

## OPERATOR HEALTH - A SURVEY OF FELLER-BUNCHER OPERATORS

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Figure 1 - Mechanised harvesting - central North Island

### Summary

Twenty-three operators of feller-bunchers were surveyed in the central North Island.

Ten of those surveyed said that they were always in pain.

The operators experienced this pain primarily in their wrists and hands. Those operators with injuries generally worked longer hours and had received less training than those operators without injuries.

To reduce the risk of developing an overuse injury, it is vitally important that operators of feller-bunchers:

- receive appropriate training
- take adequate rest breaks
- get out of the machine and stretch at regular intervals
- use micropauses throughout their working day.

# Introduction

Forest harvesting (logging) is recognised as one of the most hazardous occupations worldwide (ILO, 1990). In an effort to reduce the frequency and severity of injury to forest workers, large, complex forest harvesting machines have been developed. These machines have been successful in reducing the risk of injury from falling trees, chainsaw lacerations and rolling logs.

New Zealand plantation forests are predominantly harvested by forest workers using chainsaws. However, the number of harvesting machines is increasing rapidly and New Zealand machine operators are beginning to report overuse injuries.

In Scandinavia where forest harvesting machines have been in use for almost 20 years, more than 50% of the machine operators have neck and shoulder overuse injuries (Axelsson and Pontén, 1990). Occupational Overuse Syndrome (OOS) is now widespread among Scandinavian forest harvesting machine operators, and the incidence has not declined, despite the substantial ergonomic improvements made to forest machinery (Gellerstedt, 1993, Erikson, 1995).

The pain and disability associated with OOS causes considerable personal suffering and has often resulted in long periods of sick leave or early retirement in the Scandinavian forest workforce. In addition to the personal, financial and social costs, are the costs to employers associated with losing a highly trained machine operator and having to train a replacement with associated quality and production losses (Parker, Kirk and Sullman, 1996).

The aim of this research was to determine the extent of occupational overuse injuries among the operators of feller-bunchers in New Zealand.

## What is OOS?

Occupational Overuse Syndrome refers to a wide range of disorders characterised by pain and/or other sensations in muscles, tendons, nerves, soft tissues, and joints.

As a result of doing work, muscles and other soft tissues may become fatigued. Sensations due to fatigue (pain, stiffness, weakness)

usually disappear overnight if the affected area is able to recover. However, when recovery is not complete, fatigue levels can accumulate, and may gradually develop into an overuse injury.

There are many different types of injury that can result from occupational overuse. It is vitally important that these injuries are detected and treated early.

## Method

Twenty-three operators of feller-buncher machines in the central North Island were surveyed in April and May, 1997. The questionnaire used was a modified version of the Nordic Musculoskeletal Questionnaire (Kuorinka, Jonsson, Kilbom, Vinterberg, Biering-Sorensen, Andersson and Jørgensen, 1987). The operators were questioned about their hours, shift patterns, time spent on feller-bunchers, and areas of discomfort and pain. Only those operators with more than six months experience on feller-bunchers have been included in the analysis.

## Results

Due to the small sample size and the difficulty of obtaining statistically significant results, this report presents trend information from the survey.

Table 1 shows the base machines in which the operators were working. Timbco was the most common make, closely followed by Caterpillar. The felling heads attached to these machines also varied; for reasons of anonymity these are not identified. To encourage accurate reporting of overuse injuries, individual operators cannot be identified.

Table 1 - Base machine

Base Machine	Number
Timbco	7
Caterpillar	6
Hitachi	5
Timberjack	3
Bell	1
Komatsu	1
	23

## Body Part Discomfort

Of those surveyed, 10 of the 23 (43%) had pain all the time in various parts of their body (Table 2). Most of the reported injuries were in the wrists and hands.

Two other operators reported that they were in continual back pain. Both of these operators had severe previous injuries, and these injuries have not been included in these analyses.

Table 2 - Location of continual pain

Injury	Number
Wrists	3
Hands	2
Wrists and hands*	3
Wrists and neck	1
Wrists and back	1
	10

\*hands includes fingers and thumbs

## Hours, Shifts and Experience

Nineteen operators worked day shift. Two operators worked alternate day and night shifts rotating on a weekly basis. Two operators only worked night shifts.

