Comparison of techniques to assess grain processing in whole-plant corn

Regina C.C. Pinto[1], **Gustavo G.S. Salvati[2]**, Giovanna H. Zapponi[1], Janaina M. Bragatto[1], Joao P.M. Carmo[3], Willian P. Santos[2], Hugo A.R. Ramirez[4], Luiz F. Ferraretto[5], Joao L.P. Daniel[1]

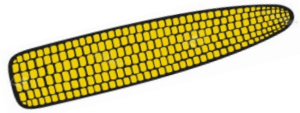
[1] Department of Animal Science, State University of Maringa, Maringa, PR, Brazil
[2]Tracking Feed, Piracicaba, SP, Brazil
[3]ESALQLab, Piracicaba, SP, Brazil
[4]Tecnología Forrajera, San Miguel de Allende, Guanajuato, Mexico
[5]Department of Animal and Dairy Sciences, University of Wisconsin-Madison, Madison, WI, USA

Whole-plant corn silage (WPCS)

Grain fraction ~ 40-45% DM

Starch content 30-39%

~50% **of WPCS energy**

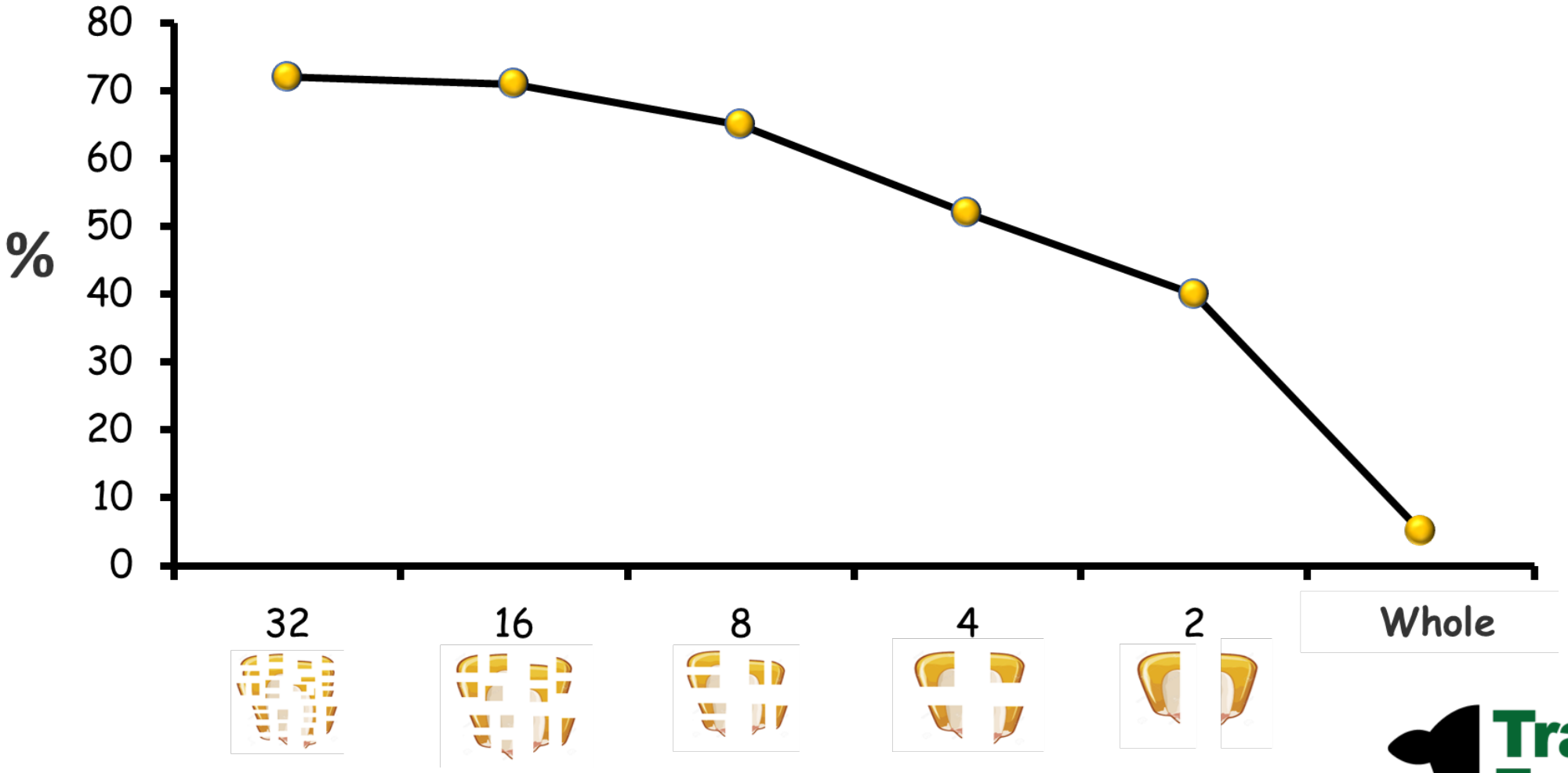


~ 80-98% total tract starch digestibility

- **Endosperm type**
- **Maturity**
- **Particle size**
- **Storage length**

Tracking Feed

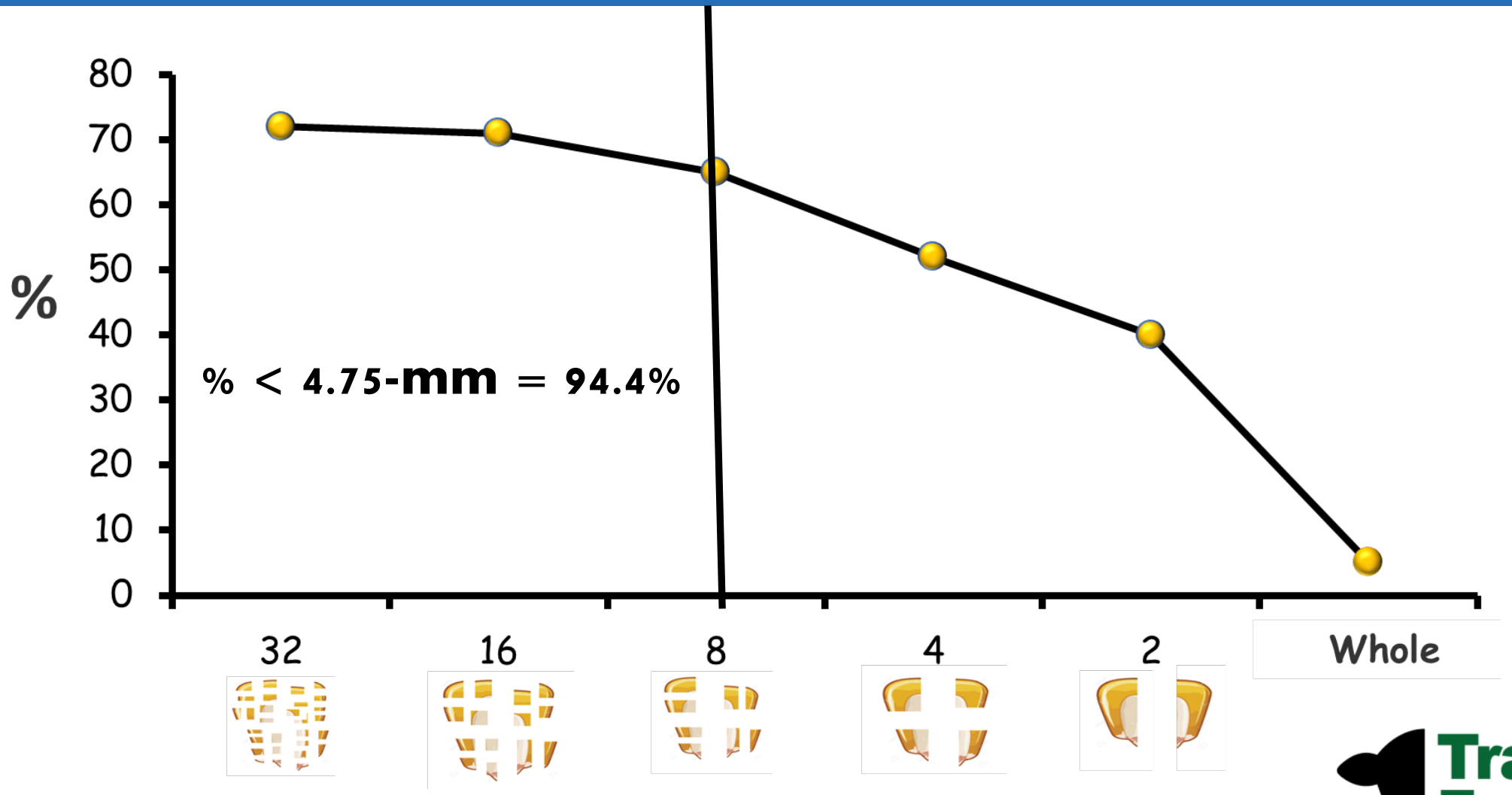
DM digestibility 24-h (%)



Tracking Feed

Dias Jr. et al. (2017)

DM digestibility 24-h (%)



Tracking Feed

Dias Jr. et al. (2017)

Kernel processing score (KPS)

% starch passing through 4.75-mm sieve	KPS
>70%	Excellent
70% a 50%	Adequate
< 50%	Poor

