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**ON-FARM SALMONELLA TESTING:  
PERSPECTIVES OF PORK PRODUCERS**

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**Summary**

Pork producers in Kansas were surveyed to determine their attitudes regarding on-farm *Salmonella* testing and to provide estimates of the costs of collecting hide, fecal, or blood samples from live pigs. Veterinarians and Cooperative Extension Service personnel were cited most frequently as the most preferred groups for monitoring and verification. Results of the survey indicate that pork producers may be willing to conduct on-farm *Salmonella* testing, if they can recover the costs of sample collection. The sampling costs ranged from \$1.76 to \$4.72 per pig, depending on the method of sample collection.

(Key Words: On-Farm Testing, Preharvest HACCP, *Salmonella*.)

**Introduction**

Meat safety is best accomplished through an integrated systems approach that links on-farm production, slaughter, processing, and food preparation. Although the current system is coordinated fairly well, a failure at any level of the food chain, including production, could introduce risks and hazards. Because proposed production practices have uncertain costs (and benefits) and can be implemented in various ways, it is necessary to explore producers' attitudes towards implementing the production practices, as well as their costs.

In the USDA's study of the National Animal Health Monitoring System

(NAHMS), nearly 30% of the swine operations in South Dakota, Nebraska, Kansas, Minnesota, Iowa, and Illinois tested positive for *Salmonella*. That study also found that 57% of operations that market more than 10,000 pigs annually were *Salmonella* positive, compared to less than 30% of operations marketing less than 2,500 pigs annually. The Food Safety and Inspection Service (FSIS) of the USDA reported that the average incidence of *Salmonella* on hog carcasses was 8.7%. Therefore, the prevalence of *Salmonella* on pigs as they leave the farm can be significant.

The objective of this research was to determine pork producers' attitudes toward an on-farm *Salmonella* testing program and the costs of development. Such a program could include producer decisions and practices that potentially could influence the food safety assurance process throughout the pork production and processing chain. The intent of an on-farm testing program is to decrease the risk of foodborne illnesses caused by *Salmonella* by reducing the incidence at the farm level. We should note that FSIS is not contemplating an on-farm testing program at the present time.

**Procedures**

Pork producers in Kansas were surveyed to determine their costs of collecting samples for *Salmonella* testing and their willingness to comply with an on-farm *Salmonella* testing program. Two-hundred and ninety members of the Kansas Pork Producers' Council comprised the survey population. Respon-

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dents were asked to provide information about their operation, attitude towards food safety, and how on-farm testing would affect their costs.

Demographic responses, such as the numbers of family and nonfamily employees, provided an indication of the overall size of the operation. Other questions requested that producers categorize their major pork production activities and the number of pigs involved in each process. This information described the size of the pork operation, which can influence the level of pathogens present on the production site. Because an on-farm testing program might be implemented voluntarily and because pork producers have some experience with voluntary quality programs through the Pork Quality Assurance (PQA) program, the survey respondents were asked to indicate the highest level of the PQA program that they had completed.

On-farm *Salmonella* reduction was described before producers were asked to estimate the costs of collecting samples to be tested for *Salmonella*. Three methods of sample collection were described: 1) restraining the pig and collecting a feces sample from the rectum, 2) restraining the pig and drawing a blood sample from the neck, and 3) wiping a sterile gauze pad or sponge against the pig's hide.

After the description of on-farm testing, pork producers were asked what they saw as the advantages and disadvantages of an on-farm testing program. Additionally, the respondents described their level of previous knowledge about *Salmonella* testing as well as their sources for new information on pathogens and food safety. The pork producers were asked to estimate the labor, management, facility, and handling costs of collecting the fecal, hide, or blood sample from five pigs in a pen (converted to a per pig basis by assuming that one pen contained 20 pigs). Therefore, their cost estimates did not include the cost of laboratory analysis of the samples for *Salmonella*.

## Results and Discussion

Twenty-four % of the Kansas survey population returned the questionnaire. Over 95% of these respondents were males and, on average, two family members were employed in the pork operation. Seventy-eight % of the producers had completed PQA Level III certification. They reported annual average sales of 9,975 head.

