Modeling of Mycobacterium avium paratuberculosis shedding in dairy cattle in Québec

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Summary

Mycobacterium avium paratuberculosis is the causative agent of paratuberculosis, also called Johne disease. It is a contagious and enzootic disease affecting a range of domestic and wild ruminants. It has been suggested that Mycobacterium avium paratuberculosis (MAP) could play a role in the aetiology or in the pathogenicity of Crohn's Disease in humans. It has been argued that this contamination could more likely occur through milk, even if it is pasteurized.

Infectious cattle could shed various amounts of MAP in their feces and in their milk according to their infection status and/or physiological status. One important characteristic of MAP is its strong resistance to chemical and physical agents and its survival in the environment. This survival in the environment could lead to the contamination of ground and drinking water. MAP is also resistant to the pasteurization process et could survive in milk distributed for human consumption.

Our purpose, is trough the development of a dynamic mathematical model of a dairy cattle herd, to quantify the daily amount of MAP shed by a typical dairy herd in Quebec, Canada, depending on various status of production and reproduction of animals in the herd.

The quantities of MAP shed by a dairy cattle herd trough both feces and milk will be modeled in order to predict the amounts of MAP transferred from the herd towards the environment. Our model, will take also in account, the possible contamination of meat in slaughterhouses through reformed infected cattle.

The model will be built according to the dynamic of paratuberculous infection in dairy herds, considering different infection and transmission routes for the disease.

Simulation results using this model could bring valuable information concerning the magnitude of the shedding of MAP in the environment and in milk or meatdelivered for human consumption. This can be used for the risk assessment of potential human exposure to MAP .