Farming Safely:

Usability Evaluation of OSHA Website for Farmers

Scott Church

University of Idaho

Author Note:

Scott Church is a human factors designer and analyst with a focus on safety and usability.

Abstract

The intent of this report is to provide constructive criticism of a current tool used for accident prevention in farming, the Occupational Safety and Health Administration (OSHA) website. It identifies requirements and stakeholders to guide the analysis, and on this foundation provides analysis of tools and materials available to users. The information contained in this report could help farmers and farmworkers do their jobs and run operations more safely by ensuring the OSHA website is appropriately designed to provide adequate support and guidance.

Introduction

The article begins “TERRETON - A young Rexburg father was killed Friday following a farm accident.” It cites a brief sheriff’s department statement saying only that the farmer was killed when removing a blockage from a grinding tub feeder. For other farmers reading, it provides no further information about the dangers of grinding hay into feed, or resources to learn more. Merely knowing that such machinery is dangerous is not enough. One must wonder how this father of six’s death could have been prevented. Farming is one of the most dangerous professions today, even when agricultural accidents are widely unreported due to immigrant labor and low visibility. Fatal and nonfatal injuries can occur both on a job site and at home on homesteads. According to the CDC, the fatality rate is 21.4 deaths per 100,000 workers, and agricultural workers number in the millions. Hazards on farmland abound - exposed moving parts on machinery, powerful manually controlled hydraulics, and unstable tractors. The United States Department of Labor operates the Occupational Safety and Health Administration (OSHA) for the express purpose of ensuring “safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance.” OSHA recognizes agriculture as a dangerous undertaking, and their website states “Farmworkers are at high risk for fatalities and injuries, work-related lung diseases, noise-induced hearing loss, skin diseases, and certain cancers associated with chemical use and prolonged sun exposure.” As such, the OSHA website and the resources should act as tools to help farmers learn from past accidents and preempt future unintentional injuries, even as the nature of farming evolves with the advent of new tools and techniques. This paper will first consider the user and the nature of the work performed by farm leaders and managers,

conducting a brief user and stakeholder analysis to determine requirements. In view of the findings, it will analyze and assess the OSHA.gov farming website and resources for usability, relevance, and effectiveness. It will conclude with recommendations for improvements to the website as a tool for farmers to prevent accidents. Farming accidents, like the one mentioned above, can be mitigated with good resources for safety education.

Requirements

Defining requirements for this website is the first step in evaluating and eventually improving it. For all safety applications, a proactive approach is better than waiting for an accident to happen and then providing tools to analyze it. So, the 1st requirement is that it aggressively presents information to prevent the most common accidents that are the most potentially damaging. The content creators need to understand the rhythm of work on a farm and update the presentation of information in a season-appropriate manner. This anticipatory approach means that it should get useful safety information in front of a user almost without the user having to ask or search. Still, the 2nd requirement is that it be easily navigable or searchable for specific questions to get targeted information to users quickly. To narrowly tailor is preferable to broad categorization of potential issues for ease of usability and rapid response to inquiries. The 3rd requirement is that it should guide users to learn more because safety requires the creation of new mindsets and cultures in any endeavor. Simply put, a good online tool concludes its purpose by guiding farmers towards a safer way of thinking.

User Analysis

To fully assess the usefulness of a tool, the user must be fully considered and understood to examine their needs. This includes knowing something about their thought processes, use cases, habits, and even beliefs. Demographics are a good starting point for understanding users. Based on data from the United States Department of Agriculture's most recent farm census, there are 2.1 million farmers in the United States. Of these, 86% of farmers are English speaking older men, with an average age of 58. The workers on these farms differ from the farm owners. The National Center for Farmworker Health reports that 72% of farmworkers are foreign-born, with the majority coming from Mexico. Only 30% of all workers said they could speak English "well," and only 28% had completed grades 1 to 12. The average age of all farmworkers was 36. This divide between farmers and farmworkers adds some complexity to fulfilling the requirements for a successful website.

