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## Recommendations and Outcomes from the First Artisan Cheese Food Safety Forum

### ABSTRACT

Increasing consumer interest and demand for artisan and farmstead cheese has allowed dairy producers another option for selling and marketing unique milk products from the farm, both locally and nationally. Food safety concerns are often attributed to the fact that many of these businesses are small to very small establishments and may lack the resources, capital, and technical expertise to implement robust food safety programs and related technology. With that, there is an increasing need for artisan cheese-specific food safety education, training, and outreach. The first Artisan Cheese Food Safety Forum was held to foster collaboration among stakeholders representing academia, cheesemakers, regulators, industry and trade associations, retail and foodservice channels, and consultants. The forum was comprised, in part, of a series of presentations that have been previously summarized. In addition, qualitative and quantitative data were collected through a survey tool, a questionnaire, and focus groups to identify research, education and extension needs to proactively advance the safety

of artisan and farmstead cheese. The consortium of 85 participants identified training and outreach opportunities and challenges, developed recommendations for future priorities to address critical food safety concerns, and established collaborative groups to identify and address action items.

### INTRODUCTION

Increasing consumer interest and demand for artisan and farmstead cheese has allowed dairy producers, including those in rural communities, another option for selling and marketing unique milk products from the farm, both locally and nationally. Although no formal definitions have been universally accepted, the words artisan and artisanal are often used to describe cheese that is produced in a traditional manner, in small batches, primarily by hand, and using as little mechanization as possible. The subset of “farmstead” often implies that the cheese is made from milk from the business’s own herd, or flock, on the farm where the animals are raised (1).

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Some practices linked to artisan and farmstead cheese-making, including the use of unpasteurized milk and the production of cheese close to the farm environment, present unique microbiological risks and challenges (4, 5), coupled with concerns that small to very small enterprises may lack the resources, capital, and technical expertise to implement robust food safety programs and related technology. Failure to implement effective food safety practices and programs in the production of cheese from pasteurized or unpasteurized milk on any scale increases the risk of contamination and resulting recalls, illnesses, and outbreaks (10, 11, 12, 13, 14). With sales through non-traditional outlets, including community-supported agriculture, small retail outlets, and farmer's markets, artisan producers are faced with unique traceability and recall challenges. In response, opportunities for artisan cheese-specific food safety education, training, and outreach are increasing.

Collaboration between stakeholders and experts could lead to the development and coordination of activities that deliver effective and harmonized training solutions, science-based risk reduction strategies, and incentives for behavioral change. The first Artisan Cheese Food Safety Forum was held in August 2015 to foster such collaboration by bringing together stakeholders to identify research, education, and outreach needs to proactively address the need for assuring the safety of artisan and farmstead cheese (3).

More specifically, the objectives of the forum were to: (a) develop a consortium of individuals and groups dedicated to enhancing artisan and farmstead cheese safety; (b) identify current artisan cheese safety-related training opportunities and challenges; (c) develop recommendations for future research and outreach priorities that address critical food safety concerns related to the artisan cheese industry; and (d) establish collaborative groups to identify and address action items.

## MATERIALS AND METHODS

### Program development

The forum was a 2-day event, as previously summarized (3). The program consisted of panel sessions of three to five short presentations (~15 minutes; sessions 4, 6, 11, and 12; Table 1) as well as stand-alone presentations (~30–45 minutes; sessions 1–3, 5, 7–10, and 13; Table 1). Sessions were grouped into the following themes: (a) Understanding the Current Situation: Providing an overview of the American artisan cheese industry, current regulatory environments, and new requirements and expectations from the supply chain; (b) Assessing Food Safety Challenges and Opportunities for Training: Overview of current food safety educational offerings and additional needs; (c) Technology Transfer: Overview of artisan cheese focused research and resources available to producers to enhance safety; and (d) Imple-

