What’s New in Corn Silage Harvest Technology

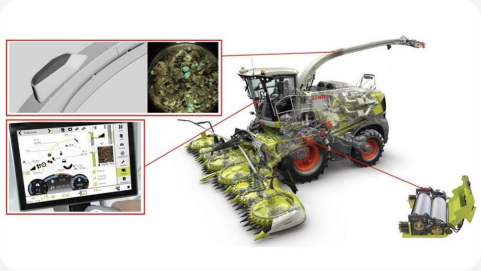
2025 World Dairy Expo

Matthew Digman and Brian Luck

Agricultural Engineers

Biological Systems Engineering
University of Wisconsin


AGRI
TECHNICA
THE WORLD'S NO.
9. – 15.
NOVEMBER
HANNOVER
GERMANY
2025



CLAAS | CEMOS AUTO CHOPPING

Fendt | Katana 850

NEW HOLLAND | ForageCam™ System

CLAAS

Hall 13 | Stand C18

Subject area: 07.3 Machinery and equipment for chopping, mowing, conditioning and baling of mowed material

CEMOS AUTO CHOPPING - automatically controlled grain processing based on AI-supported CSPS real-time analysis

Fendt - AGCO GmbH

Hall 20 | Stand B26

Subject area: 07. Harvesting technology

Fendt - ForageQualityCam

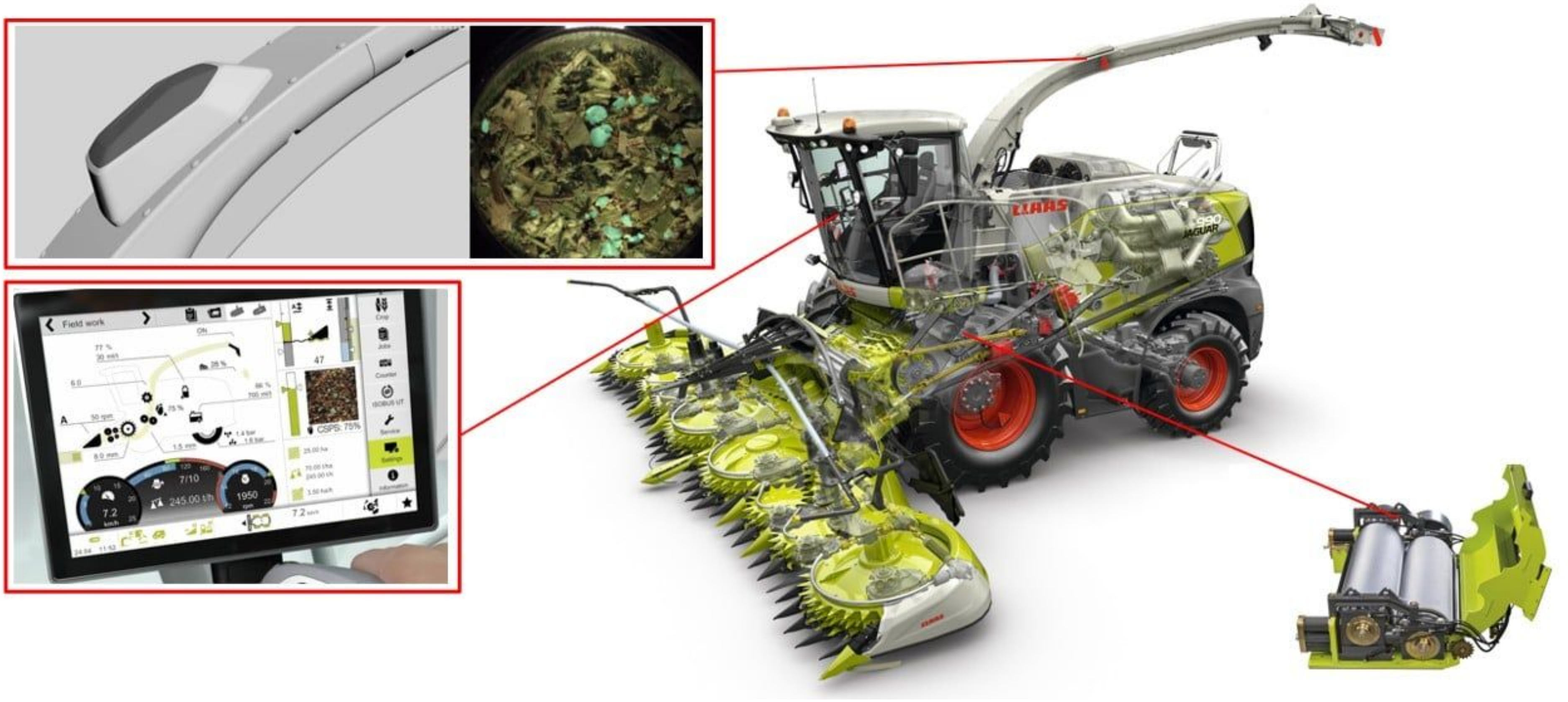
NEW HOLLAND

Hall 3 | Stand B21

Subject area: 07.3 Machinery and equipment for chopping, mowing, conditioning and baling of mowed material

ForageCam™ system

These systems employ **artificial intelligence to distinguish grain from plant material, classify grain particles by size, and calculate the CSPS**, which is then displayed to the operator. With this immediate feedback, operators can continuously adjust cracker settings to match harvesting conditions, ensuring optimal silage quality. Beyond improving feed efficiency, this technology also enhances documentation for future management decisions, while helping i**ncrease throughput, lower wear, and reduce fuel consumption.**

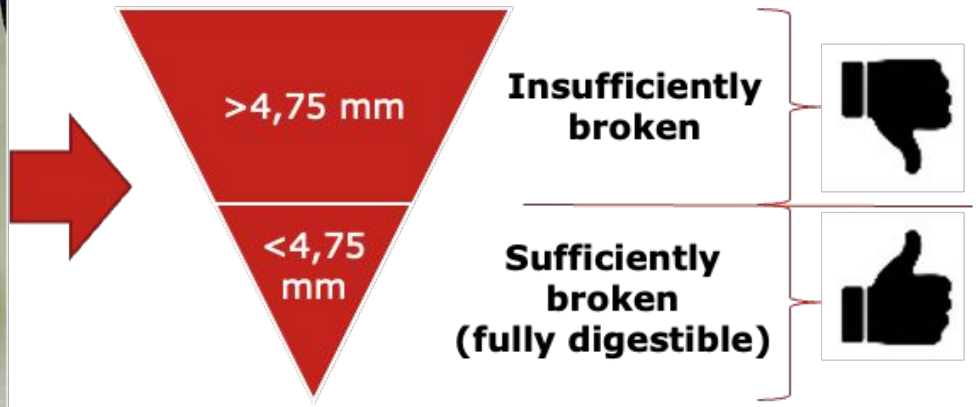

Field work
CSPS: 75%
7/10
245.00 t/h
1950
CLAAS
990
JAGUAR

What is CSPS?

