



HORSE LOGGING AT LATOUR

Dave McNamara

ABSTRACT - A commercial thinning operation using horses to skid the logs was conducted on Latour Demonstration State Forest. Three men and five Belgian horses working 64 days removed 400,780 board feet. The advantages and costs of horse logging are discussed.



Figure 1. Operator and his horse used to thin a young true fir stand.

The author is Forest Manager of Latour Demonstration State Forest, Redding, California.

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INTRODUCTION

Approximately 800 acres of young, dense, true fir stands on Latour Demonstration State Forest are in need of commercial thinning. During the summer of 1982, a commercial thinning operation was conducted on a 35.5-acre site at Latour using horses to remove the logs. The objectives of the operation were to learn the capabilities of horses in logging operations, such as the size of trees they can handle, maximum skidding distance, ground disturbance and stand damage, and to determine horse logging operating costs. Information on what densities to thin true fir stands in California is scarce. The area was selected to examine the effect on tree growth of various thinning densities for future applications.

Joe Kintz of Silvie Valley, Oregon, was contracted to harvest the site using horses. His brother Dan, and Bill Cozart rounded out the three-man crew. Joe and Dan Kintz brought over 12 years of horse logging experience to the operation, while Bill's experience was limited. The three men worked 64 days, using five horses to remove a net volume of 400,780 board feet.

A member of the Latour staff was at the site at all times recording skidding distance in 100-foot increments, volume of each log, daily and hourly production and the number of personnel and horses working.



Figure 2. Portion of stand prior to harvesting.

STAND AND AREA DESCRIPTION

The timber stand selected was a true fir stand composed of 85 percent true fir and 15 percent pine species located at the 5,600-foot elevation. The stand had not been previously logged. The stand had more than 1,000 trees per acre with an average basal area of 320 square feet per acre (Figure 2). Approximately 17 acres of the project area was on Dunning Site Class I and 18.5 acres was on Dunning Site Class II. Average slope in the area was two percent and ranged from zero to eight percent.

All trees selected for removal were marked and recorded by two-inch diameter classes (Table 1). A total of 2,277 trees were removed. Thinning was primarily from below with some dominants and co-dominants removed to get the required density. Trees marked ranged in size from 10-38 inches in diameter at breast height (DBH) with the average being 14 inches. Average net volume per tree marked was 179 board feet.

Table 1. Trees marked by diameter class.

<u>Diameter Breast Height</u> (inches)	<u>Number of Trees Marked</u>
10-14	1,546
16-20	530
22-24	111
26-30	67
32-34	19
36-38	4

No new road construction was necessary for this operation. Maximum sale boundary distance from the roads was 800 feet but some skids were longer because of topographic variations.

TEAM AND TEAMSTER DESCRIPTION

The five Belgian horses used were experienced in logging. They each weighed 1,700-1,900 pounds and their ages ranged from 8-11 years. A horse can usually be utilized 12-14 years for logging. Daily consumption per working horse was approximately 40 pounds of hay, 15 pounds of grain and 30 gallons of water. Grain was not fed on days they did not work.

The work was divided up with one man felling the trees and bucking them into logs and the other two men skidding them to the road. The faller would occasionally skid the logs to the main skid trail or even to the road when he had enough trees down and bucked to keep the skidding teams busy. He used a single stallion while the other two men used a team of two mares. A camp was set up near the site for the men and horses.

