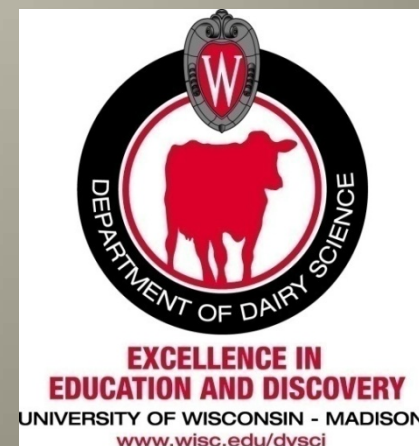


# Results of UW Madison Corn Shredlage™ Feeding Trial

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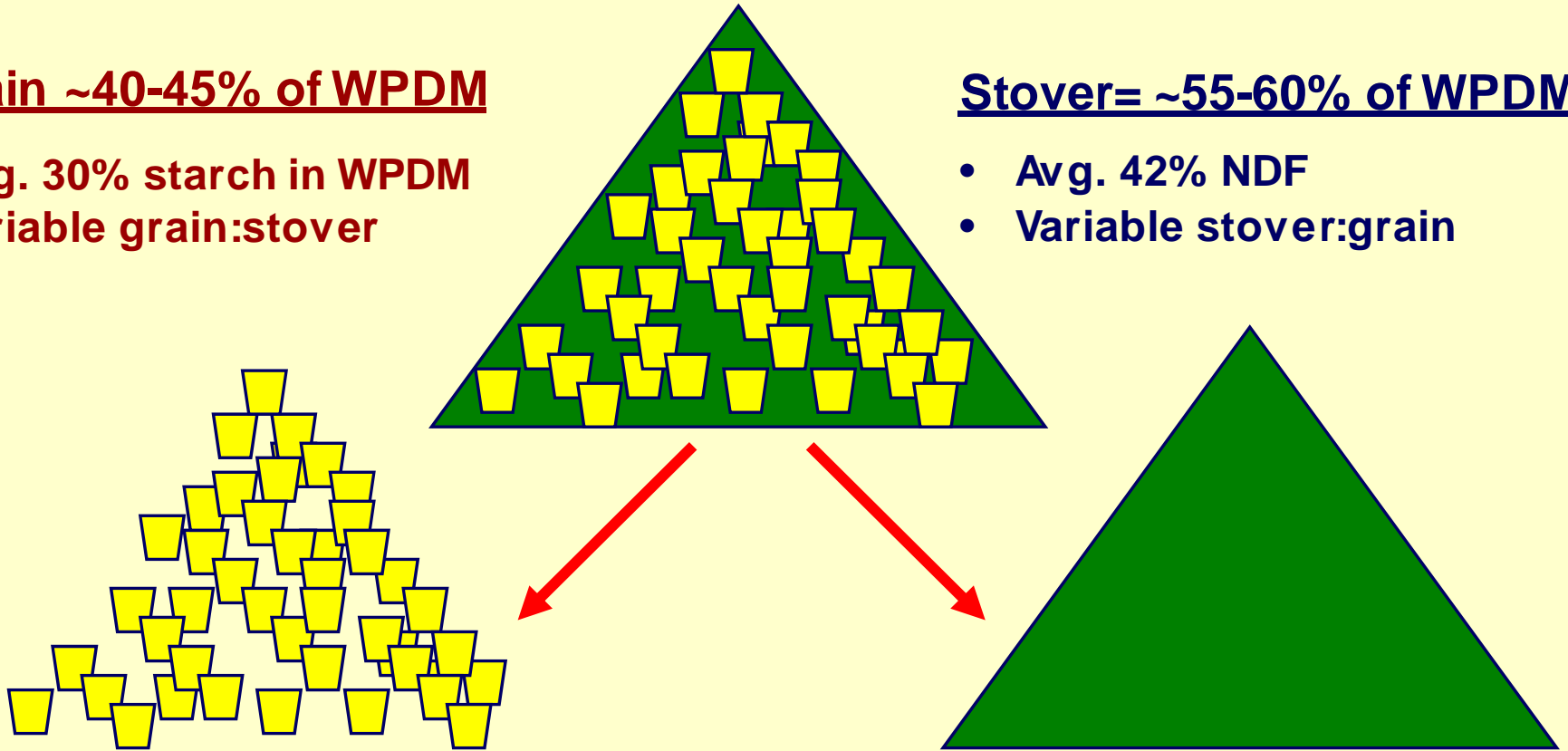
# Whole-Plant Corn Silage

