Grain Grading: Purpose and Issues

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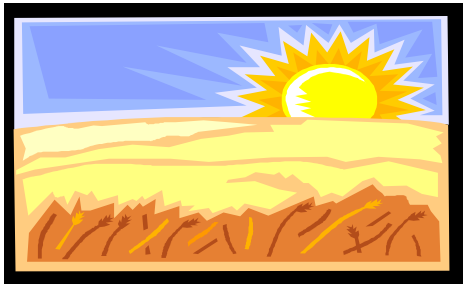
Federal Grain Inspection Service

- Provide the market with terms and methods for quality assessments. The Official U.S. Standards for Grain are used each and every day by sellers and buyers around the world to communicate the type and quality of grain bought and sold. Our standard testing methodologies accurately and consistently measure grain quality.
- Protect the integrity of the official inspection system and the market at large to ensure markets for grain and related products are fair, transparent, and free from deceptive and fraudulent practices.



Example of Grain Standard

Subpart I -- United States Standards for Sorghum
Terms Defined
§ 810.1401 Definition of sorghum.
Grain that, before the removal of dockage, consists of 50 percent or more of whole kernels of sorghum (*Sorghum bicolor (L.) Moench) excluding nongrain sorghum and not* more than 10.0 percent of other grains for which standards have been established under the United States Grain Standards Act.
§ 810.1402 Definitions of other terms.
(a)Broken kernels. All matter which passes through a 5/64 triangular-hole sieve and over a 2.5/64 round-hole sieve according to procedures prescribed in FGIS instructions.
....
(d) *Damaged kernels****. Kernels, pieces of sorghum kernels, and other grains that are badly*** ground damaged, badly weather damaged, diseased, frost-damaged, germ-damaged, heatdamaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

§ 810.1404 - Grades and grade requirements for sorghum.

Grading factors	Grades U.S. Nos.			
	1	2	3	4
Minimum pound limits				
Test weight per bushel:	57.0	55.0	53.0	51.0
Maximum percent limits of				
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total Broken kernels and foreign material:	2.0	5.0	10.0	15.0
Foreign material (part of total)	1.0	2.0	3.0	4.0
Total	3.0	6.0	8.0	10.0
.....				

U.S. Sample grade is sorghum that:
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or
(b) Has a musty, sour or commercially objectionable foreign odor (except smut odor);
or (c) Is badly weathered, heating or distinctly low quality.

Stimulus – the Grain and its Odors

- Grain has an inherent odor and it is not all the same
- Sour, Musty, and COFO encompass many different odors
  - 104 Grain Sorghum samples
    - Stale/Musty, Insect, Chemical, Vegetable Oil/Rancid, Fermented/Yeasty, Damp Basement, Fermented/Fruity, Earthy/Humus, Moldy, Barnyard/Piggy, Sour, Painty/Latex, Dusty, Smokey, Rodent. Hay-like, Grassy, Weedy, Mushroom, Chocolate
  - The off-odors can be at different intensities, but if they are “identifiable” they result in “Sample” grade.

Problem with Sorghum Odor

- Grain Odor is inspected by individual inspectors – experts
- On-Line – instantaneous decision, disagreements between the inspector and the producer or handler result in sending samples to the Board of Review (BAR), which takes time and costs money in storage fees.
- In recent years there has been disagreement on "musty". Some producers and handlers say that a form of mustiness "storage musty" is normal – others (including the BAR) don't agree

Overcoming Issues

- Develop a standard odor reference for "storage musty"
- Screen to ensure inspectors can smell appropriately
- Training to provide understanding and consistency
  - checks on the system, references where appropriate
- Controlling technique to the extent possible
  - Common way of smelling
  - Simple things like smelling something neutral between samples
  - Reasonable environment

Conclusion

- Government grading is an important quality assurance step.
- What defines quality of the product?
- How can we measure those quality characteristics reliably?