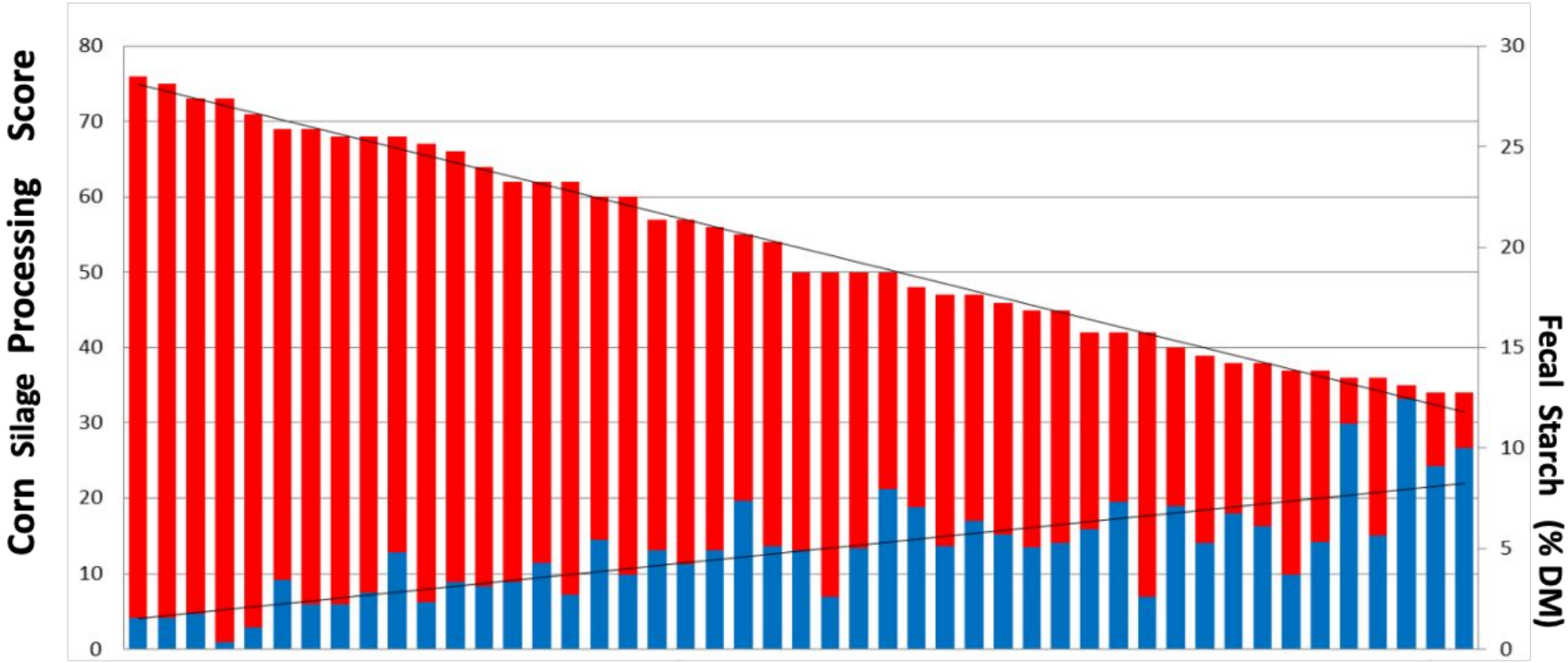
J. Dairy Sci. 88:4414–4425

Chemical and Physical Characteristics of Corn Silages and Their Effects on In Vitro Disappearance

G. Ferreira[1,2] and D. R. Mertens[3]
[1]Dairy Science Department, University of Wisconsin-Madison, Madison 53706
[2]Facultad de Ciencias Agrarias, Pontificia Universidad Católica Argentina, Buenos Aires, Argentina
[3]USDA-ARS, U.S. Dairy Forage Research Center, Madison, WI 53706



