

# Effect of type of processor and storage length on corn silage processing score in whole-plant corn silage samples

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Abstract # M159

## Introduction

It is well-established that processing the whole-plant corn silage (WPCS) during harvest reduces the particle size of the kernel fraction and increases digestibility of starch, which in turn improve milk production and feed efficiency by dairy cows. Recently, corn shredlage allowed WPCS to be harvested at a longer chop length while still maintaining or improving the degree of kernel processing, but data focused on silage quality and fermentation is unavailable. Recently, ensiling was reported to increase corn silage processing score (CSPS; % of starch passing through a 4.75-mm sieve) by 7%- to 10%-units in WPCS ensiled in vacuum-sealed plastic bags for at least 30 d and up to 240 d, but data from farm scale silos are still missing.

## Objective

Thus, this project aimed to evaluate the effects of:  
1) processor type on fermentation profile, CSPS and physically effective NDF (peNDF) of WPCS samples and,  
2) storage length on WPCS CSPS

## Material and Methods

### Data set and Treatments

A data set comprised of 3,900 WPCS samples was obtained from Rock River Labs (Watertown, WI).

All samples were collected from 2013 to 2016 by the Chr. Hansen team under specific protocols to label samples as shredlage (SHRD) only if confirmed by farmers and/or custom harvesters.

Treatments for type of processor and storage length were as follows, respectively:

- 1) SHRD and non-shredlage (CONV);
- 2) Month of submittal was assumed to be associated to time in storage.

### Statistical analysis

- The model contained either type of processor (SHRD vs. CONV) or month of sample submittal as fixed effect.
- Data were analyzed with the GLIMMIX procedure of SAS.
- Significance was declared at  $P \leq 0.05$  and the Tukey test was used for mean separation.

## Results

**Table 1. Descriptive statistics of selected nutrient composition of whole-plant corn silage harvested with or without a shredlage processor**

Item	CONV <sup>1</sup>		SHRD <sup>2</sup>	
	mean	SD	mean	SD
DM, % of as fed	35.7	5.1	35.2	4.3
CP, % of DM	7.8	1.0	7.8	0.8
aNDF, % of DM	42.8	5.5	41.2	4.7
ADF, % of DM	24.6	3.2	24.6	2.7
Fat, % of DM	2.4	0.5	2.4	0.3
Lignin, % of DM	3.4	0.7	3.5	0.7
Starch, % of DM	32.5	6.2	32.1	5.5
Ash, % of DM	1.4	1.0	4.0	0.7

<sup>1</sup> CONV - whole-plant corn silage reported as conventional or not reported as shredlage (n=3591).

