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COSTS OF ADOPTING RADIO FREQUENCY IDENTIFICATION READER SYSTEMS AND TAGGING SERVICES IN LIVESTOCK AUCTION MARKETS

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Introduction

Livestock industry initiatives such as the National Animal Identification System (NAIS), marketing alliances, and production verification programs are leading to increased use of electronic animal identification systems. Livestock markets are one place where animal movement and identification information can be recorded easily. Auction market facilities can differentiate themselves by offering electronic individual animal identification and tracking services to customers. However, facility modifications, installation, and operating equipment needed to record electronic animal identification information at the speed of commerce involves costs. The more animals that the radio frequency identification (RFID) reading technology would be used on, the lower the cost of investment per animal for the livestock market. Thus, auction markets will be reluctant to invest in RFID reading and recording equipment if there is little demand for the service by customers. This concern has likely increased with the NAIS becoming explicitly voluntary. Also, some market operators are concerned that producers will expect livestock markets to offer tagging services if RFID equipment is available for use. The investment required to adopt an electronic animal identification system and how this investment would affect a livestock market's business are also major concerns. This study examines the investments required for livestock markets to adopt RFID reader systems and tagging services.

Experimental Procedures

A national survey of livestock market operators was conducted to collect information related to costs of adopting RFID technology. A section of the survey asked livestock market operators 1) if they would offer a RFID tagging service if the NAIS was fully implemented and 2) questions relating to the costs of offering this service. Another section of the survey asked livestock markets if they had adopted a RFID reader system. If they had, questions regarding costs of adoption were asked. Fifty-five percent of livestock auction market managers stated they would provide a RFID tagging service for customers if the NAIS were fully implemented. Only 14% of survey respondents had installed RFID reader systems.

Using the data collected, annualized costs of offering a cattle RFID tagging service and reader system were estimated. Annualized costs are the sum of annualized investments and annual expenses. Annual expenses are expenses that occur on a yearly basis, and investments represent the capital outlay required for adoption. Annualized investments were calculated by annualizing the total investment given an interest rate and number of years the system was expected to be used. An 8% in-

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terest rate was used to reflect the cost of borrowing money for an operating loan. The expected useful life for the tagging service investment (chutes, facility modifications, etc.) was 10 years. The expected useful life of adding a RFID reader system included the electronic reader system with a useful life of 3 years, the facility modification a life of 6 years, and computer investment with a life of 3 years. At the end of the useful life the assumed salvage value was zero for all investments. From this information, cost estimates and economies of scale were evaluated for both investments.

Results and Discussion

The annualized cost per head of livestock using a RFID tagging service averaged $3.21 per head and ranged from $0.00[2] to $61.49 per head, excluding the cost of an RFID tag. Most livestock markets (90%) would experience annualized costs of less than $5.00 per head for a RFID tagging service, excluding the cost of the RFID tag. Economies of size were present, so markets with higher percentages of livestock using a tagging service have a competitive advantage over livestock markets with smaller percentages of livestock using the service. The annual cost per head decreases up to approximately 11,755 head of livestock using the service, and then the cost per head remains constant at $1.51 (Figure 1). For comparison, Michigan currently requires all cattle sold through auction markets to have electronic identification. Michigan auction markets are charging $6 per head for tagging if they supply the tag and $3 per head if the seller supplies the tag.

Among livestock market survey respondents who had installed RFID reader systems, total investments in RFID reader systems ranged from $5,250 to $63,000, and annual cattle sales among these facilities ranged from 12,000 to 275,000 head. Total investments were annualized and added to the annual expenses to find the annualized cost of a RFID reader system. The annualized cost per head of cattle using a reader system assuming 25% of the cattle sold annually were using the RFID reader system are shown in Figure 2. The 25% utilization value was chosen to simulate what could occur if the NAIS remains voluntary and the system was used on only one-quarter of cattle sold through auction markets. The average annualized cost per head of cattle using the systems was $0.76, the maximum was $4.02, and the minimum was $0.14. Given our assumptions, the annualized cost per head of cattle using the system could be used as an estimate of the expected fee charged to owners of cattle that use the RFID reader system at a livestock market.

Figure 3 shows the annualized cost per head of cattle sold annually when the costs are allocated over 100% of cattle marketed annually. This is a scenario useful to livestock market operators who might choose to increase commission fees for all cattle sold at their facility after installing a reader system. This scenario also depicts what the cost might be if the NAIS were to become mandatory and 100% of animals sold through the livestock market used the RFID reader system. The average annualized cost per head of cattle sold was $0.19 with maximum and minimum values of $1.01 and $0.04 per head, respectively.