Tracking Feed

Ferreira e Mertens, 2005

Whole kernel count in 1-L volume

Tracking Feed

Hydrodynamic separation procedure

Savoie et al., 2004


Tracking
Feed

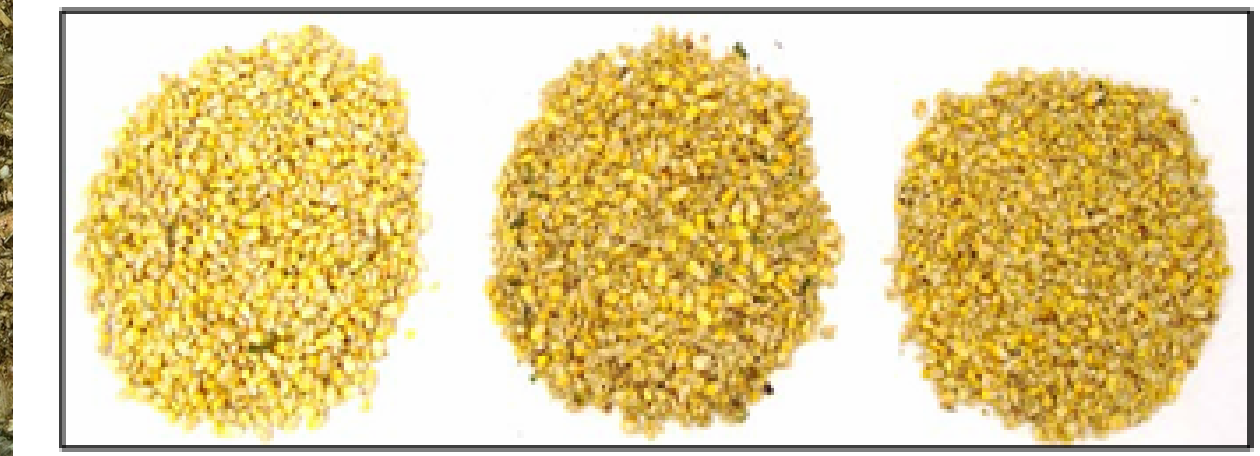
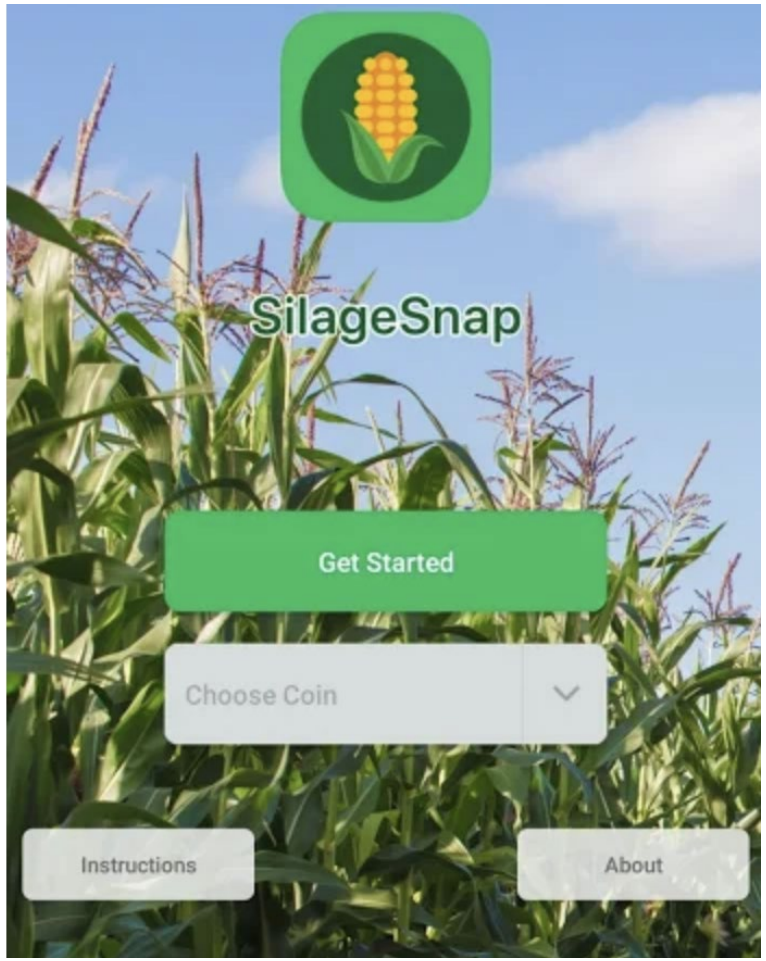


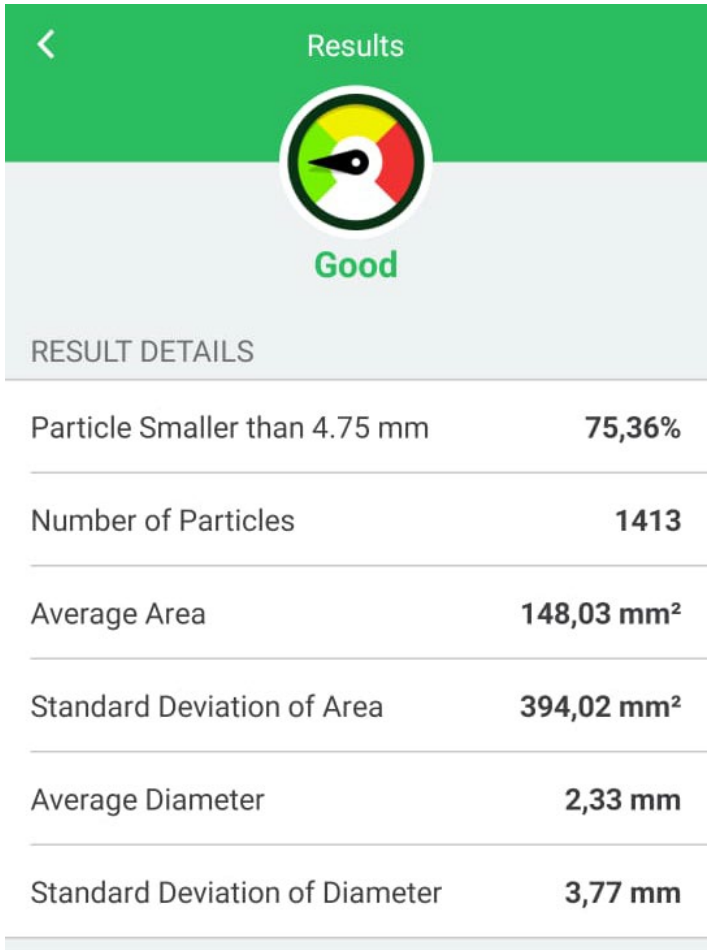
Figure 6. Separated kernels showing three levels of kernel processing. Only the material on the right could be considered adequately processed.

