Navigating the 2013-2014 dairy feed situation

Randy Shaver & Pat Hoffman

Department of Dairy Science

University of Wisconsin - Madison

University of Wisconsin - Extension

THE UNIVERSITY of WISCONSIN MADISON

UW Extension

DEPARTMENT OF DAIRY SCIENCE

EXCELLENCE IN EDUCATION AND DISCOVERY

UNIVERSITY OF WISCONSIN - MADISON

www.wisc.edu/dysci

"Perfect Storm" of Feed-Related Issues

- 2012 southern & central Wisconsin drought
- Low on-farm feed inventories coming into the spring generally & very limited feed carryover for many
- Wide-spread winter-kill of alfalfa throughout the state
- Wet conditions for corn planting and first-crop forage harvest in several key dairy areas
- Tight hay supplies nationally and very expensive prices if needing to buy hay
- High corn, soybean meal, and other concentrate prices

Tips & Strategies

- Nutrition & Crop Advisor & Supplier relationships
- Feed Inventory
  - Current & Projected (rolling)
  - Projected Needs
- Minimize Shrink

Inventory Resources

Team Forage Harvest & Storage Web Page

www.uwex.edu/ces/crops/uwforage/storage.htm

Spreadsheets
Silage Pile Capacity Calculator
Silage Pile Dimension Calculator
Bunker Silo Density Calculator
Bunker Silo Sizing Calculator

Tips & Strategies

- **Position alternative forages,** i.e. winter wheat, rye, spring oats or oats & peas, etc.
  - **Early-cut to milking cows as needed**
  - **Late-cut to heifers/dry cows**
- **Frequent forage testing critical**
  - **Greater quality variation,** for standard & alternative forages
  - **Lower than normal quality in some cases**

Average forage quality values for oats harvested at different maturity stages (Rankin, UWEX-FDL, 2003)

Harvest Stage	CP%	NDF%
Boot	16 - 18	52 - 54
Heading	14 - 16	56 - 58
Milk	12 - 14	59 - 61
Dough	10 - 12	59 - 61

Impact of Small-Grain Silage Maturity

Arieli & Adin, JDS, 1994

Item	Early Cut	Late Cut
Milk Yield, lb/d	79	72

11 days between early and late cut

Drought Stressed Soybeans

Nutrient content of soybean silage

➢ Crude protein, %	16 to 20.6%
➢ Neutral Detergent Fiber, %	38 to 48%
➢ Acid Detergent Fiber, %	27 to 37%
➢ Acid Detergent Lignin,%	6.0 to 7.4%
➢ Calcium, %	1.3 to 1.5%
➢ Phosphorus, %	0.26 to 0.31%

- Two varieties averaged over two years and growth stages R2, R4, and R6
- Adapted from Coffey et al. 1995. ARPAS 11:74.

Harvesting & Feeding Drought Stressed Soybeans

- Determine that the crop will not recover
- Carefully !!! Monitor moisture content
- Cut and wilt to 35-50 % DM
- Vary chop length depending on peNDF needs
- Inoculate if desired
- Forage test
- Tonnage maybe low but quality maybe good
- Watch ash contents
- If possible limit to 50 % of forage

Tips & Strategies

- Plan to build inventory & develop rations around higher corn silage levels than typical

