

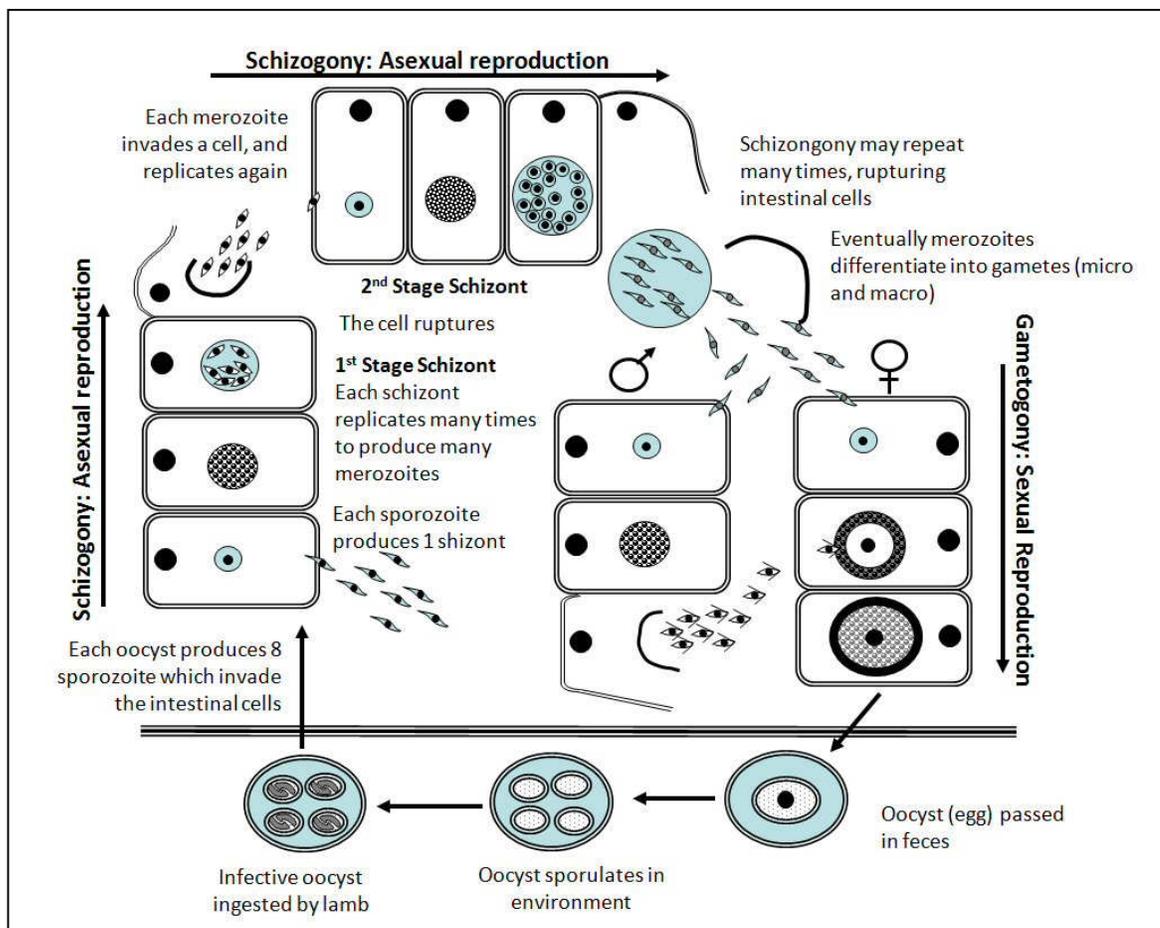
## CONTROL OF COCCIDIOSIS IN LAMBS AND KIDS

Coccidia are microscopic, protozoal parasites of the intestine. There are 11 different species of coccidia in sheep and almost an equal number in goats but not all are considered to be capable of causing disease (pathogenic). There are subtle differences in the morphology and size of their oocysts which help to distinguish pathogenic from non-pathogenic. These parasites are host-specific, i.e. sheep coccidia only affect sheep and goat coccidia, goats. None cause disease in humans.

