European Agency for Safety and Health at Work

Review on the future of Agriculture and Occupational Safety and Health (OSH)

Foresight on new and emerging risks in OSH

Executive summary

European Agency for Safety and Health at Work

Authors: Alun Jones – CIHEAM (International Centre for Advanced Agronomic Studies), Martina Jakob PhD – Leibniz Institute for Agricultural Engineering and Bioeconomy e.V. (ATB) (Sacurima member), John McNamara PhD – Teagasc (Irish Agriculture and Food Development Authority), with contributions from Dr Andrea Teutenberg (KWF).

Project management: Annick Starren, Emmanuelle Brun and Ioannis Anefantys (EU-OSHA) with support of Elisabetta de Cillis.

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Executive summary

This report has been commissioned by the European Agency for Safety and Health at Work (EU-OSHA) with the objectives of, first, examining future developments in the agriculture sector and, second, considering the implications of these trends for occupational safety and health (OSH).

A sector with serious occupational safety and health challenges

Agriculture and forestry are among the most dangerous professions in Europe, with a high level of accidents affecting the sustainability and viability of the sector. Over the last 10 years, there has been an average of over 500 registered deaths per year in the agriculture and forestry sector and over 150,000 non-fatal accidents (Eurostat, 2017). Recent research indicates that there is significant under-reporting of both fatal and non-fatal accidents in the agriculture and forestry sector throughout Europe (Merisalu et al., 2019). In many instances, national reporting also places agriculture and forestry top or almost top among sectors in terms of the level of risk.

Farmer health is a key issue in the sector. Coronavirus disease 2019 (COVID-19) and the related 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, C2020 4813 final) and some Member States establishing guidelines for the agricultural sector (OSH wiki 2020 on COVID-19). Over 60 % of agricultural workers report having a limiting chronic disease and high levels of cardiovascular disease (CVD). According to an EU survey from 2012, workers from the agriculture sector were more likely than those in any other sector to report that their work affected their health (Eurofound, 2012). Eurostat (2010) also reported that work-related health problems occur more often in the 'agriculture, hunting and forestry' sector along with in the mining and quarrying sector than in any other sector. This is related to the fact that some of the least favourable job characteristics, such as manual work and atypical working hours, are more prevalent in these sectors. This report summarises a number of OSH risks that affect farmers and foresters. Pesticide-related risks, musculoskeletal disorders (MSDs), zoonoses, skin cancer, and stress and psychosocial issues are all major emerging and continuing risks in the sector that either have not been adequately managed or have been underestimated owing to lack of accurate data over the years.

A sector in transition

This report reviews the future trends in agriculture and forestry, such as new technologies and climate change, identifies the resulting technological and organisational changes in the sector and defines the implications for OSH among farmers, foresters and other workers in this sector. The report looks at a number of potential emerging risks, particularly those that are the most imminent, namely those linked to digital evolution in the sector and resulting from climate change. The review aims to support policy-makers at European and national levels in their development of strategies, regulations, and enforcement, guidance and support measures.

The report examines a number of issues affecting the future of farming and forestry: smart farming (precision farming, digitalisation, etc.) and other technology developments; climate change and environmental issues; society and consumer trends; the 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 increase food production.

According to a survey conducted by the Organisation for Economic Co-operation and Development (OECD), digital intensity ([1]) in the agriculture, forestry and fisheries sector is 'low', with agriculture being

([1]) Digital intensity — how the extent of digital transformation in sectors 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, by the (type of) human capital and skills needed, and the way production is organised.

among nine other sectors in the least advanced quarter of all sectors. Another report even 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 occupational safety and health 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, average level of education, generational challenges and sector-specific aspects all have a major influence on technology uptake within the EU. It is expected that the digital divide will increase the economic gap between small and large farms and between countries. The digitalisation of agriculture has the potential to impact positively on the sector, offering numerous benefits: increased agricultural production, productivity and yields; reduced production costs; improved food safety and quality through the monitoring and traceability of the food chain; increased health and welfare of livestock; and improved environmental protection resulting from allowing farmers to monitor plant health more effectively through sensors and 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 the 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 the ethical concerns and increased worker stress related to the monitoring of workforce performance and pace through new wearable technologies.

