Cattle movement network to complement surveillance data: the Danish cattle *Salmonella* Dublin surveillance program

Michel Bigras-Poulin[1], Hans Houe[2], Liza Rosenbaum Nielsen[2], Marian Chriel[3].

Groupe de Recherche en Épidémiologie des Zoonoses et Santé Publique, Faculté de Médecine Vétérinaire, Université de Montréal, St-Hyacinthe, Canada.
Department of Large Animal Sciences, Faculty of Life Sciences, University of Copenhagen, Frederiksberg, Copenhagen, Denmark.
Danish Veterinary and Food Administration, Mørkhøj Bygade 19 DK-2860 Søborg, Denmark.

Introduction

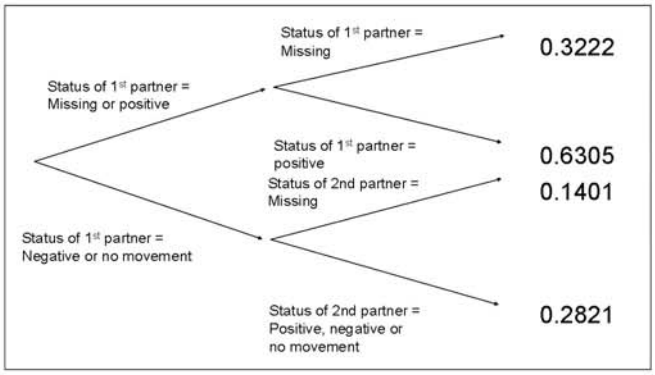
There is a recognised risk of transmission of *Salmonella* Dublin when buying animals from seropositive herds[1]. But, is there information in the trade patterns of your business partners? What if they are involved in risky trade? We tried to answer this question by looking at cattle movements in Denmark.

Results

Table 1 : Descriptive statistics of risk patterns of movements related to a herd becoming serologically positive to *Salmonella* Dublin

First link herd	Second Link herd	N (5414)	Probability of becoming positive	Number of positives (145)
No movements	All	3797	0.025	95
Movements from positive premise	All	200	0.075	15
Movements from a negative premise	All	760	0.02	15
Movements from an unknown status premise	All	657	0.0304	20
Movements from an unknown status premise	negative premise	106	0.0566	6

Figure 1 : Decision tree analysis of walks to identify combinations of movements and herd status which ended up in the final receiving herd becoming positive



The risk of buying cattle directly from a herd with a positive status relative to no movement showed an odds ratio of 3.16. The odds ratio associated with a cattle movement from a herd with a negative status and then from a herd with a missing status was 2.11.

Materials and Methods

Data for *Salmonella* Dublin surveillance and herd status were obtained from the Danish cattle industry[1]. Bulk tanks were tested every 3 months. Cattle movement data were obtained from the Danish Cattle Registry[2]. The period covered was from November 1, 2002, to April 30, 2003. All walks (i.e. a sequential series of movements) ending in a dairy herd with the second bulk tank serological test of 2003 were obtained from the cattle movement network. Only those herds which were negative[1,3] on the previous test were used. These walks were directed and up to 4 steps in length. Analysis was done using descriptive statistics on walks and on herds. A decision tree regression (tree procedure in R) was also done.

Discussion

A first observation that can be made is that the majority (95/145) herds becoming positive did so without any incoming cattle movements during the observation window (Table 1). This indicated that there was an increased risk associated with occurring within the herds of trade partners. As found by other authors[1], there was a risk in buying cattle directly from a herd with a positive status (odds ratio 3.16).

From these observed results, it seems that cattle movements from a seropositive herd does not explain much of the newly infected herds. Most of the newly infected herds showed no movements during the observation period thus indicating that the herd internal dynamics of the Salmonella infection is complicated. It is likely that it evolves over a period of time longer than 3 months. There was evidence that the network of cattle movements integrated with herd status could be used to study the flow of Salmonella transmission but it should be studied over a longer period of time.

References

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