What about the incentive properties of biosecurity inspection rules?

Susie Hester[1,2], Anthony Rossiter[3], Andreas Liebbrandt[4], Gary Stoneham[3] and Bo Wang[5]

[1]**Centre of Excellence for Biosecurity Risk Analysis**: University of Melbourne, VIC

[2]**University of New England**: UNE Business School, NSW

[3]**Centre for Market Design (Victorian Department of Treasury and Finance**), VIC

[4]**Department of Economics and Monash Experimental Research Insights Team**, Monash University, VIC

[5]**Commonwealth Government Department of Agriculture and Water Resources (DAWR)**, ACT

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Centre of Excellence for Biosecurity Risk Analysis

Key messages

- Humans behave strategically and respond to incentives in **all** domains of the economy including biosecurity
- All inspection rules, by default, possess incentives for stakeholder compliance
- Ignoring the incentive properties of rules leads to (unpleasant) surprises

Agriculture department accused of 'dropping the ball' as new figures show higher rates of diseased prawn imports

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ABC Rural By Marty McCarthy

Updated 9 February 2017 at 5:52 pm
First posted 9 February 2017 at 5:07 pm

Prawn farmer

Prawn industry in crisis mode as white spot disease spreads

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ABC Rural By Marty McC

Updated 4 Janu
First post

ot disease are being destroyed on a erty (Supplied: Biosecurity Qld)

hite spot has spread to

'Unstoppable' white spot virus detected in Moreton Bay's wild prawns

Updated 15 Mar 2017, 11:06pm

White spot virus has been found in wild prawns in Moreton Bay off Brisbane and now cannot be stopped, the Queensland Government has confirmed.

Agriculture Minister Bill Byrne briefed commercial fishermen and prawn farmers about the latest outbreak this morning.

Mr Byrne said white spot was found in two locations in the bay.

Queensland's chief biosecurity officer Dr Jim Thompson said the virus was now unstoppable and would have to die out naturally, but the movement control order was designed to contain the spread.

"You don't control the virus if it's in the wild, the aim is to contain it so that it doesn't go any further, and that eradication

PHOTO: White spot disease in a giant black tiger prawn, showing classic white spots on the carapace. (Supplied: DV Lightner, Australian Government)

RELATED STORY: White spot disease forces Gold Coast prawn farmer to head north

RELATED STORY: Agriculture department accused of 'dropping the ball' over prawn crisis

RELATED STORY: Concerns after white spot found in Moreton Bay's wild prawns

MAP: Brisbane 4000

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- How protocols are implemented can aid regulators in achieving their stated objectives

Incorporating incentives

- Australia's DAWR is now investigating the (strategic) responses of importers and suppliers to rule changes when designing inspection protocols:

  → **incentive regulation**

- Incentive regulation:
  - Takes account of (expected) behaviour of regulated entities, not just the regulator's objectives
  - Harnesses the incentives for stakeholders to comply
  - Ideally, results in improved efficiency

Background: risk-based regulation in DAWR

- CSP-3 (CBIS)

Inspect 100% of consignments

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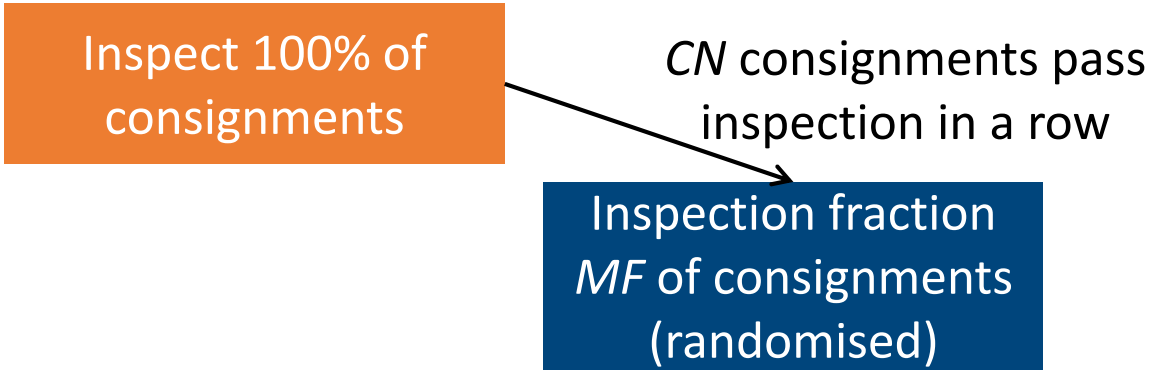

