Recent GALA Sponsored Camelid Research Studies through Morris Animal Foundation

Report by Hilary Ware, LMRG

GALA was recently a co-sponsor for a camelid health study, Subcutaneous and Intramuscular Pharmacokinetics of Florfenicol in Healthy Adult Alpacas, conducted by Principal Investigator Dr. Daniela Bedenice, DVM, Tufts University Cummings Veterinary School, Grafton, MA. GALA generously donated $10,000 to this study.

Florfenicol is an antibiotic [see below*]. The researcher is “local” - Grafton, MA - and has a demonstrated interest in camels. Both the Lama Medical Research Group (LMRG) and the Alpaca Research Foundation (ARF) reviewed this proposal and each ranked it first among all submitted projects for applicability and affordability. Our field vets on the LMRG say they need the pharmacokinetic parameters for alpacas (and subsequently for llamas) on this useful drug. There is important information to be gained for both lama species.

* Florfenicol is marketed by Schering-Plough Animal Health under the trade name Nuflor. In the United States, florfenicol is currently indicated for the treatment of bovine respiratory disease (BRD) associated with Mannheimia (Pasteurella) haemolytica, Pasteurella multocida, and Haemophilus somnus, for treatment of bovine interdigital phlegmon (foot rot, acute interdigital necrobacillosis, infectious pododermatitis) associated with Fusobacterium necrophorum and Bacteroides melaninogenicus.

Final Results: Antibiotic Florfenicol Validated in Healthy Alpacas

Bacterial infections that require long-term antibiotic therapy, such as pneumonia, peritonitis, sepsis, and uterine and dental infections, are significant causes of illness and death in alpacas. Veterinary care for these animals is hampered by a lack of information about antimicrobial use in camels (llamas and alpacas). Florfenicol is a broad-spectrum antibiotic whose efficacy has been shown to vary among species and between different drug formulations. Researchers from Tufts University worked to determine the appropriate dosage for use in alpacas. This study evaluated subcutaneous and intramuscular administration of two commercially available formulations of florfenicol (Nuflor® and Nuflor Gold®) in healthy adult alpacas, to determine the drug’s ability to maintain the plasma drug levels necessary to be effective, without inducing adverse effects. Both Nuflor® and NuflorGold® are variably absorbed following injection under the skin in this species. However, Nuflor Gold® injections lead to substantially higher drug levels compared to the same dose of Nuflor® and were associated with fewer complications following long-term use.


GALA also recently (2009-2010) sponsored Determining Optimal Dosing for Dewormers
Principal Investigator: Dr. Lisa H. Williamson, DVM, University of Georgia
Final Report:

The main objective of this study was to determine the prevalence of dewormer (anthelmintic) resistance in specific gastrointestinal nematodes (GINs) in llamas and alpacas. Anthelmintic resistance has been extensively documented in small ruminant GINs. In particular, populations of the blood sucking abomasal worm, Haemonchus contortus, and the intestinal worm, Trichostrongylus colubriformis have recently been identified that are resistant to all three major anthelmintic classes. Since these two GINs also infest camelids, this study sought to clarify whether anthelmintic resistance was emerging in llamas and alpaca GINs.

Based on fecal culture results, Haemonchus contortus was the most common GIN identified on 24/26 camelid farms. The predominant GIN on the other 2 farms was Trichostrongylus colubriformis. The third most common nematode isolated on fecal culture was nematodirus species. Whipworms, tapeworms, and a variety of small and large coccidian parasites were commonly identified on many farms.

The fecal egg count reduction tests and the larval developmental assays detected ivermectin and benzimidazole (fenbendazole) in many of the camelid Haemonchus contortus isolates. Levamisole resistance was only rarely detected, and moxidectin resistance was not detected in any of the Haemonchus contortus isolates. However, moxidectin resistance was emerging on one alpaca farm, based on larval developmental assay results. Multi-drug resistant Haemonchus contortus were detected on most farms, but total anthelmintic failure was not detected on any farms.

