

A combine harvester is shown in a field, moving from left to right. The sky is filled with falling US dollar bills, including \$20 and \$100 bills. The scene is set against a sunset or sunrise sky with a warm, orange glow. The harvester is kicking up a cloud of dust or grain behind it.

Combine Adjustment: Don't Set it and Forget it!

PAMI

Innovative Solutions for Agriculture and Beyond

Facts:

- Can = About 72 million acres of grain harvested per year
- Can 2013 Production was about 2.8 billion bushels per year

Estimations:

- 2,500 acres / combine = 28,800 combines to adjust in Can!
- About 97,000 Bushels / combine
- Just 1 bu/acre less loss = 72 million bushels
- At an average of \$7 / bushel = \$504 million



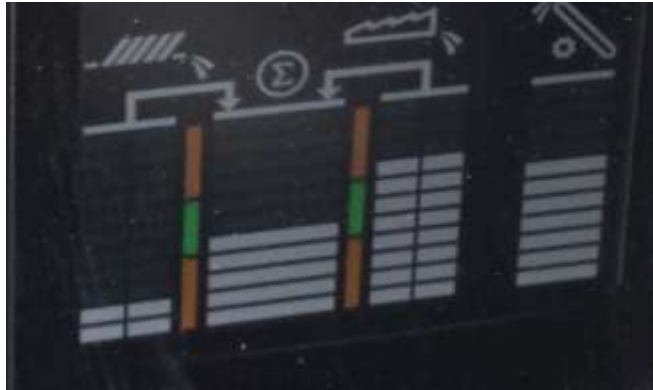
Common Misconceptions:

- Mph = capacity
- More power = More capacity
- Keeping the machine full (driving faster) = less loss
- The losses can't be that bad



Common Misconceptions:

- If I can't find much on the ground the losses are ok
- I can go the same speed with a wider header
- Same settings for one crop will be fine for the entire season
- Same settings for one crop will be fine for the entire day
- My loss monitor tells me my loss



HOW BAD CAN LOSS BE?



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What's the cost of loss?

- Canola at \$10/bu
- 160 acres
- 40 ft header
- @ 3 mph (14.5 ac/hr) loss = 1 bu/acre over 11.0 hrs
- @ 4 mph (19.4 ac/hr) loss = 3 bu/acre over 8.2 hrs
- Reduced harvest time by 2.8hr @ \$300/hr = **+\$840**
- @ 3 mph cost of loss = \$1,600 or **\$145/hr**
- @ 4mph cost of loss = \$4,800 or **\$585/hr**
- Loss Increased by \$440/hr by going 1 mph faster
- Cost **\$2,360** to go 1 mph faster for 160 acres
- **Plus the cost of dealing with the volunteer plants**



High Losses! What's Happening?

- More power! Since 1990 combine HP has more than doubled
- Significant material handling improvements
- Maximum throughput is greater than capacity of the processing and cleaning systems in some conditions.
- Modern spreaders and choppers hide the loss

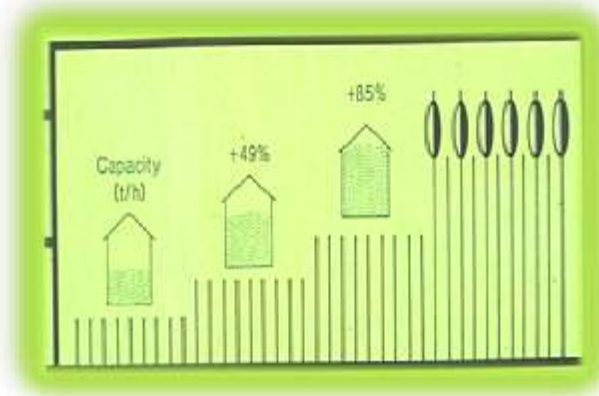


High Losses! What's Happening?