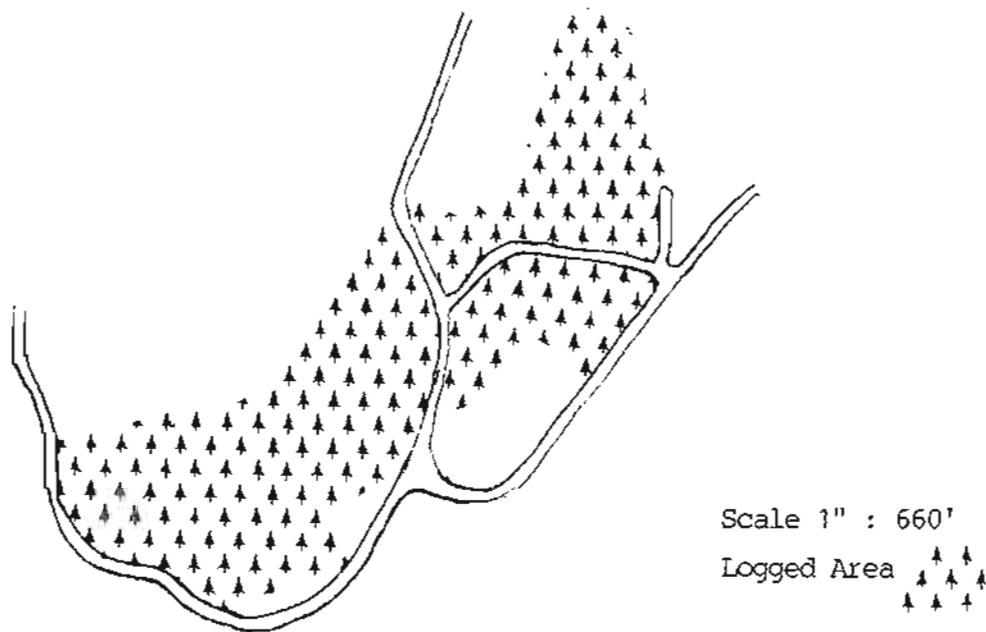


Figure 3. Area logged showing road locations and harvest boundaries.

DESCRIPTION OF THE OPERATION

The operation began on July 6 and was completed on September 24. The work week was usually 6 days with a typical day going from 7 a.m. to 4 p.m. An hour lunch and 15-minute breaks in the morning and afternoon were taken. The horses were also given a short break during skidding if they were pulling heavy loads or long distances. Exceptions to the working hours occurred when it was necessary to get supplies and then only half a day was worked. Occasionally one man would take a few days off.

The operation would generally start at the farthest point from the road and work out to the road. This helped prevent the horses from skidding through slash and reduced the time required by the teamsters to clear skid trails. Skid trails were not pre-designated so the operator could select his own route and then clear debris and trees under ten inches DBH out of the way. The same skid trail may have been used for four or five days depending on the distance and area the trail serviced.

An independent trucker with a self-loading logging truck hauled the logs, eliminating the need to construct landings, and for having a separate loader and loader operator. Skidded logs were placed along roads, natural openings and wide areas for pickup by the self-loading truck. Sawlogs, the only product harvested, were hauled 22 miles to a mill. No minor products such as firewood or posts were produced.

FINDINGS

Production

Daily production increased as the men and horses became conditioned. This was the first logging operation of the year for the horses; consequently it took about one week to condition them. They could then work a full day skidding, without multiple breaks. Approximately 80 percent of all logs were skidded singularly with the remainder skidded two or more at a time.

Daily production varied depending on the number of men and horses working, hours worked and the average distance logs were skidded (Table 2). The lowest production was 1,040 net board feet when only one hour was worked. The best day was 10,170 net board feet in eight hours using two teams and one faller.

Table 2. Volume production by personnel and horses.

Men & Horses	Average Daily Production (board ft.)	Average Number Of Logs	Average Skidding Distance (feet)
1 team, 1 single, 1 faller	6,030	77	395
2 teams, 1 single, 1 faller	7,230	84	403
2 teams, 1 faller	8,220	77	359
1 team, 1 faller	5,520	73	368
1 person with a team	4,810	45	350

The maximum skidding distance recommended is 800 feet. Beyond this distance it becomes uneconomical to work. Maximum skidding distance for this horse logging operation was 935 feet with the average being 380 feet. On days when the average skidding distance was about 800 feet the operator was just making his expenses.

The operator preferred skidding on favorable slopes up to 30 percent because the slope made log pulling easier. Slopes greater than this can be dangerous as the log may start moving on its own and run into the horses pulling it. There was no uphill skidding on this operation. McGonagil* recommends that uphill skidding not exceed 100 feet and on no more than a ten percent slope.

*McGonagil, Keith 1979 Logging Systems Guide. U.S. Department of Agriculture, Forest Service, Alaska Region.

To maintain good production, tree size should be kept under 24 inches DBH, especially when skidding over 400 feet. Skidding distances for larger trees removed in this operation was under 400 feet. The bottom logs of a few larger trees had to be cut into 12-16 foot lengths to enable the horses to pull them. Tree tops were placed in the skid trail under large logs to make skidding easier for the horses (Figure 4). The largest log removed weighed in excess of 6,000 pounds, measured 32 inches in diameter at the small end and 12 feet in length, and took approximately 35 minutes to pull 325 feet.