Shinners and Holmes., 2014

Tracking Feed

Silagem snap APP





% of grains < 4.75-mm sieve

Objective

The objective of this study was to compare lab and on-farm techniques to measure kernel processing in whole-plant corn forage.

Tracking Feed

Materials and methods

Sixty samples of fresh chopped whole-plant corn of various hybrids, maturity stages, cutting heights, forage harvesters, chopping lengths, and kernel processors were collected from commercial farms in the South and Southeast regions of Brazil between 2023 and 2024.

The samples were kept frozen during transportation to the laboratory and stored at −20°C until the start of the procedures.

Tracking Feed

Materials and methods

Samples were dried in a forced-air oven at 55°C for 72 h and ground to pass through a 1-mm screen in a Willey mill (A. H. Thomas Scientific, Swedesboro, NJ);

The nutrient composition were determined by NIRS at Esalqlab

ESALQ LAB Zootecnia

Tracking Feed

Materials and methods

The PSPS procedure was conducted manually using 3 sieves (19-mm, 8-mm and 4-mm) and a pan (Heinrichs et al. 2013)

Using dried and unground samples, the corn silage processing score or fragmentation index was determined as described by Ferreira and Mertens (2005).

Materials and methods

- A sub-sample of 0.3 kg as fed of each sample was used to separate grain and stover fractions through the hydrodynamic separation procedure (Savoie et al., 2004);

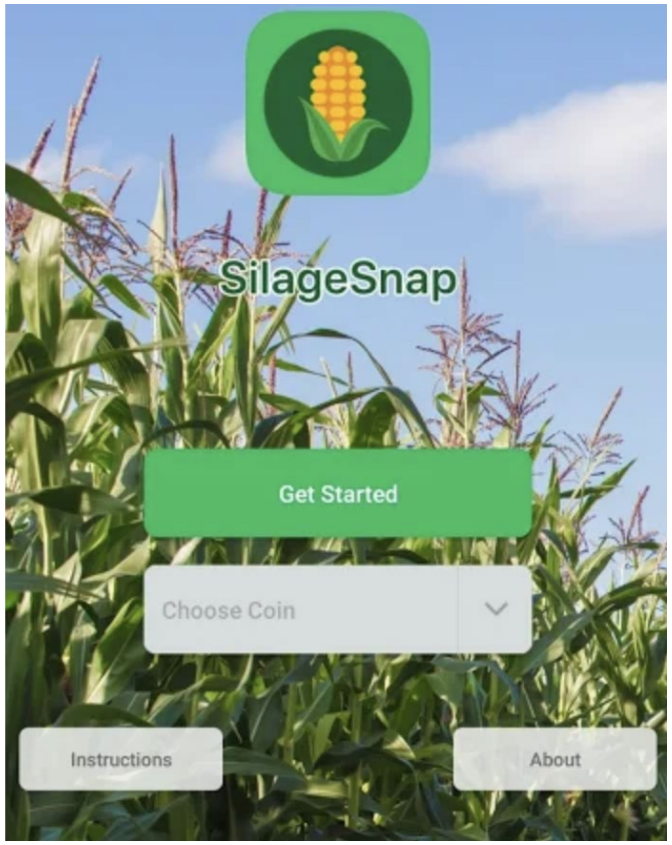
- The sub-sample was dried at 130°C for 30 minutes plus an additional 15 minutes in an air fryer prior to immersion in water

Tracking Feed

Materials and methods

- **The grain fraction was dried in an air fryer at 130°C for 10 minutes, then mixed and dried for an additional 10 minutes at the same temperature**

Materials and methods



Tracking Feed

Materials and methods

Grain fraction was dry-sieved using a Tyler Ro-Tap Shaker using a set of 9 sieves with nominal square apertures of 9.50, 6.70, 4.75, 3.35, 2.36, 1.70, 1.18, and 0.59 mm and pan (ASABE, 2007) to determine GMPS (μm) calculated using a log normal distribution (Baker and Herrman, 2002) and porportion of grains <4.75-mm.

Tracking Feed

Materials and methods

Number of intact kernels (n per 250 g as fed, considering >3/4 pieces and whole grains).

Tracking Feed

Statistical analysis

- **Data were analyzed using the REG procedure of SAS**
- **The gerometric mean particle size (GMPS, μm) was used for comparison with the other methods**

Tracking Feed

Nutrient composition

Table 1. Descriptive statistics of nutrient composition in whole plant corn samples (n=51).

	Mean	SD	Min	Max
DM, % as fed	37.6	5,2	26.1	52.3
aNDFom[1], %DM	43.3	7.1	29.9	63.4
uFDNom$_{240h}$, %DM	9.9	3.2	5.7	20.1
DFDN$_{48h}$, %DM	59.7	2.6	54.0	66.0
Starch, %DM	28.1	7.8	10.6	44.6

