

Maintenance in Agriculture - A Safety and Health Guide



Authors (Members of the TC OSH):

Mónica Águila Martínez-Casariago, INSHT, Spain

Kirsty Ormerod, Mark Liddle, HSL, United Kingdom

Gediminas Vilkevicius, LZUU, Lithuania

Ellen Schmitz-Felten, KOOP, Germany

Edited by Katalin Sas, European Agency for Safety and Health at Work (EU-OSHA)

This report was commissioned by the European Agency for Safety and Health at Work (EU-OSHA). Its contents, including any opinions and/or conclusions expressed, are those of the author(s) alone and do not necessarily reflect the views of EU-OSHA.

***Europe Direct is a service to help you find answers
to your questions about the European Union.***

Freephone number (*):

00 800 6 7 8 9 10 11

(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu>).

Cataloguing data can be found at the end of this publication.

Cover photo by Verislav Stancheventry – Entry to the EU-OSHA photo competition 2009 “What’s your image of safety & health at work?”

Luxembourg: Publications Office of the European Union, 2011

ISBN 978-92-9191-667-2

doi 10.2802/54188

© European Agency for Safety and Health at Work (EU-OSHA), 2011

Reproduction is authorised provided the source is acknowledged.

Table of contents

1.	An introduction to maintenance in agriculture	3
2.	Methodology	7
3.	Legislation	8
4.	Facts and Figures	10
5.	Maintenance tasks in agriculture	12
5.1.	Maintenance and repair of machines and equipment	12
5.1.1.	Workshop	12
5.1.2.	Machinery maintenance	13
5.1.3.	Maintenance of portable tools	14
5.1.4.	Maintenance and repair of vehicles	15
5.2.	Maintenance of farmyards and buildings	16
5.2.1.	Work on fragile roofs	17
5.2.2.	Asbestos	17
5.3.	Maintenance of silos, bins, slurry tanks and grain tanks	18
5.4.	Maintenance of electrical installations	18
5.4.1.	Electric fences	19
5.5.	Maintenance of drainage and irrigation systems	20
5.5.1.	Ditch Maintenance	20
5.6.	Maintenance of paved and unpaved roads	20
6.	Hazards related to maintenance in agriculture	21
7.	The most common causes and contributory factors of accidents in agriculture	26
7.1.	Lone working	27
7.1.1.	Maintaining machinery (including impromptu repairs)	27
7.1.2.	Maintaining infrastructure (including planned or routine maintenance)	27
7.2.	Lack of personal protective equipment	27
7.3.	Financial constraints, time pressure and fatigue	28
7.4.	Lack of awareness / training / information	28
7.5.	Subcontracting	28
8.	Preventive measures	29
8.1.	Machinery maintenance	29
8.2.	General workshop safety	31
8.3.	Working in confined spaces	32
8.4.	Working at height	33

8.5.	Using ladders	34
8.6.	Personal protective equipment (PPE)	34
9.	Initiatives and campaigns to prevent harm to maintenance workers in agriculture.....	36
9.1.	Campaigns	36
9.2.	Special events to inform and train workers	36
9.3.	Information and training courses tailored to the special needs of agricultural workers	36
9.4.	Studies to support further initiatives	36
9.5.	Incentives/certificates to motivate workers.....	37
10.	Good practice examples	38
10.1.	Safety training and consulting for farmers, Lithuania	38
10.2.	Maintaining and repairing horticultural glasshouses safely and efficiently, Netherlands	39
10.3.	Certificate of Competence in Land-based Machine Maintenance, United Kingdom.....	40
10.4.	Maintenance friendly design, Germany.....	40
10.5.	Mobile repair workshop for agricultural machines and vehicles, Germany.....	41
11.	Checklists and guidelines for safe maintenance in agriculture.....	42
11.1.	Farm self-assessment software, United Kingdom.....	42
11.2.	Concevoir, aménager votre atelier: 100 questions pour réussir, France	42
11.3.	Guidelines for safe use of tractors and agricultural machinery, Lithuania	43
11.4.	Safety and health – maintenance in agriculture, Germany	44
11.5.	Checklist for safe working in farm buildings, with electrical installations, with agricultural machines and equipment, Austria	45
12.	Conclusions	46
12.1.	Checklist for maintenance activities in agriculture, summarised from different checklists and publications.....	47
	References	54

1. An introduction to maintenance in agriculture

Working conditions in agriculture

In the EU27, family work and a large degree of self-employment predominate in the agricultural industry. In 2007 about 78% of farmers worked alone with assistance from family members and occasional help from employees brought in at peak times¹. Corporate farming (where the farm is owned by a commercial company that employs a manager to run it), is rather unusual in Europe².



Cristi Iavorenciuc - Entry to the EU-OSHA photo competition 2009 "What's your image of safety & health at work?"

Based on a secondary statistical analysis of the data from the fourth Eurofound's European Working Conditions Survey (EWCS) 2005, over 59% of workers are self-employed, compared to an average percentage across all sectors of 16.7%. Agriculture is a sector which has a higher proportion of workers on temporary contracts (43.9%), compared to an average of 16.7% for all sectors. Agriculture also has the highest proportion of employees without contracts (24%).

Agriculture is characterised by relatively high levels of unskilled work. Educational levels are relatively low: most workers in the sector have lower levels of education or no education at all³. The Health and Safety Executive (HSE) in the UK reported that, in 2000, 22% of managers in agriculture had completed either basic or full agricultural training, but the majority had only practical experience. This is especially true for those working in smallholdings⁴.

Agriculture is one of the most hazardous sectors. Non-fatal work-related accident rates are 1.7 times higher than the average, and the number of fatal occupational accidents is three times higher than the average.

The main causes of accidents include⁵:

- transport (being run over or vehicle overturns);
- falling from height (through fragile roofs, from trees etc);

- struck by moving or falling objects (bales, trees etc);
- trapped by something collapsing or overturning;
- livestock related accidents and fatalities;
- asphyxiation / drowning.



Dries Vanderschaeghe - Entry to the EU-OSHA photo competition 2009
"What's your image of safety & health at work?"

Agriculture also has a poor record of occupational health compared to other sectors⁶. Although the overall risk of occupational disease among agricultural workers is lower than that for other workers, the rates for certain diseases appear to be higher among agricultural workers. These include, for example, asthma and farmer's lung disease, induced by the inhalation of biological dusts from mouldy hay or other agricultural products, and skin diseases (for instance, dermatitis)⁷. In the UK, the incidence of asthma in agriculture is twice the national average, and 40% of those working in the industry suffer respiratory disorders⁸.

Agricultural workers may be exposed to chemicals, such as pesticides, veterinary drugs, solvents, and oils, which might in the long-term cause asthma, skin problems, harm to the nervous system, or cancer⁹.

Workers in this sector are particularly exposed to ergonomic hazards (tiring or painful positions, carrying or moving heavy loads, standing or walking and repetitive hand or arm movements), and consequently work-related musculoskeletal problems are highly prevalent¹⁰. According to data from UK, 80% of those working in the industry suffer some form of musculoskeletal injury¹¹.

Long working hours and non-standard working time patterns, such as at harvest time, are also typical problems for agricultural workers, especially for the self-employed¹².

Self-employment, and the fact that farming is often a family business, are challenges for occupational safety and health. Self-employed workers in the agriculture industry are more often victims of fatal accidents in comparison with other industries. In the UK, over the past ten years, there have been 464 fatal accidents in agriculture, involving 145 employees and 254 self-employed farmers¹³. The German data also show a significantly higher number of accidents among self-employed workers in agriculture.

Typically, the agriculture sector employs seasonal workers and contractors during busy periods (for ploughing or harvesting). Contractors are often used for particularly hazardous jobs such as cleaning or repairing fragile roofs, or cleaning out slurry tanks¹⁴ and are at greater risk from accidents and disease. In the agriculture sector, seasonal workers are often migrant workers¹⁵. Lack of awareness of hazards and risks and language difficulties make migrant workers vulnerable to accidents and disease.

Maintenance in agriculture

Maintenance influences almost all aspects of farm work, be it in the state of buildings and infrastructure, or the operation of machines and equipment.

- Farm workers may get harmed during maintenance work.
- Farm workers may get harmed because of lack of maintenance or as a result of poor maintenance.

Many farm accidents occur during repair and maintenance¹⁶ activities. The UK data for fatal injuries in agriculture broken down by work activity show that 15% of all fatal accidents between 1999/2000 and 2008/2009 were related to maintenance tasks (machinery, buildings and general maintenance)¹⁷.

Maintenance activities in agriculture are various and include the maintenance of both machinery and infrastructure, and the tasks range from oil and filter changes, battery charging and replacement, lubrication, clearing blockages and maintenance of hydraulic systems and tractors to maintenance of roofs and glasshouses, maintenance of silos, slurry tanks, bins and grain tanks or maintenance of electric fences and roads.

Because of the wide variety of tasks, there are many different hazards involved, including:

- Mechanical hazards related to the maintenance of machinery, such as crushing, entanglement and high-pressure fluid injection
- Electrical hazards when working with defective equipment or during maintenance of electrical installations and equipment, or repair of broken electric fences
- Thermal hazards related to the use of welding or heating equipment during maintenance, or maintenance of equipment with hot surfaces or operating fluids
- Chemical hazards related to the use of dangerous substances during maintenance, or maintenance of equipment containing dangerous substances
- Fire or explosion hazard during maintenance of facilities or equipment containing dangerous and explosive substances such as tanks, bins and silos, or fuel tanks
- Biological hazards during maintenance of installations contaminated by biological agents, slurry tanks, ditches and sewage infrastructure
- Ergonomic hazards, such as awkward postures, poorly designed tools
- Hazards related to working in confined spaces
- Falls from height, slips, trips

Farmers often carry out a lot of maintenance work by themselves. This applies to routine maintenance like general repair work as well as day-to-day maintenance. Financial pressures lead to

a situation in which farmers choose the do-it-yourself approach instead of paying a specialist contractor^{18 19}. This increases the risk of accidents because, on the one hand, the farmer may not have competences in maintenance and on the other, machines and vehicles in agriculture are becoming more and more sophisticated, thus requiring qualification in maintenance and repair.

2. Methodology

This guide describes the main hazards and risks associated with maintenance activities in agriculture and the most common causes of accidents and ill health related to those activities.

Statistical data on accidents and diseases and examples of typical accidents illustrate the risks and hazards related to maintenance work in agriculture. The guide also provides advice on risk management and presents examples of good practice in accident prevention as well as policies and campaigns at national level that aim to prevent harm to maintenance workers in agriculture. Finally, the guide provides examples of checklists for safe maintenance in agriculture.

To collect information about occupational safety and health (OSH) relating to maintenance in agriculture, the authors searched for specific statistical occupational safety and health data on maintenance in agriculture, accident reports and examples of good practice, and policies and specific occupational safety and health measures related to this problem. The method involved an extensive search of published research in the journals, accident insurances, institutions and internet sites of countries within the European Union.

The research includes the websites and databases of:

- European Agency for Safety and Health at Work (EU-OSHA)
- European Commission (EC)
- The Agricultural Social Insurance Organisation, Germany (LSV)
- Federation of Agricultural Trade Associations, Germany (BLB)
- Austrian Chamber of Agriculture (LO)
- Austrian General Accident Insurance Institute (AU)
- Agricultural Workers' and Farmers' Mutual Benefit Fund, France (MSA)
- Special websites for farm workers, such as www.proplanta.de
- Various farm journals and magazines
- European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT)
- Health and Safety Executive, UK
- Ministry of Labour and Immigration, Spain
- Ministry of Labour and Social Solidarity, Portugal

The following key words and phrases were used in the searches:

agriculture, maintenance, accident, repair, accident insurance, farmers, farm workers, migrant workers, risks and hazards, agricultural work, safe working, farm, repair shop, guidelines, safe maintenance, prevention of risks, accident, disease, family workers, self-employed, seasonal work, workshop, safe work, accident report.

3. Legislation

Safety and health in agriculture is not covered by a specific EU directive but various EU directives do address certain safety and health issues in the sector. Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work – the “Framework Directive” - sets out the risk assessment process and the general principles of risk prevention.