The total net volume removed was 400,780 board feet with an average daily production for the 64 working days of 6,280 board feet. Total time expended on the operation was 468.5 hours. If the total time was divided into eight-hour days, 58.5 days would have been worked. This would increase the daily production to 6,820 board feet. The average volume removed per acre was 11,290 board feet.

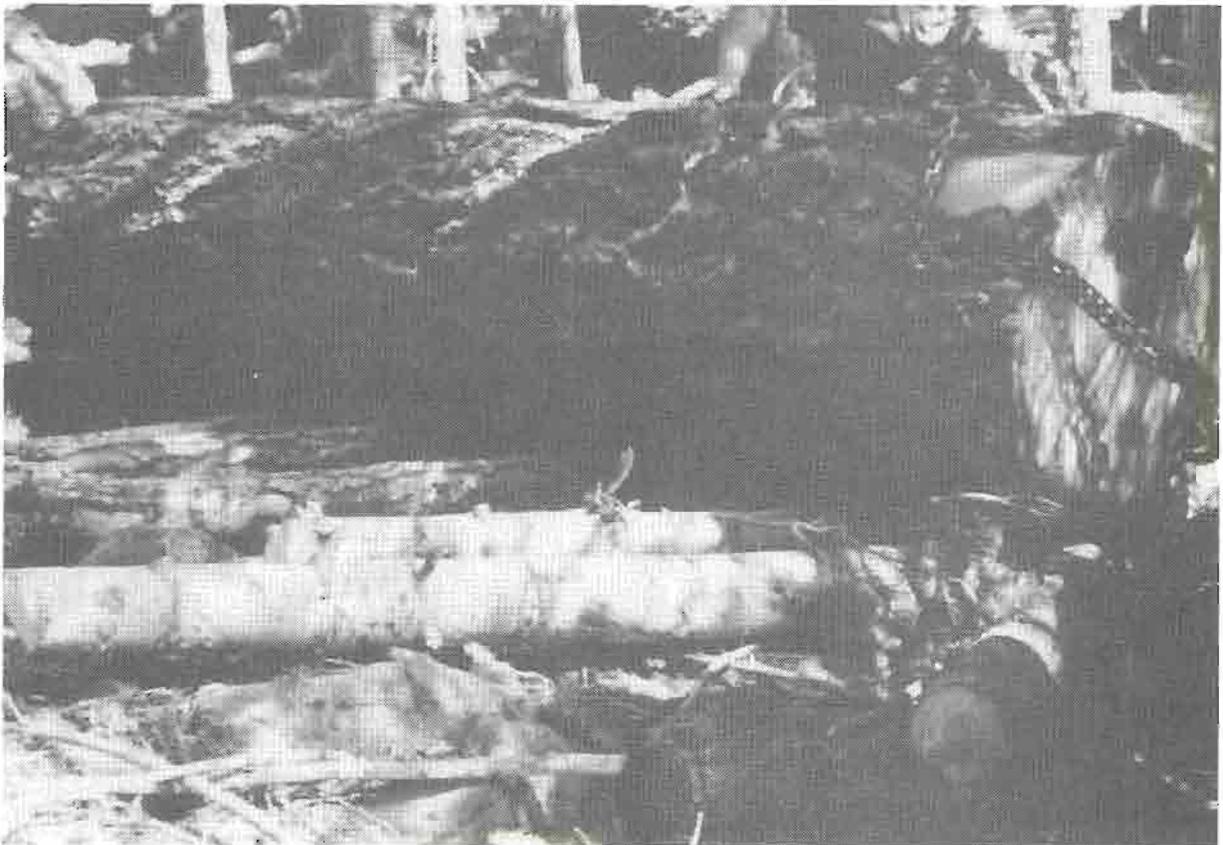


Figure 4. Tops of trees placed underneath a large log to ease skidding.