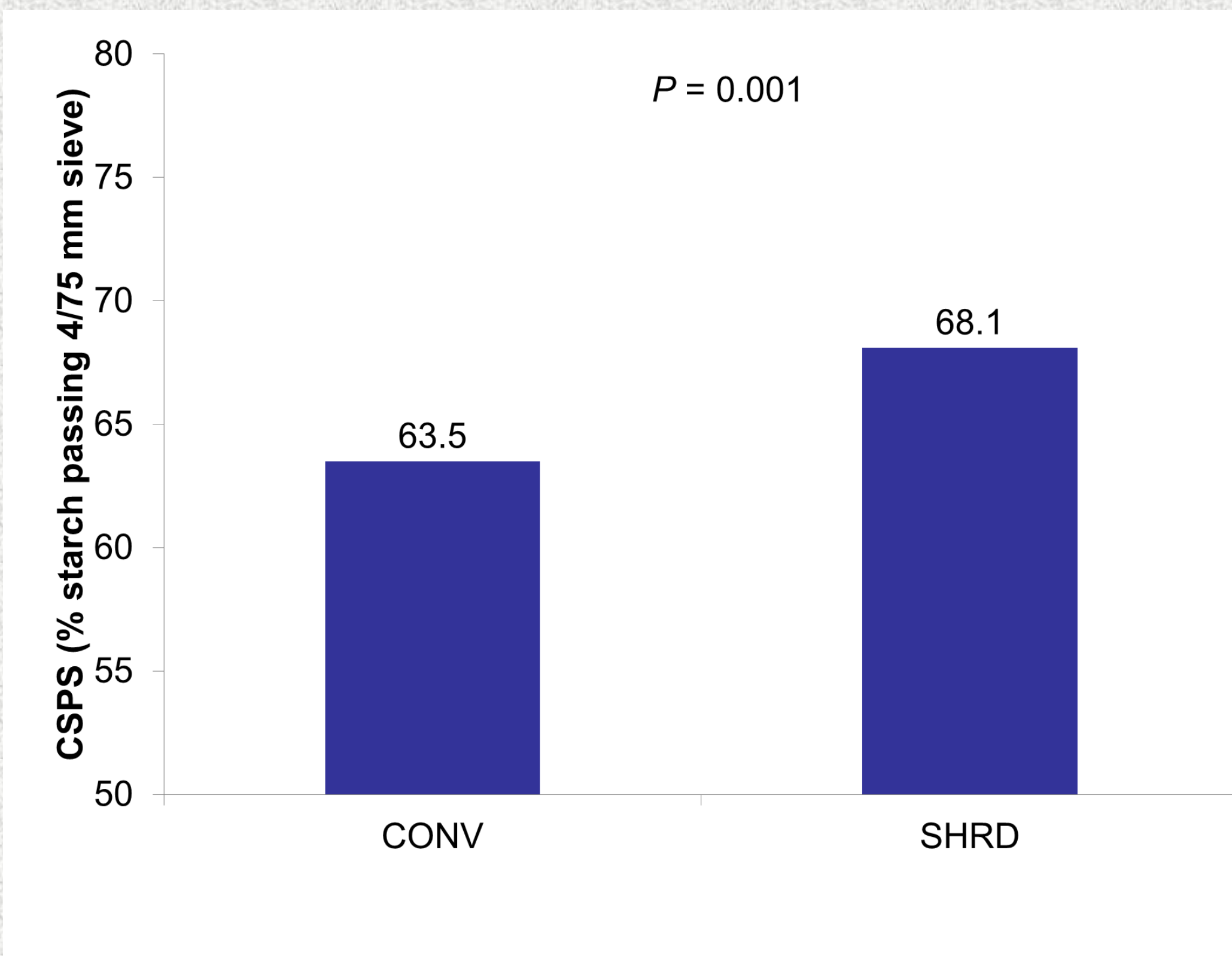
<sup>2</sup> SHRD - whole-plant corn silage reported as shredlage (n=309).

