UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
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FSA1011

Harvesting Wheat

Biological and Agricultural Engineering

Moisture

Wheat can be harvested when the moisture content dries to 20 percent. The cost of drying or high-moisture market discounts and the additional care necessary in operating the combine to avoid excessive kernel damage influence many to wait until moisture content drops to 15 percent or below. During days of low humidity, the moisture content of mature wheat quickly drops to this level. Waiting for all immature green heads to ripen is impractical because field shatter may cause significant loss. Wheat may dry 2 to 3 percentage points during a hot, dry day or rewet, depending on the weather and soil moisture content.

If drying facilities are available, carefully analyze their use and cost to determine what harvesting moisture range provides greater income. Harvesting delays after wheat first reaches 15 percent moisture reduce wheat returns in several ways. Increased field shatter reduces yields. Wheat rewetting occurs during rainfall or damp periods, which increase kernel damage and may reduce test weight. One cause for low test weight in wheat is rewetted kernels that swell and maintain bulk, even after drying to the proper moisture.

The cost of harvest delays is very weather dependent. Lodging and weed growth may also hamper harvest, thus reducing income and profit. One study indicated that each day of delay after maturity reduced yields 12 pounds per acre due to shatter and other losses. Timely wheat harvest adds greatly to the yield potential of the succeeding crop in a doublecrop field.

Discounts for high-moisture wheat can be partially offset with the weight that moisture contributes to samples above 13.5 percent moisture content. Delivering wheat below 13.5 percent provides less weight due to its slightly lower moisture content. Table 1 illustrates harvest moisture ranges that incur equal value reductions at both ends of the moisture range for one set of moisture discounts. The discounts at your market may differ considerably from the example, especially if excessive amounts of "wet" wheat are currently reaching that market. Table 1 does not account for any differences in yield, i.e, changes in field losses or test weights, across the moisture range.

Table 1. Comparable Wheat Pricing Based on Selected Market Discounts for Moisture Alone

Sample Moisture Discount (% of wheat weight)	Wheat Harvest Moisture Range for Equal Market Value
3.0% for wheat at 15% m.c.	15% ➔ 12%
5.5% for wheat at 16% m.c.	16% ➔ 10%

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Combine Adjustments

Standing wheat is one of the easiest crops to harvest. Combines were designed specifically for wheat; the first was built in 1838. A well-maintained combine with a rotary thresher or a rasp-bar cylinder can do an efficient job of harvesting standing wheat. Skilled operators monitor the combine straw discharge, the bin sample and tailings to maintain proper wheat harvesting adjustments.

If the stubble is not of particular concern – not to be baled or soybeans planted directly into it – adjust the height of the header to minimize straw gathered with the grain. The header should be raised where the straw is tall. Many producers forfeit as much as 5 bushels per acre in the heaviest-yielding areas because the combine operator fails to set the header accordingly, and the straw overloads the combine temporarily. Combine engines are large enough so they will not lug; the grain simply will not be beaten out of the "slugs" and will "ride" out on a "mat" of chaff. Field analyses indicate stripper headers offer potential to increase travel speed and combine capacity. Little wheat straw enters the combine when using a stripper header.

Combines with 42-inch wide (or wider) separators can easily handle 24-foot headers (or larger) in wheat if the field isn't so rough that it is difficult to maintain the proper cutting height along the cutterbar. However, the combine is being operated too fast for the cutterbar capacity when the wheat heads appear to be "pinched-off" at the base rather than cut a few inches below the head. It is important to maintain a fairly consistent feed rate through the combine for maximum performance.

Combines need to be adjusted for wheat moisture, rankness of the crop, grain weight (heavy or light heads) and amount of weeds in the field. Threshing cylinder diameters vary from 19 to 26 inches, so check the **operator's manual** for each **particular combine** model. Operators should strive to use the slowest rotor or cylinder speed and the widest concave spacing possible. These settings should be only aggressive enough to separate the grain from the stalk. Operator's manuals generally provide a good initial setting. Experience and judgment of field conditions to make the proper "fine tuning" adjustments ensure an excellent job.

Rotary combines do an excellent job in wheat, and the same basic principles apply. Research indicates they may cause slightly less kernel damage.