The number and size of sawlogs removed were:

Number of logs		4,562
Diameter of logs		6"-32"
Average log diameter		9"
Log lengths		8'-42'
Average log length		24'
Volume of logs		
Gross volume	409,960	board feet
Net volume	400,780	board feet
% defect		2.24%
Average volume/log	90	board feet

The self-loading logging truck was capable of hauling four loads a day. Ninety loads were removed averaging 4,450 board feet per load. Average loading time was 40 minutes.

Costs

This was a profitable operation for both the operator and State Forest. Logging cost minus trucking, loading and the yield tax was \$49.31 per thousand board feet. The operator's profit was 11.4 percent after paying all his expenses. Costs for both the operator and management are given in Tables 3 and 4. Management costs for administration are higher with horse logging due to more time needed to log an area.

Table 3. Operator's horse logging costs.

Item	Total Cost	Cost Per Thousand Board Feet
1. Falling & Bucking	\$ 5,500.00	\$13.72
Labor	\$5,000.00	
Fuel, labor & parts	500.00	
2. Skidding labor	10,200.00	25.45
3. Trucking & Loading	17,725.00	44.23
4. Various horse costs		
Feed	1,012.50	2.53
7-1/2 tons hay	562.50	
2-1/2 tons grain	450.00	
Medical Costs	165.00	0.41
Horse shoeing (2 sets each)	300.00	0.75
5. Insurance (Workmen's Comp.)	2,584.00	6.45
6. Yield Tax	723.73	1.80
TOTAL COSTS	\$38,210.23	\$95.34

Table 4. Management cost of sale layout and administration.*

Item	Total Cost	Cost Per Thousand Board Feet
1. Layout and marking (135 hrs.)	\$1,193.25	\$2.98
2. Marking Paint	150.48	0.37
3. Administration (93 hrs.)	<u>1,001.79</u>	<u>2.50</u>
TOTAL COSTS	\$2,345.52	\$5.85

*Cost of the production study not included.

Ground Disturbance

During the horse logging operation ground disturbance exposing mineral soil was slight. Sometimes soil disturbance is needed for natural regeneration but this stand was already adequately stocked. This harvest was designed to thin the stand and promote growth on the residual trees. A slight "trough" occurred on some main skid trails used for three or more days, but was not considered a problem in the loamy soils.

Stand Damage

Damage to the residual stand from the horse logging seemed less than it would have been from tractor logging. Skidding removed bark from the boles of eight leave trees but only one was damaged enough to be removed. Low skidding damage is due to the horses ability to maneuver in tight places. A team of horses can pass through a 6-foot wide area as compared to the 10- 12-foot area needed for a tractor. An additional benefit of this maneuverability was the ability to leave higher densities of trees in some areas. Falling damage seemed about the same as it would be in any dense stand.

CONCLUSIONS

This operation demonstrated that horses are a capable and an economical way to harvest a young stand. Horse logging minimizes damage to the residual stand in thinning operations. This is especially important with species such as true fir which are susceptible to disease and wood decay from bole wounds. Higher stand densities per acre can be left due to the maneuverability of horses, thus avoiding the removal of more trees than necessary to promote good growth on the residual stand.

Horse logging also provides a viable alternative for small landowners who are concerned with the visual impact of logging. Small ownerships that are not economical to log with equipment may be economical with horses due to low overhead and, move in and out costs.

Horse logging is slower than tractor logging. Tractors can move faster and are able to skid several logs at a time. A tractor's daily production on this operation is estimated to be 2-1/2 times more than the five horses' combined daily production of 6,280 board feet.

Another current disadvantage to horse logging is the lack of horse loggers. Once there were numerous horse loggers available. Oregon currently has about twenty active horse loggers but there are only a couple in California. Bill Cozart stated "horse logging never really left, but was pushed aside by the industrial revolution." In time, if demand increases for horse loggers, then more may become available.

Advantages to using horses as stated by McGonagil and observed on this operation:

1. Low overhead and investment costs.
2. Lower move-in costs.
3. Damage to the residual stand is light.
4. Stands do not have to be cut as heavily.
5. Soil disturbance is low.
6. Noise pollution is lower.

Disadvantages are:

1. Takes longer to log an area with horses.
2. Horses cannot pull logs uphill for long distances.
3. Horses are limited to working in smaller trees (24" DBH or less).
4. There are not many horse loggers.
5. Horses cannot work on rocky ground.

Additional horse logging operations are planned on Latour to determine the effect of steeper slopes on production rate.