Katahdin Breeders Take the World Lead in Parasite Resistance Selection

Jim Morgan, Katahdin NSIP Coordinator

Katahdin NSIP Breeders and Dr. Dave Notter of Virginia Tech and the National Sheep Improvement Program (NSIP) released the 2nd Katahdin Sire Summary for parasite resistance in March, 2008. Though this is not the first sire summary for resistance to nematodes (worms) released, the Katahdin sire summary is likely to set the world standard as the parasite resistance selection tool in sheep.

The United Kingdom, Australia and New Zealand developed EPDs (expected progeny differences) for parasite resistance before the USA based NSIP did. For years, Dr. Charles Parker, Emeritus Director of the US Sheep Experiment Station and Emeritus Professor and Department Chair of the Ohio State University Animal Science, has been encouraging breeders to select for parasite resistant rams and ewes. With the release of the 2nd Katahdin Sire Summary, Dr. Parker says "Katahdins are the 'Breed in the Lead' since their parasite resistance EPD identifies early resistance to worms, and parasite resistance is highly heritable".

"Katahdins are the 'Breed in the Lead.'", says Dr. Charles Parker.

Katahdin breeders have two firsts to brag about. With the second sire summary released in March of 2008, Dr. Notter has once again shown that the Katahdin are unique among the breeds in the world that are receiving EPDs (expected progeny differences) for parasite resistance. The two key differences are a) that parasite resistance can be identified at 8 weeks of age in Katahdins as compared to 20 weeks of age in other breeds with EPDs for parasite resistance and b) that the parasite resistance in Katahdins is 40-50% heritable as compared to the other breeds tested which show 20-25% heritability.

These are tremendous differences that provide the tool for Katahdin breeders to identify "super-parasite" resistant sheep. These two factors are coupled with high variability: lambs in the same highly-infested pasture can range in worm eggs/gram (epg) of feces from 0 epg to greater than 10,000 epg. Rate of selection for a trait is based on the heritability and variation in the population. There is no other trait in the livestock world in which breeders have the potential to make such rapid progress.

Using across flock procedures to produce EPDs increases the accuracy and enables breeders to compare parasite resistance between flocks. It is important for a breeder selecting for improvement to be able to determine whether the genetics in his/her flock is superior to another. This improves the accuracy for selecting superior sires.

To be truly effective at preventing losses in productivity or death from parasites, selection for resistance needs to occur when lambs first start grazing. If there are parasite loads on the pasture, a lamb can be dead by 20 weeks of age. 20 weeks of age is the point at which breeds such as Suffolks in the UK, Coopworths and Romneys in New Zealand, and Merinos in Australia are being evaluated for parasite resistance.

Further research needs to occur, but the scientists involved think there is something unique about the genetics and immune system of the Katahdin and other breeds with tropical or subtropical ancestry (St Croix and Florida/Gulf Coast Native). These unique characters are that parasite resistance develops early in certain breeds and that it is highly heritable. This work strongly suggests that commercially important meat and wool-producing sheep breeds that need improved parasite resistance need to open their flock books and grade up their resistance using tropical breeds. At this point, the important sheep producing countries of the world can look to several tropical breeds for this improved resistance. The Katahdin breeders have the best tool, but research at several institutions in the US find that other breeds such as St Croix or Barbados Blackbelly or Gulf Coast/Florida Native have superior parasite resistance. The Katahdins have the advantage of better growth and muscling than the other breeds and thus are more popular in more production systems.

Katahdin breeders have a short window in time to capitalize on selecting for parasite resistance. This EPD for parasite resistance is early in its application. Katahdin breeders need to spend 3-4 generations of breeding highly resistant rams and ewes to identify the "super-resistant" sheep. Why is there a short window? First, there are other breeds of sheep with very high resistance. Australia or New Zealand could start with genetics from Southeast Asia or tropical Africa and grade up parasite resistance. Also, with the development of new molecular genetic techniques, scientists predict that in 5-10 years, it will be much easier to a) identify the multiple genes and alleles involved in parasite resistance and b) to introgress these superior genes conferring parasite resistance into any population of sheep. If Katahdin breeders act now, the Katahdin breed will be in the driver's seat with the resistant sheep needed for the world market.

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With more investment by Katahdin breeders in the parasite resistance EPD (fecal egg count EPD), Katahdins can become the "go-to" breed for parasite resistance, but the other countries will not be waiting for Katahdins to do that.

What does it take to get involved identifying parasite resistance with the new EPD in Katahdins? First, the breeder needs to have access to pastures with a significant parasite load. Without a parasitic worm load, breeders and scientists cannot tell which of the lambs in the lamb crop are superior. In evaluating the Katahdin work, Dr. Notter has found that the average number of worm eggs in the fecal material of the labs tested in a flock needs to be greater than 750 epg. Second, the lambs need to be similar in age (range of 3-4 weeks). Third, the group of lambs (contemporary group) needs to have at least two different sires represented and at least 10 lambs per sire. Fourth, the breeder needs to collect sufficient fecal material from the contemporary group in a short period during one day and then keep the samples cool/refrigerated until shipped to a lab that does fecal egg counts. It takes a time commitment and a financial investment in paying for the fecal egg counts.

Several individuals need to be mentioned for their role in the development of this world leading selection tool. First, Dr. Charles Parker has been encouraging the sheep research community for many years to look for early and/or innate resistance to gastrointestinal nematode (worms). I first heard him talk about identifying resistant rams in 1998. Without Dr. Parker, Katahdin breeders would not have known how to move forward. And, it was only with Parker's strong insistence that Katahdin breeders look for resistance at 8 weeks of age, that Katahdin breeders tried it. This went against scientific dogma. Second, the Katahdin NSIP Breeders asked for help from Dr. Dave Notter at Virginia Tech in developing an EPD for parasite resistance. Dr. Notter has been outstanding in his support and research. Not enough can be said about his willingness to help, support and gamble with the Katahdin breeders. Third, it took a gamble by several Katahdin breeders that an across flock EPD for fecal egg count (parasite resistance) could be developed. The fourth individual to mention is Kathy Bielek of Ohio. She was key in recruiting more flocks to participate and helping with funds for fecal egg counts by securing grant funds. It should be noted that there were also several shepherds who collected and paid for fecal egg counts out of their farming funds. Finally, Dr. Dan Waldron from Texas A&M at San Angelo wrote a grant that provided funds to help support Dr. Notter and his lab in developing the EPD for parasite resistance.

Dr. Charles Parker recently said, "During the past 25 years parasites have been winning the war against sheep with genetic resistance. Now sheep with the help of progressive shepherds have the opportunity to close out the parasite war with new genetic technology. All Katahdin breeders now have the opportunity to breed for parasite resistance, the number one health problem for sheep raising in the humid regions of the world."

To obtain a list of flocks participating in the FEC-EPD for parasite resistance and the NSIP Katahdin sire summary for parasite resistance contact Jim Morgan. To obtain a protocol for being involved, contact Jim at 479-444-6075 or ***jlmm@earthlink.net****. Jim Morgan suggests that Katahdin breeders thank the above mentioned individuals and flocks for their contributions to the Katahdin breed.*