Self-employed workers are not covered by the Directives on health and safety at work, in particular with the Framework Directive, but there is a Council Recommendation concerning the improvement of the protection of the health and safety at work of self-employed workers. Taking into account that the number of self-employed is increasing and there are a large number of self-employed workers in certain "high-risk" sectors such as agriculture, fishing, construction, and transport, the Council recommends that Member States promote health and safety for self-employed workers by measures they consider most appropriate, such as legislation, incentives, information campaigns, access to training and health surveillance²⁰.

The framework directive is supplemented by individual directives, most of them also relevant for maintenance in agriculture. Some directives address safety and health in agriculture in particular, mainly in machinery and equipment safety (tractors and harvesters), ergonomic design of machinery, and the safe use of dangerous substances or agents in agriculture such as pesticides.

For example, two directives are particularly relevant to the safe use of agricultural machinery and tractors:

- Council Directive **2003/37/EC** on type-approval of agricultural or forestry tractors, their trailers and interchangeable towed machinery, together with their systems, components and separate technical units regulating all relevant aspects for tractors (road traffic, safety at work, environmental protection).
- Council Directive **2006/42/EC** of the European Parliament and the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC lays down essential health and safety requirements in relation to design and manufacture, in order to improve the safety of machinery placed on the market. The Directive stipulates that machinery must be designed and constructed so that it is fit for its function, and can be operated, adjusted and maintained without putting workers at risk when these operations are carried out under all normal conditions, but also taking into account any reasonably foreseeable misuse.

Some countries have developed a specific legal framework for occupational health and safety in agriculture. For example, Austria has the Agricultural Labour Act 1984 (Landarbeitsrecht 1984)²¹, which is enforced by central government and sets out measures for ensuring workers' safety. The relevant provisions on health and safety of agricultural and forestry workers, which largely follow those of the Workers' Protection Act, are contained in sections 76-94e of this Act.

The Safety and Health in Agriculture Convention (No. 184) was adopted by the International Labour Organization (ILO) in 2001 and covers preventive and protective measures regarding machinery safety, handling and transport of materials, chemicals management, animal handling, and the construction and maintenance of agricultural facilities. Young workers, temporary and seasonal workers, and gender issues are also covered by this convention²²

Existing standards (for example, ISO and CEN standards) give detailed technical information concerning agricultural and forestry equipment, in order to prevent accidents²³. These include:

- ISO 4254-1:2005 Agricultural machinery -- Safety -- Part 1: General requirements
- ISO 5674:2004 Tractors and machinery for agriculture and forestry -- Guards for power take-off (PTO) drive-shafts -- Strength and wear tests and acceptance criteria
- ISO/TS 28924:2007 Agricultural machinery - Guards for moving parts of power transmission - Guard opening without tools

4. Facts and Figures

In 2007, 14.6 million people in the EU 27 worked mainly in the agriculture, hunting and forestry sector, which comprises approximately 6% of the working population^{24, 25}. The utilised agricultural area makes up 43% of the whole EU-27 territory²⁶.

As described in the introduction, family work and a large degree of self-employment are predominant in the agricultural industry, the main work on farms being done by the farm owner and his or her family. Nine out of ten people working on farms (89%) are family labour force²⁷. In addition, maintenance in agriculture involves several occupations and is associated with various sectors of activity, not only agriculture. For these reasons, it is difficult to obtain statistical data related to maintenance and occupational safety and health²⁸.

The peculiarity, for self-employed workers, of being ultimately irreplaceable during times of illness and the pressure to continue with work defined by seasonal necessities and weather conditions means that accidents are not necessarily reported and the statistics, therefore, are probably considerably under-reporting the real situation. However, the risks in this sector are high, and there are a large number of fatalities each year.

Within the statistics, accidents associated with maintenance do not appear as a category of its own. A closer look at the accident statistics does however give some idea of the accidents occurring during repair and maintenance. For example, accidents due to 'contact with machinery', 'electrocution', 'asphyxiation in confined spaces', 'falls from ladders and roofs', 'engulfment or drowning (slurry tanks, silos)' may well be related to maintenance work.

Falling from height is one of the main causes of fatal accidents in agriculture. Many accidents involving falls happen during the construction or maintenance of agricultural buildings or other farm structures. These jobs typically involve working at height, and require some form of temporary access to height, for example ladders, scaffolds, or other temporary working platforms²⁹.

Agricultural work carries an above-average risk of falling accidents. In the UK, farming, forestry and horticulture employ about 1% of the national workforce but accounts for more than 13% of the fatal falls³⁰.

Data from the UK for 2007/2008 recorded 9.7 fatalities per 100,000 workers in the sector and showed the main causes of workers' death in agriculture to be³¹:

- transport (being run over or vehicle overturns), 24%
- falling from height (through fragile roofs, trees etc.), 17%
- struck by moving or falling objects (bales, trees etc.), 15%
- asphyxiation / drowning, 10%
- livestock related fatalities, 10%
- contact with machinery, 8%
- trapped by something collapsing or overturning, 7%
- contact with electricity, 5%

The UK data for fatal injuries in agriculture broken down by work activity show that 48 of 399 fatal accidents were related to maintenance tasks (machinery, buildings and general maintenance) 1997/98 to 2006/7³². This corresponds to 12% of all fatal accidents in the sector in that period.

The head organisation of Germany's agricultural accident insurance (LSV) reported that about 1,800 employees were injured while performing maintenance activities in 2009. Other statistics provided by the statutory accident insurer for agriculture indicated that, for the year 2008, 25% of all accidents in agriculture were related to the maintenance and repair of machines³³.

The statutory accident insurer for agriculture in Niedersachsen-Bremen reported about 20% of accidents related to maintenance in 2008³⁴. According to the statutory accident insurer for the Mid- and East German region, (*Mittel- und Ostdeutschland*), about 19% accidents were related to maintenance and repair activities in 2008 and 2009, down from about 22% in 2007³⁵.

All these data give an indication of the number of accidents related to maintenance work in agriculture. For the reasons already mentioned, it is very difficult to obtain statistical data that reflects the reality of the situation. However, it is reasonable to assume that the situation is much the same as other sectors, if not worse, in agriculture. The data show that around 20% of all accidents in Belgium in 2005-2006 were related to maintenance operations, around 18-19% in Finland, 14-17% in Spain, 10-14% in Italy in 2003-2006³⁶, 22% in Germany³⁷, and 15% in the UK³⁸.

5. Maintenance tasks in agriculture

Maintenance activities in agriculture include the maintenance of both machinery and infrastructure and they can range from simple tasks (changing a light bulb) to more complicated ones (maintenance and repair of machinery in large plants). Maintenance, such as the annual weatherproofing of a barn roof, may be planned or may be carried out as and when required, for example when a blockage occurs in a piece of machinery.



Source M. Águila

5.1. *Maintenance and repair of machines and equipment*

Day-to-day maintenance keeps machinery, vehicles and equipment on farms safe. It includes oil and filter changes, battery charging and replacement.

5.1.1. **Workshop**

Workshops are needed to service, repair, and adjust equipment and keep tools in one location for all kinds of farm work. Workshops may therefore contain a range of dangerous tools and substances.

It is important that workshops are properly designed and equipped. A good workshop can improve the efficiency of farm work and facilitate preventive maintenance of equipment. How a workshop is arranged, equipped and maintained is also important to prevent risks.

Broken equipment, machines and vehicles have to be repaired as soon as possible and this is often done by the farmers and their employees. Only large farm companies have big workshops and employ skilled maintenance technicians.



Source M. Águila

5.1.2. Machinery maintenance

The maintenance on machinery and its implements, equipment and farm vehicles includes tasks such as^{39,40, 41}

- Maintenance of electrical connections;
- Replacing or repairing safety guards;
- Sharpening or replacing machines' cutting blades;
- Regular maintenance of engines, cooling systems;
- Lubrication, oil changes, filter changes;
- Maintenance of lifting equipment;
- Clearing blockages;
- Light metal machining, welding;
- Operations with compressed air/tyres;
- Maintenance of oil mill's machinery as olives transporters, cleaner and washing machine, mill, mixer, transfer pumps, centrifuges, screw extractor, receiving hoppers, presses;
- Cleaning and lubricating power-take-off shaft guarding;
- Maintenance of hydraulic systems.



Verislav Stancheventry – Entry to the EU-OSHA photo competition 2009 “What’s your image of safety & health at work?”

A worker in the UK lost part of his arm while maintaining a forage harvester. He was helping a colleague to repair the sharpening mechanism on the machine after the stone carriage had jammed. The worker reached in to remove the blockage when the cutter rotated and caught his arm by the cutter cylinder. His arm was amputated below the elbow

Cause of accident: Inadequate operator training led to the use of unguarded equipment

Source and date: UK Health and Safety Executive newsletter (HSE), issue 17, *Teenage worker loses part of arm*, (February-March 2009)

A farmer was injured while clearing a blockage in a harvester. Although the power was turned off, the victim did not realise that the machine’s chopping mechanism was powered directly from the power take off (PTO). He fractured and lacerated two fingers.

Cause of accident: Unguarded PTO shaft and no tool provided for clearing blockages safely

Source and date: UK Health and Safety Executive (HSE) website, agriculture pages; <http://www.hse.gov.uk/agriculture/experience/clearing-blockages.htm> (Last accessed 3 February 2010)

5.1.3. Maintenance of portable tools

Portable tools such as saws, hammers, screwdrivers, axes and wrenches and powered portable tools such as circular saws, drills, motor winch or high pressure cleaners are part of everyday work in agriculture. These everyday tools can be very dangerous and when they are not maintained properly they can cause serious injuries, such as electric shock, finger or hand injuries or severe eye injuries. Especially dangerous are broken or defective tools, or tools that have been modified unprofessionally⁴². Powered hand tools can also cause physical hazards such as vibration and noise, and can cause ergonomic injuries especially if they are not properly maintained.

Portable electrical tools have been responsible for many electrocutions on farms. Such tools include electric welders, drills, angle grinders, and battery chargers.

Tasks to be performed are:

- Cleaning
- Lubricating
- Sharpening blades, saw chains and drills
- Replacing broken and used parts
- Replacing broken cords

Tools must be kept in good condition and appropriately stored.

5.1.4. Maintenance and repair of vehicles

Regular inspection and service of agricultural vehicles is important to ensure continuity of farm work and to prevent accidents in the field and in the work shop. However, workers can be seriously and even fatally injured while performing simple maintenance tasks and repairs to agricultural vehicles such as tractors. Particularly, repair of vehicles out in the fields presents a great challenge and should be carried out with particular care^{43,44}

A 62 year old worker was killed while repairing a tipper lorry. He lifted the tipper lorry and secured it with jack stands. While repairing the lorry, the jack stands failed and the worker was crushed under the tipper.

Cause of accident: The jack stands were not adequately placed and secured.

Source: Beratungsstelle für Unfallverhütung in der Landwirtschaft BUL,
<http://www.bul.ch/asp/aktuell/unfallgalerie.asp>, date of the accident 2 November 2009

Maintenance of tractors includes^{45 46}:

- Checking, maintaining and repairing brakes, clutches and drives;
- Checking and filling fluid levels (hydraulic fluid, coolants, oil);
- Charging batteries;
- Checking and repairing tyres and wheels;
- Removing/exchanging wheels;
- Checking and replacing air hoses;
- Checking, maintaining and repairing hydraulic lifts and coupling devices;
- Checking tyre pressure.

Two agricultural machinery operators had been asked by the head engineer for transport to change the wheels of a T-150K tractor. Worker No 1 put a jack under the front axle of the tractor, raised the tractor and put tubular support under its front part. The workers tried to put a wheel on the axle but it was not possible because the tractor was too high. Worker No 1 entered under the front part of the tractor with the intention of lowering the machine in order to allow worker No 2 to put the wheel on. During this operation, the tractor tilted and the metal support did not bear the additional weight . The tractor moved down onto worker No 1. Worker No 2 saw the incident, immediately put the jack under the tractor, raised it and pulled out worker No 1.

Cause of accident: workers were not properly equipped to change wheels, unsafe work practice.