**TABLE 1. 2015 Artisan Cheese Food Safety Forum Participant Evaluation of Individual**

### Sessions

| Session | Title  | M <sup>a,b</sup>  | SD   | n  |
|---------|--|-------------------|------|----|
| 1.      | Understanding the Artisan Cheese Industry and Food Safety Challenges | 4.01 <sup>a</sup> | 0.98 | 49 |
| 2.      | Understanding the Regulatory Environment                             | 3.76 <sup>a</sup> | 0.91 | 48 |
| 3.      | Channel Challenges: Expectations from the Supply Chain               | 4.05 <sup>a</sup> | 1.01 | 48 |
| 4.      | Overview of FSMA and Its Impact on the Artisan Cheese Industry       | 3.74 <sup>a</sup> | 1.15 | 48 |
| 5.      | Cheesemaker Experiences and Perspectives                             | 4.82 <sup>b</sup> | 0.48 | 50 |
| 6.      | FSMA—Opportunities for the Artisan Cheese Industry                   | 3.87 <sup>a</sup> | 0.86 | 49 |
| 7.      | Training and Outreach  | 4.22 <sup>a</sup> | 0.80 | 44 |
| 8.      | Safe, Quality Cheese the Wisconsin Way                               | 4.28 <sup>a</sup> | 0.82 | 48 |
| 9.      | Guides to Best Practices   | 4.45 <sup>a</sup> | 0.69 | 47 |
| 10.     | Artisan Cheese Safety Research                                       | 4.64 <sup>b</sup> | 0.6  | 48 |
| 11.     | Facility Challenges  | 4.2 <sup>a</sup>  | 0.85 | 47 |
| 12.     | Innovation Center Training and Online Opportunities                  | 4.17 <sup>a</sup> | 0.85 | 42 |
| 13.     | Consulting and Outreach Services                                     | 3.86 <sup>a</sup> | 1.05 | 36 |

<sup>a</sup>Scale of 1 (*not at all valuable*) to 5 (*extremely valuable*)

<sup>b</sup>Means within column with different superscripts are significantly different ( $P < 0.05$ )

menting Change: Exploring ways and incentives to foster behavioral changes that promote cheese safety. Each session included a facilitated question-and-answer period that involved audience participation.

### Participants

A list of ~200 potential speakers and participants was generated by the conference coordinators based on expertise related to the topics to be presented in each session and the overall themes. The list included representatives from the federal government and state departments of agriculture and public health involved in dairy regulation and plant inspection. Representatives from the cheese industry, including producers (large and small), milk advisory boards, dairy associations, cheese councils and guilds, retailers, distributors, and consumer groups, were also identified. In addition, faculty from tribal and land grant colleges and other institutions involved with dairy product education and training were included. A list of graduate students majoring in food or dairy science with a focus on extension, cheese, and/or food safety was also generated. A total of 85 participants were selected for the final cohort.

### Program evaluation

An evaluation tool was developed to collect feedback from participants to determine the effectiveness of the forum in achieving its objectives and addressing the themes. Session and speaker rating sections were included to further assist in planning similar and future events (Tables 2 and 3). Participants were also provided space on the evaluation form for additional comments. In total, 50 (59%) evaluations were returned. Results are displayed as means ( $M$ )/- standard deviation ( $SD$ ).

### Questionnaire

A packet containing open-ended questions was distributed prior to, and upon arrival at, the forum to collect qualitative, case-level data to supplement survey data. Questions addressed forum topics, including the development or improvement of education offerings, to assess the understanding of the state of the industry and its future directions related to food safety. The questionnaire was also used to gather insight into how participants perceive the effectiveness of cheese safety education offerings in changing producer behavior and areas in need of improvement, collaboration, and harmonization (Table 4). Individual responses were collected, codified, categorized, and summarized. A total of 35 (41%) questionnaires were returned.

### Focus groups

Conference coordinators also facilitated focus groups and interviews with conference attendees as an informal qualitative assessment tool to efficiently gather case-level data, insight and opinions, to supplement survey data (2, 7, 18). Discussions focused on identifying: (a) the three main takeaways from the forum, (b) three solutions to challenges addressed, and (c) three approaches to achieving these solutions. Following the forum, conference organizers facilitated additional focus groups and interviews with forum participants from several stakeholder groups representing retailers and foodservice distributors as well as industry associations. These focus groups and interviews were designed to discuss the overall event, the implications, and recommended steps needed as a result of the presentations and input received.

**TABLE 2. Attendee Responses to Evaluation Questions Regarding the 2015 Artisan Cheese Food Safety Forum**

|    | Question  | M <sup>a</sup> | SD   | n  |
|----|---|----------------|------|----|
| 1. | Presenters were clear   | 4.43           | 0.56 | 45 |
| 2. | The amount of allotted time for the forum was sufficient  | 3.79           | 1.25 | 47 |
| 3. | Gaps and solutions to providing artisan/farmstead cheese makers additional resources to address food safety were identified | 4.76           | 0.44 | 45 |
| 4. | The interaction with others at this forum was beneficial  | 4.28           | 1.5  | 50 |
| 5. | My understanding of the state of the industry and its future directions related to food safety improved                     | 4.59           | 0.65 | 46 |
| 6. | The size of the event was appropriate   | 4.85           | 0.36 | 46 |
| 7. | Overall, the forum was very valuable  | 4.73           | 0.54 | 45 |

