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## **Smoking and Grilling Foods: Enhancing Learning through a Collaborative Multi-Disciplinary Approach**

### **Abstract**

Smoking and grilling foods is very popular across the U.S. Despite the popularity, many individuals have limited knowledge of safe food handling practices, meat selection, and specific cooking techniques. In 2019, a Family and Consumer Sciences Extension Educator and an Agricultural Livestock Extension Educator collaborated to develop a cross-discipline hands-on smoking and grilling foods program intended to build knowledge, skill, and confidence in participants through an interactive format. This program successfully trained 146 adult participants in six workshops. This program facilitated the opportunity for each Extension Educator to reach a population demographic that is typically underserved through their regular Extension programming.

### **Introduction**

The benefits of collaborative Extension programs are well-documented (Downey and Peterson, 2020). However, designing and implementing programs that pair cross-discipline content may not be as common. Two Extension Educators analyzed individual program area demographic data and recognized a gap in audience gender balance;

Family and Consumer Sciences (FCS) programs reflected a much higher female participation while Agricultural Livestock (AL) program participants were predominantly male. This analysis ignited the development of a smoking and grilling foods program that combined FCS and AL education for one captive audience to improve gender balance for each Educator.

Smoking and grilling have been long-standing popular cooking methods during summer months for home food preparation (Chojnacki, 2021). These cooking techniques create a unique flavor profile for food and have become increasingly popular. This growing interest in these cooking techniques has turned a once-seasonal food preparation method into one that is now used year-round. Unfortunately, foundational food handling guidelines are not always known or followed by home food preparers (Sharma and Radhakrishna, 2015). The Centers for Disease Control and Prevention (2022) estimates that 48 million Americans will become sick from foodborne illnesses each year.

According to the Partnership for Food Safety Education (2020), the reported 255% surge in fresh meat sales from 2019 to 2020 could indicate an increase in individuals grilling meats. A lack of knowledge in proper food handling can make food safety concerns arise throughout food preparation, consumption, and storage (Langiano et al., 2012). Improper food handling, including cross-contamination risks, are a primary concern when preparing food in any method, including using a smoker or grill (Evans et al., 2020). When preparing meats, additional high-risk food pathogens become a concern if meat is not handled properly or cooked to a safe minimum internal temperature.

Additionally, many adults have limited knowledge regarding factors that affect end-product quality including selecting meat cuts and cooking meats (Blair et al., 2016). These factors can impact the food quality when cooking is complete. These include understanding the United States Department of Agriculture (USDA) quality grades, cut selection, degree of doneness, the importance of resting, and the impact of slicing direction (DeVuyst et al., 2014).

## Methods

In November 2019, a cross-discipline, hands-on *Smoking and Grilling Foods* workshop was designed and implemented to educate clientele to better understand meat cuts and food safety factors when purchasing and handling foods for smoking and grilling. This pilot program was co-taught by Extension Educators with an emphasis in FCS and AL programming. A local caterer also partnered to deliver educational information and demonstrations. At this initial five-hour program held in Marsing, Idaho, 22 participants (17 males and five females) were provided lecture, demonstration, and hands-on educational content focused on meat science and selection, food handling and safety, USDA meat quality grades and the distinction between the two different cooking methods.

This program utilized research-based information from the Centers for Disease Control and Prevention (CDC), the Partnership for Food Safety Education, the U.S. Department of Agriculture Food Safety and Inspection Service (FSIS), *Livestock and Carcasses* 5th edition (Boggs, et al., 1998), and the [beefitswhatsfordinner.com](http://beefitswhatsfordinner.com) website to develop PowerPoint presentations and talking points used throughout the lecture content. Participants were provided with a folder containing class materials. These included handouts such as a spice flavor profile sheet, recipes of food made and sampled in the class, and a refrigerator magnet containing information that indicates degree of doneness temperature recommendations for different meats.

Based on the positive feedback from the pilot program, this team continued to design and offer a program where participants receive lecture, demonstration, and hands-on education. Participant feedback from the pilot contributed to the program's adaptation into a six-hour long program divided into a two-session class to properly accommodate the lecture, demonstration, and hands-on components, featuring the experiential learning philosophy (Sanders, 2010). The workshop was structured to allow participants an opportunity to trim, season, and cook their own tri-tip and pork loin meat cuts to then sample in the class. Throughout the hands-on cooking that took place in this program, participants were also encouraged to follow food safety handling practices such as washing hands, using different cutting boards and trays for raw and cooked food

products, washing utensils throughout the process, and using a thermometer to check for the internal minimum temperature recommendations for meat products.

This two-part workshop included multiple meat-trimming demonstrations and a discussion of the use of added flavors through rubs, spices, and sauces when smoking and grilling foods. Included was a homework activity where participants were asked to build their own rub to bring to the second class of the program where participants trim and season a tri-tip beef cut prior to grilling and consuming the meat. In addition, a live brisket trimming demonstration was performed during the program, and a fully cooked brisket was sampled at the completion of the workshop. This program structure contributed to attaining knowledge, skill, and confidence-building in participants. The emphasis on these factors was intentionally structured to accommodate multiple learning styles. At the conclusion of the program, an IRB-approved post-program evaluation was offered to participants who completed the program.

