

# GENETIC MARKER IDENTIFICATION FOR RESISTANCE TO GASTROINTESTINAL PARASITES IN FLORIDA NATIVE SHEEP

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University of Florida Fairmeadow Farm, Ocala, Florida | Photos courtesy Carol Postley, Fairmeadow Farm

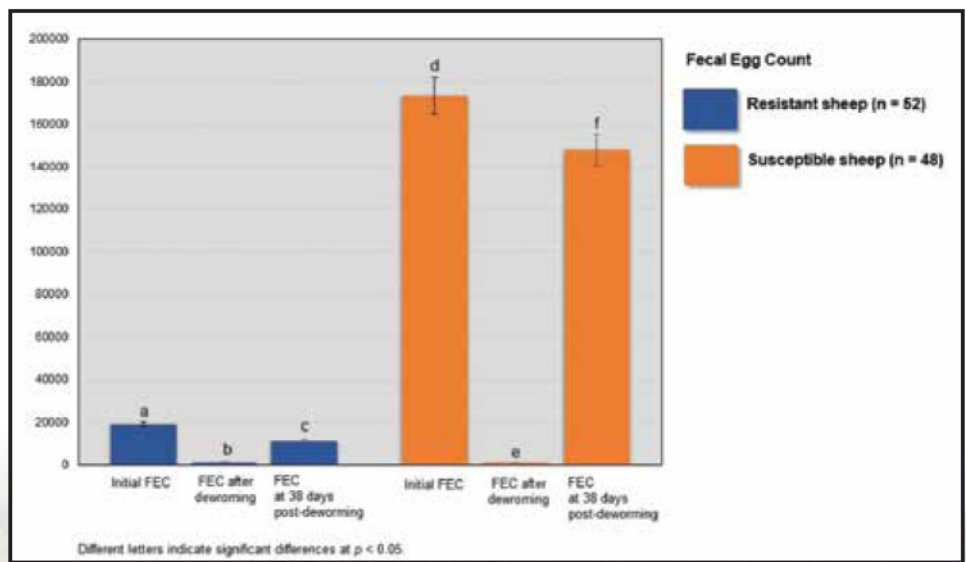
Gastrointestinal infections are the main health problem for grazing sheep in the southern United States. The humid environmental conditions from this region are ideal for survival and growth of *Haemonchus contortus* and other gastrointestinal nematodes. In the US, anthelmintics have been used for the control of gastrointestinal nematodes of sheep for more than 30 years with considerable development of anthelmintic-resistant populations being an unfortunate consequence. Alternative practices to control gastrointestinal nematode infections have been targeted to address anthelmintic resistance. One promising alternative approach is breeding for resistance to gastrointestinal nematode infections. Resistance to these infections is most likely based on inheritance of genes that are important in the expression of host immunity. Several breeds of sheep around the globe are known to be relatively resistant to gastrointestinal parasites.

Using resistant sheep breeds exclusively or in crossbreeding programs could lead to improved resistance to nematode infection. The main benefits of using selection to enhance parasite resistance in sheep breeding programs are that genetic change is a permanent attribute to that animal, its performance is improved, and infectivity of pastures is decreased as a result of fecal egg reduction,

leading to additional benefits for the susceptible and young sheep grazing in the same flock.

In the state of Florida, Florida Native sheep, commonly known as Florida “Cracker” sheep, is a landrace sheep breed with natural parasite resistance. The Spanish introduced the sheep when they founded St. Augustine in 1565 and it is believed that it was developed from Churro sheep. For almost 350 years, the sheep remained feral in the warm, humid environmental conditions of Florida until the open range era concluded at the end of 1945. The genetics underlying

resistance to gastrointestinal nematodes in Florida Native sheep have been studied without identifying the genes or gene variants controlling variation, with selection based on phenotypic measures such as FEC. Identification of genetic variants in the sheep genome may help to identify a set of genetic markers significantly associated with parasite resistance in Florida Native sheep. Thus, the aim of a study conducted by the authors was to identify a set of potential genetic markers for resistance to gastrointestinal nematode infections for a sustainable Florida Native sheep production with funding from the Sus-







tainable Agriculture Research and Education (SARE). A crucial aspect of this project was the participation of the 2018 President of the Meat Sheep Alliance of Florida, Miss Carol Postley and her Florida Native sheep flock. In the future, we expect to include more Florida Native sheep producers and continue the genetic evaluation of this heritage sheep breed.

Phenotypic and pedigree information from the Fairmeadow sheep farm were used to construct the phenotype- pedigree database. To illustrate the phenotypic variation between resistant and susceptible animals in the study, a bar graph of fecal egg count determined at an initial assessment of the lambs (and deworming), at a date 10 days following the deworming and an assessment of lambs 38 days following deworming is presented below. All responded well to deworming but two very clearly different populations of lambs were identified.

*See TABLE*

Genotypes obtained from blood samples of these two populations of lambs were utilized to perform the identification of genetic variants associated with resistance. The number of animals contributing to this project was 153 lambs, including female and male individuals. Genotypic data came from 100 lambs (52 characterized as resistant and 48 susceptible) genotyped by targeted sequencing. Parasitological and hematological traits were evaluated and a total of 23 genomic regions covering 14 genes were associated with fecal egg count, FAMACHA score, average daily gain, red blood cell count, hemoglobin level, white blood cell count, neutrophil



count, basophil count, and eosinophil count. The results from this study revealed candidate genetic variants for genes involved in the immune response to *H. contortus* exposure and provide additional marker information that has potential to aid selection of resistance to gastrointestinal parasites in Florida Native sheep.

Improvement of Florida Native sheep selection for resistance to gastrointestinal nematode infections in Florida is the long-term goal of the authors. Future research is expected to provide an insight into the potential genetic markers for resistance to gastrointestinal nematode infections. We will continue to increase the size of the phenotypic, pedigree and genotypic database for Florida Native sheep and validate our findings using genome-wide scans. The end result is intended to assist the Florida Native sheep producer in managing this very important production-limiting condition in the sheep flock.

## FLORIDA CRACKERS

*Genetics for  
Parasite Resistance*



2018: 8 Texel/Florida Cracker  
Cross Lambs, 3 with Parasite  
Resistant Gene

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