

Current Report

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SOYBEAN SAMPLING AND HAND SIEVING PROCEDURES

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To obtain a representative grade of grain in a bin, truck, rail car, barge, or ship, proper sampling and sieving procedures must be followed. Official grades are determined through proper probing procedures and the use of a dockage machine. The hand sieving methods presented in this Current Report are not used by official grain inspectors licensed by the Federal Grain Inspection Service. Licensed graders must use precision mechanical equipment that will provide the most accurate and more uniform results.

REPRESENTATIVE SAMPLE

Obtaining a representative grain sample is an essential part of grain inspection. Without a representative sample, the final grade will not reflect the true grade or value of the grain.

In order for a sample to be considered representative, it must.

1. Be obtained in accordance with recommended procedures,
2. Be of the prescribed size (approximately 2-1/2 quarts but not less than 2 quarts in size), and
3. Be handled securely, protected from manipulation, substitution, and careless handling.

Representative samples may be drawn from truck lots and car lots by either probe, pelican, Ellis cup, woodside sampler, or diverter-type mechanical sampler. In case of export cargo (shiplot or bargelot) shipments, samples must be obtained by diverter-type mechanical samplers.

The following pages explain the proper way to do probe sampling. This information was taken from Federal Grain Inspection Handbook I, Chapter 3, Grain Sampling.

Probe Sampling

A large percentage of grain, as it travels from the farm to the final consumer, is at one time or another sampled with a probe. Probe sampling is the only approved method for obtaining samples from stationary lots. If probe sampling is performed correctly, the samples drawn will consistently be representative.

The Equipment

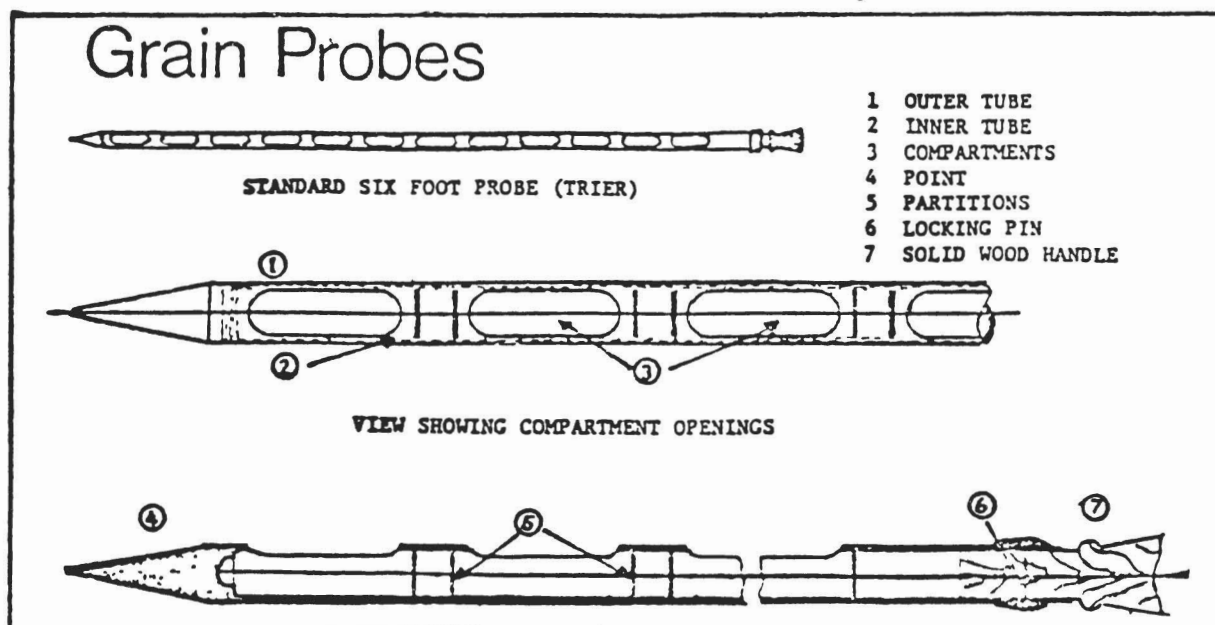
Before learning the sampling procedure, the sampler should become familiar with the equipment he will use in carrying out his duties.