**Table 3. Pathogenic species of *Eimeria* in sheep and goats**

Species	Coccidia Name	Pre-Patent Period	Pathogenicity
Sheep	<i>Eimeria crandallis</i>	15 to 20 days	++
Sheep	<i>Eimeria ovinoidalis</i>	12 to 15 days	+++
Goat	<i>Eimeria arloingi</i>	20 days	++
Goat	<i>Eimeria christensenii</i>	14 to 23 days	++
Goat	<i>Eimeria ninakohlyakimovae</i>	10 to 13 days	+++
Goat	<i>Eimeria caprina</i>	17 to 20 days	++

**Figure 4. Lifecycle of the coccidia**



Prepatent period means the time in days, from ingesting the oocysts to new oocysts being passed in the feces. What makes a species more pathogenic is if it infects both the small and large intestine. The small intestine has an amazing ability to recover from damage but not so the large intestine. If only the small intestine is affected, the goat/sheep suffers much less. The life cycle of the coccidia is quite complicated as can be seen from Figure 4. One coccidial oocyst can result in up to 50 million intestinal cells being destroyed. The act of schizogony (asexual reproduction) and gametogony (sexual reproduction) causes the cells of the intestine to rupture and release the next stage of the life cycle. It is important to understand the basics of this life cycle in order to understand how to best control the infection.

## **COCCIDIOSIS – THE DISEASE**

Coccidiosis is the name of the disease in lambs and kids caused by an infection with coccidia. Most often affected are young stock – either nursing or weaned, with diarrhoea and poor growth. Adult sheep do not get disease and only very rarely adult goats. Coccidiosis as a herd/flock problem is often seen along with another disease, most often pneumonia and soremouth (orf). This may be because the kids or lambs are “run-down” from the other diseases or may be because fighting more than one disease at a time is too difficult for them. We also more often find coccidiosis as a herd/flock problem when there are other stresses in the herd/flock, for example crowded conditions or weather stresses (e.g. cold, heat, high humidity). We tend to think of coccidiosis as either acute and severe, or chronic.

### **ACUTE SEVERE COCCIDIOSIS**

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Kids or lambs with this form of coccidiosis are notably ill and many may die without prompt and appropriate treatment. Signs may appear fairly suddenly and a kid/lamb only mildly ill the day before, may be very sick the next day. Diarrhoea is an important feature and may be watery and brown or may have blood in the stool (black and tarry and / or red streaks of fresh appearing blood). The kids or lambs may be dehydrated with pale mucous membranes (anaemic). They will invariably be depressed but fever is not always present. Some animals may strain from the inflammation of the lower large intestine and pass only watery blood. In such an outbreak, it is common to have deaths.

### **CHRONIC COCCIDIOSIS**

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Chronic means that the disease affects animals for a long period of time. Kids / lambs with chronic coccidiosis may have had acute severe coccidiosis earlier or may not ever have been noticed ill. What is noticed is that the affected group will not appear thrifty and will be growing slowly. A common finding with groups of kids or lambs affected with chronic coccidiosis is that they are thin, pot bellied and small – although their heads may continue to grow giving them a runty appearance. The hind end may be dirty due to the soft stools and intermittent diarrhea. Kids and lambs with chronic coccidiosis may never fully recover from the effects of the disease.

### **AGE AT WHICH COCCIDIOSIS IS SEEN**

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Coccidiosis is a disease of young kids and lambs. The most common age to be affected is 4 weeks to 5 months. Nursing lambs/kids appear more at risk of acute severe coccidiosis. Occasionally, kids or lambs as young as 2 weeks may be affected and rarely 1 week – although diarrhea in this age group is more often due to agents of neonatal diarrhea (rotavirus, coronavirus and *Cryptosporidium*). Older animals can also be affected if not previously exposed as lambs/kids. However, if older animals appear to be suffering from chronic coccidiosis, it may be the lasting effects from an infection from when they were younger. Disease in adults is very rare – again, because immunity develops within a month or two after exposure to the coccidia. It is important to

remember that shedding of the coccidia eggs – oocysts – is not evidence of disease, but only evidence of infection. Adult goats and sheep often shed a small number of oocysts. It is also important to remember that severe disease can occur before infection is far enough advanced for the sheep/goat to be shedding oocysts, so absence of oocysts in the manure does not mean that the animal is not suffering from coccidiosis.

