DYNAMICS OF BACTERIOPHAGE-HOST INTERACTIONS

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Background

As an alternative or supplement to antibiotics, bacteriophages (phages) can be used as therapeutics (phage therapy, PT) to treat bacterial infections[1,2]. Understanding the phage-bacterium interactions and population dynamics is essential for successful PT application[3]. Here, we investigated the growth dynamics of *E. coli*-infecting phages (coliphages) and avian pathogenic *Escherichia coli* (APEC), an important bacterial pathogen affecting poultry worldwide.

Methods

Phage-host growth dynamics of 18 lytic coliphages and 10 APEC strains (with serotype O1, O2, or O78) were assessed altering the parameters: phage species, APEC strain, and multiplicity of infection (MOI) using microtiter plate-based assays[4].

Results

Results showed 11 distinct growth patterns (Fig. 1), including

- A fully resistant pattern, representing the normal bacterial growth curve.
- A fully susceptible pattern showing no bacterial growth.
- Nine in-between patterns, characterized by lower killing, delayed killing or variable killing of the bacterial cells.

A comparison of the patterns reveals that phage, bacterial host, and MOI affect the phage-host interactions. This may influence the pharmacodynamics of a PT.

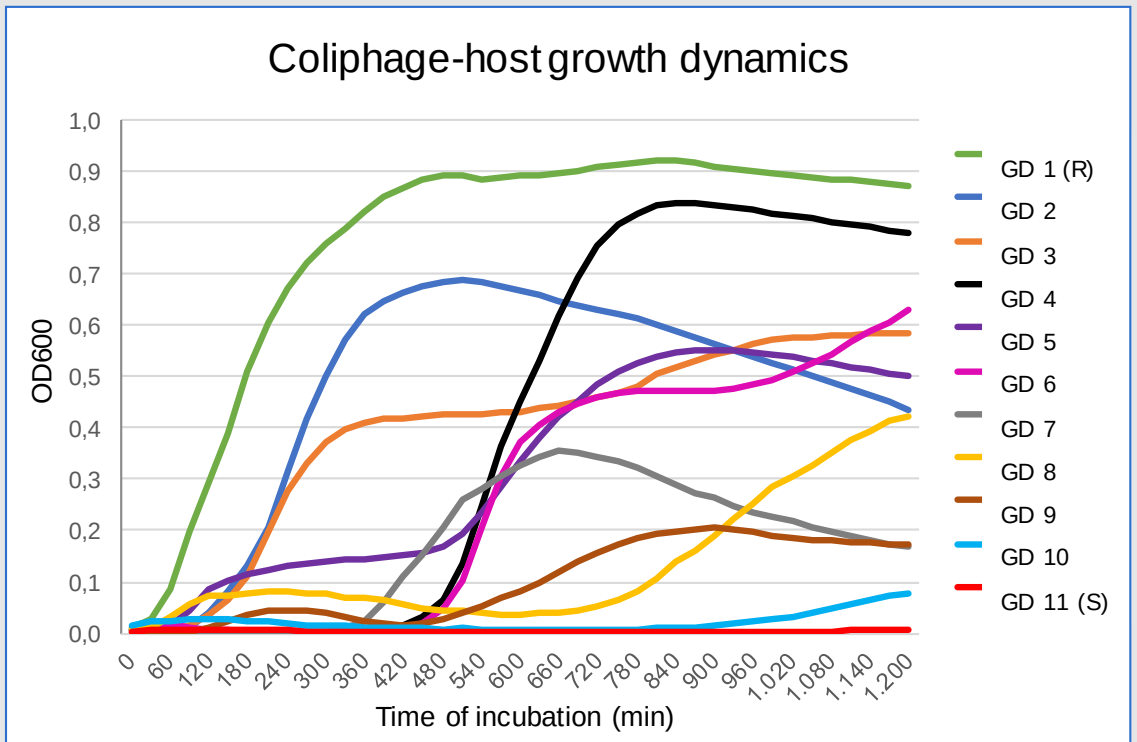

Fig. 1 | Growth dynamics (GD) of coliphage and APEC. R = Fully resistant pattern with phage-resistant APEC. S = Fully susceptible pattern with phage-susceptible APEC.

Conclusion

This study provides new insights into the phage-host interaction dynamics. These findings constitute initial steps in developing PT against pathogenic *E. coli*. However, in order to fully understand the complexity of the phage-host interaction dynamics, the underlying mechanisms behind these different interactions need to be deciphered.

References: [1]Huff W E *et al*., (2004). *Poult Sci*. 83(12). [2]Wernicki A *et al*., (2017). *Virol J*. 14(1). [3]Casey E *et al*., (2018). *Viruses*. 10(4). [4]Xie Y *et al*,. (2018). *Viruses*. 10(4)

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