Source: Accident report, Lithuania, 2005.

5.2. Maintenance of farmyards and buildings

Building works and maintenance of buildings are typical tasks on farms. This can involve, among others, dismantling and re-erecting entire buildings, maintenance of roofs, and dealing with asbestos.



Maitane Ezpeleta - Entry to the EU-OSHA photo competition 2009
"What's your image of safety & health at work?"

Construction work on farms is one of the most dangerous tasks in agriculture. There are more than twice as many accidents related to agricultural construction as there are in the construction industry itself⁴⁷.

Tasks to be performed are:

- Demolition;
- Construction;
- Renovation and isolation;
- Painting work;
- Maintenance of water and electrical supply;
- Maintenance of sewage treatment;
- Maintenance of gutters and down pipes;
- Maintenance of roofs;
- Maintenance of glasshouses;
- Cleaning tasks.

A 35 year old worker wanted to install a lightning protection device on a barn. The worker used an aluminium ladder to install the lightning protection on the barn. Because the ground beneath his ladder was covered with frozen snow, it slipped away from under him and he fell, sustaining serious head injuries.

Cause of accident: Working alone and no anti-slip protection.

Source: Beratungsstelle für Unfallverhütung in der Landwirtschaft BUL,
<http://www.bul.ch/asp/aktuell/unfallgalerie.asp>, 15 December 2009

5.2.1. Work on fragile roofs

One of the main causes of serious and fatal accidents in agriculture is falling from height, such as during work on fragile roofs⁴⁸

Many farm buildings have old or poorly-maintained roofs, often made of fibre cement⁴⁹. These roofs cannot safely support the weight of a person. Other sources of danger are the roofs of glasshouses, skylights (roof lights), and where metal sheets used as a roofing material have corroded.



Source: E. Schmitz-Felten

A young farm worker was injured in the UK while performing routine roof maintenance. The victim was helping his father to clear debris from guttering on the barn roof. He stepped backwards off the safety boards onto the Perspex roof light which gave way, and he fell through the roof to the ground below. He broke his femur which had to be pinned.

Cause of accident: No safety harness

Source: UK Health and Safety Executive (HSE) Make the Promise Campaign website <http://www.hse.gov.uk/agriculture/makethepromise/peterrooke.htm> (last updated 19 March 2010)

5.2.2. Asbestos

Material containing asbestos is still present on many farms. The risk from asbestos has to be assessed. The following list is taken from HSE, *A short guide to managing asbestos in premises*, 2009, <http://www.hse.gov.uk/pubns/indg223.pdf>, and it outlines the different forms in which asbestos may be present on agricultural premises:

- *sprayed asbestos and asbestos loose packing - generally used as fire breaks in ceiling voids;*
- *moulded or preformed lagging - generally used in thermal insulation of pipes and boilers;*
- *sprayed asbestos - generally used as fire protection in ducts, fire breaks, panels, partitions, and on asbestos cement sheets around structural steel work;*
- *insulating boards used for fire protection, thermal insulation, partitioning and ducts and as soffits and as ceiling or wall panels;*
- *some ceiling tiles;*

- *millboard, paper and paper products used for insulation of electrical equipment. Asbestos paper has also been used as a fire-proof facing on wood fibreboard;*
- *asbestos cement products, which can be fully or semi-compressed into flat or corrugated sheets. Corrugated sheets are largely used as roofing and wall cladding. Other asbestos cement products include gutters, rainwater pipes and water tanks;*
- *certain textured coatings;*
- *bitumen roofing material;*
- *vinyl or thermoplastic floor tiles.*

5.3. Maintenance of silos, bins, slurry tanks and grain tanks

The maintenance of silos, slurry tanks, bins and grain conveyors presents the usual risks associated with working in confined spaces. Access to such confined spaces is usually only possible through one access point, with no alternative exit, and often with a small opening. In slurry tanks the most common operations carried out are cleaning, inspection, repair or installation of devices. In grain conveyors and bins, workers enter to remove blockages that stop grain flow.



Source: M.Águila

5.4. Maintenance of electrical installations

Disregarding safety regulations and safe work procedure while working with electrical installation can be fatal, as can working with broken electrical installations and equipment. Even a small amount of current can kill a person. According to HSE about 30% of electrical shocks are fatal⁵⁰. Maintenance of electrical installations should be carried out by experts.

Electrical installations can be found in all buildings, including stables, workshops, residential houses and the farmyard, and many other farm buildings



Source: E.Schmit-Felten

Tasks to be performed include installing new and repairing broken cables, electric sockets, light, pumps, and ventilation.

5.4.1. Electric fences

Electric fence equipment is widely used on farms and has caused a number of fatal electrical accidents.

Tasks to be performed are:

- Repair of broken electrical fences
- Installation of electrical fences



Source: E. Schmitz-Felten

5.5. Maintenance of drainage and irrigation systems

Typical drainage maintenance activities include regular inspections, repairs, outlet replacement, erosion control, and blockage removal.

5.5.1. Ditch Maintenance

Ditches are built to drain water from the land, especially during or after heavy rain or melting of snow⁵¹.

Maintenance is necessary to remove sediment, silt, vegetation and debris to ensure an easy passage of water and to prevent flow blockages.

Maintenance tasks include inspection and repair of pump screens and weirs, of irrigation and drainage pumps, and the monitoring of water control structures such as weirs associated with farm ditches.

A 51 year old farmer was buried alive when maintaining a sewage ditch. He was working in a 4m-deep sewage ditch in Germany when the excavation collapsed and buried him alive.

Cause of accident: The sewage ditch had no protection against collapse.

Source: Beratungsstelle für Unfallverhütung in der Landwirtschaft BUL, <http://www.bul.ch/asp/aktuell/unfallgalerie.asp>, date 02 November 2009

5.6. Maintenance of paved and unpaved roads

In fields and on forestry roads it is necessary to maintain a high level of tidiness, eliminating uneven surfaces and obstructions which could cause tripping or the overturning of vehicles. For this reason it may be necessary to pave roads and continuously repair and maintain both, paved and unpaved tracks.

Forestry roads and trails should be smoothed, repaired and left in a stable condition to resist erosion⁵². Erosion of unpaved roadways occurs when soil particles are loosened and carried away by water, wind, traffic or other means. The maintenance of paved and unpaved roads requires big road-making machines and agricultural vehicles.

6. Hazards related to maintenance in agriculture

Risks and hazards related to maintenance tasks in agriculture are determined by the nature of these tasks. A wide variety of buildings, installations, machinery, equipment and tools is used in agricultural production which means that the hazards related to their maintenance are many and various. The following list of hazards related to maintenance in agriculture has been prepared using EN ISO 4254-1:2005 *Agricultural machinery – Safety – Part 1: General requirements*, although it is not exhaustive.

Table 1: List of hazards related to maintenance in agriculture

Hazard		Maintenance tasks
1	Mechanical hazards	
1.1	Crushing hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and tools during maintenance ▪ Maintenance of machinery, movable installations and tools, animal care
1.2	Shearing hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and tools during maintenance ▪ Maintenance of machinery, movable installations and tools
1.3	Cutting or severing hazard	<ul style="list-style-type: none"> ▪ Related to use of sharpened tools and machinery and sharpened working tools during maintenance ▪ Maintenance of hand tools, machinery with sharpened working tools, installations containing sharp edges ▪ Work on fragile roofs such as glasshouses or sky lights
1.4	Entanglement hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and powered tools during maintenance ▪ Maintenance of machinery with power transmission ▪ Maintenance of fences and electrical fences
1.5	Drawing-in or trapping hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and powered tools during maintenance ▪ Maintenance of machinery with power transmission
1.6	Impact hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and tools during maintenance

Hazard		Maintenance tasks
		<ul style="list-style-type: none"> ▪ Maintenance of movable installations, equipment with folding elements, compressed parts (such as springs), animal care ▪ Maintenance of farm buildings
1.7	Stabbing or puncture hazard	<ul style="list-style-type: none"> ▪ Related to use of pointed tools and materials during maintenance ▪ Maintenance of equipment with pointed parts, animal care
1.8	Friction or abrasion hazard	<ul style="list-style-type: none"> ▪ Related to use of various types of machinery, equipment and tools during maintenance ▪ Maintenance of machinery, movable installations and tools, animal care
1.9	High-pressure fluid injection or ejection hazard	<ul style="list-style-type: none"> ▪ Related to use of machinery, equipment and tools with hydraulic components during maintenance, ▪ Cleaning with high pressure cleaner ▪ Maintenance of equipment with hydraulic components
2	Electrical hazards	
2.1	Contact of persons with live parts (direct contact)	<ul style="list-style-type: none"> ▪ Related to use of electrical equipment during maintenance ▪ Maintenance of electrical equipment ▪ Maintenance of electrical installations in buildings and stables ▪ Repair of broken electrical fences
2.2	Contact of persons with parts which have become live because of a fault or through human error (indirect contact)	<ul style="list-style-type: none"> ▪ Related to use of electrical equipment during maintenance ▪ Maintenance of electrical equipment ▪ Maintenance of non electrical equipment which has become live (such as during flooding or a lightning strike, or through human error)
2.3	Approach to live parts under high voltage	<ul style="list-style-type: none"> ▪ Related to use of cranes or similar lifting equipment during maintenance ▪ Maintenance of building parts close to overhead power lines ▪ Maintenance of electrical installations in buildings and stables

Hazard		Maintenance tasks
2.4	Thermal radiation or other thermal phenomena such as the projection of molten particles and chemical effects from short circuits, overloads, etc.	<ul style="list-style-type: none"> ▪ Related to use of electrical equipment during maintenance ▪ Maintenance of electrical equipment
3	Thermal hazards	
3.1	Burns, scalds and other injuries through contact with objects or materials with an extremely high or low temperature, from flames or explosions and also from radiation of heat sources	<ul style="list-style-type: none"> ▪ Related to use of welding or heating equipment during maintenance ▪ Maintenance of equipment with hot surfaces or hot operating fluids
3.2	Exposure to strong sunlight, high or low ambient temperature	<ul style="list-style-type: none"> ▪ Maintenance tasks performed outdoor, in heat or cold (maintenance of buildings, roofs, and all outside facilities)
4	Noise	
4.1	Sudden loud noise or constant exposure to a lot of noise, where health outcomes may be hearing loss, loss of balance, loss of awareness of events in the surrounding environment	<ul style="list-style-type: none"> ▪ Maintenance tasks performed in a noisy environment next to agricultural machinery and vehicles, equipment or powered tools ▪ Maintenance of farm buildings involving the use of noisy electrical tools such as circular saws or compressors
4.2	Accidents due to interference with speech communication and acoustic warning signals	<ul style="list-style-type: none"> ▪ Maintenance tasks performed in a noisy environment (for instance, use of machinery, equipment or powered tools, working in noisy premises or near a source of noise)
5	Vibration	
5.1.	Hand arm or whole body vibration	<ul style="list-style-type: none"> ▪ Related to use of various machinery, equipment and powered tools during maintenance
6	Hazards associated with materials and substances	
6.1	Hazards from contact with, or inhalation, of harmful fluids, gases, mists, fumes and dusts	<ul style="list-style-type: none"> ▪ Related to use of dangerous substances during maintenance ▪ Maintenance of equipment containing dangerous substances (machines and implements for plant protection and pest control) ▪ Maintenance tasks related to formation of dangerous substances (for instance, repair, cleaning, lubrication, greasing, welding)

