

# Great Britain Pig Movement Data Analysis: Network Description

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## Introduction

Pig production in Great Britain (GB) is not a closed system restricted by physical barriers or geographical boundaries. Interactions may occur between neighbouring farms (share environmental or topographical conditions) or through animal contacts (pig movements). These interactions should be analyzed and taken into account when studying disease occurrence or providing preventive and control measures.

Pig movement data is recorded countrywide and provides an opportunity to improve the knowledge about the demographic, spatial and network structure of the British pig industry.

The objective of this study was to explore the spatial and network characteristics of pig movement between different pig holdings.

## Methods and Results

The 2008 GB pig movement records were obtained from RADAR. These data allowed identification of the “active” pig holdings, and provided information about inter-holding contacts and geographical location. The data was explored using simple descriptive analysis. The software ArcMap 9.2 and Pajek 2.0 3 were used for data visualization.

- The total number of pigs moved per year was used to categorise the holdings in Large/Medium/Small as a proxy for holding size:

Farm category	Large	Medium	Small	Total
Criteria	> 1000	1000-35	< 35	
Number	2,470	3,486	12,609	18,565
Proportions	13%	19%	68%	100%
Abattoir category	Large	Medium	Small	Total
Criteria	> 100,000	100,000-1,000	< 1,000	
Number	16	110	74	200
Proportions	8%	55%	37%	100%
Gathering category	Large	Medium	Small	Total
Criteria	> 1000	1000-100	< 100	
Number	22	30	149	201
Proportions	11%	60%	29%	100%

- Approximately 200,000 movements and 14 million pigs were transported per year (8M from farm to abattoirs; 5M between farms and 150,000 from farm to Gathering – i.e. markets/showground);
- The Large producers were found to be responsible for the majority of farm-farm and farm-abattoir movements; the medium producers have the highest proportion of movements between farm and gathering; movements from small to medium and large producers are reported and they should be explored because they might pose a higher risk of disease transmission (Graph 1);
- Abattoir and gathering holdings are heterogeneously distributed (Figure 1 - left); There are differences in the geographical farm distribution, e.g. small Vs large producers (Figure 1 - right);
- The visualization and detection of network patterns on the full network is not practical (Figure 2 - left). The identification of small groups within the network together with network analysis will provide a better picture of the British pig industry (Figure 2 - right).

Graph 1 - Number of movements and animals moved between farm, abattoir and gathering holdings



Figure 1 – Spatial distribution of abattoirs and gathering holdings (left); Spatial distribution of large and small producers (right)