<sup>a</sup>Scale of 1 (*strongly disagree*) to 5 (*strongly agree*)

**TABLE 3. 2015 Artisan Cheese Food Safety Forum Participant Evaluation of How Well the Forum Themes Were Addressed**

|    | Theme   | M <sup>a,b</sup>  | SD   | n  |
|----|---|-------------------|------|----|
| 1. | Understanding the Current Situation                     | 4.49 <sup>a</sup> | 0.76 | 50 |
| 2. | Assessing Cheese Safety Training and Education Programs | 4.24 <sup>a</sup> | 0.71 | 49 |
| 3. | Technology Transfer                                     | 4.18 <sup>a</sup> | 0.64 | 48 |
| 4. | Motivating Behavior Change                              | 3.4 <sup>b</sup>  | 1.12 | 47 |

<sup>a</sup>Scale of 1 (*poor*) to 5 (*excellent*)

<sup>b</sup>Means within column with different superscripts are significantly different ( $P < 0.05$ )

### Analysis

Evaluation responses were analyzed using GLM ANOVA in SPSS for Mac (version 22, SPSS Inc., Chicago, IL). Questions with a yes/no response were coded 1/0, respectively and compared by occupation with Chi-square tests. Comparisons between evaluation scores for individual sessions were conducted using the Tukey HSD test.

## RESULTS

### Participants

Self-reported occupations/affiliations of the 85 participants were as follows: Educator/researcher ( $n = 20$ ); Cheese maker/owner ( $n = 14$ ); Other ( $n = 14$ ); Distributor/retailer ( $n = 10$ ); Student ( $n = 10$ ); Consultant ( $n = 8$ ); Manager/quality assurance (QA) employee ( $n = 7$ ); Government representative ( $n = 2$ ).

### Program evaluation

There was general agreement that the forum was a valuable conference, the size of the event was appropriate, and the interactions were beneficial, according to general forum evaluation responses (*Table 2*). Successful short-term outcomes included agreement that solutions to providing artisan cheese makers/owners additional resources to address food safety were identified and that understanding of the state of the industry and of its future directions related to food safety were improved (*Table 2*). When asked for additional comments on the evaluation form, participants often noted that the information provided during the forum was valuable and that the event was well planned, with a balanced representation from across the industry (data not shown). Participants agreed that future forums would be beneficial. Suggested improvements included assuring that the proper amount of time is allotted for discussions and brainstorming as well as opportunities for networking. Although the selection of participants and presenters was intentionally structured to provide a balance of stakeholder representation, participants suggested that future forums

include more time for testimonials from cheese makers/owners and promote more active participation from representatives of state and federal regulators.

Participant responses indicated that the forum addressed the target themes very well, with the exception of theme four (Motivating behavior change; *Table 3*), which was rated significantly lower than the others ( $P < 0.05$ ). Participants recommended that future forums focus more actively on addressing the topic of motivating behavior change. Participants rated most individual sessions as very valuable (*Table 1*). There was no overall effect of occupation on perceived value of the sessions. The session profiling cheese maker/owner experiences and perspectives received the highest mean rating (session 5) and should be a key component of similar future forums. This session and session 10 were rated significantly more valuable than all others. Those rated as least valuable were the session on understanding the regulatory environment and the overview of the Food Safety Modernization Act (FSMA) as it pertains to the cheese industry. A summary of the forum and an overview of select presentations have been previously published (3).

### Educational programs or workshops

Twenty of the 50 respondents reported having attended artisan cheese-related food safety workshops. Participants (mostly cheese makers/owners) reported that limitations of time and money were constraints to attending training. The responses of 43 participants indicated that most would be very likely to view online training programs ( $4.16 \pm 0.11$ ) on a scale of 1 [*not at all likely*] to 5 [*extremely likely*]. Ideas for artisan cheese food safety training that would be valuable included increasing the number of educational offerings in general, but more specifically through online and hands-on training with more collaboration between providers, to provide consistency in content. A desire for a qualification and certification system related to cheese-related food safety training was also identified.