Hazard		Maintenance tasks
		<ul style="list-style-type: none"> Maintenance, repair and cleaning of silos, grain bins, and slurry tanks
6.2	Fire or explosion hazard	<ul style="list-style-type: none"> Maintenance of facilities containing dangerous and explosive substances such as tanks, bins and silos Maintenance of equipment containing dangerous and explosive substances, such as fuel tanks Maintenance tasks related to formation of dangerous substances (for instance, repair, cleaning, lubrication, greasing, welding etc.) Maintenance of gas installation (for instance, gas stoves, gas heating systems)
6.3	Biological hazard	<ul style="list-style-type: none"> Animal care, maintenance of installations contaminated by biological agents Maintenance of slurry tanks Maintenance of ditches and sewage treatment Maintenance of liquid manure vehicles and tanks Waste disposal
7	Ergonomic Hazards	
7.1	Awkward postures	<ul style="list-style-type: none"> Related to long working in uncomfortable postures, handling loads, using excessive effort for unscrewing/screwing etc. when performing maintenance tasks such as Repair and maintenance of vehicles and equipment Maintenance of stables and buildings Maintenance of confined spaces such as silos, tanks and bins
7.2	Poorly designed tools	<ul style="list-style-type: none"> Inadequate consideration of hand–arm or foot–leg anatomy Related to use of various types of machinery, equipment and tools during maintenance Maintenance of machinery, movable installations and tools
7.3	Repetitive movements	<ul style="list-style-type: none"> Maintenance of machinery Maintenance and repair of buildings

Hazard		Maintenance tasks
		<ul style="list-style-type: none"> ▪ Cleaning tasks
8	Unexpected start-up, unexpected overrun/overspeed	
9	Working in confined spaces	
9.1	Exhaust gases/lack of oxygen	<ul style="list-style-type: none"> ▪ Maintenance of silos, bins and tanks ▪ Maintenance work in workshops and rooms without enough ventilation
9.2	Entrapment and suffocation	<ul style="list-style-type: none"> ▪ Maintenance of silos, grain bins and tanks
10	Slips, trips and falls	Slips, trips and falls may happen in all maintenance tasks
10.1	Working at height	<ul style="list-style-type: none"> ▪ Maintenance of buildings (using ladders, scaffolds) ▪ Maintenance of roofs and fragile roofs <ul style="list-style-type: none"> ▪ Maintenance of machinery
10.2	Slippery floor Uneven path	<ul style="list-style-type: none"> ▪ Maintenance work in workshop ▪ Maintenance of building and stables ▪ Maintenance of farmyards
10.3	Insufficient lighting	<ul style="list-style-type: none"> ▪ Maintenance of buildings and stables ▪ Maintenance of farmyard at night ▪ Maintenance tasks in workshops

Hazards may also arise due to the travel function of machinery (for instance, movement without all parts in a safe position); to the working position (such as insufficient visibility from the working position); to the control system (such as inadequate location of manual controls); to a third person (such as unauthorised start-up and use); or to insufficient instructions for operators.

Mental overload, fatigue, stress, lack of appropriate training, human error, unsafe behavior, neglecting the use of personal protective equipment, and the like, increase the risk of accidents during maintenance tasks.

7. The most common causes and contributory factors of accidents in agriculture

Data from the UK indicates that the three main causes of fatal injuries to workers in the agricultural sector over the ten years between 1999/2000 and 2008/2009 were:

- Transport - being struck by a moving vehicle (25% of all fatalities);
- Struck by moving or falling objects (16%);
- Falls from a height (16% of all fatalities, with the two most common causes being falling through fragile roofing materials and falling from moveable ladders).

Other common causes included:

- Asphyxiation or drowning (10%);
- Contact with machinery or the material being machined (9%);
- Injury by an animal (9%);
- Trapped by something collapsing or overturning (7%);
- Contact with electricity or an electrical discharge (3%);

The analysis of data by work activity shows that 15% of fatal accidents occurred during maintenance of machinery, buildings and land/estates including general maintenance⁵³.

Data from Belgium seem to show a similar picture to that of the UK figures, indicating that 75% of the accidents in agriculture are due to five main causes: livestock, falls from height, falls on the same level, machinery, and tractors. The point is also made that there is probably considerable underreporting of non-fatal accidents, due to the high proportion of self-employment in the sector⁵⁴.

An analysis of machinery accidents investigated by the UK's Health and Safety Executive (HSE) revealed the following key findings⁵⁵.

- Bad work practices were a factor in 75% of machinery accidents, indicating that lack of training and lack of knowledge are issues which need to be addressed.
- Maintaining machinery and clearing blockages were identified as two particularly hazardous activities.
- Machines were under power in over 60% of cases, although power was only required in one third of these.
- 29% of machines had poor guards.
- 10% of machines had not been properly maintained.
- 50% of all accident victims were caught on moving parts.

Other factors that have been identified as contributing to the hazardous nature of maintenance include:

- Lone working
- Lack of personal protective equipment
- Financial constraints, time pressure and fatigue
- Lack of awareness / training / information
- Subcontracting

7.1. Lone working

Farming often involves people working on their own. Not only does working alone increase the risk of an accident but it also means that if someone is seriously injured there is nobody to call for help.

7.1.1. Maintaining machinery (including impromptu repairs)

Maintenance activities, especially of machinery, tend to be carried out on an irregular or infrequent basis, for example when a blockage occurs or a vehicle breaks down. Where a sudden fault leads to unplanned maintenance, it may be undertaken by a lone worker simply because the fault arose while they were already working on their own. Should an accident then occur, its severity can be amplified owing to the fact that the injured party may not only be alone but also in a remote location. If they were not expected to return to the main farm until later in the day and are unable to call for help via a mobile phone or radio, no-one will initially miss them. They may not be found or treated until several hours after the accident occurred and this time lag can mean the difference between a serious injury and a fatal one.



Audrius Bagdonas - Entry to the EU-OSHA photo competition 2009 "What's your image of safety & health at work?"

7.1.2. Maintaining infrastructure (including planned or routine maintenance)

Maintenance of infrastructure, although more likely to be planned, may still involve lone working and, therefore, carry all the associated risks.

7.2. Lack of personal protective equipment

Depending on the maintenance task, protection may be required such as eye, ear and respiratory protection, safety footwear and appropriate gloves. Clothing is an important consideration since there is the potential for loose-fitting material to be dragged into machinery, pulling the operator in with it.

Lack of personal protective equipment (PPE) may cause injury or make it worse. Inappropriate or lack of PPE may also cause exposure to hazardous chemicals.

The maintenance of infrastructure often involves working at height, for example, when weatherproofing barn roofs. Farm workers often do not use safety harnesses to prevent them from falling through the roof or from it to the floor surface below.

7.3. Financial constraints, time pressure and fatigue

Financial constraints and considerations can determine the line of action a farmer will take when it comes to maintenance. For example, in order to save money, a farmer may carry out makeshift repairs using substandard components, tools and PPE, and may be reluctant to replace damaged guards or to employ professional service engineers.

Time pressure may play a role in whether or not a farm worker turns off a machine before carrying out maintenance work and can lead to the worker carrying out a temporary repair with inappropriate tools and equipment rather than spending time doing the job properly.

The demanding nature of agricultural work, combined with financial constraints and time pressure can lead to fatigue. Fatigue increases the risk of accidents as it may reduce among others in decision making ability, attention and vigilance, and increase reaction time. A few studies have shown this effect of fatigue to be similar to that of alcohol intoxication, also increasing the tendency for risk-taking in much the same way.

7.4. Lack of awareness / training / information

Many farm workers are self-taught. They often work alone with assistance from their family members and occasional help from employees at peak times. Many have only practical experience and no professional agricultural training. Maintenance work in agriculture involves multiple tasks that are, in many cases, seasonally determined and take place in a variety of locations from the workshop to the farmyard to the field). Agricultural workers involved in maintenance are expected to be able to switch from one type of equipment or tool to another, depending on the needs. This makes professional agricultural training very difficult and as a result most farmers are typically trained 'on-the-job'.

Lack of formal training can mean that the methods agricultural workers employ do not always follow best-practice. A common example is poor housekeeping where, for instance, workers do not clear up substances such as oil, water or debris, creating slip and trip hazards. Other examples include using the wrong tools or equipment for the job, and incorrect manual handling.

Confined spaces such as slurry tanks are hazardous places, but many agricultural workers enter them without a true appreciation of how dangerous they could prove to be.

7.5. Subcontracting

Contractors are often used for particularly hazardous jobs. They are not familiar with the hazards specific to an individual farm. Sub-contracted employees can also be asked to use machinery or to perform tasks with which they are unfamiliar. This problem also applies to casual workers moving from farm to farm in order to find work. Language barriers and lack of training can also be a problem in the case of migrant workers.

8. Preventive measures ⁵⁶

To ensure good safety and health standards, a systematic examination of all aspects of the work has to be undertaken to consider what could cause injury or harm, whether the hazards can be eliminated, and if not what preventive or protective measures need to be put in place to control the risks.

In the case of maintenance, which is generally a non-routine activity, the risk assessment needs to take account of changing circumstances and conditions and specific maintenance related hazards. A separate risk assessment should be done for every activity undertaken, and every location in which the activity takes place and the preventive measures should be based on this risk assessment.

- ❖ *Try to eliminate risks. If risks cannot be completely eliminated, try to minimise them by following safe work procedures.*
- ❖ *Follow safe work procedures (for instance, turn off the tractor or switch off and lock off the machine before any intervention).*
- ❖ *Use appropriate equipment, including personal protective equipment.*
- ❖ *Never do a job you are not competent to do.*

This section provides practical advice on how to eliminate or minimise risks related to maintenance work in agriculture and improve health and safety standards on farms.

8.1. Machinery maintenance

Before working with any machinery, you should carry out a basic check to make sure that the machinery is in good working order.

- Check for mechanical defects (paying particular attention to brakes).
- Check that guards are in place.
- Check that guards are not damaged.
- Damaged guards must be reported and repaired.
- Replace missing guards.
- Never use machines which are not properly maintained.

The legs of a lorry driver were amputated following a crush injury. The lorry driver was collecting beans from a farm. An employee at the farm had loaded the beans into the bucket of a telescopic handler to transport them to the waiting lorry. The bucket was **overloaded** and as it was raised the telehandler fell forward, trapping the lorry driver underneath the bucket.

Cause of accident: The telehandler's Safe Working Load Indicator (SWLI) which would have warned the driver that the load was too heavy was defective. The load chart in the cab was worn and extension markers on the boom of the telehandler were missing. The farm employee had not been trained in the safe use of the telehandler and had not seen or been shown the user manual or written instructions

Source and date: UK Health and Safety Executive (HSE) website (agriculture pages) <http://www.hse.gov.uk/agriculture/experience/training-maintenance.htm> (Last accessed 27 May 10)

Follow safe working procedures while maintaining and servicing machines.

- Stop the machine before any intervention.
- Make sure the machine has come to rest – remember run down time.
- Make the stop positive – remove the key from mobile equipment and lock switches on static equipment.
- Secure anything which could move or rotate – for instance, by using chocks, props.
- Remember that energy is stored in, for example, springs or hydraulics.
- Use the right tools for the job.
- Follow the manufacturer's instructions/procedures.
- When the job is finished, always replace the guards before restarting the machine.
- Check the machine before restarting.
- Don't do a job if you haven't been trained to do it!



Chains of a roller baler, safety signs in place - Courtesy of FIOH

Pay particular attention to guards.

- Do not remove guards unless the power to the machine is locked off or the key removed.
- Do not defeat guards (for instance, by overriding safety devices).
- Do not run the machine when the guards are removed.
- Replace all guards before making a test run or restarting the machine.

Blockages

Many accidents happen while clearing machine blockages – often because operators try to clear a blockage while the machine is still powered.

- Stop the machine: lock off power or remove the key.

- Make sure that the machine has come to a complete stop. Even if the power has been turned off, machine parts may continue to rotate.
- Secure moving parts by chocking to prevent movement.
- Never use your bare hands to clear a blockage, always use a tool.
- Remember, machines can suddenly move when a blockage is cleared.

Working under machines

When working under raised machines, jack stands should be used and correctly located.

Checking hydraulic systems

- Hydraulic fluid is under high pressure. Injection injuries may lead to surgery or amputation.
- Do not use your hands when checking for leaks.
- Release the pressure before working on the system.

8.2. General workshop safety



Courtesy of FIOH

- Keep the workshop clean and tidy.
- Make sure there are no slipping and tripping hazards.
- Make sure that floors, steps, stairs, passages and gangways are properly maintained and kept free from obstruction, such as trailing cables, tools sacks or pallets.
- Keep walking and working surfaces free from any substance, such as oil, that is likely to cause people to slip.
- Make sure there is enough space for storing tools and materials.
- Remove waste, dust, and old equipment.
- Keep welding gas bottles secured upright, and make sure they can be moved easily on a trolley when in use.

