

Coccidiosis in Lambs

J. S. Rook, D.V.M.
MSU Extension & MSU Ag Experiment Station
Department of Large Animal Clinical Sciences
College of Veterinary Medicine
Michigan State University

Key words: scours, lambs, coccidiosis, internal parasites, medication, treatment & prevention

Midwestern sheep producers are commonly confronted with scouring lambs that do not appear to respond to treatment with traditional de-worming medications. While scouring lambs may be heavily parasitized with stomach or other intestinal worms, a protozoal parasite known as coccidia is often the real culprit. Coccidiosis, like other internal parasite problems, is directly linked to contamination of the lambing area or pastures with coccidia “eggs” (oocysts) passed in the manure of infected ewes and lambs. While a certain base level of coccidia contamination of the environment goes along with raising sheep (often resulting in no obvious clinical signs), clinical disease develops when an unreasonable number of oocysts become established in the environment and ingested by non-immune lambs. Signs of clinical disease (scours) generally occur about 18 to 20 days after ingestion of sufficient amounts of coccidia oocysts from the contaminated environment. Understanding parasite life cycle and the relationship of that life cycle to your specific production scheme is of enormous importance in prevention, diagnosis and control of coccidiosis outbreaks. It is also important in understanding why some medications designed for prevention are not particularly effective.

In winter lambing production systems, coccidiosis outbreaks are common in 3 to 6-week-old lambs that are infected with coccidia oocysts shortly after birth (first few days of life). In our area, outbreaks of clinical disease in winter lambing flocks commonly occur when lambs are about 20 to 30 days old. Coccidiosis is also more common during the second half of winter lambing, when the wet and relatively warmer transitional weather of late February and March contributes to coccidiosis survival and spread in the environment. Additionally, increased crowding of lambs and ewes during the second half of lambing season exponentially increases environmental contamination of the lambing facilities. In contrast, flocks utilizing spring lambing production systems usually experience coccidiosis outbreaks while lambs are on pasture. Newborn lambs spend little or no time in highly contaminated lambing barn environments, therefore, outbreaks on pasture can occur at various ages. Environmental contamination and resulting clinical disease is generally influenced by local weather conditions and the grazing management practices of the flock.

Hopefully, you can see that understanding coccidia host/parasite relationships is essential. Successful prevention, control, and treatment of coccidiosis requires a basic understanding of the parasite and its life cycle.

Key Elements of the Disease

1. **Clinical coccidiosis predominantly affects young, growing lambs.** Unexposed lambs confronted with large numbers of the parasite develop clinical disease but they also develop immunity. Clinical disease is followed by permanent resistance. Immunity (resistance) occurs 3 to 4 weeks after infection.
2. **The ewe, although immune to clinical coccidiosis, harbors the parasite in its intestinal tract.**

Therefore, initial transmission of coccidiosis to the lamb occurs via the ewe. Lambs, once infected, then contaminate each other. *Prevention of clinical coccidiosis in lambs necessitates targeting of the ewe flock. Prevention in purchased feeder lambs requires targeting infected lambs.*

3. **Transmission of coccidiosis occurs via oral ingestion of the parasite.** Adult ewes, which innocuously harbor the parasite, pass the infective stage of the parasite (oocysts) in their manure. Fecal contamination of hay, grain, bedding, pasture, teats, water troughs, creep feeders, etc., are all sources of infection. Signs of clinical disease develop about 17 days after infection with pathogenic levels of coccidia oocysts. This 17 day “incubation period” is often helpful in determining when exposure occurred and how to prevent future exposure to oocysts in your specific production system. It also helps to illustrate just how early oocysts infect lambs in winter lambing system and why medicated creep feeds often fail to prevent clinical disease (lambs are not eating medicated creep feed when contaminated very early in life). Furthermore, the importance of preventing the asymptomatic ewe from contaminating the lambing barn with oocysts should be obvious.
4. **Transmission of coccidiosis to lambs favors warm, wet environmental conditions.** Coccidiosis is seasonally related to when a flock lambs. Clinical disease typically erupts during transition from winter to spring. Outbreaks are often related to seasonal variations in rainfall.
5. **The coccidia organism does not respond to any of the standard deworming products commonly used in the industry.** This is the reason why producers often continue to observe scouring after deworming -- coccidia were really the cause.
6. **Medications used to treat clinical coccidiosis differ from medications used for prevention.** Producers need to identify if treatment and/or prevention is desired and use the appropriate medications.
7. **Environmental buildup (concentration) of the organism occurs in the lambing barn and feedlot.** Lambing barn outbreaks of coccidiosis often correspond to the second half of the lambing season, when organism concentrations, animal crowding and wet conditions are conducive to oocyst transmission. Pasture outbreaks of coccidiosis often correspond to spring or fall rains.
8. **Fecal flotation may or may not be a helpful diagnostic tool.** Veterinarians utilize microscopic identification of coccidia oocysts in the manure of a scouring lamb to link scouring to coccidiosis. However, failure to demonstrate coccidia oocysts in a fecal sample from a 4-week-old lamb may not necessarily indicate that coccidia are absent. **Example:** Coccidiosis is common in 3 to 4-week-old lambs, yet these lambs seldom shed coccidia organisms in their manure when the outbreak begins. Scouring usually starts about 17 days after infection, however, coccidia oocysts may not be evident in the fecal sample for another 5 days (about 22 days after initial infection). In other words, the coccidia organism is mature enough to cause scouring, but not mature enough to shed oocysts in the manure. It is a little like the analogy of finding an egg in the hen house. Finding the egg signals the presence of a hen. However, lack of an egg doesn't indicate her absence.
9. **Individual animal treatment for clinical coccidiosis is difficult, but often necessary, if affected lambs are extremely ill or have not been weaned.** Logistical problems result from: 1) the large number of lambs infected; 2) orally administered medications; and 3) daily treatment regimes for 3 to 7 days. Prevention is a much better alternative - especially where large numbers of lambs are involved.
10. **Lamb feed consumption (especially unweaned lambs) is unpredictable.** Preventive/therapeutic