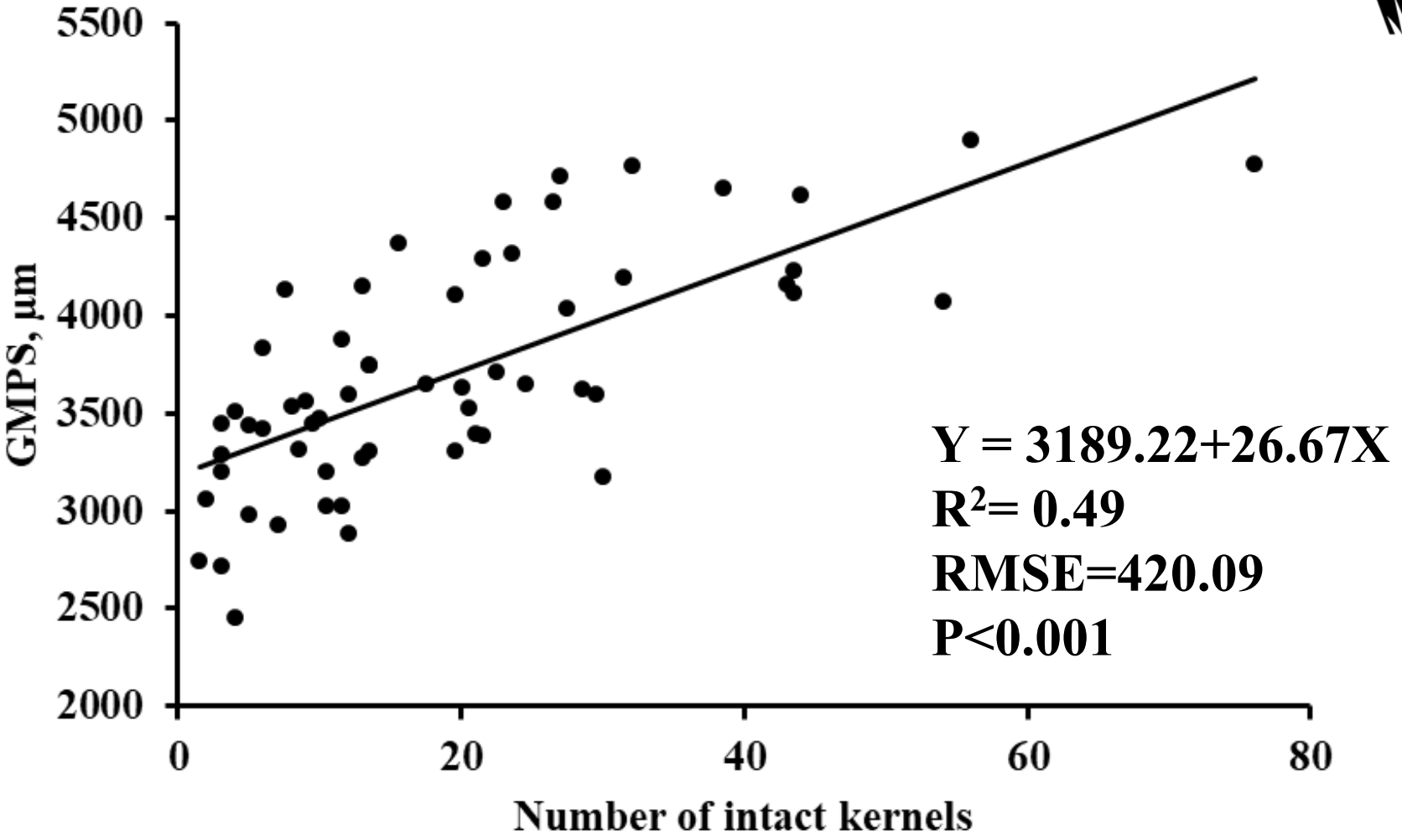
Particle size

Table 2. Descriptive statistics of particle size in whole plant corn samples (n=51).