Farmers are often grouped by geography, with different regions suited to creating different crops. The biggest agriculture states, however, are spaced across the United States. California is the highest producing state, and nearly 2000 miles east in the heartland of America, Iowa ranks next. These are followed by Texas in the south, another 1000 miles away from both. North Carolina on the east coast also ranking in the top 10 farming states. This dispersion of important farming areas indicates that the requirement for targeted information specific to farming practices will require some legwork on the developer side of the website, to tailor the site to geographically grouped farmers.

Importantly, 29% of their farms have no access to the internet. Of those which do have internet access, the Federal Communications Commission data shows that 39% lack connectivity speeds of 25Mbps/3Mbs service. This is relevant because it directly influences the

size of files that can be accessed in a reasonable amount of time, especially because of the long hours farmers must put in outside. A farmer searching for resources to address unintentional injuries, either to prevent or report them could be quickly dissuaded if the website requires too much navigation with load times.

A farmer's work is mostly dependent on the season. Crops must be planted at certain times, often using specialized equipment, and harvested in a window of just a few weeks using similar but different equipment. To meet the proactive requirement, the website tools will need to be dynamically updated by the developers and designers to be timed appropriately to the season. The cyclical aspect of the farmers and farmworkers work rhythms offers unique opportunities to meet Requirement 3. The guidance to ongoing education and new safety could be promoted between periods of intense labor when fieldwork is less intense and more time might be available to spend online.

Current Website Evaluation

Evaluating the website from a user-centric point of view means walking through the process of visiting it and taking note of problems that a farmer or farmworker might encounter. The landing page arrives in English, but has an option for viewing the site in Spanish. Information presented on the front page during Fall 2019 concerns hiring seasonal laborers for package shipping companies, suggesting that the website is monitored and can be configured to show time relevant information. None of the information on the front page, however, concerns farm safety. Users with an interest in farming can navigate guidance by "Topic" and a search bar. It is likely that a user would search before checking for other options. Under TOPICS, there

is a link to information about agriculture. Figure 1 shows the landing page with the two options to navigate to farming or agriculture resources.

Figure 1. OSHA website navigation by topic and search bar.

Typing "Farm" into the search bar, however, returns a seemingly disorganized list of links that are poorly labeled and confusing to a user looking for either broad or specific materials as seen in Figure 2. The search bar could be an early way to help fulfill requirement 1 by suggesting searches based on season and even geographic location if a user has cookies enabled. Predictive search also would help fulfill requirement 2 by filtering down a subject into precise wording to aid in-depth research. Adding suggestions to the search bar could also support requirement 3 by prompting a user to dig further into information they might not have considered, such as "How to plan an accident-free harvest" during the fall, or "Hay grinder safety" during the winter when fresh grass is in short supply.