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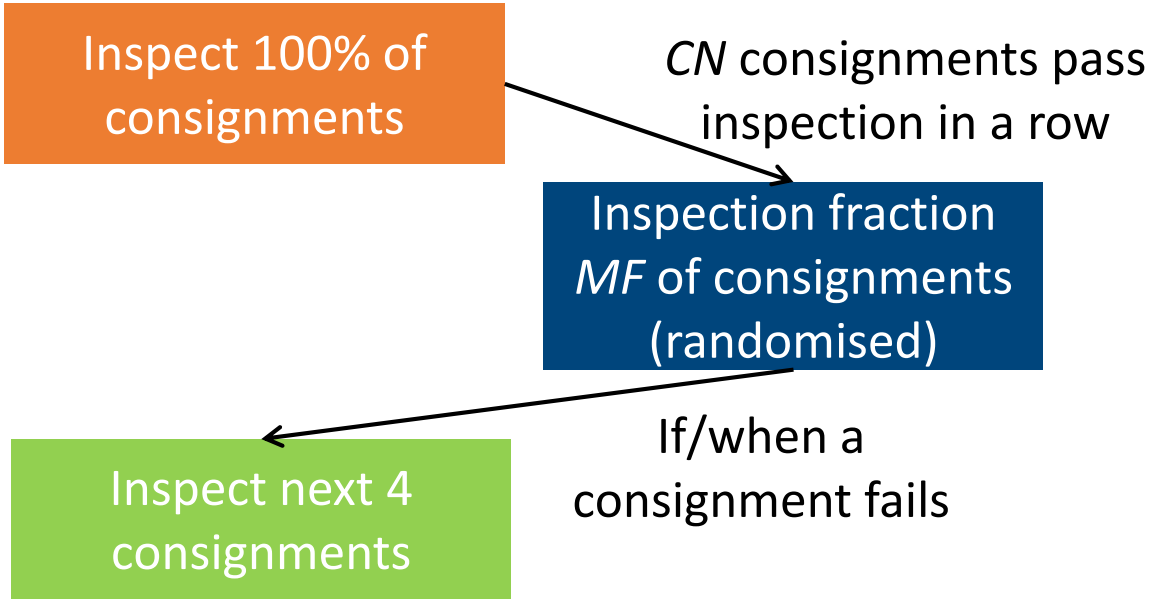
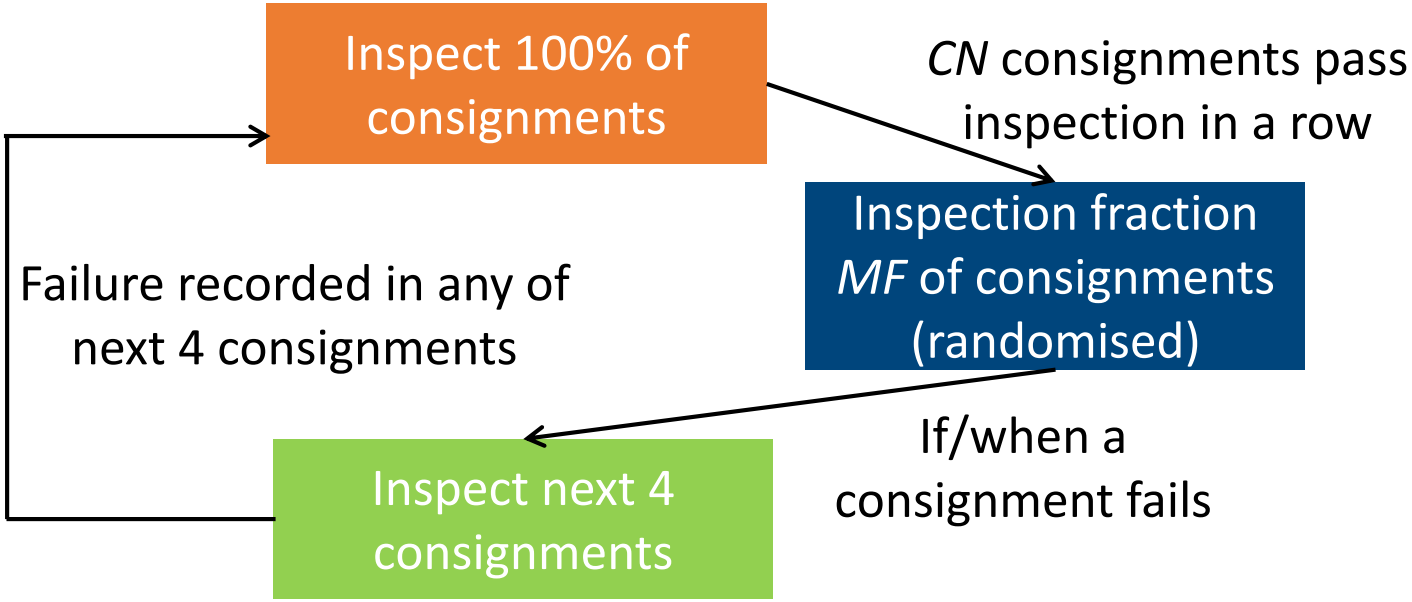


