Results of UW Madison Corn Shredlage™ Feeding Trial

Luiz Ferraretto & Randy Shaver

Dairy Science Department, UW Madison

THE UNIVERSITY of WISCONSIN MADISON

UW Extension

DEPARTMENT OF DAIRY SCIENCE

EXCELLENCE IN EDUCATION AND DISCOVERY

UNIVERSITY OF WISCONSIN - MADISON

www.wisc.edu/dysci

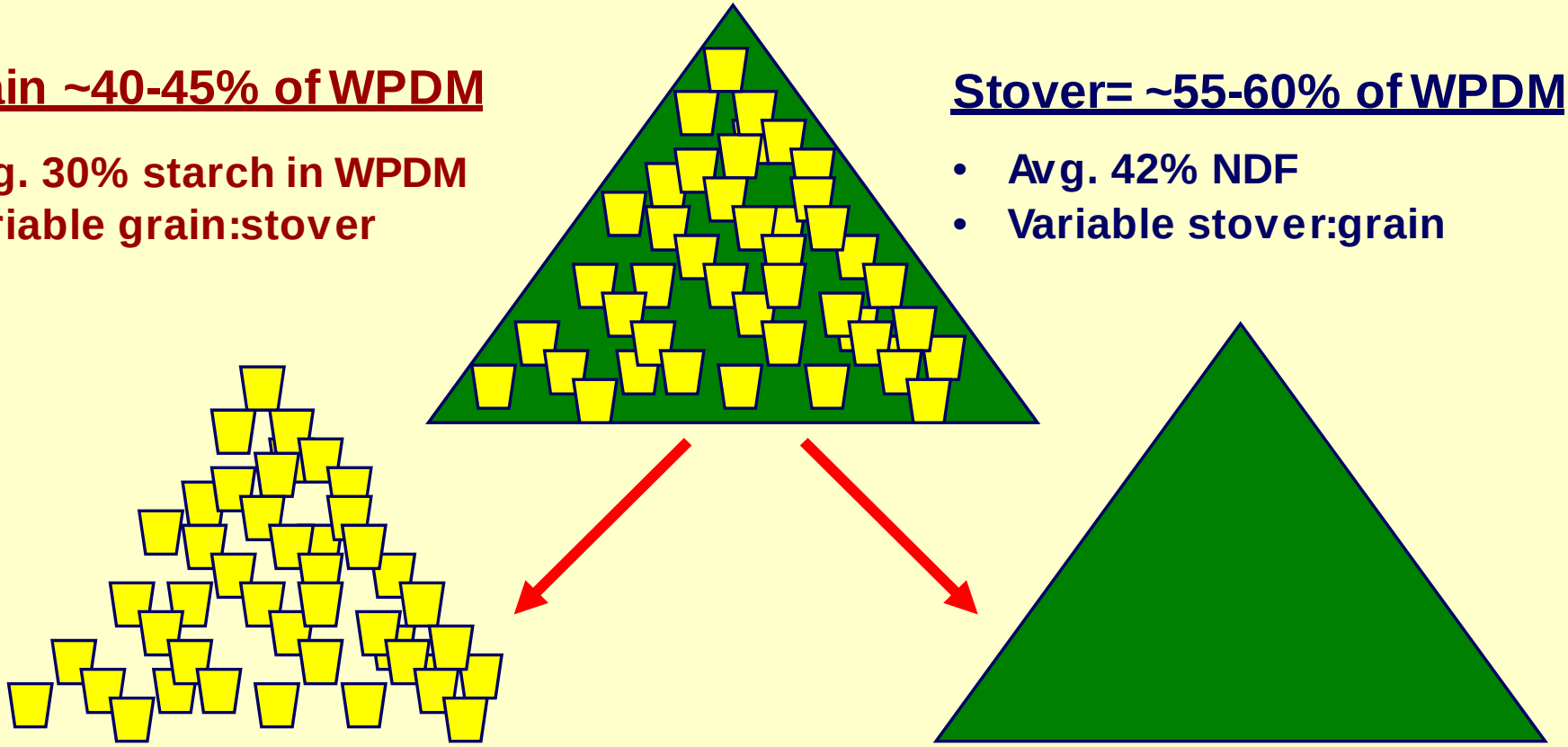
Whole-Plant Corn Silage

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

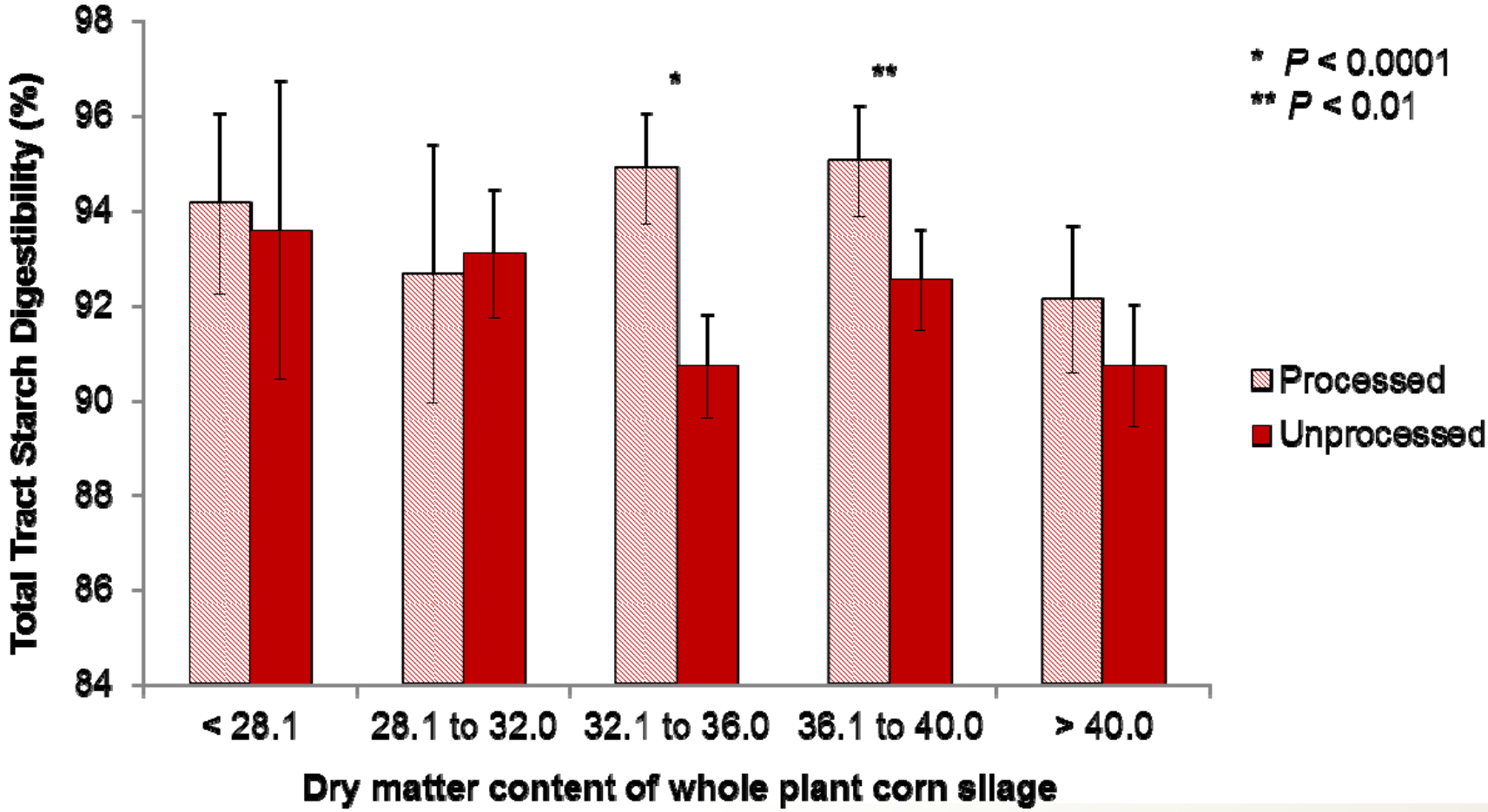
Corn Silage Harvest Practices

Meta Analysis

