

REDUCING THE IMPACTS OF FATIGUE ON FOREST WORKERS

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INTRODUCTION

New Zealand's forest industry still requires a large amount of manual labour in order to function. This will continue to be the case for the foreseeable future due to a relatively large proportion of the timber resource being planted on steep and difficult terrain. Manual

forestry work has been identified worldwide as a job requiring moderate to heavy physical workloads. The work is often carried out in harsh work environments and in close proximity to potentially dangerous equipment and situations. Physical and mental fatigue routinely affect many forest workers during the working day. Fatigue reduces

performance, lowers productivity and increases unsafe behaviour as workers begin taking dangerous short cuts which require less physical effort. This report summarises some simple work habits which, if applied correctly, can significantly reduce the physical and mental strain currently associated with manual forest work.

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NUTRITION

Having a good breakfast is vital for forest workers. During the day they will burn up energy at a very high rate. If the day is started without breakfast, the body will perform badly and the body's reserves are further reduced.

Food provides energy for the worker's body, so no food means no energy. This lack of energy leads to reduced mental and physical performance. Forestry workers require high energy food that can be quickly digested so that the energy it contains can be used by the worker's body. People needing sustained energy should try to eat complex carbohydrates as they supply long lasting energy, which, in turn, improves stamina and endurance. For example, an athlete training on a high carbohydrate diet can exercise two times longer than those on a normal diet and three times longer than those on a high fat diet. Some common examples of complex carbohydrates include: cereals, porridge, toast, baked beans, spaghetti, bananas, rice, beans, bread, pasta, noodles, potato, and root vegetables.

Eating foods high in protein, such as lean meat, chicken, eggs, milk, and cheese, helps to build muscle tissue but they are slow to digest. Such foods are best left for the evening meal

where there is less need for rapid digestion of food. Most people's daily protein requirements are easily met by the typical New Zealand diet, which tends to be high in protein.

Key minerals required by the body are iron and calcium. Iron is essential for oxygen transportation within the blood, while calcium is the major bone strengthening mineral. Red meat is a good source of iron, and milk is an excellent source of calcium.

Eating chocolate or sweets during the working day should be limited as these give a fast, short high burst of energy followed by a big slump. They are more suited to the work undertaken by a sprinter, whereas most forestry work is more like that of a marathon runner.

KEY POINTS (NUTRITION)

Some key points to consider are:

- Have a good breakfast.
- Food provides energy - you need a lot of energy to do your job. No food means no energy.
- Complex carbohydrates such as cereals, bread, pasta and potatoes are best because they supply long lasting energy.
- To digest food more efficiently, eating at the start of a break and then resting as long as possible is recommended.
- Chocolate and/or sweets will give a short burst of energy that will be followed by a big slump in energy.

ALCOHOL

Alcohol provides energy, but no useful amount of nutrients. Drinking alcohol has a long-lasting effect on bodily performance. Research has shown that drinking alcohol 36 to 48 hours before undertaking hard physical work causes early fatigue, poor co-ordination and impaired concentration. Alcohol is also a diuretic. This means that it speeds up the loss of water from the body.

KEY POINTS (ALCOHOL)

- Alcohol has a long lasting negative effect on bodily performance.
- Alcohol speeds up loss of water from your body.



FLUID INTAKE

This is a critical issue with people undertaking hard physical work, particularly when it is hot. However, dehydration can also occur in cold conditions. Dehydration hinders performance by interfering with co-ordination, motivation, concentration and endurance.

Some simple facts relating to water that should be considered:

- Water regulates body temperature
- Water transports fuel and removes waste
- Nutrients can only be converted to energy if mixed with water
- By losing and not replacing 1.5 litres of fluid, endurance can be reduced by 22%

- By losing and not replacing three or four litres of fluid, endurance can be reduced by up to 50%
- Mental performance and concentration decrease as water is lost.