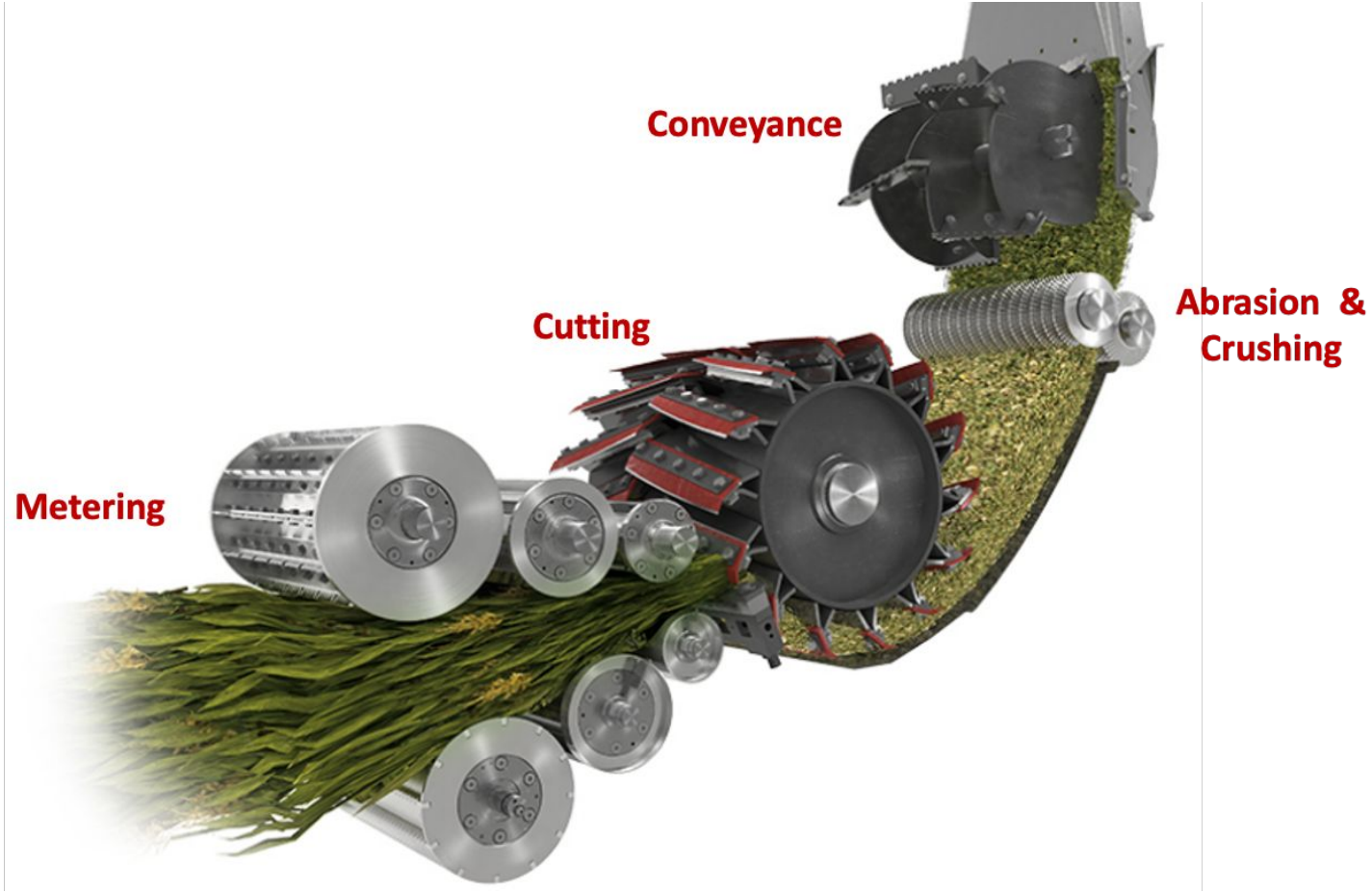
Excellent	>70%
Average	50-70%
Bad	<50%

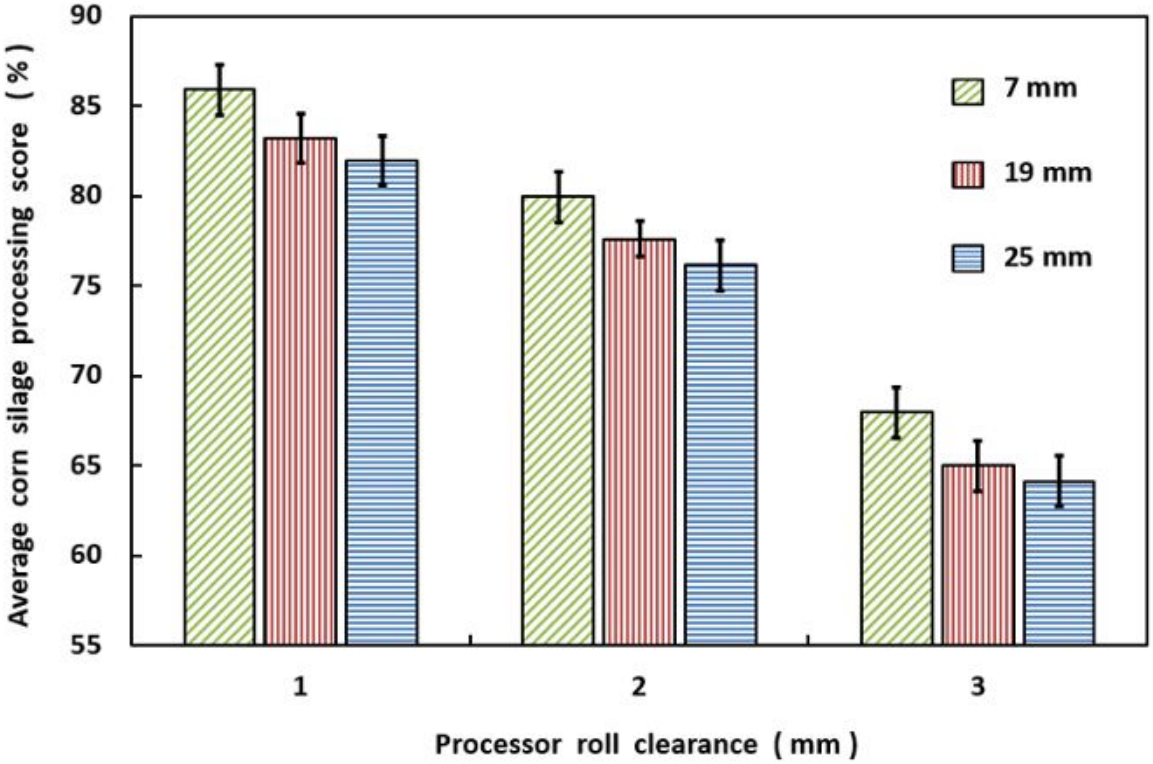


"One-unit change in