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## SYSTEMS APPROACHES FOR VALUE CHAIN INTERVENTIONS TARGETING FOOD SAFETY AND ANIMAL HEALTH IN SMALLHOLDER PIG VALUE CHAINS

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### INTRODUCTION

In the context of animal health and food safety, economic impact assessment tools are increasingly important to quantify the probable impacts of risks and to aid in decision making in times of increasingly tight budget constraints (Rich and Niemi 2017). However, the risks and impacts associated with both food safety and animal health can take place at multiple parts of the food value chain, and have different short-term and long-term effects. This suggests a need for better impact assessment tools that take the impacts at the whole chain-level into account. This paper applies a quantitative value chain approach to assess the impacts of interventions in selected pig value chains in Viet Nam, highlighting both short-term and long-term dynamic effects.

### RESEARCH APPROACH

The system dynamics approach used maps out the complex interactions between actors and processes in value chains. They show how such structure affects system behavior, which can be influenced by external shocks. This paper also highlights food safety issues within the value chain. The model is based on a value chain survey of 420 pig farmers, 22 processors, 74 retailers, and 416 pork consumers in Nghe An and Hung Yen provinces in Viet Nam.

### RESULTS

Two scenarios were analysed: (1) applying Good Agricultural Practices (GAP, which the VietGAP guidelines are derived from) whereby farm costs increase 10%, leading to productivity gains of 20% and mortality losses reduced by 50% and (2) a food safety scenario where slaughterhouse margins rise 20% to cover food safety infrastructure and there is a 20% rise in consumer income due to positive health effects. Sensitivity analyses were conducted on reduced costs in scenario (1) and lowered increases in consumer income in scenario (2).

Applying GAP in the high cost scenario was not beneficial for farmers in mixed systems that combine farrow-wean and fattening activities. On the other hand, the low-cost scenario led to positive benefits in all systems. Food safety scenarios revealed higher demand for safe pork, offsetting the higher prices paid in the baseline. However, in the lower income increase scenario, income and health gains by consumers are not enough to cover the higher margins and prices for safe pork.

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### DISCUSSION AND CONCLUSION

For GAP to play a positive role in the value chain depends crucially on its cost of implementation. Identifying cost-effective solutions, such as a "VietGAP lite" could positively influence adoption in the smallholder pig systems context in Viet Nam. These could include improved feeding practices in piggens, simple ventilation systems, drinking water through taps, and regular cleaning and disinfection. The role of extension to create awareness is critical.



The food safety scenarios highlight the potential role of the public sector in supporting value chain upgrading, especially if income gains associated with better public health do not provide adequate consumer incentives for buying safe pork. This public support could include assistance with finance and training programs to improve slaughter practices. Better capacity in the regulatory arena, in terms of inspection and compliance with standards, could further increase the returns to private sector investments in food safety.

System approaches provides a template for decision making in value chains that could be applied in a variety of different agricultural and livestock contexts, including those in mountainous regions of Viet Nam. This approach can help to overcome policy resistance that biases decision making towards immediate solutions that overlook the unintended consequences of those decisions in the future.