- Assumption that the latest combine has X% more capacity than the previous model in all conditions.
- Assumption that if the combine can send it through the grain will end up in the tank
- Similar ground speeds with wider headers
- Improved genetics have increased yields = more material

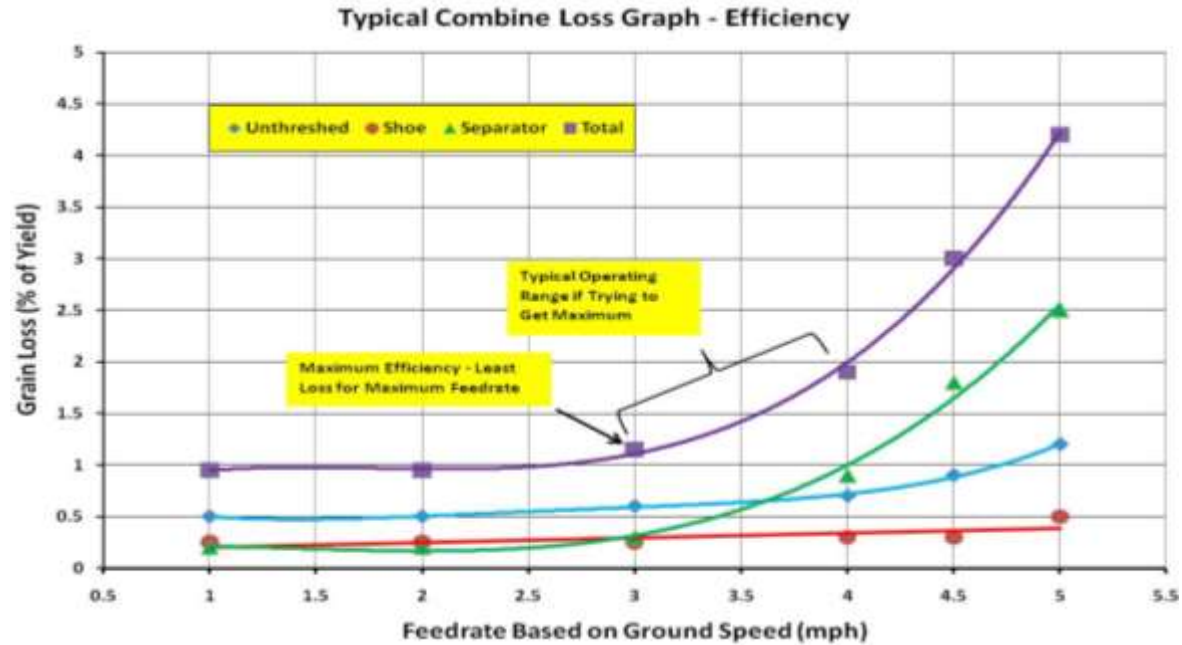


High Losses! What's Happening?



- **Cut height - Impacts MOG to Grain Ratio**
 - Tests from 1985 on conventional combine in wheat:
 - Reduce MOG to Grain ratio from 1.20 to 0.85 = **49%** capacity increase (6" higher cut height)
 - Reduce MOG to Grain ratio from 1.20 to 0.64 = **85%** capacity increase (12" higher cut height)
- **Header width increases – adjust speed**

PAMI COMBINE LOSS CURVE



HOW DO YOU KEEP LOSSES LOW?

Look for loss!

Quantify the loss!

Invest time in checking losses and optimizing settings





Better yet, catch the loss in a pan!

Know the pan area

Recommend chopper and spreaders disengaged



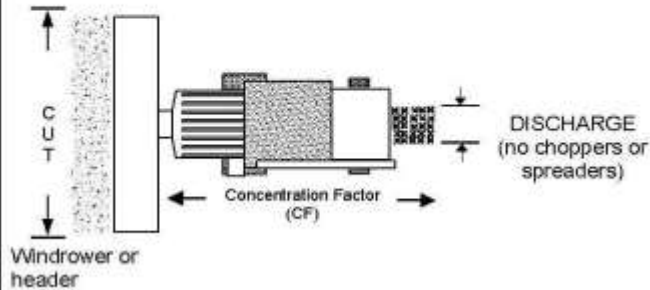


Tools Needed



Combine Seed Loss Guide

A method for determining seed loss from your combine based on weight, volume, or kernels.



STEP 1
Find your CF—in this table

Common Ratios of Width of Cut to Width of Discharge (Concentration Factor)					
Width of Cut (ft)	Width of Discharge from Rear of Combine (ft)				CF
	3	4	5	6	(X)
12	16	20	24	4	4
15	20	25	30	5	5
18	24	30	36	6	6
21	28	35	42	7	7
24	32	40	48	8	8
27	36	45	54	9	9
30	40	50	60	10	10

STEP 2
Collect a Sample from discharge of known area

Be Careful
Be Safe

Continue steps on next page



STEP 3 Clean seed from catch

- Sieve using a screen
- Blow out chaff

Hint can use leaf blower and 85 L tub

STEP 4 Weigh, measure (volume), or count seeds (use scale, test tube), see guide.

