Agronomy Research **23**(X), xxx–ccc, 2025
https://doi.org/10.15159/AR.25.080

Review of farm safety and health risk management tools

J. Leppälä[1,*] and R. Rautiainen[2]

[1]Natural Resources Institute Finland (Luke), Latokartanonkaari 9, FI00790 Helsinki, Finland
[2]University of Nebraska, Swanson Hall 3058, Omaha, 68198-5110 Nebraska, USA
[*]Correspondence: jarkko.leppala@luke.fi

Received: April 1st, 2025; Accepted: July 12th, 2025; Published: August 26th, 2025

Abstract: Risk management aims to prevent intolerable risks that could jeopardize a farm's goals and strategies. Many studies indicate that safety and health risks pose the greatest threats to farm continuity and business sustainability. Even a single injury to a key farmworker could have severe consequences for the whole farm.
The review employs content and thematic analysis to identify and classify safety and health risk management tools to assist farmers in their important risk management efforts. There is also an increasing need in EU to provide information about social conditionality requirements on farms, which include also terms in farm safety and health management.
A total of 62 risk management tools were analysed. The main typical risk factors in agriculture include machinery safety, livestock safety, chemical handling, and health hazards such as animal dust, gases, noise, biological hazards causing skin and respiratory diseases and ergonomic issues. This study is part of the Strengthening Farm Safety and Health Knowledge and Innovation Systems (SafeHabitus) project. The findings will contribute to the development of a farm safety and health risk management tool database in the SafeHabitus project.

Key words: agriculture, safety, health, risk management.

INTRODUCTION

Risk management is essential for every business. It involves planning, goal setting, and identifying the best strategies to achieve objectives in mitigating hazards and risks. A hazard is commonly understood as anything with the potential to cause harm, while a risk is typically defined as the combination of the likelihood of a harmful event occurring and the severity of the consequences of such event. A risk factor increases the probability of a harmful event. So, the hazard become a risk because of particular risk factor. Effective risk management ensures that intolerable risks do not threaten a company's business goals, production, or overall sustainability (Juran & Godfrey, 1998; COSO, 2004; Hardaker et al., 2004; Scarborough et al., 2009; Eastwood et al., 2010; Kirch, 2018; SFS-EN ISO 45001, 2023).

Safety and health risks are among critical threats to farm continuity and business sustainability is safety and health risk. A key reason for this vulnerability is that farms are typically micro-sized enterprises, often operated by just one or two individuals. In

turn, poor business sustainability on farms may cause farmers mental health problems and stress. In Europe, family farms dominate the agricultural sector, accounting for over 90% of all farms. This means that an injury to a key farmworker can have severe, even existential, consequences for the whole farm (Merisalu et al., 2019; Leppälä et al., 2021; Schuh et al., 2022). According to Goetsch (2015), the terms 'occupational safety and health' and 'occupational health and safety' have also been adopted in publications by the International Labour Organization (ILO). Occupational health generally refers to hazards linked to diseases and long-term health effects, whereas occupational safety pertains to hazards that can result in workplace accidents, injuries, or sudden acute conditions.

Management of safety and health risks is a critically important management task on a farm. EU statistics show that 1,500–2,000 in 100,000 agricultural workers experiences an injury each year and about one in ten thousand becomes a victim of an occupational fatality (Merisalu et al., 2019; Eurostat, 2024). Actual rates are estimated to be much higher due to exclusion of self-employed farmers and other difficulties in data collection (Reinvee, 2024). Farming has been number one in the frequency of serious injuries in many parts of the world, including the USA (ILO 2019; BLS, 2025). Farmers have reported that an injury, disease or burnout of a key person is a crucial risk to their farm (Leppälä et al., 2013). Starting 2025, the EU Common Agriculture Policy includes a social conditionality rule, which obliges employers on farms to provide certain social conditions for workers. The farm employers are links agricultural subsidies to providing acceptable conditions to employees including work contracts, proper personal protection equipment and safe working conditions (Laurent & Nguyen 2022; Vinci, 2024).

Governmental records, accident insurance systems, universities and research institutes, and extension service reports are primary sources for identifying potential safety and health risks in agriculture (Leppälä et al., 2021; Rautiainen et al., 2009; Frank et al., 2004). Research data and information from these sources form the foundation for developing farm safety and health risk management services and tools. Common safety issues on farms include physical injuries from working with machinery and animals, as well as slips, trips, and falls and frequent health issues include respiratory diseases, skin conditions, and musculoskeletal disorders caused by heavy, repetitive tasks. Key sources of farm injuries include human error, machinery, livestock, hand tools, and unsafe working surfaces (Donham & Thelin, 2006; Rautiainen et al., 2009; Karttunen, 2014; Leppälä, 2016; McNamara et al., 2020). Additionally, numerous studies have identified structural risk factors that predispose farmers to injuries. In a systematic review and meta-analysis, Jadhav et al. (2015; 2016) found 24 significant demographic, personal/behavioral, environmental, and safety-related risk factors for injury.

A management tool is defined as an aid used to accomplish a management task. While the term 'tool' traditionally refers to physical equipment or machinery, in corporate management, it encompasses software, analytical methods, policies, concepts, processes, communication networks, strategic planning tools, and knowledge management aids (Nedelko et al., 2012; Daft, 2015). Safety and health risk management tools help assess risks and integrate various accident prevention methods and services to reduce known risks and potential hazards (Reason, 1997; Suutarinen, 2004; Leppälä et al., 2012; McNamara, 2014). The hierarchy of controls is one framework for consideration of control measures with five levels ranked from most to least effective:

elimination, substitution, engineering controls, warnings, administrative controls, and personal protective equipment (PPE) (NIOSH, 2024). This framework can be applied to identifying effective strategies for mitigating risks and also for characterizing and evaluating safety and health risk management tools. The fundamental steps in risk management involve establishing the context and then identifying, analyzing, addressing, monitoring, and communicating risks (COSO, 2004; Aloini et al., 2007; Leppälä, 2016; ISO 31000). In the current review, safety and health risk management tools may include farm safety checklists, occupational health screening protocols, operating safety instructions, occupational accident insurance schemes, and safety education (McNamara, 2014; Leppälä, 2016).

This study is part of the Strengthening Farm Safety and Health Knowledge and Innovation Systems (SafeHabitus, 2023) project, which aims to raise awareness of agricultural safety and health management. The findings of this study support the development of a database that will assist farm managers in selecting effective risk management strategies and tools.