- Make sure battery charging is done in a well-ventilated area away from sources of ignition
- Avoid chlorinated solvents for degreasing. Use a less harmful product and put degreasing baths in well-ventilated areas.
- Make sure arc welding is done in a protected area so that others nearby are not affected
- Keep noise levels from plant, such as compressors, controlled;
- Keep tools in good working condition
- Make sure PPE is provided – eye protection for chiselling, grinding and welding work; respiratory protection for work that creates dust, if extraction cannot be provided; foot protection if there is a risk of things falling on to the feet.



Dovile Cizaitė - Entry to the EU-OSHA photo competition 2009

8.3. Working in confined spaces

Workers at farms may need to enter confined spaces, such as moist grain silos, slurry pits or storage bins and similar equipment, to carry out maintenance, inspection, cleaning and repair. Working in confined space can be very dangerous. Dangers can arise because of lack of oxygen, the presence of toxic gases, or because liquids or solids can suddenly fill the space. Poor visibility increases the risk of accidents in confined spaces



- Avoid entering confined spaces, perhaps by doing the work from outside

- If entry to a confined space is unavoidable, follow a safe system of work (ventilation, testing the atmosphere, adequate equipment)
- Put in place adequate emergency arrangements before the work starts. Someone should remain outside in case of emergency.
- Test the air before entering and monitor it during the work
- Use adequate equipment, such as personal protective equipment (for instance, respirators, harnesses and safety lines), lighting (approved for explosive atmospheres) and communications gear.

People who carry out maintenance in confined space should have adequate training and experience. Good design, including design of openings, covers and fasteners, can improve diagnosis and accessibility for maintenance operations.

8.4. Working at height

Maintenance of buildings, structures and machinery at farms may involve working at height. Falls often happen from roofs, vehicles, ladders, and unsuitable access equipment.

A grain storekeeper was examining a grain conveyor before starting up the machine. He stood at the conveyor belt's safety barrier to inspect the conveyor belt take-up. The storekeeper noticed that one of the take-up's speed-reducer belts was loose. Since the conveyor belt take-up was installed behind safety barriers, he decided to inspect it at close range. To access the device, he did not use an appropriate ladder but, instead climbed over the barrier and walked over boards towards the take-up. He slipped on crumbled grain on the boards and fell about half a metre onto the conveyor belt below, fracturing his skull.

Cause of accident: The victim did not follow the occupational safety and health requirement to use a special ladder when access to barrier-guarded parts is required for equipment inspection. Occupational safety and health requirements for grain store maintenance are set out in the company's policy document entitled Safety and health instruction for the grain storekeeper.

Source: Accident report, Lithuania, 2005

- Avoid working at height.
- If working at height cannot be avoided, use suitable access equipment or working platform, such as a mobile elevating work platform, a working platform on a forklift truck, or a tower scaffold.
- Put in place emergency rescue arrangements
- Make sure that tools and materials can be safely raised and lowered to and from the roof or working platform so that nothing can fall from or through it
- Fit appropriate warning signs to buildings that have fragile roofs, particularly at roof access points.
- Always assume that roofs are fragile unless you can confirm otherwise.
- Never go onto any part of a fragile roof without using platforms to support your weight and some means of reducing the consequences of a fall.
- Use fall-arrest safety equipment such as safety harnesses.

- Wear well-fitting, slip-resistant safety footwear when working on vehicles.

8.5. Using ladders

- Don't use a ladder if there is a safer way of doing the job, such as by using a scaffold or suitable working platform.
- Use ladders only when there is no safer alternative, and only for simple work of short duration (minutes not hours).
- Always make sure the ladder:
 - has a level and firm footing;
 - does not lean against a fragile surface (for instance, fibre cement gutters);
 - is secure and cannot slip.



Katja Wittig - Entry to the EU-OSHA photo competition 2009
"What's your image of safety & health at work?"

8.6. Personal protective equipment (PPE)

PPE is any equipment which protects the wearer from a health and safety risk. It includes respiratory protective equipment, eye and face protection, hearing protection, head protection (safety helmets), safety boots and gloves. Engineering controls and safe systems of work must always be considered

first. Provide and ensure the use of PPE **if you cannot eliminate the risk by engineering controls and safe systems of work, as a last resort.**

PPE has to be suitable for the work and conditions, and must give adequate protection.



Cecilia Ricciardi –
Entry to the EU-OSHA photo competition 2009 -
"What's your image of safety & health at work?"

For example, although a grain store encloses dust sources, some maintenance work may require access to places where dust levels may be high. In this case the only practical control of exposure may be PPE

9. Initiatives and campaigns to prevent harm to maintenance workers in agriculture

The first step in promoting the health and safety of agricultural workers is to raise the awareness of risks and hazards in their daily work routine. Different ways have been developed to inform and train agricultural workers, as it is difficult to reach employers and workers in this sector.

9.1. Campaigns

- Around 30,000 farmers across Britain have signed up to the Make the Promise campaign, which aims to highlight the unnecessary deaths and injuries that happen on farms every day.

9.2. Special events to inform and train workers

- The 'Farm Safety and Health Awareness Days' – SHADs – in the UK is an example of events that are designed to inform and train agricultural workers about the risks associated with their work. SHADs provide an excellent opportunity for agricultural workers to get information, practical experience and advice. Several demonstrations are delivered on health and safety hazards that are the most frequent cause of death and injury on farms, illustrating showing examples of good practice that any agricultural worker can use to deal with those hazards.
- PreventAgri is a project developed in Belgium to provide farmers and growers with safety information and advice on-site

9.3. Information and training courses tailored to the special needs of agricultural workers

- Special training courses for maintenance workers are provided by the Ministry of Education and Science and the Ministry of Environment in Lithuania.
- 'No second chance' is a step by step guide developed for farm workers in UK. Accident statistics were used to tailor the guide to the special needs and problems of the agricultural sector.
- 'PreVea' is a Portuguese program aimed at reducing accidents in all sectors with high accident rates, including farms, by assisting them in improving working conditions.
- The Farm Vehicle Health Check Scheme - Code of Practice' was developed by key agricultural and national bodies in the UK to help agricultural workers to comply with national legislation and regulations. It is freely available, easy to read and includes checklists.

9.4. Studies to support further initiatives

- The UK Health and Safety Executive (HSE) commissioned a study to evaluate the mechanical condition of agricultural vehicles. The study highlighted the need for further action and identified some of the problems relating to inspection of trailed equipment due to its diverse range.
- The National Commission on Safety and Health at Work in Spain established working groups consisting of experts covering different activities in agriculture. The aim of these groups is to

analyse accidents in agriculture and to assess the working situation in order to improve the health and safety of agricultural workers.

9.5. *Incentives/certificates to motivate workers*

- The Social Insurance Institution for Farmers in Austria motivates farmers to promote health and safety at farms by awarding safety certificates. This award is greatly appreciated in Austria.
- Similar incentives also exist in Germany: Safe Farm⁵⁷ awards, and a bonus system⁵⁸ for healthy life style.

10. Good practice examples

This section provides some good practice examples of how to improve safety and health in agriculture. Some examples are related to training, others to the design of work equipment and to the providing of maintenance services on site.

Due to the fact that family work and a great deal of self-employment predominates in the agricultural industry, one of the most challenging issues is how to reach agricultural workers and raise their safety and health awareness. One of the most effective ways is through training, and on-site training can increase its effectiveness.

10.1. *Safety training and consulting for farmers, Lithuania*

Organisations involved:

Ministry of Agriculture, agricultural training institutions, district municipalities, Lithuania

Introduction

The Centre of Leader programme and Farmers' Training Methodology of the Ministry of Agriculture organises and coordinates vocational training for agricultural workers.

Aims

The project aims to prepare and implement training courses for agricultural workers. Courses related to the reconstruction of various farm buildings, and to the safe use and maintenance of agricultural machinery are included in the project.

What was done, and how?

The Centre of Leader programme and Farmers' Training Methodology prepared programmes for the following basic training courses on maintenance:

- Installation and maintenance of dung-yards;
- Agricultural machinery and its use;
- Construction basics for farmers.

Occupational safety and health questions are included in each course.

For people who intend to start farming, a formal training course is suggested called Principles of Farming, 320 hours' duration and including 22 hours of theoretical lessons and 22 hours' practice, covering mechanisation and construction in agriculture. Shortened training courses for tractor drivers of various length have also been prepared and approved (280 hours, 340 hours, 360 hours). Each course involves 12 hours of separate theoretical and practical lessons on occupational safety, and theoretical and practical lessons on machinery exploitation that also include occupational safety and health questions. In order to consolidate the theoretical knowledge, 40 hours' practice is required.

All course programmes are approved by the Ministry of Agriculture and the Lithuanian Labour Market Training Authority. Training courses are organised by district municipalities and implemented by agricultural training institutions.

What was achieved?

The training courses generated great interest from agricultural workers and are run where the demand is high enough.

Success factors

Cooperation of the government, district municipalities and training institutions is the main success factor, and this ensures preparation and implementation of training courses for agricultural workers.

Transferability

The method of preparation and implementation of training courses could be used in various branches of economic activity.

References, resources:

Center of Leader programme and Farmers' Training Methodology of the Ministry of Agriculture

<http://www.zmmc.lt/lt/zemdirbiu-mokymai/mokymo-programos.html>

10.2. Maintaining and repairing horticultural glasshouses safely and efficiently, Netherlands

Organisations involved:

Glass Handling Technic Vof, Netherlands (Good Practice Award winner)

Description of the case:

In recent years the horticultural glasshouse sector has undergone tremendous development. The glasshouses are higher, the drainage channels on the roofs are extremely narrow, and the dimensions of the roof glass used have increased considerably. These developments have had a major influence on maintenance and repair work, which is associated with the risk of cuts, falls from height and physical strain.

Aims:

To eliminate the risks related to the maintenance and repair of glasshouses by developing an adequate repair system.

What was done, and how?

A new and safe method of repairing glass roofs was developed on the initiative of the glasshouse industry, trade organisations of gardeners, growers, fitters and contractors, and insurance companies and banks, and involving a number of companies with extensive experience in maintaining glasshouses. The Repair Shuttle, a system for carrying out repairs on the outside of glass roofs, was designed. It consists of a maintenance vehicle and a system for moving glass into position, with a mobile platform to move the repair vehicle from one location to another. Maintenance workers were closely involved in the development of the Repair Shuttle.

What was achieved

Injuries caused by falling glass are impossible when using the Repair Shuttle and the risk of falling has been almost completely eliminated. There has also been a marked reduction in the physical effort required of those carrying out repairs.

10.3. Certificate of Competence in Land-based Machine Maintenance, United Kingdom

Organisation involved:

City & Guilds National Proficiency Tests Council (NPTC), UK

Description of the case:

A qualification consisting of six units was developed in order to target the problem of dangerous maintenance activities in agriculture.

Aims

To increase the qualification and skills of workers in agriculture dealing with machine maintenance

What was done, and how?

Certificate of Competence in Land-based Machine Maintenance is a qualification course for agricultural workers who are in charge of the maintenance of agricultural or horticultural machinery. The six units cover:

1. Engine maintenance
2. Lubrication and hydraulic maintenance
3. Tyre safety and maintenance
4. Battery maintenance
5. Transmission, belt and chain maintenance
6. Cutting mechanism and tine maintenance

Upon successful completion of the course, learning outcomes include the application of key aspects of risk assessment relating to the maintenance and running of agricultural machinery.

What was achieved?

Over time, measurable results can be expected.

Transferability:

The course content is applicable to all countries.

10.4. Maintenance friendly design, Germany

Organisation involved

Manufacturers of agricultural machines and vehicles, Germany

Description of the case

Increasing maintenance safety by taking into account the maintainability of the machinery in the design phase

Aims

To make maintenance easier, to increase maintenance intervals, and to reduce the time needed to carry out maintenance.

What was done, and how?

