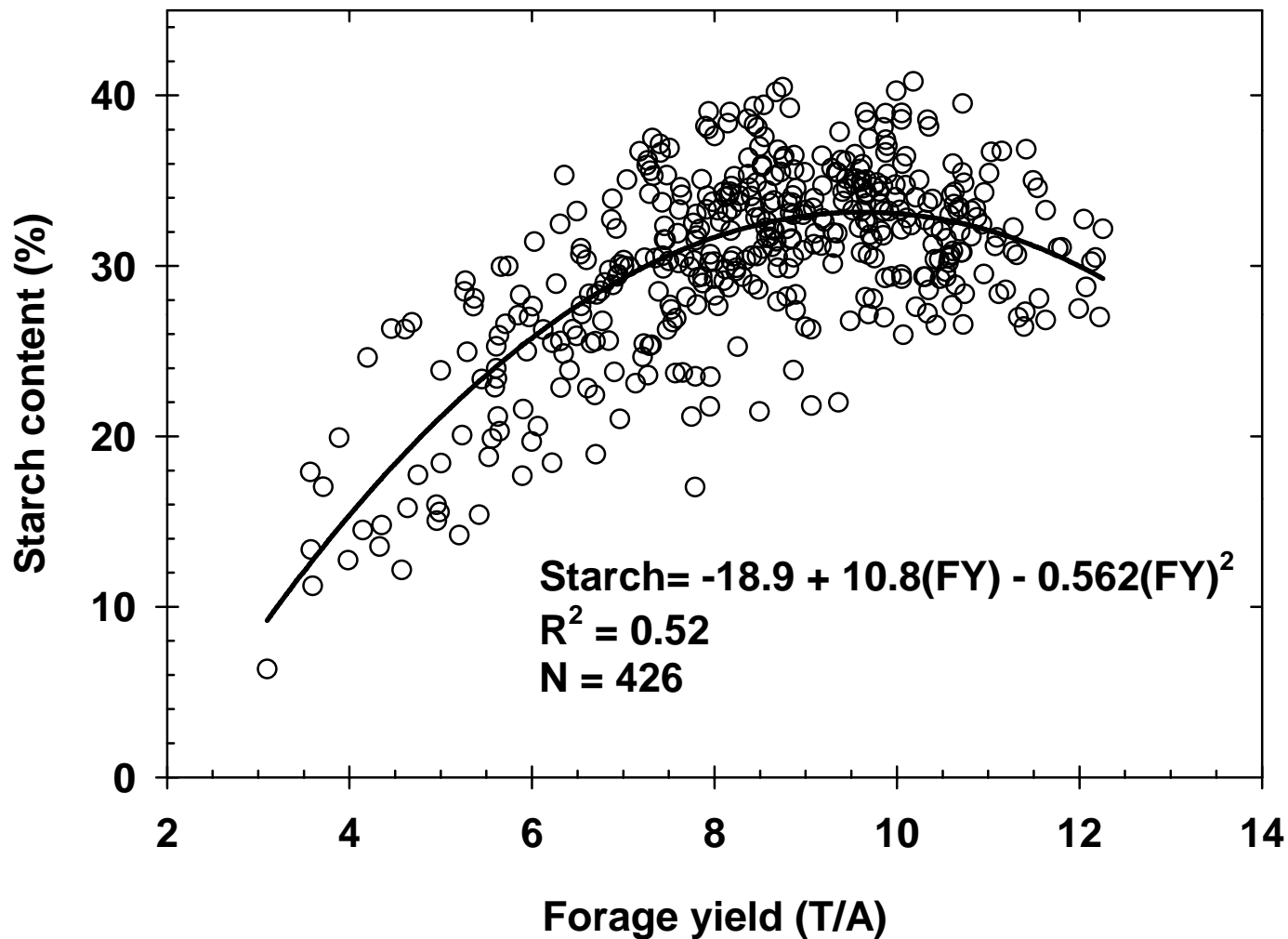
What does an average corn silage hybrid look like in WI?

Trait	Split-plot data set (1997-2002 n=37 trials)	UW Silage Trials (1995-2003 n=121 trials)
Yield (T/A)	8.4	7.9
Moisture (%)	60	62
Kernel milk (%)	34	45
Crude protein (%)	7.0	7.3
ADF (%)	23	24
NDF (%)	45	46
IVD (%)	82	82
NDFD (%)	60	62
Starch (%)	30	31
Milk per Ton (lb/T)	3420	3490
Milk per Acre (lb/A)	28900	27500