MATERIALS AND METHODS

The aim of this study was to review the existing literature related to farm safety and health risk management tools and services designed for identifying and managing safety and health risks on farms. The study employed a mixed methods approach, combining quantitative and qualitative methods, Content and thematic analyses were used to identify and characterize safety and health risk management tools for farms. Content analysis can be either quantitative or qualitative, categorizing data into numerical values, words, or thematic groups. It addresses key questions such as who, where, when, what, and why. Thematic analysis, on the other hand, focuses on qualitative aspects by identifying patterns and themes within the data (Elo & Kyngäs, 2008; Vaismoradi et al., 2013).

The searches for safety and health risk management literature were conducted using Google Advanced Search, Google Scholar, ScienceDirect, and Web of Science databases. The search keywords included farm, agriculture, health, safety, risk management, and tools, with a focus on EU and Western countries' agriculture and farming from 2014 to 2023. Each search engine functions slightly differently, and all search variables are detailed in Table 2. The latest update to the search was completed in May 2024. Only tools specifically designed for practical farm safety and health management were selected. Traditional peer-reviewed articles might not always cover the latest developments and practical tools or references. This was also the case in this study and this is why the grey literature - such as government reports, guidebooks, advisory service and technical paper links, was an important data source for this study.

To capture a broader range of practical tools, Google Advanced Search was used to identify farm occupational safety and health (OSH) risk management tools used by extension services. Since scientific articles on farm management tools used in extension and training are limited, this method helped gather relevant additional information. The search was concluded when no new farm safety risk management tools or services were found in the search results.

ANALYSIS

The content analysis method by Harwood & Garry (2003) was used to categorize the farm risk management tools for Table 2. The tools identified through the search were classified and quantified based on several factors, including: country of origin, organization type, years active, tool administration, tool level, number of users, registration requirements, annual user costs, safety or health risk factors handled and available tools and services. The data coding variables are defined and explained in Table 1, while the full list of included tools is provided in the appendix.

Table 1. Risk management tool classification variables and their definitions

Variable	Definition
Country of origin/use	The original country where the tool is established and used; country/ international (international organisation or many countries involved)
Service provider type	Public / Private / Both public and private organization
Years active	Years in active use: Under 10 years / 10–20 years / Over 20 years
Registration	User registration available or needed? Yes / No
Tool level	Comprehensive farm OSH tool / General farm safety / Specific risk tool
Administration	Administration by Farmer self/ Consultant / Both farmer and consultant
Number of users	N/A information not available / 0–1,000 / 1,000–10,000, Over 10,000 users
Annual user cost	N/A information not available, totally free, partly free/partly cost, cost under 100, cost 100–1,000, cost over 1,000 Euros
Safety or health risk issues (content analysis)	Risk areas covered in the farm health and safety management tool or program
Tools or services provided (thematic analysis)	Safety and health risk management features of services offered in the tool or program

The ChatGPT AI content generator was utilized to identify farm risk areas and tool features from the included OSH risk management tools for farms. The extracted results were added to a database for further content and thematic analysis of the types of risks addressed in the farm health and safety management tool or program is handling. The results found by the AI were checked by the authors on the tools' original web pages. The identified risk types were counted and added to the result table. Following this, a second round of queries was conducted using the AI ChatGPT search tool to identify, safety and health risk management features or services provided by the tool or program. Finally, thematic analysis was applied to define and categorize risk management themes within the safety and health risk management tools and services.

RESULTS

The volume of literature on general farm risk management with a focus on health and safety has significantly increased over the past ten years, as observed through a Google search (Fig. 1). In 2014, a search using the keywords ‘farm health and safety risk management’ and the exact phrase ‘farm risk management’ yielded 51 literature hits. By 2023, this number had grown to 242 hits. However, there are uncertainties with Google

searches, as the number of hits can fluctuate over time due to factors such as websites being closed or new ones opening. Additionally, marketing algorithms can influence search results, which should be taken into account when interpreting general Google search outcomes.

A Google search using the keywords 'farm agriculture health safety risk management tool' over the years 2014–2023 yielded 310,000 results. However, after sorting the results manually for relevance to Western-type farm or agriculture health and safety risk management, the relevant hits were limited to 170 items, and beyond that point, the relevant results diminished. In further analysis, only 50 of these items were actual safety and health risk management tools. The rest of the items were about food safety and risk management in other industries, which were excluded in the analysis.

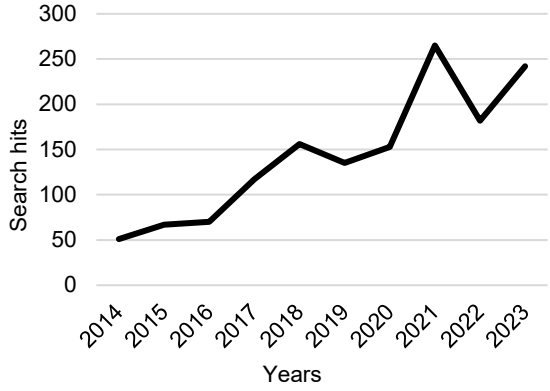

Figure 1. Numbers of farm health and safety and risk management literature in Google search in years 2014–2023.

Table 2. Literature search protocols and results

Source of the search[1]	Farm safety and health risk management search results (hits)	Included farm safety and health risk management tools
Google advanced search Keywords: farm, agriculture, health, safety, risk management, tool	190	50
Google scholar Keywords: farm, agriculture, health, safety, risk management, tool; exact phrase: farm risk management	24	4
Science Direct Keywords: farm, agriculture, health, safety, risk management, tool. 'Farm risk management' term in title, abstract or keywords. Focus on medical, agricultural and social subjects	125	4
Web of Science Keywords: farm, agriculture, health, safety, risk management, tools (All Fields) and Publication Years 2014–2023	34	4
Total	373	62

[1)] Search criteria: Years included: 2014–2023/ English language programs, guidance materials, reviews and research articles/

Words in the text/ EU/western country related agriculture/farming / Searches made during March 2024 and May 2024.

Further database searches yielded results described in the following. Google scholar had 24 hits of which 18 concerned farms and only four selected literature hits concerned farm safety and health risk management issues. Science Direct had 125 hits, but only 12 concerned farm safety and health risks and only four were about managing these risks. Web of Science had 34 hits of which only five concerned farming and four were about occupational safety and health (OSH) risk management in practice. Some literature items were included in more than one search but included in the results only once. Altogether there were 62 health and safety risk management tool literature items included in the final analysis (Table 2).

Content analysis of the tools

The identified tools were analyzed and characterized based on several variables including country, service provider type, years active, registration requirements, tool level, administration type, number of users, annual costs for a user, farm safety and health risk factors addressed, and the tools or services included for farm safety and health risk management (Table 3). The majority of the literature hits came from English-speaking countries, particularly from Australia, USA and international. However, there were also contributions from non-English-speaking countries, which have been active in farm safety and health risk management research and publishing their findings in English.