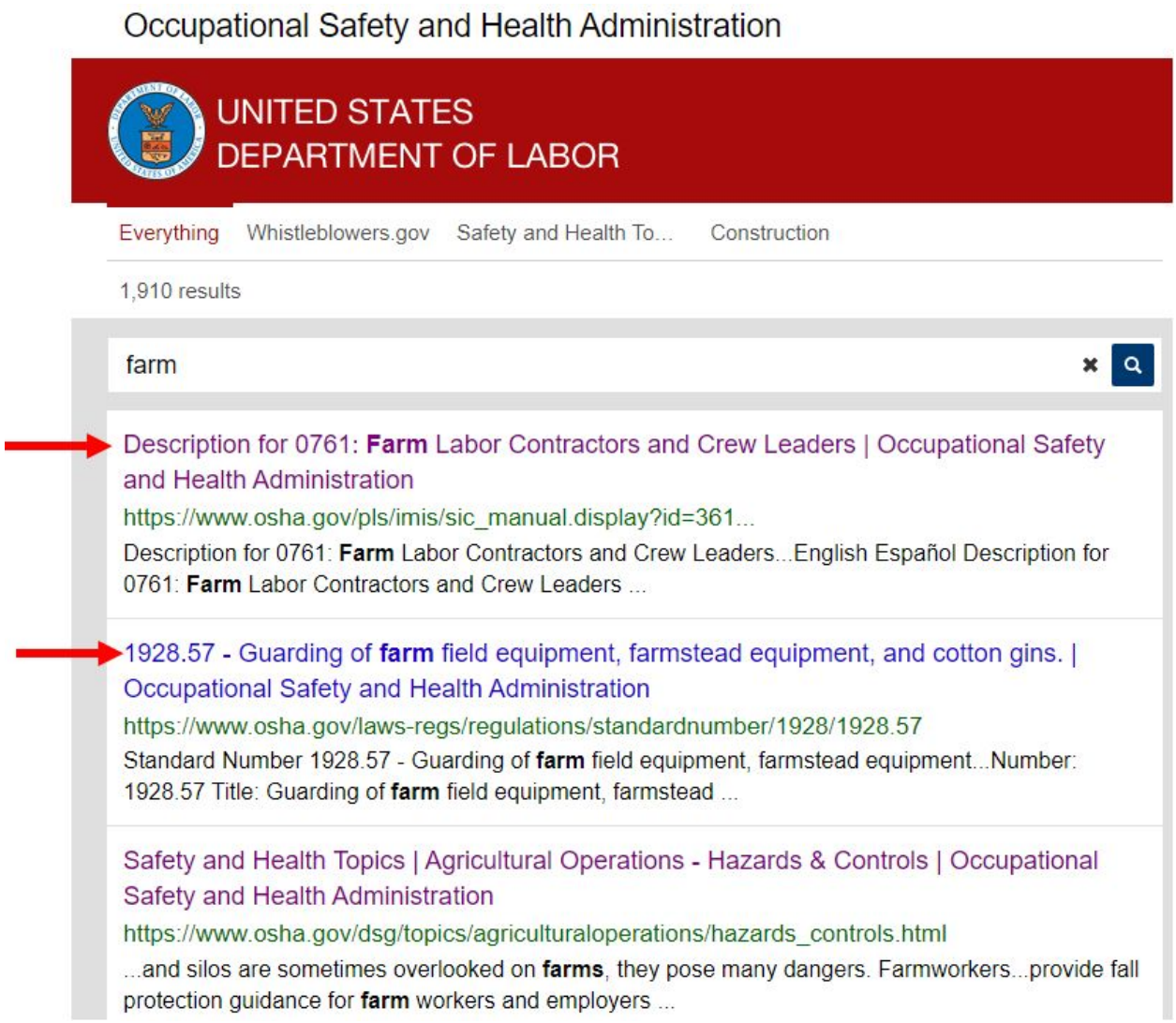


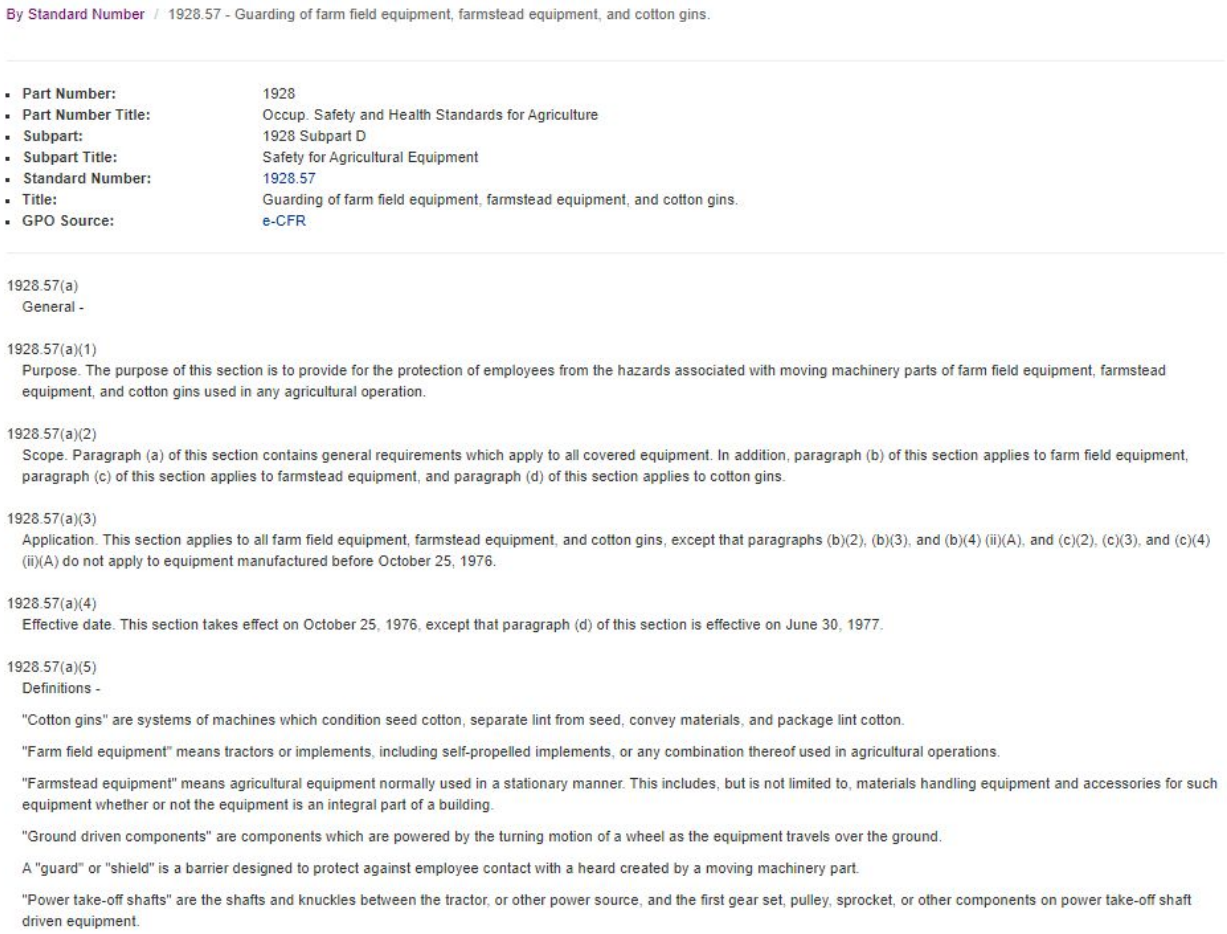
Figure 2. "Farm" search returning top results that are unhelpful.

The top link pulls up a description page with no further information or relevant links; the page is shown in Figure 3 for illustration purposes.

Figure 3. Unhelpful top link with no relevant resources for farm safety.

The next link brings up standard numbers that contain specific regulations pertaining to the operation of machinery used on certain farms. It is not a good place to start learning about farm safety or receive guidance on how to set up a safety program. There are no links to information about each piece of equipment, plans to implement safety checks or even an index to help navigate to relevant regulations. In short, the second link brings up another document that is obscure and confusing, providing only legal language and no tools. It is more useful for

lawyers than farmers, and the structure is hard to navigate and read, as seen in Figure 4.



By Standard Number / 1928.57 - Guarding of farm field equipment, farmstead equipment, and cotton gins.

- **Part Number:** 1928
- **Part Number Title:** Occup. Safety and Health Standards for Agriculture
- **Subpart:** 1928 Subpart D
- **Subpart Title:** Safety for Agricultural Equipment
- **Standard Number:** 1928.57
- **Title:** Guarding of farm field equipment, farmstead equipment, and cotton gins.
- **GPO Source:** e-CFR

1928.57(a)
General -

1928.57(a)(1)
Purpose. The purpose of this section is to provide for the protection of employees from the hazards associated with moving machinery parts of farm field equipment, farmstead equipment, and cotton gins used in any agricultural operation.