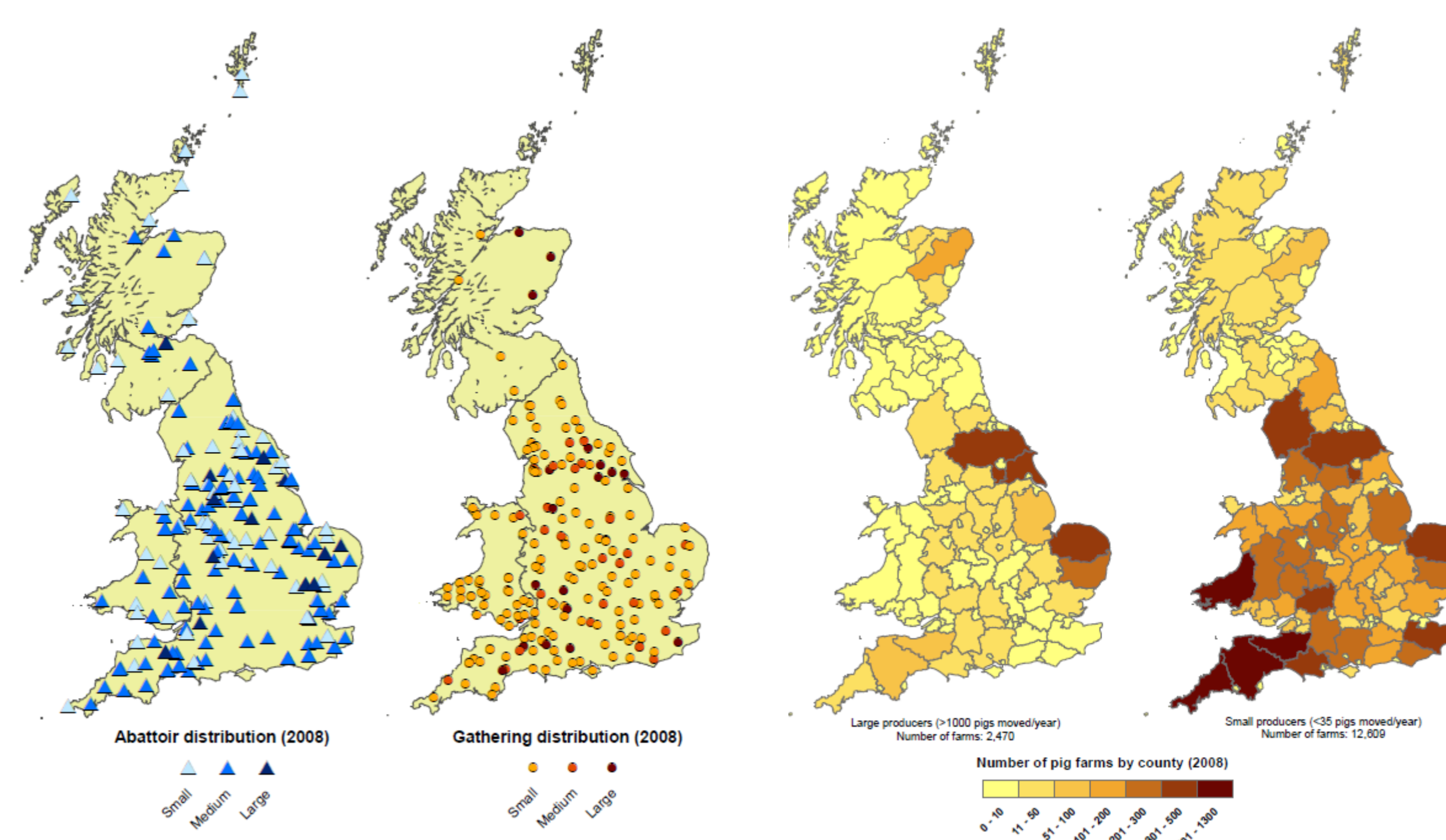
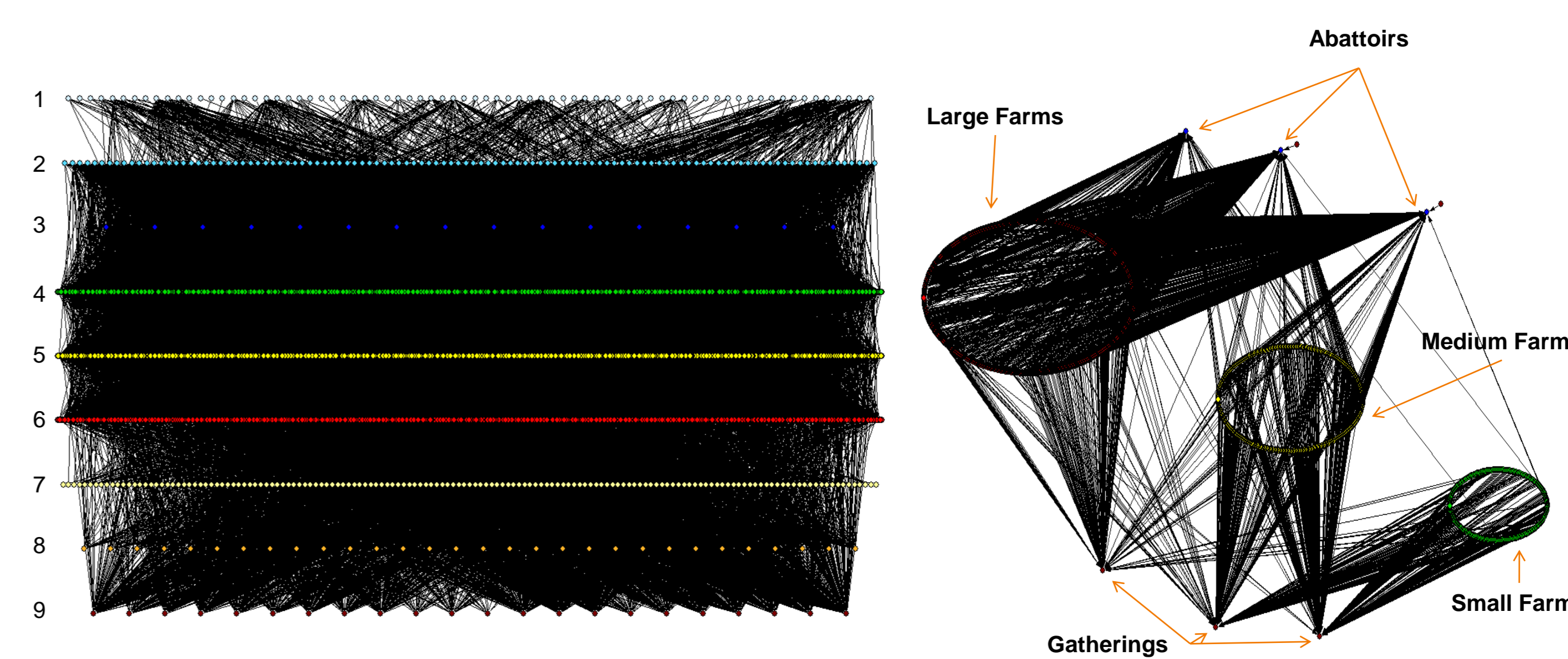


Figure 2 – Complete network representation (left) - the symbol colours represent different types of holding categories (1,2,3 - abattoirs (small/medium/large), 4,5,6 - farms (s/m/l) and 7,8,9 - gathering (s/m/l)), and black lines the links between them; Example of small network between Abattoir, Farms and Gathering holdings (right);



## Future Work

- The data will be explored considering the animal flow between/within network communities and geographical regions;
- Other parameters - spatial (e.g. spatial proximity to other holdings) and network (e.g. clustering coefficient) - will be used to finalize the characterization of the links between holdings in the GB pig industry.

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