

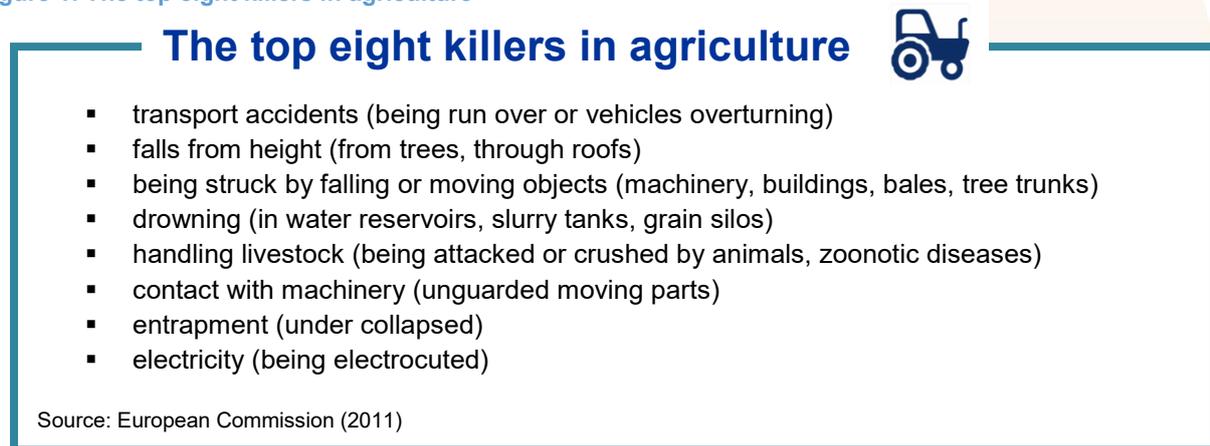
AGRICULTURE AND FORESTRY: A SECTOR WITH SERIOUS OCCUPATIONAL SAFETY AND HEALTH CHALLENGES

The agriculture and forestry sector is one of the most dangerous work sectors in Europe, with a high level of accidents affecting the sustainability and viability of these industries. Over the last 10 years, there has been an average of more than 500 registered deaths and more than 150,000 non-fatal accidents in the sector every year (Eurostat, 2019). Recent research indicates that there is significant under-reporting of both fatal and non-fatal accidents in the sector throughout Europe (Merisalu et al., 2019). In many instances, national reporting still places agriculture and forestry among the top sectors in terms of risk.

Traditional risks dominate the sector

Stubborn, long-standing risks (such as accidents related to tractors and machinery and animal handling) remain largely untackled in the sector. Figure 1 presents some of the most significant risks still dominating in agriculture.

Figure 1: The top eight killers in agriculture



Farm vehicles and machinery are a major source of workplace fatalities in agriculture.

In forestry, accidents occur with forwarders that are similar to those involving tractors and other forestry machines, such as skidders and tractor crawlers. They are associated with risks such as overturning, penetrating, being struck by vehicles, slips and trips, falling objects, etc. Safety and health hazards also include vibration and noise.

Tractors overturning remains a stubborn problem in several European countries. According to a recent Spanish study (Ramos et al., 2020), there have been 595 deaths caused by tractors overturning in the last 10 years, approximately one every week. Ninety-one per cent of these deaths involved tractors without a rollover protection structure (ROPS) or were cases where the system was not properly engaged. Fifty-four per cent of these deaths involved farmers over the age of 60.

Although **quad bikes or all-terrain vehicles (ATVs)** have been used in agriculture for the last 35 years, associated injuries among farmers and foresters are also of concern in a number of countries, with a number of high-profile fatal cases involving children. Solutions include improving driver competence, wearing a helmet and fitting a rollover/crush protection device.

