

Measuring Field Losses From Grain Combines



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Harvest losses can rob you of profit from grain and bean production. Harvest losses of 10 percent or more are not unusual, when they should be in the 2 to 4 percent range. If you do not check losses behind your combine, you have no idea what the losses are and where they occur during harvesting.

The following procedure outlines how to measure losses during harvest. It also shows you where the losses occur. The grain or beans saved mean that much more profit saved.

Corn

Set the initial combine adjustments according to the operator's manual. Once the loss data is completed, then you can make adjustments.

How to Measure Losses from a Corn Combine

First, stop your corn combine (without clearing it) 100 feet or more from row ends (in corn typical of the entire field). Use a wooden frame or four wooden stakes and string for laying out the measured area. Follow the four steps listed below.

1. **LOSS FROM CORN HEAD (SNAPPING ROLL LOSS):**
Back the combine up 20 feet and count kernels in 10 square foot plots over each row in front of the combine. Place a frame of the correct size (see Table 1) over each row, count loose kernels and divide by 20. Then take the average of these to get approximate loss in bushels per acre for each row.

For example, Table 1 indicates that for 30 inch row spacing, you need a 30-inch x 48-inch frame.

Place the frame over each row in swath (see Figure 1 on page 2), cut off and remove the stalks, then count the kernels. Assume you find 24 kernels in the frame area in the left row: 24 divided by 20 means a 1.2 bushel per acre loss for that row. Then make a count in the center row, and then the right row. Machine loss is the average of these three row losses.

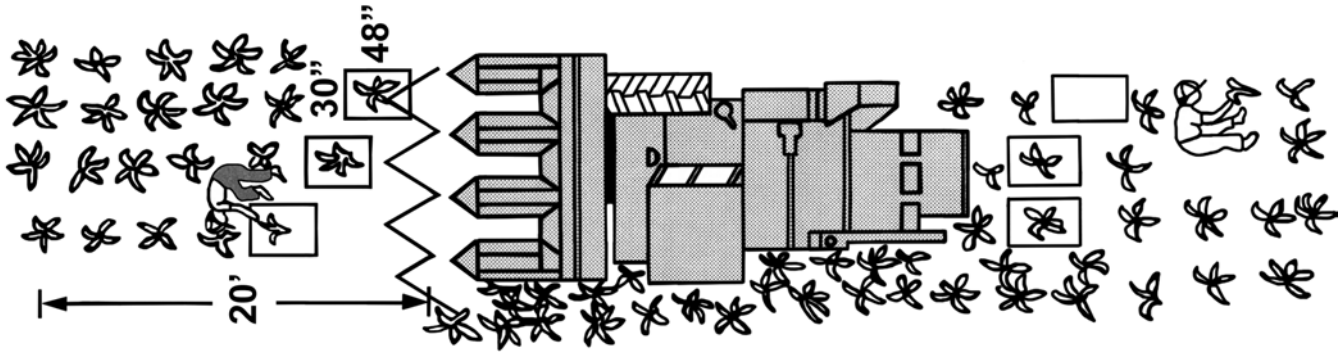
Table 1. Dimensions of 10 Square Foot Frames for Various Row Spacing.

Frame Length (inches)	Row Spacing along Row (inches)
20	*
28	51.5
30	48
36	40
38	38
40	36
42	34

*Use same frame as for 40-inch rows, but place frame over two rows at a time.

Example of corn head kernel loss:

	Kernel count per frame	Divide by	Loss per row (Bu./A.)
Left row	24	20	1.2
Center row	30	20	1.5
Right row	24	20	1.2
Average corn head kernel loss: $3.9 \div 3 = 1.4$ Bu./A.			



Check corn head loss by backing machine up and counting kernels in 10 square foot frames over each row.

Measure cylinder and separation losses here (follow step 2).

Each ¾ lb. ear or equivalent smaller ears left in 1/100 acre (see Figure 2) equals 1 bu./A. (see step 3).

Figure 1. Measuring corn harvest losses from a typical combine (3 rows shown).