- CSP- 3 (CBIS)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CN consignments pass inspection in a row
Inspection fraction *MF* of consignments (randomised)
If/when a consignment fails
Inspect next 4 consignments
Failure recorded in any of next 4 consignments

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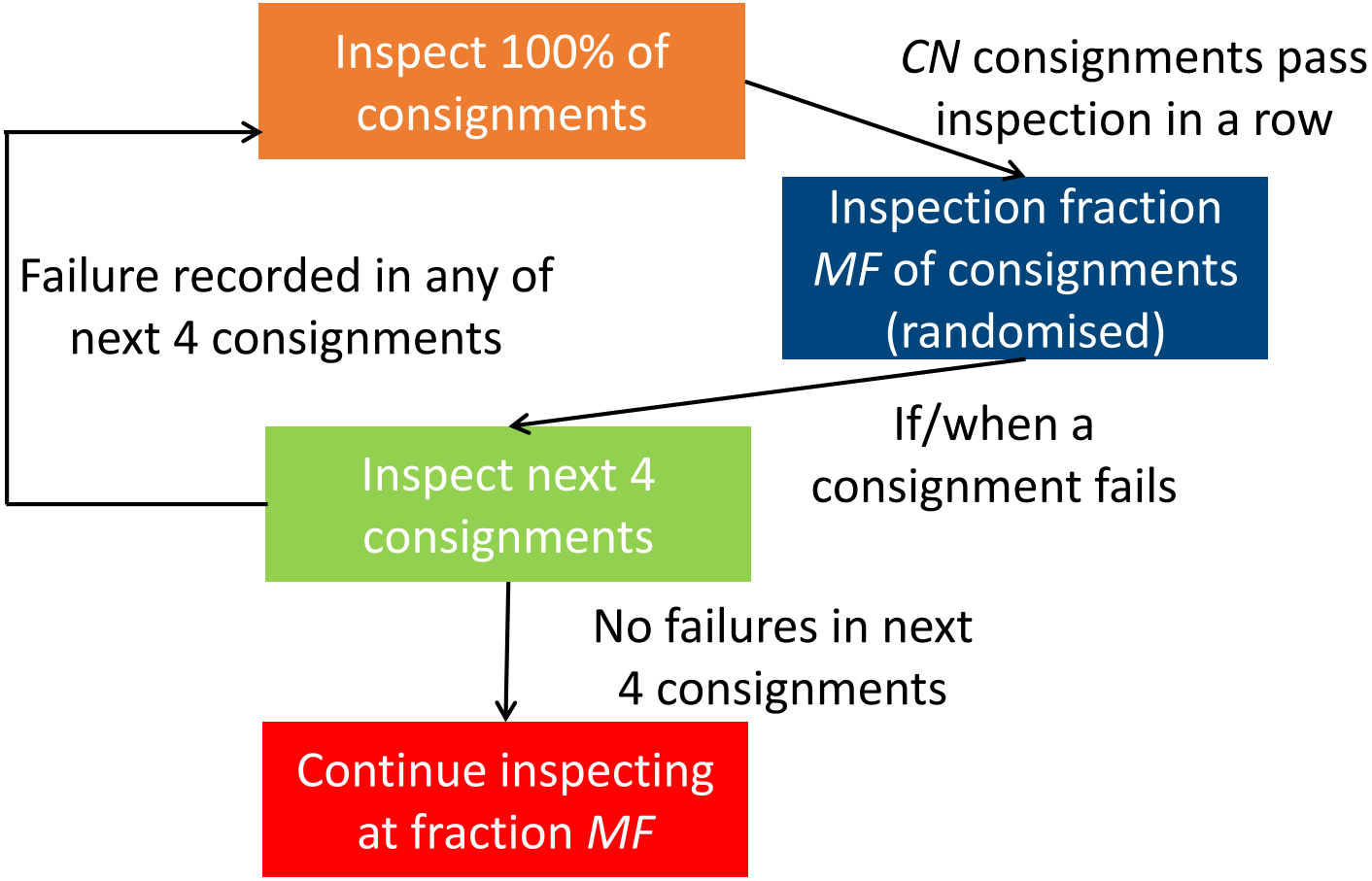
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No failures in next 4 consignments
Continue inspecting at fraction *MF*