1928.57(a)(2)
Scope. Paragraph (a) of this section contains general requirements which apply to all covered equipment. In addition, paragraph (b) of this section applies to farm field equipment, paragraph (c) of this section applies to farmstead equipment, and paragraph (d) of this section applies to cotton gins.

1928.57(a)(3)
Application. This section applies to all farm field equipment, farmstead equipment, and cotton gins, except that paragraphs (b)(2), (b)(3), and (b)(4) (ii)(A), and (c)(2), (c)(3), and (c)(4) (ii)(A) do not apply to equipment manufactured before October 25, 1976.

1928.57(a)(4)
Effective date. This section takes effect on October 25, 1976, except that paragraph (d) of this section is effective on June 30, 1977.

1928.57(a)(5)
Definitions -

"Cotton gins" are systems of machines which condition seed cotton, separate lint from seed, convey materials, and package lint cotton.

"Farm field equipment" means tractors or implements, including self-propelled implements, or any combination thereof used in agricultural operations.

"Farmstead equipment" means agricultural equipment normally used in a stationary manner. This includes, but is not limited to, materials handling equipment and accessories for such equipment whether or not the equipment is an integral part of a building.

"Ground driven components" are components which are powered by the turning motion of a wheel as the equipment travels over the ground.

A "guard" or "shield" is a barrier designed to protect against employee contact with a heard created by a moving machinery part.

"Power take-off shafts" are the shafts and knuckles between the tractor, or other power source, and the first gear set, pulley, sprocket, or other components on power take-off shaft driven equipment.

Figure 4. List of standards for operating specific equipment.

The search function fails all three requirements the way that it is currently implemented. It is clear that the search function for OSHA is broken or unusable to the point of irrelevance for farmers searching for useful information on safety for their operations.

The Topics menu bar fares a little better than the search function for returning relevant resources. Selecting “Agriculture” from the topics menu brings a user to the landing page with pictures of agricultural operations, which confirm to a user that they are in the right place. Right

after the pictures follows an overview of what agriculture actually is: “a major industry in the U.S.” which “includes growing and harvesting crops.” Any farmer reading this likely knows what agriculture entails, and is probably looking for something more substantial. Fortunately, the next paragraph ends with what is on offer: “OSHA has standards that cover agricultural operations, information on solutions to common agricultural hazards, and other resources such as publications to help employers and employees create and maintain safe and healthy work environments.” To meet requirement 1, this header would be a good choice to begin pushing relevant information in front of users. Rather than scenic pictures, infographics using similar elements could direct attention to safety aspects of the work. Although pop-ups can annoy savvy web users, the analysis of OSHA farming users indicates that these people spend less time online than the average American, and might be easily persuaded to “read more” without the cynicism.

The next section of the web page provides the first real useful tool for farmers in the form of infographics and flyers. Unfortunately, the first two fact sheets only pertain to farm safety for workers in enclosed spaces. These did not change over the course of the 8 weeks used to research this paper, indicating that the seasonal updates found on the OSHA homepage have not proliferated to other portions of the site. The FATALFacts sheet does contain a basic format for writing up incidents. The next document is a large font “Dos and Don’ts” of grain bin safety which could ostensibly be posted near a grain bin, but there is no direct recommendation from OSHA that this is a good course of action. The last safety fact sheet pertains to tractor hazards alone. Again, the website fails to push relevant information to a user upfront, help them narrow

their search, or guide them in an educational manner other than haphazard curiosity. Figure 5 shows the Agricultural Operations landing page with the overview and infographics highlighted.