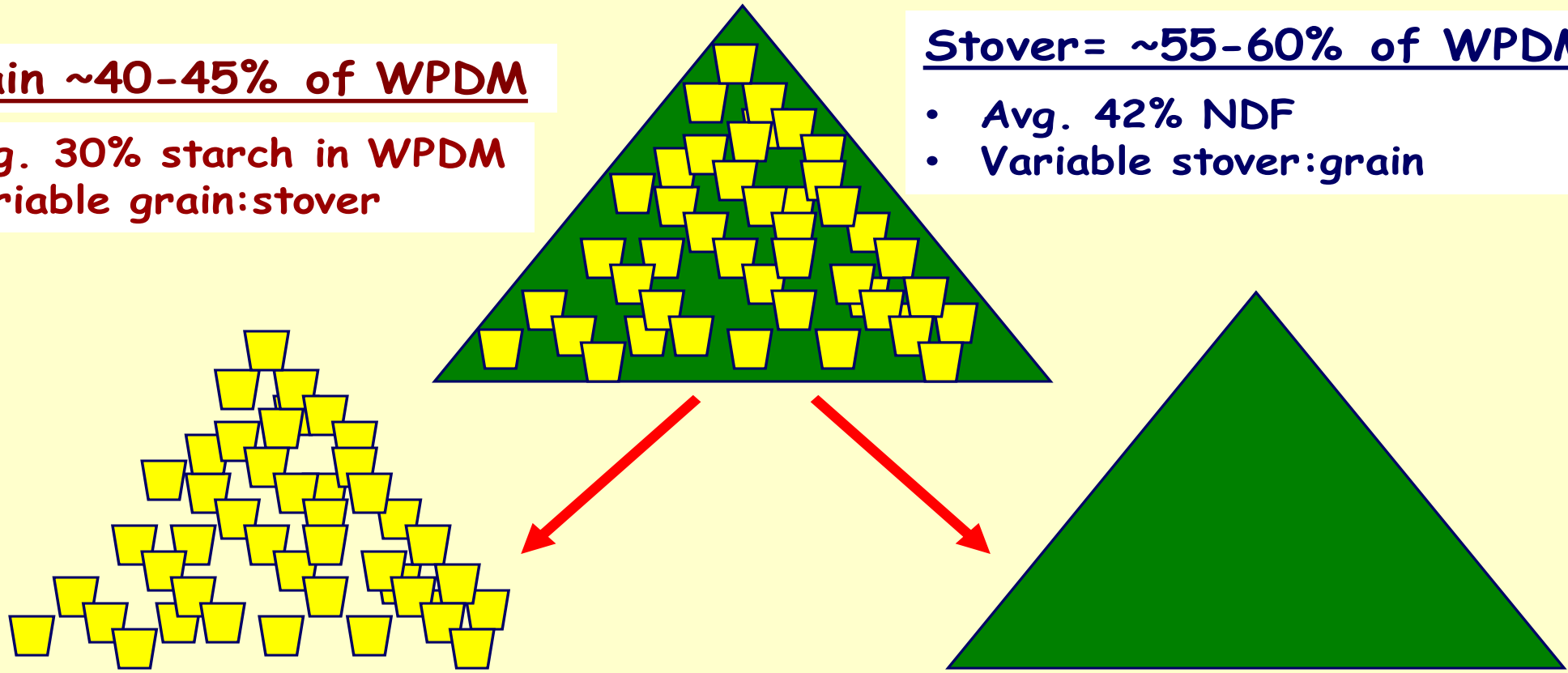
Whole-Plant Corn Silage

Grain ~40-45% of WPDM

- Avg. 30% starch in WPDM
- Variable grain:stover

Stover= ~55-60% of WPDM

- Avg. 42% NDF
- Variable stover:grain



80 to 98% starch digestibility

- Kernel particle size
- Duration of silage fermentation
- Kernel maturity
- Endosperm properties

