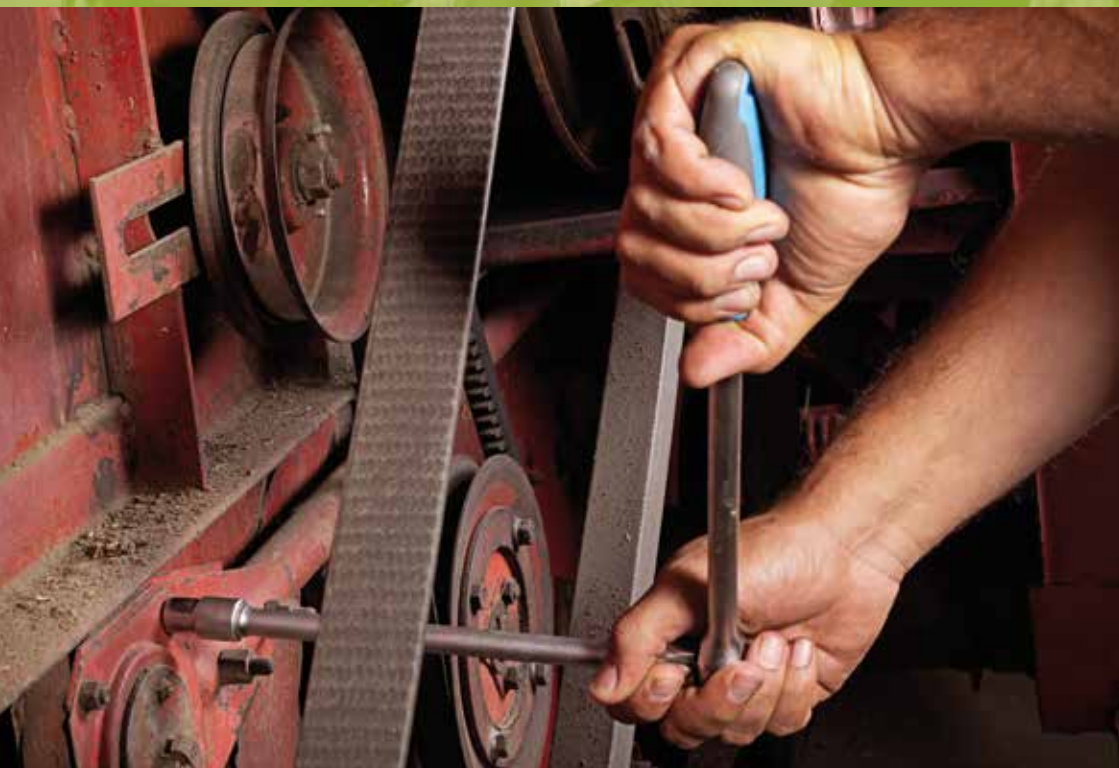


# *Working with machinery*

## *Workshop practices*



*Good practices in agriculture: social partners participation  
in the prevention of musculoskeletal disorders.*

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# Introduction

*Many serious incidents on farms involve working with machinery, often during maintenance or repair tasks. Machinery can be one of the biggest investments, so it is important to work on it carefully and safely. When buying new machinery, check that it is 'CE' marked and supplied with a Certificate of Conformity and use the machinery safely according to the instructions supplied (for more information, check HSE Farmwise<sup>1</sup> or check your national prevention services.). For safety reasons, all equipment should be maintained in good working order and in a good state of repair. Not all equipment is regularly checked and the working conditions can be very different from 'the usual work'. This often causes new hazards, so appropriate precautions must be taken.*

*Working safely with machinery, includes safe manual handling. Many workers in the agricultural sector suffer from a variety of 'musculoskeletal disorders' (MSDs) as a result of poor manual handling techniques, or through other tasks which involve repetitive movements, excessive force, unusual postures, or from badly organised working practices.*

*The brochure is divided into several subtasks:*

- Adequate tools
- Correct working height
- Workshop organisation
- Lifting and transportation
- Working techniques

*This brochure is based on farm visits across Europe. These visits resulted in several good practices being observed to prevent MSDs when working with machinery.*

*The brochure doesn't claim to be totally complete regarding all possible good practices to prevent MSDs during working with machinery, but is the result of farm visits and meetings with farmers. There is no affiliation to commercial organizations or products in presenting these good practices. We would like to thank all farmers that collaborated to this study and we hope that all other farmers might learn from their practices to prevent musculoskeletal disorders in the future!*

<sup>1</sup> Farmwise, 2009, booklet HSG270 revised 05/09, <http://www.hse.gov.uk/pubns/books/hsg270.htm>

# 1. Adequate tools

Often the wrong tool is used for the job. The tool must be in good condition, otherwise unnecessary / excessive forces may have to be applied, increasing the risk of injury. Try always to look for ergonomics variations of the tools. Sometimes solutions can be very simple, as demonstrated below.

