Reducing Soybean Harvest Losses in Manitoba

The Bean Report
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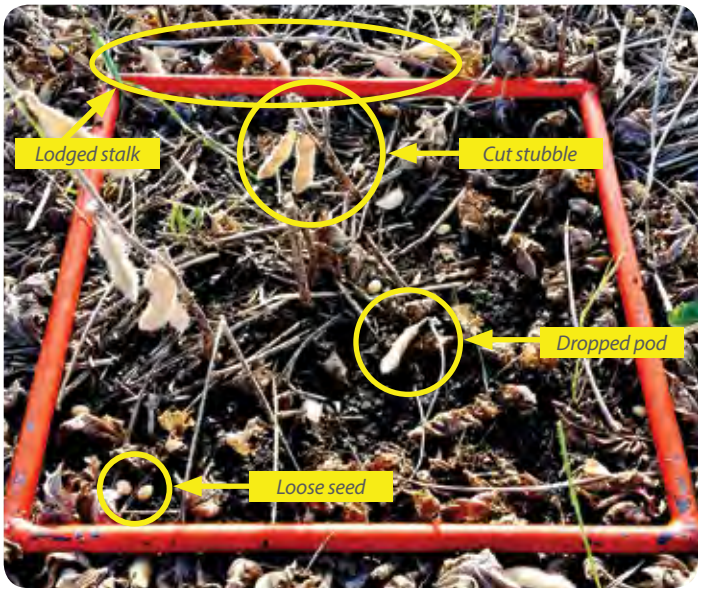
ARE WE HARVESTING soybeans efficiently in Manitoba? Do speed, header type and harvest angle matter when it comes to combining soybeans? These are questions that the Prairie Agricultural Machinery Institute (PAMI) and MPSG have been working to address in Manitoba.

HEADER LOSSES

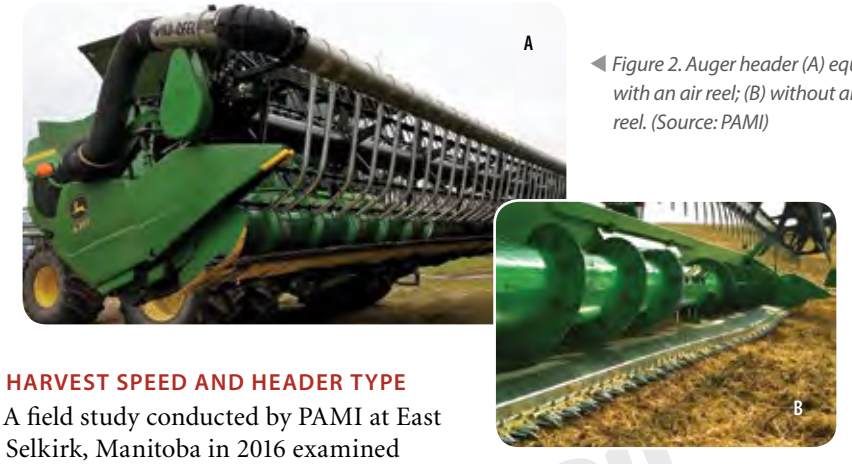
It is estimated that 80% of soybean harvest losses occur at the header, which can have a significant impact on net return. Header losses occur during gathering (the feeding of soybean plants into the header), prior to threshing. There are four types of header losses (Figure 1):

1. **Shatter** – seeds and pods shattered by the cutter bar
2. **Loose** – stalks that were cut, but not delivered into the combine
3. **Stubble** – pods that remain attached to cut stubble
4. **Lodged** – stalks that were lodged, rather than severed by the cutter bar

The primary causes of header losses are shatter and pod drop.[1, 2]



▶ *Figure 1. Loose seed, cut stubble, lodged stalk and dropped pod losses. (Source: PAMI)*



◀ *Figure 2. Auger header (A) equipped with an air reel; (B) without an air reel. (Source: PAMI)*

HARVEST SPEED AND HEADER TYPE

A field study conducted by PAMI at East Selkirk, Manitoba in 2016 examined the effects of combine speed and use of an air reel on soybean header loss. The study tested four combine speeds: 2, 3, 4 and 5 mph. It also examined auger headers with and without an air reel (Figure 2). The experiment was randomized and replicated.

Soybean header losses were low when combine speeds were 2, 3 and 4 mph. These three speeds resulted in similar soybean header losses.[2] However, losses at 5 mph were nearly 40% (0.69 to 0.82 bu/ac) greater than all other speeds (Figure 3). Therefore, slowing down the combine may cost you a bit more time, but it can put more seed in the bin and save you money. Assuming a soybean grain price of $10/bu, loss of revenue was $8.20/ac at 5 mph compared to the slowest combine speed. In addition, reduced harvest speed allows the cutter bar to run closer to the ground more safely, reducing stubble losses.[1]

This study also showed the benefit of harvesting soybeans with an air reel. Soybean header losses with and without an air reel in this study were 1.02 and 2.27 bu/ac, respectively (Figure 4).[2] This means that using an air reel could prevent 1.25 bu/ac of header losses during harvest, equal to a savings of $12.50/ac (at an assumed grain price of $10/bu).

It is important to note that these results are from only one site year of data. But there is tremendous potential to reduce soybean harvest losses and increase economic return through improved header use.

In 2017, PAMI will continue this research, examining combine speeds and draper headers with and without an air reel.

