Structural change in the Finnish livestock sector - Past changes and future prospects

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Introduction

• The structure of Finnish livestock sector has changed rapidly already for several decades
  • Which factors are related to producers’ decision to enter & exit?
  • Implications to structural change in the past and in the future?

• Increased concerns about environmental, animal health and financial risks of agglomerated production
  • Farm structure can affect the transmission of animal diseases
  • What are the benefits and costs of structural change?
  • How would risk factors related to animal disease risks change if farming structure will change in the future?
Objectives

1. Analyze, which kind of cattle or pig farms have continued their operation from 1997 to 2009
2. Project the future structure of livestock farms
3. Characterize how changes impact animal disease risk factors (with the focus on biosecurity).

• In this presentation, farm size refers to the number of animals per farm
Data & methods
Analysis of past development

- Finnish Farm Registry 1997-2009
- Farm-level information on
  - The location of each cattle and pig farm
  - The numbers of animals kept at each farm by the type of animal (dairy cows, beef cows, sows, finishing pigs etc.)
  - Regional macro-economic data such as land prices and unemployment rate
- Methods used to analyze historical changes
  - Characterization of changes in the number of animals on average and by farm size and spatial farm density classes
  - Logistic models used to assess, which factors are associated with the likelihood of farm to continue livestock farming
Three types of future projections

1. Future farm size was projected for cattle and pig farms as if historical pattern of change would continue
   - The continuation-of-business rate was projected based on the estimation results starting from situation in 2009

2. Geometric-series-based change in farm size projected

3. Parallel projections were produced until 2020 by DREMFIA sector-level economic model
   - Projects the amount of production and animals contingent upon EU-level scenario for producer and input prices under given agricultural policy (assumed policy as it is known until 2013).
   - In the model production is gradually situated in relatively advantageous areas and total domestic production is competing with imported products.
Biosecurity

• A questionnaire enquiring the use of 17 different biosecurity measures in cattle and pig farms was conducted
• Sent to 4000 farms, response rate was 44%.
• A generalized linear model (GLM) was used to estimate the prevalence of each biosecurity measure in 2009
• The prevalence of biosecurity measures were projected for each farm type in 2033 by using projected mean farm size (geometric series) and GLM estimates
Results

• The number of farms and animals will decrease in the future and farm size will increase.
  • Small farms are likely to exit or to grow in relative terms more than large farms
• Large farms and mixed farms with both cattle and pigs are most likely to continue
  • However, mixed farms are expected to vanish over time as they tend to specialize in one species.
• The spatial agglomeration of production is also possible
The number of farms according to Dremfia

Based on historical development, the number of cattle and pig farms would decrease 4% and 3% per year, respectively.
Which characteristics were related to the increased\(^{+}\) or decreased\(^{-}\) likelihood to continue production?

<table>
<thead>
<tr>
<th>Variable or factor</th>
<th>Bovines</th>
<th>Pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The farm had both pigs and cattle</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Farm is specialised in beef production</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>The farm had suckler beef cows</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>The farm had other cows</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>The farm had sows</td>
<td></td>
<td>++</td>
</tr>
<tr>
<td>Household taxable income is high in the region</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Long distance to the nearest abattoir (km)</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Long distance to the (nearest) dairy (km)</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Larger number of similar farms per km(^2) (10 km radius)</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>More pig farms per livestock farm (10 km radius)</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Larger number of pigs &amp; bovines in the farm</td>
<td>++</td>
<td></td>
</tr>
</tbody>
</table>

Statistically significant parameters in a logistic regression model applied in the Finnish Farm registry data.
Geometric annual rate of change in the average farm size

- **NOTE**: At the farm level the increase is much smaller (result not shown here) than change in the average farm size, because change in the average farm size is partly due to small farms exiting the industry.
- Relative (%) changes: farm size has increased more rapidly among small than large pig farms.
- Some production types show spatial agglomeration of production due to farm size increase.
Biosecurity

- Larger farm size seems to indicate a better biosecurity as they use more biosecurity measures than smaller farms.
- In most cases, biosecurity measures’ implementation frequencies will increase or stay the same.
- The use of protective clothing will become more common in cattle farms.
- Some measures will even become less common: washing hands in sow farms and rodent and bird control in the feed storage in dairy and sow farms.
- The use of traffic arrangements and compartmentalisation are estimated to increase the most
Change in the implementation of selected biosecurity measures by 2033

- Sow farm
- Farrow-to-finish farm
- Fattening farm
- Dairy farm
- Beef cattle farm
- Suckler cow farm

Legend:
- **Stay the same**
- **Increase**
- **Decrease**
Compartmentalisation

- Sow farm
- Farrow-to-finish farm
- Fattening farm
- Dairy farm
- Beef cattle farm
- Suckler cow farm

2009
2033
N.S.
Traffic arrangements

- Sow farm
- Farrow-to-finish farm
- Fattening farm
- Dairy farm
- Beef cattle farm
- Suckler cow farm

Graph showing percentage comparison between 2009 and 2033 for different farm types. The bars represent the percentage with error bars indicating variability. The graph includes a note for N.S. (not significant).
Conclusions

• Farm size is expected to increase by 5-10% a year
  • Small farms are likely to either exit or to grow rapidly
  • Farms will specialize

• The overall biosecurity in Finland may improve in the future because larger farms use more biosecurity measures than smaller farms
  • The use of traffic arrangements and compartmentalisation are expected to increase the most
  • Factors such as changes in the national or European animal health status, training and new production practices can alter the course of change.