medication of creep and grower rations often must exceed federally approved levels if therapeutic/preventive amounts of medication are to be consumed. Early outbreaks of coccidiosis in lambs are difficult to prevent with medicated creep feed alone. The problem is not so much ineffectiveness of the medication, but instead, lack of adequate intake in very young lambs and contamination very early in life.

11. **Stress often induces outbreaks of coccidiosis.** Coccidiosis often follows weaning or shipping stresses.
12. **Pneumonia outbreaks often parallel or follow clinical coccidiosis infections.** The conditions conducive to lambing barn pneumonia (poor ventilation, humidity, over crowding, wet bedding etc.) are also conducive to oocyst survival.
13. **Lots of dry straw** also helps to “bed away” from infective oocysts and the moisture they need to survive. A thick, well bedded manure pack allows more moisture to leave the surface layer of bedding than does a thin pack on freshly cleaned cement. Coccidiosis is one disease where excessive cleaning of cement floored barns may actually be conducive to moisture accumulation and oocyst survival.

Hopefully, the preceding generalizations concerning coccidia infections have left you with the feeling that there are no any black or white answers to the coccidiosis question. That was the intent! Producers need to recognize that a combination of factors precipitate coccidiosis and a similar combination of factors can aid in prevention. Needle and syringe delivery systems just don't work! Coccidiosis control necessitates understanding how your management decisions affect the disease.

Clinical Coccidiosis

Clinical coccidiosis affects both nursing and growing lambs. Clinical disease involves scouring (as evidenced by soiling of the rear quarters), with occasional (rare) blood observed in the feces. Unless other diseases are present, lambs generally exhibit no elevation in temperature. Typically, lambs appear empty, slightly depressed and rectal straining is evident. Although uncommon, severe infections can lead to death. In most outbreaks of coccidiosis, the real losses are reduced feed efficiency and poor performance often go unnoticed. Lambs just take 2 to 4 weeks longer to get to market, which means more money spent on feed.

Occasionally, coccidiosis can also lead to chronic thickening of the intestinal wall, resulting in malabsorption and stunted growth. Rectal prolapses are also associated with rectal straining from the diarrhea. Normally, within 2 to 3 weeks following infection, immunity develops and scouring subsides.

Treatment for clinical cases of coccidiosis is time consuming, costly, and dependent upon lamb age, facilities, feeding program, and available medications. Unweaned lambs and younger animals that are not on consistent levels of feed or water consumption must be individually treated. Older lambs may be group treated in the feed or drinking water. In most cases, group therapy is best accomplished by water medications. Sick animals will generally drink, even if they are "off feed." Treatment involves medication with either oral sulfonamide preparations or oral preparations of amprolium. Stressed lambs with coccidiosis often experience concurrent problems with pneumonia. Oral sulfonamide medications, which are effective against both coccidia and common pneumonia-causing organisms (amprolium only works on coccidia), are the most common *treatment* medications recommended by veterinarians. Some coccidiosis outbreaks tend to respond better to one or the other type of medication. Personal preference would be to start treatment with a sulfonamide preparation.