40 to 70% IVNDFD

- Lignin/NDF
- Hybrid
- Maturity

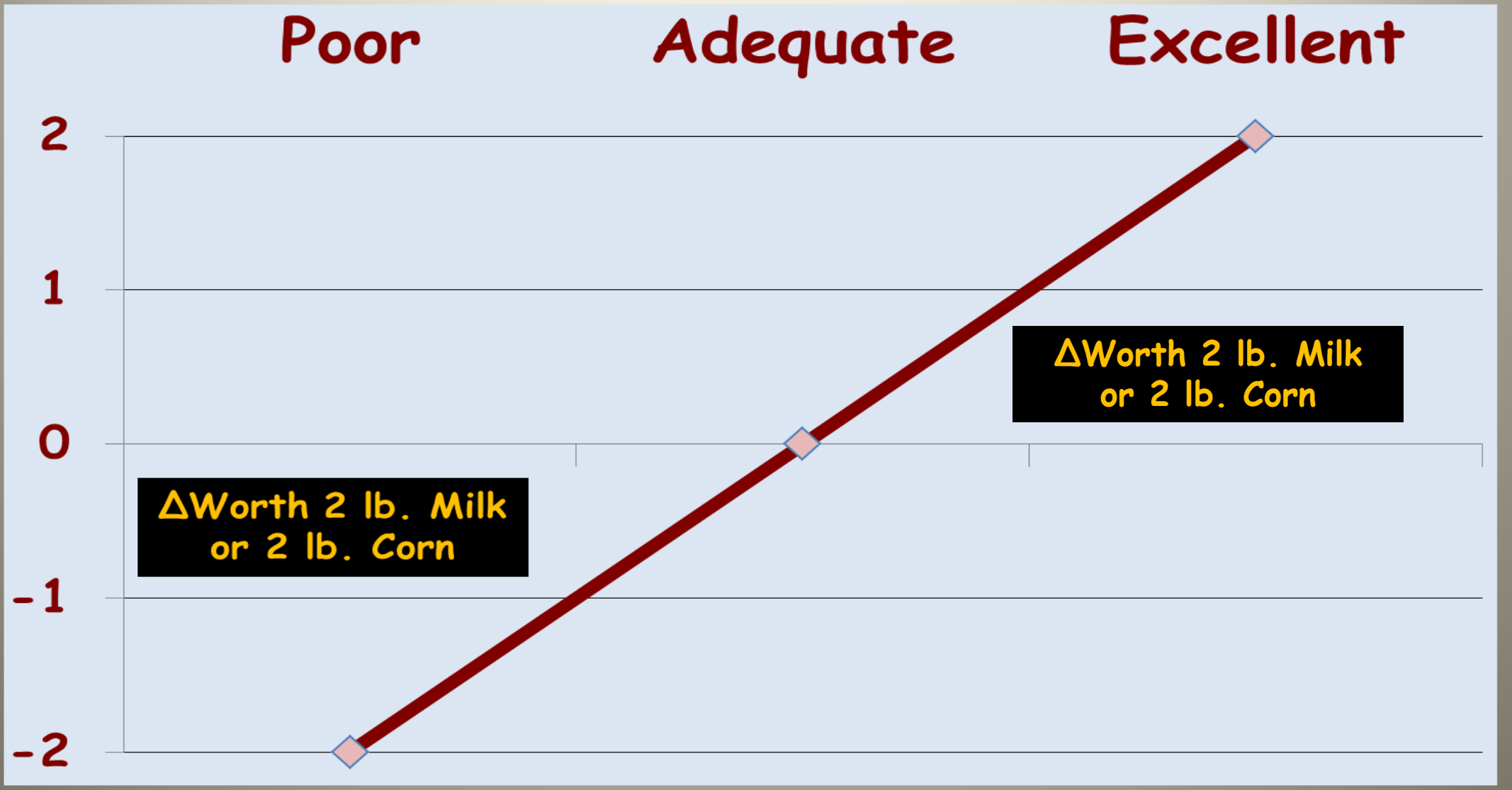
Variable peNDF as per chop length

Adapted from Joe Lauer, UW Madison Agronomy Dept.

Conv. Processor

- TLOC: 13-19 mm
- Roll Gap: 1-3 mm
- DM%: 33%-38%

Kernel Processing Score



Corn Silage Fermentation Increases Starch Digestibility

Immature Corn Silage

Harvest Stage	% Yield Potential	Moisture	CP	NDF	NDFD	Starch	Forage to Grain Ratio
Vegetative	35-40%	85%	12%	60%	70%	0	100:0
Silking/Tasselling	40-45%	85%	11%	65%	68%	0	100:0
Blister - Early Milk …note, highly variable, rapidly changing quality	60-65%	75-80%	9%	61%	68%	2-10%	90:10
Milk - Early Dough ...note, highly variable, rapidly changing quality	75-80%	70-75%	8.5%	55%	66%	10-20%	75:25

Harvest Stage	% Yield Potential	Moisture	CP	NDF	NDFD	Starch	Forage to Grain Ratio
Late Dough- Early Dent	90-95%	73%	8%	49%	65%	24%	65:35
1/4 Milk Line	95-100%	71%	8%	46%	61%	29%	55:45
1/2 Milk Line	100%	64%	7.5%	43%	60%	31%	50:50
Black Layer	100%	58%	7.5%	40%	57%	34%	50:50