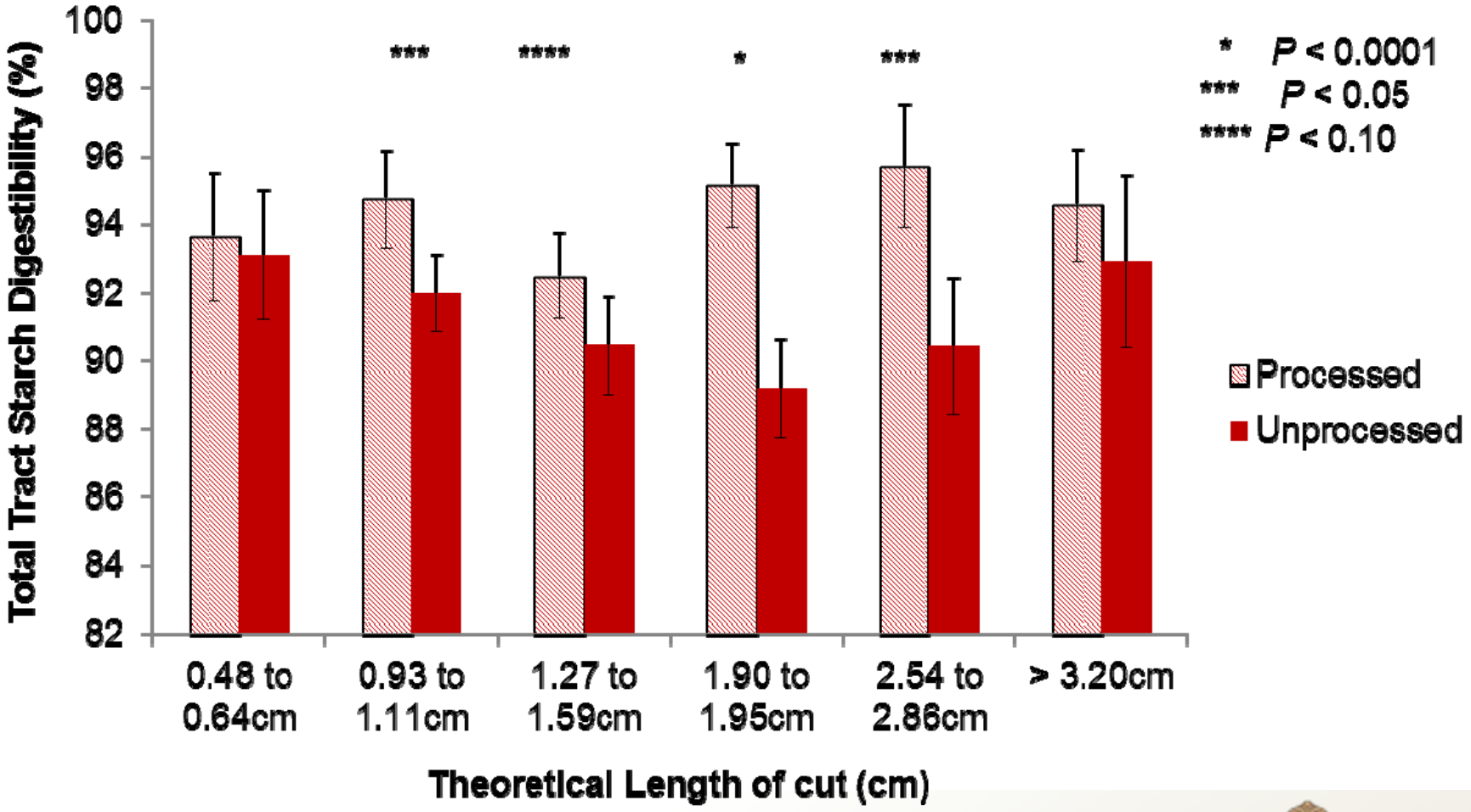
Ferraretto & Shaver, PAS 2012

- 106 treatment means – 27 studies – 24 articles
- January 2000 to July 2011 (AFST, JDS)
- Lactating dairy cows fed TMR, starch digestibility (in vivo)
- Proc Mixed (SAS, 2004)
- Fixed effects: treatment and covariance factors
- Random effect: study
- Weighted by cow (St-Pierre, 2001)

Kernel Processing*Maturity



Kernel Processing*TLOC

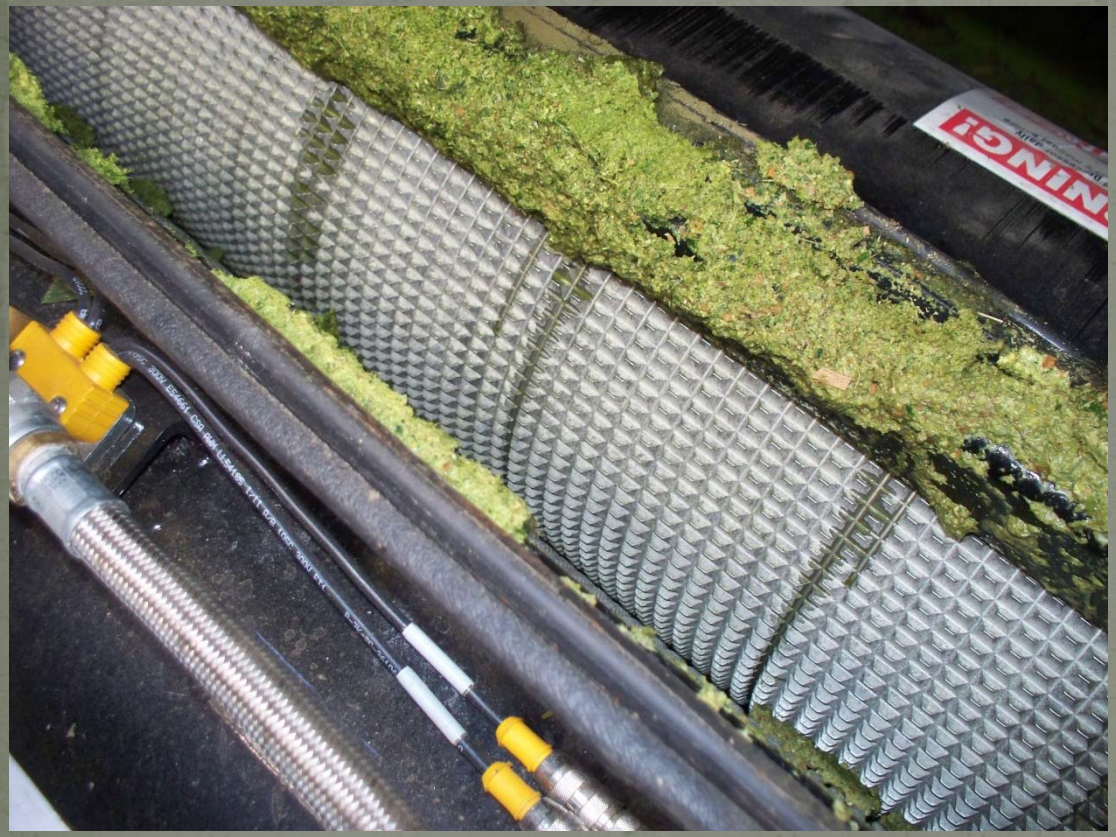


Corn Shredlage™

Corn Shredlage™

KP

Shredlage



Corn production, harvest & storage

	Shredlage™	KP
Hybrid	DKC 57-79	DKC 57-79
Planting date	5/7/11	5/7/11
Location	UW - Arlington, WI	UW - Arlington, WI
Row spacing	30"	30"
Seeds per acre	34,000	34,000
Harvest date	9/8/11	9/9/11
Acres harvested	9.1	8.9
As-Fed tons harvested	221.4	214.6
Harvester	CLAAS Jaguar - Kutz Farms, Jefferson WI	JD 6910- UW ARS
Harvester Settings	30 mm TLOC; 2.5 mm Roll Gap	19 mm TLOC; 3 mm Roll Gap
Silo Bag	10' diameter	10' diameter
Inoculant	None	None

