

## Chapter 3

# Adoption Barriers in a High-Risk Agricultural Environment

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### ABSTRACT

*To lessen the threat of an intentional or naturally occurring livestock disease, the Animal Plant Health Inspection Service of the United States Department of Agriculture introduced the National Animal Identification System (NAIS), encouraging the use of innovative tools such as radio frequency identification (RFID) tags to track cattle across the country. In this study, the author examines the barriers to adoption of NAIS and RFID technology as risk-reduction tools. Diffusion of innovation literature is used to analyze a case study of a state livestock association advocating the rejection of NAIS and RFID technology. Implications for the diffusion of risk reduction tools are provided.*

### INTRODUCTION

As the Taliban and al-Qaeda forces retreated from their caves and safe houses, American troops found “hundreds of pages of US agricultural documents that had been translated into Arabic” (Doeg, 2005, p. 167). Most alarming, a “terrorist’s training manual was reportedly devoted to agricultural terrorism such as the destruction of crops, livestock, and food processing operations” (pp. 167-168). Approximately \$17.5 billion are lost each year because of unintentional infestations resulting

in diseased livestock and poultry (ARS, 2002). While even a massive outbreak of plant or animal disease would not cause famine, a successful agro-terrorist attack could have severe consequences on the \$201 billion farm economy (Piller, 2004), the most substantial of which would be the loss of international markets (Wheelis, Casagrande & Madden, 2002). A then isolated case of mad cow disease (bovine spongiform encephalopathy or BSE) in 2003 revealed both the vulnerability of American agriculture to disease and the economic disruption that could result. U.S. exports declined by approximately 50% (Cox et al., 2005), and more than \$3 billion in annual exports were shut

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down in a matter of days (Sparshott, 2004). Even a limited occurrence of disease and a temporary suspension of trade can cause severe economic loss to the agriculture industry. Thus, terrorists need not bring about an epidemic to cause significant economic harm (Casagrande, 2002).

In April of 2005, the Animal Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) released a draft of the Strategic Plan for the National Animal Identification System (NAIS) (APHIS, 2005). Using innovative tools such as radio frequency identification (RFID) tags that can be scanned when passed by an electronic reader, the plan called for animal trace-back within 48 hours to mitigate a naturally occurring disease or an agroterrorist attack. Since the release of the draft strategic plan, USDA-APHIS has extended the deadlines for implementation of NAIS and agreed to further review tracking mechanisms and privacy concerns. USDA has also extended Federal Relations Grants to agriculture-based universities to research the potential for RFID to track cattle. Prototype RFID tags are being tested, scanned, and mapped using university extension research facilities (NDSU, 2005). RFID individually identifies each ruminant and can then identify each ruminant scanned at the same location during a specified timeframe. If the United States experiences an outbreak of a highly communicable disease like foot-and-mouth (FMD), individual identification and quick location of all cattle that has come into contact with an infected ruminant could prove to be essential information in reducing the risk of further disease.

As research continued on the technology, the plan was released on the USDA website, allowing organizations involved in the industry to comment. In July 2005, the executive vice president of the North Dakota Stockmen's Association (NDSA) submitted comments criticizing the plan. As the state legislature appointed brand inspection agency in North Dakota, NDSA traces cattle that are fire branded in North Dakota across the country without the assistance of RFID tags or the

proposed government mandates of NAIS. While evidence of 48-hour trace-back ability is limited, the brand records kept by NDSA do allow cattle to be source verified.

In the comments posted to the USDA-APHIS website, NDSA admonished USDA-APHIS for its "failure to address cost, confidentiality, flexibility and the integration of current ID programs that are proven" (NDSA, 2004). At the North Dakota Stockmen's Association Annual Meeting on September 22–24, 2005, just two months after NDSA leadership posted comments, open-ended questionnaires were distributed to attending members to learn their perceptions of the adoption or rejection process of RFID technology.

Technology has become an essential component in the resolution of terrorism threats (Wulf, Haimes & Longstaff, 2003). This study examines the barriers to adoption of NAIS and RFID technology as risk-reduction tools. Specifically, this study analyzes the responses of NDSA members surveyed two months after NDSA leadership posted their criticisms of the plan. First, diffusion of innovation literature is reviewed. This review is followed by a detailed explanation of the methodological procedure and a comprehensive analysis of the barriers to adoption identified as awareness, interest, and influence. Finally, implications for the diffusion of NAIS and RFID technology as risk reduction tools are provided.

## **Diffusion of Innovation**

An innovation is an idea, product, or process that is new to an adopter (Hage & Aiken, 1967; Rogers, 2003; Zaltman, Duncan & Hoibek, 1973). Diffusion is "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5). While the original idea of diffusion was first expounded on by Tarde in 1903, the first application of the diffusion model can be traced to the agriculture industry (Rogers, 2003). Focusing on the adoption of hybrid seed

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