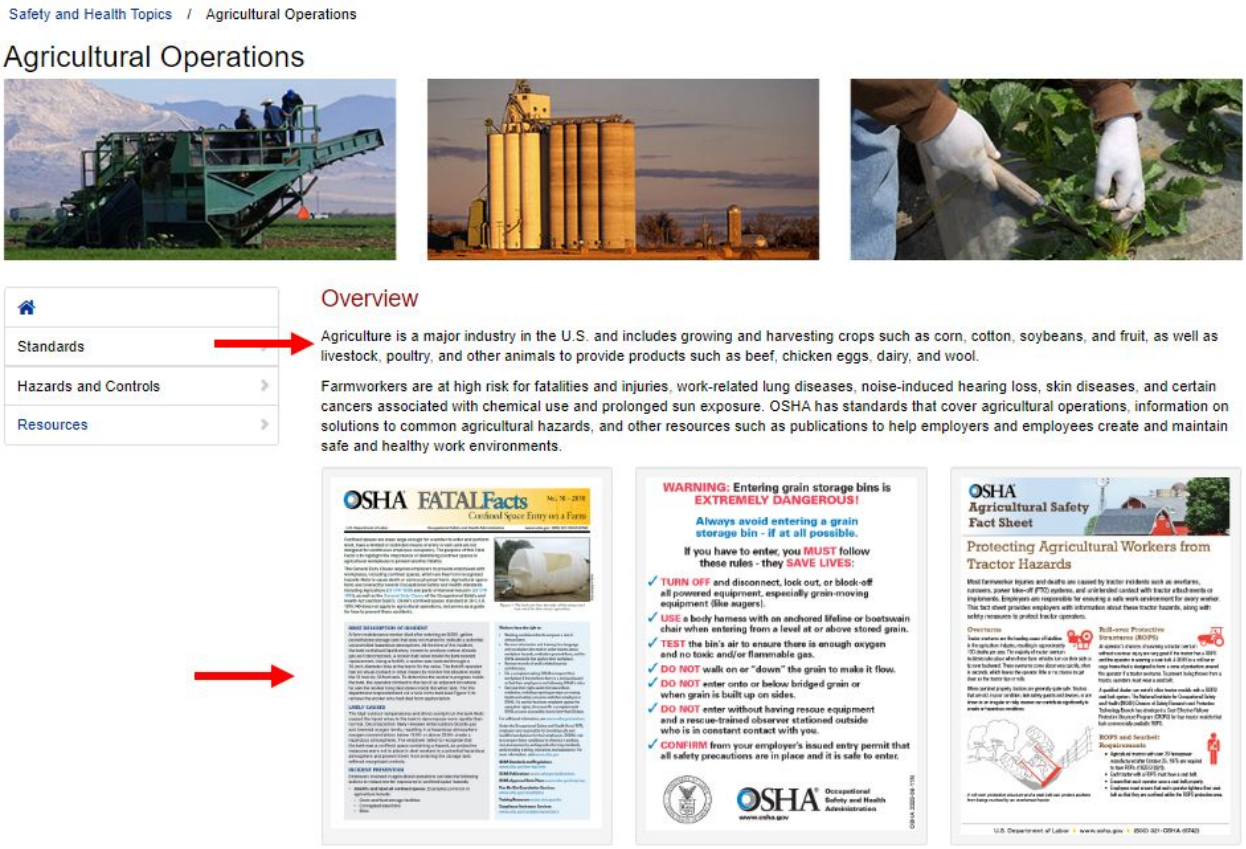


Figure 5. Agricultural Operations landing page.

Below the featured infographics, there are navigation buttons to find the Standards, Hazards and Controls, and Resources. The Standards description is that it "Provides information on symptoms and treatment," which does not match the description. It links to various regulations from parts of the overall OSHA document that provide standard interpretations of words within the document which governs exposure limits and established requirements for different kinds of workspaces and environments. The standards list is organized by subparts, but

there is no index or other navigation aids. Some of the topics, at first brush, seem completely unrelated, such as a link to Cadmium information. Cadmium is present in some fertilizers, but a beginning farmer looking for guidance on how to set up a safe farm would likely not have this knowledge. Likewise, a farmworker might not think to look at information about hazmats unless prompted. The disorganization is visible in Figure 7.

Standards

Agricultural operations are addressed in specific standards for agriculture and general industry. This page also highlights directives, which are instructions for OSHA staff, and standard interpretations, which are official letters of interpretation of OSHA standards.

