Food safety management and its impact of the rural economy

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RESEARCH COUNCILS UK

RURAL ECONOMY AND LAND USE

Outline of talk

- Intro to RELU-Risk project
- Risk assessment as information science
- Campylobacter in chickens – a rural phenomenon ?
- Food chains supporting extended participation

RELU-Risk

- A multi-disciplinary project concerned with stakeholder participation in risk assessments for food borne hazards
- Research on quantitative assessment methods combined with structured public events (stakeholder participation)
- Participants – University of Surrey (Project leader Prof. R. Shepherd), Manchester University Business School, Leeds University Business School, Central Science Laboratory, Institute of Food Research
- Models, communication strategies and web tools
- Active on the web – including an interactive forum

http://www.relu-risk.org.uk/

RELU-Risk case studies

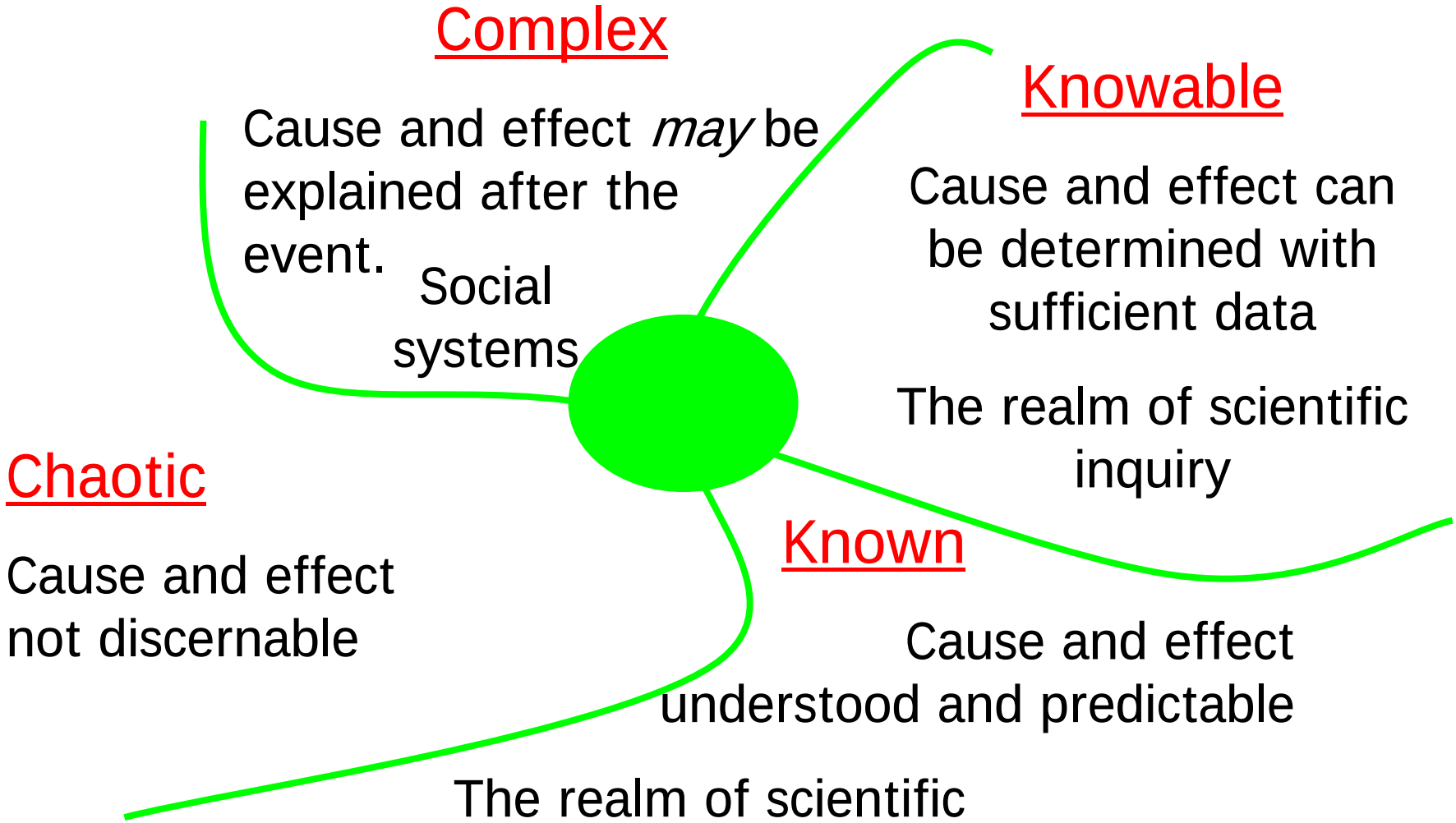
- Chemical risk – pesticides in apples
  - Ongoing (Next participation event June 2006)
- Microbiological risk – campylobacter and poultry
  - Developing (First public event in autumn 2006)
- Risks from unanticipated events
  - Hypothetical scenarios
  - Horizons and response preparations

