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Food safety initiatives: An overview

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Introduction

Consumer awareness and interest in food safety has risen sharply in recent years. Mr. Bob Howard, director at the National Center for Infectious Diseases in Atlanta, Georgia, was recently quoted in the *Wall Street Journal* as saying, "An incredible awareness has crept into the American consciousness about bacterial and viral infections." This awareness, combined with continued sensationalized media accounts of recent consumer contracted food borne illnesses, has raised the food safety issue to the top of the priority list for those producing meat protein.

This increasingly significant public concern has been expressed from the perspective of regulatory authorities with the passage of stricter food inspection regulations such as the Hazard Analysis and Critical Control Points (HACCP) and Pathogen Reduction Program recently implemented by the United States Food Safety Inspection Service (FSIS).[1] Although FSIS has no direct regulatory authority at the farm level, section 417.2 of this regulation reads as follows: "The hazard analysis shall include food safety hazards that occur *before*, during, and after entry into the establishment...."

These regulatory activities are stimulating much work that is and will continue to improve the food supply. Yet consumer concerns, bold initiatives by global competitors, and individual company desires to protect and differentiate their brands are all driving efforts that go beyond simply meeting the new HACCP regulations. Examples of this attitude can be found in the following statements made by company executives.

Dave Theno, vice president of quality assurance at Foodmaker, Inc., operator and franchiser of Jack-in-the-Box Restaurants said,

> The fact is, not all hamburger meat is created equal. Jack-in-the-Box restaurants' microbial testing of hamburger for 0157:H7 has resulted in the lowest microbial counts in the industry, something no one thought would be possible... One of the key fallacies here is that the new government meat inspection regulations are going to fix the whole problem. Important as they are, the USDA meat inspection regulations won't solve the entire food safety problem. It is only one of the many steps necessary to ensure 'farm to fork' safety in the food chain.[2]

Paul Clayton, president of Burger King North America said,

> We demand that our suppliers live up to the highest standards, even more stringent than the USDA's.[3]

David Heggestad, president of Swift & Company said,

> ISO9002 certification is one step in our commitment to the best food safety and quality assurance system in the industry... With ISO9002, we stay a step ahead of the pack.[4]

Information posted on a Shady Brook Farms web site reads,

> The company's criteria for Grade A labeling are higher than the existing specifications of the US Department of Agriculture.[5]

As the meat industry moves from commodity to branded products with specific attributes and from a supply driven system to a demand driven system, suppliers and retailers begin to have greater expectations of each other and of themselves. Just as USDA raises the bar on food safety, private industry is raising it yet again on both safety and quality. Considering the demand we must generate both domestically and globally to market the volumes of pork being produced, this is happening none too soon.

To maintain customer loyalty and expand markets, companies will focus on presenting both meat quality and safety attributes that differentiate them from their competitors. An additional driver of food safety efforts is the recognition that it only takes one food safety crisis to ruin an otherwise stellar reputation. This paper will review initiatives inside and outside our industry combining food safety efforts with food quality to enhance markets and protect brand image.

Food safety initiatives

Pennsylvania Egg Quality Assurance Program (PEQAP)

The Pennsylvania Poultry Federation has developed a program to address consumer concerns for food safety. The following is excerpted from their "Statement of Purpose":

> The Pennsylvania Egg Quality Assurance Program is a voluntary industry program intended to minimize

> *Salmonella enteritidis* (SE) contamination of chicken (shell) eggs. Although this program does not guarantee shell eggs to be free of SE contamination, the program does assure commitment of the producer to implementation of those management and monitoring practices most likely to prevent SE contamination. Basic preventive measures include placement of SE clean chicks, intensive rodent control, cleaning and disinfecting between flocks, and environmental monitoring of pullet and layer houses with continuous testing of eggs from any environmentally positive houses....[6]

Currently about 85% of the state's commercial laying industry participate in the program.[7] A third party does auditing and monitoring. Although no significant price premiums are being achieved, the program is being used to protect and expand market share. Currently the program is being advertised via cable programming in specific target areas surrounding stores buying non-PEQAP eggs.

Jack- in-the-Box Restaurants: A division of Foodmaker, Inc.

Jack-in-the-Box has made tremendous strides in food safety improvements since the associated outbreaks of *E.coli* 0157: H7 in 1993. Jack-in-the-Box instituted a comprehensive HACCP food safety program during that same year under the direction of Dr. Dave Theno. This program involves both its own procedures and those of its suppliers with routine auditing and monitoring. Testing of hamburger meat occurs every 15 minutes in the batching process. Since 1995 no *E. coli* 0157: H7 has been found and overall microbial levels have been reduced 100-fold. Jack-in-the-Box readily shares its actual testing data with its customers and describes its approach and summarizes its progress on its web site.

Shadybrook Farms: A division of Rocco, Inc.

