

On-Farm Evaluation of the Economics of Rolling Soybeans

Rolling costs about \$5/ac and offers farmers peace of mind at harvest, even on non-stony fields. When rolling with larger tractors, a gear-up/throttle-down strategy can reduce costs.

LAND ROLLING PUSHES stones, residue root balls and soil clods down, aiding harvestability of soybean plants that pod low to the ground. Stones can cause significant damage to the combine leading to costly downtime during harvest. Rolling is a common practice in Manitoba, even on fields without stones where the risk of damage is minimal.

The objective of this research was to determine the cost of rolling and the economic return provided by rolling non-stony fields. This information can be used to help farmers decide whether rolling should remain part of their standard practices or if they can forego the extra pass on the field in spring.

Rolled and unrolled soybean strips were compared at six non-stony On-Farm Network fields in the Red River Valley in 2018 and 2019. Fields were all rolled with a smooth roller (50 ft) within three days after seeding. Fuel consumption (L/ac) was recorded. Draft load and power requirement were measured using an instrumented load cart between the power unit and the roller. Costs for rolling were calculated using the *Manitoba Farm Machinery Custom and Rental Rate Guide*. Header losses were assessed at harvest. The rock trap was monitored between strips to verify that no rocks were picked up, as rogue stones can emerge even in non-stony fields. Additionally, farm operators were asked a series of questions to gauge if rolling affected operator fatigue and comfort during harvest.

The average cost of rolling was \$4.40/ac when an appropriately-sized tractor was used (< 300 hp, Table 1). However, most of the cooperating farmers used an oversized tractor (> 450 hp), either for trafficability or because that was the only unit available. In these situations, the cost of rolling was closer to \$5/ac, but the use of a gear-up/

Table 1. Summary of roller operations and cost at six On-Farm Network sites.

Site	Tractor power (hp)	Roller diam/width (in/ft)	Speed (km/hr)	Draft force (lbs)	Power req (hp)	Work rate (ac/hr)	Fuel consumption (L/ac)	Custom rate (\$/ac)
1	280	42, 50	12.7	2157	45.4	47.7	–	5.19
2	200	36, 50	13.0	1683	36.3	49.0	0.36	4.24
3	450	36, 50	15.8	1670	43.8	59.6	0.50	4.91
4	450	42, 50	17.3	1891	54.2	65.0	–	4.56
5	450	42, 50	15.9	2055	54.3	60.0	0.65	4.96
6	475	36, 51	15.1	1877	46.9	57.8	0.44	5.06

throttle-down strategy can reduce fuel consumption and operating costs (Table 2).

The impact of rolling on seedbed placement was assessed at two site-years. Rolling did not affect seed depth, nor did it affect the amount of seeds stranded on the soil surface.

Operators did not feel the need to alter harvest speed between rolled and unrolled strips, nor did they notice any difference in handling equipment or ride comfort. However, all of the farmers felt the need to be more alert in the unrolled plots to watch for rogue stones or soil clods.

Header losses ranged from 1.4 to 3.9 bu/ac and showed no clear differences between unrolled and rolled strips. Unrolled strips had greater header losses at two sites, lower losses at one site and no difference from the rolled strip at another site. Extreme moisture in the fall of 2019 prevented further data collection.

Since there was no definitive indication of whether rolling affects header losses, farmers should measure harvest losses on their farms and decide whether to continue rolling by weighing the cost of rolling (approximately \$5/ac) against the potential risk of equipment damage. ▀

PAMI load cart connected between a power unit and a roller.



Table 2. Summary of gear-up/throttle-down strategy at two sites.

Site	Gear	Engine speed (rpm)	Speed (km/hr)	Work rate (ac/hr)	Fuel consumption (L/ac)	Cost savings per 1000 acres
5	15	1811	15.7	59.0	0.69	\$ 0.00
	16	1498	15.9	60.0	0.65	\$ 51.55
	17	1216	16.0	60.2	0.55	\$ 168.01
6	13	1718	14.7	56.3	0.50	-\$148.89
	14	1389	15.1	57.8	0.44	\$0.00
	15	1109	15.2	58.5	0.36	\$94.22