fecal starch equals the energy equivalent for 0.72 pounds of milk production."

Braman and John Kurtz, 2012

How do we manipulate CSPS?


Conveyance
Cutting
Abrasion &
Crushing
Metering



Lemcke et al., 2025

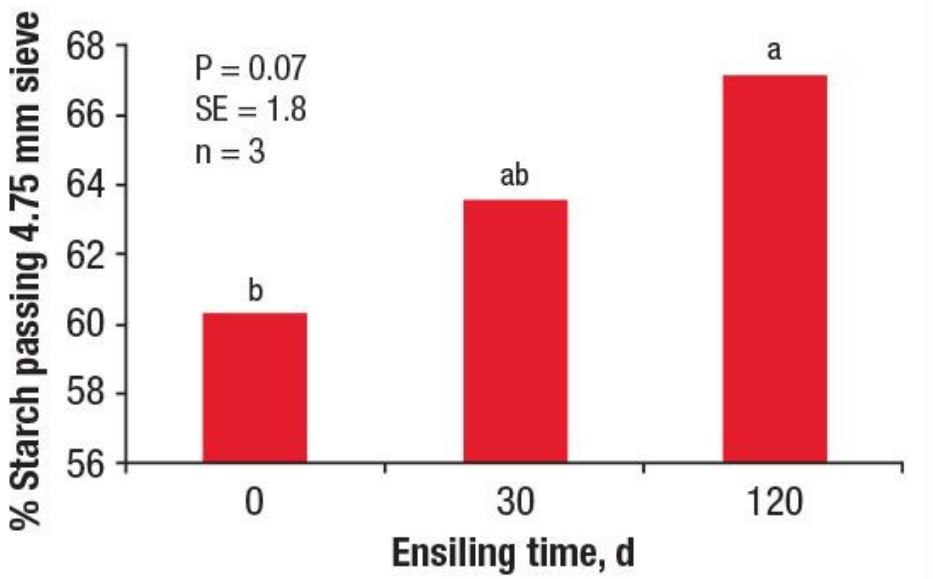
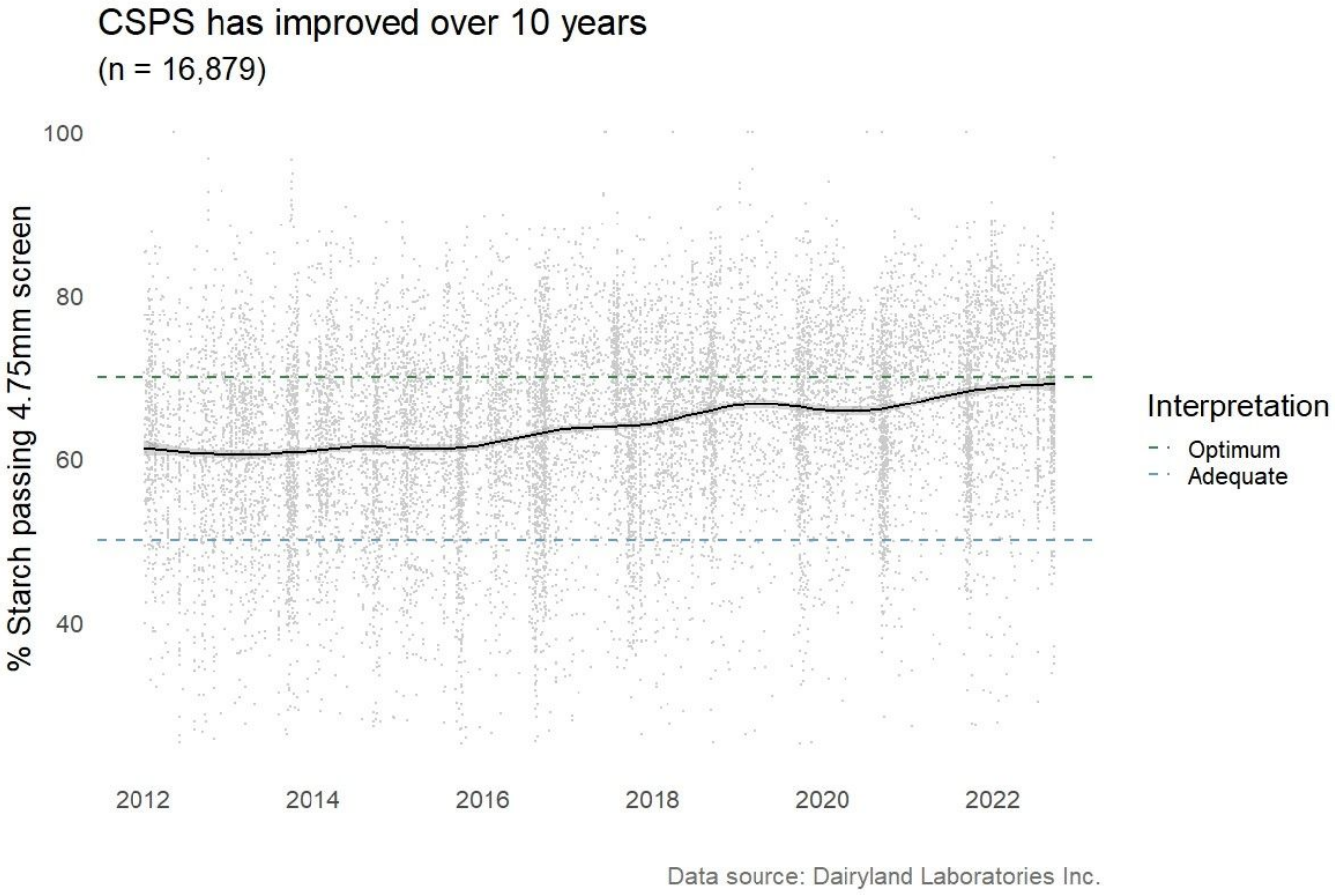


