**SUPPLEMENTARY MATERIAL**

**Model Equations**

**Data Manipulation**

The datasets used – general vs import datasets

1. General datasets
   1. Provide rationale for the datasets – why we picked ampicillin inf attending pigs etc
   2. Where we obtained the data from
   3. What stuff did we do to the data
2. Import dataset
   1. **How we calculated proportion of food usage from specific countries**
      1. **Using the different datasets**
      2. **Large amount of data and info here**
   2. Level of contamination and resistance from these countries (mention what years we used)
      1. Contamination we specifically took data from carcasses – rather than fresh as this is more representative of imported food
      2. The details like making sure that the measurements were standardised and using competent authorities etc.
      3. Resistance we just took from the general fitting dataset
3. DEFRA has data on the relative share of Domestic vs EU vs nEU countries on the UK’s food supply.
4. However this is for general food products not specific to livestock origin food products – therefore it must be scaled for livestock food products (excluding things like vegetablexss and processed food imports)
   1. We note that two cases tudies were explored to explore the effect – general livestock food products (psi = 0.656) and pig carcasses (psi = 0.4545)
   2. It is important to note that while pigs are the case study chosen by this study – the general import proportions were used to have a fairer repsentation of nEU imports (perhaps need to justify this decision better)
5. We therefore generated the proportion of UK food supply for general livestock food products – including poultry, beef, pork and eggs – from EU and nEU countries (rest of the world) – by determiniung the dressed weight and using thgis to generate the propiortioons
6. We exclude milk
7. We also have data on the share of imports in the UKs EU trade partners – by lookinga tht eproportion of money spent on iumports for the UK
8. We can then use the difference between the official reportsz for all food products and the ones for livestock food products and scale these EU importing countries approiately.
9. UK specific outcome measures
   1. Livestock resistance
   2. Livestock contamination
      1. Mention here is where we figured we would need to have an extra parameter describing the reduction in caecum to carcass
   3. Human resistance
   4. Human fbd – mention that we missed the 2016 year so we only use a single year

Data was obtained from X paper which identified a prevalence of Salmonella spp. found in the caecum of pigs of 32.2%. We also identify a UK level of contamiantion on pig carcasses of 2.865%, representing a reduction in the proportion of 89%. We use this value to parameterise the eta parameter.

* Specifically the removal of certain datapoints because they were unrealistic (where it was just 45/45 resistant), the fact that we used 3 years worth of data (2015, 2016, 2017, 2018) – although one of these intermediate years aren’t available

Supplementary Figures

1. Model fit – the one case study with a linear regression - to show that there is a relationship between livestock antibiotic usage and resistance

Chart, scatter chart

Description automatically generated

1. Diagnostic plots for the model fits – ideally, we have the plots which show the fitted distances compared to epsilon for each generation
2. Monotonicity plots for general senstivity analysis

Diagram

Description automatically generated

Diagram

Description automatically generated

1. Sensitivity analyses for the general outcome measures ICombH and resistance

Chart, scatter chart

Description automatically generated

Chart, waterfall chart, box and whisker chart

Description automatically generated

1. Uncertainty analysis for the main outcome measures (maybe this is a main figure?)
2. Monotonicity plots for outcome sensitivity analysis – the effect on fbd and resistance