DM Losses
NCR #574

Moisture %	Harvest Loss	Storage Loss	Feeding Loss	Total Loss
>70	4%	14%	4%	22%
60-70	5%	6%	4%	15%
<60	16%	6%	4%	26%

Early Frost

St. Pierre and co-workers, 1987

	Milk 8/30	Dough 9/7	Frost 9/18	Frost 2 9/26	Frost 5 10/17
Moist %	77	74	71	66	55
NDF %	59	59	59	62	66
ADF %	32	29	26	26	28
TDN %	64	66	69	69	67
DMI, lb/d	32	32	34	36	33
Milk, lb/d	43	41	41	43	39

Early Frost

St. Pierre and co-workers, 1987

- Optimum harvest a few days after 2nd frost when WP moisture near 65%
  - > DMI
  - > MY
  - < Seepage
- Harvest delayed to 5th frost (55% moisture)
  - > NDF, > ADF
  - < DMI, < TDN, <MY

Immature Corn Silage

- Allow to field-dry to < 70% moisture
  - High chopping will dry crop out about 3% units
- Alternative: add 300-400 lb Wheat midds or Corn gluten feed per ton silage to lower moisture content from 75% to 65% and raise energy content.
- Store in horizontal silos (bunkers, bags, or drive-over piles) to minimize seepage losses.
- Test moisture content coming out of silo and adjust rations as needed.
- Test NDF, starch, etc. out of the silo to predict energy content & formulate diets

Immature Corn Grain

Maturity vs. Kernel Moisture NCR #57

Stage	Kernel Moisture
Soft dough	60-65%
Early dent	50-55%
½ Milk line	40%
Black layer	25-30%

Table 1. High Moisture Corn Storage in Conventional, Bunker, Bag, and Oxygen Limiting Silos

Conventional Top Unloading Silos, Bunkers, and Silo Bags

	Corn Kernel Moisture, %		
	Minimum	Desired	Maximum
Ear Corn	26	32-36	40
Shelled Corn	26	28-32	36

Bottom Unloading Oxygen Limiting Silos

	Corn Kernel Moisture, %		
	Minimum	Desired	Maximum
Ear corn-rolled*	26	28-32	36
Shelled corn	24	26-28	32

**OL Silo with Forage Unloader*

Source: Rankin, 2009

Corn Grain Harvest

- If frost-kill occurs before ½ milkline, then harvest as WP silage
- If frost-kill occurs at ½ milkline, then allow field dry-down to desired moisture content for harvest as high-moisture corn
- If frost-kill occurs at black-layer, then follow usual harvest and handling procedures for high-moisture or dry grain

Harvest & Storage Options

- Snaplage (SNG)
- High-Moisture Shelled Corn (HMSC)
- Dry Shelled Corn (DSC)

Harvest & Storage Comments

- Advantage of DSC is mold/yeast shut down, can exclude fines, & can dilute easily
- Advantage of SNG was could get it off wetter
- HMSC is the intermediate solution
  - Leave the cob in field!
  - 35% kernel moisture less risky than 40%, i.e. yeast/ethanol issues
  - Relying on low pH (inoculant can help) & oxygen exclusion
  - If wet HMSC/yeast of more concern than mold, then LBUC or MOA likley to be more effective than PROP
  - Plan storage so that worst corn can be fed before spring/summer
  - Coarse roll (2,500 micron MPS) best on wet HMSC