Table 1. Least squares means and SE for the effect of fermentation time on IVSD, NDFd30, and CSPS.

	Fermentation Timepoint, d					
Forage Metric	0	45	90	135	SE	*P*-value
IVSD, % starch	58.2^{d}	63.2^{c}	67.2^{b}	69.4^{a}	1.7	< 0.001
NDFd30, % NDFom	57.4	57.1	57.0	56.8	0.8	0.23
CSPS, % starch	60.3^{A}	60.0^{BA}	59.3^{BA}	58.4^{BC}	5.9	0.07

^{a,b,c,d}Means with different superscripts differ ($P < 0.05$).
^{A,B,C}Means with different superscripts differ ($P < 0.10$).

Are we doing a good job?

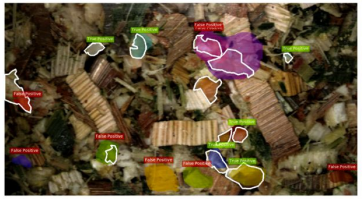

CSPS has improved over 10 years
(n = 16,879)
% Starch passing 4.75mm screen
100
80
60
40
2012
2014
2016
2018
2020
2022
Interpretation
Optimum
Adequate
Data source: Dairyland Laboratories Inc.

Can we optically measure CSPS?

(a) Sample from the plot with lowest CSPS (59.9%)

(b) Sample from the plot with highest CSPS (89.3%)

(a) Original image.