## 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

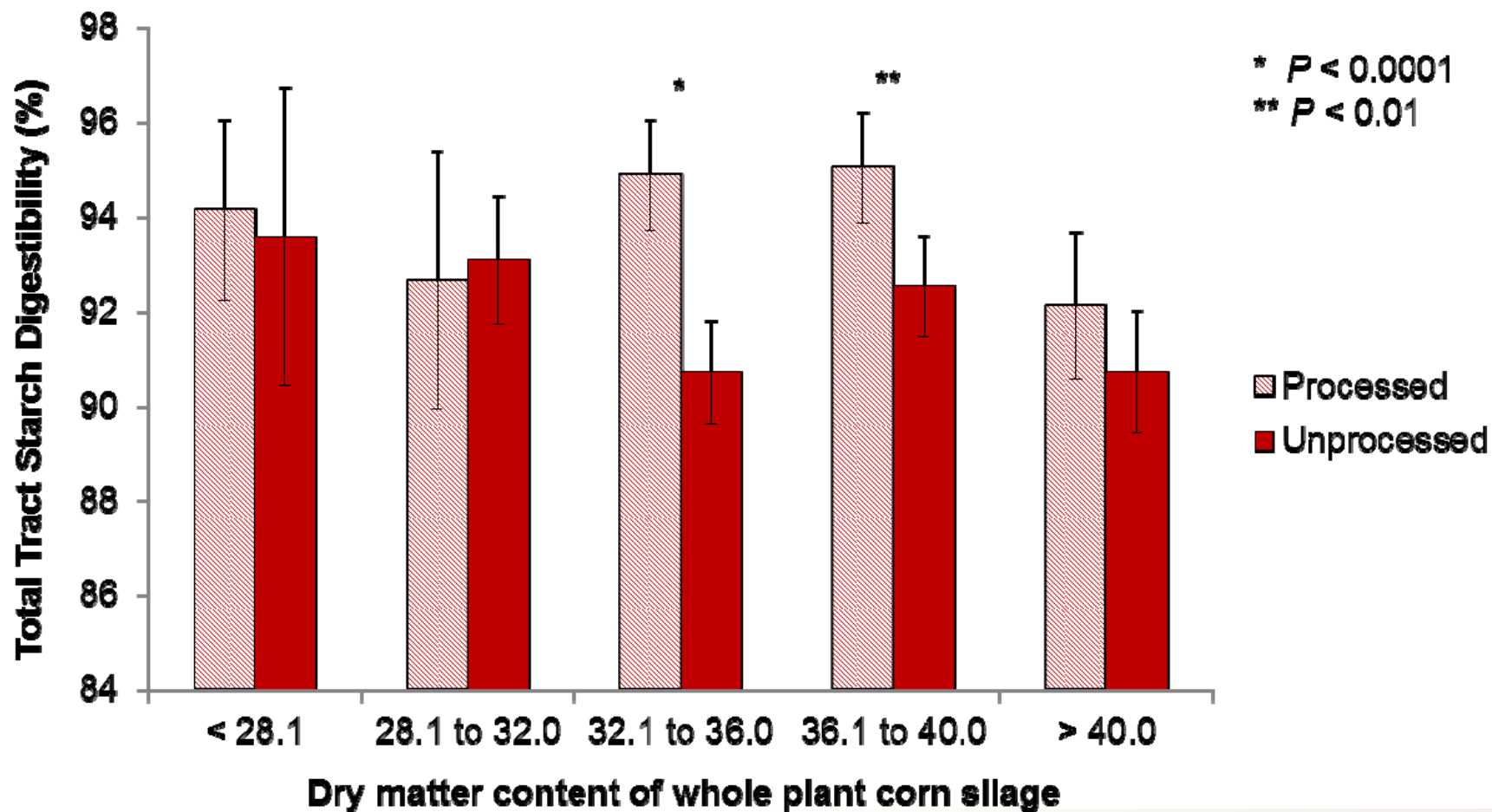
## *Meta Analysis*

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)