Potential Feeding Issues

- **DSC**
  - Reduced test weight
  - Mold/Mycotoxins

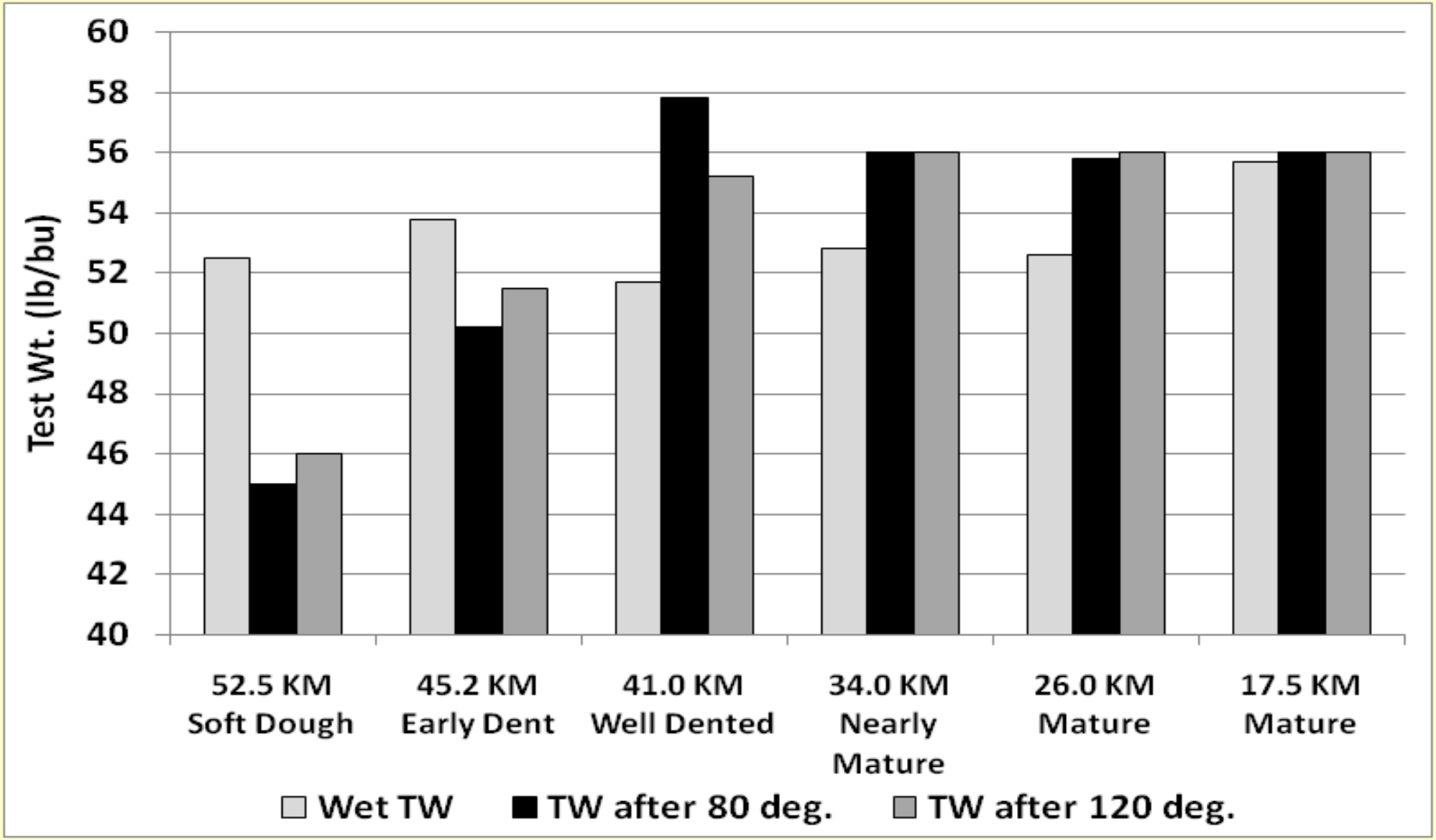


Figure 1. Wet and dry test weights for grain harvested at soft dough through mature kernel stages and dried to 15.5% moisture at 80 or 120 degrees (Hicks, 2004)

Source: Rankin, 2009

DSC Feeding Considerations

- <50 lb./bu. test weight, discount normal DSC energy value by 5%
- Feed by weight not volume
- Test for nutrient composition including starch content, have labs estimate the energy value using summative energy equations, & adjust ration
- Test for mycotoxins
  - Dilute, use binders, target groups, discard as necessary

Potential Feeding Issues

- **HMSC**
  - Reduced starch content
  - Fast rate & high extent of ruminal starch digestion
  - Yeast/ethanol fermentation
  - Poor aerobic stability during feed-out
  - Mold/Mycotoxins