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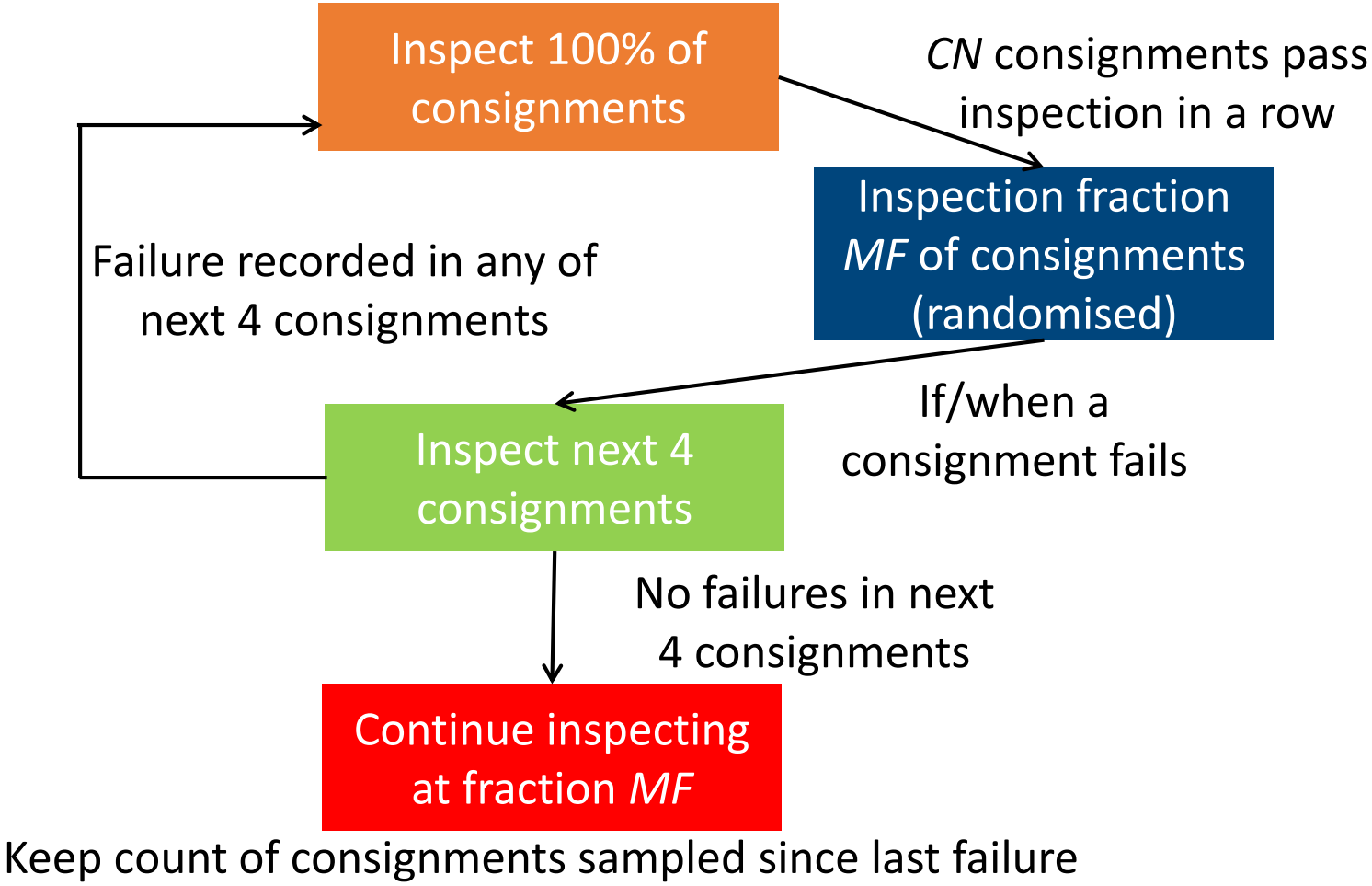
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Keep count of consignments sampled since last failure

