Exposure risk of the Belgian human population to antimicrobial-resistant bacteria originating from pet cats and dogs – preliminary results

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Background

- Due to veterinary antimicrobials use and bacterial exposure, **pet cats and dogs** can act as reservoirs for antimicrobial-resistant bacteria, **antimicrobial resistance (AMR)** can then be **transmitted between pets and humans**, either through zoonotic bacteria or through bacterial resistance genes transfer.
- There is a need for tools to **assess the risk** of AMR transmission from pets and to identify the most effective **measures** to **reduce this risk** (e.g. biosecurity protocols, hygiene practices).

Main objectives

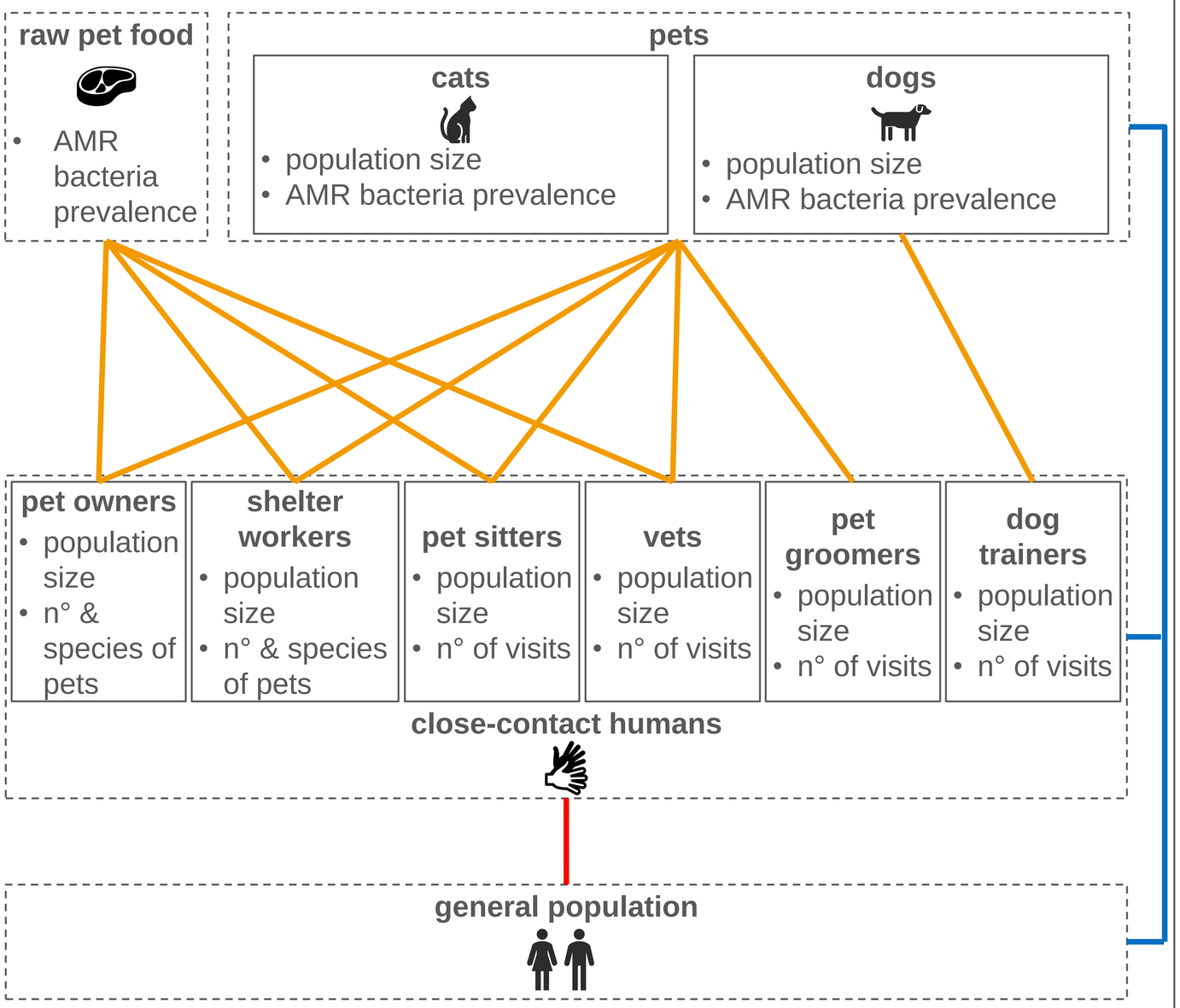
- Estimation: **probability** of the Belgian population **exposure to AMR bacteria** originating from **pet cats/dogs**
- Highlight: effective measures to **reduce exposure risk**
- **Inform the population** about this risk and these measures
- AMR bacteria in focus : *E. Coli*, *E. faecium*, *E. faecalis*, *Campylobacter* spp., MRSA, MRSP

Methods

- Identification of possible **risk pathways**
- **Data collection**: samples analyses (Belgian veterinary clinics surfaces and pet cats/dogs), questionnaire (Belgian veterinarians and pets owners), literature review
- Creation of a quantitative **risk assessment model** (@RISK®)
- Performing a **Sensitivity analysis** (@RISK®)

Model – preliminary results

Figure 1. Model framework showing the modules considered for the exposure of humans to AMR from pet dogs and cats and raw pet food.