Solutions

- Drink cool or cold drinks, as hot drinks take longer to empty from the stomach making them less effective at combating dehydration.
- Start drinking before thirst occurs.
- Start drinking at breakfast, every time your saw is refuelled and during rest breaks.
- Drink small amounts frequently throughout the day.
- The recommended rate of fluid intake for people undertaking hard physical work is one litre per hour.
- No matter how much is drunk, the body's system will still need to be re-charged with water before the next day's work is started, so drink plenty of water at night.

Warning Sign

- Dark urine usually indicates dehydration - the darker the colour, the more severe the dehydration.

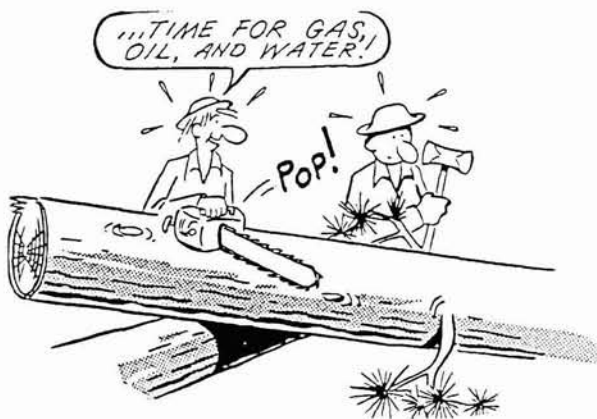
Fluid intake can have a major impact on worker performance, safety and productivity and can be easily fixed by drinking small amounts of water at frequent intervals throughout the day. Recent research has shown that the use of isotonic drinks can help lessen the effects of dehydration by speeding up fluid replacement in the body. Isotonic drinks contain additional carbohydrates and minerals and are now commonly available at supermarkets in either ready made or sachet form. Sports research has shown that isotonic drinks are at least as effective as water in preventing dehydration, and are more effective at preventing fatigue as they contain carbohydrates.

Avoid

- Drinks which are high in sugar as they take longer to empty from the stomach making them less effective for fluid replacement.

KEY POINTS (FLUID INTAKE)

- Cold or cool drinks are better at reducing dehydration than hot drinks.
- Drink small amounts of water frequently throughout the day and continue to do so once you have returned home from work.
- Avoid drinks which are high in sugar.
- Dark urine indicates that you are suffering from dehydration.



BODY CONDITIONING

After a break away from work, either as a result of a holiday or an accident, workers will need time for their body to return to full work fitness. The break away from the job means that the worker has lost some degree of "work fitness". The longer the break, the less work fitness retained. This means that workers should take things slower when they first return to work. The body has to undergo actual physical changes, such as increasing blood plasma volume, bone strengthening and muscle development which will take time.

For example, workers entering the industry for the first time will require approximately three weeks for their body to adjust. Also, the body needs about 14 days to become conditioned to heat. This heat conditioning also applies to

current loggers returning to work after a break away from work, such as at Christmas.

Soft tissue damage (pulled muscles, sprains and strains) can be significantly reduced by a simple five minute stretch and warm-up session before work is started. The crew as a whole should do this prior to starting work. This way no one person is laughed at or picked on as if this happens, the worker may never do the warm-up stretches again. The energy expenditure and physical strain of most forestry tasks is equal to that of marathon running or a game of rugby, so the benefits of a five minute warm-up should be obvious. The local gym, physio or doctor can show you some easy to use stretches.

KEY POINTS (BODY CONDITIONING)

- After a break away from work, take things slowly to start with.
- In summer, it will take approximately 14 days for your body to become conditioned to the heat.
- Use a simple five minute warm-up session to reduce strains, sprains and pulled muscles.

REST BREAKS

Rest breaks provide an opportunity for your body to recover from the physical and mental strain associated with hard work.

A rest break provides recovery by:

1. Lowering the worker's average working heart rate

Fatigue is directly related to a person's working heart rate. Working heart rate is the average heart rate from the time work is started until the time work is finished at the end of the day. It includes the heart rates during every activity at work, including rest breaks. If a person works hard all day and takes no rest breaks, the working heart rate will be higher than if one or two rest breaks were taken. The higher the average working heart rate, the more

fatigued and the less productive the worker.