Adjust threshing speeds or aggressiveness for conditions. Changing moisture content and wheat varieties often affect the ease of kernel removal. Generally, the following principles apply:

Thresher Speed – Faster than soybeans and sorghum; slightly faster than rice; about the same as oats.

Concave Spacing – Not as critical with the spike-tooth as the rasp-bar, but generally about like rice and narrower than soybeans.

Sieve Openings – Initial chaffer sieve opening doesn't vary much from other crops, but cleaning sieve generally should be nearly closed.

These are general guidelines. With the spike-tooth cylinder, some damaged kernels will appear in the bin even before all the grain is threshed out of the head. Be careful not to use excessive threshing cylinder speed where wheat is harvested for seed. Judge threshing performance by three keys:

1. Damaged kernels
2. Kernels remaining in the heads
3. How pulverized the straw is before going through a chopper

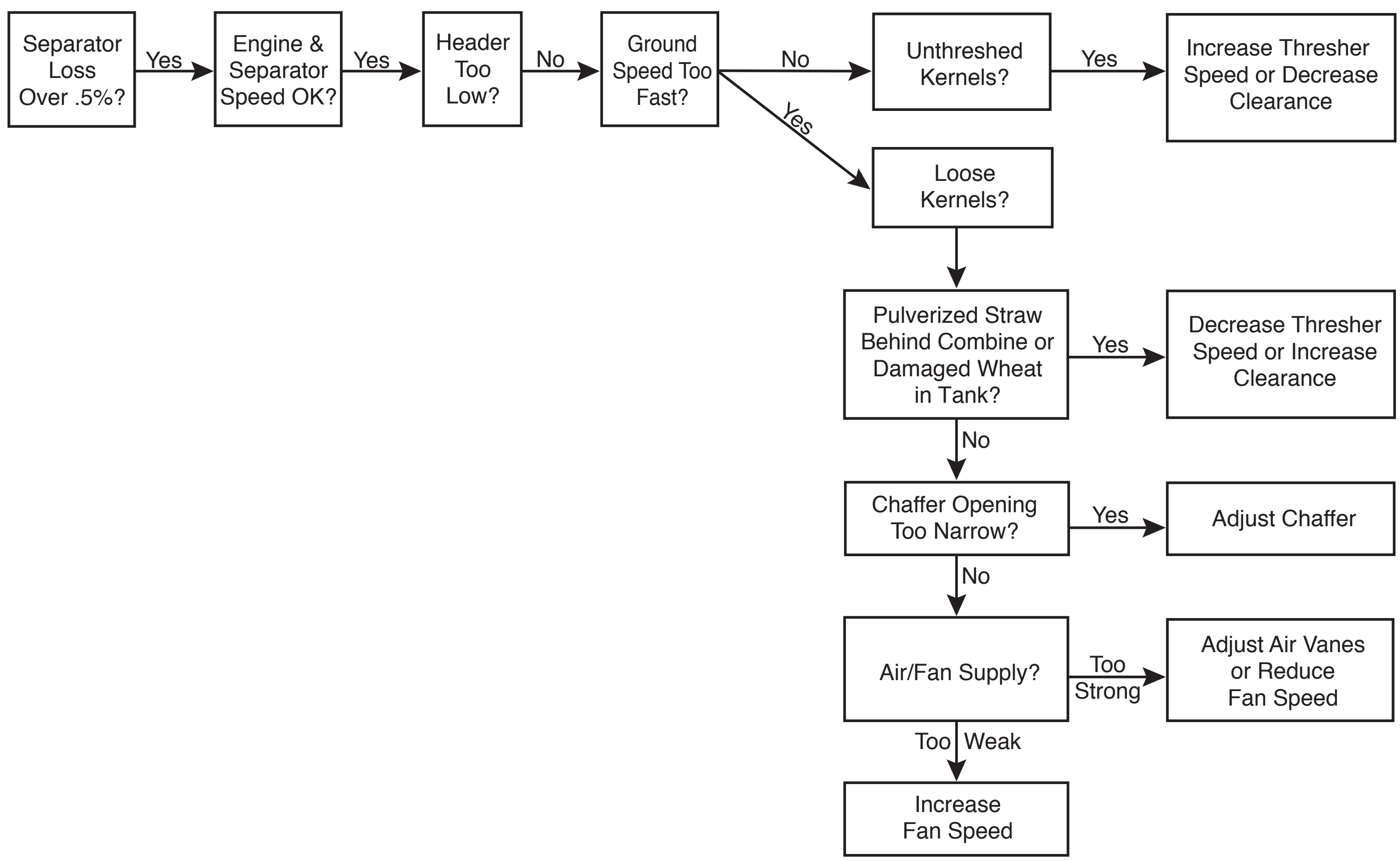
With uniform feeding, good threshing and separating shouldn't be difficult. Total field losses due to the combine shouldn't exceed 1 bushel per acre. If wheat losses were spread uniformly over an acre, approximately:

