Risk assessment of a potential outbreak of IBR in cattle exhibited at national shows in Switzerland

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Introduction

- Switzerland has been officially free of BHV-1 since 1995. Serological surveys of BHV-1 have been conducted annually in cattle herds by the Swiss Federal Veterinary Office (FVO) since 1994 to demonstrate disease freedom assuming a herd prevalence of < 0.1%.
- In 2001, in order to reduce the risk of a potential outbreak of BHV-1 and, thus, protect Switzerland's disease-free status, the FVO recommended that all cattle exhibited at national shows shall not show IBR or IPV-related clinical signs and be tested for BHV-1 antibodies within 30 days before the event, and the test result must be negative.
- Recently, Swiss cattlemen requested that this recommendation be reviewed and a risk assessment be conducted to determine if testing of cattle exhibited at national shows is justified.

Objectives

- To compare the probability of BHV-1 virus release in cattle under the following two scenarios:
  a) all cattle exhibited at national shows shall be tested for serodiagnosis of BHV-1 within 30 days before the event, and the test result must be negative; or
  b) no serological testing is required.
- To estimate the probability of BHV-1 virus exposure in cattle herds if infection occurs at a national show in Switzerland.

Methods

General approach

- We used methodology recommended by the OIE (Handbook on import risk analysis for animals and animal products, 2004), data and expert opinion available at the FVO and developed a quantitative risk model. Uncertainty and variability within the assessment were simulated using @Risk (©Palisade) and Monte Carlo sampling. The models were run for 10'000 iterations.
- To accomplish the first objective, a release assessment comparing the probability of BVH-1 introduction into a susceptible national show between cattle with and without BHV-1 testing requirements was conducted.
- The approach to the second objective consisted of an exposure assessment, where, first, it was assumed that the introduction of BHV-1 infectious or latently infected cattle into a national show would result in adequate animal-to-animal contact, leading to disease transmission at the show and, second, the transfer of infectious or latently infected cattle from a national show into new herds would result in disease transmission in the new herds.

Inputs

-The Beta distribution of the estimated seroprevalence of BHV-1 in cattle (Table 1)
P = Beta(x+1, n-x+1) = Beta (2 +1, 54'434-2+1)
-Serodiagnosis of BHV-1: ELISA, Se = 96%, Sp = 100%
-Movements of cattle to 14 major national shows: 3'500 cattle.
-Disease transmission probability of 30 to 50% as a consequence of an adequate animal-to-animal contact (expert opinion at the FVO).

Assumptions

-Each animal exhibited at a national show is transferred to a new herd.

Results

The release assessment

- The annual probability of BHV-1 infection in cattle moved to a national show was lower when cattle were tested for BHV-1 antibodies (every 128 years) than when not (every 6 years) (Table 2).

The exposure assessment

- On average, it was estimated that 40 to 400 cattle would become infected with BHV-1 in a national show if a BHV-1 infected animal was introduced into a national show with 100 or 1000 cattle in exhibition, respectively (Table 3).
- On average, it was estimated that 16 to 160 herds would become infected with BHV-1 if BHV-1 infected animals from a national show with 100 or 1000 cattle in exhibition were transferred to new susceptible herds, respectively (Table 3).
- Using a 30 to 50% transmission probability as an input value in our model, it was estimated that infection at a national show with ≥ 200 cattle would result in spread of infection from 21 to 46 new herds (Table 3).

Table 1

Seroprevalence of BHV-1 in cattle in Switzerland; results of annual population surveys

	2001	2002	2003	Total
Herds tested	632	2'400	2'274	5'306
Cattle tested	10'311	22'201	21'922	54'434
Cattle tested positive (n)	1	1	0	2
Cattle tested positive (%)	0.0098	0.0045	0	0.0037

Table 2

Probability that a randomly selected animal intended for exhibition is infected and expected number and frequency of cases with or without testing requirements

	With testing	Without testing
Probability of BHV-1 infection	0.0079	0.1929
Expected number of infected animals per year	0.0078	0.1754
New case every n years[1]	128 (42,993)	6 (3,26)

[1] Mean number (95% CI)

Table 3

Number of herds exposed to BHV-1 as a result of introduction of one BHV-1 infected animal to a national show

Number of animals at show	1000	500	300	200	100
Mean number of exposed cattle[1]	400 (305, 495)	200 (152, 247)	120 (91, 148)	80 (61, 99)	40 (30, 49)
Mean number of exposed herds[2]	160 (104, 228)	80 (52, 114)	48 (31, 68)	32 (21, 46)	16 (10, 23)

[1] Mean number (95% CI) of exposed cattle at one show, assuming a transmission rate = 30 to 50%
[2] Mean number (95% CI) of exposed herds as a result of introduction of an infected animal form a national show, assuming a transmission rate = 30 to 50%

Conclusions and recommendations

- Risk of BHV-1 infection in cattle exhibited in national shows in Switzerland is not negligible.
- Diagnosis of BHV-1 infection in 48 herds is sufficient for Switzerland to lose its disease free status.
- Based on our results (baseline model and sensitivity analysis) we recommend that all cattle exhibited at shows with ≥ 100 animals in exhibition be tested for BHV-1 within 30 days before the event, and the test result must be negative.

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