The fecal egg count reduction test and larval developmental assay gave similar results on the 4 farms where both analyses were conducted. However, ivermectin and moxidectin did not perform as well in the animals (based on fecal egg count reduction test results) as the larval developmental assay results predicted they would. These discordant results suggest that we might not be dosing ivermectin and moxidectin optimally in llamas and alpacas.

The other primary objective of this study was to compare packed cell volumes, fecal egg counts and FAMACHA© eye scores to determine if the FAMACHA© system could be useful to detect health threatening Haemonchus contortus burdens in camelids. The acronym “FAMACHA” is derived from Dr. Fafa Malan’s Chart. Dr. Malan is the South African veterinarian who developed the concept of checking the lower conjunctiva of sheep to determine their degree of worm related anemia. He devised a color chart that showed 5 shades of conjunctival coloration ranging from deep red to pale pink. FAMACHA© was validated in the United States for use in sheep and goats in 2004. Many small ruminant producers are currently utilizing FAMACHA© to selectively treat sheep and goats for haemonchosis.

We collected data on over 800 llamas and alpacas. Initial analyses show that FAMACHA© eye scores have discriminatory value in camelids. Full statistical analysis is currently underway to determine if the FAMACHA© system can be validated for use in llamas and alpacas to detect anemia associated with haemonchosis.
This study will benefit alpacas and llamas by reducing loss of productivity and life from drug resistant worms. Haemonchosis is particularly devastating, as large burdens cause progressive anemia. Terminally, animals become recumbent and die. Treatment with ineffective anthelmintics eventually leads to herd fatalities because producers often do not recognize that the medications are not working until the herd is in a crisis situation. The FAMACHA© system has the potential to aid producers in the recognition of llamas and alpacas suffering from haemonchosis earlier in the course of the disease so that treatment can be delivered when it is needed. One of the benefits of the system is that producers need to regularly examine and handle individual animals. As a result, health issues are more likely to be recognized in a timely fashion.

This project provides benefit to owners because it creates awareness of anthelmintic resistance and how it contributes to treatment failure. We educated producers at each of the farms we studied, and helped them implement treatment strategies for the various parasites we identified. On 5/25 farms we visited, we detected animals with life threatening (packed cell volumes below 10%) haemonchosis. Most producers were not aware of the magnitude of the worm problem in these severely affected animals, or the issue of anthelmintic resistance. We treated severely anemic animals (with the producer’s permission) with moxidectin in order to avoid losing any animals. Furthermore, we trained several producers on how to perform their own fecal analyses. This close interaction with producers taught us what is important to producers, and what we need to teach them to make them successful parasite managers.

Findings from this project have been discussed at numerous producer meetings in the southeastern United States in order to disseminate necessary information. In addition, preliminary findings were presented at the 2008 Alpaca Owners and Breeders Association Annual Meeting in Sandy, Utah. Stakeholders are committed to the welfare of animals, and provide monetary support to studies that benefit animals. This study provides practical information that has immediate benefit to the welfare of llamas and alpacas.

This study benefits veterinarians mainly through education and awareness. We discussed individual results with participating producers and their veterinarians, and sent copies of the individual data to them. As a result, we frequently receive phone calls and emails requesting assistance with managing parasitological issues in camelids from both producers and veterinarians. To increase awareness of the issues of haemonchosis in camelids and anthelmintic resistance, presentations were made at various veterinary meetings (International Camelid Health Conferences in 2008 and 2009, and the Ohio Veterinary Conference in 2008). Publications for veterinary journals are in preparation.

Success Experiences

The study successfully achieved its main goals. Anthelmintic resistance was identified in Haemonchus contortus isolates from camelids in the southeastern United States. With this knowledge, producers and veterinarians can make better decisions concerning management of haemonchosis in camelids. Further, the FAMACHA© system will very likely be another tool that the producer can use to determine the health status of their animals.
Success on a more personal level came from knowing we made a positive impact on the lives of many of the producers that participated in the study. Without timely therapeutic intervention, some of the animals we examined while conducting the study would have certainly died from haemonchosis. The camelid producers in the southeastern United States gave generously of their time, took a “leap of faith” in allowing us to samples their animals, and treated us like we were royalty. Their ongoing friendship has been personally enriching.