DESIGN AND RESULTS OF A STUDY CONCERNING FELLING

AND BUCKING ERRORS

A Thesis

Presented in Partial Fulfillment of the Requirements for the

DEGREE OF MASTER OF SCIENCE

with a

Major in Forest Products

in the

GRADUATE SCHOOL

UNIVERSITY OF IDAHO

By

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May 1986

ABSTRACT

Felling and bucking errors associated with timber harvesting operations have resulted in substantial dollar losses to logging operators. This thesis describes an attempt to quantify these losses and the effect of training upon the reduction of these losses. Three manuscripts are presented, each dealing with one aspect of the research.

The first manuscript describes the computer model used to analyze the data and its structure on the University of Idaho's IBM 1431 computer. The original model, developed by the U.S.F.S., is known as "Felling & Bucking Activity (FAB)". This manuscript provides data input procedures and explains model output. A sample terminal session, using existing data files, is described in detail.

The second manuscript quantifies the losses incurred in this study and the results of logger training upon reducing these losses. The University of Idaho's Experimental Forest Logging Crew was studied and losses associated with felling and bucking errors "before training" and "after training" are presented.

The third manuscript describes study design and sampling procedures used in this study. These procedures are contrasted to the "normal" approach used in felling and was statistically designed; a unique approach used in felling and bucking studies. Analysis of the results reveals that the "normal " approach may not be accurate enough to base predictions of felling and bucking loss upon.

ACKNOWLEDGEMENTS

INTRODUCTION

Volume losses due to felling and bucking errors are nothing new. Such losses weren't considered important as long as old growth was plentiful and logging was profitable. They were viewed as inevitable when operating under conditions beyond human control. But as timber size declined, volume losses loomed larger and reducing the magnitude of these losses became a topic of concern for the logging industry.

Once these losses became important investigators attempted to quantify them. One investigator stated that "three-quarters of the value lost in all woods operations is lost in felling and bucking"(1). Estimates of losses (bd. ft./cu.ft.) vary from five to ten percent for breakage (1,10), two percent for misbucked lengths (12) and five percent for slabbing (10). Annual dollar losses of $287,300 due to stump pull, breakage and slabbing were estimated for one operator who harvests 46 MMBF/year.(16).

Even before the magnitude of these volume losses were quantified, loggers recognized that proper supervision played an important role in maintaining losses at an acceptable level (2). Once the magnitude of these losses was determined, considerable interest developed in logger training and vocational education (3,13). With the increased emphasis on training and supervision came the introduction of quality control techniques. One investigator felt that "Quality-controlled bucking practices supply the answer to the need for better utilization of both grade and timber in general" (1).

The effectiveness of quality control techniques and logger training in improving performance has been impressive. Sims (16) showed a fifty percent reduction in

the frequency of occurrence of stump pull, breakage and slabbing as the result of a quality control program. Over a three year study period Heissenbuttel (9) found varying degrees of reduction in the frequency of damaged logs due to quality control measures. In a scientifically designed study Garland (4) tested the difference in the amount of time required to perform certain chokersetting tasks between a group of individuals specifically trained in the skills required of chokersetters and a group of individuals who were attempting to pick up the skills on the job. His results show an eighteen percent gain in productive time by the specifically trained individuals.

Study Goals

This study was designed to determine the felling and bucking losses associated with a conventional ground skidding operation working in an intermediate harvest in the Inland West and to determine if these losses could be reduced by logger training. The logging operation studied was the University of Idaho's Experimental Forest Logging Crew. The selection and training of this crew is somewhat unusual as it is composed of students from the College of Forestry, Range and Wildlife Sciences. Crew selection is based upon curriculum studied, experience and the individual's objective in seeking employment on the logging crew. The objective is not to train loggers but to give potential managers "hands on" experience. Typically crew members are harvesting technology students or silviculturally oriented forestry students.