Penn State Separator Box (as-fed basis)

Samples obtained during feed-out from the silo bags

Screen, mm	Shredlage	KP
19	31.5%	5.6%
8	41.5%	75.6%
1.18	26.2%	18.4%
Pan	0.8%	0.4%

Kernel Processing Score

Samples obtained during feed-out from the silo bags

	Shredlage	KP
% Starch Passing 4.75 mm Sieve	75.0% ± 3.3	60.3% ± 3.9

WI Dairy Farm Survey Results

	Corn Silage									
	Fall					Spring				
	n	Avg	Std	Min	Max	n	Avg	Std	Min	Max
CSPS%	30	57.0	11.1	34.9	74.4	35	61.1	12.4	38.6	88.7

Huibregtse, Heuer et al., 2012, unpublished; RRL sample analyses

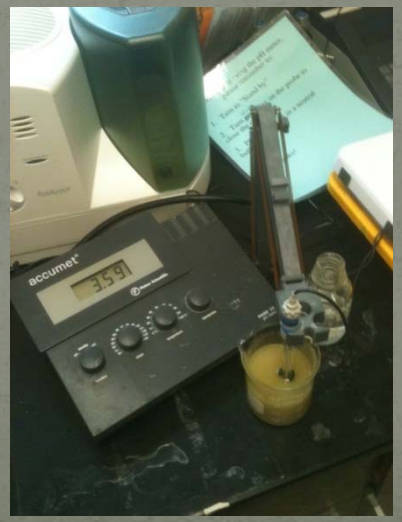
WISCONSIN

Nutrient composition of feed-out samples

	Shredlage	KP
DM, % as fed	33.9% ± 2.1	33.7% ± 3.2
CP, % DM	7.3% ± 0.4	7.7% ± 0.3
Starch, % DM	35.1% ± 2.2	35.6% ± 2.2
NDF, % DM	36.4% ± 2.4	36.3% ± 1.4

Fermentation profile of feed-out samples

	Shredlage	KP
pH	3.59 ± 0.05	3.61 ± 0.03
Ammonia, % of CP	4.7 ± 0.8	4.8 ± 0.8
Lactic Acid, % of DM	6.0 ± 0.9	5.1 ± 0.4
Acetic Acid, % of DM	1.0 ± 0.1	1.0 ± 0.1



Bag Packing Densities (lb DM/cu. Ft)

Volume = 3.14 × Radius^2 × Length

	L	Shredlage	KP
Entire Bags At Filling	158’	17.7	17.2
During Feed-out near back of bags	4’	17.5	17.2

Feeding Trial

- 10/20/11 – 12/28/11; UW – Arlington Dairy
- 14, 8 cow pens; 112 mid lactation cows
- Cows stratified by breed, parity & DIM, assigned to pens, and pens randomly assigned to 1 of 2 treatments
  - Shredlage™
  - KP
- 2-week adjustment period with all pens fed 50:50 mix of Shredlage & KP in TMR
- 8-week treatment period with all cows fed their assigned treatment TMR

Days in Milk & Body Weight at trial initiation

	DIM	BW, lb.
Shredlage	114 ± 35	1559 ± 47
KP	117 ± 36	1520 ± 33

Pens were comprised of 46% 1st lactation cows all of which were Holsteins, and of the 2nd or > lactation cows 80% were Holsteins

Experimental Diets (DM basis)

	Shredlage	KP
Shredlage	50%	---
KP Silage	---	50%
Alfalfa Silage	10%	10%
Ground Dry Shelled Corn	10.3%	10.3%
Corn Gluten Feed	7.4%	7.4%
SBM 48%, solvent	6.9%	6.9%
SBM, expeller	9.3%	9.3%
Rumen-Inert Fat	1.9%	1.9%
Min/Vits	4.2%	4.2%

TMR Nutrient Composition (DM basis)

	Shredlage	KP
CP	17.2%	17.3%
Total NDF	28.1%	28.3%
NDF from Forage	22.3%	22.5%
Starch	25.4%	25.5%
Crude Fat	4.8%	4.5%

Penn State Separator Box (as-fed basis)

TMR Samples

Screen, mm	Shredlage	KP
19	15.6%	3.5%
8	38.2%	52.9%
1.18	38.9%	35.8%
Pan	7.3%	7.8%

Feed Sorting – PSU Separator Box

% of Predicted Intake

Screen, mm	Shredlage	KP	*P* <
19	99.3	99.5	0.72
8	99.7	99.8	0.66
1.18	100.1	99.7	0.09
Pan	102.1	101.7	0.54

Dry matter intake & milk yield

	Shredlage	KP	*P* <
DMI, lb/d	55.8	54.4	0.08
Milk, lb/d	96.0	94.2	0.14
Milk/DMI	1.72	1.73	0.74

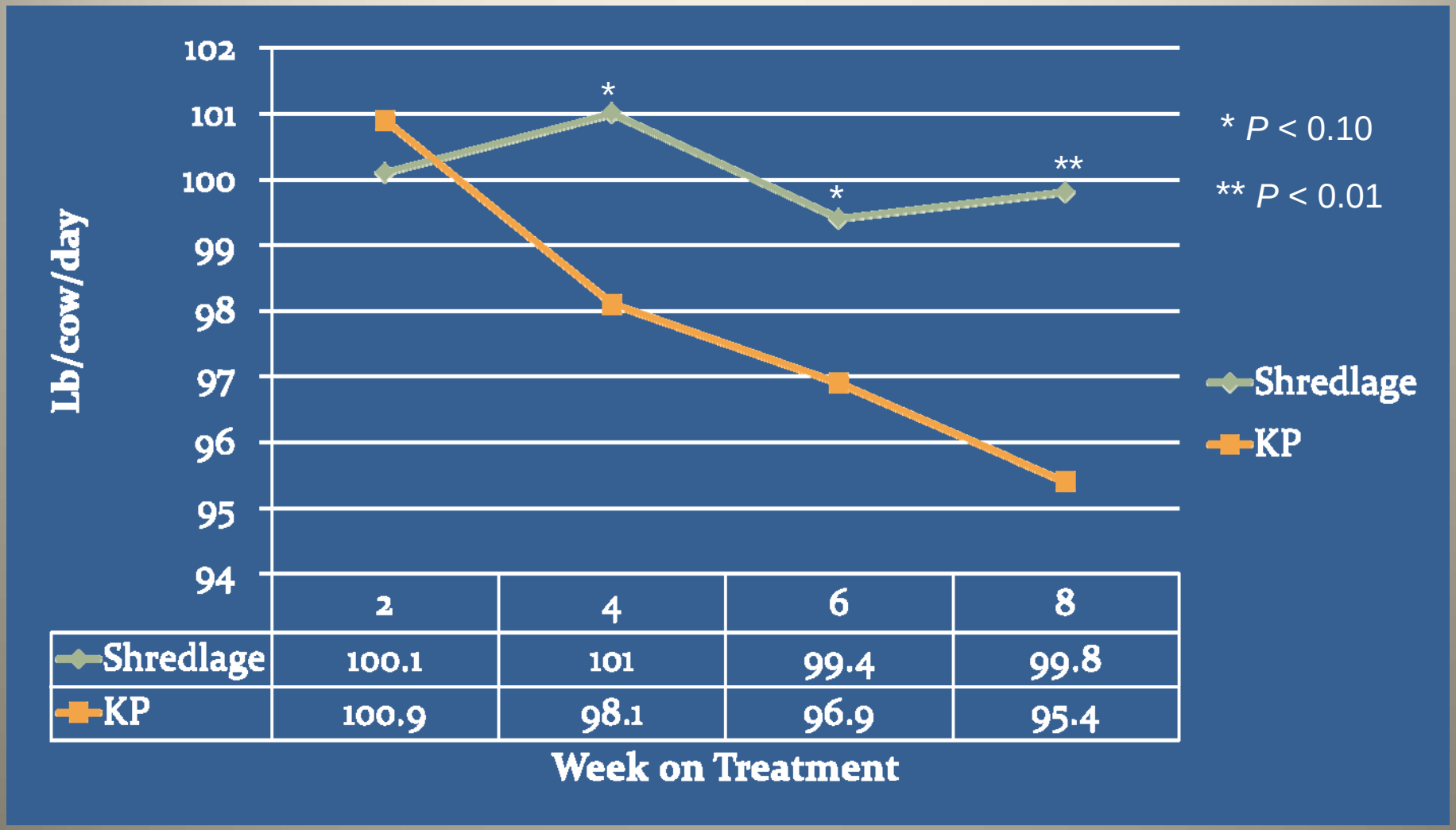
Milk composition

	Shredlage	KP	*P* <
Fat %	3.74%	3.70%	0.66
Protein %	3.18%	3.21%	0.29
MUN, mg/dL	13.9	13.6	0.48

Component-corrected milk yields

	Shredlage	KP	*P* <
3.5% FCM, lb/d	100.1	97.8	0.07
FCM/DMI	1.77	1.79	0.65
ECM, lb/d	99.2	97.2	0.10
ECM/DMI	1.76	1.77	0.50

