Introduction

HSE research has shown that operators of self-propelled agricultural machinery are exposed, for half of all working days, to whole-body vibration (WBV), at levels which can cause severe discomfort and a risk of back injury.

This information sheet outlines the WBV hazard in agriculture and steps that can reduce the risk of injury.

What is whole-body vibration?

WBV is caused by machinery vibration passing through the buttocks of seated people or the feet of standing people. The most widely reported WBV injury is back pain. Prolonged exposure can lead to considerable pain and time off work and may result in permanent injury and having to give up work.

Note: There are many sources of back injury in addition to WBV which must be adequately controlled if risk of back pain and injury is to be minimised.

What should be done?

Much can be done to reduce WBV. Exposures towards the lower levels is given in Table 1.

Decide who is at risk

Drivers using tractors or mobile agricultural machinery for long periods of time are at risk. Table 1 may help you decide when drivers are likely to be at greatest risk. If the actions suggested below have been taken, you may wish to have WBV exposures measured to help decide if any more action is appropriate.

Reducing the risk of WBV injury

The following actions are suggested to help reduce the risk of WBV injury:

Inform: Drivers can control their exposure to WBV when they know the risks and the steps they can take to reduce their exposure. Steps include:

- making full and proper use of seat position and suspension adjustments – drivers should be able to easily reach the pedals, know how to use any back support, adjust the seat so it provides support for their thighs and adjust the suspension mechanism correctly for their weight;

Table 1  Some WBV levels in agriculture and exposure periods (in brackets) that present risk of injury

<table>
<thead>
<tr>
<th>Task</th>
<th>Range of likely WBV levels (m.s(^{-2})) and corresponding suggested maximum total daily exposure period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combining</td>
<td>0.4 (24 hrs) - 0.8 (6)</td>
</tr>
<tr>
<td>Power harrowing</td>
<td>0.2 (24) - 1.2 (3)</td>
</tr>
<tr>
<td>Baling</td>
<td>0.3 (24) - 1.5 (2)</td>
</tr>
<tr>
<td>Forage harvesting</td>
<td>0.5 (15) - 1.5 (2)</td>
</tr>
<tr>
<td>Hedging, ditching</td>
<td>0.5 (15) - 1.5 (2)</td>
</tr>
<tr>
<td>Seed drilling</td>
<td>0.9 (5) - 1.5 (2)</td>
</tr>
<tr>
<td>Spreading, spraying</td>
<td>1.0 (4) - 1.6 (1.5)</td>
</tr>
<tr>
<td>Ploughing</td>
<td>1.0 (4) - 1.6 (1.5)</td>
</tr>
<tr>
<td>Harrowing</td>
<td>0.7 (8) - 2.1 (1)</td>
</tr>
<tr>
<td>Mowing</td>
<td>0.9 (5) - 2.1 (1)</td>
</tr>
<tr>
<td>Hay tedding</td>
<td>1.1 (3) - 2.7 (0.5)</td>
</tr>
<tr>
<td>Transport</td>
<td>1.0 (4) - 2.7 (0.5)</td>
</tr>
</tbody>
</table>

Note 1: Suggested maximum exposure periods follow from Annex A to ISO 2631-1.
Note 2: Appropriate control of risk may be achieved following BS 6841: 1987.

- choosing a speed appropriate for the ground they are driving over – control of WBV should be used to reduce the risk of injury, NOT increase productivity;

- selecting a course to avoid potholes, ruts, bumps etc as much as possible.

Maintenance: Engineering control of WBV exposure largely depends on suspension systems. Seat, cab and chassis suspensions should be checked and lubricated and maintained as recommended by the manufacturer.

Suspension seats often have a working life shorter than that of the vehicle they are fitted to. It is essential that the seat is kept in good working order and is replaced when worn out. The vibration dampers in the seat can wear out and these may need to be replaced during the working life of the seat.

Maintain tracks etc to a high standard to make them as smooth as possible.

Selecting machinery: Manufacturers have a duty to supply machinery (but not agricultural tractors) with low vibration emissions and inform buyers of the WBV
Choose equipment with low WBV emission levels but only compare levels if the measurements have been made using the same method. Ask suppliers for additional information such as likely vibration emissions for the work the vehicle is most likely to do.

Agricultural tractors must be fitted with seats that have passed a vibration test but there is no legal duty to provide further information.

Suspensions: Some vehicles have cab or chassis suspension, in addition to or in place of seat suspension, that will reduce exposure to WBV. Check with the supplier that the suspension(s) fitted will reduce WBV in the intended application(s) – suspensions can amplify vibration if used in the wrong circumstances!

Suspended seats need to be properly adjusted to the middle of the suspension range for the driver’s weight – some seats are self-adjusting.

The vehicle should not be driven so fast that the suspensions reach the end of their travel and hit end stops, causing jolts that may injure the user.

Job rotation: In some circumstances it may be appropriate to share driving activities among the workforce but beware of increasing the numbers exposed to risk.

Symptom reporting: Encourage workers to report back injuries and any back pain so that you can take action to stop it getting worse.

Forthcoming changes

In July 2005 new Regulations on whole-body vibration will come into force to implement the Physical Agents (Vibration) Directive, 2002/44/EC. These Regulations will introduce, among other things, an exposure limit value which places an upper limit on the amount of whole-body vibration a worker may be exposed to in a day. However, existing agriculture and forestry equipment may be eligible to make use of a transitional period which will allow equipment causing exposures above the exposure limit value to continue to be used in this way until 2014, in certain circumstances and subject to certain conditions. Any agriculture and forestry equipment manufactured after 6 July 2007 will not be eligible for the transitional period.

Further reading

BS 6841: 1987 Guide to measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock

ISO 2631-1 Mechanical vibration and shock: Evaluation of human exposure to whole-body vibration: Part 1: General requirements


In the driving seat Leaflet INDG242 HSE Books 1997 (single copy free or priced packs of 10 ISBN 0 7176 1314 3)

Product standards – Machinery - Guidance notes on UK Regulations (May 1995) DTI URN 95/650. Copies available free from the DTI Publications Orderline Tel: 0870 150 2500

Further information

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This information sheet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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