

## WILLINGNESS TO ADOPT HACCP: GOAT PRODUCERS SURVEY RESULTS

LATISHA NETTLES and JAMES O. BUKENYA  
Graduate Research Assistant and Assistant Professor, respectively  
Department of Agribusiness, Alabama A&M University  
Address: P.O. Box 1042 Normal, AL 35762; Tel: 256-372-5729  
E-mails: [nettles@aamu.edu](mailto:nettles@aamu.edu); [james.bukenya@email.aamu.edu](mailto:james.bukenya@email.aamu.edu)

---

### Introduction

The U.S. farm structure is continuously changing—modern food is now produced by large farms, processed industrially, and sold in supermarkets and multinational food outlets (Sanders, 1999; Hennessy, Hedberg, Slutsker, White, Besser-Wiek, Moen et al., 1996). Although modern food production has reduced the cost and increased the variety of foods available, this centralization of the food supply has increased the likelihood of food borne pathogens and toxins to infect and poison large numbers of consumers. Today, progress in combating food borne disease has been largely offset by several comprehensive trends, including increasing population (especially in urban areas), growing consumer demand for foods of animal origin, longer food distribution networks and many basic changes in the way food is produced, transported, processed, prepared and consumed (FAO, 2000). Globalization has also played a major role. Foreign buyers who demand high safety standards tend to test products for safety and pay premiums or guarantee sales for safer producers (ERS, 2004).

To help United States producers maintain their competitiveness on the global market, the U.S. Department of Agriculture recommended the application of Hazard Critical Control Point (HACCP); a technique designed to prevent food safety problems instead of finding problems after they occur (FSIS, 1998; USDA, 1996). In 1998 the agency mandated all meat processors and packers to operate under a HACCP plan. The producers' responsibility, under the processor and packer's HACCP plan, is to supply processors and packers with animals that are free from antibiotics and chemicals (pesticides), as well as free from physical hazards such as broken needles and other foreign objects. To meet this responsibility, large livestock and poultry producers (e.g. Coleman Natural Meats) have voluntarily incorporated HACCP in the

residue avoidance sections of their animal and poultry quality assurance programs (Bailey, Cox and Stern, 1995; Perkins, 1998; Smith, 1999).

Unfortunately, small livestock producers (particularly goat producers) have shown no efforts to voluntarily adopt this technique. Preliminary results from large animal and poultry producers that have voluntarily incorporated HACCP show impressive results. For instance, very low incidences of violative residues in meat and poultry have been reported for the overwhelming majority of slaughter classes<sup>1</sup> (Roybal, 2002).

The absence of HACCP in the small industries, such as the goat meat industry, poses major risk concerns to the issue of food safety. The focus of this paper therefore, is to examine whether or not goat producers are willing to voluntarily adopt HACCP techniques. To address this issue, the paper starts off by defining HACCP and its application to animal production. Next, some background information on the goat industry is discussed followed by the data description. The survey results presented followed by the conclusions in the last sections.

### Defining HACCP

The Hazard Analysis Critical Control Point (HACCP) concept is a systematic approach to the identification, assessment and control of hazards in a particular food operation (Pierson, 1995). HACCP aims at identifying problems before they occur and establish measures for

---

<sup>1</sup> The USDA data shows that salmonella prevalence in 1998-2001 dropped in cows and bulls from an average of 2.7% before HACCP implementation to 2.2% after implementation. For steers and heifers, the average fell from 1% to 0.4%; ground beef from 7.5% to 3.4%; ground chicken from 44.6% to 15.7%; and ground turkey from 49.9% to 29.2% (Roybal, 2002).

their control at the critical stages of production to ensure food safety. Perhaps the most important part of the HACCP definition is one for Critical Control Point (CCP): a point, step or procedure at which control can be applied and a food safety hazard can be prevented, eliminated, or reduced

to an acceptable level. Control is proactive; since remedial action is taken in advance of problems occurring. Table 1 shows the preliminary steps and principles necessary for the application of HACCP.

