Grain Particle Size

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Method differences in grain particle size measurements cause confusion in the field between buyers and suppliers and in diet formation. Like other tests used in feed labs (ex. ADF, NDF, or crude fiber), grain particle size measurements are dependent on the method's conditions, as opposed to chemically defined analytes like calcium or amino acids. Including sodium sulfite, amylase, or filters and filtration aids, and applying ash correction change what the "right" value of fiber is. Similarly, the "right" value of grain particle size depends on method conditions including:

- The number of sieves used
- Presence or absence of sieving aids (balls and brushes)
- Presence or absence of flow agents

Dairyland follows a traditional method (ASABE, 2006), utilizing 15 sieves with sieve aids (brushes and balls), a bottom pan and no additional flow agents. Methods used in other labs may utilize fewer sieves along with sieve aids as described by Goeser and Shaver (2020).

Generally:

- More sieves result in higher mean particle size and lower standard deviations, because they give particles more opportunities to be captured at different sizes and sort them into narrower, more precise ranges.
- Flow agents result in smaller mean particle size and larger standard deviations because they assist particles in reaching smaller sieves.

A method comparison analyzed six processed corn samples that were split and tested by two labs using their respective methods. The results of this side-by-side analysis are listed below:

	Dairyland Laboratories (15 sieves)		Alternative Lab (7 sieves)	
Sample	**Mean Particle Size, µm**	**Standard Deviation**	**Mean Particle Size, µm**	**Standard Deviation**
Sample 1	410	2.13	325	2.54
Sample 2	426	2.08	330	2.54
Sample 3	420	2.08	315	2.54
Sample 4	420	2.09	327	2.57
Sample 5	423	2.09	322	2.56
Sample 6	422	2.07	330	2.61

Like other tests used in feed labs, comparing samples tested at different labs is difficult without a deep understanding of the methods implemented at each lab and the consequences of those differences.

References:
ASABE, 2006 ASABE. 2006. Method of determining and expressing fineness of feed materials by sieving. ANSI/ASAE S319.3:601-605. Am. Soc. Ag. Biol. Eng., St. Joseph, MI.
Goeser, J.P. and Shaver, R.D. 2020. Commercial ground corn grain samples vary in particle size metrics and in situ rumen starch digestibility. Applied Animal Science. 36: 610-614.