

Abstract of Thesis/Dissertation

Applicant

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Title : Farmer knowledge and behavior towards the prevention, control and eradication of bovine theileriosis in Zimbabwe: Principal-agent theory and animal health management

(ジンバブエにおける牛タイレリア症の予防・抑制・撲滅に向けた農家の知識と行動：プリンシパル・エージェント問題と家畜衛生管理)

Abstract

Livestock disease are a major setback in livestock production in developing countries and the presence of disease has hampered growth of the livestock industry, reduced the efficiency of farm production making animal health an area of priority. Tickborne diseases affect cattle productivity in Zimbabwe resulting in low cattle productivity, low milk production, low market value and death. The major tickborne disease in Zimbabwe is theileriosis also known as January disease mainly lethal during the peak of the rainy season January. Control of theileriosis is done through cattle dipping to manage external parasites and the department of veterinary services (DVS) monitors the implementation of dipping activities in Zimbabwe. In Zimbabwe the 5-5-4 cattle dipping method is used, which entails that cattle dipping must be done in three times in 14 days with 5-day intervals twice and then after 4 days.

DVS is responsible for coordinating livestock disease surveillance and to motivate farmers to be active in prevention, control and eradication of disease. The government of Zimbabwe implemented land reforms in the late 1990 to early 2000s and this resulted in increased farmer population and strained veterinary thus disruption in veterinary extension and disease occurrence increasing. In recent years theileriosis has been increasing on a year by year between 2018 and 2022 at least 500,000 cattle succumbed to the disease and despite the mitigatory measures by the government to reduce the prevalence of the disease the economic cost of the disease huge. DVS has put in a plan to deal with theileriosis but the disease continues to increase thus leaving a gap on the possibility of farmer knowledge, attitudes and behavior towards the theileriosis.

Using the principal-agent theory this research was done to evaluate the veterinary extension and farmer relationship and what factors have contributed to information asymmetry in livestock production in Zimbabwe. The aim of the research was to outline three specific objectives which are: socio-economic characteristics of the farmers in Mhondoro Ngezi impact the knowledge of theileriosis; communication mediums used by the veterinary influence the level of knowledge for theileriosis prevention and control; and knowledge and attitudes towards theileriosis influence 5-5-4 cattle dipping behavior. This study was done in Mhondoro Ngezi, Zimbabwe, a district in Mashonaland Province. The district was chosen because it has been the epicenter of the theileriosis outbreak in Zimbabwe. Data was collected in two phases between September 2021 and October 2022.

Using the multivariate probit model regression was done to analyze the socio-economic factors that impact knowledge of theileriosis and source of veterinary

information. Farmers age, gender, education, ownership of radio, landholding and ownership of mobile phone are the main socio-economic indicators that impact knowledge of theileriosis. There is an aged population of farmers in the rural areas with an average age of 53 years and the age skewed to the right with more farmers in the 50-65 age range. There were more male farmers than females however the female farmers participated more in cattle dipping programs than their male counterparts. Education was a significant indicator to disease knowledge. Further farmers who had mobile phones with access to the internet had more contact with veterinary.

Instrumental Variables method was used to analyze the endogeneity problem on knowledge of theileriosis and its effect on percentage of dead cattle. Communication mediums and source of information were the two exogenous variables that influenced knowledge of theileriosis. Knowledge of theileriosis was significant in reducing the percentage of dead cattle per farmer. Farmers who used the right source of information from the veterinary extension and used communication mediums that promoted retention of message such as written documents and recorded material had higher knowledge than the farmers who relied on word of mouth. Age of the farmer played a significant role to the knowledge acquisition process as well as the income and veterinary access time.

To evaluate the behavior of farmers towards 5-5-4 cattle dipping, knowledge and attitude analysis was done using a structural equation model. Knowledge of theileriosis was reflected in the ability of farmers to identify the signs of the disease, while the attitude of the farmers was more inclined to separating sick cows. The 5-5-4 behavior of cattle dipping was indicated to be practiced by farmers who were active in

dip tank management and those that has a practice of cutting the tail brush. Knowledge and attitude had no significant relationship and attitude had no significant relationship with behavior, however, knowledge and behavior had a significant positive relationship meaning that the higher the farmer knowledge the higher the chances to practice 5-5-4 cattle dipping.

The DVS (principal), had limited contact with the farmer in order to influence or motivate the farmers (agent) to have the desired behavior practice. There is evidence of information asymmetry, which has been as a result of the principal's actions failure to respond to the growing needs of the farmers to motivate and incentivize the farmer to practice the proper biosecurity measures. DVS must consider developing education programs that they use in youth groups and primary and secondary schools to encourage young farmers to be active in livestock production. To attract young and energetic farmers DVS should support agriculture education curriculum on livestock production in primary and secondary schools.

Farmers have challenges to access veterinary services and there is limited direct and indirect communication, thus DVS should consider using radio platforms for the rural farmers who can't use social media platforms as the radio is a trusted source of information. This means that DVS must ensure that there are regional specific strategies that meet with the socio-economic status of the farmers. Farmers generating income from livestock production had increased knowledge of theileriosis because of the need to protect their cattle herd from disease, thus, it is important for DVS to encourage the government to incentivize and motivate rural farmers to participate in livestock value chain and create policies that protect rural and smallholder livestock keepers. The

government of Zimbabwe should consider increasing agriculture subsidies that are for livestock production thus improving the farmer understanding of agriculture livestock production.

Land reform had a negative impact on disease control but the introduction of community-based activities like dip tank management which can be done on a rotational basis in the local communities will help improve individual farmer participation in livestock production in rural areas. Though the government is still in the trial phase on the vaccine production, it must be noted that increase in knowledge and improving behavior practice for biosecurity in individual farm is important to achieve success in disease eradication. To remove information asymmetry, Public Private Partnerships and collaboration between principal and the agent must be prioritized to motivate and incentivize farmers.

- Notes
1. Fill in the Japanese translation for an English in the (1,109).
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