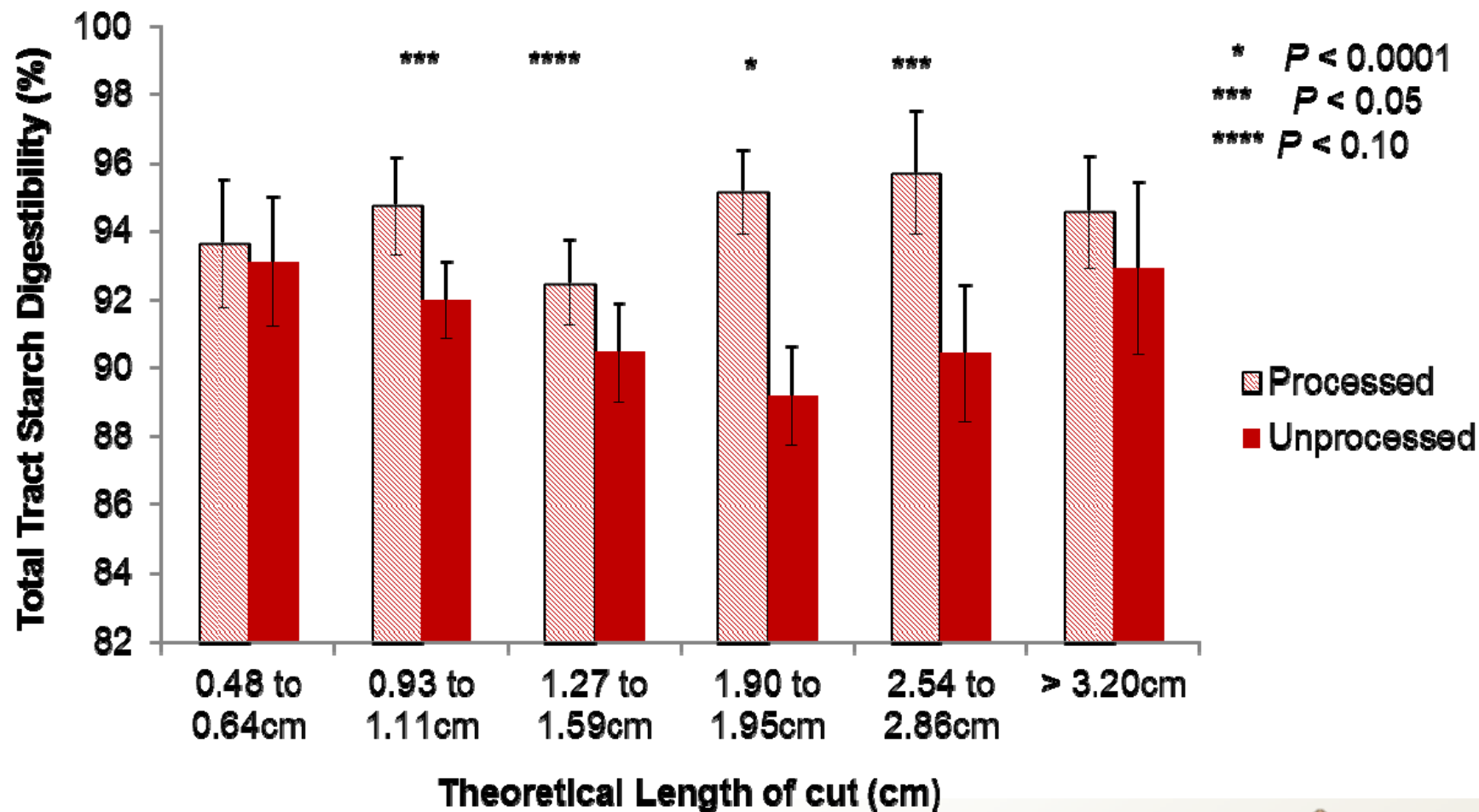


# Kernel Processing\* Maturity





# 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% $\pm$ 3.3	60.3% $\pm$ 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

# Nutrient composition of feed-out samples

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





# Fermentation profile of feed-out samples

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



# Bag Packing Densities (lb DM/cu. Ft)

$$\text{Volume} = 3.14 \times \text{Radius}^2 \times \text{Length}$$

	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 $\pm$ 35	1559 $\pm$ 47
KP	117 $\pm$ 36	1520 $\pm$ 33

Pens were comprised of 46% 1<sup>st</sup> lactation cows all of which were Holsteins, and of the 2<sup>nd</sup> 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	<i>P</i> <
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	<i>P</i> <
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



