

## Industry Perspective on Food Safety -More Questions than Answers

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### A Global Issue

Food safety concerns know no global boundaries. Information is disseminated daily, and even hourly via Internet, which describes concerns ranging from *E. coli* 0157:H7 in American beef to *Listeria monocytogenes* in Greek feta cheese. According to the CDC website (2002), an estimated 1.4 million cases of salmonellosis occur annually in the United States with an estimated 500 or more fatal cases each year. Although these numbers are rather staggering, Hedberg (2001) indicated that pork or pork containing foods were implicated as the source for only 3% of salmonellosis outbreaks reported by CDC from 1990-97. Sarwari et al. (2001) indicated that serotypes impacting human illness may not correlate as well as expected to those found in animals. There remains the question of variable virulence between types of *Salmonella* spp., which might cause one to reconsider treating all *Salmonella* as equals. Investigations into virulence of specific strains of *Listeria monocytogenes* and *Campylobacter* are being conducted as well.

Consumers' awareness of food safety concerns has been increased due to media coverage by newspapers, magazines and talk shows. The regulatory agencies have been feverishly regrouping to try to meet consumer concerns in response to dioxin, BSE and food borne illness outbreaks, some of which have resulted in large, highly publicized recalls. In the United States, change began in the mid-nineties with steps toward required implementation of HACCP in meat plants. This stimulated the promulgation of many other regulations, as well as substantially increased the attention and activity of consumer groups on food safety and policy. These consumer groups are now turning their attention to live animal impacts on food safety. In addition, there has been discussion about coordinating the efforts of agencies that address food safety in the United States as they are covered by a complex set of laws, directives, policies, notices and memos across USDA and FDA (USDA-FSIS, 2003). The Food Safety Council of Japan and the Food Safety Authority in the E.U. are further examples of the desire for centralized oversight of food production systems.

The U.S. has mandated zero tolerance for the presence of *Listeria monocytogenes* or *E. coli* H7:0157, whose presence renders the product adulterated from regulatory perspective. Other countries, such as Canada, have chosen to establish action levels for *Listeria monocytogenes* in low risk products (ICMSF, 2001)

### How Do Quality and Food Safety Fit in a Business Plan?

A better question might be, how does one have a business plan without considering quality and food safety?

### History of Salmonella and Other Pathogen Efforts: Full Circle

Premium Standard Farms began work in preharvest food safety in 1994 just as U.S. researchers were just beginning to examine and evaluate international efforts to reduce *Salmonella* in live hogs, and to work collaboratively to understand methodologies. Efforts were initially focused on applying HACCP principles to farms and feed mills. The steps were charted and flow diagrams completed. As work on the hazard analyses progressed, it became obvious that without clear food safety objectives,

efforts would be fruitless. Also, it was recognized that there simply was not a sufficient understanding of the systems that might impact end product safety. For example, programs implemented in a feed mill could be negated by recontamination in the finisher or by pig to pig contamination in lairage. Given the number of sources for *Salmonella* contamination or recontamination (Wray and Davies, 2003), attempts to reduce in a large system are rather daunting. Surveys have shown farms to be negative, but *Salmonella* isolated from the digestive tract at the slaughterhouse (Boudry, 2002). The mechanisms of keeping farms or entire production systems have not been adequately elucidated or determined to be sustainable.

Because data had not yet been generated to support clear food safety objectives or critical control point in the preharvest sector, efforts were focused on slaughtering practices. Admittedly this decision was driven in part by the USDA-FSIS performance standards and directives. This focus resulted in implementation of technologies such as steam vacuums, carcass pasteurization and intensive visual inspection to comply with these standards. In addition to regulatory concerns, some customers have standards for *Salmonella* on products they purchase. As a result of these interventions, percentages of positive carcasses have been reduced since the initiation of testing as indicated by USDA data (USDA-FSIS, 2000). *Salmonella* prevalence in large plants has declined to 1.7% positive carcasses in swine, a 100 percent compliance rate. Achieving these low levels has allowed reconsideration of preharvest interventions as a possible means to take carcass counts beyond the level they are now. In addition there is still a nagging concern that carcass values may be underestimating the actual product contamination in pork cuts, offal items and trimmings during fabrication and at retail (Duffy et al., 2001; Zerby et al. 1998). It seems logical to work backwards from slaughter toward live pig production through the first step is what is now know as peri-harvest. As a result of research showing the influence of lairage (Hurd, 2001), additional consideration is being given to new controls prior to slaughter.

## **How Does Industry use Research?**

### **-The Chicken and the Egg...**

Production companies must have quality research to facilitate efforts to be proactive regarding food safety risks. Research that is not generated in a well-balanced format may be misused or misinterpreted causing a negative impact on industry. Additionally, it is possible that research may falsely elevate the importance of an issue until it finally becomes a self-fulfilling prophecy. Research must maintain a solid anchor to tangible food safety objectives that are practical and applicable. The validation of intervention strategies across all levels of the food production continuum are a crucial need.

