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Measuring and Reducing Soybean Harvesting Losses

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Numerous tests of soybean combine losses show that up to 12 percent of the soybean crop is lost during harvest. Harvesting losses cannot be reduced to zero, but they can be reduced to about 5 percent. Combines can be operated to reduce losses without affecting the harvesting rate. This guide describes the major sources of loss.

- **Preharvest losses**

These losses are beyond the combine operator's control and cannot be called harvesting losses. Preharvest losses are caused by lodging and shattering. In most years, 0.25 percent of the total crop yield is lost before harvesting begins.

- **Shatter loss at combine header**

These losses occur when the header is operated improperly or when the crop tends to shatter easily. Shatter losses increase with crop dryness.

When the reel speed is too fast or the reel is positioned too far forward, soybeans are shelled in front of the combine. Reel peripheral speed should not exceed forward speed of the combine by more than 25 percent. Peripheral speed is easier to adjust on combines with variable speed reel controls.

Consider shatter losses of 2 percent acceptable. Average losses are 5 percent or more.

- **Stubble loss**

Often many pods are left on the stubble because they have been missed by the cutterbar and were not gathered into the combine. Overcome this problem by keeping the field level and using a flexible cutterbar or special row-crop head for soybeans.

Stubble losses should be no more than 0.75 percent of the total crop yield. Average losses are 1.5 percent or more.

- **Lodged or loose stalk loss**

Beans left in the pods on downed stalks or those that are cut but do not pass through the combine should be only about 1 percent of the total crop yield. Minimum losses occur when the machine is in top condition, the knife is sharp and the correct reel height is used. A pickup reel reduces these losses. Average losses are 2 percent to 5 percent of the crop yield.

- **Cylinder loss**

Beans left in pods that have passed through the machine are the result of harvesting when the moisture content is too high or with incorrect cylinder-concave settings. There should be no loss, but improper operation can cause losses as high as 0.5 percent of the crop yield.

- **Separation loss**

Loose beans passing out of the machine can be held to a minimum with the correct blower and sieve settings. These losses can be as high as 0.5 percent but should be held to 0.25 percent of the crop yield.

How to measure losses

To get satisfactory combine operation, you need to identify and measure losses. Alone, you can check losses in about 10 minutes. If you have help, even less time will be required. The extra soybeans in your grain tank will more than pay for the delay.

To determine losses, count the unharvested beans in an area of 10 square feet. An average of four beans per square foot equals one bushel per acre loss. Make the area of 10 square feet equal in width to the combine header (Table 1). A plastic clothes line and four pins made from number 9 wire make excellent material for forming the rectangle.

Table 1

Rectangular dimensions for 10-square-foot plot.

Common machine swath	Distance to enclose 10 square feet
8 feet	15 inches
10 feet	12 inches
12 feet	10 inches
13 feet	9.25 inches
14 feet	8.6 inches
15 feet	8 inches
16 feet	7.5 inches
20 feet	6 inches
22 feet	5.45 inches
24 feet	5 inches

Before checking for losses, disconnect the straw spreader or chopper so you can get a more accurate count. Stop the combine where the crop is representative of the entire field. Stop the header and threshing mechanism. Back the combine a distance equal to its length. Shut off the engine.

Place the rectangular frame across the machine swath and make counts for:

- Total crop loss (Step 1)
- Preharvest loss (Step 2)
- Header loss (Step 4)

Step 1

Total crop loss. Place the rectangular frame across the swath harvested at rear of combine. Count all loose beans as well as the beans in loose and missed pods. Enter the number of beans per 10 square feet in Table 2, line 1.

If the total crop loss is less than 3 percent of the crop yield, keep on harvesting. You are doing a better than average job. If losses are greater than 3 percent, pinpoint the source of the losses to determine where adjustments are needed.

Step 2

Preharvest loss. Determine the preharvest loss by placing the rectangular frame in standing beans. Count the loose beans on the ground and the beans in loose pods on the ground. Enter the number of beans per 10 square feet in Table 2, line 2.

Step 3

Machine loss. Determine the machine loss by subtracting the preharvest loss from the total crop loss. Enter this number in Table 2, line 3. If the machine loss is 3 percent of the total crop yield, you are doing a better than average job and adjustments are not necessary. If the loss is greater than 3 percent, check the header losses.

Step 4

Header loss. Determine header losses by placing the rectangular frame across the swath harvested in front of the parked combine. Place it over an area where there has been no discharge from the rear of the combine. Then make bean counts as follows and enter the numbers in Table 2.

- **Shatter loss**

Count all loose beans on the ground and beans in loose pods on the ground. Enter the number of beans per 10 square feet in line 4a.

- **Loose stalk loss**

Count all the beans in pods attached to soybean stalks that were cut but not gathered into the machine. Enter the number of beans per 10 square feet in line 4b.

- **Lodged stalk loss**

Count all the beans in pods attached to soybean stalks that were lodged and are still attached to the ground. Enter the number of beans per 10 square feet in line 4c.

- **Stubble loss**

Count all the beans in pods still attached to stubble. Enter the number of beans per 10 square feet in line 4d.

Obtain the total header loss by adding the losses for shatter, stubble, loose stalks and lodged stalk losses. Enter the total header loss in line 4.

Step 5

Cylinder and separation loss. Determine cylinder and separation loss by subtracting the total header loss from the machine loss. Enter this difference in Table 2, line 5.

Table 2

Loss data table.

Source of loss	Beans found in 10 square feet area	Number of beans = 1 bushel per acre	Your bean loss in bushels per acre
1. Total crop loss		40	
2. Preharvest loss		40	
3. Machine loss		40	
4. Gathering unit loss. Totals of:		40	
a. Shatter		40	
b. Loose stalk		40	
c. Lodged stalk		40	
d. Stubble		40	
5. Cylinder and separation loss			

Tips for keeping combine losses low

Your best guide for correct combine adjustment is your operator's manual.

Remember that more than 80 percent of the machine loss usually occurs at the gathering unit. The following suggestions will help keep these losses to a minimum.

- Make sure that knife sections, guards, wear plates and hold-down clips are in good condition and properly adjusted.
- Keep the seedbed level. Do not dig up soil around beans when cultivating.
- Operate the cutterbar as close to the ground as possible at all times. A floating header unit or an automatic header control is nearly essential on self-propelled combines.
- Use a ground speed of 2.8 to 3.0 miles per hour. To determine ground speed, count the number of 3-foot steps taken in 20 seconds while walking beside the combine. Divide this number by 10 to get the ground speed in miles per hour.
- Use a reel speed about 25 percent faster than ground speed. For 42-inch-diameter reels, use a reel speed of 11 revolutions per minute for each 1-mile-per-hour ground speed.
- Reel axle should be 6 to 12 inches ahead of the cutterbar. Reel bats should leave beans just as they are cut. Reel depth should be just enough to control the beans.
- A six-bat reel will give more uniform feeding than a four-bat reel.
- Complete the harvest as quickly as possible after beans reach 15 percent moisture content.
- A pick-up type reel with pick-up guards on the cutterbar is recommended when beans are lodged and tangled.

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Related MU Extension publications

- G1290, Measuring and Reducing Corn Harvesting Losses
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1290>
- G4470, Soybean Harvest Aids
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4470>

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