Table 3. Content analysis results of the tools. The counted observation results are in brackets

Variables	Results
Country of origin	Australia (18), USA (13), International (8), New Zealand (7), Ireland (6), Canada (4), UK (3), Finland (2), Italy (1), France (1), Norway (1)
Service provider type	Public (34), Private (23), Public/Private (6)
Years active	Under 10 years (41), 10–20 years (8), Over 20 years (14)
Registration available or needed	Yes (32), No (31)
Tool level	Comprehensive farm OSH tool (40), General farm safety (4), Specific risk tool (19)
Administration	Farmer self- administrated (35), Consultant administration (15), Both farmer and consultant administration (13)
Number of users	N/A (53), 0–1,000 (1), 1,000–10,000 (5), over 10,000 (4)
Annual cost to users, participants	N/A information not available (8), totally free (31), partly free/partly cost (5): cost under 100 (5), cost range 100–1,000 (11), cost range 500–5,000 Euros (6)
Farm safety and health risk types	Machinery handling (52), Chemical handling (49), Livestock handling (44), Environment conditions (+ noise) (37), Slips, trips and falls (+heights) (36), Contamination (35), Emergency situations (25), Mental stress (24), Worker safety (23), Confined spaces (+ suffocation) (23), Family and child safety (9), Safety culture, behavior (8) Ergonomics, MSD's and lifting (7), Biological hazards and diseases (6), Fire (5), Communication, motivation (5), Electric installation (4), Visitor safety (3)

In Australia and New Zealand, many OSH tools are based on a small number of original public farm safety risk management guidebooks. These tools have been widely disseminated through effective stakeholder collaboration, spreading across various geographic areas and nations in the region. The diversity of service providers in these countries has played a significant role in promoting the tools and ensuring their adaptation and adoption (Table 3).

Half of the service providers were from public organizations, which also contribute funding to maintain the services. Both public and private organizations offer paid services, meaning farmers are required to pay for some aspects of the OSH services. Public and private organizations can also collaborate to provide joint services. The general pattern observed is that comprehensive self-managed risk management tools are typically free to download, often provided by government, research organizations, or private associations. These tools are designed for broad use by farmers. However, more specific OSH risk management tools and advisory services tend to be paid services. The more specialized the professional advisory services, the higher the cost.

Additionally, half of the services require or offer the option for registration to create an account. This allows farmers to store and manage farm-specific information, and use a systematic approach for managing risks. Registration and own data account could help in risk identification, handling and monitoring and documenting risk management activities over time.

The search and analysis revealed that there is only in few cases where information is available about the user numbers and service costs of the tools and services (Table 3). Most public and private services do not disclose the number of their users. One possible reason for this lack of transparency is that it may take years for service providers to accumulate user data and nearly 70 percent of the OSH risk management services in this study have been active for less than 10 years. An exception is SafeAgSystems in Australia, which has over 9,000 participants using their tools and website. It is also known that in Ireland, under the Safety, Health, and Welfare at Work Act (2005), farmers are required to complete a Risk Assessment Document or a Safety Statement. Nearly half of the farmers completed the risk assessment document in its initial implementation phase, based on a survey (McNamara, 2008).

Farm work involves numerous hazards and risks that can lead to injuries or ill-health to farmers and farm workers. Most OSH risk management program or service providers offer comprehensive, multi-risk management tools and reviews tailored to farms. The primary goal of these farm safety and health risk management tools and services is to prevent and address the most critical work hazards and risks present on farms. More than half of the service providers focus on managing risks related to the safe handling of machinery, chemicals, and livestock. The handling of machinery includes vehicles such as tractors, quad bikes, and combines, as well as other vehicles and field machinery, each with its own set of safety risks. Livestock safety varies depending on the type of animal being handled - whether they are cows, horses, pigs, poultry, or sheep. Common safety risks across all livestock types include animal dust, biological safety risks, skin and respiratory diseases, and ergonomic safety issues. These risks are relevant to all forms of livestock production and must be addressed to ensure farm workers' health and safety.

Farm worker safety risks and emergency situations are critical issues in risk management, gaining increased attention due to the new social conditionality rules within the European Union Common Agricultural Policy (CAP). These rules aim to improve the overall safety and health standards on farms. Work environment risks are also a key focus, encompassing safety hazards related to changing working conditions, such as temperature fluctuations, cold and warm weather, rain, and the various hazards in the work environment causing slips, trips, falls, struck by, struck against, burn, over-exertion and other types of injuries.

Traditional environmental health hazards on farms include noise, dust, mold, and airborne gases. However, increasing concerns about contamination risks from biological hazards - including the spread of zoonoses - are also emerging. These environmental factors are influenced by policy, social relationships, and the economic challenges faced by farmers, contributing to growing levels of mental stress. Consequently, mental stress has increasingly become a common component of the safety and health management systems provided to farmers, helping them cope with the growing psychological pressures tied to environmental, economic, and social challenges.

Specific risks had fewer risk management tools available, as they may apply to smaller number of farms. While fire risks apply to practically all farms, only five OSH risk management tools specifically address and manage fire risks, likely due to the separation of OSH and fire prevention fields. Some important safety concerns seem to be underrepresented in many farm safety risk management tools. For example, ergonomic and musculoskeletal disorder risks, which are prevalent due to repetitive physical tasks, are not always highlighted. Similarly, issues like poor safety culture, communication problems, and family and child safety are often excluded from available tools. These gaps suggest that while some risks are widely recognized, others may be neglected in the development of safety and health management frameworks for farms, even though they can have significant long-term impacts on farmers' and farm workers' well-being.

Thematic analysis of tools and services

Table 4 presents the results of the thematic analysis of the farm safety and health risk management tools or services identified from the collected data. These tools and services found are listed and categorized according to their function within the standard risk management framework (ISO 31000). The initial phase of establishing a risk management system includes tools for defining safety policies, strategies, objectives, resources, workforce, and activities. This phase may also encompass crisis management or emergency planning. The manager's commitment to safety is crucial for setting the farm's safety policy and fostering a safety culture (Worksafe Australia, 2024). Grimbuhler & Viel (2019) applied the safety climate scale to vineyard farm workers, which assesses safety climate by evaluating the safety culture through the organization's personnel safety practices and health management, revealing their attitudes, behaviors, and perceptions towards safety.

