Veterinary Risk of Deer in Robust Natural Corridors in the Netherlands

de Vos CJ[1*], Groot Bruinderink GWTA[2], Elbers, ARW[1]
[1] Central Veterinary Institute of Wageningen UR, Lelystad, The Netherlands.
[2] Alterra, Wageningen UR, Wageningen, The Netherlands
*** Corresponding author. E-mail: clazien.devos@wur.nl**

ABSTRACT

Establishment of robust natural corridors between natural areas in the Netherlands will allow for migration of wild ungulates. Extension of the range of red deer (*Cervus elaphus*) and fallow deer (*Dama dama*) might, however, facilitate spread of animal diseases to domesticated animals. Roe deer (*Capreolus capreolus*), on the contrary, already present a potential veterinary risk for the livestock sector since they live throughout the country. The objective of this study was to assess the additional risk posed by the future presence of red deer and fallow deer in robust nature links.

Main results of the qualitative risk assessment are:

- Overall deer densities will increase by approximately 50%.
- Up till present, only the presence of BT, paratuberculosis, and possibly IBR has been confirmed in red deer. No diseases have been observed in fallow deer and roe deer.
- Roe deer seem to be more susceptible to disease than red deer and fallow deer.
- Red deer and fallow deer live in larger groups than roe deer increasing the probability of intraspecific transmission by direct contact.
- Red deer and fallow deer have a larger niche-overlap with cattle than roe deer increasing the probability of interspecific transmission via indirect contact and vectors.

Taking all this into account, we concluded that migration of red deer and fallow deer in robust natural corridors will result in a slight increase of the general veterinary risk for the Dutch livestock sector.

Keywords: disease transmission, qualitative risk assessment, fallow deer, red deer, roe deer

INTRODUCTION

In the Netherlands robust natural corridors will be created to connect natural areas and to enlarge the habitat of plant and animal species. Some of these corridors will allow for migration of wild ungulates. Extension of the range of red deer (*Cervus elaphus*) and fallow deer (*Dama dama*) might, however, facilitate spread of animal diseases, both within these populations and to domesticated animals. Roe deer (*Capreolus capreolus*), on the contrary, already present a potential veterinary risk for the livestock sector since they live throughout the country. The objective of this study was to assess the additional risk posed by the future presence of red deer and fallow deer in robust nature links.

For this purpose a qualitative risk assessment was conducted taking into account

(a) expected number of deer in future robust natural corridors;
(b) prevalence of specific diseases in deer populations in the Netherlands;
(c) differences in susceptibility to and excretion of pathogens in wild ungulates;
(d) disease transmission routes from wild deer to livestock.

This risk assessment was based on (a) ecology of deer and (b) epidemiology of contagious animal diseases.

ECOLOGY OF DEER

Some differences in the ecology of red deer, fallow deer, and roe deer might contribute to their capability to spread contagious diseases to livestock.

- Red deer and fallow deer are intermediate feeders, whereas roe deer are browsers. Feed will thus rather be a limiting factor for roe deer than for red deer and fallow deer.
- Red deer and fallow deer congregate in larger groups than red deer, especially during the mating season.
- Red deer and fallow deer show a greater niche-overlap with cattle than roe deer do.

EPIDEMIOLOGY OF CONTAGIOUS ANIMAL DISEASES

Red deer, fallow deer, and roe deer are all susceptible to a large number of pathogens (Böhm et al., 2007). In this study, a selection of diseases was considered taking into account (a) possible presence in Dutch wildlife, (b) diversity in transmission routes, and (c) expected economic loss for the Dutch livestock sector. Diseases selected were foot-and-mouth disease (FMD), bluetongue (BT), infectious bovine rhinotracheitis (IBR), bovine virus diarrhoea (BVD), paratuberculosis, Q-fever, and babesiosis.

Transmission routes that contribute to the probability of disease spread from wildlife to livestock are:

- direct contact;
- indirect contact (faecal-oral route);
- vector-borne transmission (ticks, midges).

Direct contact is the main transmission route for FMD, IBR, BVD, and Q-fever. Paratuberculosis is mainly spread by the faecal-oral route and can survive in the environment for a long period. BT is spread by midges (*Cullicoides* spp.). Babesiosis is spread by ticks (*Ixodes ricinus*).

RESULTS

The number of deer in robust nature links will be regulated by man at a socially acceptable tolerance level which is below the ecological carrying capacity of these areas. Therefore, no exclusion of species by competition is expected. The expected mean density of red deer and fallow deer in robust nature links is 2 animals per 100 ha. The current mean density of roe deer is 8 animals per 100ha. Hence, overall deer densities will increase by approximately 50%.

Little is known about the presence or absence of animal diseases in the Dutch deer populations, as there is no structural monitoring for diseases among wild deer. Up till present, only the presence of BT, paratuberculosis, and possibly IBR has been confirmed in red deer. No diseases have been observed in fallow deer and roe deer.

Red deer, fallow deer, and roe deer are all susceptible to the diseases selected. Information on differences in susceptibility and excretion is, however, scarce. Differences in observed prevalences in other European countries do not indicate consistent differences between deer species. Red deer and fallow deer are members of the subfamily Cervinae, whereas roe deer are member of the subfamily Odocoilinae. The latter family seems to be more susceptible to disease (e.g. FMD, Forman and Gibbs, 1974).

Direct contact between different species of herbivores is exceptional. This also accounts for wild ungulates and domestic livestock. The transmission route of direct contact will thus mainly contribute to intraspecific transmission of disease. Red deer and fallow deer live in larger groups than roe deer increasing the probability of intraspecific transmission by direct contact (FMD, IBR, BVD, Q-fever).

Interspecific transmission of diseases will mainly occur by indirect contact or vectors. The opportunities for interspecific transmission depend among others on the extent of niche-overlap between different ungulates that share the same habitat. Observational studies indicate that red deer and fallow deer have a larger niche-overlap with cattle than roe deer (Putman, 1996) increasing the probability of interspecific transmission via indirect contact (paratuberculosis) and vectors (BT, babesiosis).

CONCLUSION

Taking all this into account, we conclude that migration of red deer and fallow deer in robust natural corridors will result in a slight increase of the general veterinary risk for the Dutch livestock sector. Quantification of the risk was not possible because no disease prevalence data are available for red deer, fallow deer, and roe deer in the Netherlands. Given the lack of historical evidence of disease transmission from roe deer to livestock, we assume that the present veterinary risk is small. Furthermore, we expect that the veterinary risk will remain small, despite a slight increase due to the presence of red deer and fallow deer.

ACKNOWLEDGEMENTS

This study was funded by the Dutch Ministry of Agriculture, Nature, and Food Quality (BO-08-010-020).

REFERENCES

Böhm, M., White, P.C.L., Chambers, J., Smith, L., Hutchings, M.R. (2007) Wild deer as a source of infection for livestock and humans in the UK. *Vet. J.* 174, 260-276.

Forman, A.J., Gibbs, E.P.J. (1974) Studies with foot-and-mouth disease virus in British deer (red, fallow and roe). I. Clinical disease. *J. Comp. Pathol.* 84, 215-220.

Putman, R.J. (1996) Competition and resource partitioning in temperate ungulate assemblies. Chapman & Hall, London.