Chainsaw use will continue to be the most significant risk in forestry for some time. In addition to cutting- and felling-related accidents, there are additional risks from vibration, noise, exhaust fumes and the use of fuel (burns and dangerous substances). A large number of older chainsaws are still in use, particularly in lower income countries, and there are also reports of non-approved or substandard machines being used, thus increasing risks. At the European level, there is a certification for professional use, developed by the European Chainsaw Certificate of the European Forestry and Environmental Skills Council (EFESC), which includes significant safety and health competency training.



Animal handling fatalities account for 13 % of all farming accidents in Ireland, demonstrating the high level of risk involved in handling strong and unpredictable animals (HSA, 2017). Measures to prevent such accidents include using adequate penning and treatment facilities, training farmers in work practices and breeding for docility.

Occupational health challenges

Farmer health is a key issue in the sector. COVID-19 and the related occupational safety and health (OSH) risks highlight the importance of health and working conditions in the sector, with the European Commission establishing guidelines to protect seasonal workers, including their safety and health (EC, 2020), and some European Union (EU) Member States establishing guidelines for the agricultural sector (OSHWiki, 2020). Over 60 % of agricultural workers report a limiting chronic disease and high levels of cardiovascular disease. According to an EU survey from 2012, workers from the agriculture sector were ranked higher than all other sectors in reporting that their work affected their health (Eurofound, 2012). Eurostat (2010) also reports that work-related health problems occur most often in the 'agriculture, hunting and forestry' sector, and in mining and quarrying; this is related to the fact that less favourable job characteristics, such as manual work and atypical working hours, are more prevalent in these sectors. A number of OSH risks affect farmers and foresters, including pesticide-related risks, musculoskeletal disorders, zoonotic diseases, skin cancer and stress and psychosocial issues. They are all major emerging and continuing risks for the sector that either have not been adequately managed or have been underestimated owing to a lack of accurate data over the years.

Eurostat reports that **musculoskeletal disorders (MSDs)** are the most serious work-related health problem in agriculture. Furthermore, MSDs appear to be more prevalent in agriculture than in any other sector (Eurostat, 2010). The European Working Conditions Survey reports that 57 % of agricultural workers report backache, 55 % upper limb pain and 46 % lower limb pain, farming being the occupation with the highest reporting levels (Eurofound, 2017). In the United Kingdom, for example, MSDs account for around half of all occupational illnesses in the sector (HSE, 2018). One study points to a lifetime prevalence of any form of MSD among farmers of 90.6 % (Osborne et al., 2012). Further action to reduce the impact of MSDs in agriculture is very much needed, as they will continue to be one of the major OSH challenges for the sector.



Pesticide-related risks are a major occupational challenge for the sector, as it is difficult to document the long-term effects on the health of agricultural workers (Tual et al., 2019). This is further complicated by the atypical nature of the agricultural workforce, which can include self-employed, seasonal or temporary workers and family members, and a lack of consistent occupational health monitoring in many instances. However, according to one significant French study, farmers are more likely to develop certain types of cancer than the rest of society owing to the use of pesticides (melanomas +25 % in men and +22 % in women; lymphomas +47 % in men and +55 % in women) (Monnereau et al., 2019). Prostate cancer is also twice as common among farmers than the general population; this has been linked to the banned substance lindane, an anti-parasite treatment used in livestock farming and arboriculture. Farmers re-entering sprayed areas has been identified by experts as one of the most likely influencing factors. In addition, findings by the French public health ministry point to a link between the use of pesticides and an increased incidence of Parkinson's disease among farmers (13 % higher than other professions) (Santé Publique France, 2019).

Farming, forestry and agriculture are also among the professions most affected by risks of **zoonotic diseases**, and are at risk of exposure to biological hazards. Ticks, insect bites and stings are a particular risk for foresters and forestry workers (Haeberle, 2020). Once again, there appears to be significant under-reporting of zoonotic diseases in the sector and a lack of health surveillance among farmers, particularly in small and family-run farms (Rabozzi et al., 2012).