The average number of hours worked on the feller-buncher per day by the operators was 9.8 (range 8 to 12). The average number of days worked per week was 5.5 (range 4 to 6.5).

Half of the operators surveyed rotated jobs within their crews, mainly to supervisory jobs (four) or as operators on other machines (four). Job rotation also helps to reduce the risks of operators developing overuse injuries (Gellerstedt, 1997).

On average, the operators had worked on feller-bunchers for 1.9 years. This average was biased by the inclusion of one operator who had spent 10 years working on feller-bunchers. When this operator was excluded, the average amount of time spent working on feller-bunchers was reduced to 1.5 years. This more accurately represents the general experience of the operators surveyed.

## Injuries

The survey data was analysed to determine the key differences between those operators who had injuries (10) and those who did not have an injury (13).

An injury has been defined for the purpose of this analysis as those injuries where the operator said that the pain was continual.

The average age of those without an injury was 37 years. Those with injuries were on average 33 years old. Those with injuries on average worked 5.7 days per week, compared with 5.4 days for those without injuries. Age and days worked per week were not found to be significant factors in this survey.

An important difference which has emerged from this survey, is that those operators with an injury worked on average 10.3 hours per day, an hour longer, on average, than those operators who did not have an injury.

Those with injuries had spent slightly longer working on feller-bunchers (average of 2.0 years) than those without injuries (1.8 years on average).

The type of feller-buncher operated and the type of felling head used did not affect the risk of an injury for the operators surveyed.

## Training

Another trend which emerged was that those without injuries had on average received 2.7 days of training, compared with 0.7 days for those with an injury. Only 15 of the 23 (65%) operators had received any training in how to operate their machine (Table 3). Most of the operators who had received training had been trained by the manufacturer's trainer.

Table 3 - Who trained you?

Trainer	Number	%
Manufacturer's Trainer	6	26
Other Operator	2	9
Contractor	3	13
Previous Owner	4	17
No training	8	35
	23	100

## Work Environment

The operators were asked a series of questions about operating the feller-bunchers and their work environment. First, the operators were asked if they felt isolated in their job. Table 4 shows the operator responses.

Table 4 - Do you feel isolated in your job?

Isolated	Number	%
Never	7	30
Seldom	4	17
Occasionally	9	40
Often	0	0
All the Time	2	9
No reply	1	4
	23	100

Those without injuries reported slightly lower feelings of isolation (Table 4). They also reported lower feelings of stress in their job (Table 5). The non-injured group felt (on average) that their job was "seldom" to "occasionally" stressful. The injured group reported that on average their job was "occasionally" to "often" stressful.

All of the operators felt that learning to operate the machine was a particularly stressful time. There were several other job factors which the operators felt were especially stressful: the high level of concentration demanded by the job, the number of decisions that needed to be made, machinery problems and breakdowns.

Table 5 - Is your job stressful?

Is your job stressful?	Number	%
Never	5	22
Seldom	3	13
Occasionally	9	39
Often	4	17
All the Time	2	9
	23	100

There was no relationship between stress and amount of time spent operating feller-bunchers. Those operators with more experience felt as stressed as operators with less experience.

The operators who were sub-contracted out to other crews, all felt that this was the most stressful part of their job. There were a number of reasons for this: not feeling free to take breaks when they were in pain, production pressure, being timed by the contractor.

Sixteen of the 23 operators (70%) said they worked at high speed all the time (Table 6). Several operators felt that the machine dictated the work pace.

Table 6 - Do you work at high speed?

High speed?	Number	%
Never	1	4
Seldom	1	4
Occasionally	3	13
Often	2	9
All the Time	16	70
	23	100

There was no appreciable difference in work pace between the responses of those with injuries and those without.

The operators were also asked if they could choose their own pace (Table 7). Twelve (53%) operators felt they always chose their work pace. Differences were evident between those with injuries who (on average) felt less able to dictate their own work pace, than those without injuries.

