ON FARM SAMPLING AND FIELD NECROPSY

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In addition to routine testing for disease control and prevention programs, sheep and goat producers often depend on veterinarians for on farm assistance with fecal collection and FAMACHA scoring, California Mastitis Testing, and hair sampling for genetic testing. When possible, veterinarians are encouraged to offer field necropsy on the farm, and challenges for this practice are discussed.

CHEAT SHEET FOR COMMONLY REQUESTED TESTS

Many sheep and goat producers routinely sample livestock to identify or monitor insidious diseases such as caprine arthritis-encephalitis, caseous lymphadenitis, ovine progressive pneumonia, Johnes disease, internal parasitism, and mastitis. Different laboratories require particular substrates or sample volumes, so it is helpful to create a chart for each laboratory including available tests, required substrate, volume, and any special requirements such as test schedule, shipping method preferred and turnaround time for results. Veterinarians are encouraged to use laboratories accredited by the American Association of Veterinary Laboratory Diagnosticians or the American Association for Laboratory Accreditation to ensure accurate testing methods are utilized in order to obtain repeatable results useful to the client.

INTERNAL PARASITISM AND FAMACHA

The seriousness of internal parasitism and development of anthelmintic resistance by *Haemonchus contortus* to currently available anthelmintics is one of the most significant health threats to sheep and goat production in warm and wet climates. Small ruminants grazing wet pasture or feeding on the ground in drylot with others carrying the “barber pole worm” develop life-threatening anemia, anorexia, depression, loss of body condition and may die. The American Consortium of Small Ruminant Parasite Control evolved from research in South Africa that demonstrated the usefulness of the FAMACHA system to identify severely parasitized animals as well as those that demonstrate parasite resistance.

The level of anemia can be estimated by comparing a standardized color chart with the small capillaries near the surface of the conjunctiva in the lower eyelid. Producers can be trained to periodically monitor the conjunctiva color so that only severely parasitized animals are dewormed. Research in South Africa and the southern United States indicates use of FAMACHA scoring prior to deworming reduces anthelmintic use by up to 90%. This practice markedly decreases parasite exposure to anthelmintics, reduces development of anthelmintic
resistance and lowers producer drug expense. Further information about fecal sampling, FAMACHA scoring, smart drenching, sustainable parasite control and prevention of anthelmintic resistance can be found online at www.acsrpc.org or www.wormx.info.

CALIFORNIA MASTITIS TEST

One of the most practical animal-side tests is the California Mastitis Test, which uses a clean, rigid plastic paddle with four shallow wells to identify the udder halves from which milk samples are taken. Before sampling the milk, debris should be brushed from the udder floor, and a stream of milk should be expressed from each udder half into a strip cup for observation. Approximately 1 teaspoon (5ml) of milk should be squirted from each mammary gland into a separate well, and an equal amount of CMT test solution should be immediately and gently added to the milk. The paddle is gently swirled and examined within 10 seconds for reaction between the milk and the solution, as visible reactions may disappear after 20 seconds.

The CMT is negative if the milk and reagent retain the same liquid consistency of normal milk and there is no change in color. A slight increase in liquid consistency and presence of light sludge across the bottom of the paddle is scored as a trace or 1, and indicates subclinical mastitis. If the solution thickens in the center of the well without gel formation and sludge slides across the bottom of the paddle as it is tilted, then a positive score of 2 occurs. A strong positive or 3 is recorded when the solution forms a gel with a peak in the center of the paddle and the gel remains after paddle movement stops. The CMT reagent also contains a pH indicator that turns reddish purple in the presence of acid, and this color change implies bacteria in the milk are digesting the milk components to form lactic acid.

Aseptic sample collection and culture of milk scoring 1, 2 or 3 is recommended to identify causative agents for mastitis, and antibiotic sensitivity should be performed on bacteria isolated to develop a treatment protocol. Abnormal milk should be cultured prior to treatment because non-infectious causes such as changes in estrus cycle, stage of lactation, nutrition and even trauma may increase the white cell count in milk. Special transport media is required for samples when mycoplasma is suspected as the causative agent for mastitis. Dr. Paula Menzies demonstrates performance of the CMT test on a dairy sheep in a video at https://www.youtube.com/watch?v=5Mplg93MUz8.

