

A SURVEY OF BERRY PROCESSING SCORE AND NUTRIENT CONTENT OF SORGHUM SILAGE ON COMMERCIAL LIVESTOCK OPERATIONS ACROSS THE US

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INTRODUCTION:

- Sorghum silage is an important crop in the dairy industry, especially in areas facing drought or water shortages.
 - However, there is a wide variation in the starch content and availability of the starch contained within the plant.
 - This can cause challenges for balancing rations around this feed.
- Research has found that increasing berry processing can increase the *in-situ* starch digestibility in this forage.
 - A 1.7mm and 2.36mm berry processing score (BPS) has been developed to help quantify the degree of processing.
 - The degree of processing of sorghum silage on commercial livestock operations has not been quantified.
- The objective was to survey commercial operations to better understand the degree of berry processing in sorghum silage.

FIELD STUDY METHODOLOGY:

- Ensiled sorghum samples (n=53) were collected from commercial US dairies in January and February of 2022.
- Samples were submitted to a commercial laboratory for BPS and nutrient analysis (Rock River Laboratory Texas, Edmonson, TX).
- For BPS, unground samples were oven dried and sieved using a Ro-Tap through the following screens 9.5mm, 6.7mm, 4.75mm, 4mm, 3.35mm, 2.8mm, 2.36mm, 1.7mm, 1.18mm, 0.6mm, and pan. Samples were then divided into coarse (>2.36mm), medium (1.7mm) and, fine (<1.7mm). Starch was measured using near infrared spectroscopy for coarse, medium, fine sections.
- This data was used to calculate 2.36 mm and 1.7mm BPS.
- Nutrient analysis was completed using near infrared spectroscopy.

DATA ANALYSIS METHODOLOGY:

- Nutrition analysis and BPS data were analyzed for general population statistics to determine mean, standard deviation (SD), coefficient of variance (CV), and 15 th and 85 th percentiles for BPS and nutrient analytes using the pastecs package in R Studio v. 4.0.4.
- Pearson correlation coefficients to examine potential relationships between BPS and nutrient content were determined using the lares package in R Studio v. 4.0.4.
 - Significant correlations were identified at P<0.05, trends at P<0.10.

RESULT AND DISCUSSION:

- The coefficients of variation greater than 40% in 1.7mm and 2.36mm BPS suggest large variation in degree of processing that occurs on commercial livestock operations.
- The mean 1.7mm BPS of 10.61 and mean 2.36mm BPS of 19.99 suggest little processing occurs on commercial operations with existing equipment.
 - The larger range and distribution of the data suggest a 2.36 mm BPS score may be better suited to determining degree of processing in sorghum silage with current on farm processing details.
 - The low degree of processing and large amount of variability represents a significant opportunity for increased starch availability in this feed if adequate processing were able to be applied.
- Based on the 85th percentile a 1.7mm BPS of 16.98 or 2.36mm BPS of 28.35 would be the suggested initial goal.
 - With advanced berry processing capabilities, the goal should be re-evaluated.
- 1.7mm and 2.36mm BPS were positively correlated with fiber digestibility parameters TTNDFD and sNDFD48, and were negatively correlated with starch content (P<0.05).
 - There was a trend for negative correlation with DM for 2.36mm BPS.
- While correlation does not indicate causation, these observations warrant further research as to potential ways to increase starch availability in sorghum silage.

Table 1. Population statistics for BPS

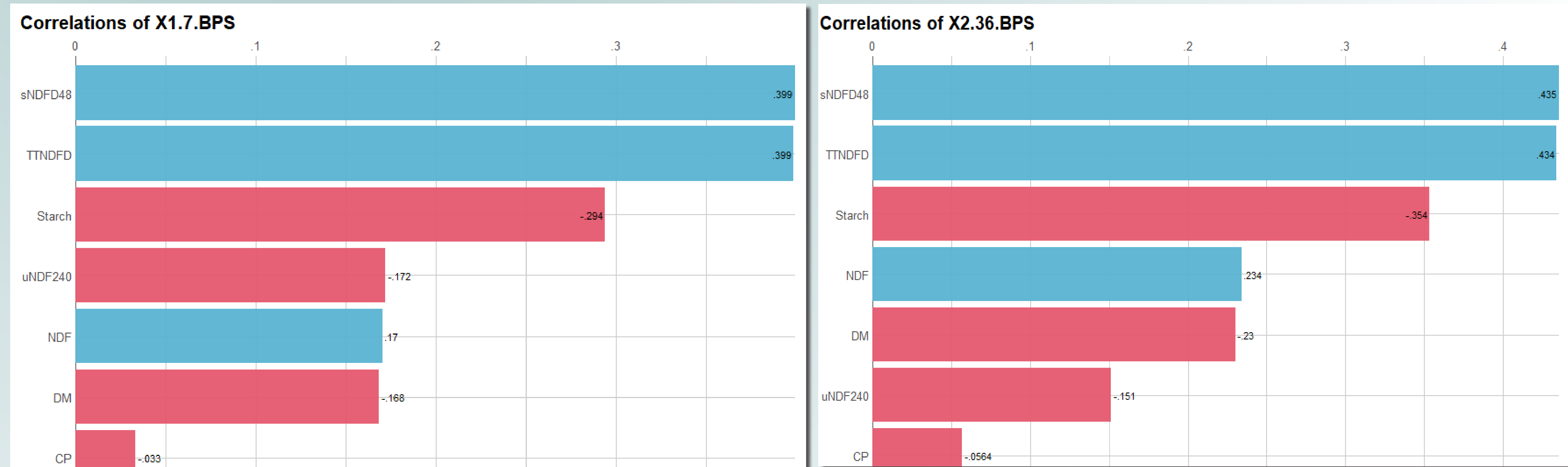
Parameters	Mean	SD	CV	15th percentile	85th percentile
1.7 mm BPS	10.61	8.49	80%	3.48	16.98
2.36 mm BPS	19.99	10.77	53.86%	8.39	28.34

Table 2. Population statistics for nutritional proximate analysis

Parameters	Mean	SD	CV	15th percentile	85th percentile
DM%	38.68	9.23	23.87%	32.12	49.35
Starch % of DM	11.60	7.24	62.38%	3.02	18.48
NDF % of DM	51.33	6.54	12.74%	46.21	52.53
Standardized NDFD 48 % of NDFD ¹	42.11	8.46	20.08%	30.98	50.74
UNDF 240 % of DM	20.05	4.69	23.39%	15.07	25.70
TTNDFD % of DM	36.42	6.87	18.85%	27.27	43.46
CP % of DM	8.96	1.53	17.04%	7.73	10.00

¹Goeser, J.P. and D.K. Combs. "An alternative method to assess 24-h ruminal in vitro neutral detergent fiber digestibility." Journal of dairy science vol. 92.8 (2009): 3833-41. doi:10.3168/jds.2008-1136

Figure 1. Correlation Coefficients for 1.7mm and 2.36mm BPS and nutrient analysis



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