**TABLE 4. 2015 Artisan Cheese Food Safety Forum Participant Responses to Questionnaire Questions**

| Question   | Responses <sup>a</sup>   | n <sup>b</sup> |
|--|--|----------------|
| What are your general impressions of the current status of the artisan cheese industry?                                      | Lack of communication between regulators and producers; fear of regulators; uncertainty of regulation                  | 13             |
|  | Need for more education about food safety/implement requirements for food safety education                             | 8              |
|  | Growing industry   | 5              |
| What is your impression of the regulatory approaches discussed? Are there examples of approaches you agree or disagree with? | Disconnect between producers and regulators; need for greater collaboration and positive discussion                    | 11             |
|  | Regulatory approaches do not appear to be science-based; interpretation of science as it informs regulation is lacking | 10             |
| What are your impressions of the cheese makers'/owners' perspective? Are there comments you agree or disagree with?          | Agreement with cheese makers; great panel; impressed   | 9              |
|  | Cheese makers/owners feel threatened; fear regulators and regulatory uncertainty                                       | 6              |
|  | Need for better communication and collaboration between cheese makers/owners and FDA                                   | 4              |
| What are some positives and negatives of the current training and outreach discussed?  |  |                |
| What could be improved?  |  |                |
| Positives:   | Lots of resources available  | 10             |
| Negatives:   | Need to be listed in single place  | 15             |
|  | Need for nationwide offerings  | 6              |
|  | Resources and programs are redundant   | 5              |
|  | Need to modify for producer size and scale   | 5              |
|  | Need to be widely available, advertised, cheap or free   | 11             |
| What are your impressions of the guides to best practices? How can they be best utilized?                                    | Great resource starting point  | 10             |
|  | Adopt as regulation  | 8              |
|  | Great for use as reference or benchmark/audit  | 6              |
|  | Could be used as core curriculum for training, need for training   | 5              |
|  | Need for routine updates over time   | 5              |
| What types of research do you think are needed for the artisan cheese industry?  | More research on the safety of raw milk, cheese, pathogen growth and inhibition  | 10             |
|  | Validation of preventive controls for artisan cheese including traditional techniques                                  | 6              |
| What do you think of online training (including Webinars) and its role in artisan cheese education?                          | Excellent resource, much needed  | 22             |
|  | Best if used as supplement to other offerings  | 10             |
|  | Great for limiting travel and expenses   | 7              |
|  | Interaction is still needed  | 4              |
|  | Better for scheduling and ability to take when time is available   | 4              |

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**TABLE 4. 2015 Artisan Cheese Food Safety Forum Participant Responses to Questionnaire Questions (cont.)**

| Question   | Responses <sup>a</sup>   | n <sup>b</sup> |
|--|--|----------------|
| What are your impressions of the consulting and outreach services currently available? | There is a lot available, more than previously known                                       | 11             |
|  | Need for a singular online portal for resources  | 6              |
|  | Providers need industry knowledge, not food safety generalists                             | 6              |
|  | Services, resources, and training vary in quality and are geographically isolated          | 6              |
|  | Costly, not an option for small producers  | 6              |
| How do you think we can best motivate behavior change among artisan cheese producers?  | Collaboration for training and food safety; mentoring program; food safety not competitive | 10             |
|  | Enhanced access to resources; clear instructions and guides; reduced costs                 | 7              |
|  | Demonstrate return on investment; increased access to, and differentiation in, markets     | 4              |

<sup>a</sup>Responses mentioned by less than four participants are not included

<sup>b</sup>Number of times response was provided among the 35 questionnaires returned

### Questionnaire and focus groups

Responses to open ended questions posed in the questionnaire are shown in *Table 4*. Although responses from focus group discussions are not shown, they generally supported questionnaire responses and inform the following discussion. The three main takeaways from the questionnaire responses (*Table 4*) and focus group discussions (data not shown) centered on regulatory concerns, food safety training, and behavior change. First, there is a perception that the dialogue between the regulatory bodies in the U.S. and artisan cheese producers is disconnected. As discussed during Session 5 (Cheesemaker Experiences and Perspectives), cheese makers are fearful of regulatory bodies and inspectors because of the uncertainty of the regulatory environment and concerns about compliance. The identification of a lack of communication and collaboration between producers and regulators suggests a need for more discussion and greater transparency. Participants also mentioned that regulatory approaches do not appear to be based on science or that there is a need for more transparent interpretation of the science as it informs regulation (*Table 4*). Admittedly, on the basis of discussions and comments, it appears that participants were largely unaware of current research related to their industry, which suggests that this information could be better disseminated. Despite relatively little relevant feedback, there was a clear request for additional research on the safety of raw milk cheese throughout the cheesemaking continuum from milking to sale. With regard to regulation, there is also a need for validated preventive controls, including evaluation and validation of traditional practices (*Table 4*).