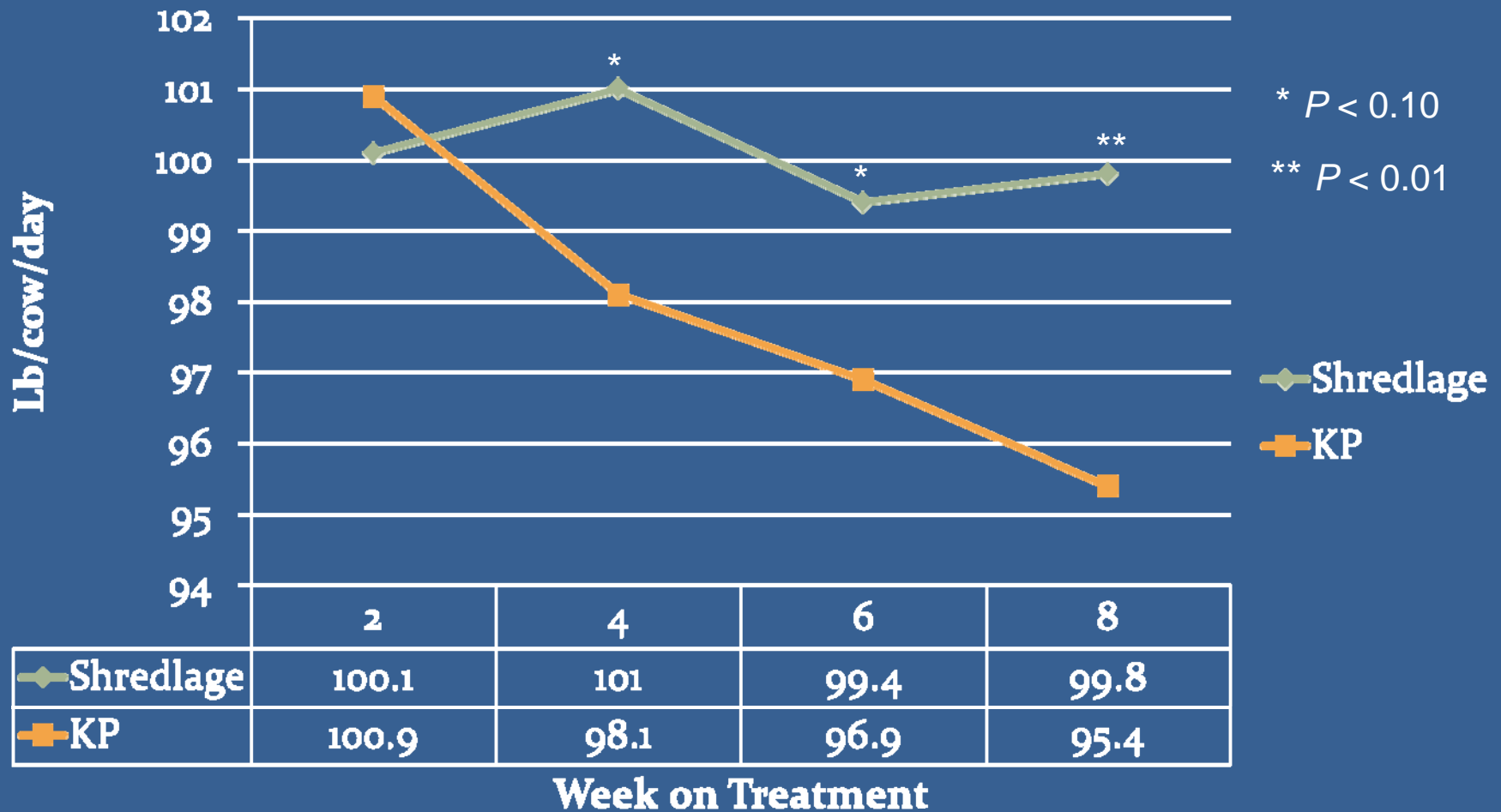
# Milk composition

	Shredlage	KP	<i>P</i> <
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



