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Ensuring Food Safety as Demand for Improved Food System Efficiency Increases

Abstract

Food security and safety issues have been central to Extension programming since its inception, but emerging concerns over the issues of food waste and system inefficiency have brought new challenges to the forefront. Social change ideas related to reducing food waste include use of secondary quality produce, date label elimination, repurposing of food scraps, and donation and gleaning of food. Implementation of these ideas often intersects with issues of food safety. Therefore, it is incumbent on Extension professionals nationwide to consider how best to use content and expertise to address modern food security, food waste, and food safety challenges.

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Introduction

In the United States, the joint issues of food insecurity and food safety affect millions of people (Hic, Pradhan, Rybski, & Kropp, 2016). In 2016, over 12% of U.S. households experienced food insecurity—a figure that remained essentially unchanged from 2015 despite emerging efforts to address the issue (U.S. Department of Agriculture, n.d.-a). Concerns about food insecurity are inextricably linked to concerns about food waste. The Food and Agriculture Organization of the United Nations has estimated that approximately 1.3 billion tn of food (one third of the total food supply) is wasted annually (Gustavsson, Cederberg, Sonesson, Otterdijk, & Meybeck, 2011). To combat this issue, the U.S. Department of Agriculture and U.S. Environmental Protection Agency started the U.S. Food Waste Challenge. The Food Waste Challenge promotes system efficiency goals, to be achieved by 2030, for reduction, recovery, and recycling related to food waste (U.S. Department of Agriculture, n.d.-b). Meanwhile, food safety continues to be a public health threat. Estimates from the Centers for Disease Control and Prevention (2016) have indicated that 47.8 million illnesses are acquired each year from food-borne pathogens. This means that roughly one in six people in the United States contract a food-borne illness every

year.

For its part, Extension has addressed the issues of food security and food safety for decades. Extension food security and food safety programs manifested as Depression-era resource and nutrition management and food preservation education. More recently, Extension has provided food security programs focused on delivering Supplemental Nutrition Assistance Program Education and food safety programs related to ServSafe training, good agricultural practices, and quantity cooking. Such programs continue Extension's line of consumer education on selecting, storing, and serving food safely while making the most of the household budget. As food trends and challenges change, Extension continues to serve an important role in the development and implementation of solutions to related problems.

Currently, in the face of initiatives such as the U.S. Food Waste Challenge, increasing attention is being directed at addressing the problem of food waste through modification of consumer behavior. Socially conscious special interest groups and idea leaders have begun promoting food handling behaviors that focus on increasing the percentage of produced food consumed by implementing community programming, changes to food policy, and viral social media campaigns. Although behavioral changes that increase the efficiency of the food system are vital to its sustainability, these changes should be evaluated for their food safety trade-offs. As novel methods for reducing food waste or increasing food system sustainability are explored, we in Extension need to help consumers understand associated safe and effective food handling practices. We should focus our efforts on promoting changes that maximize food security and sustainability while minimizing associated food safety risks and on engaging special interest groups and idea leaders so that neither of these two variables is overlooked. Here, we explore ways in which food waste reduction strategies have the potential for unintended food safety outcomes, and we provide recommendations for Extension's response to this situation.

Problem Areas and Associated Education Needs

Four common food waste reduction strategies and associated unintended results serve to illustrate the importance of balancing guidance on food waste reduction with food safety implications. Those strategies relate to consumption of secondary quality produce, date label confusion, use of scraps and waste, and food bank contributions, and Extension educators can develop recommendations and materials to address education needs associated with each.

"Ugly" Fruits and Vegetables

A much-maligned contributing factor to waste and loss for fresh produce is the unacceptability of so-called "ugly" fruits and vegetables in the fresh market. Produce items with physiological defects or physical damage (e.g., bruises) are considered secondary quality or outgraded and are culled because consumers often reject lower quality fruits and vegetables (Cai, Worobo, & Snyder, 2018). However, campaigns that promote the sale and consumption of secondary quality produce should include content describing the potential for pathogen colonization of the surface defects that typify these culls and more rapid pathogen outgrowth throughout shelf life in cases of damage (Snyder, Perry, & Yousef, 2016). Recommendations should be risk based, and more specific guidance may be necessary for safely recovering seconds.