Table 4. Analysis results of the farm safety and health risk management tools

Tools and services	Risk management tool categories
– Safety policy, strategy or safety culture/ climate defined – Mapping activities, inventory, resources, workforce – Safety/crises management plan, objectives and methods defined	Farm safety and health management framework and setting tools
– Risk source or consequence, statistical/ survey analysis – Workplace or job safety analysis, risk/ blind spots analysis factor reviews, identification, checklists, inspections – Customize risk check for own farm, near miss analysis – Safety culture/ behavioral analysis, defining exceptional vents – Family safety check, vulnerability/ disability/ workload check – Risk analysis, evaluation, risk matrices, prioritization	Safety and health risk assessment, review, analysis tools
– Reading instructions, guidebooks, standards, laws, protocols – Improving skills, training, education, learn from videos/podcasts – Taking care of maintenance, fixing, spare parts – Availability of PPE's, relevant working clothes, first aid kits – Using PPE's, safety guards, proper use of working clothes – Eliminating safety risks, task/site development/ management – Taking care of insurances, back up or alternative funding – Have social network, relief workers, contractors available to help – Knowledge of risk handling methods and good practices – Taking care of scheduling, time to do work in safe manner – Making emergency plans, emergency/first aid training – Arrange time for free time, hobbies and well-being, stress handling – Have support available: professional, advisory and peer support – Taking are of cleaning, proper storages, clear walkways/roads – Consider ergonomic development, wearable safety technology	Risk handling tools
– Making risk development/monitoring plan on a farm – Doing schedules, seasonal safety monitoring, checking dates/times – Using remote monitoring, reporting measures, alarms, sensors – Have own/family educational records, worker records – Following news, regulations, research, markets, prices – Organizing documents, terms and contracts, smart software use	Risk monitoring tools
– Taking care of worker, family member, social communication – Doing worker, family member, visitor safety orientation – Getting and handling feedback, have farm safety forum – Use of media channels, networking, stakeholder communication – Use of mobile phones, messages, photos, videos, information board, information cards, clear instructions, materials, comic pictures, visualising for kids and foreigners, multilingual instructions, drones, cloud services	Communication tools

Safety and health risk assessment tools include those for risk identification, review, analysis, and evaluation. These tools aim to identify and document safety and health hazards and their potential consequences. Farm risk management tools often rely on statistics and checklists to identify common sources of farm injuries, such as machinery, livestock, and falls, as well as health hazards like chemicals, dust, and poor ergonomics. Other tools in this category include workplace or job safety analyses, child safety checks, and safety culture evaluations. Tools to assess the probability of risks and prioritize them,

such as risk matrices, also fall under this category. Additionally, tools like customized risk check templates and near-miss reports can be used to identify risks and improve safety awareness (Agricultural Safety and Health Training Portal; Certified Safe Farm; Canada FarmSafe, U.S. Dairy Excellence).

Writing, using and keeping operating instructions available are simple and effective risk management activities for every farm. However, it is often overlooked when using new machinery or handling chemical products in a rush. Exceptional situations that arise during tasks are often the most dangerous, so farmers should be especially cautious in these moments. Being aware of risks costs little and can make a significant difference. Other risk management tools include acquiring new skills, performing machinery maintenance, using appropriate personal protective equipment (PPE), eliminating safety risks, improving ergonomics, task management, scheduling work activities, having relief workers, managing stress, and maintaining clean walkways and work areas (Pork SA: Farm Safety Self-Assessment Guide; U.S. Dairy Excellence; Safe Ag Systems; Farmsafe Australia; Safety Champion).

While some of these tools may seem easy and simple, they can save lives in certain situations, and many do not incur high costs. Regular cleaning is an inexpensive yet effective form of risk management. There is no clear data on which tools are most popular or effective, as the key is to identify the right tools for each individual farm, since every farm is unique. While insurance doesn't prevent risks, it helps enhance farm resilience and ensures continuity in case of an accident. Newer risk management tools, such as the OIRA tool, offer farm-tailored risk management software that provides more detailed information for farm management. Additionally, this data can be utilized within stakeholder networks and for worker social conditionality management (OIRA, 2024).

Risk monitoring involves tracking activities and establishing a few clear measures to follow. Monitoring helps determine whether actions have been completed or not. The challenge lies in identifying the key development areas, selecting the most effective measures to track, and getting the monitoring process started. The list of monitoring tasks should be derived from the risk identification, risk assessment phase, or even the farm safety policy and objectives. New technologies, such as video cameras, smart document handling systems, and sensors, can assist farmers in these monitoring and management tasks (Country Wide Insurance; National Institute of Food and Agriculture (NIFA); Penn State Safety and Health Management Services and Tools; Safety Revolution).

Finally, risk management on a farm cannot be fully effective without communication among farm personnel. It is crucial to communicate safety issues clearly and in the right language to the farm family and workers. Common communication challenges include using outdated or incorrect information and a lack of effective communication. Gathering feedback from others and properly addressing it is also vital. Additionally, maintaining communication with neighbors and other stakeholders can provide valuable information on safety concerns and help foster a community safety culture on farms. Farm safety is largely dependent on how communication is handled and which messaging tools are used for communication (Worksafe Australia; Farm Health and Safety Management Self-Assessment Table, NZ; Safety & Health Guide for Manitoba Farms; Evans & Heiberger, 2015; Durst et al., 2018; Kilanowski et al., 2020; Leppälä et al., 2021).

DISCUSSION

This study gives an overview about safety and health risk management tools provided for farmers. The goal was to give information about different safety and health risk management systems and programs to develop safety and health risk management database for a farmer and consulting use. The overview compiled the results of a literature review, content analysis, and thematic analysis of existing farm safety and health risk management tools at the farm level. Google, Google Scholar, Science Direct and Web of Science search engines were used to search for farm safety and health risk management tools. The scientific databases, including Google Scholar, provided only a few results related to the practical use of farm safety and health risk management tools. Using Google search is not ideal for scientific literature searches due to the vast number of search results. However, the relevant search hits for this study decreased quickly, with no additional matches found after 170 hits. A list of the included tools can be found in Appendix One.

The literature on farm health and safety risk management has increased in recent years. The results were analyzed using variables such as country, service provider type, years active, registration requirements, tool level, administration type, number of users, annual costs per user, farm safety and health risk factors, and the tools or services provided for farm safety and health risk management. The study's findings highlighted many valuable safety and health risk management tools, along with potential services to enhance farm safety risk management.

Half of the service providers and a significant portion of the funding came from public organizations. This is justified, as the direct and indirect costs of farm injuries and diseases are ultimately paid by society and the primary food sector (Rautiainen et al., 2006; Adhikari et al., 2025). Self-managed risk management tools provided for farmers are typically free to download from public organization services and sources, which are then disseminated through advisory services. While comprehensive and general risk tools and checklists are often free to use, specific OSH risk management tools and advisory services for farmers usually come with a fee, ranging from 50 to 5,000 euros. The more specialized the professional advisory services, the higher the cost.