HAIR SAMPLES FOR GENETIC TESTING

Sheep and goat producers occasionally ask for assistance taking hair samples for a variety of available genetic tests. The Veterinary Genetics Laboratory (VGL) at the University of California at Davis offers information on testing, sample collection and forms for parentage verification, freemartinism and

Sample collection is critical to the success of DNA testing, and the need to keep samples dry in individual paper envelopes cannot be overstressed. DNA degrades rapidly if it gets wet. The best sites for hair collection in sheep and goats are from the back of the hind leg just below the tuber ischii, above the knee pad on the front leg, from the guard hairs at the top of the withers and the long hairs over the rump. Latex gloves are recommended to prevent contamination between animals, stray hairs should be removed from equipment and hands between animals, and the paperwork for one animal should be completed before sampling another animal. Mosquito forceps or needle-nose pliers should be used to grasp the hairs firmly near the skin, and the hairs should be pulled in a smooth motion against the direction of growth. Make sure that a follicular bulb is visible at the end of each hair shaft, and avoid areas where the hair appears to be shedding. Do not put more than one sample in an envelope and label every envelope clearly. Most DNA tests require 20 to 40 hair bulbs, and make sure to check the hairs for root bulbs before sealing the envelopes. If samples will not be processed immediately, store at room temperature away from sunlight, and do not use plastic bags, as moisture will condense inside the bags.

**THE CASE FOR FIELD NECROPSY**

Due to the smaller carcass size of sheep and goats, on farm necropsy is easier to perform than in larger livestock species. Postmortem examination may reveal previously undiagnosed diseases in the herd such as failure of passive transfer in neonates, caseous lymphadenitis or Johnes disease, and may provide valuable information regarding the nutritional status of the rest of the animals in that environment. Always take advantage of dead or slaughtered small ruminants in order to obtain liver samples for trace mineral analysis. Because microbial populations in the digestive tract begin decomposition immediately following death, necropsy should be performed as soon as possible. If the animal cannot be examined immediately, then refrigeration is necessary to slow decomposition, but freezing should be avoided to protect the tissues.

External examination of the carcass in situ may yield clues as to cause of death that would not be in evidence if the body were moved prior to examination. For example, position of the body, evidence of discharge from body orifices, alteration of the ground surface and presence of available feed or toxic plants may provide helpful clues leading to a cause of death. The ability to observe other animals in the same environment may reveal early stages of the same
disease process, and presence of normal, unaffected animals may rule out some diagnoses.

Plan the necropsy ahead of time and gather adequate sharp tools such as scalpels, knives, pruning shears and a small hatchet or rongeur if the brain is to be removed for examination and sampling. Organize sample containers such as Whirl-pacs or sealable leak-proof bags, formalin jars, and a tarp to contain fluids before the necropsy begins. Pick a flat location on which a waterproof tarp can be placed to contain body fluids and tissues, and determine legal carcass disposal for after the necropsy is completed. Develop a systematic approach to the necropsy procedure so that all tissues are examined in sequence every time. During the necropsy, collect heart blood, urine, any unusual body fluids observed, and a full set of both fresh and formalin tissues. Keep an accurate record of what tissues were sampled and of all observations of each tissue. Remember to wear clean gloves when using cell phones to record abnormalities observed during the procedure, and list all observations and samples taken for diagnostic laboratory personnel. After completing the necropsy, gather all tissues removed and place them inside the thorax and abdomen prior to suturing the musculature and skin closed. Ensure that no remnants or fluids are left behind that could be encountered or consumed by other animals. Always dispose of the carcass in a legal manner according to local regulations.

Veterinary oversight through collection of samples on the farm for both routine procedures and diagnostic purposes, as well as field necropsy, benefit sheep and goat producers through improved disease surveillance and prevention.