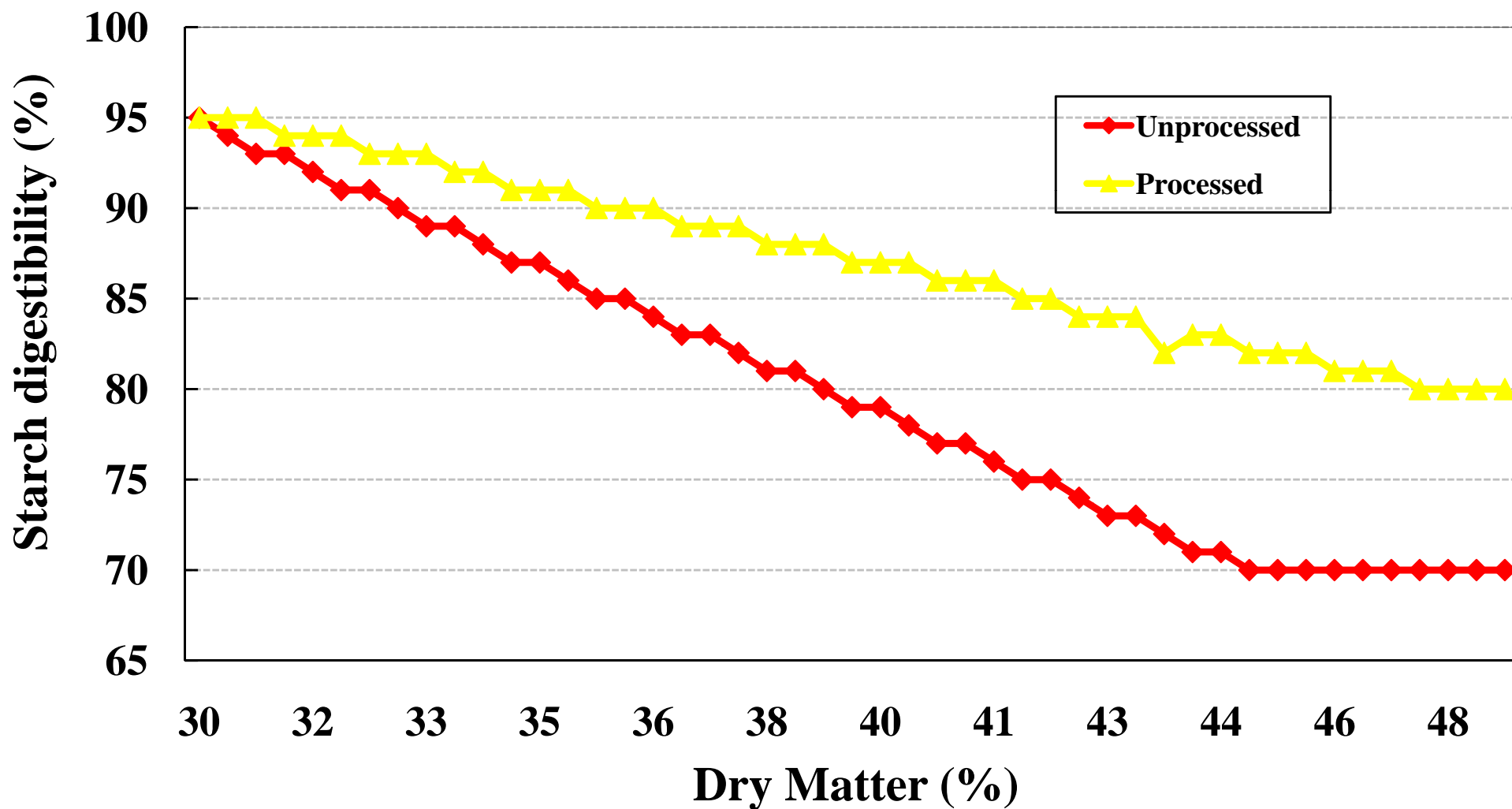
The Starch Pool

- Assume corn is about 72% starch on a dry matter basis
- Value of starch (grain) pool
 - ✓ Kernel maturity
 - ✓ Starch vitreousness
- Grain:stover ratio (starch content)
 - ✓ Influenced by hybrid, environment and management
 - ✓ Managing corn for silage should be the same as corn for grain.

Relationship between corn starch content and forage yield (1997-2002)