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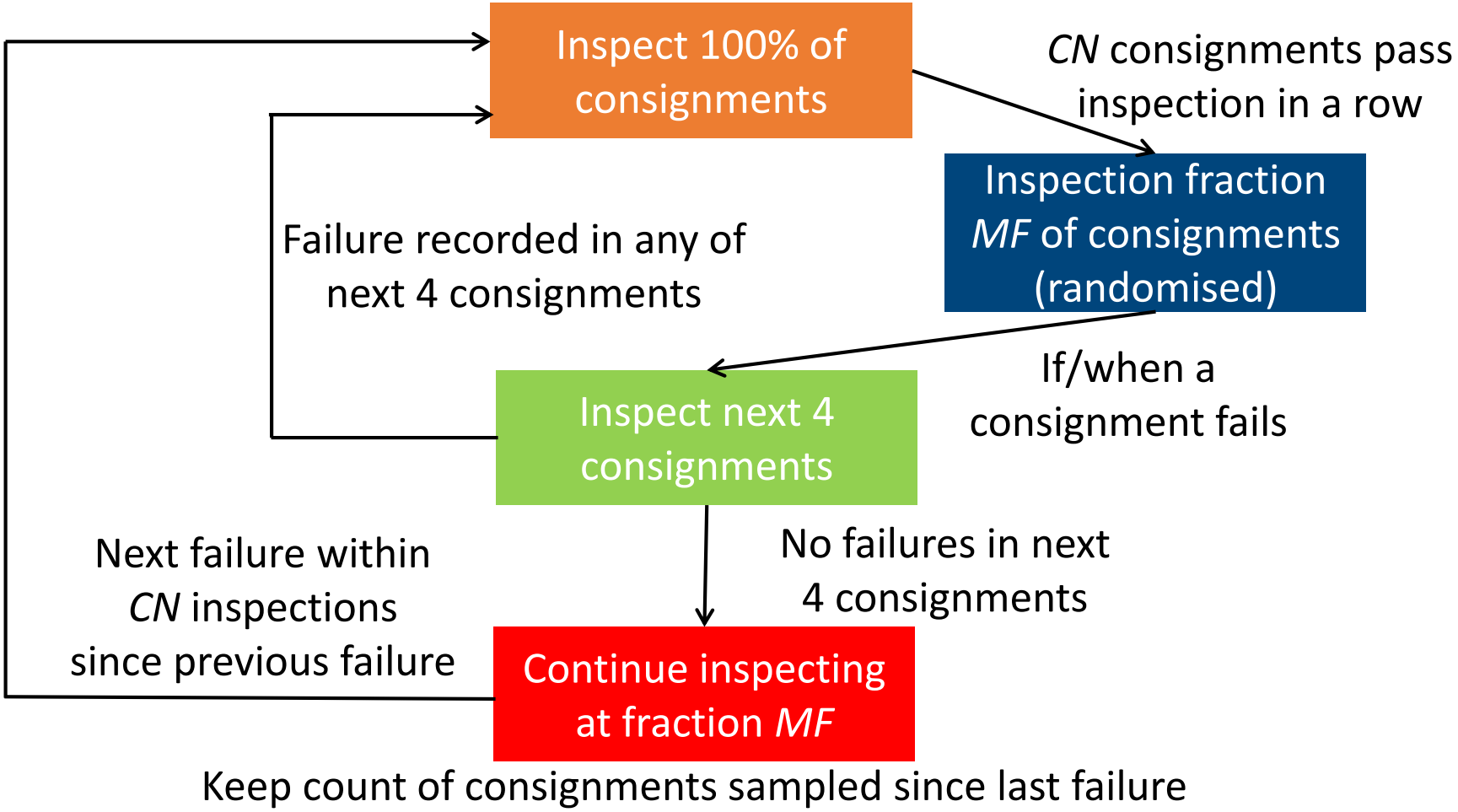
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