Psychosocial risks, mental health and stress are often regarded by farmers as one of the biggest challenges facing the industry (Tasker, 2020). In addition, international and French data point to a higher suicide rate among farmers, being 20 % above the average national suicide rate of other professions in the case of French male farmers (Santé Publique France, 2017).

Farmers are subjected to multiple 'stressors', outlined in the following box.

Farmers' stress factors

Climate change — uncertainty and unpredictability: seasonality, weather, extreme weather, loss of crops, planning challenges.

Financial pressures: reduced influence of farmers in food value chain, weakened bargaining power against large retailers, decreasing prices for agricultural produce and lower profit margins.

Growing regulatory and administrative pressures: food safety, animal health and welfare, biotechnology and genetically modified organisms (GMOs), environmental standards, common agricultural policy (CAP) cross-compliance practices, CAP reform, EU 'Farm to Fork Strategy' (reduction of antibiotics and chemical pesticides and fertilisers, as well as improved animal welfare standards).

Increasing consumer and societal demands on food production: increasing demand for quality — increase in quality labels and systems (organic food, GMO-free, animal welfare and feed practices), reduction in meat consumption and production.

Farmer bashing and lack of attractiveness of farming: farmers held responsible for ethical and environmental aspects of farming, and working conditions considered unattractive to many young people.

Emerging public health and animal/plant disease/pest calamities: the impact of diseases on agro-food production (highlighted by COVID-19), emerging and re-emerging plant and animal-related diseases and pests, such as foot and mouth disease, African swine fever, *Xylella fastidiosa*, bark beetle in forests, as well as the impact of disease resistance, such as antimicrobial resistance in livestock.

Physical attacks and threats: more extreme environmental and animal welfare campaigners exerting increased pressure on farmers and foresters through intimidating publicity stunts and shame campaigns (farmer bashing) or even direct action or attacks, particularly in relation to intensive farming practices.

Rural crime: theft (sometimes with violence or threat of violence) of livestock, agricultural goods and machinery, feeling of insecurity, insurance costs and financial losses from theft.

A sector in transition

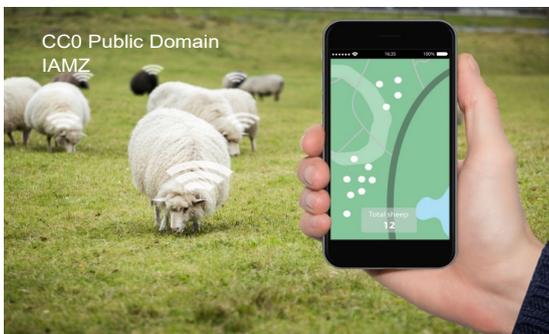
A number of trends affect the future of agriculture and forestry: smart farming (precision farming, digitalisation, etc.) and other technology developments; climate change and environmental issues; society and consumer trends; labour market and organisational issues; and international trade and economic considerations. Smart farming (digitalisation and the use of new technologies) has been the subject of much attention in the sector, being identified as one of the few innovations that could potentially bring about a paradigm shift in productivity and increased food production.

According to an Organisation for the Economic Co-operation and Development (OECD) survey, digital intensity¹ in the agriculture, forestry and fisheries sector is 'low', with agriculture being one of the least advanced of all sectors. Another report places the European agriculture sector as second from bottom of all industrial sectors in terms of digitalisation (Calvino et al., 2018; McKinsey Global Institute, 2016).

Resulting changes and OSH outcomes

Impact of new technologies

The uptake of smart farming and forestry practices varies significantly throughout the sector. One of the most important factors influencing uptake is farm size, coupled with income. Smart technology uptake also depends on sufficient access to broadband, but only 50 % of EU rural areas have adequate access to broadband. Each country's cultural context, level of education, generational challenges and sector-specific aspects all have a major influence on technology uptake within the EU. The digital divide is expected to increase the economic gap between small and large farms, and between countries. The digitalisation of agriculture has the potential to positively impact on the sector, offering numerous benefits: increased agricultural production, productivity and yields; reduction in production costs; improved food safety and quality through monitoring and traceability of the food chain; increased health and welfare of livestock; and improved environmental protection by allowing farmers to monitor plant health more effectively through sensors and to tackle plant diseases early on.