3.5% FCM Yield by Week



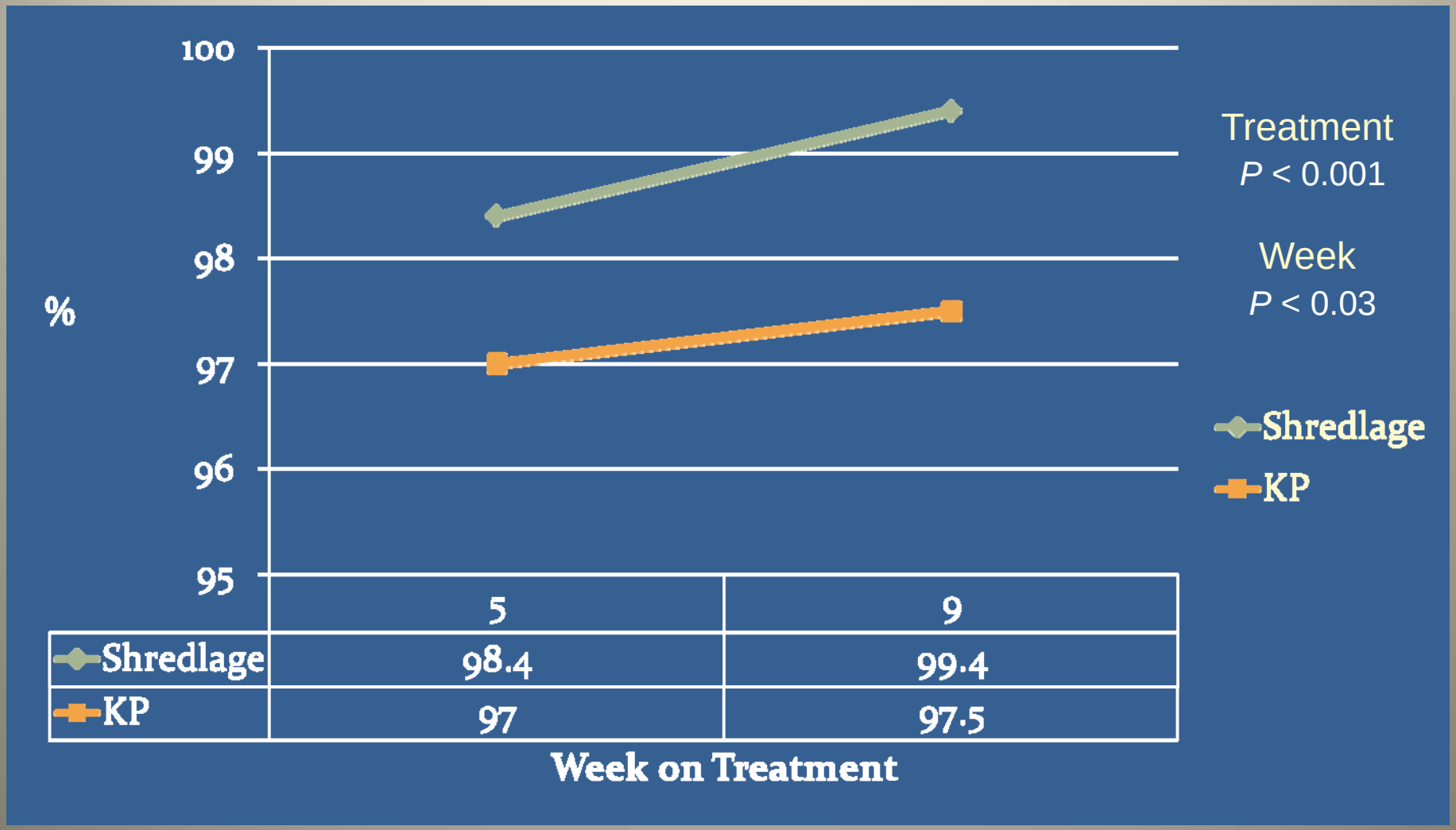
	2	4	6	8
Shredlage	100.1	101	99.4	99.8
KP	100.9	98.1	96.9	95.4

Week × Treatment Interaction ($P < 0.03$)

