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Evaluation of the surveillance sensitivity of the official Enzootic bovine leukosis programme in Norway

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Introduction

Enzootic bovine leukosis (EBL) is caused by bovine leukosis virus (BLV). In Norway a surveillance and control programme started in 1995. Since then only a few herds with EBL have been detected and the within-herd prevalence has been low. Since 1997 no new cases have been detected. Norway was declared as officially free in 2007 by the EFTA surveillance authority.

Aim: To evaluate the surveillance programme for EBL according to the demands in the Council Directive 64/432/EEC.

Materials and Methods

Data 2003-2014 on population size, production types and number of slaughtered animals were obtained from official registries. Laboratory data were obtained from the Norwegian Veterinary Institute. The three surveillance system components are described in Table 1.

Surveillance sensitivity and probability of freedom was estimated by stochastic simulation of scenario trees [1]. Input values are described in Table 2.

Bulk-tank milk or pooled blood samples were tested for BLV antibodies using an indirect enzym-linked immunosorbent assay (ELISA SVANOVIR BLV-ab (BLVgp51-AB); Svanova Biotech AB, Uppsala, Sweden). Positive tests were followed up by individual samples according to the testing protocol.

Table1. The three surveillance system components of the official Norwegian surveillance program for EBL, their sampled proportion of the target population and the sampling regime. The sampling was performed at random.

Surveillance system component	Population proportion herds / year	Sampling regime herd level
Dairy herds	10-12%	Bulk tank milk
Beef suckler herds (2003-2010)	10-16%	Pooled blood from 10-20 cattle at farm
Beef suckler herds (2011-2014)	23-30%	Individual blood samples from up to five cattle per day at slaughterhouse

Table 2. Input values used in the scenario tree model to estimate the sensitivity of the Norwegian surveillance program for EBL 2003 to 2014 and the probability of freedom.

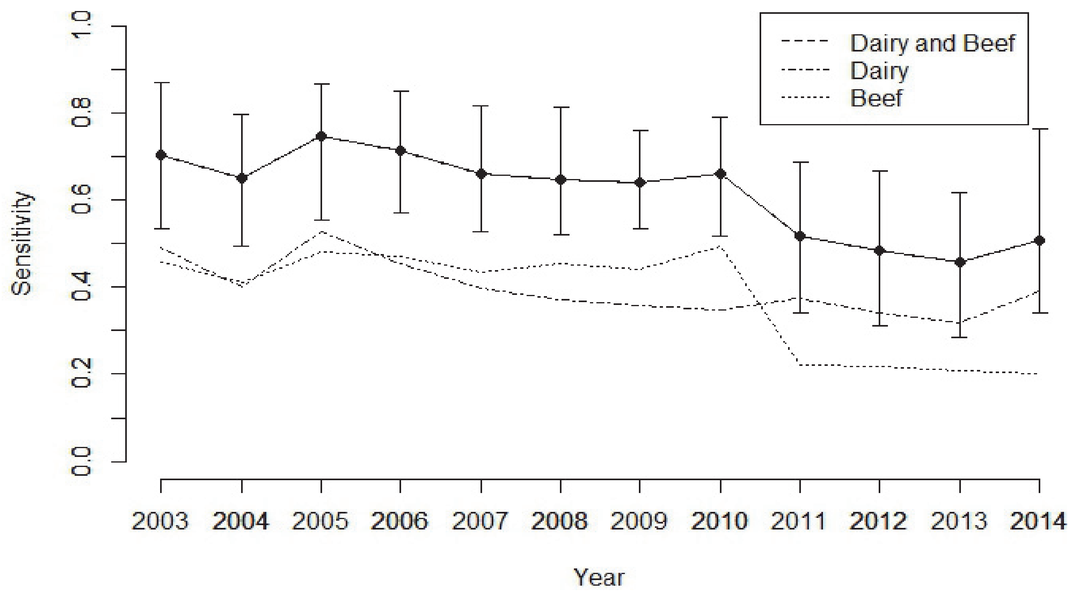
Parameter	Inputs	Distribution	Source of information
Design prevalence	0.002	fixed	
Within-herd prevalence	0.05	fixed	
Risk for introduction	0.01		
Se[b] bulk-tank milk	0.67[a]	Beta(18,9)	[2]
Se[b] individual blood samples	0.86[a]	Beta(72,2) Pert(0.825,0.864,0,940)	[3], [4]
Se[b] pooled blood samples	0.86[a]		[5]
Se[b] extended investigations	1		
Prior probability of infection	0.5		

[a] Expected value
[b] Sensitivity

Results

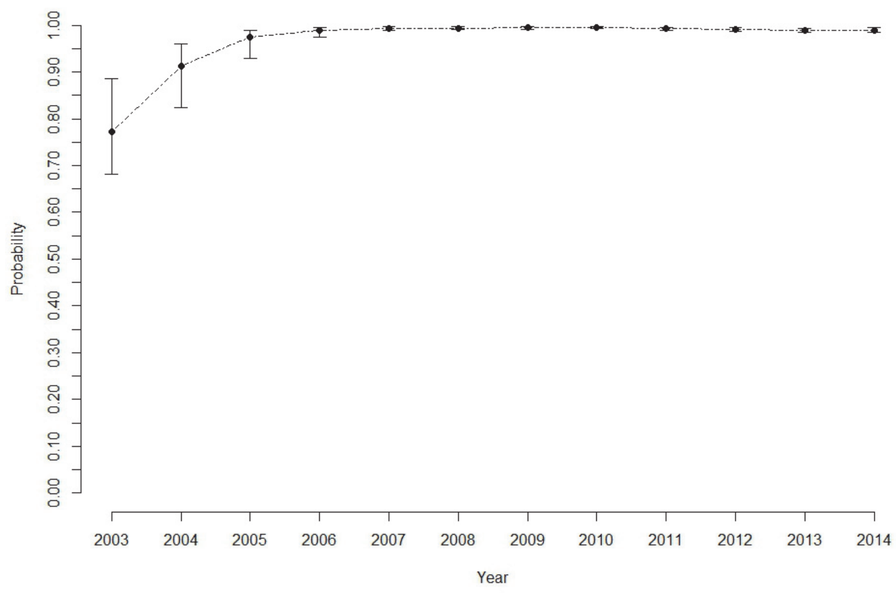
By the end of 2014 the median sensitivity for the surveillance programme was 0.53 (0.34-0.74) as shown in Figure 1. The median sensitivity for the dairy compartment was 0.42 and for the beef compartment 0.20.

Figure 1. The annual median sensitivity for the dairy and beef surveillance compartmentes and the combined sensitivity in the Norwegian surveillance programme for EBL 2003-2014.



The probability of freedom (<0.2 %) by the end of 2014 was 99.0% (98.5-99.5; 95% credibility interval) as presented in Figure 2.

Figure 2. Estimates of probability of freedom from EBL in the cattle population in the Norwegian surveillance programme for EBL 2003-2014.



Discussion & Conclusions

No new cases have been reported since 1997 and the surveillance shows that the Norwegian cattle population is free from EBL. Together with a testing protocol for imported animals, the surveillance programme for EBL should be an effective means to detect occurrence or introduction of infection.

However, the sensitivity is slightly decreasing indicating that an evaluation should be made regularly to possibly adjust the programme design.

References

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