“The Modified Wisconsin Sugar Flotation Technique”

A simple, yet highly accurate, method for conducting fecal worm egg counts on all species of animals.

By Dr. Don Bliss

The universal existence of parasitism requires the occurrence of encounters whereby the parasites have successfully established host-parasite relationship systems. The host-parasite relationship involves the accessibility of the host to the arrival and continued presence of the parasites. It is an essential feature of parasitic nematodes that they undergo some development in the outside world before re-entering a host and adopting a parasitic way of life. The process requires that nematode parasites living within another host animal species lay eggs, which pass out of the animals in the fecal matter. The eggs then hatch and the larvae produced undergo several molts until they become infective and are then consumed, or otherwise enter, the target host to complete the life-cycle infective process.

A large number of coprological (fecal) examination methods have been developed over the past 50 years. These methods have been developed to recover parasitic worm eggs and oocysts (from protozoan parasites), as they pass out of the animals, to identify them according to the type of parasite present and to enumerate them as to the number of eggs being passed in a specific amount of fecal material. These techniques all differ in their sensitivity and accuracy, as well as their consistency in recovering all the different types of parasite eggs being passed by any one particular animal host specie. Hundreds and maybe thousands of worm egg counts are completed every day by diagnostic laboratories and veterinary clinics all across the world that lack the sensitivity to accurately find parasites and, therefore, produce unreliable results.

A common remark given by cattle producers is “I took fecal samples to my vet and was told that my cattle were parasite-free.” Where there’s cattle and pasture, it’s a well proven fact that there are parasites present. Misdiagnosing or underdiagnosing the presence of parasites has no doubt cost producers significant production losses from parasitisms without their knowledge. It only makes sense that the technique chosen to accomplish the task of finding parasites in fecal material should be the most accurate in as wide a range of animal species as possible and for as many different parasite species as possible.

Parasites often live deep within an animal and, therefore, animals can easy harbor large number of parasites unknowingly. The widespread prevalence of parasitism in all species of animals means that scientific diagnosis is paramount in determining whether the health and well-being of an animal or groups of animals are being compromised by parasites. This means that being able to determine the presence or absence of parasites, and if present, the types of parasites present and the egg shedding potential as determined by total eggs found in a specific amount of fecal material may save an animal’s life, help prevent economic loss in animals raised for production, or simply improve the life of a pet or

companion animal. The test needs to be non intrusive to the animal but yet simple enough to conduct so that the procedure is not cost prohibitive. The test needs to be sensitive enough that it can detect the presence or absence of worm eggs and oocysts in fecal as accurately as possible under a wide range of conditions. The test needs to work whether searching for parasite eggs in fecal material from animals that only excrete small amounts of fecal material daily (such as a rabbit or bird) or from animals, such as lactating Holstein dairy cows that can excrete up to nearly a hundred pounds of manure on daily basis, where checking for worm eggs is like "looking for a needle in a haystack.".

The "Modified Wisconsin Sugar Flotation Technique" is the best of all techniques for this task:

1. The "Modified Wisconsin Sugar Flotation Technique" has a high degree of sensitivity for use in animals producing large volume of manure such as lactating dairy cows or feedlot cattle on "full" feed. Part of the reason the "Modified Wisconsin Sugar Flotation Technique" produces consistent results with a high degree of repeatability is due to sample size a 3-gram sample taken for all species except sheep, goats and some poultry). The reason for this is that the distribution of eggs in feces is not homogenous, especially in cattle and bison, therefore, a 3-gram sample provides a 3X better chance for finding worm eggs than a 1 gram sample provides. More fecal volume than this, however, especially with equine, ties up the solution making a paste mixture reducing worm egg recovery.
2. The "Modified Wisconsin Sugar Flotation Technique" is sensitive enough that negative results indicate the absence of adult parasites or the presence of a very low level of parasitism, i.e., below the detection level.
3. The "Modified Wisconsin Sugar Flotation Technique" is sensitive enough to pick up all types of parasites present in the fecal material, even those with high specific gravity* and eggs from low egg-shedding parasites such as whipworm (*Trichuris*) or *Nematodirus*. The "Modified Wisconsin Sugar Flotation Technique" is excellent for recovering tapeworm eggs (such as *Monezia* (cattle, bison, sheep & goats), *Taenia (dogs and cats), Dipylidium* (dogs and cats) and *Anaplocephala* (horse and donkeys).
4. The "Modified Wisconsin Sugar Flotation Technique" is a low cost test so that producers can afford to have the fecal worm counts conducted on their operations. The "Modified Wisconsin Sugar Flotation Technique" is also easy to conduct so large numbers of samples can be examined in a short period of time, if necessary.

The Modified Wisconsin Sugar Flotation Technique was published in the Compendium entitled "The Fecal Examination: A Missing Link in Food Animal Practice" describes the technique in detail[1]. The University of Wisconsin demonstrated that when comparing the McMaster's technique, the Fecalizer technique to the Modified Wisconsin Sugar Flotation Technique with 275 Lactating dairy cows, the efficacy of the McMaster was only 10% showing only one out of every 10 samples positive for parasites while the Fecalizer was 19% positive compared to 90% positive with the Wisconsin Sugar Flotation Technique[2].

Recent published data by M.W. Dryden, *et at*., on the "Comparison of common fecal techniques for the recovery of parasite egg and oocysts" from Kansas State University describes a number of critical issues

*except fluke eggs which sink to the bottom of the tubes but can be recovered from the sediment.

from their findings[3]. The first key finding was that centrifugation consistently recovered more worm eggs than all other methods such as direct smears or letting samples set for long periods of time. Secondly, the Sheather's sugar solution (Specific gravity of 1.27) used with the Modified Wisconsin Sugar Flotation Technique was equal to or better that magnesium sulfate, zinc sulfate, sodium nitrate, or saturated salt solution in the different species of parasites recovered and in total number of eggs found in the fecal material tested.

In full acceptance of the many uses, limitations and interpretation of worm egg counts, it is easy to conclude that when eggs are found, live worms are present within the animal from which a stool sample is being examined. Parasites cause disease, interfere with feed utilization, retard growth in young animals, lower body condition scores, interfere with reproductive efficiencies and diminish milk production. The livestock producer and animal owner is also affected by the indirect effects of parasites. These involve deworming labor cost, the cost of the dewormer, and the cost of diminished performance associated with the stress animals undergo during handling. Clinical, as well as subclinical infection levels, influences the immune status of the infected animals by exacerbating the effects of other disease organisms they may harbor or by reducing the effectiveness of vaccines.

Foremost in achieving successful control of parasitisms, is the ability for detection, even of a single parasite followed by an evaluation of the type or types of parasites found, numbers of parasite species found, number of eggs being shed, the animal species being examined, the age of the animal being examined, time of the year, and the ease of treatment in terms of efficacious products available and ease of administration of the dewormer. Everything hinges on having both a specific and an adequately sensitive test to detect the existence of all parasites present at the time of examination. We believe that the "Modified Wisconsin Sugar Flotation Technique" provides us this test.

References:

1. Bliss DH and Kvasnicka WG. The Fecal Examination: A Missing Link in Food Animal Practice. The Compendium (Beef Production Management). 1997.; 104-109.
2. Dryden MW, Payne PA, Ridley R, Smith V. Comparison of Common Fecal Flotation Techniques for the Recovery of Parasite Eggs and Oocysts. Vet. Ther. 2005; 6: 15-28.
3. Todd AC, Myers GH, Bliss DH, Cox DD. Milk Production in Wisconsin Dairy Cattle after Anthelmintic treatment. VW/SAC 1972; 67 (11) 1233-1236.