Based on estimated annual costs, economies of scale exist in RFID system adoption (i.e., larger-volume livestock markets have lower costs per head). Most auction markets would have annual costs associated with RFID

[2]One livestock market indicated they would not incur any additional cost by adding a tagging service.

systems of less than $0.30 per head of cattle sold annually, with large volume markets having annual costs less than $0.11 per head of cattle sold annually.

Figure 4 shows expected annualized costs of RFID readers systems of four "typical" livestock markets based on varying levels of cattle using the system. This figure shows economies of size are related both to market size and intensity of use of RFID reader systems. Smaller-volume livestock markets that use an electronic reader system intensively (i.e., on a high percentage of cattle sold annually) can compete cost-wise with larger volume markets that use a reader system on a small percentage of cattle.

Implications

Due to the voluntary nature of the NAIS, livestock markets that can find value opportunities in adopting animal identification tracking systems will be more likely to adopt these practices. Large-volume livestock markets and those that will send a higher percentage of cattle through such a system are much more likely adopters of RFID technology than small-volume markets and/or those that would not heavily utilize the system. If the NAIS remains voluntary, additional specialization and differentiation across auction markets is likely.

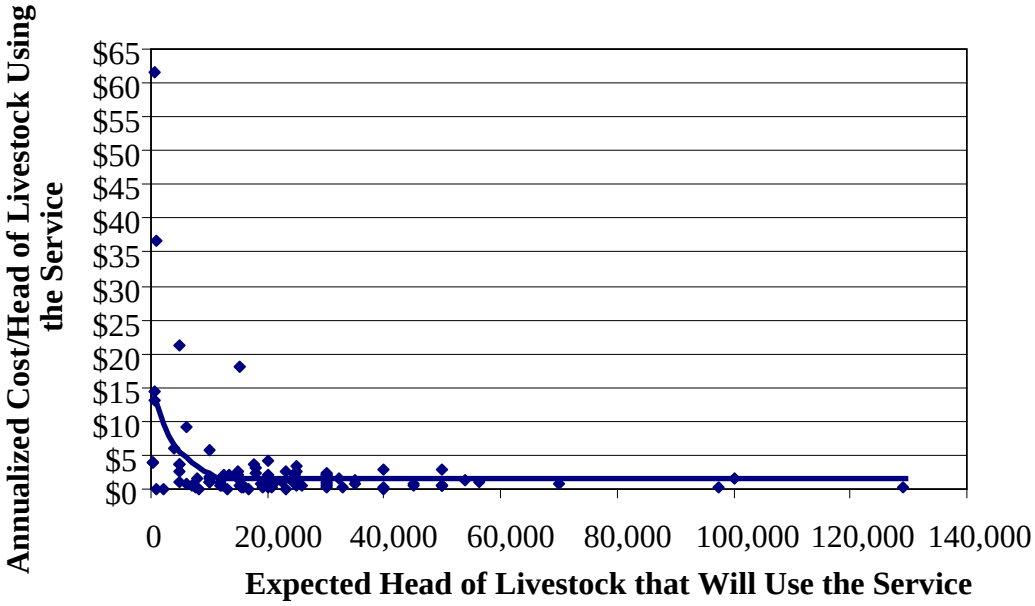

Figure 1. Livestock Market Annualized Cost of a RFID Tagging Service per Head of Livestock Using the Service.

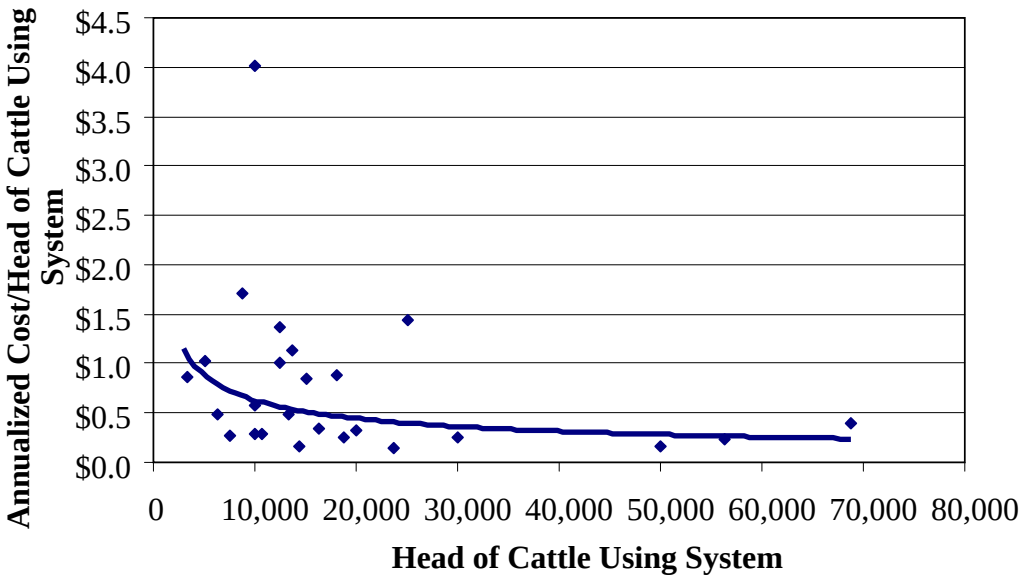

Figure 2. Livestock Market Annualized Costs of a RFID Reader System Based on 25% of Annual Cattle Sales.