A. Probe. This standard piece of equipment, sometimes referred to as a trier, is constructed of brass or aluminum. Probes come in various sizes with standard lengths of 5, 6, 8, 10 and 12 feet. The type of carrier dictates which probe length shall be used. Probes consist of two tubes, one inside the other. All official grain probes are 1-3/8 inches in diameter (outer tube). The inner tube is divided into compartments. The outer tube has slots which match the compartment openings of the inner tube. When the tubes are aligned, grain may enter into or be extracted from the compartments in the probe.

The following lengths of double-tube compartmented grain probes are approved for use by official inspection personnel for sampling lots of bulk grain

Container	Length of Trier	Number of Compartments
Barges and Bay Boats	12-ft	20
Hopper Cars	10-ft	20
Boxcars	6-ft	12
Trucks	5 or 6-ft	11 or 12

Grain Probes



Hopper-Bottom Trucks 6, 8, 10-ft 12, 16 or 20

Other containers - Use grain probes that will reach the bottom of the container.

Whenever the bottom of a container is not reached by all probes, the special statement, "Top feet sampled. Bottom not sampled," shall be shown on the sample ticket. The number of feet shown in the statement shall correspond to the estimated average depth of all probes which did not reach the bottom of the carrier.

Example A sampler is unable to reach the bottom of a hopper car compartment after inserting the probe to its full 10-foot depth. The bottom of the next compartment is not reached after the probe is inserted 8 feet. In the last compartment, the probe reaches the bottom after being inserted 9 feet.

Since the bottom of the container was not reached in all probes, the statement, "Top 9 feet sampled. Bottom not sampled," shall be shown on the sample ticket. The average of the two probes that did not reach the bottom (8 and 10 feet) is 9 feet.

Noncompartmented grain probes or open-ended probes shall not be used by official inspection personnel to sample bulk lots of grain for official inspection under the United States Grain Standards Act. Studies have proven that noncompartmented grain probes do not obtain representative samples.

B. Sampling Canvas.

This piece of equipment shall be constructed of heavy canvas cloth or similar material. Always use a sampling canvas(s) that is at least 6 inches longer than the probe used to draw the sample. This size is necessary so that the grain from the entire length of each probe will not spill off the ends of the canvas. Sampling canvases must always be kept clean, dry, and free of holes.

Half sections of pipe, similar to rain gutters, may be used instead of sampling canvases.

C. Sampling bags.

Bags shall be made from heavy cloth or canvas, have a draw string closure, and be large enough to contain up to 4 quarts of grain. Sample bags shall be free of all old grain, insects, and other waste material prior to use. It is also recommended that the bags be lined with a polyethylene liner to prevent loss of moisture and to protect the sample from adverse environmental conditions, such as rain or humid weather.

Containers such as metal buckets or plastic cans may be used in lieu of sampling bags, provided the containers are clean and dry.

General Procedures

Before sampling any carrier, record on your sample ticket the carrier's identification number. Then, break the seals that secure the hatches or doors that are to be opened. Record the broken seal numbers on the sample ticket. Open the door(s) and enter the carrier. The applicant for inspection shall be responsible for removing the tarp from trucks and trailers, opening roll-top barges, and trimming (leveling) the grain in the carrier.

After entering the carrier, visually examine the whole lot of grain. Take a handful of grain from several locations and check it for odor. Record any unusual conditions on your sample ticket. Next, spread your canvas and check to see that the probe and canvas are clean and dry. You are now ready to start sampling.

