The Intertwined Successional Development of the Lamb Gut Microbiota And Immune System (Poster)

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Gastrointestinal tract (GIT) microbes play critical roles in host nutrition, health and immunological development. For adult ruminants, GIT-dwelling microbes provide ~70% of daily energy requirements. The GIT also houses 70 % of the animal's immune system in the form of the Gut-associated Lymphatic Tissue (GALT), which houses 80% of all plasma cells and depends on microbial stimulation for maturation. Because nutrition and disease are two major factors in the economic sustainability of livestock production, our group set out to characterize the successional development of GIT microbiota and immune activity. Blood and GIT samples were collected from lambs immediately at birth through one-year of age, and from the dam's vagina, mouth, and rectum at parturition. Blood samples were profiled for serum titers of IgM, IgA and IgG, while microbiota were profiled in GIT samples by 16S rRNA gene sequencing. Lamb GIT microbiota initially resembled the dam's vaginal microbiota but following exposure to the dam, became rapidly more similar to the dam's teat. GIT samples eventually formed stable climax communities similar to the dams around 180 days of age. This corresponded to the peak serum titers for each immunoglobin, which, aside from a peak in IgG at birth (likely colostral transfer), had gradually increased prior to this time. Immunoglobins peaked and then return to a sub peak level between 180 and 365 days. These results indicate dam vaginal microbiota have a short-lived impact on the neonatal microbiota, with the GIT microbiota going through a dynamic successional development to 180 d when immune function appears to peak.