Concerning 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; offering better prevention of MSDs; reducing exposure to pesticides and hazardous substances; improving the work-life balance of farmers; improving health and safety through new smart monitoring technologies and devices; and improving safety in the forestry sector through an increase in the use of wood harvesting technology and remote-controlled felling wedges.

However, because of the slow uptake of new technologies in general, this will not offer an immediate solution to the high level of accident and OSH challenges in the sector. A key challenge that remains is how to ensure the effective adoption of such technology. This is associated with variables such as farm income and scale, farmer age and education, the usability of specific technology, and industry and extension support (support services to farmers' business) for farmers.

New technologies also need to be evaluated to see if they bring any new or additional risks to the workplace, such as new ergonomic risks. There is a need to establish safety protocols and OSH evaluation/certification systems for smart farm technologies. In addition, 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 previously been associated with the introduction of new automated technologies in farming and forestry, such as automated milking systems (AMS).

Likewise, the stubborn long-standing risks in the sector (such as accidents related to tractors and other machinery and animal handling, slips, trips and falls, and chainsaw use) remain largely untackled. New digital technologies will only partly offer solutions to these very serious risks with often more holistic approaches to safety and health being 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; producing crops that are more resistant to pests or diseases (thus reducing pesticide use); and reducing the need for water or energy, resulting in less greenhouse gas (GHG) emissions.

The reduction in pesticide use through such genetic improvements would in particular result in a significant improvement in the safety and health of farmers and foresters. However, although 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 to accept 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 owing to 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). Changes in precipitation patterns will also affect the sector, with the need for irrigation increasing. 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 will be 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, with a shift towards species resistant to drought and high temperatures or even less-flammable tree species. Overall, climate change will contribute to unpredictability and increased risks for crops, animals and farmers.

Other environmental pressures affecting the agriculture sector include the EU's commitment to reducing pesticide use through its Pesticides Sustainable Use Directive ([2]) and the European Commission's general move towards integrated pest management (IPM) ([3]) practices. This has been reinforced by the ambitious pesticide reduction goals of the EU's farm to fork strategy ([4]), which aims to reduce the use of pesticides by 50 % before 2030.

GHG and environmental (e.g. pesticide-related) regulation will also add to pressure on farmers and foresters, obliging them to modify farming practices to make them more environmentally friendly and to improve their environmental performance in general.

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 specific forestry risks (extreme danger in clearing up damaged trees due to weather and insect damage) are just a few. Farm and forestry working practices will need to be adapted to minimise the impact of these occupational risks. Such measures could include providing sufficient shade for workers; using non-reflective surfaces to protect against light; providing sufficient ventilation and cooling systems; adapting working hours and planning work to avoid heat and extreme weather; and adopting a more hands-on approach to the monitoring of working conditions, such as workers' water consumption, body heat, etc. Other measures could also help, such as more predictive weather systems and health promotion programmes on exposure to sun and insect-borne diseases.

Concerning IPM practices (see above), we will need to assess whether or not the decreased use of pesticides could impact on the health of farmers and foresters, such as by increasing the risk of musculoskeletal disorders (MSD's) (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

([4]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — A farm to fork strategy for a fair, healthy and environmentally-friendly food system (COM(2020) 381 final).

Impact of labour market trends

Self-employed farmers, who form the majority of the agricultural workforce in most countries (Merisalu et al. 2019) will continue to dominate the OSH agenda in farming and forestry. Most self-employed farmers and foresters are not covered by OSH legislation and are very rarely inspected, and occupational accidents and ill health are very rarely reported among this group; they also have limited access to OSH resources and training and lack resources to invest in new, safer machinery and farm infrastructure. However, this problem will not be solved until the true extent of occupational accidents and illness in the sector is accurately reported, as accidents concerning many categories of worker are excluded from official data. For example, the reporting of data to Eurostat in the farming and forestry sector is not mandatory for the self-employed and family members, as they are not '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. COVID-19 has highlighted the acuteness of some of these OSH challenges, as well as the general situation concerning living and working conditions for seasonal workers.