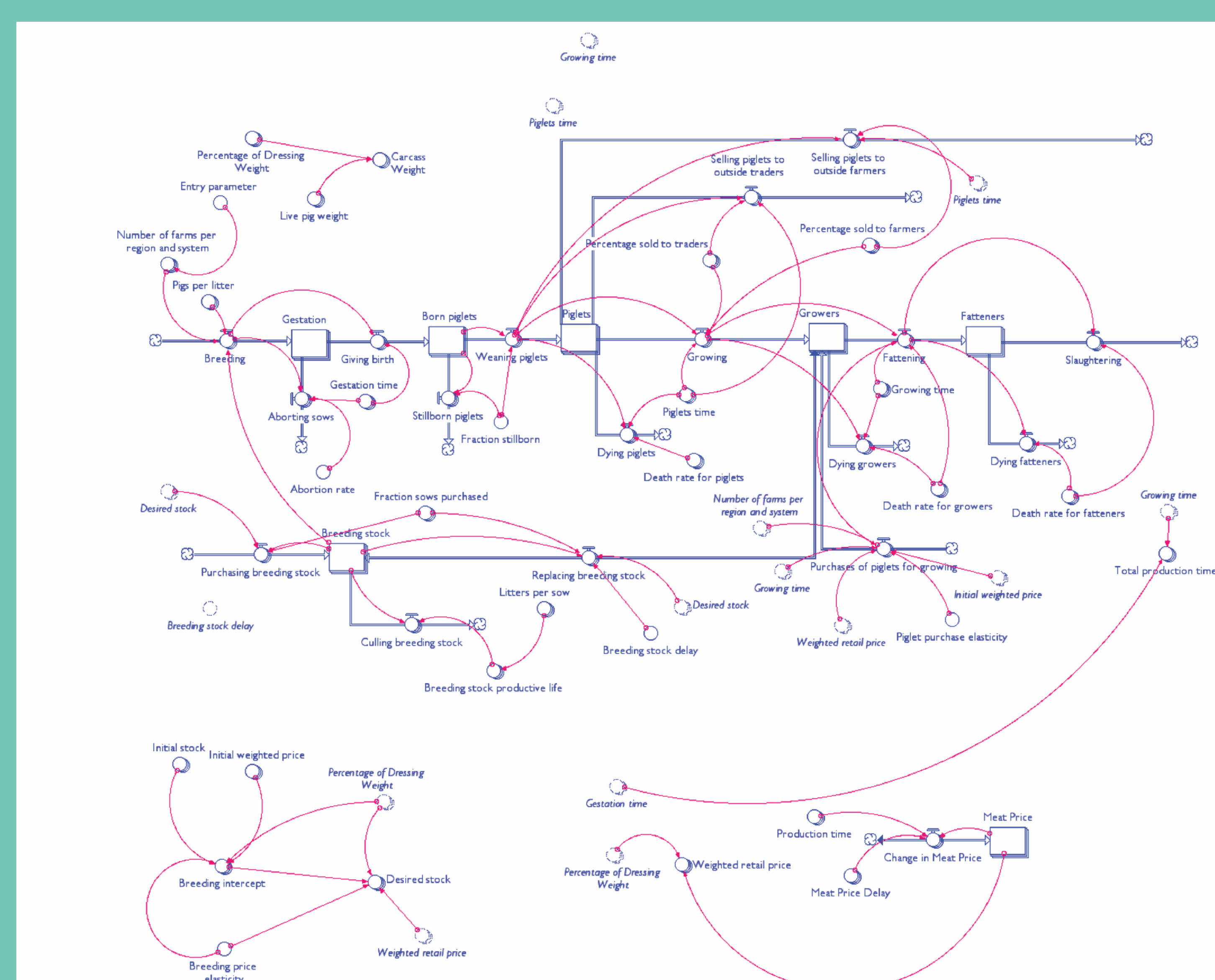


Figure 1: Herd demographics and marketing

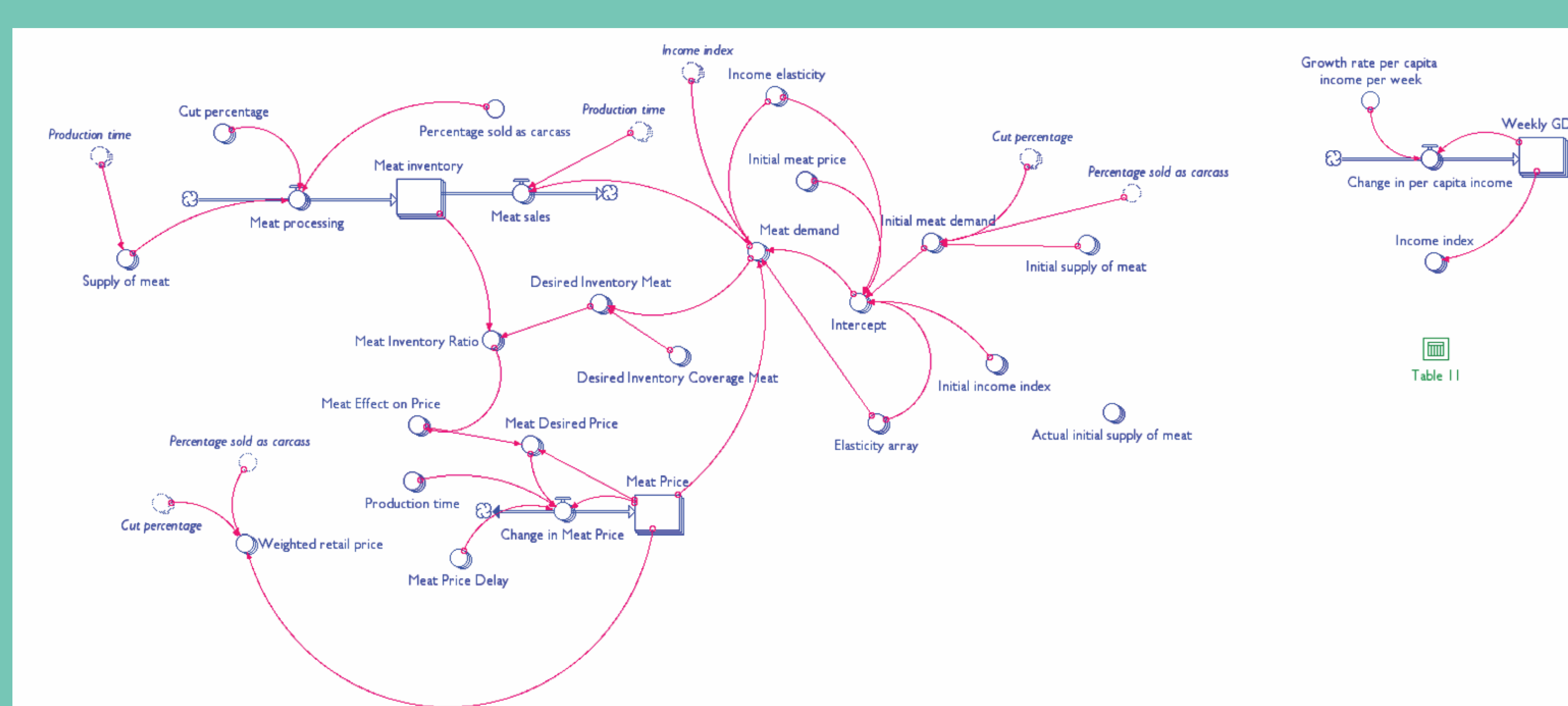