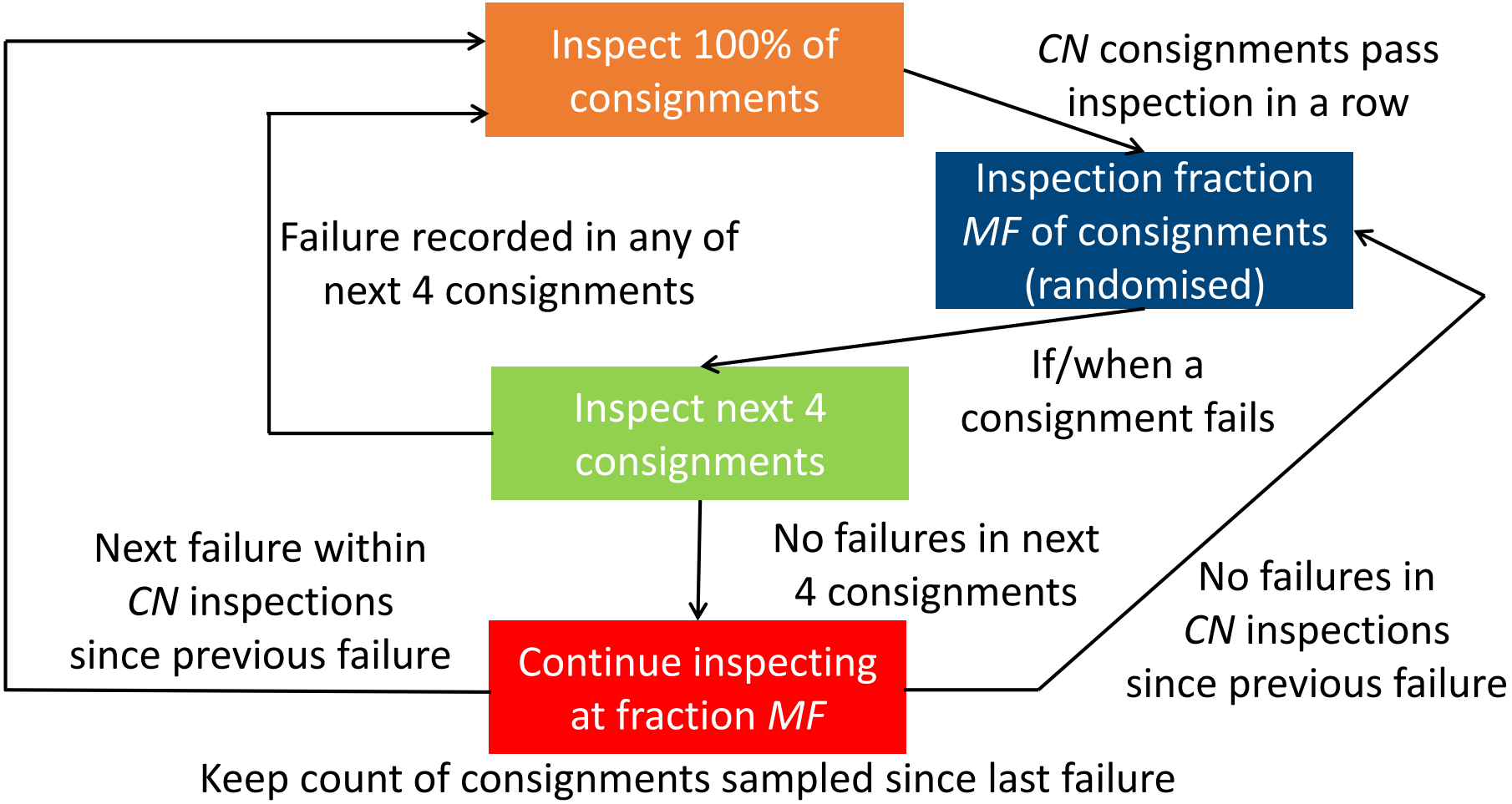
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CEBRA's 'Carrots and Sticks' project