Note: Cylinder loss and separation loss are determined the same as the previous method, but insert the proper counts per frame as follows.

2. **CYLINDER LOSS:** Divide 20 into the number of kernels remaining on cobs in the 10 square foot areas at the rear of the machine to find cylinder loss in bushels per acre. Again, average the row losses to get the machine cylinder loss. Count the number of loose kernels in the same 10 square foot areas. Divide this number by 20 and subtract the loss from the corn head kernel loss. This equals the separation loss behind the machine.
3. **COUNT EARS LOST:** Gather ears from the machine swath covering 1/100 acre (see Table 2 for length of area). Each ¾ lb. ear or equivalent smaller ears represents 1 bushel per acre loss. Ear loss in 1/100

acre behind the combine, minus ear loss in 1/100 acre of standing corn in front of the combine (pre-harvest losses) gives machine ear loss in bushels per acre (see Figure 2 on page 3).

4. **FIND TOTAL MACHINE LOSS** by adding machine ear loss to the total corn kernel loss found in steps 2 and 3.

Small Grains, Soybeans and Grain Sorghum (Drilled)

Use the initial settings given in the operator's manual (these assume average conditions). Final adjustments must be made in the field, because operating the combine is affected by grain moisture, stalk condition, weeds, grain, variety and yield.

Table 2. Row Length in Feet per 1/100 Acre.

Row Width (Inches)	One Row	Two Rows	Three Rows	Four Rows	Six Rows	Eight Rows
	Distance (Feet)					
20	262	131	87.3	65.5	43.6	32.7
28	187	93.5	62.3	46.7	31.1	
30	174	87	58	43.5	29	
36	145	72.5	48.3	36.2		
38	138	69	46	34.5		
40	131	65.5	43.6	32.7		
42	124	62	41.3	31		

Field losses can be divided into two categories: (1) pre-harvest and (2) harvest (combine). Pre-harvest losses are those caused by shattering and lodging, and loss of dry matter due to birds, wildlife, weather and other natural causes. Harvest losses are those caused by the combine. Some losses are unavoidable. Proper combine adjustment and operation plus early harvest can minimize these losses.

Field losses can be determined by counting the kernels or seed left in the field after harvest. This is normally done by counting the kernels or seed in a 10 square foot area across the swath width of the combine. Table 3 gives the rectangular dimensions for a 10 square foot area across the swath of the combine.

Table 3. Rectangular Dimensions for 10 Square Foot Plot.

Common Machine Swath (feet)	Distance to Enclose 10 sq. ft. (inches)
8	15
10	12
12	10
13	9.25
14	8.6
15	8
16	7.5
20	6
22	5.45
24	5

If the row spacing is 3 feet and you harvest 4 rows, the swath is 12 feet even if you harvest with a 13- to

15-foot header. The actual header width is used for small grains. Table 4 gives the approximate number of kernels (or seed) per 10 square feet to equal 1 bushel per acre for various crops. These values assume average seed or kernel size and can vary slightly among different varieties. To determine exact values, divide the number of seed in a bushel by the area in 1 acre (43,560 sq. ft.) and multiply by 10 for a 10 square foot area.

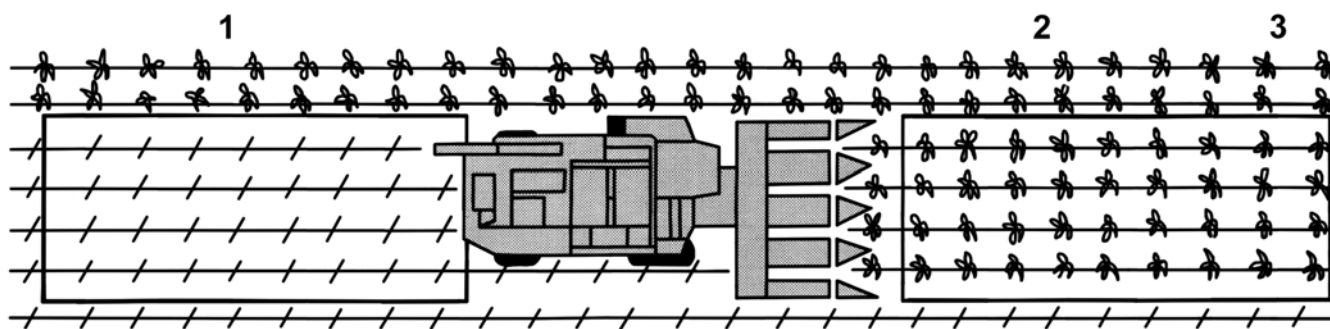
Table 4. Approximate Number of Kernels per 10 Square Feet to Equal 1 Bushel per Acre.

