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DEHYDRATION IN LOGGERS - A PILOT STUDY

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Measuring urine concentration using a refractometer

Summary

This pilot study investigated the extent of dehydration in six logging crews by measuring the specific gravity of urine. Thirty one loggers provided a urine sample and gave information on their fluid intake for that day. The specific gravity of the urine samples was measured and the weather conditions monitored. Twelve loggers (30%) were found to be inadequately hydrated.

This study showed that fluid intake was not sufficient in many workers.

Therefore our advice is to increase daily fluid intake before and during work.

- If you are drinking enough, your urine will be light coloured and clear.
- If you are not drinking sufficiently, you will not pass much urine.

Introduction

In the New Zealand forest industry there is ongoing education of forest workers on the need for adequate fluid intake. However, little work has been done to investigate the extent and causes of dehydration among forest workers. COHFE is running a long term project to investigate the extent of dehydration, and to evaluate potential solutions to the problems.

Dehydration can occur when fluid lost by sweating is not replaced by drinking. There are many reasons for inadequate replacement, including: not drinking enough before work and while at work, not carrying enough replacement fluid, and inadequate toilet facilities. Short term effects of dehyration are reduced physical capacity and a decrease in alertness. Long-term effects of dehydration include kidney stones and an increased risk of bladder cancer. It is important to avoid being dehydrated because of these short and long term health implications as well as increased potential for injury.

Follow these two quidelines to ensure you remain hydrated:

- MAKE SURE YOUR URINE IS LIGHT COLOURED AND CLEAR
- MAKE SURE YOU URINATE AT LEAST TWICE (MORE IS BETTER), DURING A NORMAL WORKING DAY

DEHYDRATION - What's the problem?

Dehydration occurs when the body loses more fluid by sweating than is replaced by drinking. Possible health risks associated with being dehydrated are:

Short term

Reduced physical capacity
This could be up to 25% reduction in work capacity.

Reduced mental alertness.
When the body is dehydrated, you are more likely to slip, trip or injure yourself. You may become less able to make decisions, and may get more irritable and short tempered. This could result in poor communication between workmates who depend on one another for safe work practice.

Long term

Long term risks of persistent dehydration are kidney stones and cancer of the bladder.

DON'T GET STONED!

Figure 1 - Kidney stone

DEHYDRATION

Six factors that effect fluid loss

HOW DO WE MEASURE DEHYDRATION?

Methods of assessing hydration usually involve using blood or urine samples. For our pilot study we chose urine sampling as we didn't think the crews would be keen on having a blood test.

We took a drop of urine and measured the specific gravity (density), using a refractometer, just like measuring the concentration of sugar in fruit using a Brix meter.

We also recorded the volumes and types of fluids consumed by loggers over the day.

Figure 2 - Refractometer

The graph shows the results of the pilot study which involved 31 loggers. You can see from the graph that although some loggers were OK, many were marginal or dehydrated.

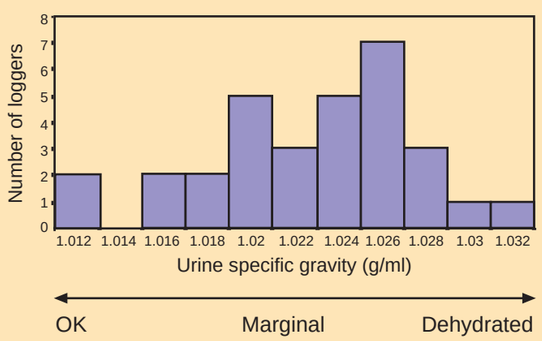


Figure 3 - Urine concentration for 31 loggers

THE INFLUENCE OF WEATHER

We used an instrument called a heat stress meter, that measures wind speed, air temperature, radiant heat, air pressure and relative humidity.
It then calculates the sweat rate, taking work rate and clothing into account, and estimates the amount of fluid required. This can then be compared with actual fluid intake. During this study weather conditions were moderate - dry bulb temp averaged 19°C, yet some workers were still dehydrated.