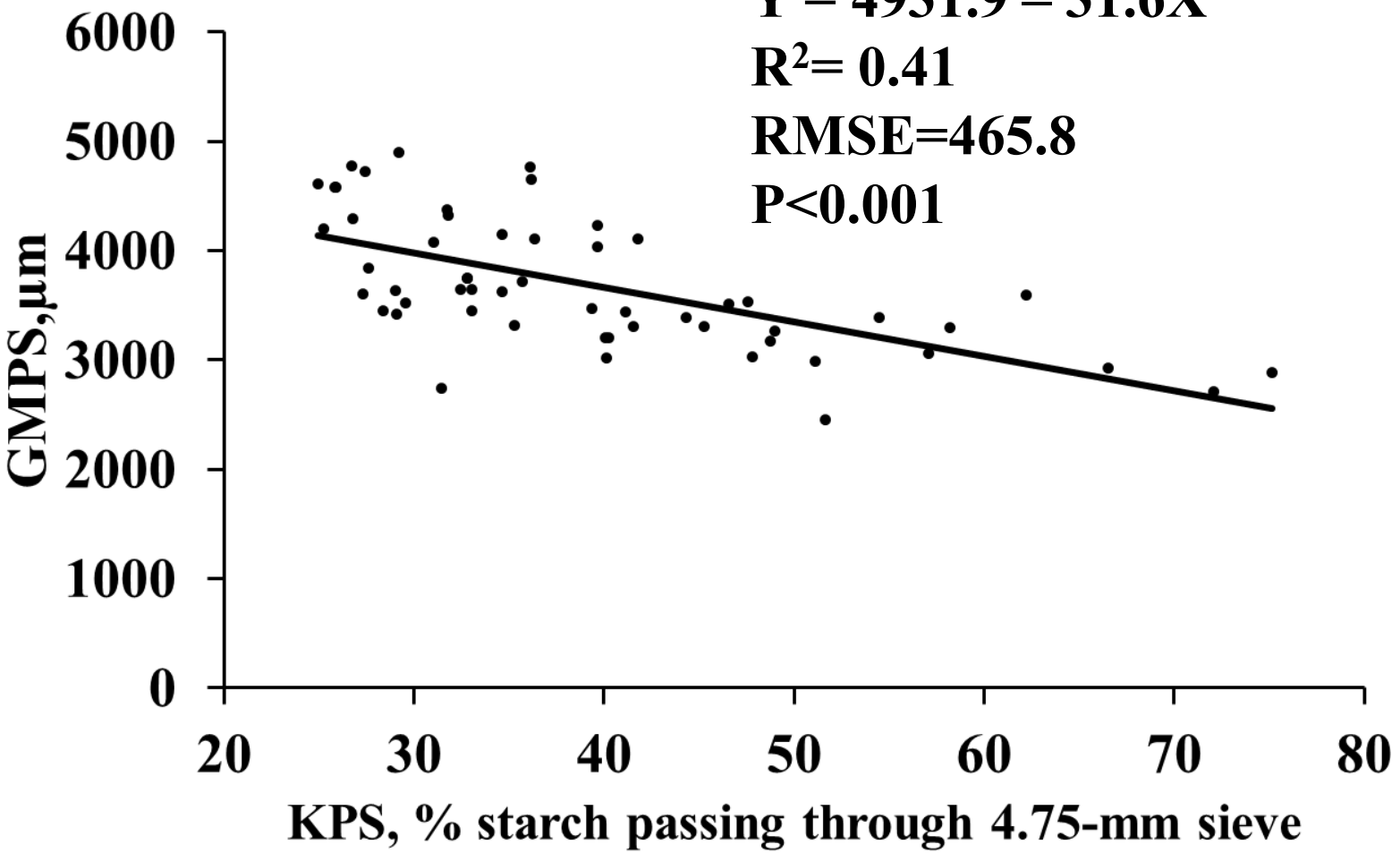
	Mean	SD	Min	Max
19-mm	6.5	4.4	0.4	21.6
8-mm	60.1	9.8	30.5	74.4
4-mm	21.3	7.5	9.7	39.3
Botton	11.6	4.0	3.8	24.2

