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# Use of Scanning Electron Microscopy to Evaluate and Determine host:parasite interactions in a large animal model

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Helminth parasitism in small ruminant livestock represents a threat to animal welfare and economic production. The overuse of drugs used to treat this pathogen has resulted in the development of drug-resistant parasitic worms. In efforts to identify new management strategies to reduce the impact of parasitism on production, one approach is to utilize parasite-resistant sheep. One breed of sheep that has noted parasite resistance is the St. Croix. Originating from the island of St. Croix in the Caribbean, these sheep have demonstrated remarkable resistance to helminth parasites. To better understand genetic underpinnings of parasite resistance, a functional knowledge of enhanced immunity of these sheep is critical. Our early studies focused largely on the immune response generated during the larval stage of infection. This approach is limited as these assays do not describe the effect on the parasite other than death. More recently we have been able to identify other breeds of sheep with enhanced resistance to this parasite but this breed produces a different immune response that is more focused on the adult stage of the parasite. In efforts to understand the impact of host immunity on parasite killing we employed scanning electron microscopy of adult worms cultured with immune cells from Texel, St. Croix and Suffolk sheep. Our results were able to demonstrate preferential binding to specific and known physiological locations on the worm that was also found to be breed dependent. Immune cell binding of female ovipositor by cells from St. Croix and Texel sheep occluded this pore preventing the female from shedding eggs. This inability to oviposit may reveal insights as to why these sheep have lower worm egg counts in feces. Using these advanced microscopy techniques, we were able to better describe the interaction of host immune response with various stages of this parasite, thus catapulting our ability to better explain functional immune responses and their impact on parasite survivability and motility.

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