Plenary Lecture - Lee Segel Prize, Friday, July 1, 18:20

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Persistence and Spread of Gastro-Intestinal Infections: the Case of Enterotoxigenic *Escherichia coli* in Piglets

Several gastro-intestinal infections in animal husbandry not only greatly reduce the well-being of animals, but also have the potential to cause large economical damage. It is thus of great importance to understand the dynamics of such diseases. We will focus on the within-host aspect of the dynamics and present a model that describes the spread of the pathogen inside a single infected host. Our motivation to study the problem stems from the case of enterotoxigenic *Escherichia coli* in newly weaned piglets, but the model offers an acceptable description of within-host dynamics of several other gastro-intestinal infections. We will first deal with the case where infection is a one-time event. While the description of the problem is in this case in several ways reminiscent of the problem of the 'drift paradox' in aquatic populations, there exists an additional aspect to the problem that is not relevant for aquatic populations: the problem of reintroduction. We will thus investigate also the reinfection case, in which a fraction of the shed pathogens is reintroduced into the host's intestine. We will present the condition that guarantees persistence of colonization in the reinfection case and discuss the implications for infection control.

References

[1] Barbara Boldin: *Persistence and spread of gastro-intestinal infections: the case of enterotoxigenic Escherichia coli in piglets.* Bulletin of Mathematical Biology, **70**, No. 7, (2008), pp. 2077-2101.