Table 7 - Can you choose your own work pace?

Work pace	Number	%
Never	1	4
Seldom	1	4
Occasionally	2	9
Often	7	30
All the Time	12	53
	23	100

The operators were then asked if they decreased their work pace if they were in pain or discomfort (Table 8). Fifty-three percent said that they never reduced their work pace.

Table 8 - If you are in pain/discomfort, do you reduce your work pace?

Reduce pace?	Number	%
Never	12	53
Seldom	1	4
Occasionally	3	13
Often	3	13
All the Time	1	4
No reply	3	13
	23	100

A number of operators commented that when they felt particularly sore, they got out of their machines and walked around or stretched. This is a good method for reducing overall muscle tension, especially in conjunction with micropauses (Byers and Skerten, 1996).

It is important that feller-buncher operators feel free to decrease their work pace, or take a short rest break, if they are in pain or discomfort. Continuing to work at a high pace is unlikely to reduce any discomfort or pain.

### End of Shift

The operators were asked how they felt at the end of their shift. Table 9 shows that most of the operators were feeling tired by the end of their shift.

Eight operators said that they had sore or tired eyes at the end of every shift. This may be associated with glare problems, and the high levels of concentration required for the job.

Table 9 - How do you feel at the end of your shift?

End of shift	Number	%
Headache	6	26
Tired/sore eyes	8	35
Tired	20	87
Hyper*	7	30
Stressed	3	13
Drained	3	13
Drowsy	1	4
Vague	1	4
	49**	

\*Hyper = mental exhaustion.

\*\*Some operators gave more than one answer.

### Glare

An issue which was mentioned consistently by the operators was that of glare, particularly when the sun was low on the horizon. The operators said that they found it difficult looking from areas of shade into areas of sun. This problem may be partly alleviated by working with the feller-buncher's external lights turned on.

## Conclusions

A high proportion (43%) of the operators surveyed were in continual pain. This is particularly alarming given the short time that the operators have been working on feller-bunchers (1.9 years). Swedish experience suggests that neck and shoulder overuse symptoms usually occur after five to ten years of operating feller-bunchers (Gellerstedt, pers com).

It appears that longer hours and a lack of initial training may have contributed to the development of these injuries.

The wrists and hands of the operators appear to be the most vulnerable parts of their bodies. Some of these issues may be reduced by better design and location of control levers.

Those operators who had sustained an injury felt more isolated and more stressed than those operators who did not report an injury of this nature.

The operators felt that the major contributors to stress were:

- learning to operate the machine
- the high levels of concentration and complex decision-making demanded by the job
- machinery breakdowns
- sub-contracting for other crews as a major source of stress.

It is important that all machine operators get out of their machines and stretch on a regular basis, preferably every hour. The use of appropriate stretches and micropauses may also help to reduce the incidence of overuse injuries and muscle fatigue.

# References

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Axelsson, S.-Å. and Pontén, B. (1990): New ergonomic problems in mechanised logging operations. *International Journal of Industrial Ergonomics*, 5:267-273.

Byers, J. and Skerten, R. (1996): Techniques for reducing injuries in machine operators. LIRO Report Vol. 23, No. 23.

Erikson, G. (1995): RSI in forest-machine operators in Scandinavia. The Forestry Research Institute of Sweden. Redoğorelese nr 4.

Gellerstedt, S. (1993) Work and fatigue - the operator's reaction to mechanised logging operations. Report No. 248. Institutionen for Skogsteknik/SLU Garpenberg, Sweden.

Gellerstedt, S. (1997) Job-Rotation rosters for mechanised operations. Liro Report Vol. 22, No. 10.

Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sørensen, H., Andersson, G., and Jorgensen, K. (1987) "Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms" *Applied Ergonomics* 18 (3) 233-237

ILO, (1990) Occupational Safety and Health in Forestry. Forest and Wood Industries Committee, Second session, Geneva.

Parker, R. J.; Kirk, P. M; Sullman, M.J. (1996) Learning curves of mechanised harvester and forwarder operators. LIRO Report. Vol. 21 No. 29.