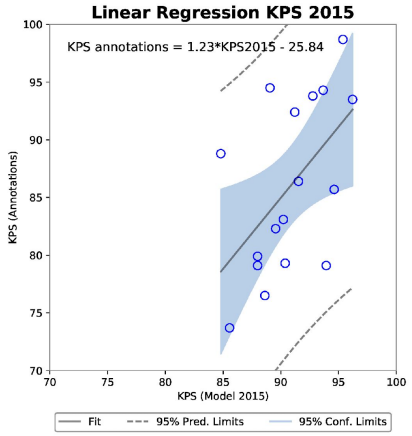
(b) 2015 model.

(c) 2016 model.

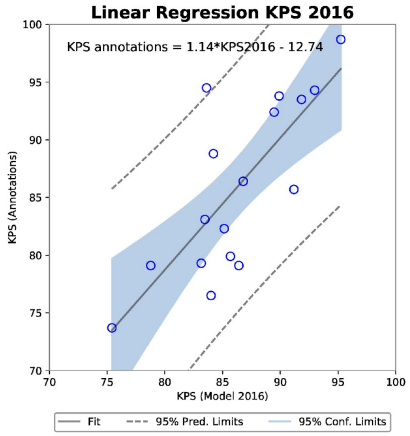
(d) 2017 model.

(e) 151617 model.

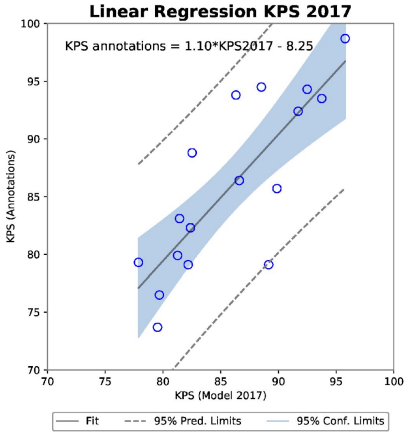
- Unsorted kernels, RGB images
- Strong correlation (r^2= 0.78) between R-FCN predictions and CSPS



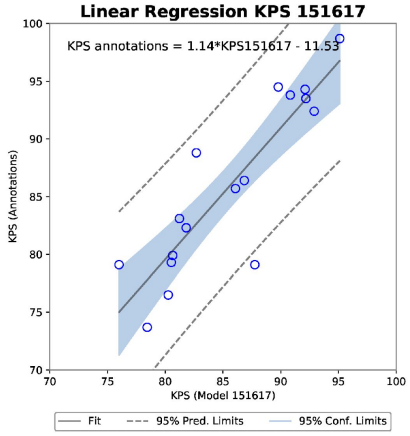
(a) 2015 model.



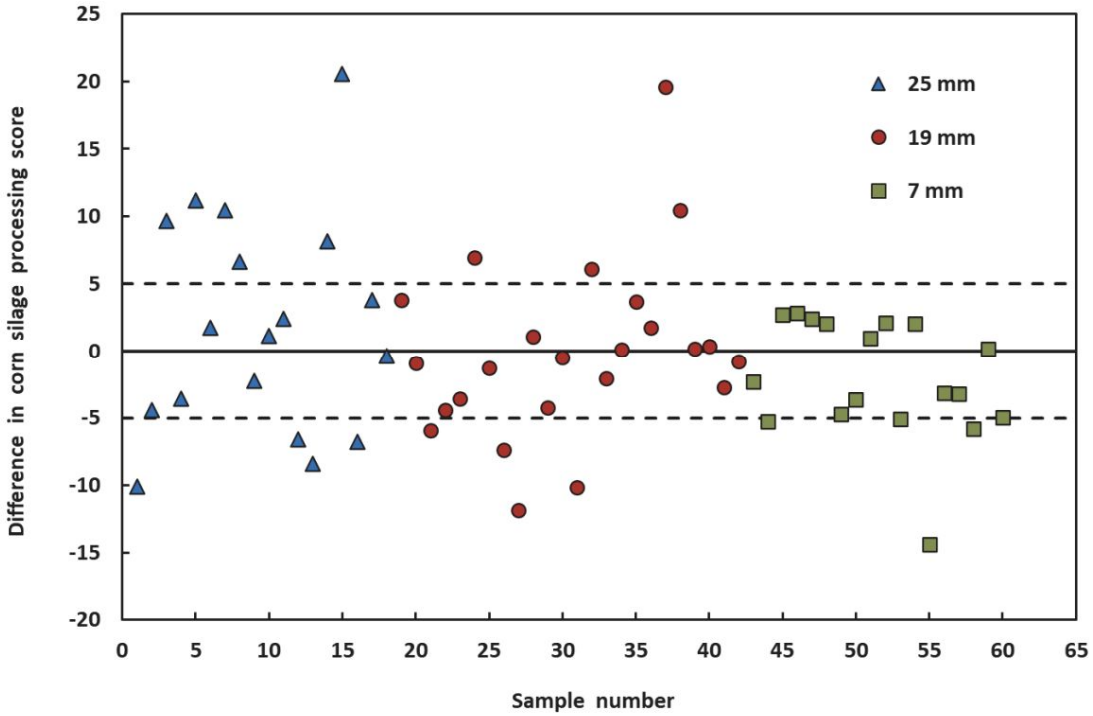
(b) 2016 model.