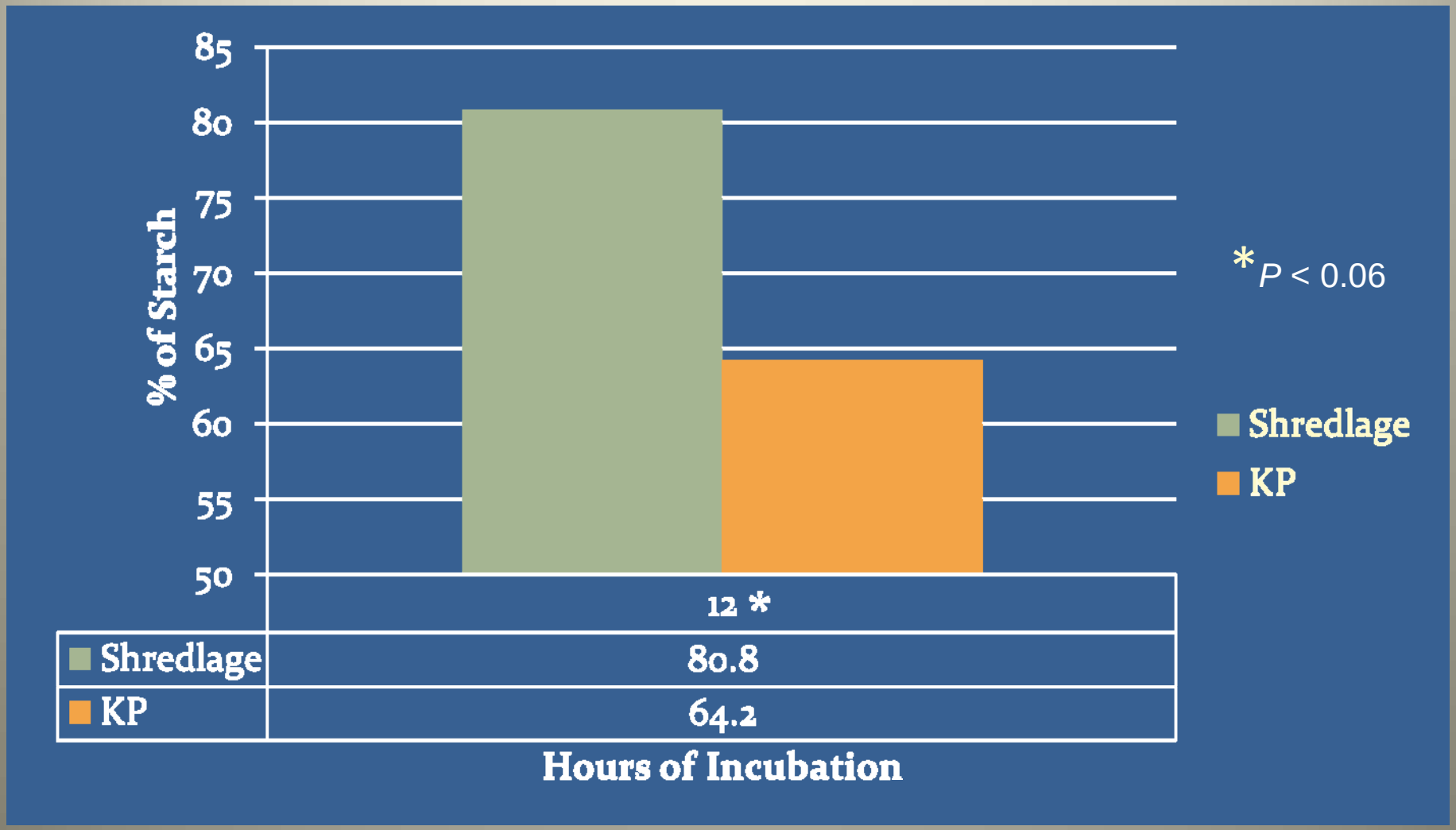
BW, BCS, BWC & Diet NE_L Results

	Shredlage	KP	*P* <
BW, lb	1568	1553	0.29
BCS	3.03	3.04	0.90
BWC, lb/d	0.62	0.68	0.84
Calc. Diet NE_L, Mcal/lb DMI	0.81	0.82	0.59

Total Tract Starch Digestibility

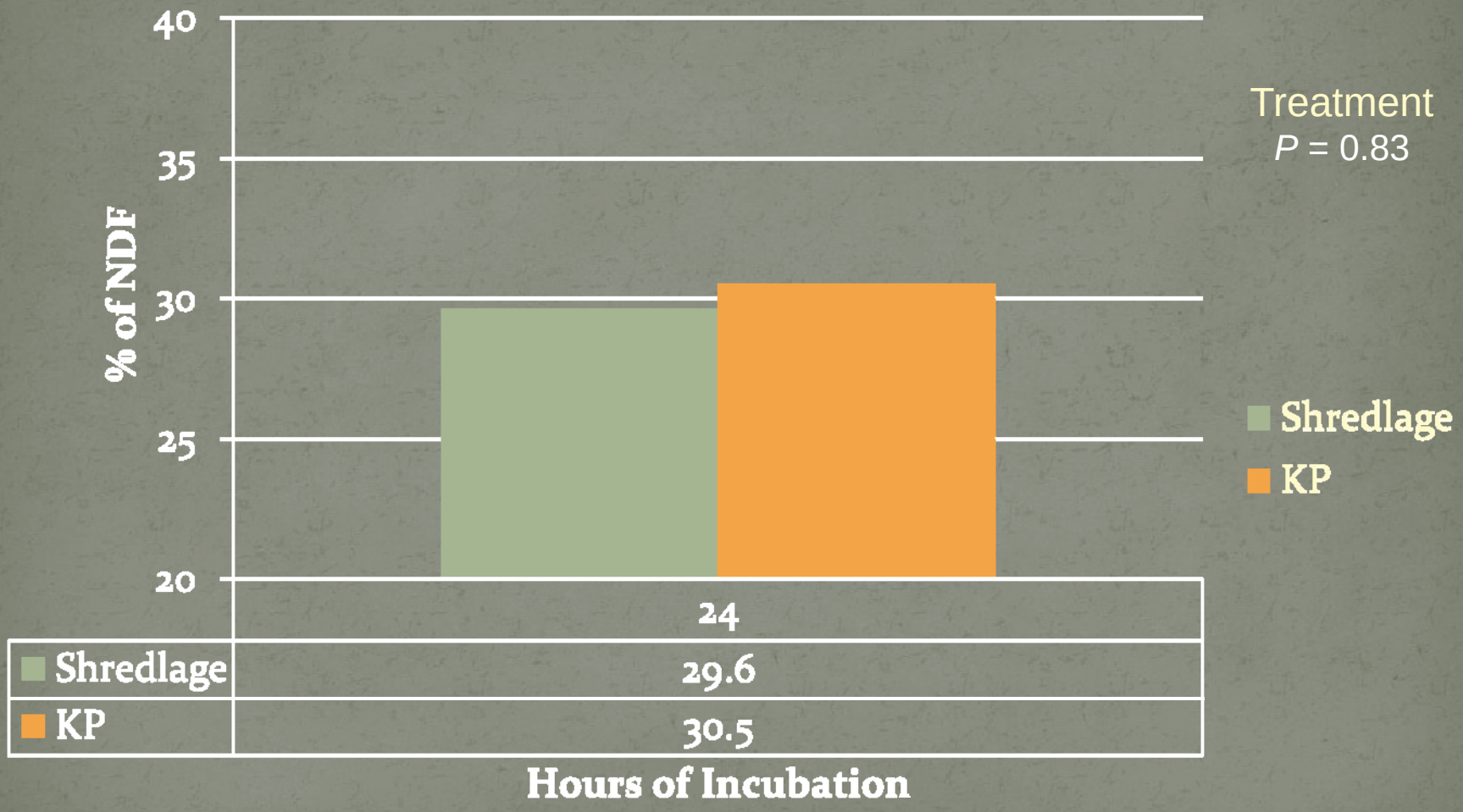


Ruminal In Situ Starch Digestibility



Ruminal incubations on undried, unground samples

Ruminal In Situ NDF Digestibility



Ruminal incubations on undried, unground samples

Summary & Conclusions

- Under the conditions of this study
  - i.e.
    - TLOC & Roll Gap setting of the harvesters
    - Silage DM content, particle size and length of silo fermentation
    - Diet forage % and corn silage %
    - Level of production
    - Stage of lactation