Table 1. Steps and principles for the HACCP application

Preliminary Steps	Principles
1. Assemble the HACCP team.	1. Conduct a hazard analysis. Prepare a list of steps in the process where significant hazards occur and describe the preventive measures.
2. Describe the food and the method of its distribution.	2. Identify the CCPs in the process.
3. Identify the intended use and consumers of the food.	3. Establish critical limits for preventive measures associated with each identified CCP.
4. Develop a flow diagram which describes the process.	4. Establish CCP monitoring requirements.
5. Verify the flow diagram.	5. Establish corrective action to be taken when monitoring indicates that there is a deviation from an established critical limit.
	6. Establish effective record-keeping procedures that document the HACCP system.
	7. Establish procedures for verification that the HACCP system is working correctly.

Source: Pierson, 1995

### HACCP Application to Animal Production

While not a regulatory standard for the North American livestock production industry, an increasing emphasis on HACCP by food processors and export customers necessitates the voluntary adoption<sup>2</sup> of this technique by all sectors of the livestock industry to retain their competitiveness. To guide producers adopt this technique, the USDA-FSIS (FSIS, 1998)

<sup>2</sup> An example of a voluntary HACCP plan for livestock production is the Coleman Natural Meats. Coleman's HACCP plan covers animal production, slaughter, processing and shipping. The animal production component includes the ranch, live animal shipping, feedlot, shipping to slaughter, and receiving (Rice, 1993).

established a food safety program (Animal Production/Preharvest Food Safety Program) to work with livestock producers and scientists to design and implement measures prior to slaughter (preharvest) that will improve food safety (Lautner, 1995). Similar efforts that hold enormous promise for developing food safety preventive programs for livestock producers are found in the *live animal segment* of the farm-to-table continuum. Today, several interventions at the animal production stage have been proposed for the control of food borne pathogens including animal trace back, replacement progeny, vaccination, environment control, diet, feed/water, competitive exclusion and handling during transport (Pierson, 1995). These interventions, however, need considerable research before they could be applied on a

practical basis in a HACCP system for actual animal production.

### **Goat Meat Industry**

In the last ten years, the focus of the goat industry in the U.S. has shifted from one of primarily fiber production to emphasize meat production (Pinkerton, Harwell, Escobar, and Drinkwater, 1993; Pinkerton, Harwell and Drinkwater, 1994; Pinkerton, 1995). This is because the portion of the American population that has a taste for goat meat has been increasing. Domestic slaughter and imports continue to rise annually, and goat meat that was once exported to Mexico, Canada, and the Caribbean is now being consumed in the U.S. (Miller, 1999). Although goat meat appeals to health-conscious consumers, the primary purchasers are members of ethnic groups, especially Hispanics, Muslims, and various Caribbean, African and Asian peoples. These minority populations are beginning to increase in most southern cities and townships including, Nashville in Tennessee, Birmingham and Montgomery in Alabama, and Atlanta in Georgia. The U.S. Census Bureau projects that by 2050, Hispanics will account for 57 percent of the immigration into the U.S., and that Hispanics will account for 25 percent of the U.S. population (U.S. Census Bureau, 1998). These projections support the notion of an expanding goat meat market; and since the goat meat industry is not impervious to pathogens that cause food borne diseases, the trend adds a new dimension to the issue of food safety, and early intervention is imperative.

Like other livestock, goats often contract Salmonella and E. coli on the farm and in feedlots. Pathogens can also be introduced into goat meat in slaughter plants, processing procedures, equipments and sanitation facilities, which in turn increase the risk of food borne illnesses. One way through which slaughter plants and processors can reduce the likelihood of producing goat meat with high levels of pathogens is if goat producers provide them with livestock that are free of pathogens. Regrettably, there have been little or no studies on food safety in the goat industry. The invisible hazards and inconsistent information about food borne risks associated with goat meat makes food safety an unpredictable problem that can disrupt markets and cause substantial economic losses for everyone from farm input suppliers to consumers. Thus, efforts to encourage goat

producers to adopt production practices that are consistent with the HACCP systems are paramount.

