Epic 3 Conference

Modelling to support disease outbreak management

Economics

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Typical Economic Model?

Predicted Losses from BTV8 Incursion into Scotland*

“It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their self-love, and never talk to them of our own necessities but of their advantages.”

Adam Smith, 1776
Importance of this to Epic

Infected Nodes

Percentage of infected nodes

Time

MRP=Movement Restriction Policy

No MRP
MRP with anticipation
MRP no anticipation

Need to understand farmers*

*And other significant ‘actors’ of course – see Alyson Barrett’s presentation.
Management problem model


Dairy cow culling guide based on an optimal replacement decision model that maximises the £NPV of heifers in perpetuity.
### Mean Inefficiencies in French Specialist Dairy Farming Businesses

<table>
<thead>
<tr>
<th></th>
<th>CSS</th>
<th>OSS</th>
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<tbody>
<tr>
<td><strong>Environmental impacts</strong></td>
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<tr>
<td>Non-renewable energy</td>
<td>0.066</td>
<td>0.060</td>
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<tr>
<td>Land use</td>
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<td>Eutrophication</td>
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<td>Acidification</td>
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<tr>
<td>Mean</td>
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<tr>
<td><strong>Outputs</strong></td>
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<tr>
<td>Crops</td>
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<tr>
<td>Milk</td>
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<tr>
<td>Meat</td>
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<tr>
<td>Mean</td>
<td>0.025</td>
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</tbody>
</table>

CSS = continental specialized systems; OSS = oceanic specialized systems; GWP = global warming potential.

Data capture

Smart Sensors at Kirkton Farm – SRUC Hill & Mountain Research Centre

Internet of ‘Ewe’ things?
Conclusions

• Interdisciplinary epi-economic models are insightful
• Their value is not always fully understood
• There is therefore opportunity for future developments
• Technology and data capture should help
Acknowledgements

• Resas funding via EPIC and SRP
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• Staff at SRUC Hill and Mountain Research Centre
Leading the way in Agriculture and Rural Research, Education and Consulting
Data capture & Communication
A few seconds of accelerometer data OR a whole month/year?
Data Capture and Communication

- New (cheap) sensors – field-based, animal-based
- Reduced power needs (software improvement and hardware size/weight reduction)
- Improved (and cheap) communication (IoT technology)
- Associated platforms (such as mapping technologies for smartphones)
- Hardware size, costs and fitness for purpose improving dramatically through parallel developments e.g. batteries for human wearables and nearables will benefit animal wearables
- Move from data-logging (good for science and to document) to real-time monitoring (good for science, but becomes fit for active management)