Risk, information and uncertainty

- Hazard information is incomplete, uncertain and populations are variable (dependency)
- Risks are not well defined and usually involve multiple endpoints of concern (frequency x detriment)
- Risks are appreciated by different people in different ways and risk analysts often have one particular view of events (analysis, management, communication)

… communication, analysis, management, communication, analysis management, communication, analysis management, communication, analysis management, communication, analysis management, communication …

Cynefin model of decision contexts



Snowden (2002)

Rural affairs – decision contexts

- Farming and primary production are rural affairs and are subject to *complex (knowable?)* influences

- Food borne ill health has a societal *(complex)* as well as a scientific *(known)* context

- Risk management and public health concerns are commercial activities and are driven dominantly by *known (knowable?)* influences

Does risk management place a disproportionate emphasis on the *complex-knowable-known* context of agriculture and production? Can improved education and risk communication activities be more (cost) effective?

Estimate of infection rates (chicken & pathogenic bacteria)

- In the UK approximately 4 x 10^5 cases of food borne illness per year are associated with chicken consumption (HPA, EID 2005)
- In the UK there are about 4 x 10^9 chicken servings per year (about 100 each) (FSA NDNS 2005)
- In the UK about 1 in 10000 servings of chicken leads to infection
- Food poisoning from chicken is a once in a lifetime event?

Beliefs concerning chicken consumption and food borne campylobacteriosis

- *Campylobacter* is the most common cause of infective intestinal illness (food poisoning) in the UK (~350,000 cases yr^{-1}, CDSC reports, FSA IID report)

- Chicken is most commonly associated with reported cases of campylobacteriosis (~50% of retail chicken in the UK is contaminated with *Campylobacter*, FSA retail survey 2002)

Beliefs concerning chicken consumption & food borne illness

- In the UK broiler production is a significant element of many rural economies and is an area of ongoing investment and developments (British Poultry Council)

