For the first time we describe colonisation dynamics for Pasteurellaceae in URT of healthy neonatal beef suckler calves in a long-term, longitudinal study using both molecular and culture-based methods. We collected short nasopharyngeal swabs from thirty housed calves (Stabiliser or crossbred from Hereford-Friesian dams by either Charolais or Limousin sires) within their first week of life and at approximately monthly intervals thereafter until 10 months of age. Using published PCR gene targets and 16s rRNA sequences we have developed three real-time PCR (qPCR) assays, allowing both detection and quantification of P. multocida, M. haemolytica.

Our preliminary findings using qPCR reveal marked differences in colonisation patterns of commensal Pasteurellaceae. Within the first week of life 27% of calves were colonised with H. somni, with carriage rates subsequently maintained at similar rates up to 10 months of age. In contrast, colonisation with P. multocida was not detected until 3 months of age (3% prevalence), with carriage rate increasing with age thereafter.

Threshold cycle (Ct) values indicated that the density of carriage for H. somni was low in comparison to that for P. multocida (H. somni mean Ct = 33 at 3 months, 32 at 10 months; P. multocida mean Ct = 25 at 3 months, 27 at 10 months). All Ct values will be converted to CFU/mL (equivalent to gene copies/mL) for direct comparison of bacterial density between species.

Our results suggest that bacterial colonisation with age is dynamic. However, it is not yet clear how these colonisation dynamics affect or are affected by host mucosal immune responses, although early life colonisation could be an important factor in determining later respiratory health. The trends in bacterial colonisation we describe in cattle appear to be analogous to those seen in the nasopharynx of children, where Staphylococcus is frequent in the early days of life, but declines between 1 & 4 years of age when species such as Streptococcus pneumonia, Haemophilus influenzae and Moraxella catarrhalis predominate. Emerging epidemiological data in humans suggests that bacterial colonisation of the URT in early life may modulate the risk of developing respiratory dysfunction later in life, and may also impact on mucosal immune development. Further work will focus on defining prevalence and density of M. haemolytica and a subset of samples will be cultured to validate qPCR results. Colonisation rates and densities for all three species of Pasteurellaceae will be investigated over time using mixed effect repeated measures models, taking into consideration covariates such as gender and breed.