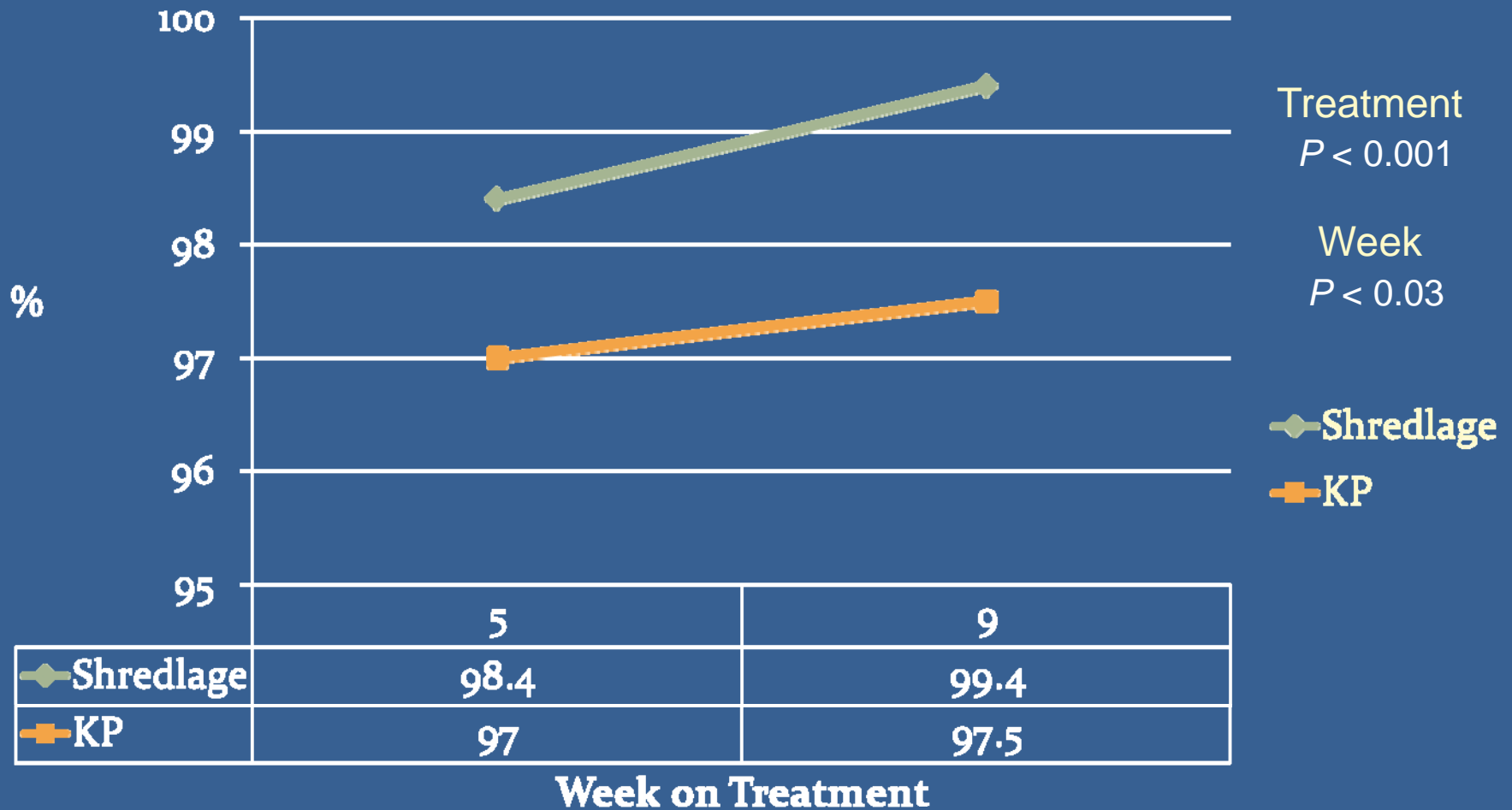
Week  $\times$  Treatment Interaction ( $P < 0.03$ )

