INFLUENCE OF HOST FACTORS ON THE SECRETION OF STX2E BY SHIGA TOXIN-PRODUCING ESCHERICHIA COLI (STEC) FIELD STRAINS FROM SWINE

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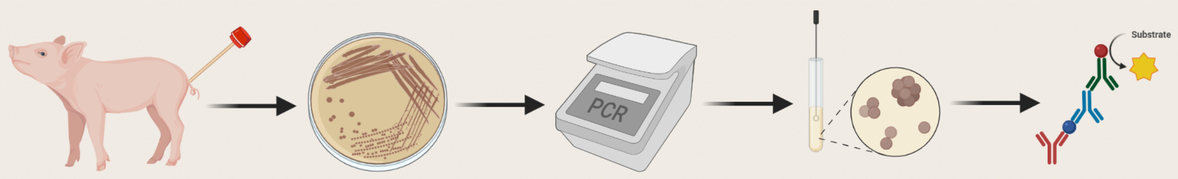
INTRODUCTION

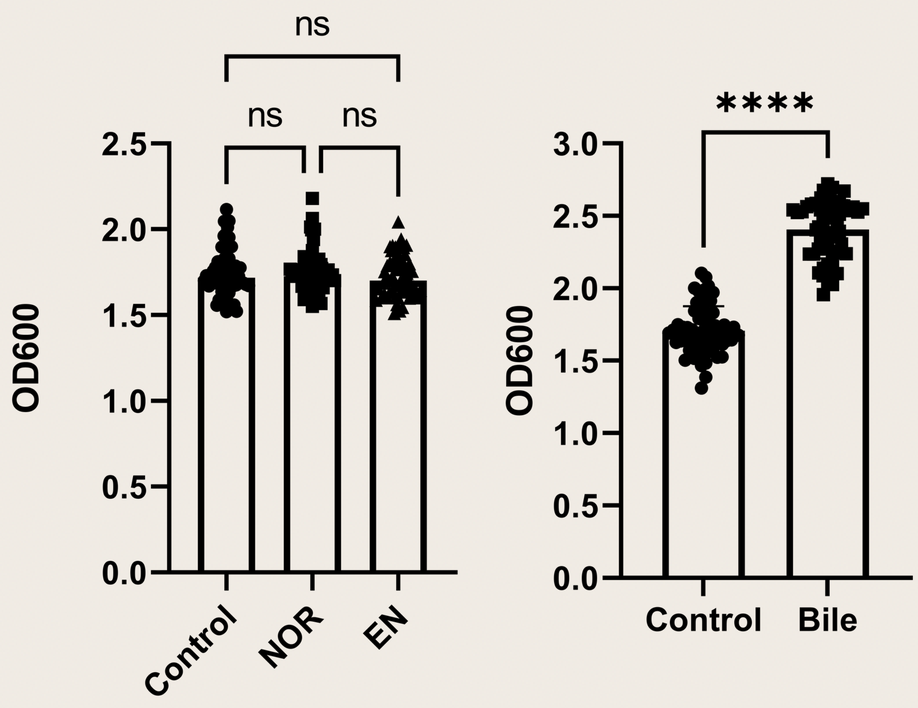
Shiga toxin-producing *Escherichia coli* (STEC) are known to cause oedema disease in pigs, causing significant losses for farmers. Not all affected pigs develop disease. Previous research has shown certain host factors like bile and glycocholate can influence the expression of virulence factors by pathogenic *E.coli*, which likely plays a role in their pathogenesis and potentially in the severity of clinical symptoms. These studies only looked at a limited number of strains and were not STEC-specific. Therefore, this study aimed to map variation in Stx2e secretion by a large number of STEC field isolates recently collected on farms with oedema disease in response to bile acids and (nor)epinephrine.