Sulfonamide medications. Many sulfonamide medications can be used to treat coccidiosis. Most preparations are sold as packets of powders or as gallons of liquid that can be added to drinking water. **Example:** A 12.5% solution of sulfadimethoxine (Albon) is commonly prescribed by veterinarians. *Group treatment* dosages might include adding 1 pint of this solution to each 25 gallons of drinking water for 3-5 days. *Individual treatment* might include a daily drench of 4 cc of the 12.5% sulfadimethoxine solution per each 25 lbs of body weight for 3-5 days. Producers should consult their veterinarians for products and doses appropriate for their given management schemes. Also remember that many sulfonamide medications are bitter tasting. Commercial products often include flavoring) or packets of j can be added to enhance consumption.

Amprolium Medications. Amprolium (Corid) is also labeled for use as both a treatment and preventative for coccidiosis. Amprolium comes as both a feed additive and as a liquid for drinking water medication.

- Sample **treatment dose:** Treatment is continued for 5 days using one pint of a 9.6% oral solution of amprolium added to 100 gals of drinking water.
- Sample **prevention dose:** Prevention is continued for 21 days using one-half pint (8 oz) of a 9.6% oral solution of amprolium added to 100 gallons of drinking water.

Individual lambs can also be drenched with amprolium for both treatment and prevention of coccidiosis.

- **Treatment** involves making a stock solution by mixing 3 oz of 9.6% amprolium solution in 1 pint of water. This stock solution is then drenched daily at the rate of 1 oz of stock solution per 100 lbs of body weight for 5 days.
- **Prevention** doses involve making a stock solution by mixing one and one-half ounces of the 9.6% amprolium solution with 1 pint of water. This stock solution is then drenched daily at the rate of 1 oz of stock solution per 100 lbs of body weight for 21 days.

CAUTION! It is extremely rare, but polioencephalomalacia (caused by a thiamine deficiency to the brain) can be induced as a side effect of amprolium treatment. The mechanism of action of amprolium may provoke a thiamine-like deficiency, causing the typical neurological symptoms observed with polioencephalomalacia.

Feed Additives for Prevention of Coccidiosis

Newer feed additives for the prevention of coccidiosis in lambs are currently in use by the sheep industry. These compounds include two FDA-approved products known as, lasalocid (trade name Bovatec), and decoquinate (trade name Deccox) and one non-approved product called, **monensin (trade name Rumensin)**. Monensin requires a veterinarian-client-patient relationship for use.

Killing Coccidia vs Reducing Coccidial Shedding) IMPORTANT ISSUE!

Preventive medications such as monensin, lasalocid, and decoquinate, are collectively referred to as coccidiostats (meaning that they slow down the shedding of coccidia into the environment). They should be used for prevention, not treatment of coccidiosis. The theory behind employing lasalocid, monensin, or decoquinate in a feeding program is to reduce the shedding of infective levels of coccidia oocysts into the environment of the lamb. Remember that ewes and previously infected lambs that have developed immunity, although they may show no signs of clinical disease, const

shed coccidia into the lambing barn, dry-lot, and pasture environment throughout their entire life. They are what we refer to as asymptomatic carriers or coccidia. Reducing coccidia oocyst contamination in the environment prevents clinical disease, yet allows lambs to have enough exposure to coccidia to develop immunity. Like most exposures to any disease, it is somewhat of a numbers game, high populations of oocysts in the environment lead to disease. Lambs can usually handle lower concentrations of oocyst contamination.

Producers and their veterinarians also need to understand that feed additives such as monensin, lasalocid, and decoquinate, are only effective in preventing disease if they are added to the feed before lambs become exposed. Some of these medications also have a lag time between when you start sheep on the medicated feed and when the oocysts stop being passed in the manure. This lag time varies between products, but is usually about 21 days. Therefore, pregnant ewes (that are responsible for initially contaminating the lambing barn environment) need to be on medicated feed at least 21 days prior to entering the lambing barn and drylot area. Most producers forget this very important point. Furthermore, using lasalocid, monensin, or decoquinate as the only *treatment medication* for clinical outbreaks of coccidiosis has created problems for many a sheep producer! These feed additives are for prevention, not treatment.

On the contrary, **treatment medications such as sulfonamide compounds and amprolium are coccidiacidal** (meaning that they actually kill the coccidia organisms in the intestine of the treated animal). While a 3 to 5 day treatment with appropriate doses of a sulfonamide or amprolium is normally effective against clinical disease, it does not prevent reinfection after treatment ceases. In the past, prevention with these treatment medications was attained by repetitive administrations of the medications every 2 to 3 weeks. Cyclic administration of treatment drugs prevented coccidia contamination of the environment by not allowing newly ingested coccidia time to mature and pass infective eggs in the manure. (Again the hen house analogy - chicks mature to poults who then mature to laying hens. If the chicks were "killed-off" every 2 to 3 weeks, they could never mature to lay eggs.) This maturation process takes about 21 days, thus the rationale for the cyclic 2 to 3 week treatments. Costs, logistics of administration (especially to pastured animals), residue worries, and the development of monensin, lasalocid, and decoquinate, have limited the use of cyclic treatments to specialized situations.