Figure 4 - Heat stress meter

SOLUTIONS TO THE DEHYDRATION PROBLEM

Two quick checks .....

1 Make sure your urine is a light colour and clear
2 You should be urinating at least twice during your shift at work, preferably more often.

How quickly does drinking restore hydration?

Fluid (depending on what sort) will have a rapid effect on your hydration level.

What sort of drinks are best? Here are some facts and ideas....

Fizzy drinks usually contain a lot of sugar and these sorts of fluids can slow down rehydration.
If you find water in large volumes is boring, the following ideas may help:

1 Try mixing drinks – alternate between cups of water and flavoured drinks.
2 Use diet cordial or lemons to flavour your water.

Some drinks, like tea, coffee, cola and other soft drinks contain caffeine, which can increase your fluid loss.

3 If you do drink caffeinated drinks, make sure you drink plenty of water, and non-caffeinated drinks (like milo) too.

What can you do as the boss?

4 Try having an ongoing supply of diet cordial or cool water, and encourage your workers to drink plenty of it.

5 Have two smokos instead of one and provide shade where possible.

6 Consider having a porta-loo, as some workers (male and female) report they drink less because of the lack of toilet facilities.

THE DEHYDRATION STUDY

Aim

To determine the level of dehydration in a sample of loggers in moderate weather conditions.

Method

- Took a urine sample from 31 loggers and measured the specific gravity (concentration of the urine) with a refractometer (Figure 2).
- Measured the weather conditions with a Heat Stress Meter (Figure 4).
- Asked the loggers what they had drunk and eaten that day, before they gave a urine sample.

Results

- Most loggers had concentrated urine so were marginally hydrated to dehydrated (Figure 3).
- On average, loggers had consumed a little more than one litre of fluid (in addition to fluid in food) in the first five hours of work (7.00am to noon). One logger had consumed no fluid in that time.
- Of the 31 loggers, seven (23 %) had drunk only caffeinated beverages (coffee, tea and/or cola) up until the time of urine sampling. Sixteen (52 %) had drunk both water and caffeinated drinks and seven (23 %) had drunk only water
- Many loggers were unaware of appropriate fluids to drink before and during work to ensure hydration (caffeine in tea, coffee and other drinks will dry you out).

Discussion

Loggers fluid intake was too low even for the moderate conditions they were working in. Urine specific gravity should be 1.020 g/ml or below, however the majority of loggers were well above this.

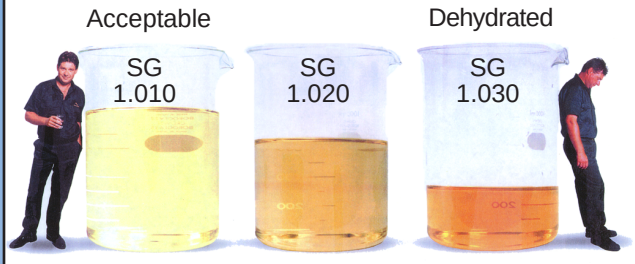
Some machine operators limited their fluid intake to reduce the number of times they had to get off the machine for a pee. Portable toilet facilities need to be provided so female loggers in particular do not feel pressured to limit their fluid intake.

Further work needed

- A practical water bottle is needed for loggers which can be used without contaminating the mouth of the bottle with fuel and oil.
- The effects of caffeine intake on logger urine specific gravity need to be established.
- Fluid intake education must change in emphasis from being prescriptive (drink x litres) to giving guidelines (drink until your urine is clear) because people differ in their fluid requirements, and work and weather conditions are not constant. Fluid education must also emphasise that drinks containing caffeine will make you more dehydrated.

This work is continuing through winter and summer conditions, following loggers over four day periods.

ARE YOU DRINKING ENOUGH?



Appropriate fluid intake at regular intervals throughout your shift will protect you from heat stress.

Source: Graham Bates

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