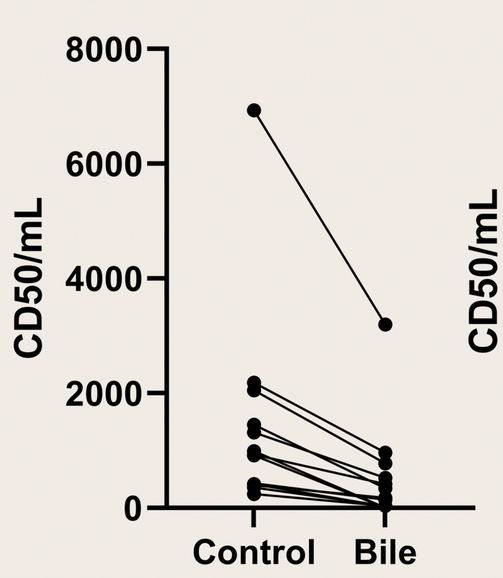
METHODS

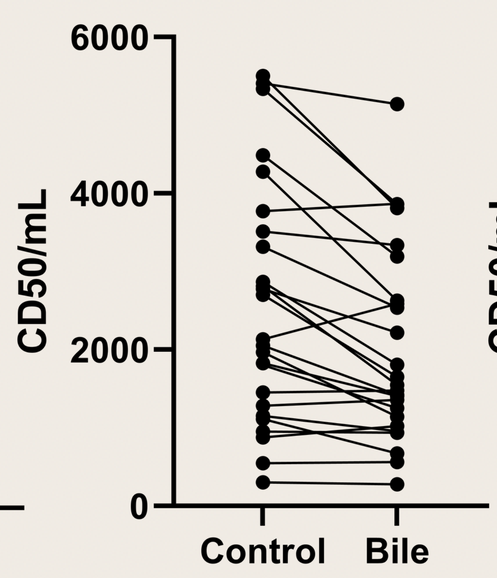


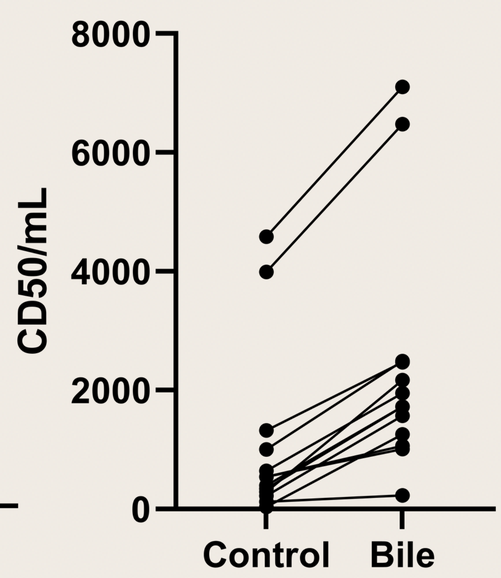
The presence of virulence genes associated with STEC was evaluated by an in-house developed multiplex-PCR. STEC field strains (58) were cultured in the presence of a 0.3% bile acid mixture or 50µM (nor)epinephrine, and growth kinetics were determined by measuring the optical density at 600nm. Stx2e secretion was measured by ELISA, with up -and downregulation defined as at least a 1.5 fold increase and 2-fold decrease as compared to the untreated strain, respectively.

RESULTS









For both norepinephrine and epinephrine, no significant changes in growth were observed. Bile acids however significantly (Ratio paired t-test, $p<0.0001$) increased the growth of STEC strains (mean OD600 = 0.7). Here, no significant pairing was observed, meaning that different strains showed different responses.

Up- and downregulation of Stx2e secretion were defined as at least a 1.5 fold increase and 2-fold decrease as compared to the untreated strain. While no response was observed for either nor -and epinephrine, a variable response of the strains to bile acids was observed with 13 strains showing downregulation and 12 strains showing upregulation. The 33 remaining strains did not show up – or downregulation as determined within the set cut-off values.

CONCLUSIONS

STEC strains vary in their Stx2e secretion in response to bile acids, while (nor) epinephrine does not affect Stx2e secretion by the tested strains. Both up- and downregulation of Stx2e secretion were observed under he influence of bile acids, with the variation being independent of the virulence profile of the strains.

References:

Skinner, C., Patfield, S., Hernlem, B. J. & He, X. New Stx2e Monoclonal Antibodies for Immunological Detection and Distinction of Stx2 Subtypes. PLoS One 10, e0132419 (2015).