Value of Grain – Predicted Total Tract Starch Digestibility

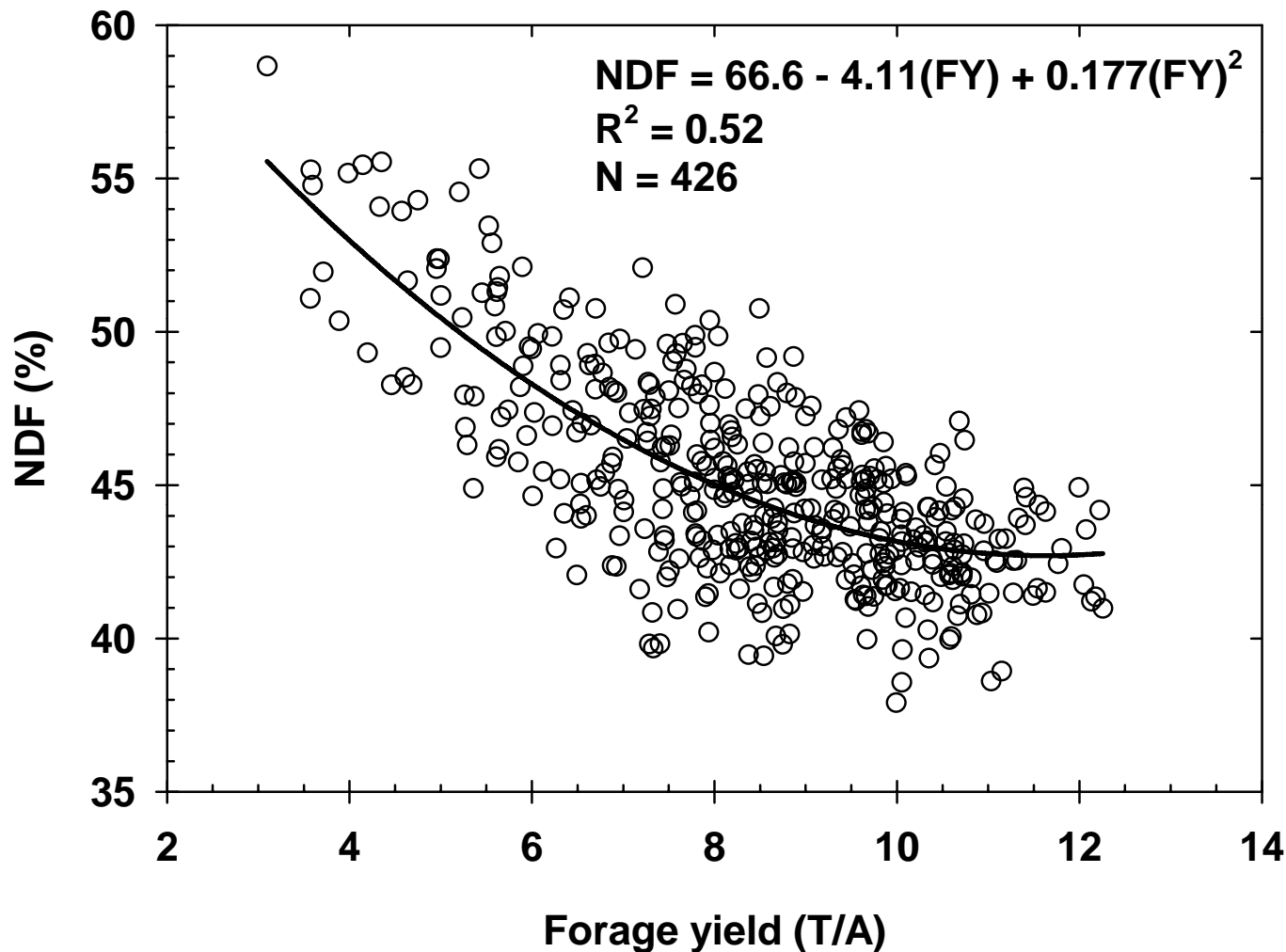


*Based on data of Bal et al., 2000; Dhiman et al., 2000); Rojas-Bourrillon et al.1987

