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BUNCHING TO INCREASE SKIDDER PRODUCTIVITY

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INTRODUCTION

When the Bell Logger was undergoing field trials in New Zealand, it was obvious that one of its advantages would be the ability to bunch stems in the field, for subsequent extraction by a standard skidding machine. In many operations in small-wood, the power of the conventional skidding machine is under-utilised because only a small number of stems can be hooked on. Alternatively, productivity may be limited because of the time taken to hook on a larger payload of these small stems. Fletcher Forests Ltd. decided to use the Bell logger in a clearfelling operation to prepare bundles of logs for a conventional skidder, with the aim of increasing productivity and reducing unit costs.

FLETCHER FORESTS LTD. PHOTO

Logs Bunched by Bell Logger on Flat Terrain

TRIAL CONDITIONS

Two distinct areas were worked during the trial. In the first, the terrain was flat and conditions easy. In the second, the terrain was broken with valleys and ridges criss-crossing the area. The ridges were up to 15 metres high and very steep. The stands were yellow contorta pine. Average butt diameter was 21 cm and the average piece size was 0.23-0.25 tonnes.

EXISTING LOGGING METHOD

The extraction machine was a 96 kW rubber-tyred skidder. Three bushmen felled and trimmed logs. The skidder carried 10 chokers and generally only one stem was attached to each choker. In the broken terrain the skidder generally worked in valleys. Considerable time was spent in breaking-out and repositioning the skidder, as the valleys were narrow and trees scattered. Trees were felled downhill into the valley and as a consequence there was a lot of slash on the skidder tracks.

TRIAL RESULTS

The Bell bunched the trimmed logs into bundles of 4, 5, or 6, travelling between the bushmen. Whenever there were insufficient logs ready for bunching, the Bell was able to extract logs to the landing.

The optimum load for the skidder was found through trial and error. With the standard choker length used, four logs per bundle was the optimum. With longer chokers, bundles containing more than six pieces came apart, as the inner logs tended to slowly slip out. Not enough tension could be applied to the choker to hold them all together.

Four or five bundles containing four logs were found to be the most suitable. Any greater number of bundles caused the load to spread out behind the machine, catching on obstructions. Also, a greater number of butts would not fit onto the butt plate of the skidder.

In the trial area on steep terrain, the Bell was unable to operate on slopes, and was therefore restricted to the valley floors. It was able to reach them for bunching as the trees were felled down into the valleys. In some areas it was necessary for the skidder to form short lengths of track for the Bell to operate on.

The tabulated results are actual study times and cannot be related to times for target or rate setting.

BUNCHING LOGGING METHOD

A. FLAT TERRAIN

	Normal Logging Method	Bell Assisted
Haul loaded (166 m average)	1.11 mins	1.93 mins
Return empty	0.91 mins	1.11 mins
Position for load	0.38 mins	0.15 mins
Breakout	3.96 mins	3.22 mins
Skid travel	0.37 mins	0.44 mins
Unstrop (assisted by skiddy)	0.97 mins	0.74 mins
Fleet and stack	1.54 mins	1.79 mins
Other (personal time, infield repairs, remove skid rubbish, etc.	1.18 mins	1.31 mins
Total Cycle Time	10.42 mins	10.69 mins
Machine time per day	6.25 hrs	6.25 hrs
Cycles per day	35.99 36	35.10 35
Pieces per drag (study average)	8	12.75
Pieces per day	288	446
Productivity @ 0.25 tonnes/piece	72 tonnes/day	111.5 tonnes/day

PRODUCTIVITY INCREASE : 55%

B. BROKEN TERRAIN (slopes up to 21°)

	Normal Logging Method	Bell Assisted
Haul loaded (200 m average)	3.10 mins	3.10 mins
Return empty	1.74 mins	1.76 mins
Position for load	1.75 mins	0.35 mins
Breakout	6.63 mins	3.98 mins
Skid travel	0.40 mins	0.42 mins
Unstrop	2.24 mins: *(unassisted)*	0.80 mins: *(assisted)*
Fleet and stack	1.24 mins	1.61 mins
Other	0.98 mins	1.67 mins
Total Cycle Time	18.08 mins	13.69 mins
Machine Time per day	6.25 hrs	6.25 hrs
Cycles per day	20.7 21	27.4 27
Pieces per drag (study average)	9.4	12.0
Pieces per day	197	324
Productivity @ 0.23 tonnes/piece	45.1 tonnes/day	74.5 tonnes/day

PRODUCTIVITY INCREASE: 65%

COMMENTS ON TRIAL RESULTS

Breakout times were longer than expected for the bunched logs in both trial areas. This is probably because the chokers were often too short and some logs has to be manually repositioned for the chokers to be fitted around them. The ideal choker length was around 3.1 metres; about 0.4 metres longer than standard. In the normal logging method on flat terrain, the skidder carried 9 chokers, while on steep terrain, 10 were carried. This resulted in a greater number of pieces per drag on steep terrain.