Potential Feeding Issues

- **SNG**
  - Reduced starch content
  - Increased NDF content
  - Increased variability in starch, NDF & energy contents
  - Fast rate & high extent of ruminal starch digestion
  - Yeast/ethanol fermentation
  - Poor aerobic stability during feed-out
  - Mold/Mycotoxins

HMSC & SNG Diagnostics

- **Testing**
  - Nutrient composition including starch & NDF contents
  - Labs estimate energy value using summative energy equations
  - Particle size
  - Fermentation profile
  - Mycotoxins

HMSC & SNG Feeding Considerations

- **Adjust ration based on nutrient composition, energy value & particle size**
  - May require partial substitution with DSC, but feed-out rate must be adequate
  - May require using more dietary buffer
  - May require using byproduct fiber sources
- **Determine & monitor corn DM content to adjust as-fed corn feeding rate, so that desired amount of DM fed**
- **If bunk stability poor, may require back-end use of TMR preservative products**
- **Depending on results of mycotoxin tests, dilute, use binder, target groups, discard as necessary**

Tips & Strategies

- Work with nutritionist on partially replacing forage with high-fiber byproducts. Changing from a max to min forage-NDF ration formulation approach could reduce forage DM needed to feed the milking-cow herd for the year by 1/3rd
- Discuss limit-feeding as an option for older heifers with nutritionist

Min NDF - Forage	Min NDF - Diet	Max NFC - Diet
19%	27%	42%
18%	27%	42%
17%	29%	40%
16%	31%	38%
15%	33%	36%

NRC-01

%Diet forage to meet minimum NDF from forage

Min. NDF-F	40% NDF	45% NDF	50% NDF
19%	48%	42%	38%
17%	43%	38%	34%
15%	38%	33%	30%

Ingredient	NDF % of DM	pef % NDF	peNDF % of DM	Replaced per lb. DM	Replaced by 5 lb. DM
Replaced Haylage					
Medium Chop Length	45	85	38.3	--	--
Replacement Feeds					
Chopped Straw	73.0	110	80.3	2.1	10.5
Chopped Hay	55	95	52.3	1.4	7.0
Beet Pulp	45.8	30	13.7	0.4	2.0
Brewers Grains	47.4	40	19.0	0.5	2.5
Corn Gluten Feed	35.5	40	14.2	0.4	2.0
Cottonseed Hulls	85.0	90	76.5	2.0	10.0
Distillers Grains	38.8	40	15.5	0.4	2.0
Malt Sprouts	47.0	40	18.8	0.5	2.5
Soybean Hulls	60.3	30	18.1	0.5	2.5
Wheat Middlings	36.7	40	14.7	0.4	2.0

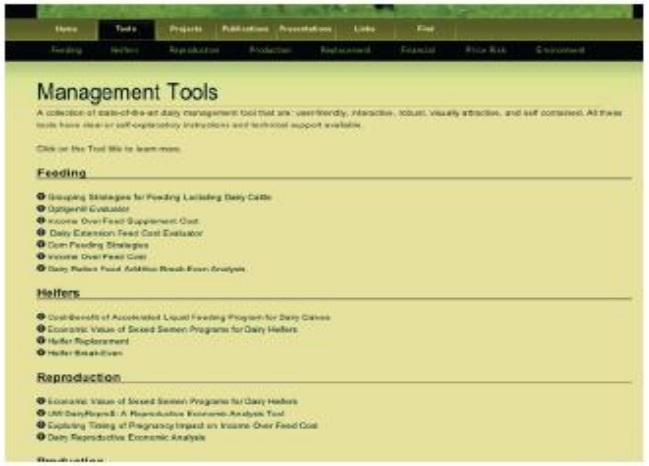
Tips & Strategies

- Source feed ingredients to supply protein, energy and fiber with the best value relative to market price on a nutrient content basis

FeedVal 2012 Tool Availability

DairyMGT.info

Tools



Dairy Cattle Nutrition UW-Extension: http://www.uwex.edu/ces/dairynutrition/

FeedVal 2012 predicted dairy feed prices and rankings for July 2013[1]