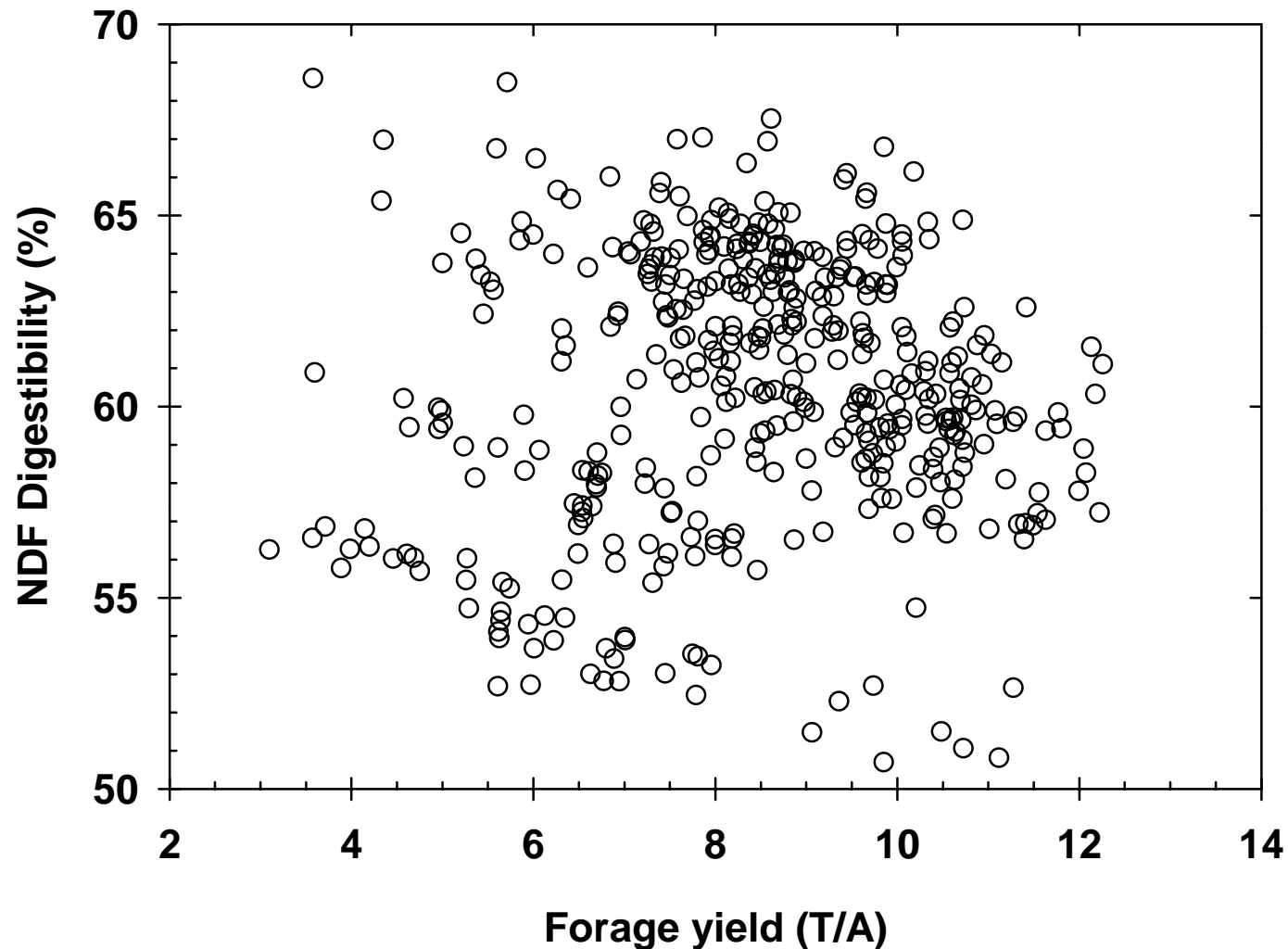
The Stover Pool

- Value of stover pool
 - ✓ bmr versus all other
- Differences in the value of corn silage comes down to the value of the stover as perceived by the dairyman.
- How many tons do you handle?
Handling, hauling and storage costs
 - ✓ Bmr: 1 Ton = 3100 lbs milk
 - ✓ Leafy: 1 Ton = 2700 lbs milk
- Currently not important to most dairyman
- Becomes more important as dairies become larger.
 - ✓ Handling costs
 - ✓ Less manure to handle??

Relationship between corn NDF and forage yield (1997-2002)

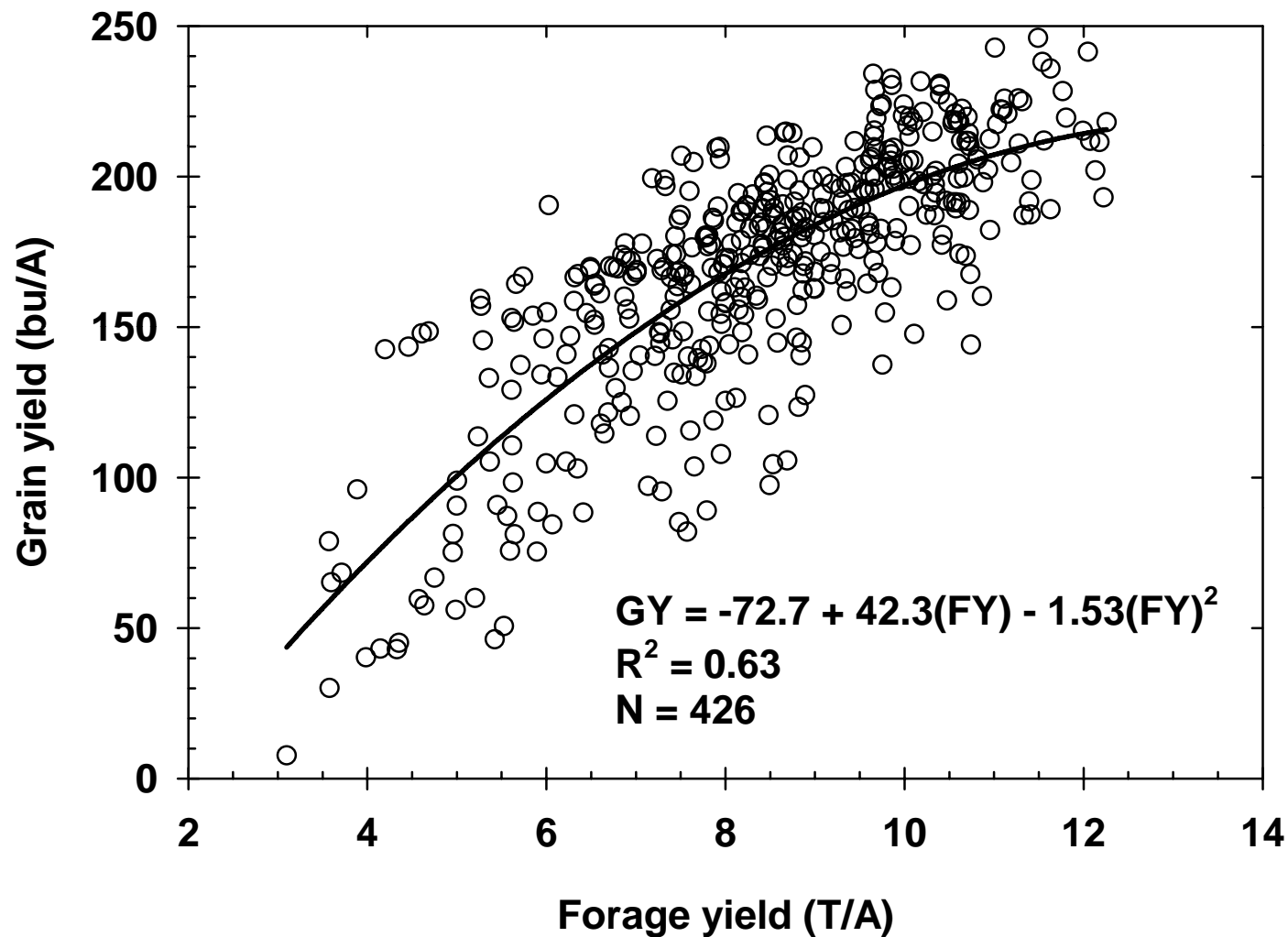


Relationship between corn NDF digestibility and forage yield (1997-2002)