## Tighten or loosen a bolt / nut

The image on the right demonstrates how you normally can loosen a nut when you e.g. change a tyre. A bad posture of the right wrist can be seen and a lot of force has to be applied.



## Solution

### Longer lever arm



With the help of an ordinary iron pipe, the extra leverage makes it easier to apply more torque.

The image on the right demonstrates how you normally unload/span a nut.  
Considerable force may have to be applied.



## Solutions

### Linking two spanners or wrenches



With existing objects you are able to exert more torque by increasing the leverage. Another benefit is to improve access to difficult places, such as when servicing agricultural machinery.

### Extension of a spanner



This image shows a basic construction of a spanner. By extension, you are able to exert more torque but another benefit is to improve access to difficult places, such as when servicing agricultural machinery.

*Separating the tyre beading from the wheel rim is a difficult task and is very hard work using the standard tool.*



**Solution**

**Lever arrangement**



*An alternative approach has been designed by a young farmer which relies on using the mechanical advantage provided by a lever arrangement. It is simple to construct and much easier to use than the standard tool. It needs only one anchor point that, in the example shown, is provided by the tractor linkage assembly.*

## *Drill*

*This image shows how to drill a hole in a plate. The problem is that the plate is not stationary but is moving. The work posture is poor and you need protective eyewear to avoid getting dust or other debris into your eyes.*



## *Solution*

### *Modern drill*



*A plastic shield prevents getting dust or other debris into your eyes. There is also the option to set the height of both the drill and vice so you can work in a correct posture, important when drilling several pieces.*

## 2. Correct working height

### *Oil recharging*

*Oil is often used during maintaining of machinery. The cans are often placed on the floor, so the worker has to bent down to pour the oil into a container.*



### *Solution*

#### *Oil pump*



*Using a pump or a holder on the can, avoids the worker having to bend over when recharging his oil can.*



## Heavy loads

The counterweights for a tractor are used according to the weight of the coupled implement or machine. The manual placing of the tractor weights (usually 28 kg) is difficult, if not impossible, to carry out alone.



## Solution

### Working on higher level

Placing the equipment to be attached at a higher level makes the coupling to the tractor easier.



When performing maintenance jobs on a machine lying on the ground, the worker will probably work squatted, with bad postures of back, head and knees.

## Solution

### Height-adjustable table

The use of a height-adjustable table avoids lifting the machine on to a table and permits the work to be carried out in a more comfortable posture.



It may be possible to fix a pallet to the lifting forks of a fork-lift truck (FLT) to make a height-adjustable working surface.

Important: the workpiece must be firmly fixed to the pallet and the pallet must be firmly attached to the forks.

## *Tools for low heights*

*Sometimes it is not possible to work on the correct working height and squatting down is necessary to work even at floor level (e.g. during vehicle repair).*



## *Solutions*

### *Knee protection*



*Try to keep your back as straight as possible also in difficult situations. Use knee protection when having to kneel on the floor.*

### *Rolling board*



*By using a rolling board, the farmer does not need to work with bent knees.*

## Track



*For the separation of engine and gearbox, the front end can be moved from the rear end on a track, thereby avoiding lifting and ensuring the parts line up for re-assembly.*

### 3. Workshop organisation

#### Storage of small tools

*In the workshop, many tools are used for the maintenance or the repair of the farm machinery and equipment. It is not uncommon to see tools scattered around and not stored in a tidy, methodical way. When there are several mechanics or workers involved doing similar tasks simultaneously, this may cause frustration or time-wasting if it becomes necessary to search for the correct tools.*



#### Solutions

##### Wall storage



*The workshop can be kept tidy, by using a wall cupboard to store the tools. Outlines of the tools can help locate the correct storage position. It is advisable to store the tools according to their weight and in terms of users' needs.*

## *Trolley*

*An alternative solution for equipment that needs to be used in a number of different locations is to make it portable and keep it together on a trolley or cart.*



*The figure below shows a pneumatic tool for tightening (or removing) wheel nuts. The trolley carries the tool (which is heavy) plus ancillary equipment including a range of nut-spinner sizes and the hose, which must be connected to the compressor to use the tool.*



Cables not stored correctly may cause bad postures in reaching for them and also possible tripping hazards and injuries.

### Solution

#### Cable reel

Keep the hoses off the floor for a safer, more efficient workplace (also for avoidance of bacteria build-up).



