- Open concave in small increments only, to reduce damage.

4. CLEANING SYSTEM

- Remove any perforated screens under elevator doors, cross augers, or under the unloader tube
- Check wear on front grain bed auger bearings. Worn bearings cause augers to droop and pinch grain.
- Increase fan speed slightly, one increment at a time and check.
- Open the chaffer (upper sieve) wide enough, say 5/8-inch, to prevent grain from being carried to the returns system. Open lower sieve slightly (1/4 to 3/8 inch) to allow the clean grain to flow to the clean grain auger and then grain tank instead of entering the tailings returns system.

Note that the combine shoe is fine-tuned to perform best when the engine is operated at a rated speed. If you cause the engine to slow significantly, processor, and particularly shoe performance, is adversely affected, so that losses and tailings flow will escalate.

As Jim Minnihan, Case Combines Product Support Specialist and a valuable source for many tips in this guide, says: "It pays to strive for grain quality."

Thanks to Jim Minnihan, Mark Hanna, Nathan Isaac, Bill Couser, Wes Buchele and Marvin Gorden who were most helpful in the preparation of this harvesting guide.

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa. File: Engineering 2-2

SETTING COMBINES

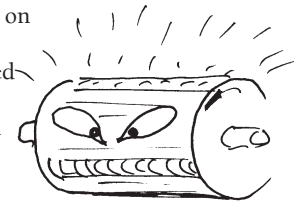
for HARVESTING BEST QUALITY SEED AND FIELD CORN

Definition of QUALITY:

Seed Quality and ***Grain Damage*** mean different things to different customers, particularly for corn.

First, the USDA corn grading standards are used by elevator operators for grading regular corn. A grain sample is shaken into a 12/64 -inch sieve to identify and measure broken corn and foreign matter (BCFM). At the same time, the elevator operator examines the sample on top of the sieve superficially, looking for any kernel breakages and trash that did not pass through the sieve.

Second, the visible damage check, used by seed producers, and we use at Iowa State for combine performance evaluation. This involves carefully sub-dividing the bin sample with a Boerner divider to procure a 100 to 200 gram sub-sample. That sub-sample is screened through the 12/64-inch round hole sieve for BCFM, then the material on top is examined kernel by kernel for visible damage discernible to the trained eye. Usually we have two people evaluate separate samples on any given batch from the combine runs, and average the two readings.



Finally, there is a green dye test. We do not regularly conduct green dye tests in Agricultural Engineering on our corn samples because of the time each sample involves. Dye tests reveal more visible damage. There is an escalation in scale of damage levels measured

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from a given sample of corn. For example the ratio of damage at the "normal" combine thresher speed is approximately 1 : 10 : 20 for the BCFM : visible damage : green dye measurements respectively. Visible damage is the main criterion used for corn kernel damage and quality assessment in this guide.

Combine settings and grain damage—SAMPLE PURITY:

Damage comes from impact, crushing, and shearing of grain. That takes place not only in the thresher but in grain-handling equipment as well. Augers are not the best way to move grain if damage is to be minimized. Where augers are deployed, they need to be kept full to reduce damage!

The dominant machine setting affecting grain damage is cylinder or rotor speed, but other settings are relevant, as mentioned below. Grain damage tends to increase with thresher speed, so try to operate at the lowest cylinder or rotor-speed that will shell the most grain with acceptable loss levels.

Damage to grain can start right at the head itself. Corn is more susceptible to damage at higher moisture contents; therefore, harvesting at 15 to 22% kernel moisture level is advantageous. Assuming that the machine is run-in, with more than fifty hours on the separator, here is a systematic procedure to minimize damage:

Start with the settings in the operator's manual first, making only one adjustment at a time. Bear in mind that an underloaded machine will cause more grain damage. Maintain engine speed for best processor performance.

1. CORN HEAD

- Slow down stalk roll speeds; match to travel speed
- Move snapping plate openings to say 1-inch front, 1 1/4-inch rear for regular corn
- Raise cross auger and grind the sharp edges of the cross auger flighting
- Typical cross auger to pan clearance for corn should be 1-inch
- Adjust corn head to take in slightly more trash
- Keeping the machine loaded with corn by adjusting the forward speed will reduce kernel damage.

2. FEEDER HOUSE

- Grind/smooth any sharp leading edges off the feeder chain slats
- Raise lower stop to lift the feed elevator drum for corn and raise upper stop to maximum.

3. THRESHER

- Smooth all sharp edges
- Start with the low end speed recommendation in the operator's manual.
- Thresher tip speed should typically be 2,700 ft/minute (range 2,050-4,500 ft/min peripheral speed, depending on crop moisture conditions). On a 30-inch rotor machine, 2,700 ft/min would mean running the rotor at 345 rpm.
- Install smooth rasp bars if that option is available (They are available for Case Axial Flow combines.)
- Do not use surface chrome-plated wear parts such as thresher bars for vulnerable crops. On chrome-plated wear parts, the brittle plating tends to chip and the underlying material wears away, exposing the hard, thin, sharp chrome edge which will damage grain.
- Components made entirely of chrome alloy get better with wear, while chrome-plated parts only get worse. Chrome alloy wear parts are desirable for food and seed grade crops, especially if first conditioned in less delicate harvesting conditions. For example alloy rasps maintain their rasping ribs.
- Use filler plates on an open drum threshing cylinder
- Removing certain concave wires may be desirable for earlier escape of seeds through the concave
- Round bar concave elements are gentler than rectangular concave bars, if available.
- Increase concave clearance in small increments to reduce damage. Typical settings are about 1 and 1/4-inch open for field corn.