Rocco, Inc. is the third largest producer of turkeys in the United States. Its Shady Brooks Farm label brand was one of the first to claim differentiation with food safety attributes. Shady Brook was the first poultry company to use the Assur-Rinse (trisodium phosphate) food safety wash on its fresh poultry products. A logo was placed on product sold indicating that the rinse intervention step was used. In addition, the company claims in its promotional material to use only Salmonella-free feed.

DiMare Company, California

This company is one of the largest US suppliers of fruits and vegetables. At a recent meeting I attended on Agri-Chain management, Mr. Thomas DiMare told the audience that each case of product shipped to a customer is labeled with a bar code allowing that product to be traced to the field of origin and to a database detailing all activities and products used on that particular crop.

I had the opportunity to ask Mr. DiMare if his company achieved price premiums for these efforts. His response was that no premiums are being received but the programs will continue because it's the right way to do business. The company does feel these efforts will influence its ability to expand markets in Japan.

Danish Salmonella surveillance and control

Denmark experienced a food-borne illness outbreak in 1993 caused by Salmonella associated with pork. The Danish Salmonella control program was launched in 1995 and involves all producers that produce more than 100 market hogs per year. Herds are categorized based on Salmonella exposure levels determined by ELISA testing of meat juice. Intervention plans are mandatory in herds determined to be high prevalence and special slaughter requirements and penalties are assessed on the worst herds.

Similar programs are now being initiated in other European countries and these food safety efforts will likely become an additional issue for entry of US pork in the future. It is unclear to what degree these programs are affecting our ability to compete with Denmark in the Asian export markets.

Other European pork activities

In the United Kingdom, Farm Assured British Pigs is a program addressing pork quality, food safety, and animal welfare issues with approximately two-thirds of pork producers involved. A private, third party firm operates this auditing and testing program. Certain retail grocers promote the farm-to-store nature of this program.

The Netherlands has a voluntary farm-to-retail certification program called IKB, with two thirds of the producers participating. Auditing by outside parties is a key component. Product traceability is one of several key requirements built into the system.[8]

The above programs achieve no price premiums. Such programs may assure market access and may become a barrier to imports.

Swift & Company, Global Ventures, and Ellison Meats

This past summer, Swift and Company announced that its Worthington, Minnesota pork slaughter plant would be ISO9002 certified by September 1, 1998. In the announcement, the company made the following statement:

> What makes ISO certification really unique is that Swift & Company is pursuing ISO for its entire supply chain... Global Ventures, one of the major hog suppliers to our Worthington plant, is also being ISO certified. So is Ellison Meats, a Pipestone, Minnesota processing plant to whom we supply fresh pork. By September, we'll be able to offer customers value

added pork products that have been grown, slaughtered and further processed at ISO certified facilities.[4]

Intense documentation and training is required for ISO certification. Certification audits, performed by an independent registrar, are required annually. Such certification efforts are in addition to meeting the HACCP requirements of USDA.

Boehringer Ingelheim/NOBL: Guardian Systems

The Knowledge Product Group of Boehringer Ingelheim/NOBL Laboratories Inc. (BI/NOBL) has developed a monitoring, education, and intervention system designed to continuously improve pork safety. This system, known as Guardian Systems, incorporates continuous improvement methods to reduce the risk of pork safety hazards. Guardian is customized to fit the production chain with specific objectives for the hazards of concern and the information flow clearly established for each customer.

The biological pathogens addressed in Guardian include: *Salmonella spp.* during the live animal production and slaughter processes; *Trichinella spp.* during the live animal production process; and general microbial contamination during the slaughter process. BI/NOBL has exclusive rights to serologic tests for Salmonella[9] and Trichinella.[10] These tests provide an objective measurement of exposure to Salmonella and Trichinella. Test results are combined with farm visits to objectively assess risk and strategically assign intervention to the live animal production process.

Guardian can monitor and identify production process concerns which may lead to residues in the pork, depending upon the destination market (export or domestic) and the types of antimicrobials used within the specific production system. Guardian focuses on the feed manufacturing and delivery system and on-farm handling of antimicrobials with audits of the National Pork Producers' Council (NPPC) Pork Quality Assurance (PQA) Level III^{SM} Program[11] and random sampling of feed. Potential physical hazards, such as broken needles, can also be evaluated by Guardian using on-farm visits and auditing of the PQA Level III^{SM} program.

Guardian is comprised of a series of activities including education, site audits, group audits, live animal monitoring, sanitation audits, slaughter plant audits, and processing plant audits. Data from these activities are then evaluated using statistical process control to determine which, if any, areas require intervention.

The foundation of the Guardian System is education of the customer's personnel to the risk factors associated with biological (i.e., pathogens), physical, and chemical hazards in pork production. The increased awareness to risk factors and procedures addressing those risk factors are critical to the successful reduction of hazards associated with pork. The awareness and subsequent compliance to procedures can also impact live animal productivity, resulting in increased profitability for the production system in addition to the food safety benefits.[12]

Site audits include the evaluation of the facilities and procedures at the farm level. The production system is mapped out and terminology is defined to optimize communication. Site audits are performed annually, with additional audits conducted if necessary. Site audits are valued as educational opportunities to allow the introduction of new ideas as well as revisiting other key components.