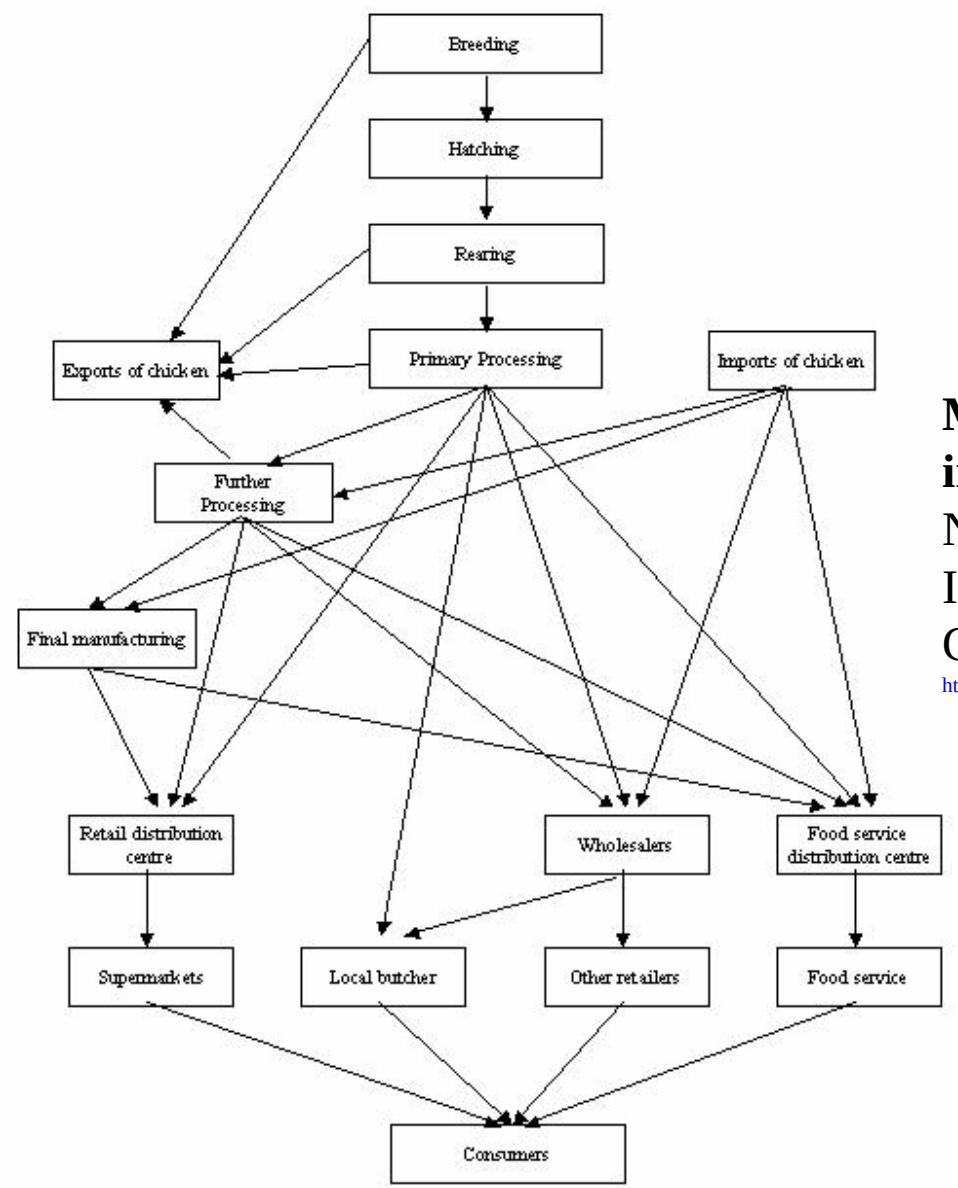
- News reports and voiced concerns most often highlight biosecurity during intensive UK broiler production or hygienic practice during primary chicken meat processing as target control points (Food Europe)

- Expert reports and quantitative assessments have identified cross contamination and hygiene in the food preparation area as a significant contributor to risks associated with *Campylobacter* (ACMSF 2005, CARMA, RIVM 2004)

Beliefs concerning chicken consumption & food borne illness

- Does UK primary broiler production, and the rural economy, carry unfair responsibility for illness caused by *Campylobacter*?
- Can a wider picture of the public health burden be appreciated by stakeholders?
- Can an integrated control policy lead to a shared burden across the food chain?