Pricing Corn Silage

Relationship between corn grain yield and forage yield (1997-2002)



Bushels of grain contained in a ton of corn silage (1997-2002 n=426)

Grain yield Bu/A	<u>Silage at 0% moisture</u>		<u>Silage at 65% moisture</u>	
	Silage yield T/A	Grain equivalent per ton of silage Bu/T	Silage yield T/A	Grain equivalent per ton of silage Bu/T
25	2.5	9.8	7.3	3.4
50	3.3	15.2	9.4	5.3
75	4.1	18.3	11.7	6.4
100	5.0	20.1	14.2	7.0
125	6.0	21.0	17.0	7.3
150	7.1	21.2	20.2	7.4
175	8.4	20.8	24.1	7.3
200	10.3	19.5	29.3	6.8

Pricing Corn Silage Linn (Minnesota)

Silage value (\$/T) =

Base price + Starch adjustment + NDFD adjustment

- Base price = Cost of production
 - ✓ \$60 per DM Ton
- Starch adjustment =
 $(\text{starch}\% - 29\%) \times (0.5 \text{ bu/starch}) \times (\text{corn price } \$/\text{bu})$
 - ✓ 29% = average starch content of corn derived from Dairyland Labs
 - ✓ 0.5 bu/T = 1% change in starch content
- NDFD adjustment =
 $(\text{NDFD}\%) \times (0.6 \text{ lb milk/NDFD}) \times (\text{milk price } \$/\text{lb})$
 - ✓ 0.6 lb milk = 1% NDFD derived from Allen (48-hr digestion)

Changes in corn silage value using Minnesota approach.

Base price = \$60/T DM, corn price = \$2.20/bu, milk price = \$0.135/lb

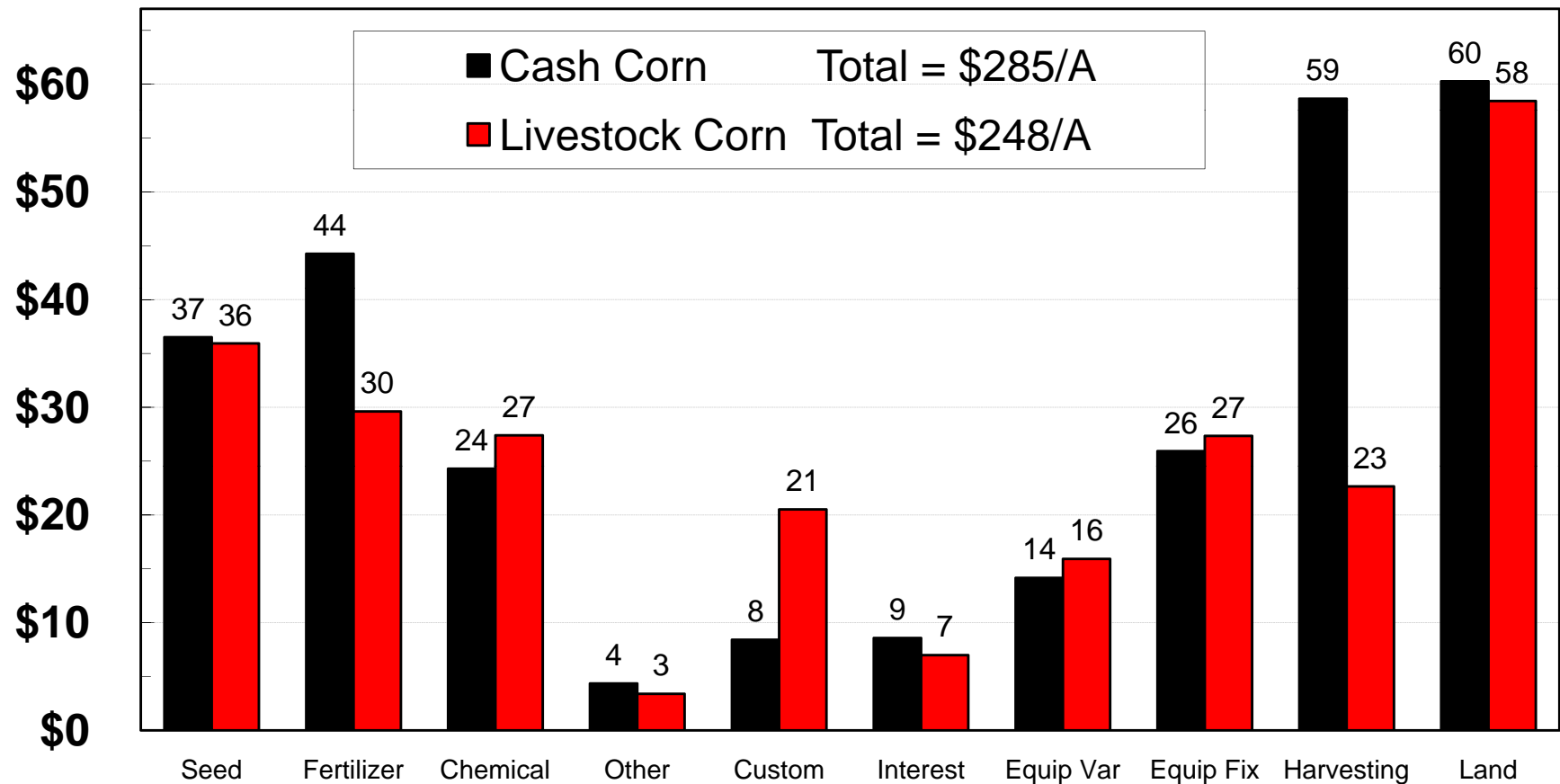
Starch % DM basis	NDFD(%)					
	49	53	57	61	65	69
Corn silage value, \$/ton DM						
20	54.07	54.39	54.72	55.04	55.37	55.69
23	57.37	57.69	58.02	58.34	58.67	58.99
26	60.67	60.99	61.32	61.64	61.97	62.29
29	63.97	64.29	64.62	64.94	65.27	65.59
32	67.27	67.59	67.92	68.24	68.57	68.89
35	70.57	70.89	71.22	71.54	71.87	72.19