Other forces may cause efforts to be increased in the preharvest area. One example is the focus on the pathogen *E. coli* 0157:H7. What has occurred in the beef industry is a good example of what could occur with any animal borne pathogen. Those companies which grind beef for hamburger and slaughter the cattle are nearly to the point of exhausting the existing arsenal of interventions. This has resulted in increased pressure on the research community as well as on live cattle suppliers to find and implement live animal technologies to reduce the load entering the slaughter facilities. This is a very good example of hurdle technology (Leistner and Rodel, 1976) where efforts must be layered in order to be most effective.

Poultry and egg production, in particular, are also much further along the path of preharvest controls of pathogens due primarily to the concerns associated with *Salmonella* enteritidis. Interventions include competitive exclusion cultures and feed additives. Interestingly, the Danes have specifically excluded competitive exclusion and vaccines from their reduction strategy due to a belief that these might "mask the *Salmonella* problem" (Wegener et. al. 2003)

So why is pork trailing the preharvest progress of these two species with their pathogens of concern? It is primarily due to the lack of a triggering event such as those experienced by other species. Additionally,

pork still does not have clearly established relationships between on farm and product levels of *Salmonella*. However, the identification of antibiotic resistant pathogens such as multiple drug resistant *Salmonella* typhimurim DT104 may serve as an additional catalyst to reduce *Salmonella* levels in swine.

There is also a strong need for researchers to guide industry on testing methodologies, yet it is difficult for researchers to agree on the definitive methods that will represent live pigs, their environment and pork products. Researchers generally use lymph nodes or carcass values as a means to assess post-harvest implications, but these may not be sufficient. Maddox (2003) describes the large number of methodologies that were identified during her search for detection methods. Methodologies that industry can use to track *Salmonella* levels must be rapid, accurate and cost effective.

## **Why is PSF putting An Effort in Verification and Quality?**

Companies around the world are recognizing that they it is impossible to be competitive merely by marketing a commodity such as pork. What started as areas for specialized companies to differentiate themselves has turned into a race to raise the bar and establish the next niche. Once that is accomplished, the competition quickly adopts the same technologies or programs and the hunt is on for the next way to differentiate product in the marketplace. This is driven by demands from export customers as well as by some domestic customers seeking to distinguish themselves from retail giants like Wal-Mart. The U.K. led the way in these efforts with its welfare-friendly and high-palatability programs marketed at stores like Marks and Spencer, and Sainsbury's.

## **Who's Going to Pay for Food Safety?**

Unfortunately most customers are unwilling to pay more for the same product with new food safety enhancements. With rare exceptions such as irradiation, they view these upgrades as a cost of doing business to their supplier. However, as interventions are implemented which add cost, those costs will have to be covered by either revenues or benefits such as improved production or yields. If this does not occur, it becomes an additional component of the cost of the product and is passed on more discreetly through the system. The problem with the latter solution is that unless all companies are forced to implement interventions, costs between them are no longer competitive, penalizing the company attempting to "do right".

Food safety is something that the end consumer understandably views as a right. Those of us in the business of producing food know it is something not to be taken for granted and that there are many steps through the chain of production that will help us control the risks. Objective measurements or performance standards are needed as an incentive for compliance, and to tie live animal efforts to final-product safety.

According to Wegener et al. (2003), the Danes have saved U.S. \$25.5 million in costs to society by controlling *Salmonella* in multiple species. This cost their pork industry almost U.S. \$.08/kg so it is very important that the link between that very real cost and the calculated benefit for society is correct. An additional reason the Danish program has been successful is that it was done on a national scope causing costs to be incurred across all producers.

## **Answering the Questions: What Does Business Need from the Research Community?**

- Evidence of a more concrete relationship between live animal and product levels of pathogens.
- Evidence of the relationship between product levels of pathogens and human illness.
- A systematic evaluation of interventions that are correlated with end product results.
- Cost-effective interventions proven to impact products.
- Validation of existing and new interventions conducted on the farms and in the plants.
- Uniform testing methodology and interpretation of live animals, carcass and finished products.
- A recommendation for a uniform control plan and means to measure results.

- Continued research into the relevance of emerging pathogens (e.g. toxoplasmosis).
- The evaluation of control programs for *Trichina* and *Salmonella* as templates for reduction of other pathogens.

## What Will Define "Safe Pork" in the Future?

Besides the current pathogens of concern, other critical issues may be involved in defining a safe product in the future. These will undoubtedly include the continued focus on antibiotic resistant pathogens and GMO concerns. However, non-traditional components of food production such as product traceability are increasing in consumer importance. Social issues such as antibiotic usage, animal welfare and the environment are being used by consumers to determine their purchasing choices. Researchers and industry must work cooperatively to be proactive in addressing these issues and building consumer confidence in our products.

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