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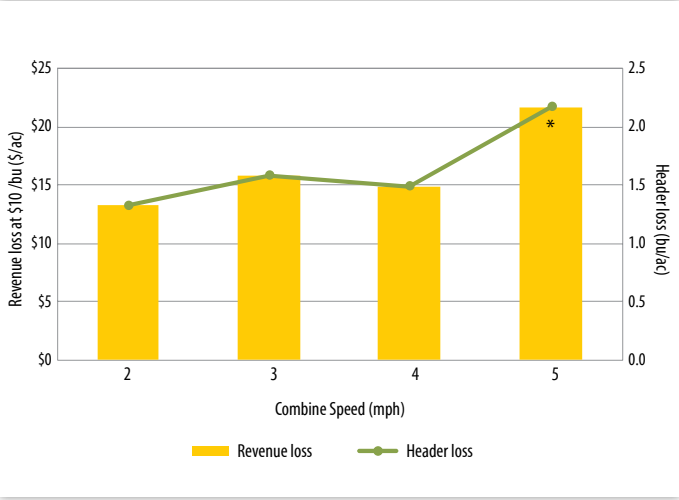
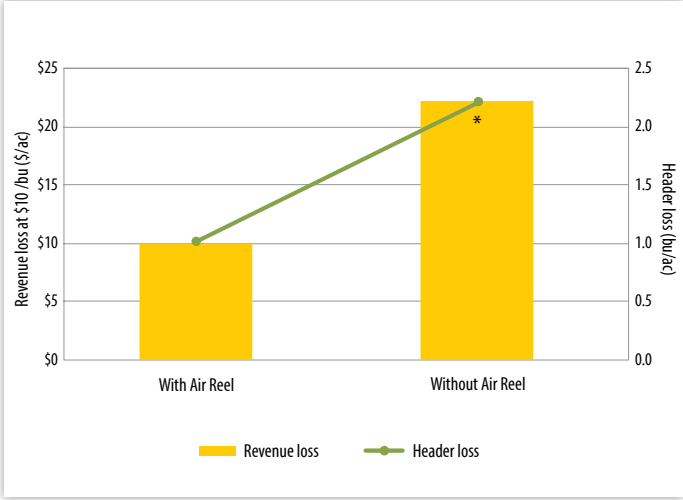
▼ *Figure 3. The effect of combine speed on revenue loss and soybean header loss. (Source: PAMI)*



▼ *Figure 4. The effect of auger headers with and without an air reel on revenue loss and soybean header loss. (Source: PAMI)*



HARVEST ANGLE

Another randomized, replicated field study conducted by PAMI near Tyndall, Manitoba in 2015 evaluated the effect of harvest angle on soybean header loss. Two soybean varieties (Dekalb 23-60RY and 24-10RY) were harvested at 0° and 45° angles to the rows using a draper header.

There was no conclusive evidence from this study that soybean harvest losses were reduced by combining at a 45° angle. However, harvesting at a 45° angle provides the benefit of distributing the cutting load across the entire header. In-line harvesting (0° angle), on the other hand, can increase wear on cutter bar knives by heavily loading knife sections, and under-utilizing combine capacity.

This study provided evidence that optimal combine settings differ among soybean varieties. However, more research on this topic is needed.

SOYBEAN HARVESTING TIPS

- Monitor soybeans every other day once they begin to mature. Consult the MPSG *Soybean Maturity Guide* to help time your harvest.
- Avoid harvesting soybeans at less than 13% moisture to avoid seed damage.
- Direct combine soybeans with a flex header at 4 mph or less.
- Adjust the cylinder speed and concave clearance carefully to prevent seed cracking and splitting.
- Aim to lower the cutter bar within two inches of the ground to capture the lowest pods, preventing stubble losses.
- Measure losses regularly during harvest to optimize your combine settings.

Watch for our new Bean App tool – the *Harvest Loss Estimator* for soybeans! ■

References

[1] Paulsen, M.R., F.D.A.D.C. Pinto, D.G. De Sena, R.S. Zandonadi, S. Ruffato, A.G. Costa, V.A. Ragagnin, and M.G.C. Danao. 2014. Measurement of combine losses for corn and soybeans in Brazil. Appl. Eng. Agric. 30(6): 841–855.

[2] Simundsson, A. and L. Grieger. 2017. Optimizing combine efficiency while harvesting soybeans in Manitoba. Prairie Agricultural Machinery Institute (PAMI) Research Report.

[3] Mak, J., Grieger, L. and H. Chorney. 2016. Potential value of straight cutting soybeans at an angle to the rows. Prairie Agricultural Machinery Institute (PAMI) Research Report.

HOW TO MEASURE SOYBEAN HARVEST LOSSES

1. Stop the combine and back up 15–20 feet.
2. Lay out a quadrant (e.g., ft²) or hula hoop (e.g., 28.4" diameter equals 1/1000th of an acre) in at least four areas along the header.
3. Record the number of beans in all areas, accounting for all types of header loss.
4. Calculate the average number of beans across all sample areas.
5. Divide the average number of beans by the area (e.g., ft²), then divide by four to calculate header loss in bu/ac. As a rule of thumb, 4 beans/ft² equals 1 bu/ac, which can be used as a conversion factor in this case.

A similar method can also be used to measure threshing losses behind the combine.