General Industry (29 CFR 1910)		Related Information
Subpart H – Hazardous Materials	1910.111, Storage and handling of anhydrous ammonia	▪ Topic page ▪ Federal Register notices ▪ Letters of interpretation
Subpart J – General Environmental Controls	1910.142, Temporary labor camps	▪ Directives ▪ Federal Register notices ▪ Letters of interpretation
	1910.145, Specifications for accident prevention signs and tags	▪ Federal Register notices ▪ Letters of interpretation
Subpart R – Special Industries	1910.266, Logging operations	▪ Directives ▪ Federal Register notices ▪ Letters of interpretation
Subpart Z – Toxic and Hazardous Substances	1910.1027, Cadmium	▪ Topic page ▪ Directives ▪ Federal Register notices ▪ Letters of interpretation
	1910.1200, Hazard communication	▪ Topic page ▪ Congressional testimonies ▪ Directives ▪ Federal Register notices ▪ Letters of interpretation ▪ Memorandums of understanding ▪ Settlement agreements
	1910.1201, Retention of DOT markings, placards and labels	▪ Federal Register notices ▪ Letters of interpretation

Figure 7. Lack of navigation aids and disorganized topics list.

The Hazards and Controls selection says it "Highlights OSHA requirements and related information that may be applicable in the event of possible worker exposure to Avian Influenza viruses," which is inaccurate because it links to a variety of topics besides simply the Avian Influenza virus. The topic list includes descriptions for each hazard and links to infographics and background information on each. Clicking a link does not open a new page, despite the standard blue hyperlink appearance, but it does drop down information about each topic. These drop-down information boxes contain more links, which do take the user to different pages. The inconsistency can be frustrating, but a determined farmer can find information relevant to their operations. Some topics are farm-specific such as the pesticides and cotton dust information pages. Other are not farm-specific, but they do provide background information on how things like noise and chemicals can affect workers, and how to take steps to mitigate and protect from these hazards. The Hazards and Controls list, if a farmer can find it despite the description, is the most useful tool on the website thus far. Figure 8 shows the list of useful topics.

The resources page has many of the same topics listed and materials linked as the hazards and controls and contains a mixture of outside links and internal OSHA produced documents. It is not searchable or indexed. This is the primary repository for PDFs that can be printed and posted around worksites, and PDFs of pamphlets that provide background information - some of which is directly relevant to farming, such as a pamphlet on Green Tobacco Sickness. Unfortunately, the PDFs open in the same window, so clicking through to find multiple resources on an issue will require back and forth navigation, which can be problematic on slow connections. It is foreseeable that because farms are remote to populated places they might not

have high-speed internet connections, which means this particular aspect of the site would be especially frustrating for a farmer trying to explore various resources.