Crop	Approximate Number of Kernels
Wheat	200
Oats	100
Soybeans	40
Barley	140
Rye	220
Sorghum	310

To measure losses, stop the combine at least 100 feet from the end of the row (without clearing) and move backwards 20 feet.

You can measure the pre-harvest losses in a 10 square foot area in the standing crop ahead of the machine. The header losses can be measured immediately ahead of the machine, and total losses behind the machine (Figure 3 on page 4).

Pre-harvest losses subtracted from total losses gives machine loss. Subtracting header (or gathering) loss from machine loss gives cylinder and separation loss. The cylinder loss is the number of unthreshed kernels

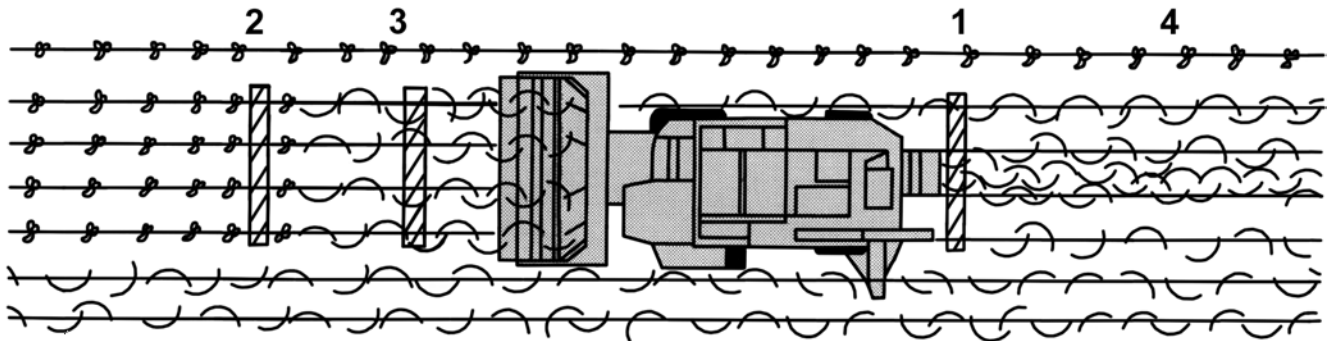


Determine the total ear loss by laying out a 1/100 acre test area immediately behind the combine, as described in the text. Gather the missed ears from all the rows in the test area. Each 3/4 lb. ear or equivalent represents 1 bushel per acre loss.

Determine the pre-harvest loss by laying out a 1/100 acre test area in the standing corn in front of the combine, as described in the text. Gather and count the ears on the ground as in part 1.

Determine the machine ear loss by subtracting the pre-harvest loss (part 2) from the total ear loss (part 1).

Figure 2. Determine ear corn loss.



PRE-HARVEST LOSS: 10 sq. ft. area

GATHERING UNIT LOSS: 10 sq. ft. area (combine backed up from standing crop, not more than 20 feet or the length of the combine)

TOTAL CROP LOSS: 10 sq. ft. area

MACHINE LOSS: total loss minus pre-harvest loss

Figure 3. Procedure to follow in making kernel or bean count to estimate harvesting losses.

going through the combine and found in the head or pod in the 10 square foot area behind the machine.