Figure 2: Meat demand and price formation

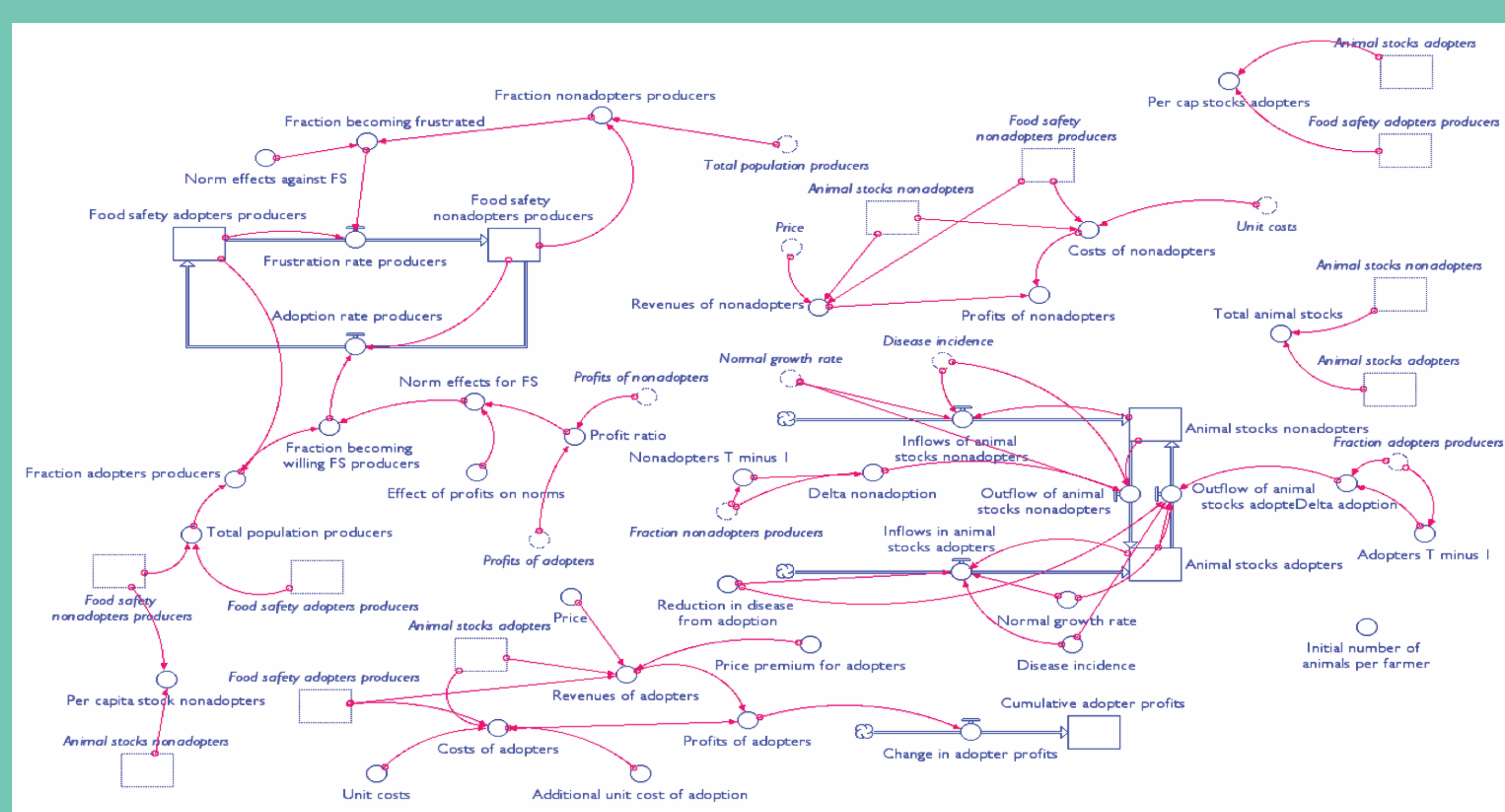


Figure 3: A model of producer adoption