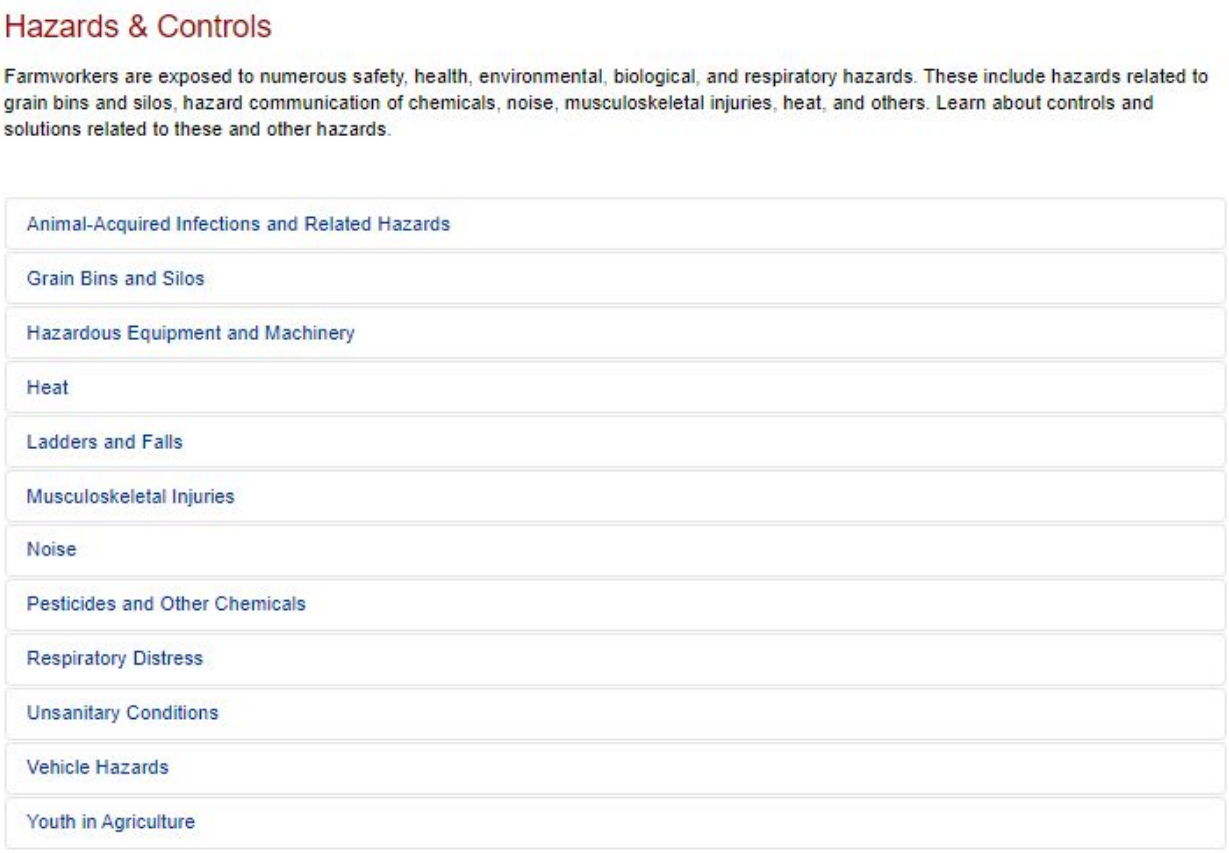


Figure 8. Hazards and Controls topics listed under description of influenza risks.

Overall, the OSHA farming section of the website does provide a wide range of information about hazards, infographics that can be posted to inform workers of safe practices, and tools. It fails to accommodate users and fulfill the requirements set forth earlier in the paper.

Improvements

While it is true that each part of the website has some potential use for certain users, there is little aggressive presentation, poor targeting, and very little leading. A farmer or farmworker should not need a guide to use the guide. Preferably, the website itself could be such a guide. Improvements to the search function have already been discussed, but to recap, the search should provide suggestions and anticipate queries based on user location and time of year. This would meet requirements 1 and 2. To push useful information to the forefront of a user's awareness, the Agriculture splash page should concentrate on providing news on recent accidents or accidents that have occurred in a similar timeframe in the past. Fear is an appropriate motivator for workers trying to learn about safety, and hearing about the tragedies of others is a proven persuasive method to shape behaviors. This satisfies requirements 1 and 3. Popups based on browsing history or searches could also be used to help users narrow their queries. A user reading about a hay bale grinder incident, for example, could be pushed information via popup or search suggestion about ways to prevent such an incident. While this paper mainly focused on the evaluation of the website and the users, the improvements section could be built into an entire paper of its own.

Conclusion

As a safety and accident prevention tool, the OSHA Farming resources utterly fail. They do not push relevant information to a user, help a user quickly arrive at a precise answer, nor do they push users to learn more. Farmers and farmworkers are more likely to shut off their computers in frustration than find actionable intelligence within the site. If safety is a culture that can be built and an intelligence that can be learned, the OSHA website has a long way to go to promote its self proclaimed goals. While many farmworkers may have little or sporadic

access to the world wide web, it is possible that those who do, if given a better experience, could help lead the charge for safety in farming in the future.

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