Tracking Feed

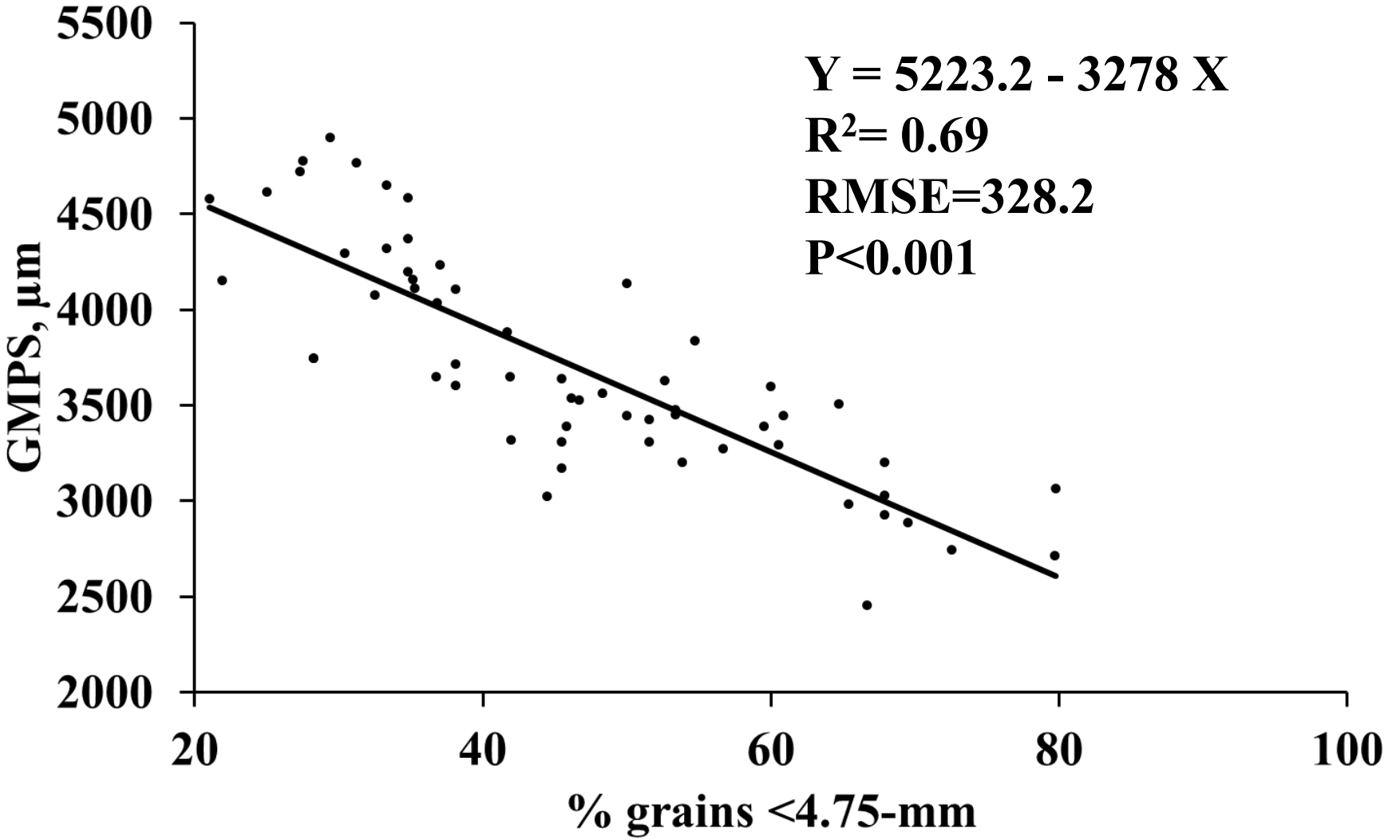
Intact kernel count



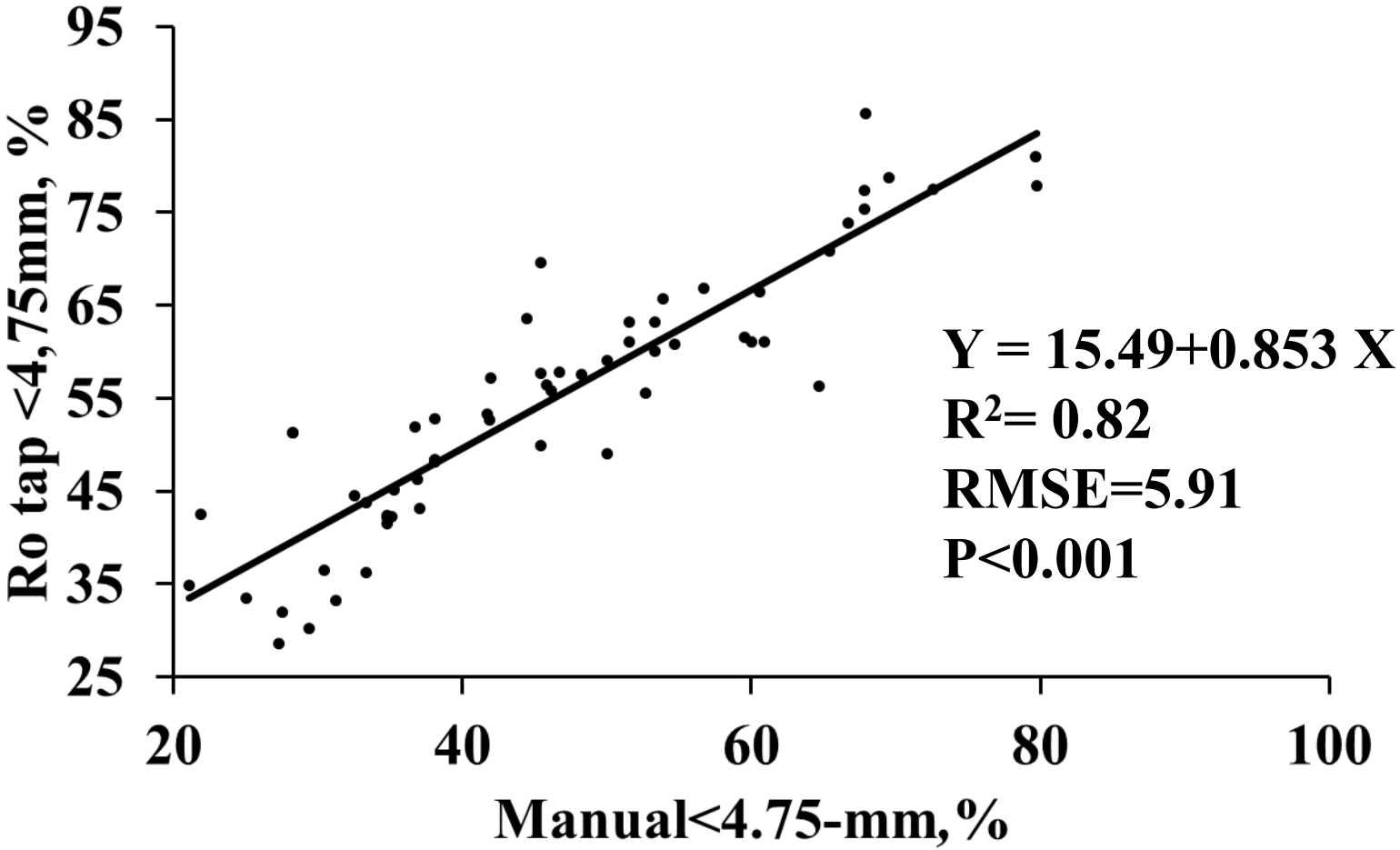
Corn silage processing score (CSPS) or Kernel processing score (KPS)



