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Modelling the effect of enforcement strategies on food safety

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Introduction

Food producers are responsible for the production of safe products that comply to EU food safety legislation. The level of compliance between companies differs and can be improved by measures such as education or sanctions. The aim of this study was to determine the effectiveness of various enforcement strategies on the level of compliance.

Materials & Methods

We developed a simulation tool using Agent Based Modelling (ABM) as a method. As a case study, we focused on the use of antibiotics within primary pig production. The agents in this case were defined as individual farmers and food safety inspectors. Factors incorporated in the model were: risk aversion, accidental errors, social influence and the effect of inspections and education.

Results

The ABM approach demonstrated that social stimuli and a bonus-malus principle are important factors influencing the level of compliance. A certain amount of law-abiding behaviour is needed in combination with a minimum number of food safety inspectors to achieve a pre-set level of compliance. Risk-based inspections resulted in a higher level of compliance than random inspections and education seemed to have less influence on compliant behaviour.

Discussion

This is a first attempt to simulate food safety behaviour as a result of enforcement strategies. As such, the underlying assumptions need to be explored in more detail.
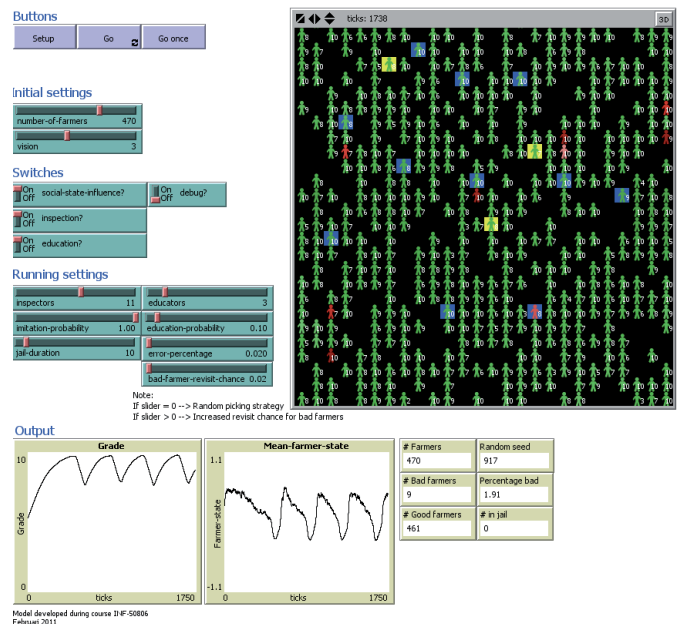

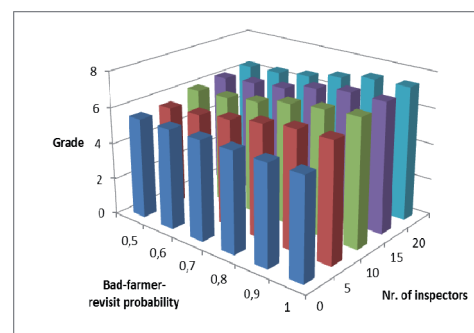Figure 1. Food safety status of the pig farmers as simulated in ABM

Figure 2. Effect of risk-based inspections and number of inspectors on the food safety behaviour of farmers

Conclusions

ABM is a powerful tool that helps to visualize the consequences of changes in inspection systems on food safety behaviour.

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