Assessing coverage and representativeness of an early-warning surveillance system

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INTRODUCTION

Early-warning surveillance systems are used to identify changes in the health of animal populations, which may indicate new or exotic disease emergence. To maximise the likelihood of timely detection of these diseases, early-warning surveillance should include a suitably large and representative proportion of a given population (DEFRA, 2011). Therefore, coverage (the proportion of a population included in a surveillance system) and representativeness (the degree to which the included population reflects the characteristics of the target population) are important considerations when evaluating these systems.

Methods for assessing the coverage and representativeness of early warning surveillance systems were evaluated using 'FarmFile' as an example surveillance system and pigs as an example population.

The 'FarmFile' system holds information on submissions from clinically sick livestock sent to a network of 16 regional centres and can be used to identify changes in the health of the animal population.

METHODS

Four counties with diverse pig population characteristics were selected (Figure 1) and the coverage for each county was estimated

Coverage	=	Number of a population submitting a sample to FarmFile	÷	Total in population

DATA SOURCES
- **FarmFile**: Submissions to from practices and holdings

DATA SOURCES
- **RCVS practice register**: practices treating pigs
- **Agricultural Survey:** Holdings and pigs
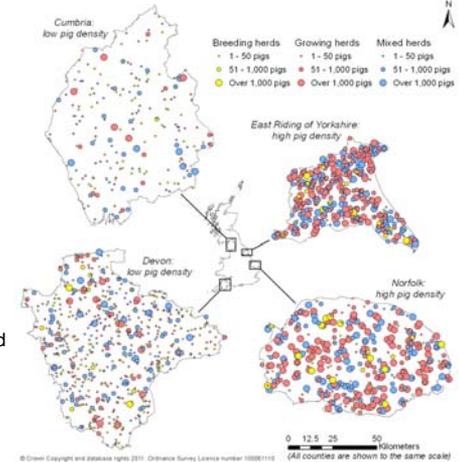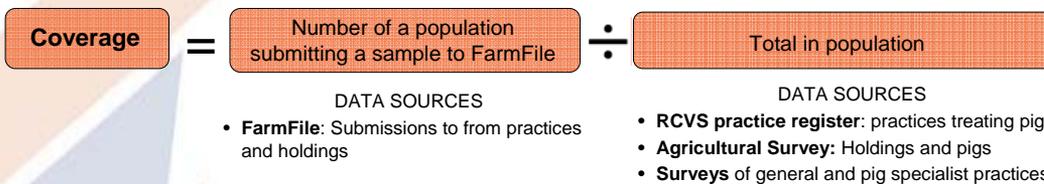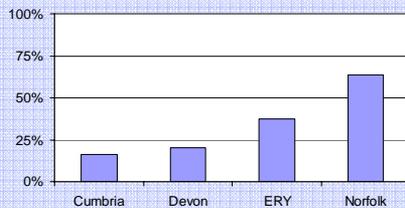- **Surveys** of general and pig specialist practices

Figure 1: Density of pig herds of different size and type in Cumbria, Devon, East Riding of Yorkshire and Norfolk

Some coverage estimation methods also accounted for 'intention to submit'. That is, some holding may be willing to submit a sample, but did not because disease requiring laboratory investigation was not encountered. This is accounted for by assuming that holdings registered with a practice that had submitted a sample would be covered should disease occur.
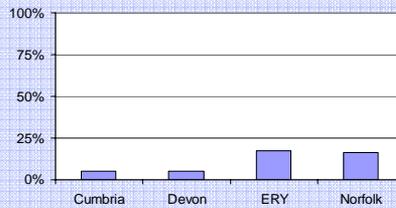
RESULTS

PRACTICE-LEVEL COVERAGE

ASSUMPTION: All practices or holdings that were willing to submit a pig sample did submit a pig sample

METHOD 1: Proportion of pig practices that submitted a pig sample to FarmFile
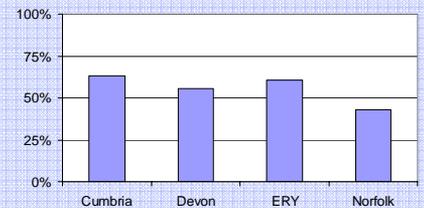

HOLDING-LEVEL COVERAGE

METHOD 2: Proportion of pig holdings that submitted a sample to FarmFile


PIG-LEVEL COVERAGE

METHOD 4: Proportion of pigs on holdings that submitted a sample to FarmFile

- Coverage *tended to be* higher in high pig density counties
- Coverage of small holdings and 'breeding only' holdings was lower than that of larger and 'growing' or 'mixed' holdings
- Higher coverage of larger holdings meant that pig-level coverage was higher than holding-level coverage and varied less between regions

ASSUMPTION: Some additional holdings would submit a pig sample if they encountered disease requiring laboratory submission

METHOD 3: Proportion of holdings registered with practices that submitted a pig sample to FarmFile
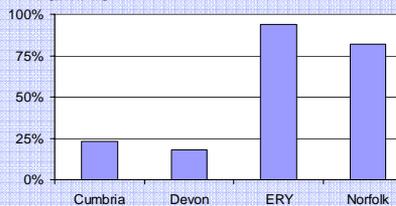
METHOD 5: Proportion of pigs on holdings registered with practices that submitted a pig sample to FarmFile
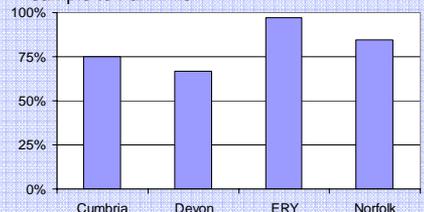
CONCLUSIONS

- Coverage estimates vary depending on assumptions made about submitting behaviour and it is important to take these assumptions into account when estimating coverage
- Existing data sources on submitting practices may provide an accurate estimate of the proportion of holdings covered in low pig density areas, but additional data about holdings registered with these practices was required to estimate holding level coverage in high density pig areas
- A high proportion of individual pigs are on holdings that are covered by current surveillance activities, particularly in high pig density areas
- Small holdings, those classified as 'breeding-only' and those in low pig density areas may be underrepresented by current surveillance activities

REFERENCES: DEFRA (2011) A review of the implementation of the Veterinary Surveillance Strategy (VSS). http://www.defra.gov.uk/publications/files/pb13568-vss-review-110204.pdf