### **Data**

The data were drawn from a food safety education project for small ruminant producers funded by the USDA Food Safety Inspection Services (FSIS). The data were collected among goat producers using a survey questionnaire that was administered during goat workshops, auctions and producer association meetings in Alabama and Tennessee. Prior to answering the questionnaire, respondents were provided with a description of HACCP and its use in livestock and poultry slaughtering and processing plants; its advantages and the necessary adoption costs (training cost, implementation costs, and monitoring costs). Producers were also informed that HACCP was a completely voluntary program among animal producers and that if adopted, HACCP could increase or retain their competitiveness on the market. Based on this information goat producers were asked to answer the following questions:

*If HACCP as described was recommended to you: (a) would you be willing to voluntarily adopt the technique? (Yes/No response). (b) If you answered Yes to question (a), would you be willing to incur the necessary costs to ensure the safety and quality of your product? (Yes/No response). If you answered Yes to question (b) assuming these costs are deductible from your expected annual FARM profit, what percentage of your FARM profit would you be willing to forego to meet these costs (possible responses: 5%, 10%, 15%, 20% or 25% of annual farm profits). If you answered No to question (b), would you be willing to adopt HACCP if there is no adoption costs involved? (Yes/No response).*

The questionnaire also collected information related to producers' demographics, farm characteristics, production practices and producers' attitudes towards food safety. In total, 198 questionnaires were collected, but only 166 were usable.

### **Survey Results**

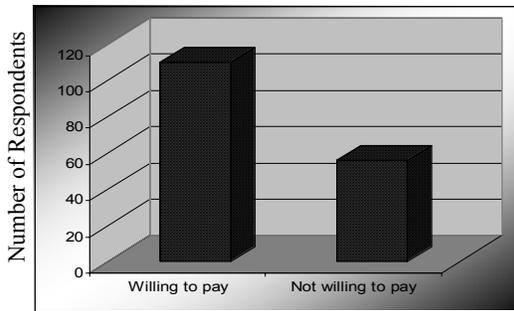
This section presents and discusses basic summary information on the results of the survey of particular interest for HACCP. Figures 1-2 report summary results of the survey for the

willingness to pay for HACCP training and willingness to adopt HACCP questions.

**Willingness to Pay**

More than half of the respondents expressed willingness to adopt HACCP, with about 110 of the respondents indicating a “yes” response while 56 indicated a “no” response. This high number of willing respondents may be an indication of prior knowledge or familiarity with HACCP or at the same time might be an indication of a strong resolution among goat producers to protect the emerging goat industry. With a population of over 600 goat producers in Alabama and Tennessee, and extrapolating to the state levels, these percentages add up to a substantial number of producers willing to adopt HACCP.

Figure 1: Willingness-to-Pay for HACCP Training



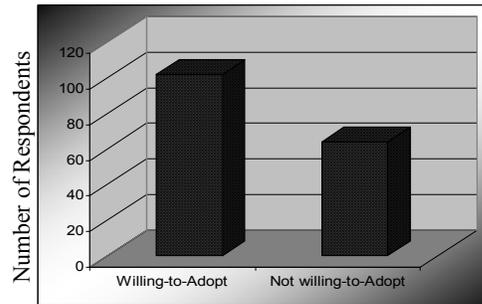
**Willingness to Adopt**

For respondents who answered no to the willingness to pay question, the questionnaire included a question asking if they would be willing to adopt HACCP if it enhanced market value. The responses to this question are presented in Figure 2. As shown in Figure 2, 61 percent of the respondents (102 producers) expressed willingness to adopt HACCP. This high number of willing respondents may be an indication of prior knowledge or familiarity with HACCP or at the same time might be an indication of a strong resolution among goat producers to protect the emerging goat industry. To the contrary, 31 percent of the respondents expressed no desire to adopt HACCP.

**Bid**

The respondents who answered yes to the willing-to-pay question were asked to indicate the percentage of their expected annual profit that they would be willing to forego to pay for HACCP training. [The follow-up question was asked under the assumption that the cost of this training is deducted from goat producers’ expected annual profit from their operations]. The possible percentages offered to the respondents were 5, 10, 15, 20 and 25 percent. Out of the 110 goat producers who had answered yes to the willingness to pay question, 31 percent were willing to forego 5 percent, 39% indicated 10 percent and 31 percent indicated 15 percent. None of the respondents were willing to forego more than 15 percent of their expected annual profits.