There are several ways to insert the probe into the grain. Regardless of which technique you use, these general rules shall be followed

1. Insert the probe at a 10 degree angle from the vertical, with the slots facing upward and completely closed. A 10 degree angle is used to obtain a cross-section of grain, while placing the end of the probe as close to the bottom of the carrier as possible. As the grain becomes more compacted, greater force is needed to reach the bottom of the carrier. The 10 degree angle eases the resistance of the compacted grain against the probe. The slots must be kept closed until the probe is inserted as far as it will go. Otherwise, a disproportionate amount of grain from the top of the lot will fall into the probe compartments as it is being inserted.

When sampling grain which contains sand or grit, insert the probe with the slots downward to avoid freezing it. After the probe is inserted, turn the slots upward before opening.

2. After the probe is fully inserted, (with the slots facing upward) open the slots and move the probe up and down quickly in two, short motions. When sampling grains, like oats and barley, additional up-and-down movement may be necessary to fill the probe. Close the slots completely, grasp the probe by the outer tube, and withdraw it from the grain. Do not pull the probe by the wooden handle. This can result in the inner tube being pulled out of the outer tube. When this occurs, the probe must be emptied, reassembled, cleaned, and the area probed again.

3. Empty the probe on the canvas and compare the grain from each depth of the probe for uniformity of kind, condition, and infestation. Also, compare the probe to others drawn from the same lot. If all probes and portions of probes are uniform with one another, they shall be composited and placed in a sample bag along with a completed sample ticket. If the examination of the probes indicate that the lot of grain is made up of distinctly different parts in regard to condition (such as musty, sour, commercially objectionable foreign odor, or heating grain), the sampler must then draw a sample from each of the different parts, in addition to the sample that represents the carrier as a whole.

4. When transferring the grain from the canvas to the sampling bag, take care not to spill any portion of the sample or allow fine material to be blown from the canvas.

5. Close all hatches or doors and replace all broken seals with new seals, unless directed by the applicant for inspection to do otherwise. Record on the sample ticket the code number of all seals applied. If the applicant directs that the doors not be closed or seals not applied, note this on the sample ticket.

6. After placing the grain and the completed sample ticket into the sample bag, tighten the drawstrings at the top of the bag so that it is closed securely. Carefully remove the bag from the carrier so that none of the sample is lost or spilled. Do not drop the sample to the ground.

Flat-bottom Trucks or Trailers

This section applies to trucks or trailers containing grain more than 4-feet deep or 8 filled probe compartments of grain. In Figure 1, the letters identify the probing sights, the X shows the probing location and the arrow indicates the direction of the 10 degree probing angle.

Probe site A - Probe the grain approximately 2 feet from the front and side.

Probe site B - On the side opposite probe site A, probe the grain approximately halfway between the front and center of the carrier, 2 feet from the side.

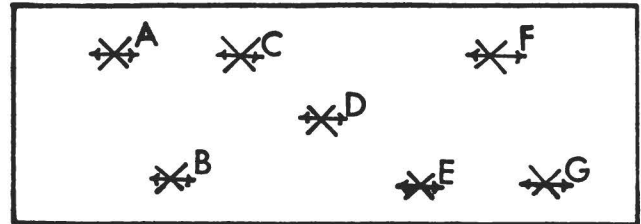
Probe site C - On the same side as probe site A, probe the grain approximately three-fourths of the distance between the front and center of the truck, 2 feet from the side.

Probe site D - Probe the grain in the center of the carrier.

Probe site E - On the side opposite probe site C, probe the grain approximately three-fourths of the distance between the back and the center, 2 feet from the side.

Probe site F - On the side opposite probe site E, probe the grain approximately halfway between the back and center, 2 feet from the side.

Probe site G - On the same side as probe site E, probe the grain approximately 2 feet from the back and side of the carrier.