Maintenance-friendly design means that all points for routine maintenance are easy to access, such as lubrication points, motor, and battery. A maintenance-friendly harvester has been developed to improve maintenance efficiency and safety. The number of lubrication points has been reduced and they are easy to access. The harvester has large maintenance flaps and a mechanical shaker that can easily be pulled out. The parts in the harvester are wear resistant and of high quality.

What was achieved: The routine maintenance of the harvester can be done very quickly because it is easy to access to all parts, and it also has long maintenance intervals.

10.5. Mobile repair workshop for agricultural machines and vehicles, Germany

Organisation involved

Mobile Werkstatt Allgäu GmbH, Germany

Description of the case

Modern agricultural machines and vehicles need increasingly professional service, requiring qualification and competence in maintenance and repair.

Aims

The aim of the mobile workshop is to offer a professional repair and maintenance service on site.

What was done and how

Modern agricultural machines and vehicles are increasingly complex and professional skills and competences are needed in their maintenance and repair. Farmers therefore developed a mobile repair shop for agricultural machines and vehicles. It has all the tools, testing and measuring equipment necessary for repair, and a team of qualified maintenance technicians to carry out repairs and services. The mobile repair shop is available on call.

What was achieved

The farmers get professional help for machinery maintenance on site and at any time.

11. Checklists and guidelines for safe maintenance in agriculture

11.1. Farm self-assessment software, United Kingdom	
Organisation and contact	Health and Safety Executive (HSE) http://www.hse.gov.uk/agriculture/assessment/index.htm
Short description	<p>Self-assessment software was piloted from September 2003 to January 2004. Following an evaluation which involved telephone interviews with farmers who had used the software, Version 2 was launched in 2005. A third version was launched in 2008.</p> <p>The flexibility of the software means the questions can be tailored to different farm types. The questions cover health and safety and advice</p> <p>Information is provided concerning the minimum standards necessary for compliance with the law.</p> <p>Further questions can be added into the tool, making it specific to individual farms.</p> <p>After working through the exercises, farmers are given a prioritised list is produced to remind them of relevant safety checks they should be carrying out.</p>
Keywords	<p>Checklist</p> <p>Accident prevention</p> <p>Risk assessments</p> <p>Awareness raising</p>
Comments	<p>Free tool – downloadable from the internet or order a free CD-Rom</p> <p>It was originally done as a pilot. Evaluation based on feedback from farmers has led to an improved version</p>

11.2. Concevoir, aménager votre atelier: 100 questions pour réussir, France	
Organisation and contact	Agricultural Workers' and Farmers' Mutual Benefit Fund (MSA) http://www.msa.fr/front/id/msafr/S1096561018128
Short description	This guide offers help and advice for farmers who have planned to install a workshop, to modify or to set-up the existing workshop.

	<p>It consists of four booklets based on simple but essential questions to support employees and employers regarding occupational health and safety (risk assessment):</p> <p>Booklet 1 with the workers and work organisation</p> <p>Booklet 2 deals with the environment and building,</p> <p>Booklet 3 deals with the workplace accommodations</p> <p>Booklet 4 deals with tools and accident prevention measures.</p> <p>The prevention in this guide is built on following principles:</p> <ol style="list-style-type: none"> 1. Avoiding risks; 2. Evaluating risks; 3. Preventing risks at source; 4. Adaptation of the work to the workers with a particular emphasis on the concept of workplaces and equipment; 5. Implementing technical state of the art best practices; 6. Substitution of hazardous activities; 7. Planning prevention methods taking into account work organisation, working conditions, social and environmental issues, implementation of preventive measures with priority to individual protective measures; 8. Providing appropriate information and instruction for workers.
Keywords	<p>Workshop</p> <p>Risk assessment</p> <p>Work organisation</p> <p>Planning a workshop</p>
Comments	<p>Workshops play an important role in agricultural companies for the repair and maintenance of machines, tractors, tools, and buildings. Broken machines and vehicles have to be repaired and maintained immediately.</p>

11.3. Guidelines for safe use of tractors and agricultural machinery, Lithuania	
Organisation and contact	<p>Ministry of Agriculture, Lithuanian University of Agriculture, district municipalities</p> <p>Traktorių ir žemės ūkio mašinų saugaus eksploatavimo rekomendacijos. – Lietuvos Respublikos žemės ūkio ministerija, Akademija, 2008. – 60 p</p>
Short description	<p>The project was funded by the Ministry of Agriculture and started in 2007</p>

	<p>The Department of Occupational Safety and Engineering Management of the Lithuanian University of Agriculture carried out research into the causes of work-related accidents occurring during the operation and maintenance of agricultural machinery and identified the most common mistakes made by agricultural machinery operators.</p> <p>Results of the research were summarised and used as the basis for guidelines on the safe use of tractors and agricultural machinery. Cooperation of state, municipal and research institutions ensured a high quality, well-presented and user-friendly publication.</p> <p>The guideline was delivered to district municipalities who in turn distributed them among farmers and agricultural enterprise employers.</p>
Keywords	<p>Tractor</p> <p>Agricultural machinery</p> <p>Maintenance</p> <p>Occupational safety and health</p>

11.4. Safety and health – maintenance in agriculture, Germany

Organisation and contact:	<p>Statutory accident insurance for agriculture, Agricultural Trade Association (LBG)</p> <p>Landwirtschaftlicher Sozialverband Franken und Oberbayern, http://www.lsv.de/fob/08service/service02/service021/service0211/index.html</p>
Short description	<p>This booklet gives information about safe maintenance practices in agriculture. It deals with:</p> <ul style="list-style-type: none"> ▪ Safe storage of tools; ▪ Safe material storage; ▪ Safe storage of flammable liquids; ▪ Ventilation; ▪ Inspection pits; ▪ Lifting devices; ▪ Battery charging stations; ▪ Safe use and maintenance of hand tools; ▪ Safe use and maintenance of electrical tools and machines; ▪ Personal protective equipment; ▪ Safe maintenance practice; ▪ Welding; ▪ Battery charging; ▪ Cleaning of parts; ▪ Paintwork.

Keywords	Safe maintenance Workshop
Comments	This booklet provides information at a glance. It is illustrated and easy to read and to understand

11.5. Checklist for safe working in farm buildings, with electrical installations, with agricultural machines and equipment, Austria

Organisation and contact:	Insurance Institution for Farmers (SVB) http://www.svb.at/portal27/portal/svbportal/channel_content/cmsWindow?p_t_abid=3&p_menuid=64049&action=2
Short description	<p>The Insurance Institution for Farmers provides different checklists for safety and health at farms. The checklists which are important for maintenance work are specifically designed for:</p> <ul style="list-style-type: none"> ▪ Buildings; ▪ Electrical installations; ▪ Machines and equipment. <p>They provide help to identify risks and hazards at workplaces in agriculture.</p> <p>The checklist for buildings includes workshops, high-rise silos, garages, storage and warehouses, manure pits, cold stores and others.</p> <p>The checklist for electrical installations includes electrical equipment, fixed installations, cable drums, extension cables and socket distributors, and overhead lines.</p> <p>The checklist for machines and equipment include vehicles, hand tools, tools and equipment for woodwork, metal work and welding, in agriculture, forestry, meat processing, distilleries and wineries.</p>
Keywords	Checklist Safe working Electrical installations Working in farm buildings Agricultural machines and equipment
Comments	The checklists provided by the Insurance Institution for Farmers (SVB) are applicable to maintenance tasks.

12. Conclusions

Maintenance in agriculture covers a wide range of tasks and is necessary for almost all work processes on farms: from maintenance of machines and vehicles, as well as maintenance of silos (storage), buildings, electrical installations and farmyards.

Although many accidents occur during maintenance, repair and cleaning activities, poor data about maintenance-related accidents and diseases is available.

This is partly because it is not easy to separate maintenance work from other agricultural activities and it is difficult to identify the number of workers involved specifically in maintenance, or to decide whether an accident is maintenance-related.

Agricultural work is also a varied and demanding job with a high workload, characterised by seasonal workload peaks (such as harvest times), a workload that is determined by weather conditions (such as the need to complete haymaking before a thunderstorm begins) and working in a wide variety of locations.

Occupational health and safety in agriculture differs from that for other workplaces because the farm is often also a home: farmers frequently work and live in the same location. This means that agriculture is one of the few industries in which entire families are at risk of occupational injury because of the presence of children under 14 and ageing persons over 65 on work sites.

Agricultural workers are more prone to accidents than most other occupations for a number of reasons, which include:

- Working with giant farm machines, vehicles, equipment;
- Multi-tasking without professional/adequate training;
- Seasonal workload;
- Long working hours and weekend work (six to seven days in a week).

Information and training are needed to reduce the number and severity of accidents and occupational diseases suffered by farmers and people working on farms. They are, however, difficult to reach because farms are frequently run as family businesses and there is a large number of self-employed in the sector. Farmers and their workers are accustomed to deciding for themselves how to carry out their work and deal with problems. They have a tendency to place a high level of trust in their own experience. This is particularly true for older farmers who tend to have a high level of confidence in their own abilities⁵⁹. It is therefore important to involve farmers and agricultural workers and to include their experience in any activities targeted at the improvement occupational safety and health.

In the transport sector, analysis of different health and safety campaigns has shown that drivers can be reached most effectively by means of⁶⁰:

- Face-to-face events;
- On-site training and advice;
- Campaign events involving their families.

This is likely to be equally valid for agricultural workers, and a successful strategy to reach this group may be to offer on-site training incorporating practical experiences so that training is relevant to everyday tasks and takes into account farmers' specific problems. Where possible, information and training should be provided by other farmers (accepted by the farmer), and given on-site where farmers feel comfortable. This approach was adopted the UK HSE for their SHAD events (refer to

9.3), and it has received positive feedback from the majority of agricultural workers who have participated in the scheme.

Events such as agricultural fairs or countrywomen's association meetings may provide a very good opportunity to reach the farmers and their families directly and to motivate them to participate in training by face-to-face promotion. It can be assumed that involving the family may help to reach and motivate more workers.

Seasonal and migrant workers in agriculture

Seasonal peaks in workload require more workers and this demand is often managed by hiring migrant workers or seasonal (casual) workers. According to the ILO, workers who are hired only seasonally and migrant workers suffer twice as many accidents as full-time agricultural workers. They often have no professional training and are not aware of the risks at the workplace. Lack of training, language barriers, not being familiar with the workplace and equipment are all factors which increase the risk of accidents⁶¹. It is extremely difficult to reach seasonal and migrant workers. For that reason it is as crucial to inform agricultural employers about their responsibilities towards all their workers, including seasonal and migrant workers, as it is to tell the workers about their rights and duties. Training and information materials in different languages and illustrated by pictures are very helpful.

12.1. Checklist for maintenance activities in agriculture, summarised from different checklists and publications^{62,63,64,65,66}

The checklist presented here is intended to promote safety awareness and encourage safe maintenance practices. It should serve as a reminder of things that can be done to enable people involved in maintenance work to work more safely.

Legislative requirements can vary between EU Member States and some countries may have specific regulations, such as laws or regulations regarding electrical work. It is important that you check your national legislation.

INFORMATION AND TRAINING

- Have your family members, employees, contractors and service providers read and understood the contents of your safety statement or risk assessment?
- Do the workers involved in maintenance work have all the information and skills necessary to ensure safety and health?
- Are workers properly trained to do the job?
- Are adequate tools and instructions provided for maintaining, adjusting, cleaning and unblocking machines?
- Are safe working practices devised and used?

FALLS ON THE FARM

- Are work areas cluttered?
- Are stairs, floors and working surfaces in good repair and as free as possible of mud, manure or snow?
- Do stairways have handrails?

- Are your workshops and other working areas clean and free of slipping and tripping hazard?
- Do you cover manholes and eliminate unnecessary ledges and uneven surfaces which could cause a trip or fall?
- Are ladders in good condition?
- Do you wear shoes or boots with anti-slip soles and heels?
- Is lighting at the workplace sufficient to perform tasks efficiently and accurately?