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 socio-economic considerations. Many of the labour market deficiencies (high number of self-employed, temporary, seasonal, migrant, family and older workers) that impact on the OSH conditions in the sector are difficult to remedy, while overall profitability for small farmers (low income and food price margins) also remain 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) training and skills development and decent salaries and working conditions for seasonal workers.

Trade and economy

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

Conclusions

The EU farm to fork strategy recognises the importance of the EU Pillar of Social Rights and its application to the sector; however, there is still a major social-economic deficit in farming today, owing to the marginal profitability and low income for many small farmers (who make up the majority of farmers), undermining the social sustainability of farming and forestry. This socio-economic deficit affects the ability of the sector to fully embrace and manage growing trends, such as digitalisation, climate change, societal 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, it will be important to address existing, structural and future OSH issues in a comprehensive and cohesive manner, namely:

- the lack of investment in and uptake of new smart and safer technologies and machinery;
- the growing number of climate change-related risks and occupational health challenges;
- the lack of transparent and the wholly inaccurate occupational accident and ill health reporting in the sector, particularly for the self-employed;

- the fact that there is no clear OSH regulatory framework to protect farmers and foresters and manage OSH, particularly for the self-employed;
- the lack of a prevention culture (farmers and foresters tend to give low priority to OSH over other competing issues), as well as the considerable skills and training deficit, particularly in OSH;
- the existence of widespread atypical, and sometimes irregular, employment practices;
- the lack of appropriate labour inspection resources to combat undeclared work and ensure adequate protection of seasonal and migrant workers in the sector;
- the issue of insufficient farm income and quality management time with which to prioritise OSH issues, particularly for small and family farmers.

Recommendations on 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 health and safety training to account for new technologies, such as robots and cobots, AI;
- actively encourage the use of technology to enhance safety through the use of smart sensors, IoT, AI and smart PPE;adapt risk assessment, workplace design and awareness-raising initiatives to account for climate change circumstances, ensuring that risk assessments are in particular responsive to sometimes extreme environmental conditions that can change from one moment of the year to the next;
- improve the prevention culture in the sector, in line with international initiatives such as the Safety Culture and Risk Management in Agriculture (SACURIMA) ([5]) and International Social Security Association's (ISSA's) Vision Zero initiative, by establishing a specific sectoral prevention campaign or **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 safety, tractor over-turns, safety-related technologies to prevent farm machinery accidents and smart personal protective equipment (PPE).

OSH related policy recommendations:

- include 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 ILO Convention on Agriculture (and its Annex on the self-employed) in order to provide a minimum legal framework for governing safety and health in the sector, particularly concerning the self-employed;
- include agriculture and forestry sector-related activities in the 2021-2027 EU OSH strategy and EU-OSHA work programmes;
- include activities on OSH and well-being in agriculture and forestry in the Horizon Europe programme;
- establish a link between EU OSH legislation and common agricultural policy (CAP) conditionality (as the position of agricultural employers and workers organisations may differ on this point, this should be negotiated);

([5]) https://www.sacurima.eu/

- 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 1305/2013 ([6]) 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 retro-fitting roll-over protection (ROPS) systems (and seatbelts), which have been used in the United States ([7]) and Australia (Day et al., 2005) 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).

([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.ropsr4u.org/

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 1994 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 Member States and beyond.

European Agency for Safety and Health at Work

Santiago de Compostela 12, 5th floor
48003 Bilbao, Spain
Tel. +34 944358400
Fax +34 944358401
E-mail: information@osha.europa.eu

http://osha.europa.eu

Publications Office