

AE 340 Laboratory 6, Combine Testing

OBJECTIVES:

Learn how corn harvesting losses are measured and reported.

PROCEDURE

A series of combine loss measurements were collected in the field. These will include pre-harvest losses, header losses, threshing and separation losses. The combine will travel through the field stop and then back up 15-20 feet. Three different areas will be tested 1) In the rows in front of the combine which have not been harvested to determine pre-harvest losses 2) In front of the combine, where only the header has passed, to determine the header losses, and 3). Behind the combine to determine the threshing and separation losses.

These measurements were taken at three different speeds (2, 4, 6 mph) and at three cylinder speed settings (nominal cylinder speed, low cylinder setting, high cylinder setting).

Ten square foot frames were placed in each of the three areas. Measure the cylinder losses in each section by counting the number of kernels (or beans) within each frame. For the preharvest losses only a single frame count may be taken. For the header losses two representative frame samples may be taken across the width of the header. However, for separation losses the sampling frames must be moved and the counting repeated across the whole width of the header.

The following data was collected:

Net crop yield: The mean harvested corn yield in the field was recorded and moisture content measured. Net crop yield should be based on corn at a moisture content of 15.5%.

Losses:

Preharvest: Detached ears or those on detached stalks will be collected before the machine passes through. An area 10 square feet by covering one row was used. The square moved so all 8 rows were measured across the width of the combine.

Gathering: Gathering ear losses are ears lost by the header. Ear losses will be collected over the same area as the preharvest losses. An area 10 square feet by covering one row was used. The square moved so all 8 rows were measured across the width of the combine. To obtain gathering kernel losses it is necessary to stop the machine and back-up the machine, so kernels can be collected from an area free of threshing and separating losses.

Threshing and separating losses: For threshing and separating losses. An area 10 square feet by covering one row was used. The square moved so all 8 rows were measured across the width of the combine. Threshing losses are kernels attached to cobs discharged from machine. Separating losses are kernels separated from cobs and discharged from machine.

Loss Measurements for 2005 Corn Harvest									
Average Corn Yield				185 bu. acre					
Average Corn Moisture Content				15 %					
Average Losses (all rows, kernels per 10 square feet)									
Combine	Cylinder		Row	Header		Threshing		Seperation Losses	
Speed	Speed	Clearance		Ear	Kernels		Kernels		Kernels
(mph)	(rpm)	(mm)		Number	Number	Number	Number	Number	Number
2	260	36	All		14		17		128
2	370	36	All		15		0		36
2	470	36	All		14		0		74
4	260	36	All		32		14		108
4	370	36	All		29		20		66
4	470	36	All		30		0		36
6	260	36	All		23		10		104
6	370	36	All		22		9		54

REPORT

Read the two Iowa State Extension publications to determine the following information.

- a. Determine preharvest, gathering (ears and kernels), threshing, and separating losses in bushels per acre (kg/ha). each of the tests.
- b. Net yield (harvested yield) and gross yield (harvested yield plus all losses) in bushels per acre (ton/ha). Show all calculations.
- c. Preharvest, gathering, threshing, and separating losses as a percent of gross yield.
- d. Plot a graph of yield loss versus combine speed. (Use separate curves for different test groups). (Provide sample calculations for one test)
- e. Plot a graph of yield loss versus cylinder speed. (Use separate curves for different test groups). (Provide sample calculations for one test)
- f. If corn is selling at \$2.50 a bushel, calculate the total monetary loss for each test, for 1000 acres for the crops .
- h. What speed and operational settings, would you recommend a farmer use. **Briefly state what you think increases losses and physically why this is happening**