Conclusions

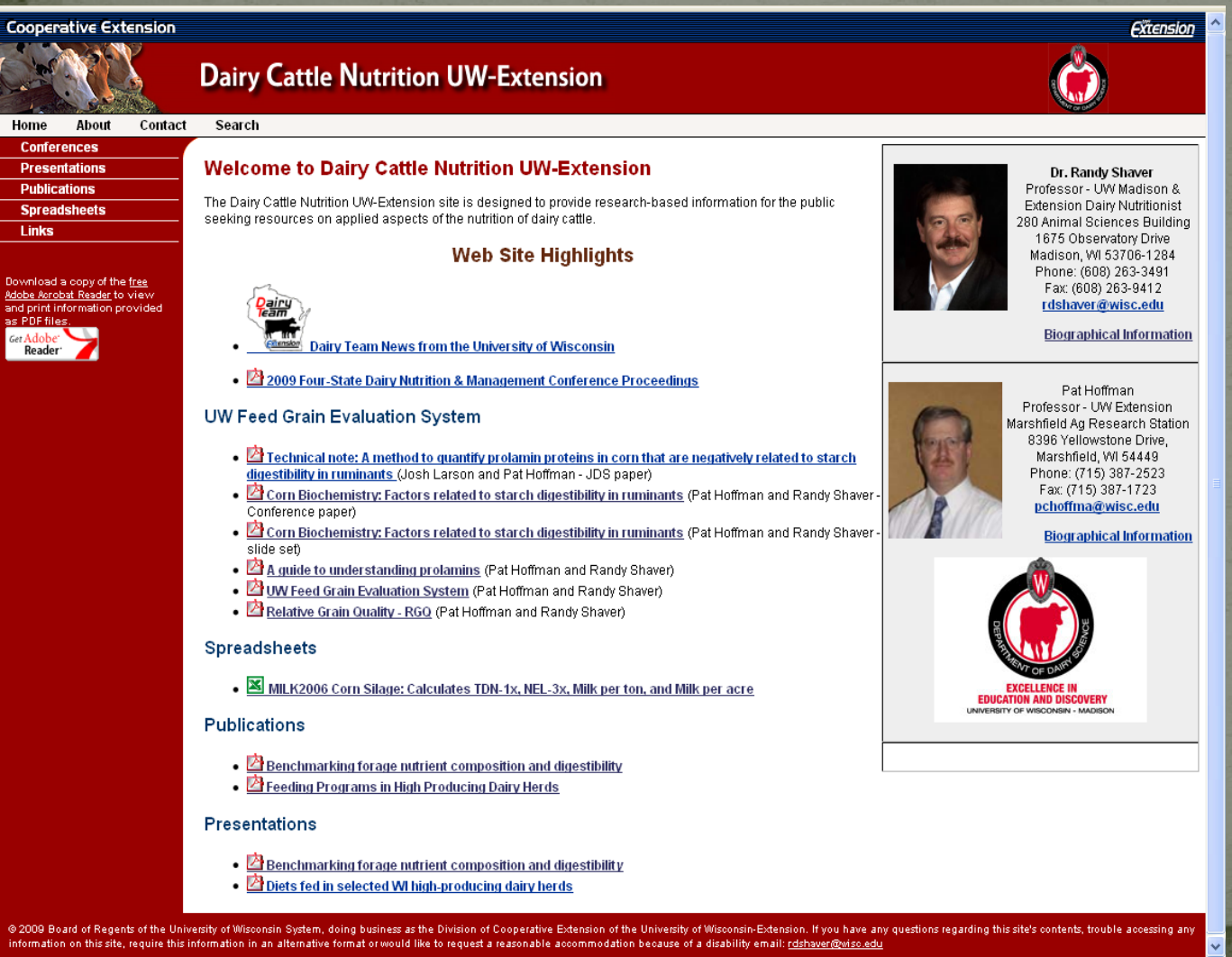
- The proportion of material on the top (coarsest) screen of the PSU Separator was greater for Shredlage
  - This was also the case for the TMR which contained Shredlage
    - There was no sorting of the TMR for either treatment
- DMI tended to be greater for cows fed Shredlage
- FCM & ECM tended to be greater for cows fed Shredlage
  - The FCM response to Shredlage increased as the treatment period progressed
- Kernel processing score and ruminal & total tract starch digestibilities were greater for Shredlage

Acknowledgements

- Kutz Farms, Jefferson, WI
  - Shredlage harvest
- UW ARS Field Staff
  - Corn production, KP harvest, all bagging
- UW Blaine Dairy Staff
  - Herd care, milking, feeding, management
  - Feed & milk sampling
- Dairyland Labs, Arcadia, WI
  - Feed analysis
- Roger Olson, rolson@shredlage.com **http://www.shredlage.com/**
- Scherer Design Engineering, South Dakota

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