Cost of Corn Silage Production in Wisconsin

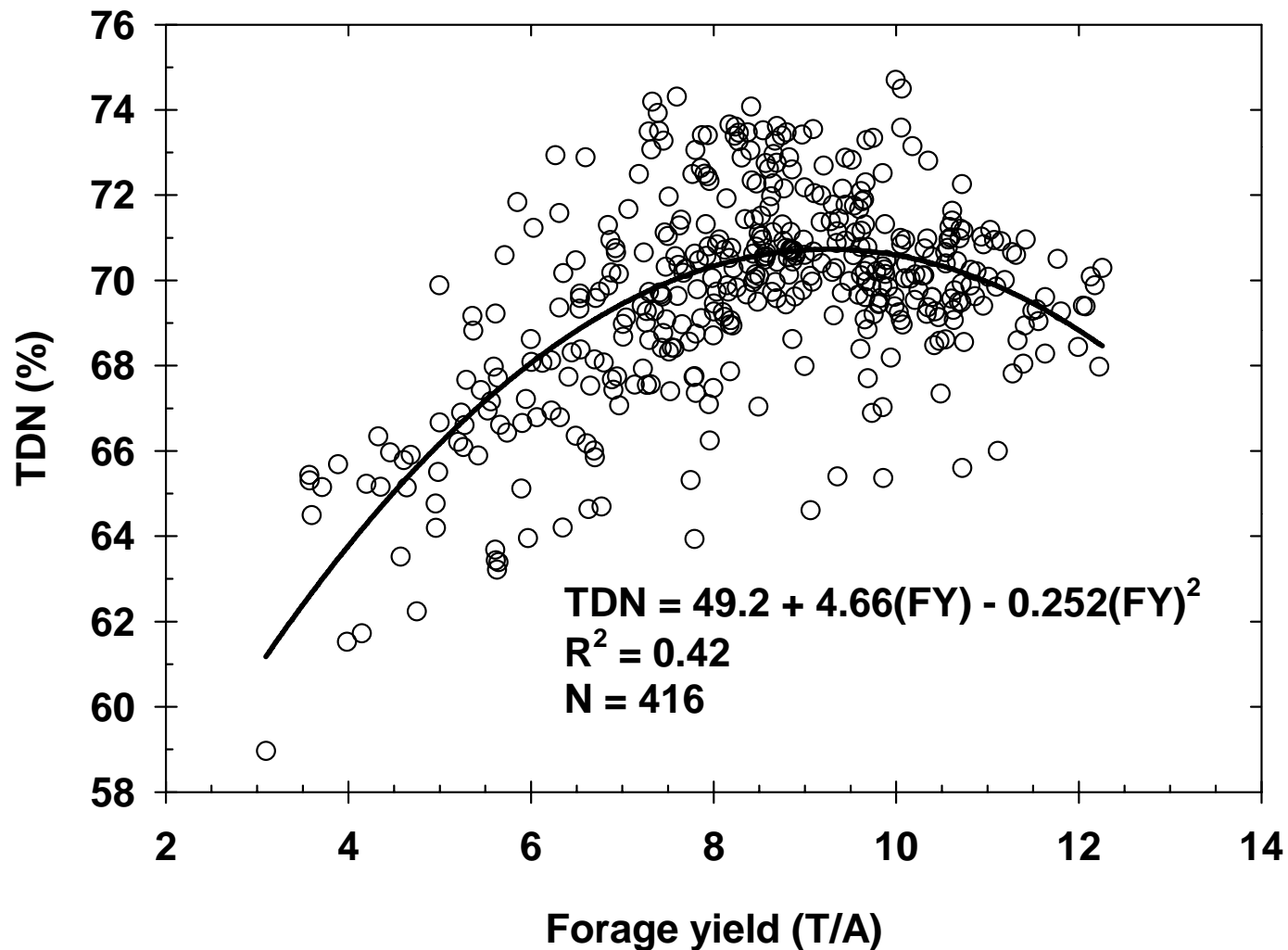
- Typical harvesting costs \$5/T in the field (total ~\$100/A).
- Potassium ($K_2O = \$0.14/lb$) removal of stover (90 lb/A = \$12.60/A)
- Moisture considerations
- Handling, hauling and storage costs of silage harvest differ from grain harvest