Soybeans (in Rows)

There are four components of gathering (or header) losses: (1) shatter loss, (2) stubble loss, (3) lodged loss and (4) stalk loss. Shatter is found by counting the loose beans or kernels found in the 10 square foot area ahead of the machine (Figure 3). Stubble loss is the number of beans left in pods on the stubble when measured as above. Lodged loss consists of beans in the same 10 square foot area on stalks that have fallen over but have not been cut from the stubble. The stalk loss

consists of stalks cut from the stubble but not going through the machine. A convenient means of recording the loss data is given for grain and beans in Form 2 on page 7.

Grain sorghum heads can be treated just like corn ear losses and measured ahead of and behind the combine in 1/100 of an acre for a given row spacing or swath width. Sorghum heads (when dry) average about 1/7 pound each, requiring about 5 heads to be equal to 3/4 pound (or 1 bushel per acre loss in 1/100 of an acre, like corn in the corn section of this publication). Green sorghum heads weigh 1/5 pound each, requiring about 4 heads to equal 3/4 pound or 1 bushel per acre loss in 1/100 acre.

Form 1

RECORD FOR CHECKING CORN COMBINE LOSSES

Name of farmer _____

Condition of crop _____

Number of rows harvested by combine _____ Width between corn rows _____ inches

Row length per 1/100 acre (Table 2) _____ feet Row length for 10 square foot frame (Table 1) _____ inches

Step 1A. Snapping Roll Loss (in front of combine after backing 20 feet)

1 Row	2 Kernels on Ground 10 square feet	3 Loss Bushel/Acre Column 2 ÷ 20
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
Total _____		
Total for all rows _____ ÷ number of rows = _____		

Step 1B. Corn Kernel Loss for Machine (behind combine)

1 Row	2 Free Kernels on Ground (10 sq. ft.)	3 Kernels Attached to Cob (10 sq. ft.)	4. Total Kernels on Ground (2 ÷ 3)	5. Loss Bushels/Acre per Row (Column 4 ÷ 20)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
Free Kernel Total: _____			Total _____	

Total for all rows _____ ÷ number of rows _____ = Kernel Loss _____ Bushels/Acre

Free Kernels Total for all rows _____ ÷ number of rows _____ = Free Kernel Loss _____ Bushels/Acre

Step 2. Cylinder Loss (behind combine)

1 Row	2 Kernels on Cob (from Step 1B Col. 3)	3 Loss, Bushels/Acre Column 2 ÷ 20
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Total: _____

Total for all rows _____ ÷ number of rows _____ = Kernel Loss _____ Bushels/Acre

Step 3. Ear Loss

Total ear loss _____ Bushels/Acre minus pre-harvest loss = machine ear loss _____ Bushels/Acre

Step 4. Total Machine Loss

Machine ear loss _____ + kernel loss (Step 1B) _____ = total machine loss _____ Bushels/Acre

Step 5. Separation Loss

1. From Step 1B, column 2, Total Free Kernel Loss on Ground _____ Bushels/Acre
2. From Step 1A, Snapping Roll Loss – _____ Bushels/Acre
3. Separation Loss _____ Bushels/Acre

Separation Loss = Total Free Kernel Loss on ground minus Snapping Roll Loss

Form 2

RECORD FOR CHECKING SMALL GRAIN AND SOYBEAN COMBINE LOSSES

Name of farmer _____ Crop _____

Condition of crop (weedy, lodged, wet, etc.) _____

Width of cut _____ feet.

Distance to enclose 10 sq. ft. _____ inches (Table 3)

1 Source of Loss	2 Kernels per 10 sq. ft.	3 Kernels per 10 sq. ft. to equal 1 bushel/Acre (Table 4)	4 Loss Bushels/Acre Column 2 ÷ Column 3
Total Crop Loss			
Pre-Harvest Loss			
Machine Loss (Total loss minus pre-harvest loss)			
Gathering Loss (a, b, c, d minus pre-harvest loss)			
a. shatter			
b. stubble			
c. lodged			
d. stalk			
Cylinder and Separation			
Separation			

Observations

Condition of straw as it leaves rack: _____

Amount of chaff and other debris in tailings: _____

Are unthreshed heads of pods going over the chaffer extension? _____

Condition of threshed grain in the tank (damaged kernels or extensive dirt): _____

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