

Management of the Severely Parasitized Small Ruminant

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Abstract

The most common reason for anemia in small ruminants is internal parasitism. *Hemonchus contortus* (barber pole worm) is a voracious bloodsucker that typically resides in the abomasum. The condition may occur in both young stock and adults alike. With the ever-increasing issue of parasite resistance, practitioners will be faced with small ruminants that are severely anemic. Providing that there are no other serious disease conditions, these cases can have successful outcomes. Management of the severely parasitized small ruminant (goat, sheep, camelid) is detailed, and subsequent herd/flock parasite management is discussed.

Résumé

De plus en plus de personnes ont des chèvres de compagnie et l'élevage de chèvres est en hausse. Les propriétaires sont souvent plus enclins à investir dans des procédures médicales et chirurgicales plus extensives. Trois cas intéressants sont l'objet d'une discussion ci-dessous. Bien que les signes cliniques soient communs (anémie, déficit neurologique et abdomen élargi), les diagnostics sont en fait relativement rares.

Case Presentation

The case presentation is quite typical. The animal is weak and often down, and mucous membranes are pale pink to white. The mucous membranes of the eye provide the most consistent coloring, although mucous membranes of the oral cavity and vagina may also be examined. The heart and respiratory rates are usually elevated. Diarrhea may or may not be present. Oftentimes, there is a history of deworming, even recent deworming.

Case Management

If the client is bringing the animal into your clinic as a probable anemia case, the client should bring a healthy blood donor. The client should ensure that the donor's mucous membranes are pink to red. It is important to not stress or excite the patient, as this could lead to collapse and possibly death due to anoxia. Most cases we have dealt with in Tennessee are too weak to become excessively stressed. A packed cell volume (PCV), total protein (TP), and fecal floatation help to confirm the

diagnosis of anemia due to internal parasitism. A blood transfusion is the treatment of choice if the PCV is 10 or less. The lowest PCV seen by the author, at least a couple of times, was 4. These cases were transfused successfully and sent home. Animals with PCVs as low as 9 or 10 can recover without blood transfusions if treated with effective anthelmintics, but blood transfusions help ensure and speed recovery. An animal with a PCV of 11-15 may benefit from a transfusion, but this is not always necessary for a successful outcome. The TP is usually low as well, and fecal floatation should demonstrate numerous parasite eggs. About 50% of the time, the case is complicated by coccidia.

Steps in Performing a Blood Transfusion

1. Place a temporary jugular catheter in the anemic animal.
2. Make sure the blood donor is healthy by checking mucous membrane color and running a PCV. The PCV should preferably be above 30, but we have used donors with PCVs between 20 and 30 without incident.
3. Place a jugular catheter in the donor animal; a needle may be used as well, as long as there is good restraint.
4. Collect blood from the donor: 4.5-9.1 mL/lb (10-20 mL/kg) can be collected from a healthy donor. We typically collect 4.5-6.8 mL/lb (10-15 mL/kg), which equates to 500 to 750 mL from a 110 lb (50 kg) goat. Blood can be collected in sterile IV bags with sodium citrate added as an anticoagulant. The proper concentration of Na citrate is 4%; this would be 100 mL per liter. The bag should be agitated during collection to prevent clotting.
5. Transfuse donor blood into patient. Infuse at a slow drip for the first 15 minutes; if no reactions occur, the rest of the volume may be transfused at a rapid drip. Reactions are quite rare in small ruminants during the first transfusion. Reactions will likely become more frequent if subsequent (days to weeks later) transfusions are necessary. Epinephrine is the drug of choice if a reaction occurs. If a serious reaction does occur, blood may be transfused very slowly or another donor should be sought. We have never had to do this.

Post-transfusion, the patient will often be noticeably stronger and will eat. We typically keep the animals

overnight and monitor the PCV and TP the next day. You can expect a 5 to 10 point rise in the PCV, which should at least be in the teens. Iron injections are often unnecessary, but should be considered for animals that repeatedly become anemic over a short time period.

Herd Management and the Internal Parasite Control Program

When animals become anemic due to internal parasitism, the veterinarian should examine the client's parasite control program. The means of controlling internal parasites has changed drastically over the last 10 years and the "best" method of control will vary depending on the region of the country. Despite the idea that internal parasite resistance was developing to anthelmintics, routine and more frequent deworming, using higher dosages and multiple products at the same time, was common. These methods increased internal parasite resistance. The following internal parasite control primarily pertains to flocks and herds in which *Haemonchus contortus* is the main problem.