Group audits are performed on each finishing group, as defined by the production system. Documentation is reviewed; live animals are observed; appropriate samples are collected, and discussions are held with on-site personnel during the group audits. Epidemiologic principles are applied to group audit data to define risk factors. Results of the group audits can be used to evaluate compliance to procedures and for investigating assignable causes of statistical process control (SPC, see below) signals.

Sanitation procedures are monitored at the farm level. Random monitoring of facilities is conducted following sanitation. Re-training on procedures occur as needed.

Culture samples from carcasses and primal pork cuts are collected at the slaughter plant. Pre-operational and operational sanitation SOPs are also monitored and Guardian can provide HACCP verification from qualified HACCP experts. These audit reviews are excellent opportunities for education and training.

Samples for microbial evaluation may be processed at the customer's plant or shipped directly to Guardian for culture and pathogen identification. Serum samples collected in the live animal production phase are transported to Guardian for testing.

Data gathered throughout each step in the system are evaluated via SPC methods. SPC allows for the evaluation of each of the processes within the pork chain with the purpose of continuous improvement for the entire chain. For each process, normal variation is separated from causal variation. Thus, it is possible to determine appropriate intervention targets and establish predictable limits for the particular process. For example, with live animal production, the Salmonella titers can be determined for each finishing system and exceptions to the "normal" variation can be identified and further evaluated. We have identified significant differences in Salmonella titers within systems supposedly operating under common standard operating procedures.[13]

Guardian provides regular reviews of the progress within the customer's system. These reviews are conducted on

the feed manufacturing, sanitation, and live animal production phases. In addition, reviews are conducted with the slaughter and processing personnel as well as management teams for each of the production phases covered by Guardian. These reviews focus on objective data gathered by Guardian, and are intended to provide an indication of the predictability of the entire system and identify specific areas for further reduction of the food safety risks.

Risk communication is also a unique benefit of Guardian. Effective continuous improvement systems for food borne hazards must be combined with effective communication strategies in order to achieve benefits. Guardian has assembled a team with significant experience in risk communication and crisis management related to food safety. This team reviews data and the progress of Guardian that can be utilized to assist with the communication of Guardian; this team also prepares regular updates on current food safety issues in the global pork industry.

By staying current on the issues pertaining to pork safety, the Guardian team can identify areas that may be of value to address in the future. For instance, Guardian continues to develop components to address potential hazards of concern such as Toxoplasma.[14]

The goal of Guardian is to establish and maintain a system for continuous improvement of food-borne hazards so that risks to the customer and eventually the end consumer are reduced. By proactively addressing food safety during live animal production as well as during slaughter and processing, the customers of Guardian are implementing the most comprehensive system available in the industry today. The potential benefits include reduction in food safety hazards, improved live animal production economics, added-value through expanded market share in premium markets, risk management through communication of the Guardian System, and a heightened focus on food safety issues throughout the pork chain.

References

1. USDA, Pathogen Reduction; *Hazard Analysis and Critical Control Point (HAAP) Systems; Final Rule.* Federal Register, 1996. p. 38805–38989.

2. Jack-in-the-Box web site: *http://www.jackinthebox.com/meatsafepr.htm.*

3. The National Food Safety Database Web site: *http://www.foodsafety.or/ht/ht067.htm#sec5.*

4. Press release June 19, 1998: Swift and Company.

5. Shady Brook Farms web page: *http://match.cuisinenet.com/market/shadybrook.*

6. *Pennsylvania Egg Quality Assurance Program Brochure*: revised May, 1994.

7. Personal communication: Dave Henzler.

8. Miller, Marlys, What's Your Competition Up To? *Pork 1997*, November 1997: p. 52–53.

9. Nielsen, B., et al., The serological response to Salmonella serovars typhimurium and infantis in experimentally infected pigs. The time course followed with an indirect anti-LPS ELISA and bacteriological examinatIons. *Vet Microbiol*, 1995. 47: p. 205–218.

10. Gamble, H.R., N. Wisnewski, and D.L. Wasson, Diagnosis of trichinellosis in swine by enzyme immunoassay, using a synthetic glycan antigen. *Am J Vet Res*, 1997. 58(12): p. 1417–1421.

11. Council, N.P.P., *Pork Quality Assurance. A Program of America's Pork Producers. Levels I, II, and III.* 1997, Des Moines, IA.

12. Baum, D.H., et al. Risk factors associated with seroprevalence of Salmonela in Pork. in *Second Int'l Symposium on Epidemiology and Control of Salmonella in Pork.* 1997. copenhagen, DK.

13. Baum, D.H., et al. Evaluating Salmonella seroprevalence in swine herds using statistical process control. in *15th IPVS Conference.* 1998. Birmingham, England.

14. Dubey, J.P., *et al.*, Antibody responses measured by vairous serologic tests in pigs orally inoculated with low numbers of Toxoplasma gondii oocysts. *Am J Vet Res*, 1996. 57(12): p. 1733–1737.