## **HOW THE DAMAGE IS DONE**

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A single oocyst, once ingested – releases 8 sporozoites which swim through the contents of the intestine and then each penetrate a cell on the lining of the intestine. Inside the cell, the sporozoite undergoes a change and becomes a structure known as a schizont. This schizont divides many times within the cell to produce up to 1,000 structures called merozoites. The cell then ruptures releasing these merozoites which then again swim through the intestinal contents. Each merozoite penetrates another intestinal cell and goes through another cycle of developing into a schizont, dividing numerous times and then again releasing thousands of merozoites. This part of the cycle of the coccidia is called “schizogony” or asexual reproduction. Eventually, the merozoites that are released change into either microgametes (male merozoites) or macrogametes (female merozoites)(“gametogony”). These again infect intestinal cells and male cells divide many times. The male cells fertilize the female cells (sexual reproduction) and in each infected intestinal cell, an oocyst or egg is formed. These oocysts burst out of the cell and are passed in the feces.

So there are many stages, and at each stage intestinal cells are invaded and then destroyed – causing repeated damage to the intestine. The intestinal damage can release blood and cause inflammation of the lining of the gut. The animal loses blood, water and protein and cannot absorb nutrients as efficiently. If enough damage is done, it becomes extremely ill and may die.

## **DIAGNOSING COCCIDIOSIS**

The best way to diagnose coccidiosis is based on the clinical signs shown in the group of animals and evidence of infection based on post mortem if any animals have died. Taking a fecal sample and having a quantitative count of the number of oocysts (fecal oocyst count or FOC) in the stool can also be helpful but there are many ways it can be misinterpreted so caution must be used.

A low FOC does not rule out coccidiosis. As mentioned before, acute disease may be present before the prepatent period is reached – so the FOC may be very low.

A high FOC (even in the tens of thousands) can occur when the kid or lamb is infected with a low pathogenic species. While it is possible to differentiate the species of coccidia based on the microscopic appearance of the oocysts, it is difficult and must be done by a trained parasitology technician using special techniques.

Additionally, a moderately high FOC will often be present even long after the animal develops immunity, and may rise if the animal’s immune system is stressed – all without it suffering from the disease .

## **FACTORS AFFECTING IF COCCIDIOSIS IS A PROBLEM IN THE HERD OR FLOCK**

Why does one herd/flock have a problem with coccidiosis and another does not? Why are some years, or some times of the year worse than others? We need to consider that presence of the disease agent alone is often not sufficient for a coccidiosis problem to occur, but that different factors all play a role. It is easier to consider the factors in three categories:

## THE PARASITE

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What species of coccidia are present and how pathogenic are they? How many oocysts are present in the environment and where are the oocysts? Are they contaminating places that allow for easier transmission to the kids/lambs?

## THE ANIMAL

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How immune is the kid or lamb? Younger animals are more susceptible. Are the kids/lambs ill with another disease that could weaken their immune systems, e.g. soremouth or pneumonia? Have they been stressed by changes in the diet or a poor diet, by crowded conditions or bad weather. Have groups been mixed (e.g. younger moved in with older). Has there been fighting and competition at the feeders? Have they recently been weaned?

## THE ENVIRONMENT

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The oocysts must mature (sporulate) before they are infective. Time to sporulation depends on moisture, oxygen (e.g. exposed to the air rather than buried in the bedding pack) and temperature. Exposure to sunlight will assist killing of the oocysts so pasture tends to be safer than indoor housing. Animals raised on dirty bedding are more at risk than those on slatted floors or clean bedding. Type of feeders and waters may have an effect if they are designed to prevent contamination with manure. High stocking densities, build-up over the kidding/lambing season – all increase the load of oocysts in the environment and thus increase risk of disease developing.

## CONTROLLING THE ENEMY

So, we now know a great deal about coccidia, the disease and the factors that may increase the risk of coccidiosis in our goats and sheep. This gives us the ability to develop a workable coccidiosis control program. The information in the rest of these notes is not a recipe for what you should do but rather the building blocks that you and your herd veterinarian can use to develop a herd health program.