Orange = pets to close-contact humans, blue = pets to general human population, red = close-contact humans to general human population). Each route includes more detailed ways of exposure (not shown here). Possible ways of human exposure to AMR from pet cats and dogs considered: raw pet food meal preparation, contact with excrements; contact with blood, contact with surfaces, physical contact, biting and/or scratching.

Figure 2. Comparison of exposure risk between different human categories. The graph shows the relative exposure risk, with the reference being the general population (= 1).

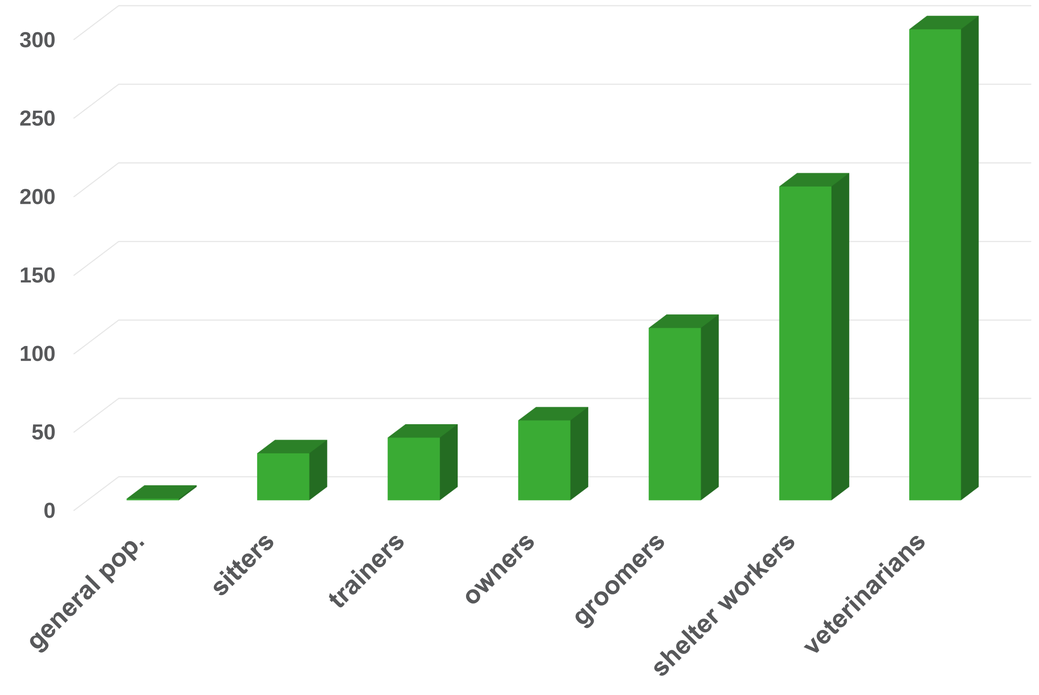
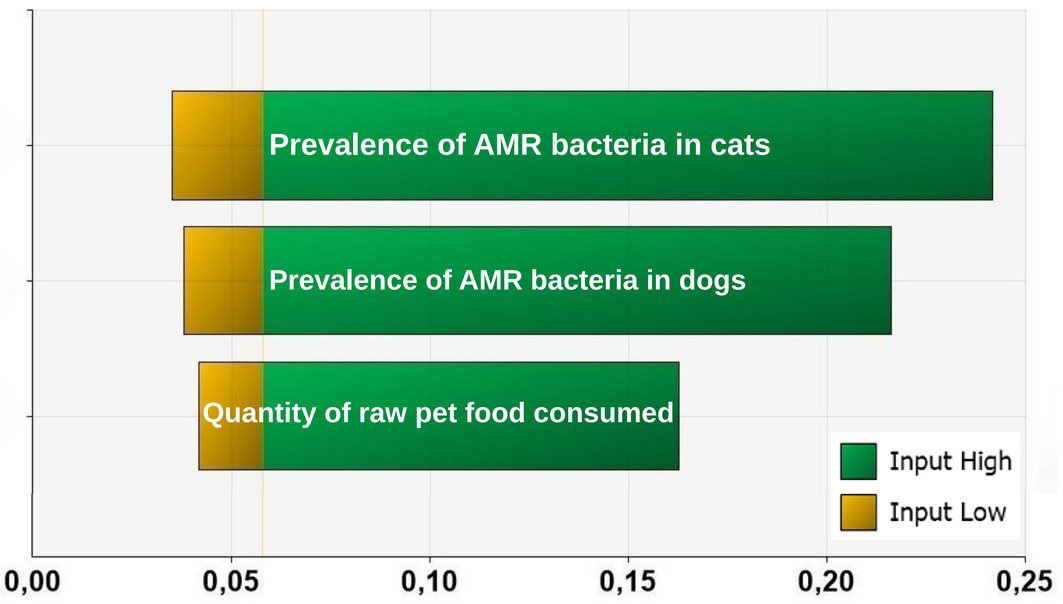


Figure 3. Sensitivity analysis showing the impact of the three most impactful inputs on the output of the model (i.e. the probability of exposure of the Belgian population to AMR originating from pet cats and dogs per week).



X-axis = mean value of the probability of exposure of the Belgian population to AMR originating from pet cats and dogs per week,

Next steps and future applications

- **Finalization** of the model with the incoming data.
- Test of **"what-if" scenarios**: decision-making tool for effective measures to reduce the risk.
- **Generate new results** upon availability of potential new data: monitoring of the risk evolution over time and improvement of the model.

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