The digitalisation of agriculture will also result in some negative impacts: a reduction in jobs in the sector; a decline in competitiveness of small family farms; an increase in farmers' dependency on large multinationals and data and tech companies; the challenge of data security becoming a stress factor for farmers; the real safety and security threat of 'hacking' and interference; and ethical concerns and increased worker stress related to the monitoring of workforce performance and pace through new wearable technologies.

With regard to the impact of smart farming on OSH, smart farming and digitalisation will offer a number of potential improvements in workplace safety, for example by substituting capital for labour and minimising risk exposure; improving process control and safety systems management, improving machine and vehicle safety and livestock handling; enhancing prevention of MSDs; reducing exposure to pesticides and hazardous substances; improving farmers' work-life balance; improving safety and health through new smart monitoring technologies and devices; and improving safety in forestry through advances in wood harvesting technology and remote-controlled felling wedges.

However, the slow uptake of new technologies will not offer an immediate solution to the high accident and OSH challenges in the sector. The key challenge that remains is the effective adoption of such technology, which is associated with variables such as farm income and scale, farmer age and education, usability of specific technology, and industry and extension support for farmers.

New technologies also need to be evaluated to establish whether they bring any new or additional risks to the workplace, such as new ergonomic risks. In addition, there is a need to establish safety protocols and OSH evaluation/certification systems for smart farm technologies. The use of several artificial intelligence (AI) systems together could potentially 'clutter' the farm workplace with a number of interacting technologies and multiply risk. New smart technologies could also increase the number of lone workers in forestry and agriculture, and high levels of monotony and stress have been associated with the introduction of new automated technologies in farming and forestry in the past, such as automated milking systems.

As previously noted, stubborn, long-standing risks in the sector (such as accidents related to tractors and machinery, animal handling, slips, trips and falls, and chainsaw use) remain largely untackled. New digital



¹ Digital intensity is the extent to which a sector's digital transformation is shaped by firms' investments in 'digital' assets, as well as by changes in the way companies approach markets and interact with clients and suppliers, the (type of) human capital and skills needed, and the way production is organised.

technologies will bring only moderate solutions to these very serious risks, with more holistic approaches to safety and health often necessary to achieve improvements.

Genetic improvement is another technological development that has the potential to transform European agriculture. Improvements could include an increase in yields and crop quality, reducing the need for fertilisers; the production of crops that are more resistant to pests or diseases, thus reducing pesticide use; a reduction in the need for water or energy; and lower greenhouse gas emissions. The reduction in pesticide use through such genetic improvements in particular would provide a significant improvement in the safety and health of farmers and foresters. However, despite offering several potential benefits to European agriculture, the contribution of genetic breeding techniques, including new breeding technologies, to improving OSH is likely to be limited in the foreseeable future owing to legislative and regulatory uncertainty and a high level of societal reluctance towards such technologies.

Impact of climate change

Climate change will impact significantly on agricultural production. On the one hand, crop yields in northern Europe may increase as a result of higher temperatures, and certain crops may expand further north. On the other hand, drought and heat stress on plants and animals, changes in crop phenology and the extension of pests and plant diseases will impact negatively on production in other specific regions (WMO, 2020). Changing precipitation patterns will also affect the sector, further increasing irrigation needs. Farmers will need to modify the types of crops they grow, adapting cultivation and even animal breeds to suit the changing climatic conditions. In the forestry sector, technical measures such as more effective firebreaks and the consistent clearing of brushwood are necessary to mitigate the risks of forest fires, as extreme heat increases their likelihood. Intense heat, risk of fire and changing rainfall patterns could also influence the type of trees planted in new forests to foster species resistant to drought and high temperatures, or even less flammable species. Overall, climate change will contribute to unpredictability and increased risks for crops, animals and farmers.