An on-farm *Salmonella* testing program likely would require monitoring or verification of sampling and testing information. Figure 1 illustrates the producers' preference for groups to conduct verification and monitoring. Veterinarians and Cooperative Extension Service personnel were most preferred, whereas USDA personnel from either the Animal and Plant Health Inspection Service (APHIS) or the FSIS were less preferred to conduct the verification activities. Kansas producers also indicated relatively high levels of preference for private consultants and slaughter plant scientists.

The respondents' attitudes about food safety and their willingness to participate in on-farm tasks designed to increase food safety also were examined. Many producers believed that they can improve the safety of pork products on the farm. Figure 2 shows that 35% of Kansas producers believed that on-farm activities can "greatly increase" pork product safety, but over 60% of producers believed that they can only "marginally contribute". However, all respondents indicated that they would comply with requests from slaughter plants for changes in their production process. Approximately 60% of the Kansas producers indicated that they would expect a premium for compliance, whereas the remaining 40% were willing to comply without a premium.

Various types of on-farm testing can be used to detect the presence of *Salmonella*, and the costs are likely to differ for each based upon the pork producers' facilities and labor availability. Pork producers' decisions to participate in an on-farm *Salmonella*

testing program will not only be influenced by the costs of collecting samples from their swine herd, but also will be a function of their belief that the program, in fact, will reduce the prevalence of pathogens in the pork supply, their willingness to work with those administering the program, and their familiarity with foodborne pathogens.

Producers were asked to describe their knowledge of on-farm *Salmonella* testing. Most of the producers indicated that they had either never heard about on-farm *Salmonella* testing or knew very little about it. The majority of the Kansas producers indicated that most of their previous knowledge about on-farm pathogen testing was obtained from producer trade magazines and newspapers.

After reading the statement describing on-farm *Salmonella* testing, producers were asked to select from among six options the one they believed to be the single greatest benefit to on-farm *Salmonella* reduction. Over 50% of the Kansas producers identified safer pork products (Figure 3). However, nearly 10% of the Kansas producers reported no benefits to an on-farm *Salmonella* reduction program.

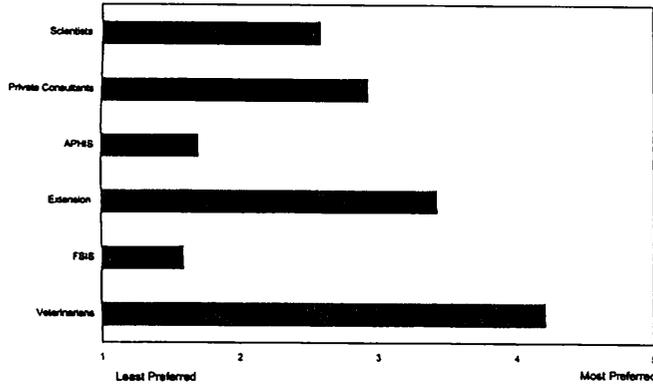
Over 40% of the producers identified live pig sampling costs to be the greatest disadvantage to an on-farm pathogen reduction program (Figure 4). Other producers identified feed sampling, animal identification, or record keeping as the greatest disadvantage, as well as other disadvantages such as inconvenience and time.

Testing a hide sample for *Salmonella* indicates if the pig has been exposed to feces containing *Salmonella*. Blood samples are tested to determine if the pig is producing an immune response to disease. A fecal sample

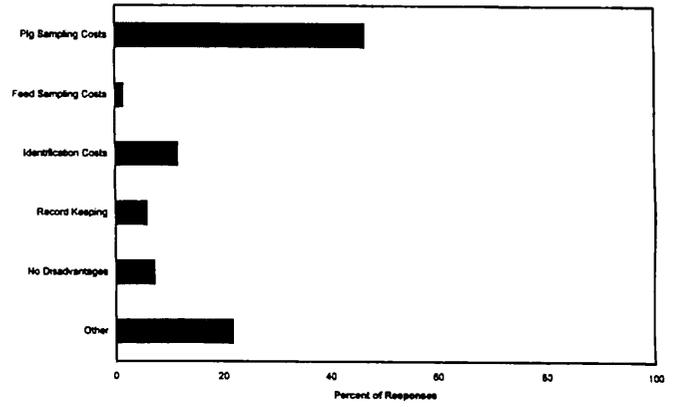
test measures exposure to disease or the amount of *Salmonella* being shed by the pig. One of the main goals of the pre- and postharvest Hazard Analysis and Critical Control Points (HACCP) program is to reduce the amount of fecal contamination on pigs and carcasses, so testing hide samples (rather than fecal or blood samples) for pathogenic *Salmonella* would most closely meet this goal.

