

Dairy cows are one of the most important agricultural animals in the USA, with dairy products estimated to be worth \$32 billion annually. The ability of cows to convert their feed into milk requires a tight association with ruminal microbes that break down and convert plant biomass into nutrients. The development, establishment, and maintenance of these microbes is critical to the success of these animals as milk producers, and efforts are focused on improving milk production by altering the rumen microbiota via diet and other therapeutics. Here, we investigated the impact of diet on the establishment of ruminal microbes in developing pre-ruminant dairy calves and show that the rumen microbiota varies substantially over time, regardless of diet. We also show that increased dietary fiber results in a faster acquisition of an “adult-like” rumen microbial community. We also studied a group of 14 adult cows across two lactation cycles and show that high-milk producing animals have a more similar ruminal microbiota to each other, relative to low-milk producing animals. Taken together, these data suggest that alterations to the ruminal microbiota may be possible during development, and that once established, the rumen microbial community is relative stable over time.