Control Strategies

1. Deworm only when necessary on an individual animal basis. Don't deworm animals with bright pink to red mucous membranes. One can use FAMACHA to determine which animals need to be dewormed. If the mucous membranes are pale pink to white, deworming is necessary. Animals with mucous membranes somewhere between red and white may or may not be dewormed based on client/veterinarian decisions on which way to err. These animals should be re-evaluated in a couple of weeks.
2. Document that the dewormer is effective. Fecal egg counts (FEC) should be conducted on a portion of the herd. Collect and run fecal egg counts, deworm, wait 10-14 days, and run fecals again. Fecal egg counts should be reduced by > 90% if resistance is minimal. If FEC are not reduced to an acceptable level, repeat the procedure with the next anthelmintic. An anthelmintic can still be beneficial as long as the egg count reduction is greater than 50%.
3. Don't overstock. An anemic llama was presented for a blood transfusion. It had come from a farm that had 30 llamas on 2.5 acres. The owners indicated that they had no short-term solution to the stocking rate. Internal parasite problems will continue to be problems in these situations. Worm larvae do not migrate more than 12 inches from a manure pile but when stocking density is high there will be fewer grazing areas that aren't within 12 inches of manure.

4. Provide access to browse. Worm larvae only migrate up to three inches on plants. Allowing longer length pasture and brush access will decrease the number of parasites ingested.
5. Graze horses or cattle with small ruminants. Sheep, goats, and camelids all share internal parasites. However, horses or cattle will consume small ruminant parasites, and vice versa, with little detrimental effect. When cattle or horses cannot be grazed with small ruminants, try rotational grazing such as cattle on pasture for one month, then sheep on pasture for one month.
6. Save moxidectin for special cases. Moxidectin^a is considered the last-line dewormer and should be reserved for cases in which all other dewormers have failed, or cases that may die if an effective dewormer is not used. This dewormer should not ever be the routine dewormer.
7. Administer avermectins orally only. One of the reasons that resistance developed to avermectins is that the product could be administered subcutaneously. This used to be considered a good thing, because the product could last up to 21 days. The problem became that the level of product available decreased over those 21 days, exposing potentially susceptible parasites to ineffective levels and leading to resistance.
8. Routinely deworm two weeks prior to parturition. Because the stress of parturition results in increased shedding of internal parasite eggs, this is one of the few times that routine deworming can be recommended. One other instance when routine deworming might be advised for neonates is at the time of weaning. Use oral products only.
9. Realize that some small ruminants simply cannot tolerate worms (need to be culled). It has been said that 80% of the pasture parasite load comes from 20% of the animals on the pasture. Conversely, there are some animals that may never need to be dewormed. These are the keepers, the ones that you want offspring from.
10. Some eggs are expected, and the number of eggs does not necessarily indicate the need to deworm. If a small ruminant is demonstrating signs of parasitism, deworming is important. However, most small ruminants will have some eggs...sometimes many eggs, but if signs of parasitism are absent, deworming is not recommended.
11. Use the proper dose and route of administration. It is better to overdose than underdose, as underdosing is more likely to lead to resistance.

When possible, weigh each animal prior to deworming. Most of the dewormers are approved for sheep and the dosages suggested should be followed. Few dewormers are approved for goats, so as a general rule, the sheep or cattle dosage should be doubled for goats for all products except for levamisole, which should be dosed at 1.5 times the sheep dose. The reason for the increased dosage in goats is due to a proportionately larger liver (more rapid metabolism) and more rapid gut transit time. Oral administration is highly preferred and it is important to deposit avermectin products over the base of the tongue, which allows the product to enter the rumen rather than the abomasum. This allows longer contact time in the gut. In addition, withholding feed for 12 hours prior to dewormer administration and for

12 hours after leads to slower gut transit time and longer dewormer contact with internal parasites.

Conclusions

Successful management of the severely parasitized small ruminant can be performed both easily and economically. However, the parasitized individual is just the tip of the iceberg. Controlling internal parasites in small ruminant herds or flocks requires a judicious deworming strategy, an effective dewormer, and pasture management.

Endnote

^aCydectin®, Boehringer Ingelheim Vetmedica, Inc, St Joseph, MO 64506