Explanatory framework for regression analysis (EFRA) in veterinary research. Case: risk factors of BVD in Finland

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Abstract

Bovine viral diarrhea (BVD) is rare in Finland. A case-control study was conducted to identify risk factors for a herd having BVD-virus secreting animals (BVD-herd). A questionnaire was mailed to all known 25 herds with at least one BVD-virus secreting animal between 1998 and 2004 as well as to randomly chosen control herds (n=394) from the same geographical areas. Response rate was 44%, with 12 case herds and 174 control herds.

Statistically significant risk factors in multiple logistic regression analysis were: 1) another BVD-herd within a distance of 1 kilometer (='neighbor-BVD' effect; odds ratio (OR)=23), 2) shared use of feed producing/processing equipment (OR=4), and 3) animal transfer people crossing the feeding manger (OR=3).

Effect of multicollinearity among explanatory factors was taken into account by using EFRA (explanatory framework for regression analysis) -approach (see e.g. Rita and Lehtonen 2005) developed from social science –based elaboration techniques (Kendall and Lazarsfeld 1950). The role of e.g. 'neighbor-BVD' within the context of other explanatory variables was studied as follows: other potential explanatory factors (even those with low significance in the previous multiple logistic regression model) were included separately or in meaningful groups (e.g. shared use of any equipment) into the model and the resulting changes in the coefficient of the 'neighbor-BVD' were recorded. For example, the inclusion of 'shared use of any equipment' changed the coefficient of the 'neighbor-BVD' from 2.6 to 3.4 (OR from 14 to 30). An explanation to this could be that if the positive BVD status of the neighboring herd is known, sharing of equipment is avoided.

References

Kendall, P.F. and Lazarsfeld, P.F. (1950) Problems of survey analysis. In: R.K. Merton and P.F. Lazarsfeld (ed.). Continuities in social research. Glencoe.

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