

Animal Disease Related Pre event Investment and Post-event Compensation: A Multi-agent Problem *

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(Abstract)

Animal disease management involves both the potential adoption of pre event investments in disease prevention as well as post event participation in slaughter of infected animals. Both types of participation while felt to be desirable by the government are under taken by private parties and may require compensation to occur at an appropriate level. Furthermore while prevention is a possibility current compensation practices limits compensation so that those who invest prevent cannot get any more than those who do nothing and thus acts as a disincentive for prevent action. This paper considers both sides of the compensation problem and examines the economic components of compensation system design as a multi agent problem considering risk and economic interests of the government and the producer. In particular, this study investigates the possible linkage between the preventive investment and the compensation package. It also reviews the economic dimensions of the compensation problem and derives ...

Compensation and animal disease management. Once an outbreak of animal disease occurs government agencies frequently come into an area and slaughter all infected and contact animals. The Fifth Amendment of the US Constitution requires the government to compensate individuals when private property is taken for public use. To set individual compensation, USDA APHIS compensation schemes in the US largely rely on diagnosis technology and farmers' self reporting to identify and trace the infected animals (Kuchler and Hamm 2000). In such a case an efficient compensation scheme needs to arrive at payments that are (a) low enough to prevent individual farmers from over-reporting, transporting animals from areas outside the event and contact zones, or even manufacturing diseased animals; and (b) high enough to prevent under-reporting or hiding sick animals somewhere else. Therefore, an appropriate and efficient compensation scheme is needed to ensure a truthful disclosure of privately hold information about animal disease and its management.

Compensation and animal disease prevention. Individual farmers may not be willing to make pre event investments to prevent, control, or eradicate animal disease in their herd mainly because of the following reasons, including (a) Investments cost money and margins are low. Especially, when the outbreak of animal disease like foot-and-mouth disease occurs, a centralized control effort is to slaughter all the animals within the quarantine zone regardless whether these animals are sick or not. In this sense, once the outbreak occurs the ex ante investment does not reduce the consequential loss – two farmers having an identical herd bear

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the same cost regardless one invests ex ante while another one does not; (b) Externalities associated with livestock disease prevention and control reduce individual producers' incentive of investing ex ante. They would rather free ride on their neighbor's investment; and (c) Current disease control policies and indemnity payments do not provide individuals with a sufficient incentive to invest ex ante. The 2002 farm bill, Farm Security and Rural Investment Act of 2002, Title X, Subtitle E, Animal Health Protection Act, Public Law 107-171, states that the government is to pay fair market value for animals destroyed for disease control purposes and any compensation paid is to be reduced by any other funds received. Other funds would include any salvage value, indemnity paid by states or insurance. Thus, two individual farmers who have an exactly same herds and claim for compensation will receive the same amount of indemnity regardless that one has a far better preventive investment than another one, or one who indeed has insurance will receive the difference net of the indemnity paid by the insurance.

Analysis of the current compensation scheme

Current plans for compensation face two major problems: (a) it is problematic or inefficient to induce a truthful disclosure of private information regarding livestock disease outbreak and its management; and (b) There is no linkage between the preventive investment and compensation package ex post in the current practice. Hence, it provides no incentive to induce individual producer to incur preventive investment to reduce the likelihood of disease outbreak and/or decrease the consequential event cost. However, there are some evidences showing indemnity payments influences individual behaviors: (a) Reaney (1998) reported that farmers are under pressure not to report cases of BSE due to a decrease in the compensation for sick animals; (b) Stecklow (1998) reported that farmers were paid more than the sick animal was worth so that there was no incentive to send a sick animal to the slaughterhouse; and (c) Kuchler and Hamm (2000) and Wineland, Detwiler and Salman (1998) demonstrate that individual farmers increase their efforts to find scrapie-infected sheep within their flocks as the indemnity payments increase.

In the paper we employ a game-theoretic framework to analyze the individual farmer and governmental behavior pre- and post-animal disease outbreak. As agents, individual farmers maximize their expected monetary value considering compensation for preventive investments and post-event animal slaughter. Government, as a principal, maximizes the overall welfare. Our results show that the privately optimal investment is generally lower than the socially optimal level; however, a well-designed differentiated compensation scheme can induce private preventive investment to increase approaching the socially optimal level. We also discuss whether and how the government can monitor and assess the privately hold investment information, including preventive technology related methods and economic screening and monitoring.

References:

Bicenell, K. B., J. E. Wilen, and R. E. Howitt (1999). Public policy and private incentives for livestock disease control. *The Australian Journal of Agricultural and Resource Economics* 43(4), 501-521.

Kuchler, F. and S. Hamm (2000). Animal disease incidence and indemnity eradication programs. *Agricultural Economics* 22, 299-308.

Reaney, P. (November, 1998). Some Scientists question decision on British beef. In Reuters.

Stecklow, S. (1998). "Mad Cow" export ban ends, Portugal's begins, and cases increase. *The Wall Street Journal*.

Umali, D., G. Feder, and C. de Haan (1994). Animal health services: Finding the balance between public and private delivery. *World Bank Research Observer* 9, 71-96.

Wineland, N., L. Detwiler, and M. Salman (1998). Epidemiologic analysis of reported scrapie in sheep in the United States. *Journal of American Veterinary Medicine Association* 212(5), 713-718.