Practical Prevention (General)

Doses and applications of lasalocid, monensin, or decoquinate will depend upon both your feeding and management programs and veterinarian-client relationships. Lambing operations that consistently experience coccidiosis outbreaks should utilize the addition of preventive medication to the ewe grain or salt mix *prior to* and throughout lambing. This practice reduces coccidia contamination of the lambing premises and thereby controls the spread of coccidia to the lamb crop. The aforementioned practice, coupled with the addition of preventive medication in the lamb ration (creeper feed to finishing), suppresses coccidiosis shedding to levels that prevent clinical disease.

Because most Midwestern producers feed grain to ewes during late pregnancy, the practice of adding medication to the late gestation diet should not be too cumbersome. ***It is important to remember that any preventive medication needs to be in the ewe diet for at least 21 days prior to the ewe being moved into the lambing facility. These preventive medications need to be used for this length of time to be effective!*** This is an important area of breakdown in a control program. Producers unfairly blame the feed additive for being ineffective, when producer misapplication is really the culprit.

Sanitation) If the lambing barn has recently housed feeder lambs, or continually houses sheep, the premises may already be contaminated. Lambing areas with this history should be cleaned and left to stand idle for several weeks

prior to introducing the medicated ewes. If weather or animal use prohibits cleaning the area, producers should use a heavy bedding of straw to isolate the incoming ewes from the preexisting coccidia. This layer of straw will also create a dry area less conducive to the spread of coccidia. ***Breaking the coccidia cycle by hauling manure and allowing an area to be void of animal units is an important part of any disease control program. Give some thought to your management scheme to allow this to happen!***

Dosage Rates for Lasalocid, Monensin and Decoquinat

Lasalocid (Bovatec) is included in many feeder lamb 35% protein supplement pellets, complete feeds, or it can be purchased as an individual additive. ***The FDA approved rate for lasalocid use in sheep is 30 grams per ton of feed.*** While this approved level allows for adequate lasalocid consumption for finishing rations and for the ewe flock, it may not provide adequate doses of lasalocid in the creep or grower ration. Young lambs consume only very small amounts of feed; therefore, they may not ingest an appropriate amount of the medication. For this reason, practitioners with an appropriate client-patient-veterinarian relationship may recommend increasing lasalocid rates to as high as 90 grams/ton in the creep ration, 60 grams/ton in the grower ration (40-70 lb lambs), and the approved 30 grams/ton in the finisher diet (lambs over 70 lbs).

Monensin (Rumensin), while not approved by the FDA for use in sheep, is effective for prevention of coccidiosis. Numerous monensin-containing feed additives are available for cattle and should only be used for sheep if a client-patient-veterinarian relationship exists. Monensin dosage is at the 15 gram/ton level. ***CAUTION!!!) Monensin is extremely toxic to sheep if dosages are incorrect. Improper mixing, errant calculations, and inappropriate use of highly concentrated cattle products can lead to toxicity and death! There is no antidote! Cattle salt blocks containing concentrated levels of monensin are extremely dangerous to sheep. Products formulated for cattle may also contain high levels of copper or other toxic elements. Scours is a common sign of both coccidiosis and early monensin toxicity. Since they are already treating scouring lambs resulting from coccidiosis, producers often fail to associate the continued scouring with possible toxicity.***

Decoquinat (Deccox, a 6% decoquinat preparation) can also be used to help prevent coccidiosis in sheep. It has been recently approved for use in sheep. Two pounds of the 6% decoquinat preparation (Deccox) can be added to 50 lbs of a loose trace-mineral salt. This preparation can then be fed free-choice to the ewe flock or grazing sheep. This is a convenient method for coccidiosis control in grazing management systems that do not grain feed lambs. ***Caution:*** A 0.6% decoquinat preparation is also available and should not be confused with the 6% Deccox product. This has been a common mistake in our area.

Final Caution

Producers that house horses in the same area as sheep should use EXTREME CAUTION with storage, feeding, and purchasing of products designed for the prevention of coccidiosis in sheep or cattle. Monensin (Rumensin) is extremely toxic to horses! Ingestion of very small amounts of the product is usually fatal. Lasalocid (Bovatec) and decoquinat (Deccox) are much less of a problem but should still not be fed to horses (or any equine species - guard donkeys etc.). Avoid any possibilities of consumption by equine species.