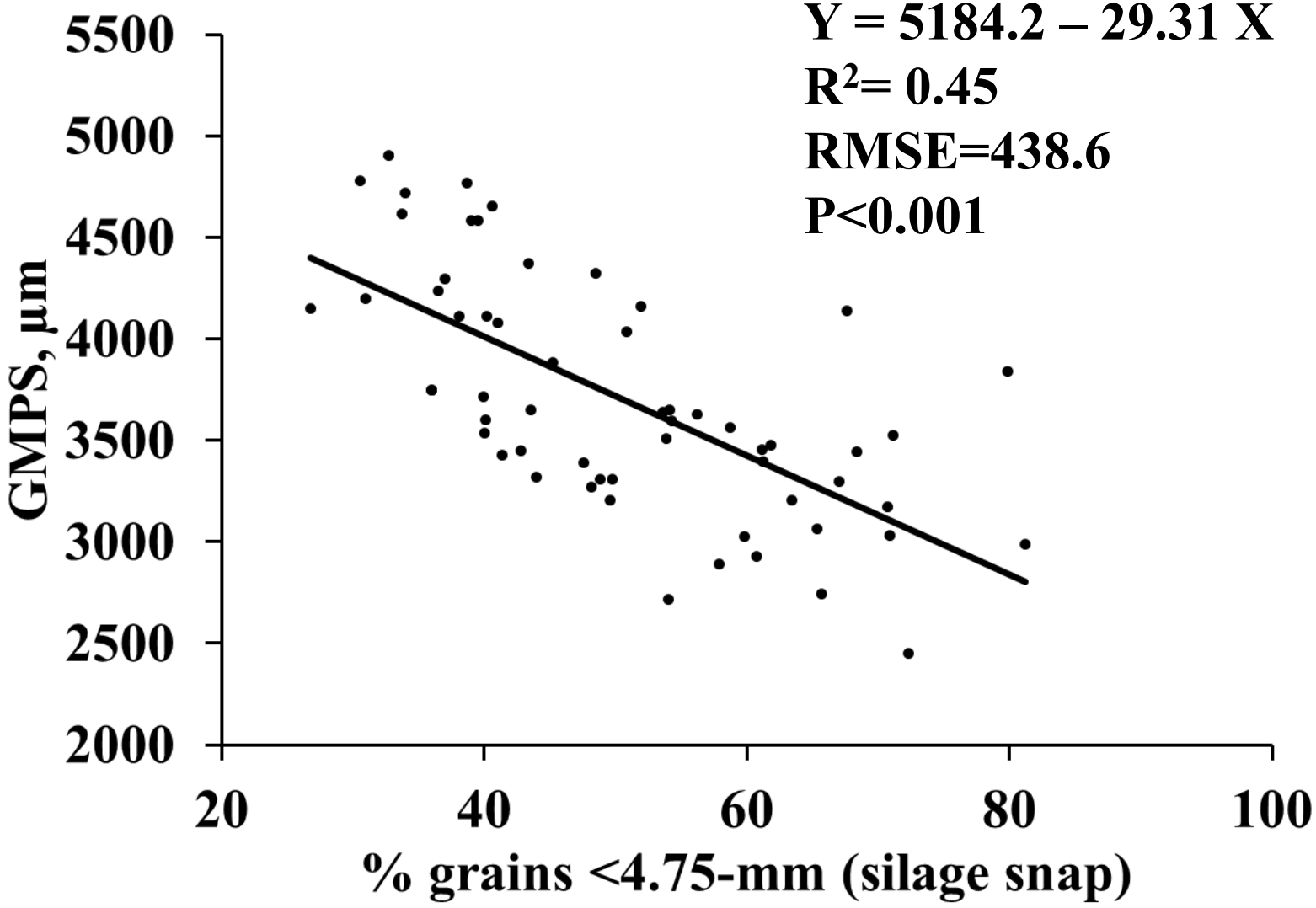
Manual sieving process

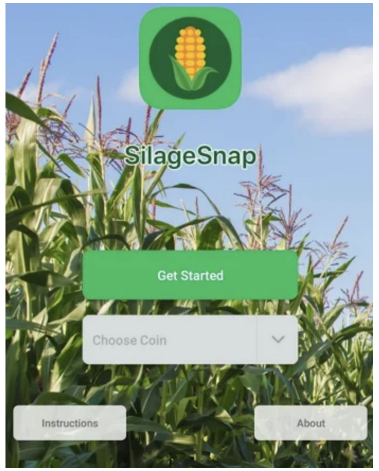


Ro-tap shaker sieving vs. manual



Silage snap App





Conclusion

On-farm manual sieving of the grain fraction with a 4.75-mm sieve, combined with hydrodynamic separation, is an effective tool for evaluating kernel breakage, aiding in decision-making during harvesting of WPCS

Tracking Feed

Acknowledgments

tracking_feed

Compartilhar uma...

534 publicações

20 mil seguidores

1.133 seguindo

Tracking Feed | Nutrição Gado Leite/Corte

tracking_feed

Produto/serviço

🌾 Democratizando a nutrição de gado de leite e corte - da lavoura => silagem => cocho => desempenho => lucro

Ver tradução

linktr.ee/trackingfeed

Tracking Feed · 587 membros

Painel profissional

25 mil contas alcançadas nos últimos 30 dias.

Editar | Compartilhar perfil | Contato

Novo | Treinamentos | Produtos | Pesquisa | Viagem Téc...

Tracking Feed

@trackingfeed3914 · 2,53 mil subscritores · 125 vídeos

Canal de integração de Ciência e Prática na produção de silagens até o desempenho ani ...mais

facebook.com/Trackingfeed e mais 1 link

Personalizar canal | Gerir vídeos

Início | Vídeos | Shorts | Em direto | Playlists | Publicações

Para si

EPISÓDIO 04 - Professor Carlos Corassin

833 visualizações • há 12 dias

EPISÓDIO 05 - Pecuária e Carreira Profissional - Dr ´André Nagatani

160 visualizações • há 3 dias

EPISÓDIO 03 - Manejo e Nutrição de Bezerras Leiteiras, com Carla Maris Machado Bittar.

475 visualizações • há 2 meses

Thank you very much for your attention!

+55 32 99120 6343

gustavosalvati@systechfeeder.com.br

Tracking Feed