### Storage of agricultural machinery

Agricultural machines are used more or less frequently depending on the season. To avoid premature aging, it is advisable to store them on a dry place. When it is time to use them, it may not be easy to get to them if they have been stored in an inaccessible place.



## Solution

### Store on a pallet



Using a pallet to store the machine and a pallet truck to move it not only helps to avoid unnecessary stresses and strains but also to avoid potential accidents. The machine is vertically stored, can easily be moved and coupled (the manual pallet truck can easily be lifted up to 20 m). The pallet truck must be pushed and not pulled.



Be careful when using several pallets, there is a risk of instability when storing pallets

## *Draining of containers*

*The need to drain containers of unwanted liquid is a frequent occurrence on the farm: they may have contained pesticide, fertiliser or lubricants and the more viscous the fluid the greater the time required.*

### **Solution**

#### *Draining rack*



*The self-constructed rack, enables the farmer to leave the containers to drain themselves. The upturned containers are placed on the spikes and the remaining liquid falls into the channel below the spikes. All the waste can then drain out through the downpipe into a single collection point. This is similar to the guttering system for the roof of a house.*



## 4. Lifting and transportation

### Transportation of machinery

#### Solutions

##### *Pallet truck*



*The machine is stored on a pallet and easily transported using a pallet truck.*

##### *Store on a pallet with wheels*



*A pallet with wheels can be used to store and to transport a machine. However, it is important to check whether the wheels can withstand heavy loads and use such pallets accordingly.*

### *Use machines with wheels*



*These wheels permit the farmer to move the machines without carrying them.*

### *Lifting machine*



*Instead of carrying a heavy pump in the workplace, the farmer uses a manual crane.  
Important: since the wheels are small, the floor has to be smooth and clean.*

## *Moving smaller loads*

### *Solution*

#### *Dollies or mobile platforms*



*It is also possible to use small dollies / mobile platforms to move relatively small loads to avoid having to carry them.*

## Replacing tractor tyres

Replacing tractor tyres is a task that most farm workshops would undertake.

Tractor wheels are very heavy, so very bad postures can be seen during manual handling.



## Solution

### Tackles



Using a tackle permits lifting and moving the tyre without carrying it. There are electric or manual tackles. It is always very important to check the strength of the supporting beam to avoid accidents. Once you start using it, the daily work becomes much easier.

The tackle presented at the right picture can move sideways so that heavy material can be placed where you want. When the equipment is not in use it can easily be pushed aside.

### Carriage

A carriage is used for holding the wheel. The wheel can not tip over, and you can easily roll it to get the holes for the bolts to line up.



## *Transportation of welding gas bottles*

*Transportation of welding gas bottles is very common in a farm workshop. The standard gas bottle trolley is poorly designed from the user's point of view, particularly when it needs to be moved – the handles are too high, requiring an unnecessarily awkward posture.*



## **Solution**

### *Trolley*



*It is easy to make, in almost any workshop, a more ergonomically designed trolley which is easier to move (handle height and weight of bottles balanced over axle) and allows easier access to the gas bottles for removal or replacement.*

## 5. Working techniques

*Working with machinery is physically demanding and associated with difficult working postures and movements, strenuous and static muscle loads. It is important to prepare for the physically demanding work and to help prevent musculoskeletal disorders by being physically fit and well-trained. Furthermore, learn how to practice working techniques so they become natural for you.*

- *Keep your body in good trim by regular physical exercise*
- *Use supports, tools, machinery when possible*
- *Do not use more muscle strength than the task requires*
- *Lifting a load – put your feet around the load, keep the load close to your body, bend your knees AND keep your back straight*
- *Carrying a load – if possible divide the weight equally between your hands or carry the load symmetrically*
- *Turning with a load - move your feet instead of twisting your back*
- *Avoid lifting above shoulder height*

*Work near your body use both hands or alternate, and avoid extending your joints to more distal positions*

# General information

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*Ownership of the results of the action, including industrial and intellectual property rights, and of the reports and other documents relation to it shall be vested in the beneficiary (IDEWE non-profit).*

*Goal of the project is to further implement the European social partners’ agreement of GEOPA-COPA and EFFAT by developing prevention policies and good practices to reduce musculoskeletal disorders in agriculture and to disseminate the results. For the following tasks good practices are presented:*

- Livestock handling*
- Working with machinery*
- Manual stable work*
- Greenhouses*
- Dairy small ruminants*
- Milking cows*
- Tractor driving*
- Ground level manual crops*
- Pruning*
- Sorting and packaging*
- Harvesting*

*For more information on the project: [www.agri-ergonomics.eu](http://www.agri-ergonomics.eu).*

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