



Profitable Corn Harvesting

Every bushel of corn you save by careful operation of your combine adds to your profit per acre. Losses as high as 20 bushels of corn per acre have been measured behind a poorly adjusted combine operating in weedy or severely lodged corn. Harvesting losses cannot be completely eliminated, but they can be reduced to 1 bushel per acre or less in good standing corn if you take time to check the performance of your combine.

To keep harvesting losses low, you need to know where losses occur, how to measure them, what reasonable loss levels are, and what machine adjustments and operating practices will reduce losses.

Calibrated loss monitors are useful in detecting separating and cleaning losses, but are unable to detect gathering unit losses. Gathering unit losses are half or more of total machine loss.

Where Do Losses Occur?

Preharvest losses are ears that drop from the stalk before harvesting begins. These losses are not caused by the combine, but they can be reduced by scouting fields and harvesting early if necessary.

Harvesting losses can be separated into four types of losses. Gathering losses occur at the front of the combine, and consist of ears missed or dropped by the machine and loose kernels shelled by the stalk rolls on the cornhead. Threshing and separating losses will be found on the ground behind the combine. Threshing losses are kernels attached to pieces of cob that were not shelled by the combine rotor or cylinder. Separating losses are loose kernels that were not shaken out of the cobs and husks and were lost over the back of the combine.

How to Measure Losses

Ear losses can be measured from an area equal to 1/100 acre. Each 3/4-pound ear (or its equivalent in smaller ears) found in this area is approximately equal to a loss of 1 bushel per acre. The length of row for 1/100 acre depends on your row width and the number of rows being harvested (see table 1).

The easiest way to measure loose kernel losses is to use a rectangular frame enclosing 10 square feet. Every 20 kernels of corn found within the frame is approximately equal to 1 bushel per acre loss. Make the frame out of No. 9 wire or 1/8-inch rod and carry it on the combine. The width of the frame should be the same as the width of your corn rows, and the length of the frame is listed in table 2.

To measure losses, stop your combine well in from the edges of the field, disengage the header drive, raise the header, and back up 15 to 20 feet. Measure or pace off an area of 1/100 acre on the harvested rows behind your combine, gather all missed ears of corn within this area, and count the number of equivalent 3/4-pound ears to determine total ear loss.

If total ear loss is high, mark off an area of 1/100 acre in the standing corn in front of the combine, gather all missed ears, and count the number of equivalent 3/4-pound ears to

determine preharvest loss. Subtract preharvest loss from the total ear loss to determine machine ear loss.

To measure kernel losses, place the rectangular frame over the first harvested row behind the combine. Carefully remove the stalks, husks, and leaves, and count the kernels attached to pieces of cob and the loose kernels within the frame. Record each count separately. Then flip the frame over onto the next row and count the kernels. After kernels are counted from all the rows being harvested, divide the total number of kernels attached to cobs by the number of rows, and then divide the answer by 20 to find threshing loss. Divide the total number of loose kernels by the number of rows, and then divide the answer by 20 to find the total loose kernel loss. This will be the sum of stalk roll shelling and separating loss.

If total kernel loss is high, place the frame over the first harvested row in front of the combine, just ahead of the drive wheel tracks. Carefully remove the stalks and leaves, count all loose kernels within the frame, and divide by 20 to find stalk roll shelling loss for that row. Flip the frame over and count the kernels in the next row. Record the count for each row separately, because only one row on the cornhead may be out of adjustment and may be shelling more corn than the others. After counting losses for all rows, add them and divide by the number of rows to

Table 1. Length of row (feet) for 1/100 acre for measuring ear losses.

Row width (inches)	Number of rows being harvested			
	4	6	8	12
15	87.1	58.1	43.6	29.0
20	65.3	43.6	32.7	21.8
22	59.4	39.6	29.7	19.8
30	43.6	29.0	21.8	14.5
36	36.3	24.2	18.2	12.1
38	34.4	22.9	17.2	11.5

find an average stalk roll loss. Subtract this average loss from the total loose kernel loss found behind the combine to determine separating loss. Because each area is a separate check, the number of loose kernels in front of the combine may exceed those in the rear.

Table 2. Dimensions of a rectangular frame enclosing 10 square feet for measuring loose kernel losses.

Width (inches)	Length (inches)
15	*
20	72
22	65 7/16
30	48
36	40
38	37 7/8

*Use frame for 30-inch rows and place over 2 rows at a time.

What Are Reasonable Loss Levels?

During an extensive field survey in the 1970s extension personnel checked 84 central Iowa corn combines, and the average losses for the top 10 percent of the combines are listed in table 3. Machine ear loss and stalk roll shelling were the most frequent causes of high field losses. Note, these losses at the cornhead are not detected by monitors. Harvest losses were lowest when kernel moisture was between 19 and 23 percent. Losses increased as lodging increased and were high in weedy fields.

If your losses are greater than the average values in table 3, stop and find out why. Your goal should be to reduce losses to the levels shown for the top 10 percent of the combines in the survey.

Adjustments and Operating Practices to Keep Losses Low

Keep your combine in good repair. Keep chains properly adjusted and belts tight. Oil roller chains in the evening so excess oil can drip off overnight.

Plant your corn in rows equal to the row spacing of your cornhead. In the survey (and since verified by later data), harvest losses were more than 1 bushel per acre higher for combines with a cornhead row spacing 2 inches different from the width of the corn rows.

Adjust stalk roll speed and spacing to snap ears about one-half to two-thirds of the way up the snapping bars. Snapping bars should be spaced narrower in front than in back to prevent wedging. A spacing of 1 1/4 inches in front and 1 3/8 inches at the back is satisfactory under average conditions. If a wider spacing is used, small ears will wedge between the snapping bars and shelling losses will increase. Be sure stalk roll spacing and snapping bar spacing are the same on all rows.

Adjust gathering chains so the flights are opposite each other and extend about 1/4 inch beyond the snapping bars. Keep trash knives adjusted close to the stalk rolls.

Gathering snouts should just touch the ground under normal field conditions. If corn is badly lodged, slow down

and let the snouts float on the ground. Under good field conditions, maintain a field speed that uses much of your combine's capacity. Avoid overloading. Check chaffer, sieve, and fan adjustments and reduce travel speed if necessary to keep separating losses under 0.3 bushels per acre. Use adequate fan speed to fluidize the mat of material. Watch for ears lost at the header and reduce travel speed if more than one ear per 1/100 acre is dropped. Slower field speed is required for heavy crop conditions.

Rotor cylinder speed should be just high enough to adequately thresh corn without excessive damage. Try not to break cobs into more than three or four pieces for better separating. Start with wider concave clearance to promote crop-on-crop threshing and narrow it only as necessary to limit threshing losses.

Stay Safe

Disengage power and shut off engine before leaving the operator's station. Stalk rolls turn faster than you can react to release plugged stalks. Keep shields in place.

Mechanically lock and block the corn head before getting underneath it. Carry two fire extinguishers, a small one inside the cab and a 20-pound unit at ground level.

Know where all bystanders are during machine operation. Finally, take a break to reduce fatigue and stay alert.

Table 3. Harvesting losses for 84 randomly selected combines harvesting corn in central Iowa.

	Average (bushels/acre)	Top 10% (bushels/acre)
Machine ear loss	1.5	0.0
Stalk roll shelling	0.9	0.3
Cylinder loss	0.6	0.0
Separating loss	0.7	0.2
Total harvesting loss	3.7	0.5
Preharvest dropped ears	2.1	1.0
Total loss	5.8	1.5