# BW, BCS, BWC & Diet NE<sub>L</sub> Results

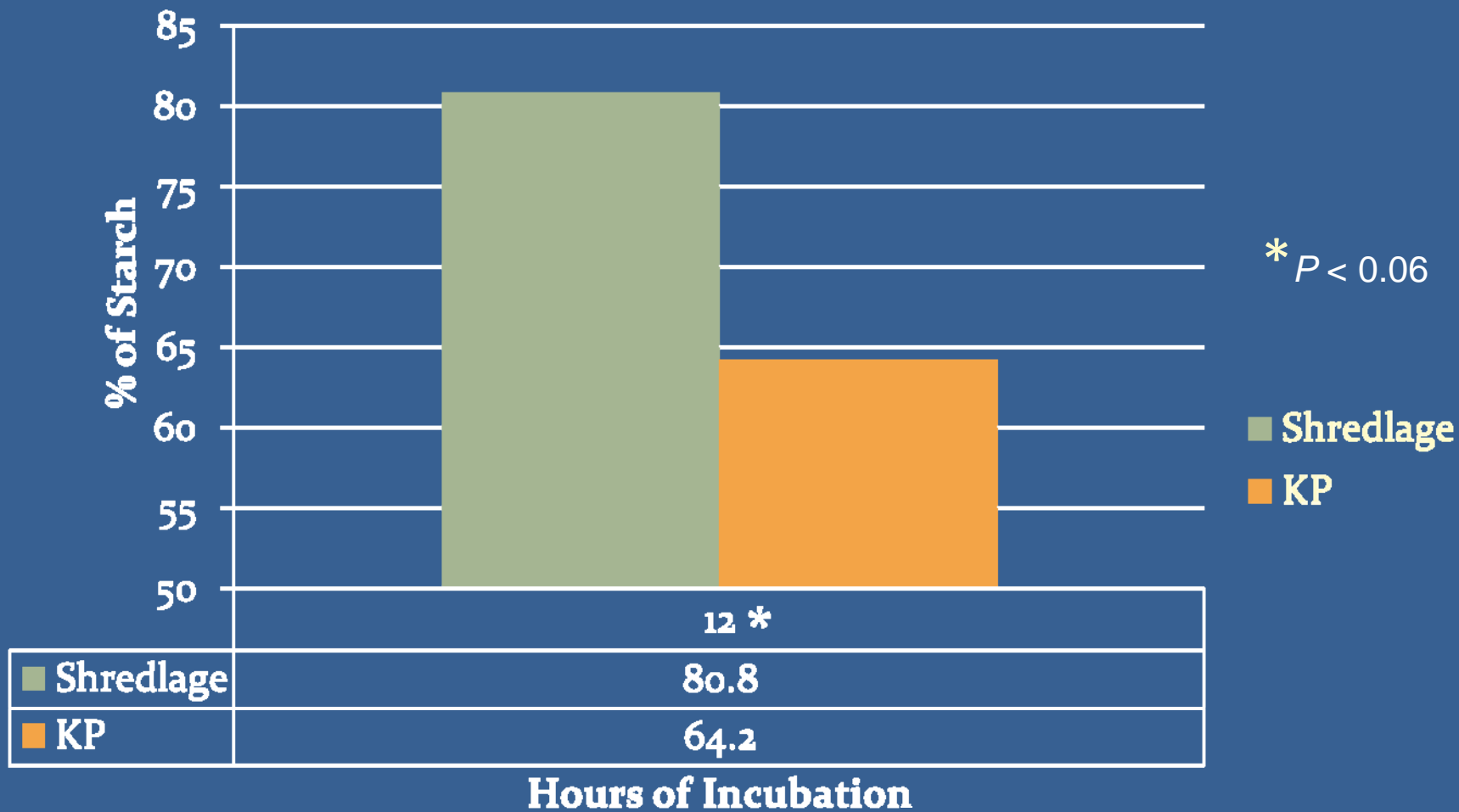
	Shredlage	KP	<i>P</i> <
BW, lb	1568	1553	0.29
BCS	3.03	3.04	0.90
BWC, lb/d	0.62	0.68	0.84
Calc. Diet NE <sub>L</sub> , Mcal/lb DMI	0.81	0.82	0.59