2. Enabling effective digestion of food

Blood can either supply food and oxygen to working muscles, remove heat and waste from working muscles or be used by the stomach for the digestion of food. When someone is working hard, approximately 80% of the blood is directed to the muscles, 15% to the brain and kidneys and 5% to the stomach. When you rest, approximately 80% of your blood is directed to your stomach to enable effective digestion.

Food digestion means that the body can effectively use the energy contained in the food that has been eaten. One break replenishes energy reserves once during the working day, two breaks and it is replenished twice.

3. Mental stimulation

The monotony of some jobs, the physical strain of the work and the effects of the weather combine to lower mental alertness as the day progresses. This can result in increased unsafe behaviour and/or an inability to correctly read dangerous situations and/or react to them. A rest break provides the chance for social interaction (talking). This provides mental stimulation which, in turn, improves alertness when returning to work.

How many breaks?

Previous research supports the use of frequent short structured rest breaks over the period of the day rather than one long rest break in the middle of the day. A large number of studies based around factory workers have shown that two breaks, instead of one, increase productivity and worker satisfaction while reducing errors. As forest workers tend to be working physically harder than most factory workers, the physical, mental and safety

benefits of rest breaks should be even more noticeable.

Typically, two 30-minute breaks evenly spaced throughout the day (for example, 10:30 am to 11:00 am and 1:30 pm to 2:00 pm) seem to be the most favoured solution for forest workers. The key to this work/rest regime is the afternoon (1:30pm to 2:00pm) break. It is at around this time that mental and physical fatigue will start to be noticeable in workers. The afternoon break is something to look forward to and breaks up that long hot boring afternoon run. It has both physical and mental advantages as both the body and the mind get a breather and a re-fuel.

KEY POINTS (REST BREAKS)

- Build short frequent rest breaks into your work routine.
- Take at least two evenly spaced 30 minute rest breaks during the working day.

SUMMER START TIMES

During the summer many crews use the option of starting work an hour or so earlier than normal. Such an option can be a double-edged sword. While it is a good idea for getting a good start to the day before the heat builds up, if used continually it can generate cumulative fatigue in workers.

When using earlier start times, workers have to be careful that they go to sleep at night an hour earlier. For example, if you started one hour earlier but went to bed at the normal time, by the end of the week you would have had five to six hours less sleep than normal but still doing the same amount of work. This also means by the end of the month 20 to 24 hours of sleep are missed that the body is used to having. Since the body recovers from the effects of the day most effectively during sleep, losing 20 to 24 hours per month can have a dramatic effect on performance. Remember also that it will take time to recover from this cumulative sleep loss once normal starts are resumed. It may take a week or so to recover from two months of early starts.

A key issue with early starts is to alert workers to the potential for cumulative fatigue. If they can make an effort to get to bed a bit earlier than they normally would, the effects will be lessened.

KEY POINTS (EARLY STARTS)

- Ensure that each night you replace the sleep you lost in the morning.
- Once early starts have finished, allow time for your body to recover.

SUMMARY

Impaired performance may not only reduce the amount and quality of work carried out, but may also affect the ability of workers to counter unexpected hazardous situations. By simply implementing a few easy changes to your diet and/or work practices, a worker's physical performance, endurance, safety and productivity can be improved. The other option is that production stays the same but workers are less fatigued. Additional benefits may also show themselves in the form of reduced worker turnover, absenteeism and injury rates. The goal of the forest industry as a whole should be to have a workforce which is not only well trained, but also able to carry out the required work in a safe and sustainable way. The ideas outlined in this report will assist in achieving this goal.

BIBLIOGRAPHY

Johnson, D. and Tabor, F.C. (1987) : "Body of Work". Northern Logger and Timber Processor, Volume 35, No 11.

Thompson, C. and Hellemans, I. (1994) : "Sport Nutrition. In Science, Medicine and Sport; Enhancing Sport Performance". Edited by D.G. Russell and B.D. Wilson. University of Otago.

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