ROOF WORK

- Can you avoid going onto a roof by carrying out the repair safely from below?
- Do you make sure everyone is aware of the precautions to be followed when working at height?
- Is there a safe system for work at height (buildings, machinery, equipment, reservoirs, etc.)?
- Do you consider using competent construction contractors for all work at height?
- Do you work in a high place when the weather is windy, stormy or when you are ill, tired or taking strong medication?
- Are all ladders reliable, suitable for heavy work and are they safely stored when not in use?
- Are precautions taken to ensure ladder stability when using one to work at a height?
- Do you use roofing ladders on sloping roofs?
- Have safer alternatives to a ladder for access to heights been considered?
- Are you aware of the danger of walking on fragile materials such as asbestos, other fibre cement sheet or glass, and of the possibility that glass may have been painted over?
- On other fragile roofs, can you use suitable crawling boards, remembering never to use less than two boards if you have to move along the roof, and remembering to cover fragile skylights?
- On a flat roof, do you make sure that the edge is protected by a parapet and/or guard-rails, and that the roof is strong enough to support you?
- Where someone could fall over the edge of the roof, can you fit temporary guard-rails and toe boards? Or can you install anchorage points for safety belts, making sure that safety belts are always worn?

SCAFFOLDS AND PLATFORMS

- Are scaffolds erected by people with appropriate training and experience?
- Is a free-standing tower used out of doors any higher than three times its base?
- Is the elevated work platform sufficiently strong, with lockable access points, and fitted with sides or rails and toe boards on all four sides?
- Is the elevated work platform secured to the lifting machine and unable to tip or slip sideways or forwards?
- Is the elevated work platform fitted with a fail-safe lifting device that is designed to prevent collapse?

- Does the elevated work platform have controls to enable lifting and lowering from within the platform? Where these are not available, is a reliable system of communication used between the person in the platform and an alert and experienced operator?
- Are loaders with buckets, pallets or other makeshift equipment used as a work platform?

BUILDING DEMOLITION

- When buildings are in a poor state of repair, are they made safe with temporary supports before demolition can proceed?
- Is asbestos, or suspected asbestos, handled with expert guidance?

PORTABLE TOOLS (taken from UK HSE publication *Electricity: What you need to know*)

- Do you regularly inspect portable tools?
- Do you take suspect or faulty tools out of use and make sure they are not used until repaired by a competent person?
- Do you use electrical plugs and fittings that are robust and suitable for wet or dusty conditions?
- Do you regularly inspect the wiring and condition of all portable tools, including hired or borrowed tools?
- Do you make someone responsible for regularly operating the 'test' button on RCDs to ensure they work correctly?
- Do you unplug or isolate appliances before cleaning or adjusting?
- Do you provide enough socket outlets to keep the use of extension leads to a minimum?
- Do you use only insulated leads and undamaged electrodes on welding sets?

IN THE WORKSHOP

- Is your workshop organised so that everything has a designated place?
- Are walkways and working platforms clear of debris and free of grease and oil to reduce trips and falls?
- Are slippery surfaces due to oil or grease cleaned up immediately?
- Is there space of at least two metres around a machine?
- Are welding gas bottles secured upright, and when in use they can be moved easily on a trolley?
- Do you use only fireproof materials in workshop construction?
- Do you have solid walls to support tool boards and shelves, and to anchor benches?
- Do you have extra lighting for using some machine tools?
- Do you maintain a minimum temperature of 10 degrees Celsius in your workshop?
- Is the access to your workshop limited to people who work in it?
- Is battery charging done in a well-ventilated area away from sources of ignition such as welding flames or angle grinding?

- Do you avoid dangerous substances such as chlorinated solvents for degreasing?
- Do you put degreasing baths in well-ventilated areas?
- Is your workshop equipped with Ground Fault Circuit Interrupters to help prevent electrical shock?
- Is arc welding done in a protected area so that others nearby are not affected by the ultra-violet light and suffer 'arc-eye' as a result?
- Are noise levels from equipment and machines such as compressors controlled or sited in a separate closed area or outside?
- Is PPE provided? (eye protection for chiselling, grinding and welding work; respiratory protection for work that creates dust where extraction cannot be provided; foot protection where there is a risk of heavy objects falling onto the feet)
- Is a fully supplied first aid kit available?
- Do you carry a communication system to call for help in emergencies?

MACHINERY REPAIR

- Do you wear well-fitting overalls with zipped pockets, and safety boots with steel toe-caps when you are working near machinery?
- Do you ensure that long hair is tied back, and that jewelry or rings are not worn while operating machines?
- Do you use hand tools only for their intended purpose?
- Are hydraulically raised machines or parts prevented from descending by using mechanical devices such as stops or jacks when people work under them?
- Do you make sure that the equipment is turned off, all rotating parts have stopped moving, and safety locks are put in place when working on agricultural equipment?
- Do you always stop the machine and the tractor before attempting to carry out maintenance work or to free a blockage?
- Is stored energy, for instance, from compressed material, springs or hydraulics, released safely before you start work?
- Do you make sure that the machine is adequately supported before working under any machine part where you could get crushed?
- Do you isolate machines before any maintenance, cleaning or adjustment, recognising that it is not enough to just switch the machine off?
- Do you maintain fixed guards in good condition and refit after maintenance work?
- Are tractors, combines and machinery always stored well away from combustible materials, such as hay or straw, to minimise possible loss and injury?
- Do you always use a high-quality pressure gauge to make sure that a tyre is inflated correctly?
- Do you always use a safety cage or an airline extension when inflating a tyre fitted to a split rim?
- Do you have plant and safety devices regularly tested and examined?

VEHICLE REPAIR

- Do you make sure brakes are applied and wheels chocked?
- Do you always prop raised bodies, and do not rely on hydraulic systems for support?
- Do you start and run engines with brakes on and in neutral gear?
- Do you work under vehicles supported on jacks alone, or do you always use axle stands?
- Do you use a retriever/adaptor to drain petrol from tanks and lines in a safe place, away from drains, pits, openings in the ground and sources of ignition?
- Do you avoid burns from battery short circuits by disconnecting the battery before starting work?
- Do you ensure that you don't breathe in asbestos dust from brake and clutch linings and pads by using suitable protective equipment?
- Do you 'blow out' brakes, always using a vacuum or other dust-free method?
- Do you use asbestos brake lining as a replacement?

POWER-TAKE-OFF (PTO) SAFETY

- Are all workers wearing proper clothing and is long hair tied back or under a cap?
- Is the stub shaft shield available and in use when the PTO is not in operation?
- Is the PTO shielding damaged?
- Is the PTO shaft shield working properly?
- Is the PTO stopped when repairing the tractor?
- Do the power shaft guards comply with the requirements of European Standard CEN 1152?

FIRE SAFETY IN WORKPLACES

- Are all workers on your farm informed about flammable and explosive hazards?
- Are Material Safety Data Sheets available for all dangerous chemicals used?
- Are fire-hazard areas appropriately signed?
- Are all flammable materials stored safely (fire resting store, appropriate ventilation), well away from possible sources of ignition? Also, where possible, stored away from buildings and perimeter boundaries?
- Are compressed gas cylinders stored safely, away from flammable materials, preferably in the open air?
- Are flammable materials on the farm kept to a minimum?
- Are flammable liquid containers closed to stop vapour escaping? Where possible, are special safety containers which have self-closing lids and caps used?
- After each spell of work, do you check the area for smouldering matter or fire?
- Are there enough properly maintained extinguishers of the right type to deal promptly with small outbreaks of fire?
- Are escape routes marked and kept free from obstructions?

- Are the fire alarms working and can they be heard everywhere over normal background noise?
- Are fire-fighting and alarm drills carried out?
- Is fire-fighting training provided?
- Do all workers know how to raise the alarm and, if necessary, how to use the extinguishers?

ELECTRICITY

- Are electrical cords undamaged?
- Are plugs checked regularly to make sure they are properly earthed?
- Is equipment ever connected without using a plug top and/or socket?
- Do you buy plugs, sockets and fittings from a reputable supplier, checking that they are sufficiently robust and suitable for the wet or dusty areas likely to be found on farms?
- Do you ever use unsuitable domestic-type plugs and other accessories?
- Do you ever use any equipment which has a temporary electrical joint, whether taped and un-taped, on extension cables?
- Do you ever connect portable equipment, including infra-red lamps, to lighting circuits?
- Are improvised measures taken and repairs carried out in an amateur fashion?
- Are faulty equipment or faulty installations ever used?
- Are high voltages ever imposed on electric fences where the fence earth electrode is too close to the farm installation earth electrode?
- Do plugs and sockets have keyway coding to prevent voltage mismatch so that, for example, a yellow plug will not be connected to a blue socket?
- Are plugs and sockets appropriate to the voltage of the equipment used?
- Are plugs and sockets of sufficient capacity?
- Are all exposed metal parts, normally non-current-carrying, earthed?
- Are protective conductors for earthing of sufficient size and properly installed, protected and maintained?
- Are protective conductors, if broken or disconnected, immediately restored?
- Are earth electrodes made of base copper or hot-dipped galvanised rod or piping, at least 12mm in diameter, and driven vertically into the soil for a length of not less than 1.2m?
- Are your earthing circuits tested by a competent electrician?
- Do you operate or tip high machinery or equipment under or near overhead power lines?
- Do you/your family/your employees know how to free a victim from electrical contact and treat electrocution victims?

FUSES AND MINIATURE CIRCUIT-BREAKERS (MCBS)

- Do you use an MCB or a fuse to protect circuits from fault or overload?
- Do you use the correct type and rating?

- Do you ever replace an MCB with one of a larger size rather than investigating the cause of the fuse blowing or MCB tripping?
- Do you use a main fuse or circuit breaker to protect the total electrical installation?
- Do you label clearly for ease of identification?
- Do you use undervoltage protection to prevent the danger of machinery driven by an electric motor starting up automatically at the end of a power cut?

CONFINED SPACES

- Are confined spaces well ventilated?
- Are the doors to confined space in good repair?
- Are ladders in good condition and well-positioned?
- Is the power shut off and locked out before entering ?
- Are guards and shields in place?
- Is the air tested before entering and monitored during the work?
- Is monitoring equipment operational?
- Is adequate equipment, such as personal protective equipment (for instance, respirators, harnesses and safety lines), lighting (approved for explosive atmospheres) and communications gear provided and used?
- Do over ground slurry tanks and grain or meal bins have a secure working platform with protective rails and a safe means of access, such as a caged ladder?

FARM INFECTIONS

- Are there any sources of hazardous biological agents at your farm (plants, animals and substances of animal origin, organic dust, waste, etc.)?
- Has the risk of contact with hazardous biological agents been controlled or reduced?
- Is there a safe system of work with hazardous biological agents?
- Do you pay attention to personal hygiene?
- Do you cover all cuts and wounds?

SUN AND HEAT EXPOSURE

- Do you wear a wide-brimmed hat protect the neck, face and ears and to keep your head and face cool?
- Do you wear a light-colored shirt with long sleeves at all times?
- Do you wear sunscreen that has an SPF of at least 15?
- Do you carry water with you and do you drink frequently - every 15 minutes?
- Do you take frequent breaks in the shade or in a cool environment during the hottest times of the day?
- Do you adjust gradually to working in the heat over a period of 10-20 days?
- Do you know what to do if someone suffers from heat exhaustion or heat stroke?