Partially Filled Trucks or Trailers

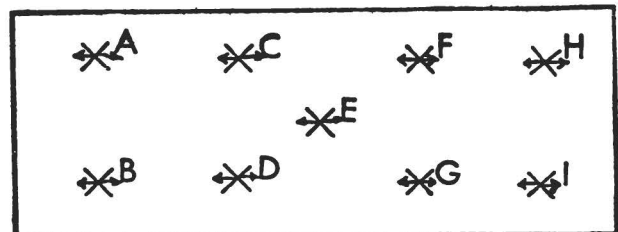
This section applies to trucks or trailers containing grain less than 4-feet deep or fewer than 8 filled probe compartments of grain. In Figure 2, the letters identify the probing sights, the X shows the probing location and the arrow indicates the direction of the 10 degree probing angle.

Probe site A - Probe the grain approximately 2 feet from the front and side.

Probe site B - Probe the grain as specified for probe site A, but on the opposite side.

Probe site C - On the same side as probe site A, probe the grain approximately three-fourths of the distance between the front and center of the carrier, 2 feet from the side.

Probe site D - Probe the grain as specified for probe site C, but on the opposite side.



Probe site E - Probe the grain in the center of the carrier.

Probe sites F, G, H, and I - Probe the grain 4 additional times in the remaining portion of the carrier in the same manner as described for probe sites A, B, C, and D.

DETERMINATION OF FOREIGN MATERIAL IN SOYBEANS BY HAND SIEVES

Percent foreign material (FM) in soybeans affects the USDA grade. The maximum percent FM is 1%, 2%, 3%, and 5% for USDA #1, #2, #3, and #4 soybeans, respectively. Following is a method to determine the percentage of FM.

1. Divide out a representative portion of soybeans ranging in size from 1-1/8 to 1-1/4 quarts or approximately 1000 grams. Record the weight of the sample used.
2. From the above portion, "coarse" foreign material must be removed by hand picking.

Cockle burrs, sticks, soybean pods, kernels of corn, or other material that may adversely affect the grade of the lot would be considered coarse foreign material.

3. After the "coarse" foreign material has been removed by hand picking, divide out approximately 125 grams and sieve this portion for fine foreign material.
4. To sieve for fine foreign material, the following procedure should be used

Assemble the hand sieves by placing an 8/64 inch round-hole sieve on a bottom pan and then placing a 10/64 x 3/4 inch slotted sieve on top of the 8/64 inch round-hole sieve. The top slotted sieve shall be placed so that the perforations will be parallel to the motion of the sieve as it is shaken. Hold the sieve in both hands, directly in front of the body with elbows close to the sides. The sieves should be held level so the soybeans move lengthwise of the top sieve perforations. In a gentle, steady, side - sieving motion move the sieves right to left approximately 10 inches and return from left to right. Repeat the operation five times. The foreign material will consist of

- A. All matter, including soybeans and pieces of soybeans which readily passed through the 8/64 inch round-hole sieve.

- B. All matter other than soybeans remaining on top of the 8/64 sieve after sieving.

After the "fine" foreign material is removed from the 125 grams portion, it is weighed and a percentage is obtained.

The percentages of "fine F.M." is then added to the percentage of "coarse F.M." that was removed from the original 1000 gram portion.

The two percentages added together gives the amount of FM in the sample.

DETERMINATION OF SPLITS IN SOYBEANS USING HAND SIEVES

The percentage of split soybeans also effect the USDA grade, thus, the value of the beans. The maximum percentage splits for determining grade are 10% for #1, 20% for #2, 30% for #4 and 40% for #5. A split is any sound soybean that has more than 1/4 broken off.

1. The determination of splits is based on the same portion (approximately 125 grams) that was previously used in the determinatin of fine foreign material.
2. The material remaining on top of the 8/64 round-hole sieve is primarily foreign material, splits, and small whole beans. The foreign material is added to the portion that passed through the 8/64 sieve while the whole beans remaining on top of both sieves are separated from the splits.
3. The splits are then weighed and a percentage is detemined, based on previously recorded weight of sample used.

Summary

It is important that grain handlers concentrate in determining the correct grade. Profit margins are too small to loose money because improper grade determination. The procedures presented in this Current Report are not designed to produce Official grades. The procedures should produce relatively accurate estimates of dockage, foreign material, damaged kernels and other factors effecting grades and the value of the grain.