Aims to design and trial biosecurity inspection protocols that encourage compliant behaviour.

1. Select pathways and protocols to trial through
   a) Analysis of DAWR's administrative data
   b) Stakeholder consultation
   c) Economic theory
2. Test aspects of protocols using economic experiments
3. Implement field trial

1 a) Analysis of administrative data

Analysis of DAWR databases gave an understanding of the following:

- Distribution of failure rates between importers, suppliers and countries of origin
- Reasons for consignments failing inspection, patterns of failure
- The relationship between importers, customs brokers and suppliers

1 b) Stakeholder consultation

- Semi-structured discussions with importers and customs brokers
- Information gathered on key biosecurity issues, including:
  - Importers' and customs brokers' understanding and experience of Australia's biosecurity system
  - Measures taken by suppliers and importers to reduce likelihood of biosecurity risk material in products
  - Import supply-chain structures
- Interviews identified key import-supply chain participants

1 c) Economic theory

- Use insights from economic theory to structure and design protocols
- Use simulation model to determine expected behaviour of importers
- Theoretical models can provide benchmark for how importers could be expected to respond to various rules:
  - Can test theoretical predictions in an experimental economics laboratory

Selected pathways and protocols

Two pathways selected:

1. Peat
2. Selected vegetable seeds for sowing (VS)

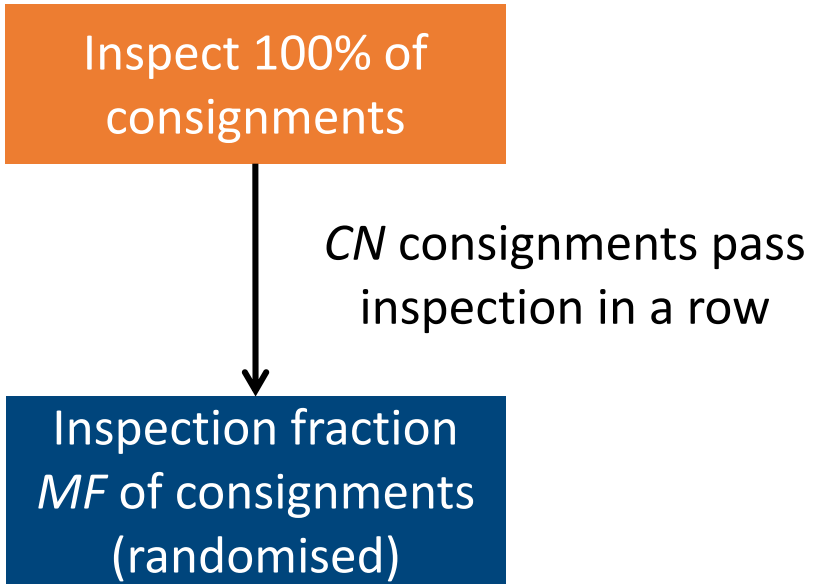
Suggested protocols for testing:

- CSP-1
- New approaches to communicating inspection rules
- Structured feedback reports