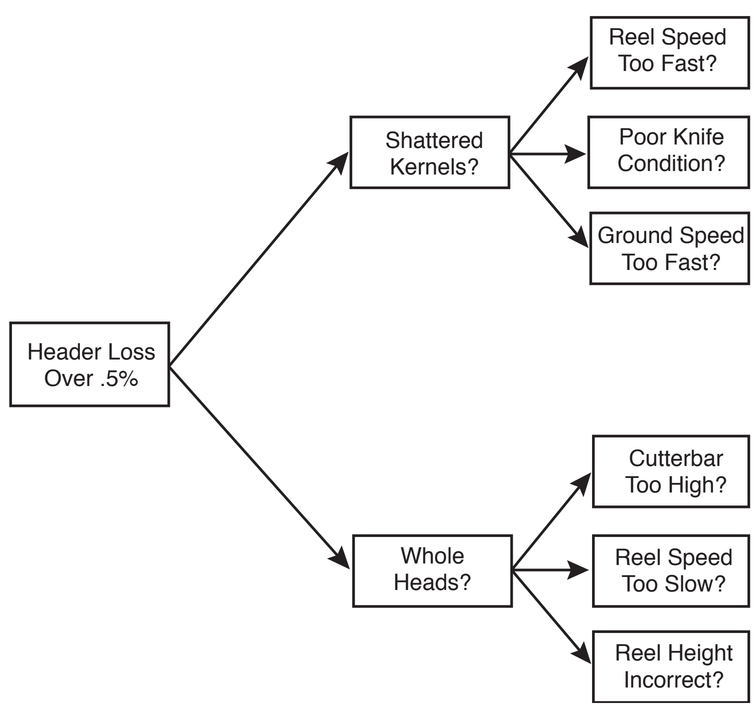
21 seeds per square foot = 1 bushel per acre

Not using enough air or enough fan speed is a common failure. A good blast of air is necessary to "tumble" chaff at the front of the chaffer. A good air pattern keeps chaff bouncing nearly to the back of the chaffer, permitting wheat to drop through. Open the sieves until some trash appears in the bin. Then, increase fan speed, aim the baffles or reduce the covering on the fan intake. If a little clean grain appears in the tailings, adjustments are about right. If more wheat appears on the ground behind the machine, **you have blown some over**. Reduce air accordingly.

The following flow chart (Figure 1) is a good step-by-step method of checking harvest losses and correcting them in the field.

Figure 1. Correcting Wheat Harvest Losses





Combine Loss Monitors

Grain loss monitors can be helpful for optimizing operating adjustments and combine forward speed. The "area-based" systems with compensation for forward speed provide the most useful signals. The sensors must be properly installed in the straw and chaffer discharge to intercept wheat that leaves the combine. The sensitivity may have to be set to ensure that only grain and not straw segments are triggering the sensors. Calibrate the monitor for wheat, and check occasionally that wheat harvest losses are proportional to the signal in the cab.

Temporary monitor fluctuations can be overlooked. However, observing a monitor and the field conditions will quickly highlight conditions that increase field separation losses. An alert operator "fine tunes" thresher speed and forward speed to use combine capacity while reducing wheat loss.

Always make only one adjustment at a time. After making the adjustment, check the combine performance under normal load. Count losses in the field, evaluate the bin sample and monitor the tailings throughout the harvest day.

References

Pacey, D. A., and M. D. Schrock. 1985. "Harvesting Wheat." Kansas State University, Manhattan, KS.

Ridenour, H. E., and D. M. Byg. 1981. *Combines and Combining.* Ohio Agricultural Education Curriculum Materials Service, Columbus, OH.

Taylor, R., W. Downs and M. Stone. 1990. "Combine Operation: Loss Monitors." OSU Extension Facts No. 1227. Stillwater, OK.

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