Figure 2: Willingness-to-Adopt HACCP



**Pasture**

Pasture availability can be a limiting factor in production size, therefore limiting the amount of income a producer can make. As shown in Figure 4, 28 percent (48 producers) pasture size falls within the range of 5 to 10 acres. The second highest is over 40 acres, at 21 percent (35 producers). This brings about the question when referring back to Figure 4-8, income, do the producers surveyed in this study use all 40 + acres for goat production.

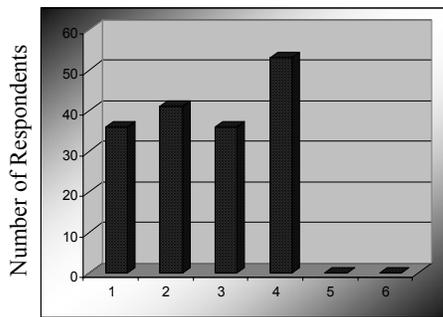
**Health**

This variable explains whether a producer has experienced death among his or her herd for any reason. However, this variable does have other determining factors such as age of goat, diet and sporadic environmental factors such as, predators and weather. There is almost a 50 percent chance that a producer will experience mortality among his/her herd.

## Marketing

As shown in 4, 32 percent of producers sell their livestock directly to slaughter plants. This may be due to the fact that it is easier to sell parts of a carcass rather than a whole carcass. It is shown also that 25 percent of producers sell directly to consumers. In literature, it is shown that most people that purchase goats are of Caribbean, African or Hispanic ethnic background. These populations mainly purchase whole carcasses for special occasions. Some prefer to slaughter their own goat, whether for ritual or the idea of eating freshly slaughtered meat, as opposed to frozen. Direct sale to traders and local auction make up 44 percent of all sales for goat producers. None of the surveyed producers responded to the use of special auctions which included clubs, associations and cooperatives.

Figure 4: Marketing techniques



### Notes:

1 = Direct (on farm) sales to traders; 2 = Direct (on farm) to consumers; 3 = Local auction; 4 = Local slaughter plant; 5 = Special auctions (clubs, associations, cooperative, etc.); 6 = Other

## Association

Out of the 166 producers that responded 38 percent belong to one of more of the following: Meat Goat Association, American Boer Goat Association, United States Boer Goat Association and International Boer Goat Association. About 45 percent (74 producers) of the producers surveyed belonged to Dairy Goat Association. This has implications that of the 166 producers surveyed were 74 most likely primary goat milk producers. The other 17 percent belong to the American Dairy Goat Association and/or other goat producers associations or clubs.

## Demographics Characteristics

From the total sample of 166, 23 respondents did not answer this question. About 57 percent of goat producers report gross farm income less than \$25,000, about 23 percent report gross farm income levels between \$30,000 and \$50,000 and a little over 13 percent report gross farm income levels over \$50,000. The gross farm income distribution obtained in this survey is very consistent with gross farm income information derived from the US Agricultural Census for Alabama and Tennessee. This is another indication that the results obtained through this survey are reasonably good.

In terms of education, over 80 percent of goat producers completed at least high school and about 12 percent had post-graduate training. This racial breakdown suggests that about 71 percent of goat producers in the study region are white; although recent trends show that the number of minority producers, especially in Alabama is steadily increasing.

## Conclusions

The paper summarizes survey data drawn from a food safety education project for goat producers in Alabama and Tennessee. The survey results reveals a diversified set of preferences among goat producers with more than half of the respondents indicating their willingness to pay and to adopt HACCP practices. In the event of implementing HACCP in the goat production, it is necessary to consider the role played by each of these variables.

*Limitations:* The major limitation of this study is related to survey data. Particularly, problems associated with data collection, coverage errors, non response due to lack of cooperation of the respondents or errors in framing the questions to solicit the needed information, and measurement errors which may arise as a result of faulty responses due to unclear questions, memory errors, deliberate distortion, inappropriate informants, and errors in recording of responses.