**Table 2. Effect of processing on fermentation profile, microbial count and DM loss of whole-plant corn silage**

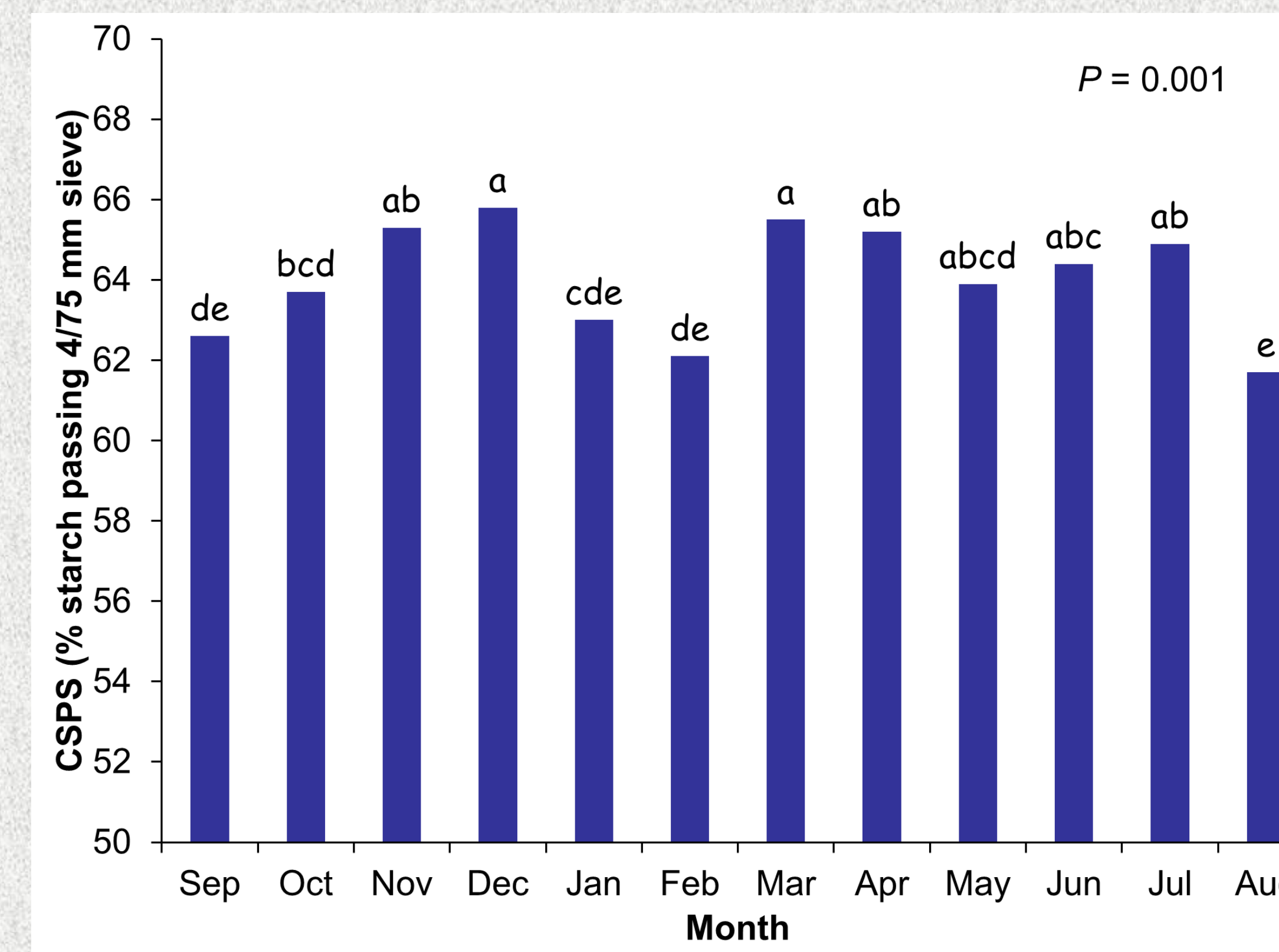
Item	CONV <sup>1</sup>	SHRD <sup>2</sup>	SEM	P-value
pH	3.97	3.90	0.02	0.01
Lactate, % of DM	4.34	4.89	0.11	0.001
Acetate, % of DM	2.25	2.29	0.07	0.59
Butyrate, % of DM	0.36	0.37	0.09	0.96
Ethanol, % of DM	0.55	0.59	0.05	0.45
Yeast count, log cfu/g	2.35	0.72	0.36	0.001
Mold count, log cfu/g	0.35	0.21	0.15	0.36
DM loss <sup>6</sup> , % of fresh forage DM	2.73	2.42	0.15	0.05

<sup>1</sup> CONV - whole-plant corn silage reported as conventional or not reported as shredlage.

<sup>2</sup> SHRD - whole-plant corn silage reported as shredlage.



**Figure 1. Effect of processing on corn silage processing score of whole-plant corn silage**



**Figure 2. Effect of month of sample submittal on corn silage processing score of whole-plant corn silage**

## Summary

- Lower pH and greater lactic acid concentration for SHRD than CONV
- Similar acetic, propionic and butyric acids between processing treatments
- 4.6%-units greater CSPS for SHRD than CONV
- 1.8%-units greater peNDF for CONV than SHRD (40.3 vs. 38.5, respectively)
- 1.6%-units greater ivNDFD for CONV than SHRD (55.0 vs. 53.4, respectively)
- Time of ensiling affect peNDF and CSPS but did not followed a pattern

## Conclusions

- Our results suggest that harvesting WPCS as SHRD improve kernel breakage while maintaining adequate fermentation patterns.
- Effect of ensiling on CSPS did not followed a pattern and further research is warranted.