Further environmental pressures affecting the agriculture sector include the EU's commitment to reduce pesticide use through the Pesticides Sustainable Use Directive² and the European Commission's general move towards integrated pest management (IPM)³ practices. These are reinforced by the ambitious pesticide reduction goals in the EU's Farm to Fork strategy (EC, 2020b), aiming to reduce the use of pesticides by 50 % before 2030.

Greenhouse gas and environmental regulation (e.g. on pesticides) will also add pressure on farmers and foresters, obliging them to modify farming practices to be more environmentally friendly and improve their environmental performance in general.



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OSH in the sector will also be significantly affected by climate change. Extreme weather events, heat and sun exposure, insect-borne diseases, dust and pesticide exposure, increased use of pesticides to combat insect growth and hazards specific to forestry (extreme danger in clearing up trees damaged by weather and insects) are just a few of the risks. Working practices in farming and forestry will need to be adapted to minimise the impact of these risks. Measures could include providing sufficient shade for workers; non-reflective surfaces to protect against light; sufficient ventilation and cooling systems; adapting working hours and planning work to avoid heat and extreme weather; and more hands-on monitoring of workers' conditions, such as hydration body

heat, etc. More predictive weather systems and health promotion programmes on exposure to sun and insect-borne diseases could also help.

Regarding IPM practices (see above), it will need to be assessed whether the decreased use of pesticides could impact on the occupational health of farmers and foresters, for example in the form of MSDs (through an increase in manual weeding) and insect-borne diseases (owing to an increase in the volume of insects).

² Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides.

³ https://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides/ipm_en

Impact of labour market trends

The high number of self-employed EU farmers and foresters will continue to dominate the OSH agenda in the sector. Most self-employed farmers and foresters are not covered by OSH legislation, are very rarely inspected, their occupational accidents and ill health are very rarely reported, they have limited access to limited OSH resources and training, and they lack resources to invest in new, safer machinery and farm infrastructure. However, these issues will not be solved until the true extent of occupational accidents and illness in the sector is accurately reported, as data on accidents concerning many categories of worker are excluded from official data. For example, data reporting to Eurostat is not mandatory for the self-employed and family members in the farming and forestry sector, as they are not considered 'employees'.

Moreover, the frequent use of seasonal and temporary workers in certain agricultural activities, such as horticulture, brings additional risks owing to insufficient training, lack of health surveillance and cultural/language barriers, and has involved undeclared work in some instances. The COVID-19 pandemic has highlighted the acuteness of some of these OSH challenges, as well as concerns about seasonal workers' living and working conditions in general'.



The major organisational challenges in the sector point to long-standing structural issues, related in particular to the labour market, farm organisation and profitability, which are all closely intertwined socioeconomic considerations. Many of the labour market deficiencies (high number of self-employed, temporary, seasonal, migrant, family and older workers) that impact on OSH conditions in the sector are difficult to remedy, while the overall issue of profitability for small farmers (low income and food price margins) still remains unsolved. The lack of decent revenue and income for small farmers undermines inclusive and preventive management approaches, such as effective OSH management practices, and limits investment in new safer technologies, OSH and other training and skills development, and decent salaries and working conditions for seasonal workers.

Trade and economy

Trade can also have impact on OSH aspects, particularly in the area of **biological agents and invasive species**. In the agriculture sector, global trade may propagate the movement of alien species, vectors and pests, which can have novel or emerging impacts on farmer and forester safety and health when species are allowed to take hold among the local fauna and flora. For example, the spread of ash dieback disease and elm bark beetle, which increase risks in forestry, have resulted from international timber and tree movements. In addition, agricultural organisations have raised concerns about weaker environmental and food safety standards for food imports, and **OSH and labour standards in third countries can be significantly lower**.

