

Food Defense – A New Consideration for Inclusion in Food Safety Curriculum

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Introduction

- Food Defense is the “effort to protect food from acts of intentional adulteration” (FDA, 2017).
- The factors to be controlled in Food Safety are called “Hazards” while in Food Defense they are “Threats”
- The U.S. Food and Drug Administration (FDA) has recognized the importance of Food Defense, and, accordingly, has included Mitigation Strategies to Protect Food Against Intentional Adulteration as one of the rules in the Food Safety Modernization Act (FSMA).
- There is now a need for knowledgeable and trained individuals in Food Defense within the food industry.
- As educators in Food Science and Poultry Science, it is our job to ensure that our students receive the appropriate training in Food Defense.
- Although Food Safety has traditionally been taught as part of the curriculum, and there are various similarities between the two subjects, the unique nature of the threats and adversaries that need to be assessed in Food Defense requires exploring the necessary approach to teaching this subject.

Objective

- First, to address the types of adversaries and related counter strategies and techniques unique to intentional food adulteration
- Assess the need for a course in Food Defense as well as student interest and current knowledge of the topic area.

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Analysis of Current Situation

- Threats unique to Food Defense
 - **Intentional** public health risk, or economic harm
 - Targets vary:
 - Company
 - General Public or a specific community
 - Individual
 - Common adversaries
 - Disgruntled employee – seeking to disrupt production, or to harm the company brand, or customers of the company.
 - Terrorist – seeking to hurt the community or nation. The Criticality and Shock Attributes (Table 2) are of import to these groups.
- Certification in Food Defense
 - Relatively few courses are available.
 - Most third party courses that are available are too expensive for students.
 - The FDA has online “Food Defense 101” training that has been updated to include FSMA and offers a certificate of completion once participants have finished the modules.
 - Students are looking for more certification courses; 81% of the responders to the student questionnaire indicated a certification opportunity would increase their likelihood to enroll in a Food Defense course.

Table 1: Similarities and Differences between Food Defense and Food Safety

	Food Defense	Food Safety
Categories of hazards/threats	Physical, Chemical, Biological, Cyber	Physical, Chemical, Biological
Requires a good traceability and recall program	Yes	Yes
Assessed throughout the production and transportation chain	Yes	Yes
Written plan required	Yes	Yes
Mitigation focus	Vulnerability	Control of hazards
Introduction of hazards	Intentional	Unintentional
Risk assessment	Assess vulnerability due to unknown potential for occurrence	Consider severity and likelihood of occurrence
Risk assessment tools	CARVER + Shock	Hazard characterization and dose-response assessments
Human element	Intentional harm by employee or outside source, control of threats by employees	Accidental contamination by employees, control of hazards by employees
Ease of detection	Limited detection methods and many unknown agents	Well established best practices and detection methods

Questionnaire results

- There were 18 students enrolled in a Food Safety class who responded to the questionnaire, 38% of whom plan to work in Food Safety or Quality Control after graduating.

Figure 1: Self identified importance of Food Defense to the future career of students.

Students were asked to identify the relevance of Food Defense to their future career as: useful, necessary, of interest but will play no role in your career, or irrelevant

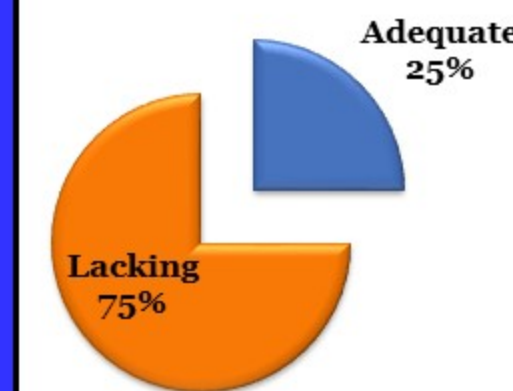
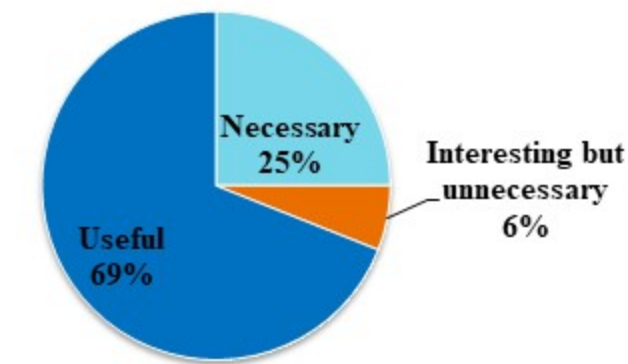


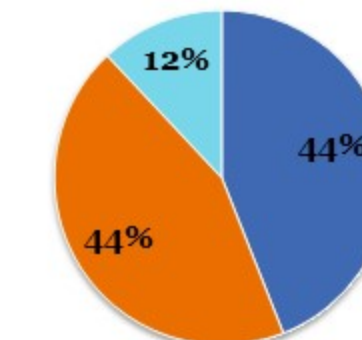
Figure 2: Self identified student knowledge of Food Defense

Students were asked to identify their knowledge of the topic as Expert, Fairly High, Adequate, Lacking, or Not High and you don't feel the need to learn more

- Should be a larger part of the course
- Adequately addressed already in the course
- Should be a stand-alone course

Figure 3: Addressing Food Defense in the curriculum

Students were asked if the topic of Food Defense : Is adequately addressed in the food safety course already, Should be a larger part of the food safety course, or Should be a stand-alone course



Tools for Food Defense

- Similar to the HACCP (Hazard Analysis and Critical Control Plan) students construct in Food Safety, students would create a Food Defense plan for a hypothetical food facility
- Tools need to be address the differences (Table 1) from Food Safety
- FDA Food Defense Plan Builder is a useful tool – takes them through the process step by step
- CARVER + Shock analysis (Table 2) would also be conducted for each facility

Table 2: CARVER Shock Attributes (adapted from Mitenius et al, 2014)

Attribute	Description	Question
C	Criticality	Do I hurt the economy, health, ability to fight?
A	Accessibility	How close? How easy to get to? Physical access
R	Recuperability	How quickly can they rebuild?
V	Vulnerability	Can I damage the target? Is it hardened? Guarded?
E	Effect	Do they have backups or alternatives?
R	Recognizability	Can we recognize and find the target?
Plus	Shock	Psychological effects? Women and children?

Discussion

- Students in Food Safety do not feel they currently have an adequate grasp of Food Defense, but most feel it would be useful to them in their future careers and wish to expand that knowledge.
- Student interest in Food Defense would be increased if they could receive certification that they could leverage upon entering the work force.
- The similarities of Food Safety mean the existing teaching framework can be used, but requires the integration of information and tools unique to Food Safety.

Conclusions

- Both Food Safety and Food Defense require assessing the current situation, hazards/threats, and determining control or mitigation strategies.
- Students require training in this area considering the current climate in the food industry and regulatory agencies, and their current lack of knowledge.
- Students DESIRE more education in Food Safety.
- FDA provides several online tools that can be integrated into a university course on Food Safety.

References

1. FDA. 2017. <https://www.fda.gov/food/fooddefense/>
2. Mitenius, N., Kennedy, S.P. and Busta, F.F. 2014. In *Food Safety Management* pp. 937-958.
3. Norton, R.A., Wright, J.C. and Ostrowski, S. 2017. HDIAC 3(4): 17-25.