The skid work (fleeting and stacking) was longer for the bunching trial because of the greater number of pieces to be handled. In addition, it was found that when bushmen were hard pressed to keep up with the extraction machine, more untrimmed trees were pulled onto the skid. These were delimbed by the skiddy, and the skidder had to spend more time removing slash.

The trials showed that bunching logs increased productivity dramatically in both areas. However, the increase was greater where the terrain was more difficult. This largely results from a big reduction in breakout times between the normal and the bunching logging method on steep terrain. In the normal method the skidder often had to be driven to two or three different places to get a full load. The quantity of slash made it difficult to pull out the mainrope and to locate and hook on logs. Using the Bell to bunch the logs alleviated most of these problems, reducing the cycle time.

COSTS

The productivity increases achieved through bunching must cover the increased costs associated with the additional machine. A further bushman would also be required in any long term trial, and this has been included in the costing. The costing sytem used is based on a method developed by LIRA and does not represent actual costs of operation in this area.

DAILY COSTS:	Existing System	Bunching System
Extraction Machine (100 kW)	$195	$195
Bell bunching machine	-	78
Bushmen }	110	165
Machine Operator } @ $55 per day	55	110
Skiddy }	55	55
Saws @ $13 per day	39	52
Other costs (transport, overheads, etc.)	65	75
	$519	$730

COST OF PRODUCTION $/TONNE:	Existing System	Bunching System
72 tonnes per day	7.21	-
111 tonnes per day	-	6.64
45 tonnes per day	11.53	-
75 tonnes per day	-	9.73

CONCLUSIONS

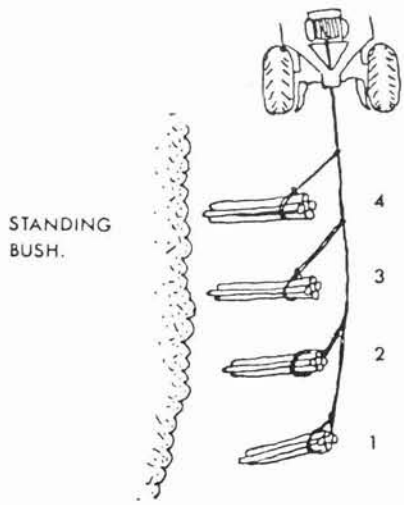
It is apparent from the trial results that bunching logs for an extraction machine can reduce logging costs. However, further improvements to the technique are suggested:

1) Stumps should be kept as low as possible, especially in areas where the Bell is to travel. Stumps catch behind the drive wheels causing the machine to slew or tip, slowing down its travel.

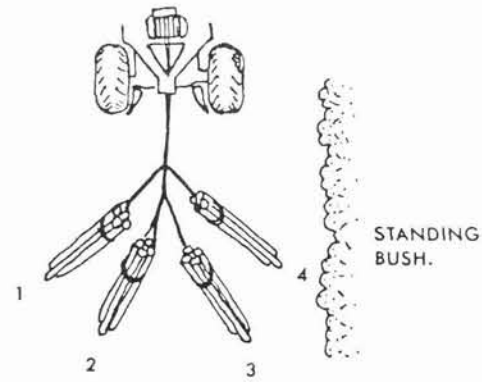
2) Short logs and long logs should be made into separate bundles. This makes handling on the landing much easier.

3) Bunches of logs should be placed so as to reduce the length of winch rope to be pulled out. The diagram below shows the possibility for improvement.

4) Grapple skidders appear more appropriate than cable skidders for multiple log chokering. An evalution of the cycle shows that if a grapple skidder could take 12 or 13 pieces per load, then productivity could be increased some 50% above that with the cable skidder.



Original Method



Improved Method

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