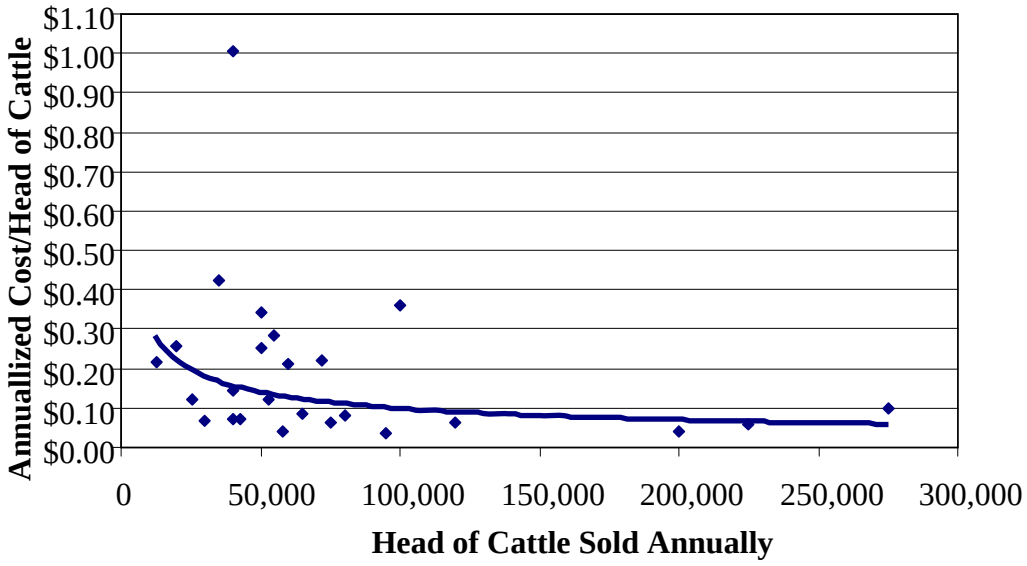

Figure 3. Livestock Market Annualized Costs of a RFID Reader System Based on 100% of Annual Cattle Sales.

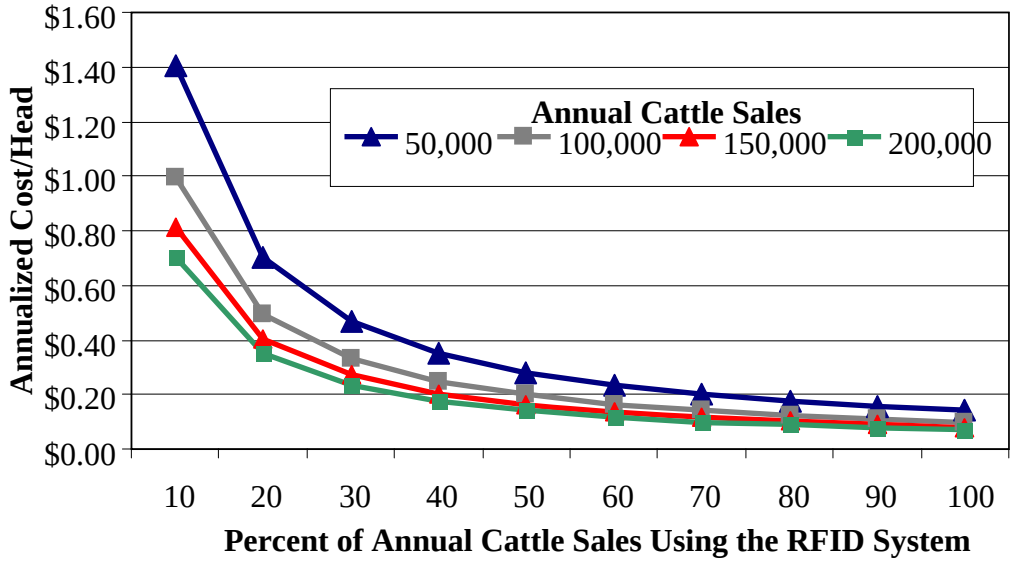

Figure 4. Four Hypothetical Livestock Markets' Expected Annualized Costs of RFID Reader Systems Based on Varying Levels of Cattle Using the System.