There is limited information available regarding user numbers and service costs for the tools. However, it is known that in Ireland, under the Safety, Health and Welfare at Work Act (2005), farmers are required to complete a Risk Assessment Document or a Safety Statement. According to Mohammadrezaei et al. (2024), nearly 70 percent of Irish farmers use the Irish farm safety code risk assessment document. Some private companies, such as Australian SafeAgSystems, report having nearly 10,000 users. This disclosure may also serve as a marketing strategy to highlight the widespread use and effectiveness of their safety risk management tools and services. It is also worth noting that most OSH risk management service providers have relatively young services or tools.

The main typical risk factors in agriculture addressed by these tools and services include machinery safety, livestock safety, chemical handling, and health hazard exposures such as animal dust, gases, noise, biological safety risks, and ergonomic issues causing skin and respiratory diseases. Farm worker safety risks and emergency situations are gaining more attention, especially in the light of the new EU social conditionality under the Common Agricultural Policy (CAP) regulations for farm employers (Vinci, 2024).

Environmental challenges are also highlighted in safety management, particularly concerning harsh weather conditions, rain and water, temperature fluctuations, and the increasing need for chemicals. Climate change-related risks require future awareness in production, asset, building, and economic risk management. These factors can contribute to stress and mental health issues among farmers, in addition to the traditional environmental health hazards present on farms. However, issues such as ergonomic and musculoskeletal disorders, safety culture, communication, and child safety should still be prioritized in farm risk management development. A list of top safety and health risk topics in farm safety and health management tools and services were:

- Safety and health risks on handling cows and horses
- Safety and health risks in farm machinery and vehicle use or maintenance
- Poor ergonomic and other work environment issues
- Poor chemical safety and storage arrangements
- Slips, trips and falls
- Safety and health risks for farm workers, poor farm worker orientation and management
- Risks caused by stress, work strain and mental health
- Poor electricity installations or other farm building asset maintenance
- Safety and health risks for farm children and farm family
- Lack of safety management and safety culture.

Thematic analysis results indicated that some tools emphasized mapping out safety management settings such as safety policy, strategies, objectives, resources, workforce, and activities. In management literature, it is often noted that a clear vision and well-defined objectives make it easier for a manager to follow a strategy (Strategic Planning, 2009). Risk management is not solely about evaluating risks; it also involves identifying positive opportunities. In essence, effective risk management should distinguish between 'good' risks and 'bad' risks, ultimately leading to better decision-making and management choices (Rasmussen, 1997).

In complex world of risk management tools in general, checklists have proven their effectiveness and quality. When a farm is considered as a complex unit, safety checklists or other risk review tools support the farm manager's job by providing a structured way to evaluate potential risks. This study found that most farm safety management planning guides incorporate checklists, but worksite or job safety analyses are also valuable safety assessment tools.

However, one challenge is that comprehensive checklists have often become too lengthy, which can make them for farmers overwhelming or difficult to use effectively. By tailoring these checklists to the specific needs and conditions of their farm, farmers can create more focused, efficient, and practical tools for managing safety risks. Some services provide paid consultants for doing customized risk reviews for farms. Some tool services have also templates, which guide farmers to make their own customized checklist. To these templates farmers could add issue measures for some activities or workplaces, which they have found risky. However, they may still need advisory support to customize and follow the safety and health risks

Farmers sometimes may claim that managing safety risks is difficult and expensive, but that's not always the case. One of the simplest and most effective risk handling tools is often overlooked: read the manual instructions. For example, reading the guidelines

for using a chemical product or taking the time to understand the safety features of new machinery can prevent accidents. Other simple practices, like not jumping from a tractor or being extra cautious when something unexpected happens, can also make a huge difference. These actions are often forgotten in the rush to get things done, but taking the time to read the instructions or plan ahead is often the quickest and most effective way to get the job done. The best part is, it doesn't cost anything - just a bit of attention and mindfulness before starting a task. And it does not cost much but just thinking.

Risk management in factories focuses on controlling workplace safety conditions (Reason, 1997). However, this becomes more challenging on a farm, where the work environment is constantly changing - whether due to unpredictable outdoor conditions in the fields or the behavior of livestock inside the animal house. Unlike a factory setting, where the environment is more controlled, managing farm safety culture requires a different approach (Leppälä, 2016; Leppälä et al., 2021). If it's not possible to control every factor, the next best solution is to establish clear routines and procedures for how tasks are done. By creating structured, reliable routines, farmers can mitigate the risks posed by these unpredictable elements and ensure safety on the farm, even when conditions are beyond their control.

Following few essential risk measures on a farm serves as a monitoring tool. The advantage of monitoring is that if you have a clear schedule, protocol or checklist to follow, you are more likely to accomplish your safety goals. The biggest challenge, however, is getting started and identifying the areas that need development. The list of monitoring tasks should stem from the farm's management safety policy, objectives, and risk assessment findings. By having these structured guidelines in place, farmers can more effectively track and address safety issues over time.

Effective communication is crucial for creating an organized and safe farm environment. The exchange of information differs between stakeholders, media representatives, and internal farm communications. From a communication perspective, a modern farm should be viewed as an organization. One common mistake made by managers is listening to worker feedback but failing to act on it. This can lead to frustration and missed opportunities for improvement.

The development of new digital tools and online services has greatly enhanced risk management in various industries, including agriculture. Online software services are becoming more prevalent and efficient, enabling a broader range of risks and issues to be addressed in a more organized manner. These intelligent programs can process larger amounts of risk management information, making the system more efficient. The use of media communication tools, such as videos and audio products, could also play a greater role in farm safety risk management, offering new and diverse ways to educate and raise awareness. Using various methods for learning is expected to be beneficial for farmers' learning and knowledge development.

However, despite the growth of technological innovation, the basic need for strong communication skills and regular feedback remains essential between farm workers, farmers, and the broader farm community. The new technologies should be integrated into traditional farm management tasks. For instance, carrying a fully charged mobile phone in the field work or forest should be a standard practice for every farmer and farm worker, but also not to forget the old practices like keeping bottle of drinking water and a first aid kit on the tractor. Another future challenge among farmers is to cope with the stress caused by work activities, market, policy and environmental changes. The

numerous shifts occurring in agriculture may increase the risk of burnout, particularly given the demanding nature of farmers' work (O'Shaughnessy et al., 2022; Geidelina-Lugovska & Cekuls, 2025). Added to this, human behavioral factors, work ability, skills and safety culture development on farms are coming more and more important in the future (Leppälä et al., 2021; Lezdkalne, 2025; Mattila et al. 2025).