Average Division Production Costs For Farmers in PEPS (1999-2003)

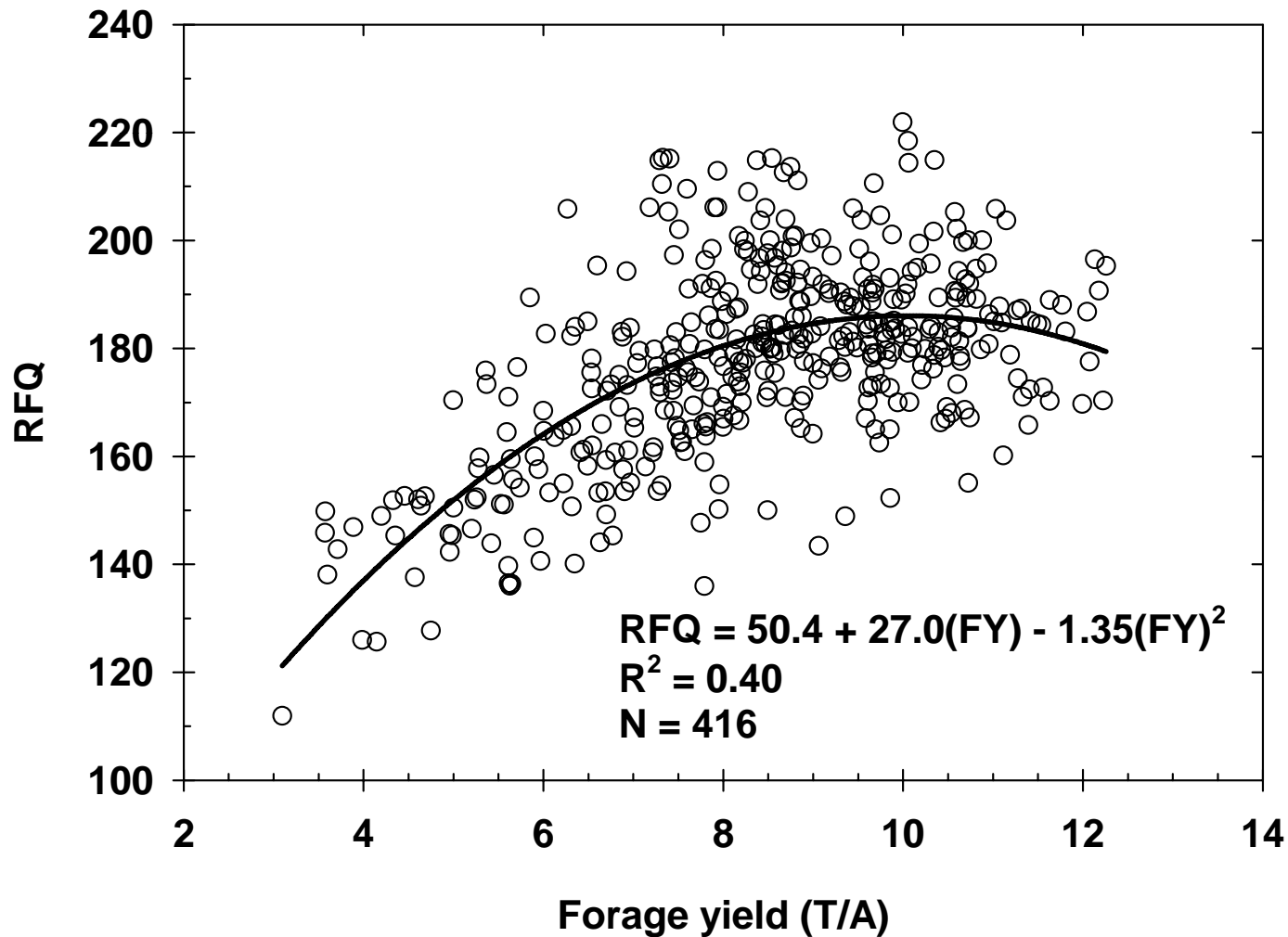
Cost (\$/A)



