Redesigning Serological Surveillance AI In Belgium

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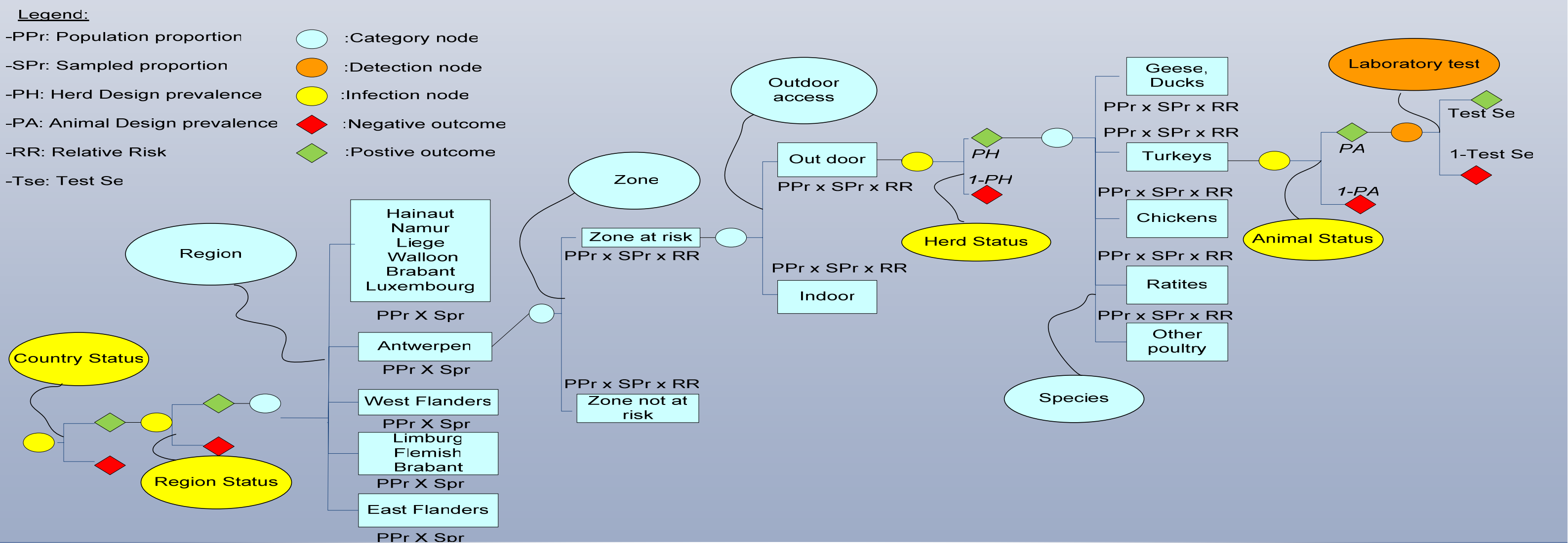
Context & Aims

- Commission Decisions 2005/734 (1) and 2007/268 (2)
- Passive and active surveillance in professional poultry holdings
- Aim: Evaluate the sensitivity of Belgian serological active surveillance programme for detecting LPAI in professional poultry holdings

Materials & Methods

- Scenario tree as proposed by Martin et al. (2007) (3) implemented in @risk software (Palisade, 2007)
- Calculation of respective effective probabilities of infection, and effective probabilities of detection for each limb of the tree
- Optimal sample size was obtained through Freecalc software (Survey Tool box (Ausvet, 2008))
- Optimised sample scheme, redistributing the samples foreseen to be taken in 2009 in Belgium, following the optimal results obtained

Figure I: Scenario tree representing the different steps between the introduction of LPAI in domestic poultry in Belgium and it's detection by the active surveillance system



Results

- Effective probabilities of detection (Se), initial sample sizes (Initial SS), optimal sample sizes (Optimal SS), optimised sample (Optimised SS) size are stated in Table I for each risk group identified at the end of each limb
- Species more at risk are geese and ducks (GD), turkeys as well as other poultry (OtherP)
- To many samples taken in chicken holdings in non risk zone especially those with no outdoor access
- An increase amount of samples must be taken in risk zones

Table I: Summary for Belgium of the sensitivities, previous sample sizes, as well as optimal and optimised sample sizes estimation obtained in each risk group in Belgium

RG	Risk zone				Non risk zone			
	Se	Initial SS	Optimal SS	Optimised SS	Se	Initial SS	Optimal SS	Optimised SS
Outdoor access Chicken	0.99	120	70	450	0.99	1400	90	580
Outdoor access Turkey	0.93	40	30	200	0.61	180	60	380
Outdoor access GD	0	0	0	0	0.57	800	300	2000
Outdoor access Ratites	0.93	40	50*	250*	0.86	380	90	580
Outdoor access OtherP	0	0	0	0	0.57	160	80	500
Indoor Chicken	0.99	920	90	580	0.99	5640	90	580
Indoor Turkey	0.89	80	30	200	0.84	720	40	260
Indoor GD	0	0	0	0	0.74	2600	200	1300
Indoor Ratites	0	0	0	0	0.39	200	200	1300
Indoor OtherP	0.88	80	40	260	0.54	300	90	580

Conclusions

- Enhanced value of risk estimate and sensitivity by fitting appropriate distributions to account for uncertainty and variability
- Advantage of such models: Allows Quantification of complex surveillance system sensitivity
- More efficient target sampling
- Enabled reallocation of the samples foreseen for 2009 in Belgium according to the differential risk in each risk group
- Efficient tool in evaluating surveillance programmes for substantiating disease freedom with a statistical confidence level as required by the international standards

References

(1)E.C. (European Commission), 2005. Commission decision laying down biosecurity measures to reduce the risk of transmission of highly pathogenic avian influenza caused by Influenza virus A subtype H5N1 from birds living in the wild to poultry and other captive birds and providing for an early detection system in areas at particular risk (2005/734/EC). "*In: Official Journal of European Union*".

(2)E.C. (European Commission), 2007, Commission Decision on the implementation of surveillance programmes for avian influenza in poultry and wild birds to be carried out in the Member States and amending Decision 2004/450/EC (2007/268/EC). "*In: Official Journal of the European Union*".

(3)Martin P.A., Cameron A.R., Greiner M. Demonstrating freedom from disease using multiple complex data sources 1: a new methodology based on scenario trees. *Preventive Veterinary Medicine*, 2007; 79, 71-97

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