CONCLUSIONS

The development of farm safety and health risk management has progressed significantly in recent years. However, these tools and activities often do not become part of the everyday routine for every farmer and farm worker unless there is systematic support for these management practices among farmers and their stakeholders. The key questions driving the background of farm safety and health risk management still remain:

1. How are farm safety and safety culture developing (e.g., are accidents decreasing)?
2. How are farmers' skills in safety and health management improving?
3. How can farmers effectively use safety and health management tools (including new digital tools and devices) to enhance farm safety?

If a safety guide, personal protective equipment (PPE), safety device, policy rule, software, video, or any other safety tool prevents even one injury or saves a single life, the return on investment has been paid back. The value of these tools is not just in their initial cost, but in the long-term benefits they bring by reducing accidents, injuries, and fatalities, thereby ensuring safer working conditions for farm workers and improving overall farm safety.

REFERENCES

Adhikari, S., Wilson, F. & Rautiainen, R. 2024. Cost of agricultural injuries in the United States: Estimates based on surveillance, insurance, and government statistics. *Am. J. Ind. Med*. **67**, 801–812. doi:10.1002/ajim.23628

Aloini, D., Dulmin, R. & Mininno, V. 2007. Risk management in ERP project introduction: Review of the literatuure. *Information & Management* **44**, 547–567. doi: 10.1016/j.im.2007.05.004

BLS. Census of Fatal Occupational Injuries. 2025. Number and rate of fatal work injuries, by private industry sector, 2023. Available at: https://www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm (Accessed May 25, 2025).

Cecchini, M., Bedini, R., Mosetti, D., Marino, S. & Stasi, S. 2018. Safety Knowledge and Changing Behavior in Agricultural Workers: an Assessment Model Applied in Central Italy. *Safety and Health at work* **9**(2), 125–238. doi.org/10.1016/j.shaw.2017.07.009.

Cook, A., Fry, R., Desai, Y., Swindall, R., Boyle, J., Wadle, C., Casanova, V., Cloonan, M., Rogers, F., Horst, M., Morgan, M. & Norwood, S. 2022. Agricultural Injury Surveillance Using a Regional Trauma Registry. *J. Surg Res*. **273**(May), 181–191. doi: 10.1016/j.jss.2021.11.018

COSO. 2004. Enterprise risk management – Integrated framework. Application Techniques. Committee of sponsoring Organizations of the Treadway Commission. September 2004. Durham. USA, 105 pp.

Daft, R. 2015. *Management*. South-Western College Pub; 12 edition, 800 pp.

Donham, K.J. & Thelin, A. (ed.) 2006. *Agricultural Medicine: Occupational and Environmental Health for the health professions*. Blackwell. 429 pp.

Durst, PT., Moore, S.J., Ritter, C. & Barkema, HW. 2018. Evaluation by employees of employee management on large US dairy farms. *J. Dairy Sci*. **101**(8), 7450–7462. doi: 10.3168/jds.2018-14592

Eastwood, R., Lipton, M. & Newell, A. 2010. *Farm size*. In: R. Evenson and P. Pingali (eds.) *Handbook of Agricultural Economics IV*, Oxford, UK: North-Holland, Elsevier, pp. 3323–3397.

Elo, S. & Kyngäs, H. 2008. The qualitative content analysis process. *Journal of Advanced Nursing* **62**(1), 107–115. doi: 10.1111/j.1365-2648.2007.04569.x

Eurostat. 2024. Statistics. Published in internet: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes

EU 2019/1152. 2019. Directive (EU) 2019/1152 on transparent and predictable working conditions in the European Union. The European Parliament and the Council of the European Union.

Evans, J. & Heiberger, S. 2015. Fitting Farm Safety into Risk Communications Teaching, Research and Practice. *Journal of Applied Communications* **99**(3), doi: 10.4148/1051-0834.1060.

Frank, A., McKnight, R., Kirkhorn, S. & Gunderson, P. 2004. *Annu. Rev. Public Health* 2004. **25**:225–45. doi: 10.1146/annurev.publhealth.25.101802.123007

Geidelina-Lugovska, M. & Cekuls, A. 2025. Organizational identification, workaholism, and burnout: a cross-sectional study of age, gender, tenure, and work arrangements. *Agronomy Research* **23**(S1), 45–56, 2025. https://doi.org/10.15159/AR.25.016

Goetsch, D.L. 2015. *Occupational Safety and Health for Technologists, Engineers, and Managers*. 8th Edition, Pearson Education Limited, Harlow,715 pp.

Grimbuhler, S. & Viel, J.F. 2019. Development and psychometric evaluation of a safety climate scale for vineyards. *Environ Res*. **172**(May), 522–528. doi: 10.1016/j.envres.2019.03.007

Harwood, T. & Garry, T. 2003. An Overview of Content Analysis. *The Marketing Review* **3**(4), 479–498.

Hardaker, J.B., Huirne, R.B.M., Anderson, J.R. & Lien, G. 2004. *Coping with Risk in Agriculture*. Cabi Publishing. UK, 332 pp.

Health & Welfare at Work Act 2005. https://www.hsa.ie/eng/Topics/Managing_Health_and_Safety/Safety,_Health_and_Welfare_at_Work_Act_2005/ HSA

ILO. 2019. Statistics and databases. https://www.ilo.org/global/statistics-and-databases/lang--en/index.htm.

ISO 31000. 2018. Risk management – Principles and Guidelines. 2018-11-15.

Jadhav, R., Achutan, C., Haynatzki, G., Rajaram, S., & Rautiainen, R. 2015. Risk Factors for Agricultural Injury: A Systematic Review and Meta-analysis. *J. Agromedicine* **20**(4), 434–49. doi: 10.1080/1059924X.2015.1075450

Jadhav, R., Lander, L., Achutan, C., Haynatzki, G., Rajaram, S., Patel, K., & Rautiainen, R. 2016. Review and Meta-analysis of Emerging Risk Factors for Agricultural Injury. *Journal of Agromedicine* **21**(3), 1–14. http://dx.doi.org/10.1080/1059924X.2016.1179611

Juran, J.M. & Godfrey, A.B. 1998. Juran's quality handbook. New York. McGraw -Hill. 1872p.