Conclusions

The EU Farm to Fork Strategy has recognised the importance of the EU Pillar of Social Rights and its application to the sector; however, there is still a major socioeconomic deficit in farming today, owing to the marginal profitability and income of many small farmers (who make up the majority of farmers), undermining the social sustainability of farming and forestry. This socioeconomic deficit affects the ability of the sector to fully embrace and manage growing trends, such as digitalisation, climate change, society pressures and labour market developments, and is very much linked to the poor level of OSH protection in the sector.

To successfully tackle future OSH challenges in the sector, the following existing structural and future OSH issues need to be addressed in a comprehensive and cohesive manner:

- lack of investment in and uptake of new smart and safer technologies and machinery;
- a growing number of climate change-related risks and occupational health challenges;
- lack of transparent, and wholly inaccurate, occupational accident and ill health reporting, particularly among the self-employed;
- no clear OSH regulatory framework to protect farmers and foresters and manage OSH, particularly for the self-employed;

- lack of a prevention culture (farmers and foresters tend to give low priority to OSH over other competing issues) and a strong skills and training deficit, particularly in OSH;
- widespread atypical, and sometimes irregular, employment practices;
- lack of appropriate labour inspection resources to combat undeclared work and ensure adequate protection for seasonal and migrant workers in the sector;
- insufficient farm income and quality management time to prioritise OSH issues, particularly among small and family farmers.

Recommendations and OSH measures

- Integrate OSH considerations into the development and design of new digital, precision and smart farming technologies (and adapt farm layouts).
- Adapt risk assessment techniques and safety and health training to new technologies such as robots and cobots, AI, etc.
- Actively encourage the use of technology to enhance safety through the use of smart sensors, the internet of things, AI and smart personal protective equipment (PPE);
- Adapt risk assessment, workplace design and awareness-raising initiatives to circumstances brought about by climate change; risk assessments in particular need to be responsive to sometimes extreme environmental conditions from one time of year to another.
- Improve the prevention culture in the sector in line with international initiatives, such as SACURIMA⁴ and the International Social Security Association's Vision Zero⁵, by establishing a specific sectoral prevention campaign or a European network for agriculture safety and health.
- Carry out specific OSH research on issues related to safety and health in agriculture (e.g. on quad bike safety, tractor overturns, safety-related technologies to prevent farm machinery accidents and smart PPE).

OSH-related policy recommendations

- Include more transparent, comprehensive and consistent data on the self-employed in Eurostat OSH reporting for forestry and agriculture, and tackle other OSH under-reporting challenges in the sector.
- Promote ratification into national law of the International Labour Organisation Convention on Agriculture (and its annex on the self-employed) to provide a minimum legal framework for governing safety and health in the sector, particularly concerning the self-employed.
- Include agricultural and forestry sector-related activities in the EU's 2021-2027 OSH strategic framework and work programmes of the European Agency for Safety and Health at Work (EU-OSHA).
- Include activities on OSH and well-being in agriculture and forestry in the Horizon Europe programme.
- Establish a link between EU OSH legislation and CAP conditionality (as the position of agricultural employers' and workers' organisations may differ on this point, this should be negotiated).
- Encourage Member States to include safety measures and training under Pillar II of their CAP plans (CAP Pillar II Article 15 of Regulation (EU) No 1305/2013⁶ includes training and advice on occupational safety standards or safety standards linked to the farm as eligible for funding when included in national CAP plans).
- Consider establishing a rebate scheme for retrofitting ROPS (and seatbelts), which have been used in the United States⁷ and Australia (Day et al., 2004), in view of the significant number of deaths and injuries resulting from the overturn of farm vehicles (in particular tractors and, in some countries, quads and similar vehicles).

⁴ <https://www.sacurima.eu/>

⁵ <http://visionzero.global/vision-zero-agricultural-sector>

⁶ Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005. OJ L 347, 20.12.2013, p. 487-548.

⁷ <https://www.ropstr4u.org/>

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