STEP 5 Calculate loss on per ft² basis (divide results by ft² of collection pan)

STEP 6 Select Table 2, 3, 4, or 5 to find loss on a per acre basis

Table 2 Weighing Method - All Crops

Cut width compared to windrow dropped behind combine (Concentration Factor = CF)

CF	4	5	6	7	8	9	10	Loss lb/ac
Loss Collected Behind Combine in 1 square foot Grams/ft ²	0.4	0.5	0.6	0.7	0.8	0.9	1.0	10
	0.6	0.8	0.9	1.1	1.2	1.4	1.6	15
	1.0	1.3	1.6	1.8	2.1	2.3	2.6	25
	2.1	2.6	3.1	3.6	4.2	4.7	5.2	50
	3.1	3.9	4.7	5.5	6.2	7.0	7.8	75
	4.2	5.2	6.2	7.3	8.3	9.4	10.4	100
	5.2	6.5	7.8	9.1	10.4	11.7	13.0	125
	6.2	7.8	9.4	10.9	12.5	14.1	15.8	150
	7.3	9.1	10.9	12.8	14.6	16.4	18.2	175
	8.3	10.4	12.5	14.6	16.7	18.7	20.8	200

For bigger collection pans multiply the values in the grey zone by the number of ft² in the collection. Calculations are based upon 0.000415 grams/ft² over each ft² in an acre = 1 lb/ac

Table 3 Volume Measurement Method - All Crops

Cut width compared to windrow dropped behind combine (Concentration Factor = CF)

CF	4	5	6	7	8	9	10	Loss bu/ac
Loss Collected Behind Combine in 1 ft ³ in Millilitres (ml)	0.8	1.0	1.3	1.5	1.7	1.9	2.1	0.75
	1.7	2.1	2.5	2.9	3.3	3.8	4.2	0.50
	2.5	3.1	3.8	4.4	5.0	5.6	6.5	0.75
	3.3	4.2	5.0	5.8	6.7	7.5	8.3	1.00
	4.2	5.2	6.3	7.3	8.3	9.4	10.4	1.25
	5.0	6.3	7.5	8.8	10.0	11.3	12.5	1.50
	5.8	7.3	8.8	10.3	11.7	13.1	14.6	1.75
	6.7	8.3	10.0	11.7	13.4	15.0	16.7	2.00
	8.3	10.4	12.5	14.6	16.7	18.8	20.9	2.50
	10.0	12.5	15.0	17.5	20.0	22.5	25.0	3.00
	11.7	14.6	17.5	20.5	23.4	26.3	29.2	3.50
	13.4	16.7	20.0	23.4	26.7	30.1	33.4	4.00
	15.0	18.8	22.5	26.3	30.1	33.8	37.6	4.50
	16.7	20.9	25.0	29.2	33.4	37.6	41.7	5.00

For bigger collection pans multiply the values in the grey zone by the number of ft³ in the collection. Calculations are based upon 0.004875 ml/ft³ over each ft³ in an acre = 1 bu/ac

Online Calculator - Use your smartphone!

<http://farmpro.ca/ref/CombineLoss>

Crop

Density (lbs/bu)

Yield (bu/ac)

Catch area (ft²)

Cut width (ft)

Discharge width (ft)

Loss weight (g)

Total loss (bu/ac)

Relative loss (%)

By Weight

Crop

Density (lbs/bu)

Seed size (mg)

Yield (bu/ac)

Count area (ft²)

Cut width (ft)

Discharge width (ft)

Kernel count

Total loss (bu/ac)

Relative loss (%)

By Seed Count

Operating cost (\$/hour)

Width of cut (ft)

Crop price (\$/bu)

	Option A	Option B
Speed (mph)	<input type="text" value="4"/>	<input type="text" value="3"/>
Loss (bu/ac)	<input type="text" value="2"/>	<input type="text" value="0.8"/>
Workrate (ac/hr)	<input type="text"/>	<input type="text"/>
Total cost (\$/hr)	<input type="text"/>	<input type="text"/>
Savings (\$/ac)	<input type="text"/>	<input type="text"/>

Cost Calculator

Key Indicators:

- High amount of grain in tailings may indicate improper cleaning system settings
- A very clean grain tank sample may indicate high losses



Key Indicators:

- Stick your hand in the grain tank sample – damaged grain will sometimes stick to your hand
- Condition of the straw coming out of the combine
- Watch your yield monitor (in consistent fields)
- Kill stalls – you can learn a lot!