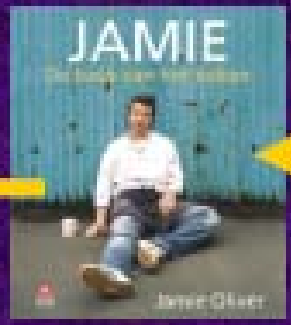
Food chain models



Map of the chicken supply chain in the UK

N.,Yakovleva, A.,Flynn (2004) Innovation and the Food Supply Chain: a Case Study of Chicken

http://www.brass.cf.ac.uk/uploads/wpinnovationfoodNYAF1004.pdf



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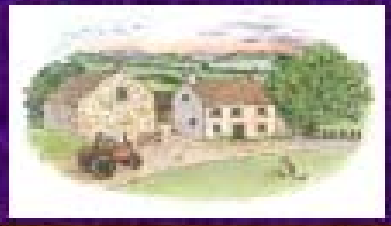
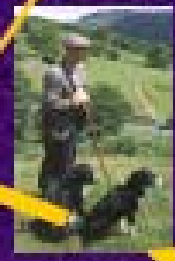
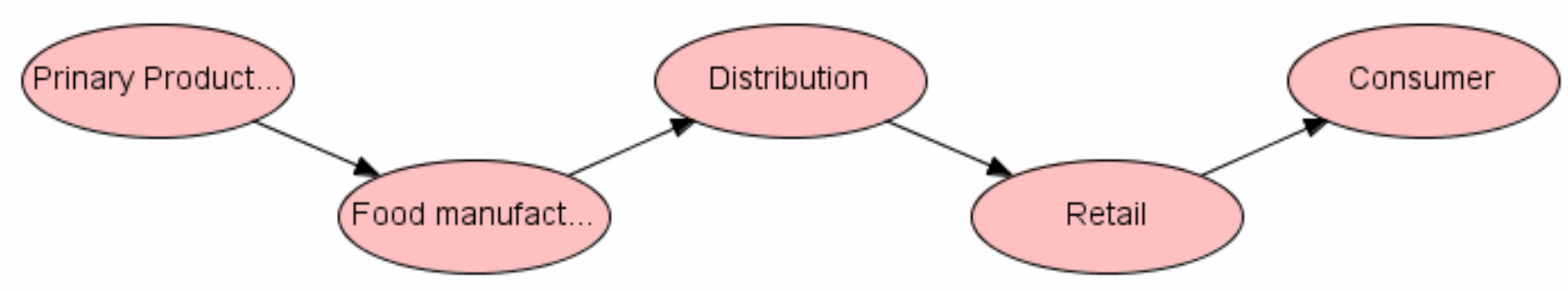




Modular food chain models



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- Food chain from primary production to consumption (coarse grained modularity – discriminate rural component)
- Build uncertainty distributions for (safety) performance criteria that relate to well defined elements of the food chain
- Consult stakeholders including farmers, processors, distributors, retailers and consumers, as well as governments and other groups
- Explore independence assumptions and complexity issues for food chain elements

(*FAO's Strategy for a Food Chain Approach to Food Safety and Quality: A framework document for the development of future strategic direction)*

Food safety objectives (FSO)

- In a quantitative microbial risk assessment the risk is expressed by combining the chance and the severity of illness (or other outcome) after exposure to the agent. Conveying this concept to multiple stakeholders can be problematic because of the specialist knowledge involved in preparing a quantitative model

- A FSO translates a public health goal into measurable attributes that allow stakeholders to assess control measures for complex (modular) processes

- The ICMSF uses this translation

$$H_0 - \Sigma R + \Sigma I \leq FSO$$

Food chain models

- The uncertainty distributions provide an interface to the NDNS food intake data set
- The uncertainty distributions provide a focus for the participation of stakeholders
- The uncertainty distributions provide an opportunity to integrate epidemiological and process management views

The modular nature of the food chain enables isolation of the elements and an analysis which leads to the relative contribution to safety for each element (i.e. rural elements)

When an element or elements which contribute strongly to safety are identified further partitioning of the left side of the FSO inequality is practical (targeted activity)

RELU-Risk supporting improved appreciations of hazards

In a progressive representation of food borne hazards the risk is inseparable from the information content and from the domain (food chain) structure so that it is open to distinct (local) views and presentations by multiple stakeholders but it is also clear from contradictions and ambiguity