Karttunen, J. 2014. *Clustering of occupational injuries, diseases and disability in Finnish farmers - an opportunity for targeted prevention*. PhD Thesis. Department of agricultural sciences. University of Helsinki. Helsinki. http://urn.fi/URN:ISBN:978-952-10-8881-0

Kilanowski, J.F.2020. Agricultural Safety Comic Book for Latinx Migrant Families: Development and Evaluation. *J Pediatr Health Care*. 2020 May–Jun;**34**(3), 230–238. doi: 10.1016/j.pedhc.2019.11.003

Kirch, W. (eds). 2008. *Encyclopedia of Public Health*. Springer, Dordrecht. doi: 10.1007/978-1-4020-5614-7_3038

Kjestveit, K., Aas, O. & Holte, K.A. 2021. Occupational injury rates among Norwegian farmers: A sociotechnical perspective. *J Safety Res*. **77**(Jun), 182–195. doi: 10.1016/j.jsr.2021.03.001

Laurent, C. & Nguyen, G. 2022. Innovation in Labour Organisation and Social Conditionality: Implications for Farm Advisory Services. *EuroChoices* **21**(1). doi: 10.1111/1746-692X.12350

Leonard, J. 2015. Stress Management in Farming in Ireland. A report for NUFFIELD IRELAND Farming Scholarships. 47 pp.

Leppälä, J., Griffin, P., McNamara, J. & Rautiainen, R. (eds.). 2021. *Safety Culture and Risk Management in Agriculture: Sacurima Cost Action CA16123.* Highlights and Conclusions. Natural resources and bioeconomy studies 63/2021. Natural Resources Institute Finland. Helsinki, 81 pp.

Leppälä, J. 2016. *Systematic Risk Management on Farms*. PhD Thesis. Department of Industrial Engineering and Management. Aalto University publication series 17/2016. Espoo. Finland, 130 pp.

Leppälä, J., Kolstrup, CL., Pinzke, S., Rautiainen, R., Saastamoinen, M. & Särkijärvi, S. 2015. Development of a Safety Management Web Tool for Horse Stables. *Animals* (Basel). **5**(4).1136–46. doi: 10.3390/ani5040402

Leppälä, J., Kauranen, I. & Rautiainen, R. 2013. Effectiveness of occupational health service programmes in farmers' safety and security risk management. *International Journal of Agricultural Management* **2**(3), 130–140. doi: 10.5836/ijam/2013-03-02

Leppälä, J., Murtonen, M. & Kauranen, I. 2012. Farm risk map: a contextual tool for risk identification and sustainable management on farms. *Risk Management* **14**(1), 42–59. https://doi.org/10.1057/rm.2011.14

Lezdkalne, J. 2025. Integrating human factors into occupational accident investigation: a literature review of methodologies and their application. *Agronomy Research* **23**(S1), 93–108. https://doi.org/10.15159/AR.25.036

Lipari, M. & Watson, H. 2019. Check your blind spots: 360° of farm risk management. AgEcon Search. *22nd International Farm Management Congress*. Grand Chancellor Hotel, Launceston, Tasmania, Australia. pp. 1–18.

Mattila, T.E.A., Liski, E., Väre, M. & Rautiainen, R.H. 2025. Diminished work ability as a contributing factor for farmer's interest in switching to organic production. *Agronomy Research* **23**(S1), 134–150. https://doi.org/10.15159/AR.25.019

McNamara. 2008. Evaluation of strategies to assist farmers to implement safety and health requirements in Ireland. Available at: https://www.hsa.ie/eng/Your_Industry/Agriculture_Forestry/Research/Evaluation_Strategies.pdf?utm_source=chatgpt.com.

McNamara, J., Kinsella, A., Osborne, A., Blake, C., Meredith, D. & Kinsella, J. 2020. Identifying Farmer Workplace Injury Risk Factors in Ireland Using Farm Accounts Data. *J. Agromedicine* **26**(4), 411–419. doi: 10.1080/1059924X.2020.1837704

McNamara, J.G.A. 2014. *Study of the Effectiveness of Risk Assessment and Extension Supports for Irish Farmers to Improve Farm Safety and Health Management*. UCD School of Agriculture and Food Science, 360 pp.

Merisalu, E., Leppälä, J., Jakob, M. & Rautiainen, R. 2019. Variation in Eurostat and national statistics of accidents in agriculture. *Agronomy Research* **17**(5), 1969–1983, doi: 10.15159/ar.19.190

Mohammadrezaei, M., Meredith, D. & McNamara, J. 2024. Counting Farm Injuries and Fatalities: An Assessment of Irish Occupational Health and Safety Surveillance Data Systems. *Journal of Agromedicine* **29**(2), 289–296. doi: 1080/1059924X.2024.2317862

Nedelko, Z. 2021. What Drives the Usage of Management Tools Supporting Industry 4.0 in Organizations? *Sensors* **21**, 3512. doi: 10.3390/s21103512

NIOSH. 2024. Hierarchy of controls. Available at: https://www.cdc.gov/niosh/hierarchy-of-controls/about/index.html

O'Shaughnessy, B., Hagan, A.D., Burke, A., McNamara, J. & O'Connor, S. 2022. The prevalence of farmer burnout: Systematic review and narrative synthesis. *Journal of Rural Studies* **96**. doi.org/10.1016/j.jrurstud.2022.11.002

Rasmussen, J. 1997. Risk management in a dynamic society: A modelling problem. *Safety Science* **27**(2–3), pp. 183–213. doi: 10.1016/S0925-7535(97)00052-0

Rautiainen, R., Ledolter, J., Ohsfeldt, R., Donham, K. & Zwerling, C. 2009. Risk Factors for Serious Injury in Finnish Agriculture. *Am. J. Ind. Med.* **52**, 419−428. doi: 10.1002/ajim.20688

Rautiainen, R.H., Ohsfeldt, R., Sprince, N.L., Donham, K.J., Burmeister, L.F., Reynolds, S.J., Saarimäki, P. & Zwerling, C. 2006. Cost of Compensated Injuries and Occupational Diseases in Agriculture in Finland'. *Journal of Agromedicine* **10**(3), 21−29. doi: 10.1300/j096v10n03_03

Reason, J. 1997. *Managing the risks of organizational acidents*. Aldershot, England: Ashgate Publishing ltd., 252 pp.

Reinvee, M. 2024. SafeHabitus. Deliverable D3.1 Farm safety in the EU: Which injuries, and who is counted? Estimating the number of farm accidents and fatalities in the EU. Available at: https://www.safehabitus.eu/wp-content/uploads/2024/08/SafeHabitus_D3.1_Farm-safety-in-the-EU.pdf.

