



Pleasures and pains of risk-based sampling

Professor Andrew Robinson

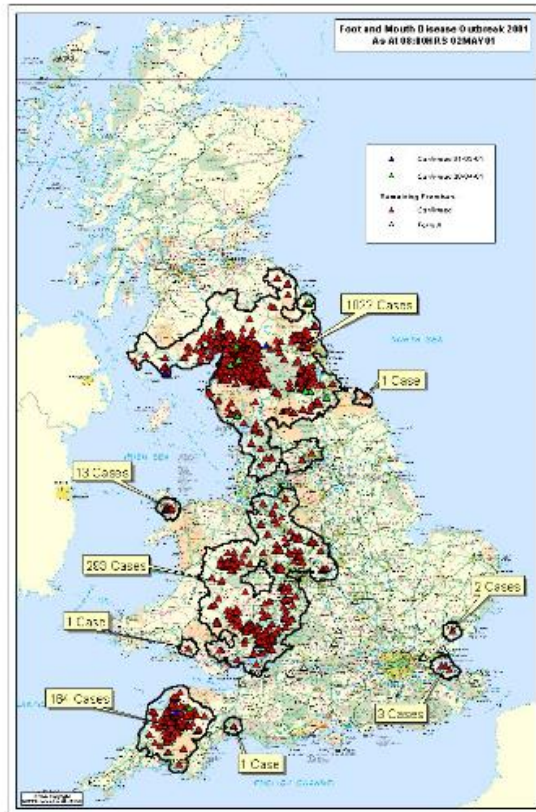
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2 ideas

- Managing the risks on voluminous, indivisible pathways: hypothesis test
- Managing the risks on sparse, bespoke pathways: CSP



United Kingdom 2001 FMD Outbreak



- ▶ 2001 FMD in UK — cost **£8 Billion**;
(Half in tourism)
- ▶ **6 M** sheep & cattle slaughtered
(2030 tested positive!)
- ▶ Modelled for Australia — **\$7–\$16 B**;
now \$50 B.

ACERA 0806: 2001 IQI — rollback



Null Hypothesis Test: *Prevent* or *Monitor*

- The manager nominates a risk cutoff r , *e.g.*, 1%, possibly with input from other stakeholders, and possibly varying across commodities.
 - The cutoff reflects the danger inherent in the contamination of the pathway.
- Compute f , an upper confidence interval estimate of the contamination rate.
 - Every pathway with $f > r$ is inspected at 100%
 - Every other pathway is inspected at a sufficient rate such that the probability that the future observed risk will turn out to be, in fact, higher than r is, *e.g.*, 0.05, *if the true contamination rate does not increase.*
- (This is a power analysis!)

CSP-1: Risk-Based Inspections



Pathway is in one of two modes: *census*, or *monitoring*.

1. In **census** mode, inspect all items. Switch to monitoring upon c consecutive passes. Start in *census* mode.
2. In **monitoring** mode, inspect $f\%$ of the items, randomly selected. Switch to enhanced upon any fail.

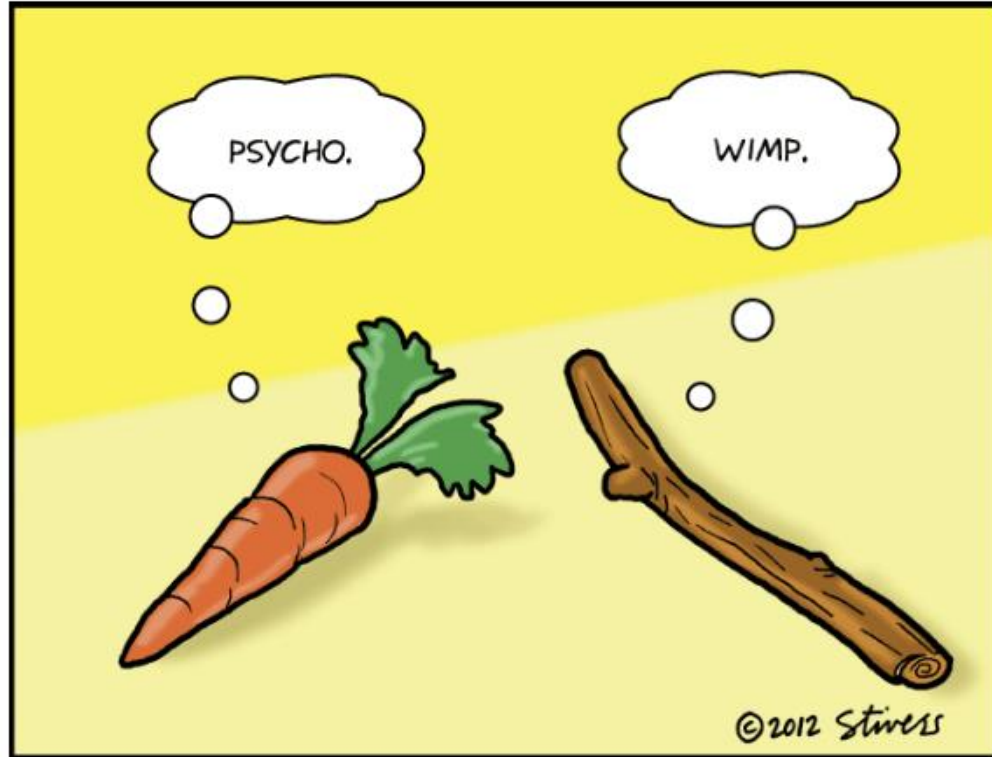
Pains

- Embedding RBS in transactional regulatory data systems
- Handling temporal issues (multiple locations)
- Consignments comprising multiple commodities
- Determining the level of organization for the algorithm
 - (Importer, exporter, combination?)
- Training
- Cultural acceptance

Pleasures

- In 2022, CBIS has saved 21,268 inspection hours for the department and industry \$4.2 million in intervention savings.
- Since its introduction in 2013, CBIS has saved an estimated 100,462 inspection hours and over \$18 million in intervention savings.
- Currently 71 commodities are managed under the scheme.

Pleasures Part 2





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Thank you

Winter is Coming

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