Participants appreciated learning of the many opportunities for training available to cheese makers/owners that they were previously unaware of. However, there is a need for more food safety education, including the addition of more in-depth and advanced technical material for those who have completed the more basic levels. It was noted that many institutions offer different content and resource materials (e.g., templates) and that regional workshops are often developed and taught locally without consideration for, or collaboration with, programs in other regions. Similarly, resources developed are not widely disseminated. It was also noted that current materials require modification to be more specific to artisan cheesemakers (e.g., sanitary facility design). Training should also be available to Extension educators as well as regulators and inspectors so that they can better assist processors. This is particularly important in view of the fact that support and knowledge vary greatly across states and regions. As with training, participants were surprised at the number of consulting and outreach services available. However, these services tend to be geographically isolated and most areas remain underserved. There is also concern that consulting services are too costly for the smaller producers and that some providers are simply food safety generalists with little industry knowledge (*Table 4*).

### DISCUSSION

Focus group discussions contributed greatly to the synthesis of potential approaches to address the challenges and opportunities identified. The development of a harmonized training curriculum was frequently suggested

as a solution to the current training challenges identified. Information from the various training materials could be collated and revised to create a common core curriculum to be made available in a format that can be adapted by instructors for specific target audiences. This core curriculum could then be updated annually as part of a train-the-trainers program. It could be comprised, in large part, of the material presented in the guides to best practices discussed during the forum, since it was also recommended that these documents would be made more valuable by being supplemented with training. Participants noted that a centralized or national certification or licensing for cheese makers is a potential role or outcome of training. Another potential solution to increase access to training materials and resources is the development of a centralized online portal containing pertinent information, resources, and toolkits. Regulators could collaborate with producers to assist by developing concise guidance documents on recalls, inspections, and audits.

Factors limiting stakeholder attendance at training programs include distance and time lost to travel. Time away may also reduce productivity in addition to causing direct financial costs (19). Travel also presents ongoing demands of instructor time. As a solution, materials and training could be offered, at least in part, online in an effort to broaden reach and limit costs. Online training also allows users to independently and incrementally complete training around their individual schedules and at their own pace (8). Limiting travel and related costs is particularly important considering that time and money constraints were mentioned as major barriers to accessing training and implementing best practices learned. Distance education and online learning can be as effective as in-person approaches for improving knowledge and should be a promising delivery approach for cheese food safety education for stakeholders of all backgrounds (9, 16). Also, online approaches have been shown to significantly improve knowledge achievement and behavior change when compared to traditional programs (6, 17). Online training tools were perceived as an excellent approach when used as a supplement to in-person workshops or outreach, since interaction was still considered necessary.

The most common suggestion to best motivate behavior change was collaboration among producers. For example, a mentoring program would allow producers to learn from one another and information could be shared with a hands-on approach. Increased access to resources, especially if accompanied by clear instructions and guides, may also help to bring about behavior change. Participants also felt that a clear demonstration of return on investment would be a strong motivator. This could include increased access to markets or a certification to differentiate producers in the marketplace based on food safety training.

Following the first forum, an Artisan Cheese Food Safety Advisory Team was established to address the action items identified, with a focus on resource/website development, online training, and national direct support. This collabora-

tive team includes cheese producers, suppliers, retailers, university faculty, trade association representatives, and other related industry experts. To date, this effort has led to the development of a website ([www.safecheesemaking.org](http://www.safecheesemaking.org)) to serve as a central access portal for forms, templates, webinars, videos, guides to best practice, research articles, and a calendar of events for training opportunities, as well as links to external resources. This site also serves to maintain relevant discussions around the topics identified in the forum and to identify new challenges and opportunities. Through collaborative efforts with the FDA and state regulators, this site will house quick guidance documents on recalls, inspections, and audits, among other summary documents, to effectively communicate inspection and regulatory processes and policies. The team has also collaborated on the development of an online Artisan Cheese Food Safety training course that was launched in 2017. A second harmonized training and outreach program focused on the production and maintenance of food safety plans in compliance with the Food Safety Modernization Act is currently under development and will be piloted in the fall of 2017. This course will be offered across the country through regional trainers and will include interactive hands-on assistance to producers.

## CONCLUSIONS/RECOMMENDATIONS

The Artisan Cheese Food Safety Forum provided a unique opportunity and venue for interaction among a diverse group of industry stakeholders. Participants agreed that it is critical to keep the dialog going by holding future forums. To date, successful outcomes include the establishment of an advisory team to coordinate collaborative and harmonized efforts focused on addressing cheese-focused food safety education and training. Building on the results of the forum, this effort has resulted in the development of a Web site to serve as a central access portal for cheese safety-related content, an online Artisan Cheese Food Safety training course, and an in-person, hands-on training and outreach program focused on the development and maintenance of food safety plans. Based on the success of the forum, the format, approach, and evaluation presented here could be adapted by other industries to identify and address emerging issues, update stakeholders on new opportunities for education and outreach, and allow attendees to network and brainstorm collaborative teams and solutions.

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