## Reference

Bailey, Stan N. Cox, and N. Stern. 1995. "Risk Management Factors Associated with Implementation of HACCP in the Poultry Industry." Paper presented in Association with the 75th Annual Meeting of the Conference of Research

- Workers in Animal Diseases. Chicago, IL (November 12).  
<http://www.cvm.uiuc.edu/HACCP/Symposium/title.htm>
- ERS, 2004. "Food Safety Innovation in the United States." United States Department of Agriculture.  
<http://www.ers.usda.gov/Publications/aer831/aer831h.pdf>
- FAO, 2000. "The State of Food and Agriculture 2000." Food and Agriculture Organization of the United Nations, Rome.  
<http://www.fao.org/docrep/x4400e/x4400e00.htm#TopOfPage>
- FSIS, 1998. "Pathogen Reduction and HACCP Systems...and Beyond: The New Regulatory Approach for Meat and Poultry Safety." Food Safety and Inspection Service United States Department of Agriculture, Washington, D.C.  
<http://www.fsis.usda.gov/OA/background/bkbeyond.htm>
- Hennessy TW, Hedberg CW, Slutsker L, White KE, Besser-Wiek JM, Moen ME, et al. 1996. "A national outbreak of Salmonella enteritidis infections from ice cream." *New England Journal of Medicine*, 334: 1281-1286.
- Lautner, Beth. 1995. "HACCP: Its Application for the Pork Industry." Paper presented in Association with the 75th Annual Meeting of the Conference of Research Workers in Animal Diseases. Chicago, IL (November 12).  
<http://www.cvm.uiuc.edu/HACCP/Symposium/TITLE.HTM>.
- Miller, Marie. 1999. "The NSW Goat Meat Industry." Goat Market Focused Plans Forequarter.  
[http://www.agric.nsw.gov.au/Sheep/speciality/\\_goat1.htm](http://www.agric.nsw.gov.au/Sheep/speciality/_goat1.htm).
- Perkins, Doug. 1998. "Get In The HACCP Habit." Retrieved on June 21, 2004, from  
<http://www.keepmedia.com/ShowItemDetails.do?itemID=174971&extID=10032&oliID=213>.
- Pierson, Merle. 1995. "An Overview of Hazard Analysis Critical Control Points (HACCP) and Its Application to Animal Production Food Safety." Paper presented in Association with the 75th Annual Meeting of the Conference of Research Workers in Animal Diseases. Chicago, IL (November 12).  
<http://www.cvm.uiuc.edu/HACCP/Symposium/TITLE.HTM>
- Pinkerton, F., L. Harwell, N. Escobar and W. Drinkwater. 1993. Marketing Channels and Margins for Slaughter Goats of Southern Origin. Southern Rural Development Center, Mississippi State University.
- Pinkerton, Frank, Lynn Harwell, William Drinkwater, and Nelson Escobar. 1994. "Marketing Meat Goats: Channels, Supply and Demand." <http://www.luresext.edu/m03.html>.
- Pinkerton, Frank. 1995. "Meat Goat Marketing in Greater New York City." <http://www.goats.clemson.edu/NY%20Paper/newyork.htm>.
- Rice, Judy. 1993. "Animal Tracking from the Hoof to the Store." Food Processing: Coleman Natural Meats Inc. Retrieved from the HighBeam Research archive on June 18, 2004,  
<http://www.highbeam.com/library/doc1.asp?docid=1G1:14559745>
- Roybal, J. 2002. "Foodborne Illness Drops Dramatically." *Beef Magazine*." Accessed May 14, 2004 at,  
[http://www.beef-mag.com/ar/beef\\_foodborne\\_illness\\_drops](http://www.beef-mag.com/ar/beef_foodborne_illness_drops).
- Sanders, T. A. B. (1999), "Food Production and Food Safety." *British Medical Journal*, 318 (7199): 1-9.
- Smith, G.C. 1999. Meat Safety, Colorado State University, Fort Collins.  
[http://ansci.colostate.edu/ran/meat/meat\\_safety.htm](http://ansci.colostate.edu/ran/meat/meat_safety.htm)
- United States Census Bureau. 1998. "1997 Population Profile of the United States." Current Population Reports Special Studies P23-194.

USDA. 1996. Pathogen reduction: Hazard Analysis and Critical Control Point Systems; Final Rule, Federal Register, 61: 38805C38989.