CSP-1 Algorithm

Inspect 100% of consignments

CSP-1 Algorithm



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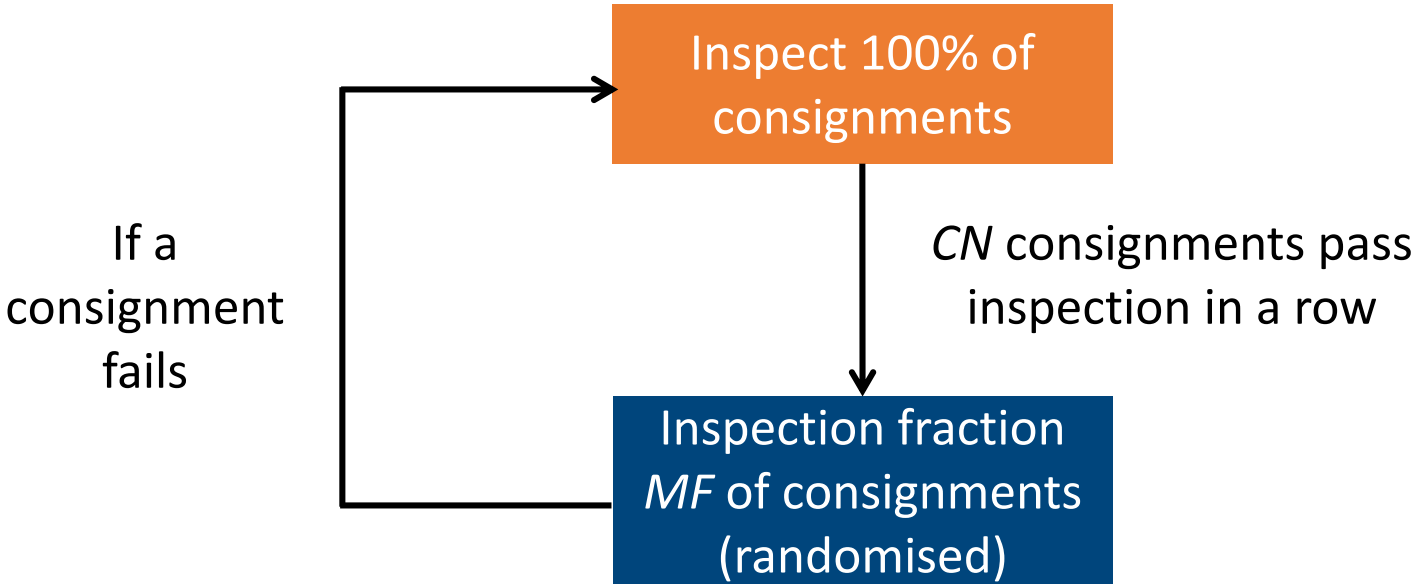

2. Economic experiments

- Aspects of proposed protocols were in an experimental economics laboratory, where:
  - Subjects (students) take on the role of the importer choosing a supplier
  - Experimental ‘treatments’ were different forms of the rules and costs
  - Role of regulator played by computer software

2. Economic experiments – key results

- Feedback may be important for influencing performance under compliance-based inspection rules
- More information about the rule seems to encourage supplier choices with lower biosecurity risk
- CSP-1 may perform as well as CSP-3 from choice perspective and may be better understood by stakeholders
- Compliance-based protocols may support biosecurity objectives when failing inspection and/or being inspected is costly

3. Implementation of field trial

Two pathways selected:

1. Peat
2. Selected vegetable seeds for sowing (VS)

Two protocols being tested:

1. Adaptive inspection with refined pathway definition (peat and VS)
   - CSP-1
   - profile within a tariff code
2. Structured feedback reports (VS only)

3. Implementation of field trial

- What we have learnt so far:
  - Tailored communication with importers seems to be well-received and more effective
  - Feedback can be valuable for stakeholders – identify options for changing systems to avoid repeating non-compliance and even picking up problems with lodgement by customs brokers
  - Internal department communication/processes could be more consultative to implement change
  - Industry bodies can be a great ally to help with communication.
  - Selection of commodities for incentive-based regulation
  - Many unforeseen issues and complications (IT, legislation, pathway peculiarities)

Next steps

- Field trial ends in November 2017 – analyse results
- Incorporate findings into DAWR 'business as usual'
  - Feedback reports have been implemented on several pathways
- New CEBRA project to help design protocols around assurance activities delegated to Competent Authorities

Publication

- Rossiter, A. and Hester S. 2017. Designing biosecurity inspection regimes to account for stakeholder incentives: An inspection game approach. *Economic Record*, DOI: 10.1111/1475-4932.12315.

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- Ignoring the incentive properties of rules leads to (unpleasant) surprises
- How protocols are implemented can aid regulators in achieving their stated objectives
- **Include economists in rule design**, and regulation activities in general! Particularly economists with skills in:
  - Economic theory (game theory, contract theory, mechanism design), behavioural and experimental economics

Acknowledgements

- DAWR staff (in Canberra and at the ports)
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- CMD – University of Melbourne

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University of New England