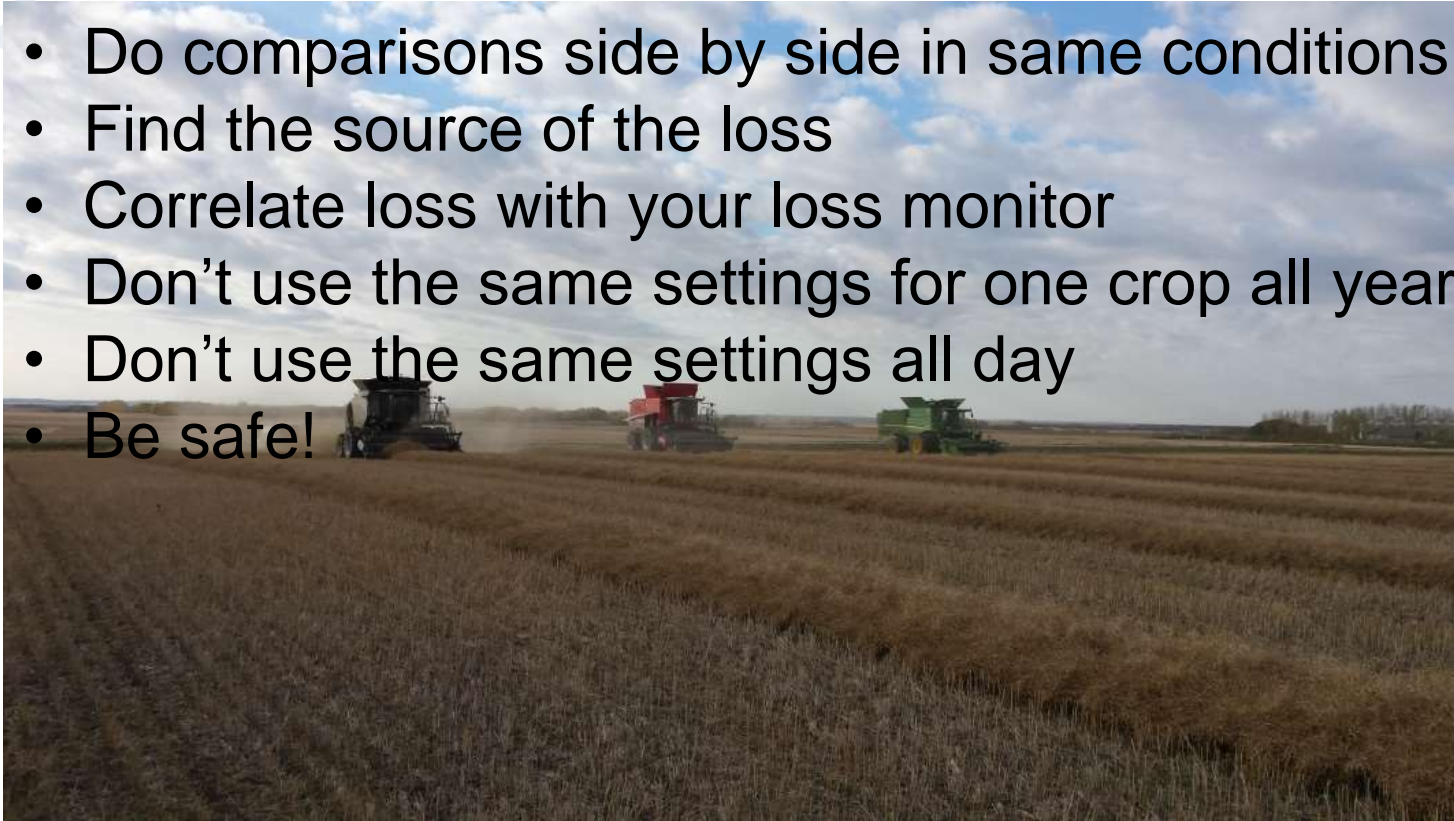
Recommendations

- Don't make it a race!
- Don't use all of the available power all of the time
- Learn about your combine
- Invest time in checking losses and optimizing settings



Recommendations

- Do comparisons side by side in same conditions
- Find the source of the loss
- Correlate loss with your loss monitor
- Don't use the same settings for one crop all year
- Don't use the same settings all day
- Be safe!





PAMI

Questions and Discussion

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