Rodriguez, A., Lopez, S.N. & Douphrate, D.I. 2023. On-Farm Health Screening Needs of Immigrant Dairy Workers in the Texas Panhandle and South Plains. *J. Agromedicine* **28**(4), 665–675. doi: 10.1080/1059924X.2023.2200418

Safehabitus. 2023. Strengthening farm safety and health knowledge and innovation systems. Website. https://www.safehabitus.eu/

Sargeant, K. & Paine, M. 2015. Building a robust capability framework to face the fast-growing challenges of the New Zealand dairy industry. *Rural Extension and Innovation Systems Journal***11**(1), p. 210–217.

Scarborough, N.M., Wilson, D.L. & Zimmerer, T.W. 2009. *Small Business Management: An Entrepreneurial Approach* (9th ed.). New Jersey: Prentice Hall. Jersey: Pearson Education, Inc, Upper Saddle River, 912 pp.

Schuh, B., Gaupp-Berghausen, M., Münch, A., Badouix, M., Hat, K., Brkanovic, S., Dax, T., Machold, I., Schroll, K., Juvančič, L., Erjavec, E., Rac, I. & Novak, A. 2022. *Research for AGRI Committee - The Future of the European Farming Model: Socioeconomic and territorial implications of the decline in the number of farms and farmers in the EU*. European Parliament, Policy Department for Structural and Cohesion Policies, Brussels. doi:10.13140/RG.2.2.15638.63040

SFS-EN ISO 4500:2023. *Occupational health and safety management systems. with guidance for use*. Finnish Standards Association SFS. Helsinki, 97 pp.

Strategic Planning: Why It Makes a Difference, and How to Do It. 2009. *J. Oncol Pract*. **5**(3), 139–143. doi: 10.1200/JOP.0936501

Suutarinen, J. 2004. Management as a Risk Factor for Farm Injuries. *Journal of Agricultural Safety and Health* **10**(1), 39–50. doi: 10.13031/2013.15673

Vaismoradi, M., Turunen, H. & Bondas, T. 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Sciences* **15**, 398–405.

Vinci, C. 2024. Improving EU farmers' and agricultural workers' working conditions and mental well-being. In *AT A GLANCE Plenary*. EPRS | European Parliamentary Research Service. PE 767.154 – December 2024.

Worksafe Australia. 2024. Farm safety checklist. Available at: https://www.worksafe.wa.gov.au/system/files/migrated/sites/default/files/atoms/files/farm_safety_checklist_2021.pdf.

APPENDIX 1. Tools included in the study:

Tools	Organisation/Source
Safety management software for agribusiness	SafeAgSystems
Risk Management Tools	Farmsafe
Safety culture and risk management in agriculture	Luke
Safety Champion Agriculture Safety Management Software |	Safety Champion
A Comprehensive Guide to Farm Safety	SafetyCulture
Farm health and safety management self-assessment table	Worksafe
Farmwise - Your essential guide to health and safety in agriculture	Farmwise, HSA, UK
Farm Safety Code of Practice - Risk Assessment Document	HSA, Ireland
Agriculture - Managing risks	Safe Work Australia
Health and Safety on Farm - Risk management	Beef and Lamb New Zealand
Farm risk map - Risk assessment tool for farms	LUKE
Farm safety - risks and hazards	Better health channel
Resources for farmers	AgHealth Australia
Farmers' Guidebook to work health and safety	Safework SA
Farm safety management plan	Beef and Lamb New Zealand
Safety in Farming and Agriculture	WHS Systems
FARM SAFETY SELF ASSESSMENT GUIDE	Pork SA
A guide to developing safety management systems	Worksafe
5 common farm hazards and how to manage them	Onside
Farm safety self-assessment	NSW Government
Child Safety	Gov. Ireland
Online interactive risk-assessment (OiRA)	EUOSHA
4 steps to manage hazards and risk	Work Safe, Tasmania
Farm buildings, equipment and environment	Gov. Ontario
Manage the risks of machinery in your rural workplace	Country Wide Insurance
Farm safety and health	NDSU
Work health safety (WHS) plan for farm	Comcare
SAFETY & HEALTH GUIDE FOR MANITOBA FARMS	Manitoba
Work, Health and Safety	Agforce, Australia
Agricultural safety software	Ideagen
AgrAbility, US	NIFA
Agricultural Safety Health Training Portal, US	Iowa, Great Plains
Safety and Health Management Planning for General Farmers and Ranchers, US	Pennstate
A Guide to Your Farm Safety Plan	Nova Scotia
Canada FarmSafe Plan, Canada	Casa
Certified Safe Farm (CSF), US	Iowa University
Risk management programmes for farm dairies, New Zealand	MPI
Essential farm safety practices, Australia	Digi Clip
Farm safety videos, US	Dairy Excellence
Farm safety check, US	UMASH
Ensuring Child Safety on Farms, Australia	ProcessWorx
Farm health and safety, UK	Safety revolution
Farm Safety: Risk Management, UK	NFU
Managing chemical risk in the agriculture sector	ILO
The Farm Safety, Health & Wellness Toolkit	VCE
Farm safety advise, Ireland	FBD
Health of farmers videos, Ireland	Teagasc

Appendix 1 *(continued)*

Agritourtism Safety & Risk Management, US	UVM
Vision Zero: Guide for individual farmers	ISSA
Advisory safety expert service	Ag health and safety alliance
Fitting farm safety into risk communications teaching, research and practice	Google Scholar; Evans & Heiberger, 2015
Stress Management in Farming in Ireland	Google Scholar; Leonard, 2015
On-Farm Health Screening Needs of Immigrant Dairy Workers in the Texas Panhandle and South Plains	Google Scholar; Rodriguez et al., 2023
Npr-Check Your Blind Spots: 360â° Of Farm Risk Management	Google Scholar; Lipari & Watson, 2019
Agricultural Injury Surveillance Using a Regional Trauma Registry	Science Direct: Cook et al., 2022
Agricultural Safety Comic Book for Latin Migrant Families: Development and Evaluation	Science Direct: Kilanowski, 2020
Occupational injury rates among Norwegian farmers: A sociotechnical perspective	Science Direct: Kjestveit et al., 2021
Safety Knowledge and Changing Behavior in Agricultural Workers: an Assessment Model Applied in Central Italy	Science Direct: Cecchini et al., 2018
A new web tool for equine activities. The safety section contained a safety checklist, stable safety map and good practices to support human health	Web of Science; Leppälä et al., 2015
Evaluation by employees of employee management on large US dairy farms	Web of Science; Durst et al., 2018
Development and psychometric evaluation of a safety climate scale for vineyards:	Web of Science; Grimbuhler & Viel, 2019
Building a robust capability framework to face the fast-growing challenges of the New Zealand dairy industry	Web of Science; Sargeant & Paine, 2015