V.E. Cabrera, P. Hoffman, and R. Shaver

Ingredient	DM %	Unit	Feed Prices ($/Unit) Market	Feed Prices ($/Unit) Predicted	Actual Price as % of Predicted Value	Best-buy Ranking
Wet Distillers	45	ton	76.0	183.9	41	1
Corn Gluten Feed	89	ton	162.0	286.7	57	2
Distillers Dried Grains	89	ton	245.0	383.4	64	3
Poor Quality Hay	87	ton	127.5	172.8	74	4
Wheat Middlings	89	ton	190.0	247.0	77	5
Soy Hulls	89	ton	185.0	231.1	80	6
Hominy	89	ton	220.0	257.8	85	7
Wheat	89	bu	6.6	7.7	85	8
Corn Gluten Meal	89	ton	600.0	698.4	86	9
Corn Silage	35	ton	67.8	75.2	90	10
Shelled Corn	89	bu	6.8	7.6	90	11
Sunflower Meal	89	ton	240.0	259.3	93	12
Cottonseed Meal	89	ton	390.0	416.8	94	13
Canola Meal, expeller	89	ton	362.0	387.0	94	14
Molasses	89	ton	220.0	218.3	101	15
Urea	99	ton	472.0	454.7	104	16
Oats	89	ton	263.1	251.3	105	17
Soybeans, raw	87	bu	13.5	12.5	108	18
Soybean Meal 48%	89	ton	533.0	491.0	109	19
Blood Meal	94	ton	1175.0	1072.4	110	20
Good Quality Hay	87	ton	246.2	213.5	115	21
Soybean Meal 44%	89	ton	521.0	449.3	116	22
Barley	89	cwt	14.6	12.6	116	23
Linseed Meal	89	ton	415.0	351.0	118	24
Beet Pulp	89	ton	270.0	217.2	124	25
Whole Cottonseed	89	ton	370.0	293.4	126	26
Tallow	99	cwt	36.0	27.7	130	27

Soybean Meal, expeller	92	ton	594.6
Soybeans, heated	92	ton	559.8
Earlage/Snaplage	60	ton	162.2
High-Moisture Corn	70	ton	213.9
Straw	85	ton	133.0
Canola Meal, solvent	89	ton	343.8
Hi-Pro Distillers	89	ton	460.8
Brewers Dried Grains	89	ton	354.4
Wet Brewers	25	ton	92.6
Malt Sprouts	89	ton	281.0
Wheat Bran	89	ton	230.1
Corn Stover	80	ton	105.4
Whey	20	ton	51.2

[1]Analysis performed using UW-Madison FeedVal 2012: http://dairymgt.info/tools/feedval_12/index.php including 27 feed ingredients displayed in top part of the table, 4 nutrients: RUP, RDP, NEL, and peNDF; and using general wholesale FOB Midwest input prices. These results might change substantially depending on: local input prices, nutrients, and feed ingredients used for price formation. For more in-depth analyses please use the FeedVal 2012 decision support tool and local input prices.

How much to feed?

- **Feeding limits**
  - i.e. DDG at 10 to 20% of diet DM a reasonable target depending upon diet formulation constraints
    - i.e. High Fat & P and Low Lysine impediments to higher inclusion rates

- **Least cost ration formulation for specified nutrients**
  - i.e. CP, RUP, NDF, Starch, Fat, NEL, etc., etc.