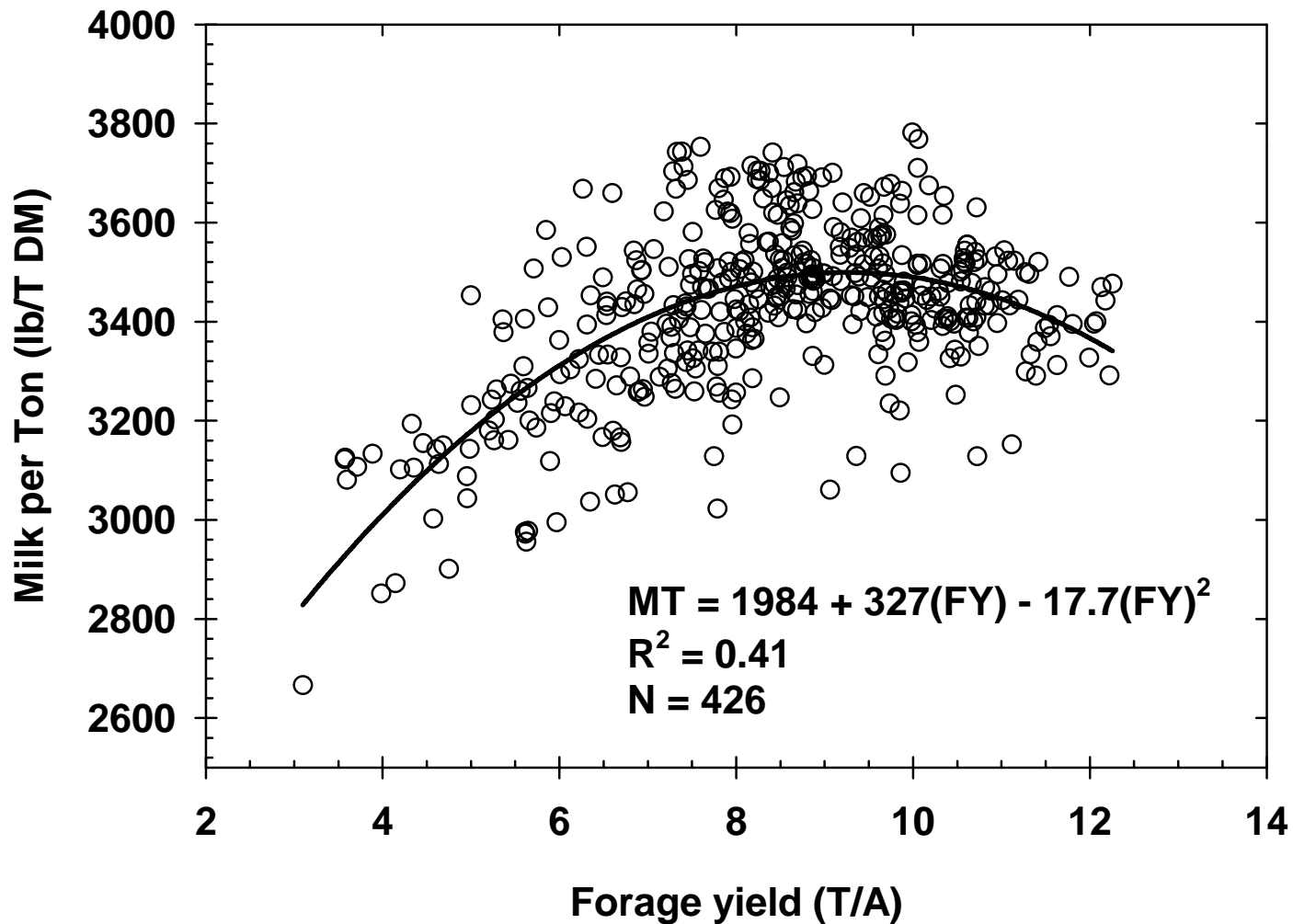
Relationship between corn total digestible nutrients and forage yield (1997-2002)



Relationship between corn relative feed quality and forage yield (1997-2002)



Relationship between corn Milk per Ton and forage yield (1997-2002)



Proposed Method to Determine Silage Value

Production costs = \$265 per A, breakeven = 120 bu/A at \$2.20/bu

Grain yield	Forage yield	Grain equivalent	Value of grain in forage (\$2.20 bu)	Milk per ton	Milk per ton adjustment	Selling price
50	3.3	15.2	\$33			
75	4.1	18.3	\$40			
100	5.0	20.1	\$44			
125	6.0	21.0	\$46			
150	7.1	21.2	\$47			
175	8.4	20.8	\$46			
200	10.2	19.5	\$43			

Proposed Method to Determine Silage Value

Production costs = \$265 per A, breakeven = 120 bu/A at \$2.20/bu

Grain yield	Forage yield	Grain equivalent	Value of grain in forage (\$2.20 bu)	Milk per ton	Milk per ton adjustment	Selling price
50	3.3	15.2	\$33	2869	-13%	\$29
75	4.1	18.3	\$40	3027	-8%	\$37
100	5.0	20.1	\$44	3173	-4%	\$42
125	6.0	21.0	\$46	3304	0%	\$46
150	7.1	21.2	\$47	3412	+3%	\$48
175	8.4	20.8	\$46	3482	+5%	\$48
200	10.2	19.5	\$43	3477	+5%	\$45

Marketing Strategies

- Deliver corn to buyer as silage is harvested
- Store purchased crop on-farm until late spring when forage supplies are tight
 - ✓ Better price
 - ✓ Need to market prior to new crop hay
- Sell silage early in year, store on farm and deliver as needed by buyer
 - ✓ Handling and hauling costs need to be recovered
 - ✓ Next step is delivering complete ration mixed to specifications.
- **USE WRITTEN CONTRACTS!!**