13. References

- [1] Eurostat 'Farm structure, statistics explained', March 2010, available online at http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Farm_structure
- [2] European Commission 'A picture of EU agriculture: Europe's agriculture and the Common Agricultural Policy (CAP) – frequently asked questions', 2009, available online at http://ec.europa.eu/agriculture/faq/index_en.htm
- [3] Eurofound, *Factsheet: Agriculture and Fishing*, Luxembourg, Office for Official Publications of the European Communities, 2008
- [4] United Kingdom Health and Safety Executive 'About health and safety in agriculture', 2010, available at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [5] EU-OSHA 'FAQ section – Agriculture', undated, available online at <http://osha.europa.eu/en/faq/agricultural-occupational-diseases-and-accidents/what-are-the-most-common-accidents-in-agriculture>
- [6] UK Health and Safety Executive 'About health and safety in agriculture', 2010, available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [7] National Cancer Institute (UK), 'Agricultural health study', 2006, available online at <http://www.cancer.gov/cancertopics/factsheet/risk/ahs>
- [8] UK Health and Safety Executive, 'About health and safety in agriculture', available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [9] EU-OSHA, 'Sectors – Agriculture', available online at <http://osha.europa.eu/en/sector/agriculture>
- [10] Eurofound, *Factsheet: Agriculture and Fishing*, Luxembourg, Office for Official Publications of the European Communities, 2008
- [11] UK Health and Safety Executive, 'About health and safety in agriculture', available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [12] EU_OSHA 'Thematic report – Agriculture', not yet available online. (TCRO2007)
- [13] UK Health and Safety Executive 'About health and safety in agriculture', 2010, available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [14] Health and Safety Executive Northern Ireland, 'The guide to health and safety in agriculture', 2001, available online at http://www.healthandsafetyworksni.gov.uk/the_guide_to_health_and_safety_in_agriculture-2.pdf
- [15] Eurofound 'Employment and working conditions of migrant workers', 2007, p74, available online at <http://www.agri-migration.eu/docs/employment%20and%20work%20cond%20eurofund.pdf>
- [16] EU-OSHA 'FAQ section – Agriculture', undated, available online at <http://osha.europa.eu/en/faq/agricultural-occupational-diseases-and-accidents/what-are-the-most-common-accidents-in-agriculture>
- [17] UK Health and Safety Executive 'Fatal injuries in farming, forestry and agriculture', available online at <http://www.hse.gov.uk/agriculture/resources/fatal.htm>
- [18] EU-OSHA 'FAQ section – Agriculture', undated, available online at <http://osha.europa.eu/en/faq/agricultural-occupational-diseases-and-accidents/what-are-the-most-common-accidents-in-agriculture>
- [19] UK Health and Safety Executive 'Agriculture – Falls from height', undated, available online at <http://www.hse.gov.uk/agriculture/articles/falls-from-height.htm>

- [20] Council recommendation of 18 February 2003 concerning the improvement of the protection of the health and safety at work of self-employed workers
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003H0134:EN:HTML>
- [21] Landarbeitsrecht 1984, BGBl. Nr. 287/1984, in der Fassung von BGBl. I Nr. 29/2010, Retrieved 4 November 2010, from:
http://www.bmask.gv.at/cms/site/attachments/5/8/1/CH0650/CMS1272017449498/landarbeitsgesetz_1984.pdf
- [22] International Labour Organization, 'Safety and Health in Agriculture Convention, 2001', available online at <http://www.ilo.org/ilolex/cgi-lex/convde.pl?C184>
- [23] International Organization for Standardization (ISO), '65: Agriculture', available online at http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_ics_browse.htm?ICS1=65
- [24] Eurostat, *Eurostat Pocket Book 2009 Edition*, 'Agricultural statistics - Main results — 2007–08', available online at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-ED-09-001/EN/KS-ED-09-001-EN.PDF
- [25] Eurostat, *Population and Social Conditions: Data in focus 27/2008*, 'European Union Labour Force Survey-Annual results 2007', available online at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-08-027/EN/KS-QA-08-027-EN.PDF
- [26] Eurostat, *Eurostat Pocket Book 2009 Edition*, 'Agricultural statistics - Main results — 2007–08', available online at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-ED-09-001/EN/KS-ED-09-001-EN.PDF
- [27] Eurostat, *Eurostat Pocket Book 2009 Edition*, 'Agricultural statistics - Main results — 2007–08', available online at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-ED-09-001/EN/KS-ED-09-001-EN.PDF
- [28] EU-OSHA, 'Maintenance and occupational safety and health – A statistical picture, 2010', available at http://occupational_safety_and_health.europa.eu/en/publications/factsheets/en_90.pdf
- [29] UK Health and Safety Executive, 'Why fall for it? – Preventing falls in agriculture', available online at <http://www.hse.gov.uk/pubns/indg369.pdf>
- [30] Falls from height
<http://www.hse.gov.uk/agriculture/articles/falls-from-height.htm>
- [31] UK Health and Safety Executive, 'About health and safety in agriculture', available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [32] Fatal injuries to employees and self-employed workers in agriculture 1997/98 to 2006/07
<http://www.hse.gov.uk/agriculture/pdf/fatal0708.pdf>
- [33] Land- und Forstwirtschaftliche Berufsgenossenschaft Niederbayern/Oberpfalz und Schwaben, Bericht für mehr Arbeitssicherheit und besseren Gesundheitsschutz in der Land- und Forstwirtschaft 2008, 38 pp., available at http://www.lsv.de/nos/5publikationen/ujb/jb_2008.pdf (accessed 4 November 2010) Editor's note; this needs to be styled in accordance with OSHA style guide by a German speaker
- [34] Landwirtschaftliche Berufsgenossenschaft Niedersachsen Bremen, *Jahresbericht 2008*, 38 pp. http://www.lsv.de/nb/02aktuelles/01informationen/00allgemein/Jahresbericht_2008.pdf accessed 4 November 2010 Editor's note; this needs to be styled in accordance with OSHA style guide by a German speaker

- [35] Landwirtschaftliche Berufsgenossenschaft in Mittel- und Ostdeutschland, Präventionsbericht 2009, 37 pp. http://www.lsv.de/mod/010_praevention/praev_bericht_2009.pdf, accessed 4 November 2010 Editor's note; this needs to be styled in accordance with OSHA style guide by a German speaker
- [36] EU-OSHA, 'Maintenance and occupational safety and health – A statistical picture, 2010', available online at: <http://osha.europa.eu/en/publications/factsheets/90/view>
- [37] Federal Institute for Occupational Safety and Medicine (BauA, Germany), 'Arbeiten bei Instandhaltung sicherer machen', May 2010, available online at <http://www.baua.de/de/Presse/Pressemitteilungen/2010/05/pm032-10.html?nn=664262>
- [38] UK Health and Safety Executive, *Maintenance related incidents in topside systems*, Sudbury, HSE Books, 1996
- [39] Health and Safety Agency, Ireland 'Draft Code of Practice for Preventing Injury and Occupational Ill Health in Agriculture', 2006, available online at http://www.hsa.ie/eng/Publications_and_Forms/Publications/Agriculture_and_Forestry/Code_of_Practice_Agri_.pdf
- [40] National congress for the prevention of occupational hazards in the agricultural sector, 'Evaluación de riesgo en Almazaras', November 2002, Spain, available online at <http://congreso.agroprevencion.com/icomgreso/comunicaciones/nuriatorres.pdf>
- [41] Agsafe, 'Safely working around Agricultural Machinery', available online at http://www.agsafe.org/index.php?option=com_content&view=article&id=57
- [42] EU-OSHA, 'Safe maintenance – portable tools in construction', <http://osha.europa.eu/en/publications/e-facts/efact54/view>
- [43] Health and Safety Executive Northern Ireland, 'The Guide to Health and Safety in Agriculture, 2001', available online at: http://www.healthandsafetyworksni.gov.uk/the_guide_to_health_and_safety_in_agriculture-2.pdf
- [44] Agsafe, 'Safely working around agricultural machinery', available online at http://www.agsafe.org/index.php?option=com_content&view=article&id=57
- [45] Oregon State University College of Agricultural Sciences, *Health and Safety Training Manual*, 'Section 4 - Agricultural Safety Rules' available online at <http://agsci.oregonstate.edu/research/training-manual/4-1>
- [46] Oregon State University College of Agricultural Sciences, *Health and Safety Training Manual*, 'Section 4 - Agricultural Safety Rules' available online at <http://agsci.oregonstate.edu/research/training-manual/4-1>
- [47] Landwirtschaftliche Sozialversicherung Franken und Oberbayern, Bauen und Instandhalten, retrieved in June 2010, from <http://www.lsv.de/fob/04praevention/praev01/praev011/praev0114/index.html#txt1>
- [48] UK Health and Safety Executive, 'Why fall for it? – Preventing falls in agriculture', available online at <http://www.hse.gov.uk/pubns/indg369.pdf>
- [49] EU-OSHA, 'Agriculture: Fragile roof', 2010, available online at http://occupational_safety_and_health.europa.eu/en/campaigns/hw2010/get-it-right/wrong-right/fragile-roof
- [50] UK Health and Safety Executive, 'Electrical safety and you', available online at <http://www.hse.gov.uk/pubns/indg231.pdf>
- [51] Darby Joint Board of Supervisors, 'Drainage and ditch maintenance', 2009, available online at http://www.darbywatershed.com/Ditch_maintenance.htm
- [52] Kittredge, D.B., Parker, M., *Forestry Best Management Practices Manual*, Department of Environmental Protection, Massachusetts, 1999

- [53] UK Health and Safety Executive, 'About health and safety in agriculture', available online at <http://www.hse.gov.uk/agriculture/hsagriculture.htm>
- [54] SPF Emploi, Travail et Concertation sociale, Bonnes pratiques de sécurité dans le secteur agricole, 2009
- [55] UK Health and Safety Executive, 'No second chances: A farm machinery safety step-by-step guide', available online at <http://www.hse.gov.uk/pubns/indg241.pdf>
- [56] UK Health and Safety Executive, 'Farmwise: Your essential guide to health and safety in agriculture', available online at <http://www.hse.gov.uk/pubns/indg427.pdf>
- [57] Landwirtschaftliche Sozialversicherung LSV, LSV Gewinnspiel - Sicherer Betrieb 2010, retrieved 1 November 2010, from <http://www.lsv.de/fob/01aktuell/aktuell02/index.html> (last update off the website not mentioned)
- [58] Landwirtschaftliche Sozialversicherung LSV, Bonus für gesundheitsbewusstes Verhalten, retrieved 1 November 2010, from <http://www.lsv.de/fob/01aktuell/aktuell04/index.html> (last update off the website not mentioned)
- [59] University of Kentucky Southeast Center for Agricultural Health and Injury Prevention, 'Social marketing of agricultural safety and health to ageing and limited resource farmers: what are the implications?', 2005, available online at: http://www.agsafetyandhealthnet.org/AgeingFarmers_SocialMarketing.pdf
- [60] EU-OSHA, 'Delivering the message — Programmes, initiatives and opportunities to reach drivers and SMEs in the road transport sector – Available at: http://osha.europa.eu/en/publications/reports/campaigning-transport_TEWE10005ENN/view
- [61] Poschen.P., 'Forestry, a safe and healthy profession?', *Unasylva*, No. 172, Vol. 44, 1993/1, available online at: <http://www.fao.org/docrep/u8520e/u8520e03.htm>
- [62] Health and Safety Agency, Ireland, 'Draft Code of Practice for Preventing Injury and Occupational Ill Health in Agriculture', 2006, available online at http://www.hsa.ie/eng/Publications_and_Forms/Publications/Agriculture_and_Forestry/Code_of_Practice_Agri_.pdf
- [63] New Zealand Department of Labour, *Farm Health and Safety package*, 'Section 3.Managing Farm Hazards: Check Sheets', 1995, available online at: <http://www.occupational safety and health.dol.govt.nz/order/catalogue/archive/farmhse3.pdf>
- [64] The National Education Center for Agricultural Safety (NECAS), *Silo Gas Hazard and Falls on the Farmstead*, available online at: http://www.necasag.org/safety_brochures.php
- [65] Occupational safety & health service. Department of labour, New Zealand. '*Guidelines for the provision of safety, health and accommodation in agriculture*' — October 1996 <http://www.osh.dol.govt.nz/order/catalogue/pdf/agricu-g.pdf>
- [66] UK Health and Safety Executive, 'Electricity: what you need to know', available online at http://www.hse.gov.uk/agriculture/topics/electricity.htm#_Portable_equipment

The **European Agency for Safety and Health at Work (EU-OSHA)** contributes to making Europe a safer, healthier and more productive place to work. The Agency researches, develops, and distributes reliable, balanced, and impartial safety and health information and organises pan-European awareness raising campaigns.

Set up by the European Union in 1996 and based in Bilbao, Spain, the Agency brings together representatives from the European Commission, Member State governments, employers' and workers' organisations, as well as leading experts in each of the EU-27 Member States and beyond.

Gran Vía 33, 48009 Bilbao, Spain
Tel. +34 944794360
Fax +34 944794383
E-mail: information@osha.europa.eu

<http://osha.europa.eu>