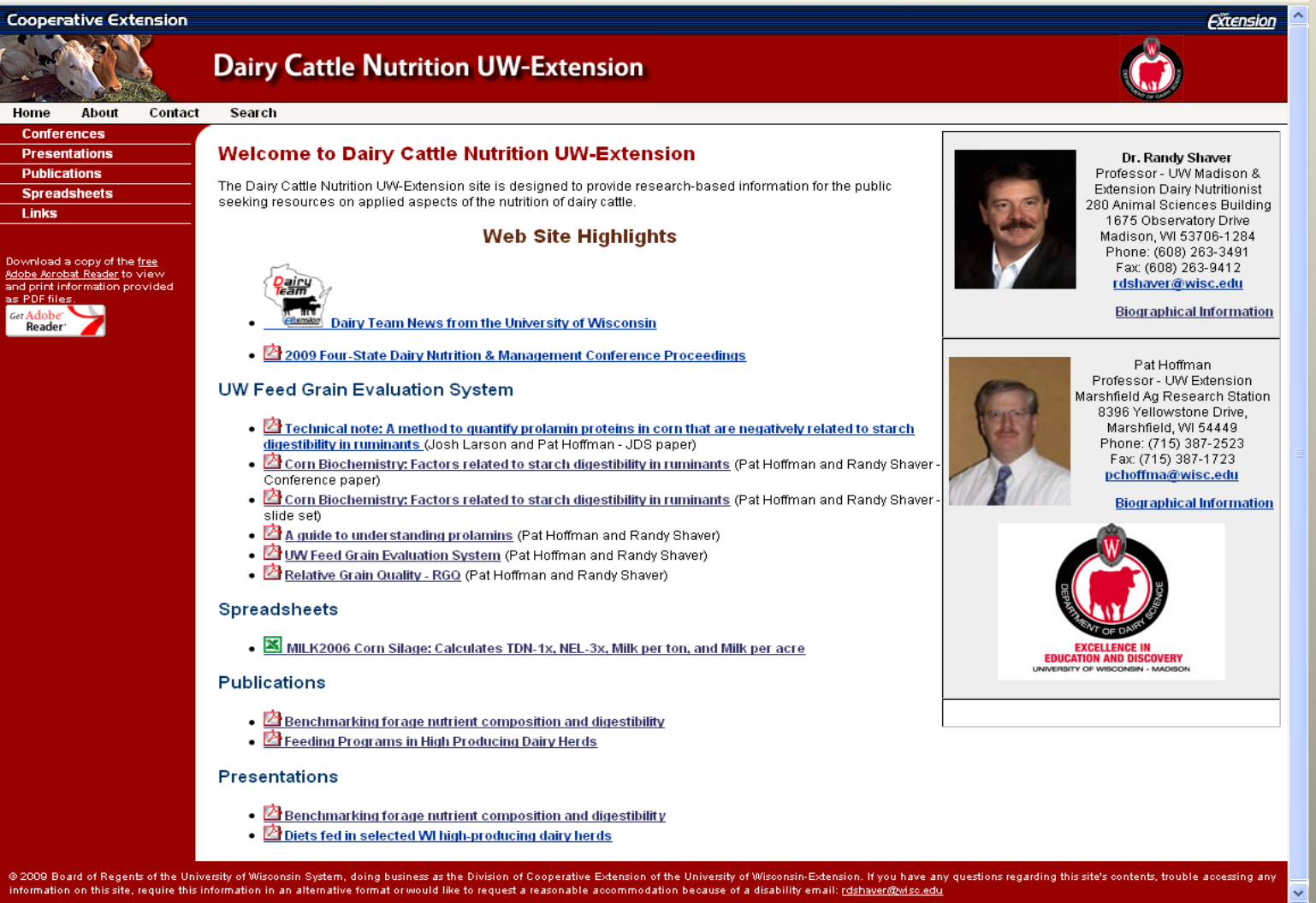
Ingredient	Suggested Limits lb. DM per cow per day
Beet Pulp	8 - 12
Brewers Grains	5 - 10
Corn Gluten Feed	10 - 15
Cottonseed Hulls	5 - 10
Distillers Grains	5 - 10
Malt Sprouts	5 - 10
Soybean Hulls	8 - 12
Wheat Middlings	8 - 12
Whole Cottonseed	5 - 8

Tips & Strategies

- Look ahead -- Consider planting winter wheat or rye for harvest next spring as forage
- Harvest of corn stalklage for use in replacement heifer and dry cow rations may be an option

Visit UW Extension
Dairy Cattle Nutrition Website

http://www.uwex.edu/ces/dairynutrition/



UW Extension

DEPARTMENT OF DAIRY SCIENCE

EXCELLENCE IN EDUCATION AND DISCOVERY

UNIVERSITY OF WISCONSIN - MADISON

www.wisc.edu/dysci

THE UNIVERSITY of WISCONSIN MADISON