Date Label Confusion

Confusion surrounding date labels reportedly accounts for around 20% of household food waste as consumers

discard products based on "use by," "sell by," "best before," or some other iteration of guidance rather than noticeable spoilage (Leib, Ferro, Nielsen, Nosek, & Qu, 2013). Changes to date labeling policies have been proposed, and retailers have expressed interest in eliminating or simplifying these labeling conventions. However, guidance that eliminates or directs consumers to ignore "use by" dates specifically for ready-to-eat refrigerated products may increase the risk of listeriosis. Date labels on these products have safety implications. Consumption after the "use by" date extends the growth period for *Listeria monocytogenes*, which is capable of replication under refrigerated conditions. Consumer education materials should note that the disposition guidance for these products, lunch meat as an example, should be followed.

Novel Use of Scraps and Waste

Guidance for reducing food waste at the household level often focuses on using food scraps. Suggestions regarding regrowing produce after consumption of the edible portion through placement of the stem or seed in water (e.g., growing lettuce from leftover lettuce hearts) can lead to risky food-handling scenarios. If the resulting vegetative growth is to be consumed, the consumer should observe food safety practices to minimize cross-contamination as such conditions support the outgrowth of bacterial pathogens. Similarly, the use of pits, peels, stems, or other scraps as infusions in oil or vinegar-and-oil mixtures also represents a potential risk for botulinum toxin formation (Morse, Pickard, Guzewich, Devine, & Shayegani, 1990). Although these activities are unlikely to significantly contribute to food security, consumers may wish to carry them out; consequently, Extension professionals can work to educate home gardeners and food preservers about risk mitigation strategies appropriate for each scenario.

Food Bank Contributions

Food-insecure populations rely on community programs, including food banks and pantries. Efforts to donate leftovers or surplus garden produce serve the dual function of food insecurity reduction and food waste reduction. However, the food safety risks associated with accepting donations of food prepared or grown in homes, under practices that may not align with codified food safety programming and without documented time-temperature histories, must be evaluated. State and local regulations regarding these contributions also should be considered as community programs develop policies on donations. Generally, food prepared outside a licensed food bank should not be accepted. A recent recall of temperature-abused food pantry items (U.S. Food and Drug Administration, 2017) and the 2016 outbreak of illnesses associated with home-prepared, temperature-abused community Thanksgiving dinners (Food Safety News News Desk, 2016) underscore the importance of actively managing food safety when trying to provide foods to sensitive groups. However, acceptance of fresh produce from home gardens is occurring, although this scenario is highly specific to the individual food bank. Written policies on what is and is not acceptable should be developed, and employees/volunteers should be trained on those policies to ensure implementation.

Extension Education Strategies and Solutions

Historically, Extension has played a critical role in addressing food security and food safety threats to public health. The current food production climate also necessitates the involvement of Extension professionals with the emerging challenge of hunger in a population continually more separated from food production. Research has revealed the lack of adequate consumer knowledge regarding safe and effective food handling techniques, a circumstance that increases the risk of in-home food-borne illness (Langiano et al., 2011). Consumer awareness

can be influenced by increased education on how to identify both risks and methods of prevention of food-borne illness.

Examples of educational strategies and solutions developed by Extension in response to the intertwined challenges of food insecurity and food safety include

- partnering with schools and local farms to reduce food waste through classroom and cafeteria educational messaging and promotion of the use of food scraps for compost or animal feed ("Reducing and Managing School Cafeteria Food Waste," 2016);
- encouraging the implementation of good consumer practices for home food safety to complement the good agricultural practices and good manufacturing practices already used by food producers (Leighton & Sperber, 2015);
- creating an online food safety course detailing safe food handling practices for food service employees (Dittmar, Anding, & Green, 2014); and
- assisting local food banks with transitioning from providing set "food boxes" to using "choice" food-selection systems, which promote decreased food waste as clients are allowed to select foods their families will eat (Remley et al., 2006).

Collaborating with area leaders and organizations and engaging with regulatory agencies enables Extension to respond to current issues by applying its direct link to research from land-grant colleges and universities. Extension professionals should use the aforementioned areas of educational need and programming examples as springboards for increasing their impact related to balancing food security initiatives with food safety fundamentals. Positioning new efforts on the pedagogical bases of previous Extension programming in food choice training will increase public health outcomes and bring about behavioral changes.

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