Crew members undergo all three types of training classified by Garland (5). "Technical learning" starts in the classroom and is carried into the field. "Formal

learning" is used to instruct felling, bucking, machine operation and chokersetting techniques. "Informal learning" is a daily occurrence with a "green" hand usually working beside an experienced crew member. Normally the crew operates with one-to-three experienced personnel and three-to-five newcomers.

Study Design

Two crew members were selected, based upon their experience and availibility, to participate in the study with each having about seven months experience on the logging crew. They were informed that their felling and bucking would be examined, that losses would be noted, their errors would be discussed with suggested methods of improvement and their work would be sampled again to determine if there was any improvement. This procedure differs from the normal "FAB" approach where the individuals studied are unaware that they will be studied.

The study area was a thirty-six acre block of timber to be treated with an intermediate harvest. Slopes ranged from ten to thirty-five percent. Due to the gentle terrain it was assumed that breakage would be limited. The majority of the area was of the Psuedotsuga menziesii-Physocarpus malvaceus h.t. with the draw bottoms and northeast aspects shifting to Abies grandis-Pachistima myrsinites h.t. The thirty-six acre block was broken into four smaller blocks of approximately equal size. Units designated as "A" contained the original samples while units designated as "B" contained the sample trees to be processed after training. Sample trees were statistically selected using random numbers and an X-Y coordinate system (7). Table 1 compares the sample trees by block. The sample trees had no identifying marks

placed upon them so that they could not be identified. The fellers were given identical cutting bills and instructed to fell and buck in the woods. The logs were then measured and skidded to the landings.

Volume losses were determined using the U.S.F.S. "Felling & Bucking Activity (FAB)" model (17). The versatility of this model allowed the results of the study to be utilized in decisions concerning not only volume loss but potential gain in volume and value, as well as testing the cutting bill against alternate cutting bills to determine which would return the greatest revenue. In addition, it allowed comparison with the historical data from other "FAB" studies. Historical data from "FAB" evaluations show that "four to ten percent of the potential wood volume is lost due to improperly bucked logs" (17).

Training

The between sample training consisted of a mixture of formal and informal conversation concerning specific problems associated with each individual. Actually training began as soon as as the fellers started working on the "A" units. From the start it became obvious that one of the individuals had problems with excessive long-butting and the other individual had problems with stump pull. Because these problems were obvious suggestions were made to improve their performance immediately. This may have been improper from a scientific point of view because it did improve the fellers performance on the "A" units. An example of the results of this early training can be found in Cutter 1´s performance. Cutter 1 lost 20.8 cubic feet to excessive long-butting in the first 15 sample trees compared with 4.5 cubic feet of loss in the remaining 24 trees. The effect

of this early instruction upon the study results is unknown but it can be assumed to be of major importance given the change in the performance of Cutter 1. However due to estimated time span of one month to fell the "A" units and the goal of the study to train the fellers it was felt that immediate correction of these errors was necessary. The measurements from the "A" units were analyzed with the "FAB" program and errors were identified. Both fellers were below the "four percent loss on gross volume" stated as a common occurrence in "FAB" evaluations (17).

The results of the "A" units can be found in Table 2. Cutter 1 had problems with "Buckout(stump)" , i.e. excessive long-butting. To improve his performance in this area several examples were discussed where the individual had lost scaleable volume due to excessive long-butting.

Cutter 2 had problems with "Misbuck" and "Buckout(stem)". In addition he had a fairly high frequency of stump pull resulting from his habit of low backcuts.

As predicted breakage was not a major component of the volume losses. This may be attributed to a combination of the site and silvicultural conditions mentioned earlier, which allowed the fellers various choices for the lay of the timber so that breakage could be minimized.

In both cases the problem areas were pointed out to the individuals and corrective measures suggested. This training method would be classified as "formal learning" by Garland (5). The importance of hitting the target length was stressed to both fellers and it was noted that since they were bucking to maximum trim it was better to miss target length by bucking a little short than a little long.

Location of Complete Research:

Author & Title: Gregory, Larry C.
Design and Results of a Study Concerning Felling
and Bucking Errors

University of Idaho Library:

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Other Sources: