

Processor Productivity Analysis When Handling Residues – Two Methods

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Introduction

FPInnovations completed a trial in December 2016 which examined the productivity and cost of three methods of piling and grinding logging residues (Spencer and Blackburn, 2017). The December trial compared three pile types:

1. Piles built by a log loader for burning after the initial harvest.
2. Piles built by a log loader for biomass extraction after the initial harvest.
3. Piles built by the processor during the processing phase of harvesting.

One concern that arose from this trial was whether having a processor neatly pile residues created a loss in productivity versus the traditional method of throwing or “flinging” the residual tops as far as possible from the processor. Researchers returned to Vanderhoof in March 2017 to monitor the productivity of the two methods (throwing and stacking) for handling residues.

Stand description

The trial was located approximately 25 km north of Vanderhoof, BC. The stand was a mix of 45% lodgepole pine (both live and dead), 45% hybrid spruce and 10% subalpine fir. Two decks of logs were processed. In deck 1, approximately 41% of the stems were alive at the time of harvest. In deck 2, approximately 16% of the stems were alive at the time of harvest.

Machine description

The machine used for this trial was a Hitachi Zaxis 210 excavator with a Log Max 7000XT processing head.

Description of handling methods

Method 1 – Throwing or Flinging

This method is the traditional technique used by most processor operators. Residual tops are thrown away from the processor with the intention of clearing space in front of the processor. No care is taken to ensure pieces are aligned in an organized manner as this method originated at a time when burning residues was the only method of disposal (see Figure 1a).

Method 2 – Stacking Neatly

This is a non-traditional technique where the operator simply drops the tops in front of his working space. Tops should be aligned with the lower portion (the butt of the residual piece) facing the road (see Figure 1b, right).



Figure 1a. (Left) Residues handled using the throwing method.

Figure 1b. (Right) Residues handled using the stacking method.

Productivity

A day of productivity for each method was analyzed for each of the two processed log decks (Table 1).

Table 1. Productivity of two residue handling methods

Unprocessed Deck #	Handling Method	Productivity (m ³ /PMH)	Average piece size (m ³ /piece)
Deck 1	Method 1 – Stacking neatly	34.6	0.33
Deck 1	Method 2 - Throwing	34.4	0.32
Deck 2	Method 1 – Stacking neatly	23.2	0.23
Deck 2	Method 2 - Throwing	25.6	0.24

In the first deck, the productivity for the processor using each method was nearly identical. In the second deck, the productivity was slightly higher for throwing, but the difference was not statistically significant. The slight difference may have been caused by a mechanical problem in the processing head that was present throughout the two days the processor worked on the second deck. In both sample sets (deck 1 and 2), piece size was indistinguishable.

Conclusion

At the start of the trial, the operator voiced concern that stacking the residue would take significantly longer than simply throwing the residue to the side. Towards the end of the second day, (one day throwing, one day stacking) the operator had changed his mind and stated that there was no lost productivity. The measured results corroborate the operator's opinion.