## **Results**

To date, the *Smoking and Grilling Foods* program has educated 146 adult participants in southwest Idaho. Of these unique contacts who have completed one of the six separate programs this team has taught, 129 individuals responded to the anonymous and voluntary retrospective survey, which included a demographics question set. Of these respondents, participants ranged from 18 years of age to over 65 years of age, with 30% of respondents between the ages of 55-64 years. Respondents self-reported their ethnicity as 92% Caucasian, and 2% Hispanic. Of those who completed the survey, fifty-seven percent (57.36%) were male.

The evaluation contained questions addressing knowledge gain and intended behavior change surrounding meat science, consumer-level meat purchasing decisions, and food handling and safety practices. As a result of this program, a drastic shift occurred in participants' thermometer usage habits. Prior to their involvement in the program, only fifty-seven percent (56.5%) of respondents reported always or almost always using a thermometer and fourteen percent (13.9%) reported never using a thermometer when

cooking. Post-program, 92% of participants expressed intent to always or almost always use a thermometer when smoking or grilling meats. No survey respondents expressed that they never intended to use a thermometer, following participation in this program.

Table 1. Mean of participant responses regarding their knowledge and understanding of topics related to smoking and grilling.\*

Question Categories	Before Program	After Program
Meat cuts selection and differences	2.52	3.96
Palatability	3.09	4.25
Thermometer use and food safety	3.31	4.43
Degree of doneness comprehension	3.36	4.27
Grill preparation knowledge	2.99	3.78

\*Answers for each question were given values on a Likert scale ranging from 1 to 5, with 1 representing “Not well at all” and 5 representing “Extremely well”.

The greatest increase in participant understanding after attending this program was comprehension of the selection of meat cuts. This change is represented by a mean increase of 1.44 (Table 1). In addition, participants also demonstrated a noteworthy increase in palatability knowledge increase with a mean change of 1.16 as well as comprehension of thermometer use and food safety with a mean increase of 1.12.

There was also a mean increase demonstrated in the areas of degree of doneness and grill preparation knowledge with increases of .91 and .79, respectively.

Respondents shared intended action following the class, when asked “As a result of this program, please share two things you will put into practice.”

- 40 people stated they now had better knowledge of selecting and purchasing meat, including different cuts and the importance of marbling.
- 40 participants shared that they will regularly implement thermometer use.
- 35 individuals specified they will be mindful or aware of food safety practices including proper preparation, safe handling, cross-contamination, and thawing safely.
- It was indicated 31 times that individuals will use better meat preparation practices, including trimming.

- 31 times it was noted that there would be the creation or incorporation of homemade rubs, seasonings, or writing recipes down.
- The planning to grill or smoke foods more as a cooking method was included a total of 25 times.
- The intent for participants to focus on the degree of doneness and meat quality factors in the process of preparing, cooking, or storing food prepared by smoking and/or grilling was referenced 17 separate times.

Of the open-ended survey responses provided by participants, there were eight separate identifiable practice themes. The top two most favored groups, with an overwhelming 31% of responses, included planning to make better purchases when selecting different meat cuts for smoking or grilling and the use of a thermometer to determine proper internal temperature recommendations when cooking meats. These results demonstrate a strong positive outcome towards this program's primary purposes to educate adult clientele in these two different key topics.

Additionally, 27% of responses indicated that they would take food safety handling practices into account when conducting smoking and grilling cooking methods in the future. As a result of information received in the program, 24% of respondents plan to use better meat preparation practices, including trimming meat cuts, and creating more rubs while writing recipes down and making notes for future use. In the evaluation, respondents were also asked to share if there was something NOT covered during the program that they would like to see included. Multiple survey responses exhibited these five identified themes:

- Cooking Time Recommendations
- Knife Sharpening Methods
- Smoker Appliance Demonstration
- Extracting Higher-Value Cuts from Wholesale Meat Cuts
- Grill Preparation

## Discussion and Conclusions

A significant factor in this program's design and implementation has been the multi-disciplinary approach that coupled an FCS Extension Educator with enthusiasm for food safety and an AL Extension Educator passionate about meat science and smoking and grilling meat to enhance the educational experience of participants across the gender demographic. This team's evaluation validated that the pairing of these two programming content areas, in conjunction with working with a dedicated local caterer, demonstrated remarkable success throughout the last four years. The program's intent was to improve gender balance through meat science and food safety education, and initial survey results demonstrate a 57% male and 43% female participation rate, accomplishing this purpose.

While this program has accomplished the original intent, true behavioral change analysis has not been conducted. Respondents of the survey only assess their individual intended behavior change; this limits the accurate assessment of the true impact of this program. This program's implementation has continued, and a long-term study could be conducted to thoroughly identify behavioral changes.

This collaborative work continues to be developed and implemented, with participant feedback contributing to the ongoing adaptation of the program. As program participants have expressed interest in more in-depth content, there are considerations for offering additional research-based smoking and grilling foods content for Extension clientele to build upon the foundational *Smoking and Grilling Foods* class. Developing a more advanced program could allow for some of the topics identified as not currently covered in the class to be delivered. In addition, this team has presented educators' experiences and lessons learned in this program with other Extension professionals in and outside of the state of Idaho, in hopes of extending the reach of this program's success. By disseminating the program structure, including educational materials developed for this program, other professionals have had the opportunity to easily replicate this program for their audiences.

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