(c) 2017 model.

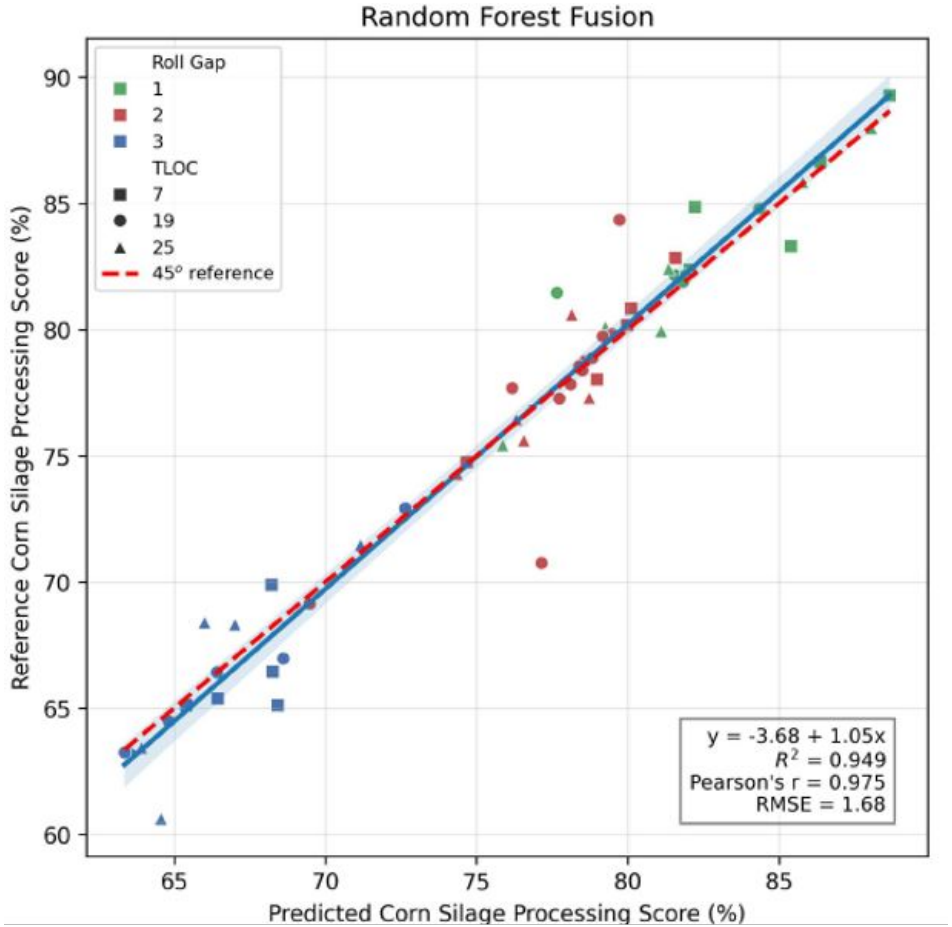


(d) 151617 model.



SEL was 6.7 and 6.9 for Labs A and B.

Lemcke et al., 2025



Yamada et al., 2025, Preprint

This is a big step forward!

So we're done? Not quite:

- **In my opinion** the lab assay is too noisy for precise control of CSPS
- We don't have enough information to understand the cost of attaining a one point change in CSPS
- Many of these systems use **CVML** and can be easily overfit to the data - it will take time to understand the limitations and improve the models

Questions?

Matthew Digman
digman@wisc.edu