Iron source influences *Campylobacter* growth rate

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Iron and pathogen virulence

For many pathogens, virulence gene express is linked with their access to iron from their environment[1]. For example, increased iron activates Ferric Uptake Regulator (FUR) in *Salmonella*, which increases expression of *Salmonella* Pathogenicity Island 1 (SPI-1). SPI-1 expression enables *Salmonella* to inject virulence factors into host cells to help it invade host tissues and to evade detection by the immune system[2].

QualiTech research has demonstrated a connection between use of SQM Iron (SQM Fe) in place of $FeSO_4$ and reductions in growth of *Salmonella, E. coli*, and *Clostridia,* as well as improvements in performance of swine[3] and poultry[4].

Campylobacter and Spotty Liver

Like *Salmonella*, *Campylobacter* is another pathogen with both animal health and food safety concerns. Most recently, *C. hepaticus* was identified as the cause of the resurgent Spotty Liver Disease (SLD) in birds raised with access to soil[3], including poultry products labelled as Free-Range, Pasture-Raised, or Organic.

Design

We conducted an *in vitro* growth kinetics assay to explore the sensitivity of *C. jejuni* to the level and source of iron using iron depleted media supplemented with:

- 3 levels of iron (10, 20, and 50 ppm)
- 3 sources of iron ($FeSO_4$, SQM Fe, SQM without iron)

Results

Replacing $FeSO_4$ with an equimolar concentration of SQM Fe resulted in:

- Up to 39.5% reduction in max growth rate
- Up to 31% reduction in max carrying capacity
- No evidence of anti-microbial effects of SQM matrix alone

Conclusions

Campylobacter joins *Salmonella* and *E. coli* on the list of known pathogens that grow more efficiently on $FeSO_4$ than on SQM Fe. Spotty Liver Disease is caused by a species of *Campylobacter*, indicating that iron source may be a tool for mitigating some risks related to recurrent Spotty Liver Disease in hens with access to soil.

References
1. DOI: 10.3389/fcimb.2013.00059
2. DOI: 10.1128/mBio.02122-17
3. DOI: 10.1016/j.vetmic.2016.12.033
4. Garret et al., 2019. Poult. Sci. 98(E-suppl. 1):104
5. DOI: 10.1016/j.vetmic.2016.12.033

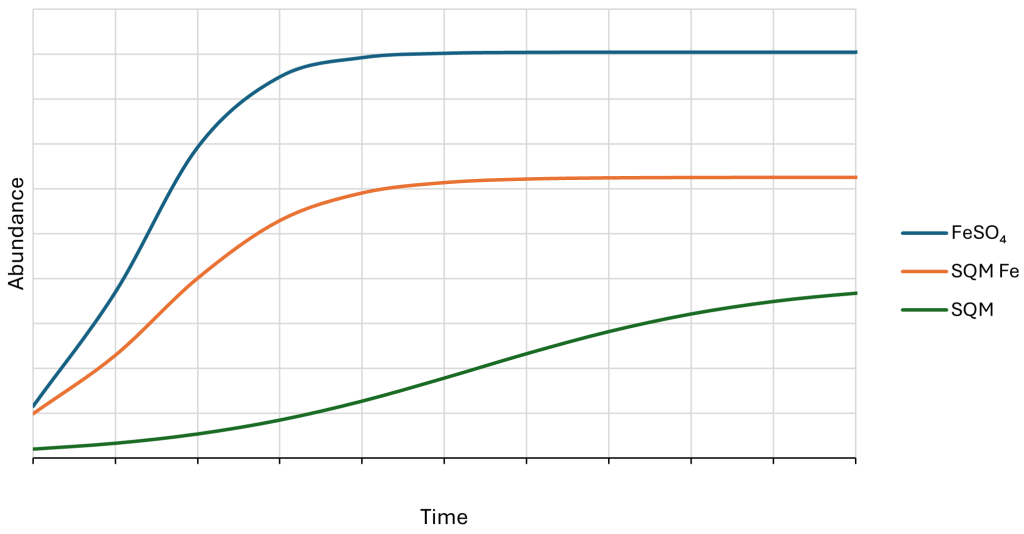

Figure 1. Growth curve of *Campylobacter jejuni* in response to 20 ppm of iron from different sources.

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