The costs of collecting samples that producers were asked to estimate reflect increased labor, facilities, and management expenses, not the laboratory costs of analyzing the sample for *Salmonella*. Kansas producers estimated the costs for collecting hide, fecal, and blood samples to be \$1.76 per pig, \$2.14 per pig, and \$4.72 per pig, respectively (Figure 5). The differences in the costs for the three methods of sampling were not statistically different, because of the small sample number and high variability in responses.

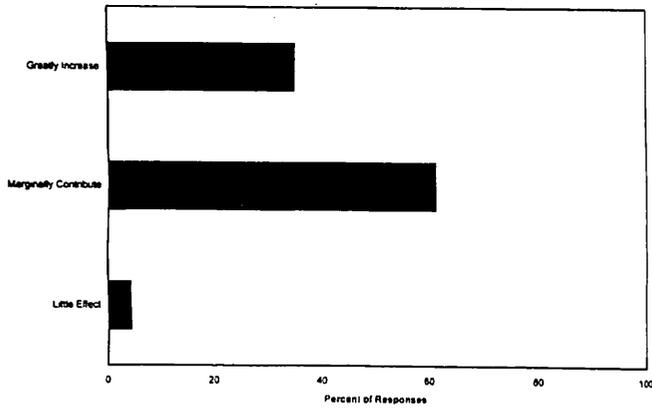
Current research is studying whether the implementation of on-farm *Salmonella* testing will significantly contribute to reducing *Salmonella* in the pork supply. Although the pork producers generally indicated a willingness to participate in on-farm *Salmonella* testing if they were compensated for doing so, few of the producers surveyed possessed a substantial knowledge of the process. Therefore, if on-farm *Salmonella* testing is to be adopted, more education is needed. Pork producers' preference for veterinarians and the Cooperative Extension Service personnel to conduct verification and monitoring of an on-farm *Salmonella* testing program suggests that these groups would be favorable choices to develop and conduct an education program.



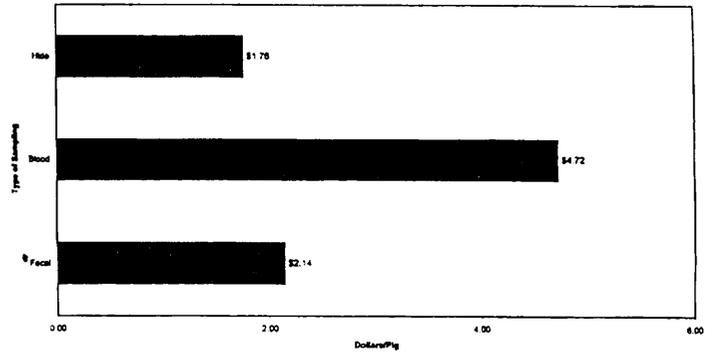
**Figure 1. Preference for Verification and Monitoring.**



**Figure 4. Greatest Disadvantage of On-Farm *Salmonella* Testing.**

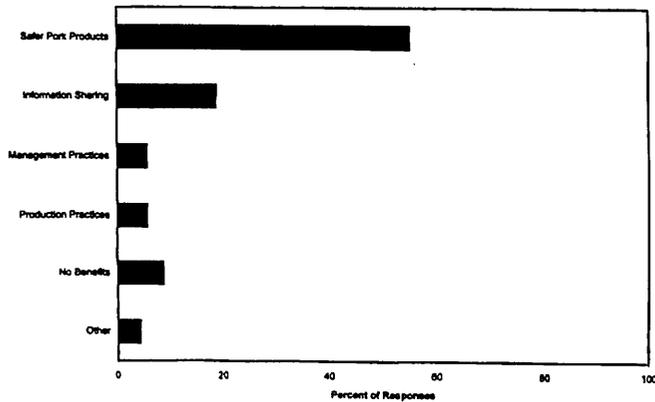


**Figure 2. Ability to Improve Pork Product Safety on the Farm.**



\*These cost estimates represent on-farm sampling costs and do not include laboratory costs.

**Figure 5. Live Pig Sampling Costs.**



**Figure 3. Greatest Advantage of On-Farm *Salmonella* Testing.**