# Total Tract Starch Digestibility

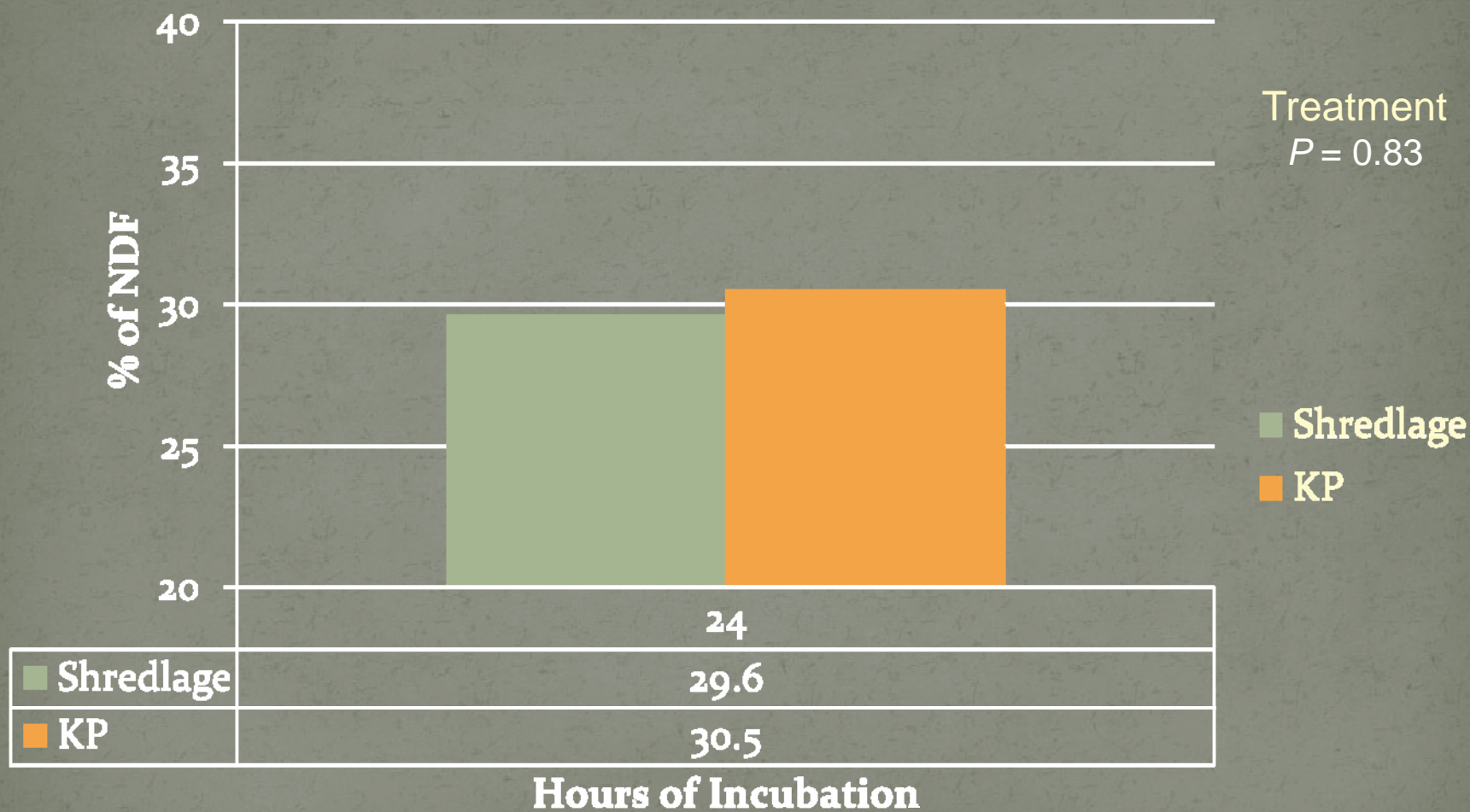


# Ruminal In Situ Starch Digestibility



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](mailto:rolson@shredlage.com) <http://www.shredlage.com/>
- Scherer Design Engineering, South Dakota







# Visit UW Extension Dairy Cattle Nutrition Website

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#### Web Site Highlights



- [Dairy Team News from the University of Wisconsin](#)
- [2009 Four-State Dairy Nutrition & Management Conference Proceedings](#)

#### UW Feed Grain Evaluation System

- [Technical note: A method to quantify prolamin proteins in corn that are negatively related to starch digestibility in ruminants](#) (Josh Larson and Pat Hoffman - JDS paper)
- [Corn Biochemistry: Factors related to starch digestibility in ruminants](#) (Pat Hoffman and Randy Shaver - Conference paper)
- [Corn Biochemistry: Factors related to starch digestibility in ruminants](#) (Pat Hoffman and Randy Shaver - slide set)
- [A guide to understanding prolamins](#) (Pat Hoffman and Randy Shaver)
- [UW Feed Grain Evaluation System](#) (Pat Hoffman and Randy Shaver)
- [Relative Grain Quality - RGQ](#) (Pat Hoffman and Randy Shaver)

#### Spreadsheets

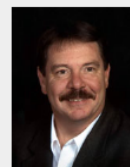
- [MILK2006 Corn Silage: Calculates TDN-1x, NEL-3x, Milk per ton, and Milk per acre](#)

#### Publications

- [Benchmarking forage nutrient composition and digestibility](#)
- [Feeding Programs in High Producing Dairy Herds](#)

#### Presentations

- [Benchmarking forage nutrient composition and digestibility](#)
- [Diets fed in selected WI high-producing dairy herds](#)



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