

The FAMACHA[®] System for Managing *Haemonchus contortus* (barber pole worm)

The FAMACHA system was developed in South Africa by a group of scientists from the Faculty of Veterinary Science, University of Pretoria, the Onderstepoort Veterinary Institute, the Worm Workshop of the South African Veterinary Association, and Intervet South Africa. It was named for its originator, Dr. Francois “Faffa” Malan – Faffa Malan CHArt. Dr. Jan van Wyk and Professor Gareth Bath played an essential role in the development. It is a novel technique for the assessment and subsequent treatment of *H. contortus* infection. It was developed in response to emergence of severe anthelmintic resistance in South Africa. FAMACHA is a method of selective chemotherapy which leads to a large reduction in anthelmintic treatment.

H. contortus is a major problem to sheep and goat producers in the southeastern U.S. as well as many other parts of the world. Infection of small ruminants with this nematode can lead to lost production (decreased growth, milk production, and pregnancy rates, etc.), anemia, and death. Haemonchosis, infection of this parasite, occurs when the environment is warm and moist. In the past, we have relied on anthelmintics to control *H. contortus*. Due to overuse and misuse of these anthelmintics, resistance of *H. contortus* has been reported in all of the available anthelmintics. In some cases a complete resistance has occurred and in others the resistance is minimal, but increasing. This means that producers will not be able to rely on these drugs to control *H. contortus*. In addition, when all animals in a herd or flock are treated with anthelmintic, all the susceptible worms will be killed, leaving only resistant worms. If selective deworming occurred, some susceptible worms would remain to breed with the resistant worms, leaving a larger population of potentially susceptible worms. We will never remove all

worms from a farm, therefore, we want to manage the susceptible and resistant worms as best we can.

Animal resistance (the ability to prevent or suppress infection) and resilience (the ability to tolerate the effects of the parasites) has been observed within and between breeds of sheep. This is a moderately heritable trait, which means that animals that consistently become infected can be culled and those that resist the infection can be selected for. Resistant animals will need fewer treatments than susceptible animals.

The principle of the FAMACHA system is based on the level of anemia of an animal. This can be measured in a laboratory on a blood sample that measures the proportion of red blood cells to plasma, also called packed cell volume or hematocrit. The more anemic an animal is, the fewer red blood cells she has. The healthier an animal is, the more red blood cells she has. The adult stage *H. contortus* lives in the abomasum (true stomach). A large number of this nematode can consume an enormous amount of blood, leading to anemia. The proportion of red blood cells can also be estimated by assessment of the color of the mucous membranes of the eyes. Anemic animals will have a pale color, whereas healthy animals will have a red color.

A FAMACHA card is available upon completion of the training. There are five colors listed on the card ranging from 1 (red) to 5 (pale or almost white). Instructors teach producers how to compare the mucous membranes of the animal with the card. The card has been validated by a group of researchers in the southeast (from Georgia, Louisiana, Arkansas, Florida, and Puerto Rico) as part of a SARE grant with advice from scientists from South

Africa and Denmark) by comparing FAMACHA scores from trained technicians with packed cell volume and fecal egg counts. Animals used belonged to private producers in each of these states as well as university and government institutions. Results of the validation and recommendations for use on farm will be published as a peer reviewed manuscript (in progress) and in sheep and goat journals by spring 2004.

Some have asked about using color of the gum, vagina, or thumb nail. The FAMACHA system was validated by using the mucous membrane of the eye. We can not make any predictions of success by using any other system. The color of one's finger nail can vary significantly from individual to individual. Similarly, the color of the gums of Dorper sheep (some pigment may be present) may be very different from that of a Boer goat. The mucous membrane of the eye has been determined to be the most consistent in color from animal to animal.

The advantages of using the FAMACHA system include decreased number of treated animals, slower resistance to anthelmintics, selection for more resistant animals, and identification of anthelmintic resistance (if membranes become more pale after anthelmintic treatment, resistance can be suspected). Potential problems do exist with

the system. This system only monitors *H. contortus* infection, not other parasites. Anemia can be caused by other conditions (hookworms, liver fluke, external parasites, blood parasites, infections, nutritional deficiencies). During moist summer conditions, most often anemia is caused by *H. contortus*. There are conditions that make the mucous membranes appear redder such as irritants (dust), hot conditions, fever, diseases associated with eye or blood circulatory failure.

Kids or lambs and pregnant does or ewes are more susceptible to parasite burdens. The immune system is altered during the periparturient period (period following kidding or lambing). This means that even the resistant animals can become susceptible to parasites during this period.

The FAMACHA system should be used with good management and alternative means of controlling parasites. Other means of control include alternative forages (sericea lespedeza has been reported to decrease fecal egg counts; other studies are needed to confirm and understand the mechanism), good nutrition (can have a great impact!), nematode trapping fungus (*Duddingtonia flagrans* kills larvae on pasture; research currently in progress), and exposing goats to browse rather than grazing conditions. Other means and alternative forages are being examined.