## REDUCING THE LOAD OF OOCYSTS IN THE ENVIRONMENT

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### Reduce Stresses to the Kids/Lambs

Do this by optimizing housing. Keep stocking densities down. Here in Ontario, we often kid or lamb out of season in the winter and our females often have twins and triplets. Make sure there is adequate space, not just for the dams but also the offspring. 2 square meters per animal is not unreasonable and 3 square meters is preferred. Make sure that ventilation is adequate to prevent build-up of humidity and ammonia levels in the barn. Avoid drafts and daily temperature fluctuations. If outdoors, make sure they have shelter from inclement weather (e.g. a run-in shed). Nutritional stresses may be from artificial rearing with poor quality or poorly managed milk replacer, nutritional deficiencies from a poor diet (e.g. poorly digestible forages, inadequate vitamin E and selenium, other mineral deficiencies). Other diseases such as soremouth and pneumonia may be worse under stressful conditions. In pastured kids and lambs, concurrent infection with gastrointestinal nematodes may increase the risk of disease from coccidia. Infections can be managed through the judicious and proper use of prophylactic anti-coccidial medications. This will be covered in depth later. Kids or lambs that are ill should be promptly treated to prevent more contamination of the environment.

## Reduce Risks from the Environment

The biggest source of contamination of the environment is from kids or lambs with uncontrolled infection so it is important to control infection as mentioned above. 1 oocyst eaten by a kid or lamb will result in 10,000 new oocysts produced and there can be thousands to millions of oocysts excreted per gram of feces (30 grams = 1 ounce). These oocysts can survive in the barn for many months. So we can see outbreaks of coccidiosis late in the kidding/lambing season because of the build-up through the winter. For example, kidding out doelings in a pen that previously had does raise kids in it, can be a big risk if the pen was not properly cleaned first. Forage and grain feeders need to be designed so that manure contamination is minimized. This means not only preventing animals from defecating in the feeder but also preventing dirty feet from going in the feeder. Bedding should also be kept fresh and dry.

Oocysts are very hard to kill. They are resistant to desiccation (drying) and many disinfectants. Sunlight will help to kill oocysts on pasture but those in the barn are very protected. Oocysts will sporulate in as little as 2-5 days at temperatures as low as 12° C so potential for environmental build-up is massive. To disinfect: remove all bedding, old feed, water and manure first by scraping. If possible, steam-clean the entire pen and equipment. The extreme heat will help to kill the oocysts as well as physically remove them (they are sticky!). Disinfectants usually aren't that effective but if used, make sure it says on the label that they are effective against oocysts. Ammonium based disinfectants may be most effective but surfaces need to be initially cleaned. One product is available in Canada for premise cleaning. OO-Cide (Vétoquinol Canada Inc.) (ammonium chloride and sodium hydroxide) and should be applied with no animals present after the area is cleaned.

Although kids and lambs are the biggest source of contamination, some advocate preventing build-up in environment from adult animals. All adults will shed a few oocysts but in the period a few weeks before parturition and through lactation, the number of oocysts excreted may rise (peri-parturient oocysts rise). This is because the dam's immune system is stressed with pregnancy and lactation. Yearlings have higher rises than adults. To control this, some give medicated feed to the adults during this period. The decision to do so should be made with your herd veterinarian's advice as not all situations warrant this practice and this practice alone will likely not prevent coccidiosis in the offspring.

## USE OF ANTI-COCCIDIAL DRUGS

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### Issues

The use of preventive anti-coccidial medications (also called coccidiostats) is a common method to control coccidiosis in sheep and goats. However there are some issues that should be outlined.

- Drugs are an expense and to decide to use them, there should be a benefit to the animal higher than their cost.
- There are no approved medications for goats and so all require a veterinary prescription, and only one approved product for sheep (lasalocid in lamb creep at 36 parts per million).
- For those producers trying to raise animals in an organic or "natural" way, drugs should not be routinely used.
- Using these drugs requires more exacting feeding management to make sure the kid/lamb gets the correct amount.
- It also requires getting the medication into the very young animal (perhaps even less than one week of age) in sufficient quantities to prevent disease.
- Even the best drug cannot protect very stressed animals or those in a heavy contaminated environment.

The goal of using these medications is to control the level of infection so as to prevent the disease but to still allow enough infection so that the young animal develops immunity. To do that, usually the drug needs to be available from birth to 3 - 4 months of age, usually delivered in palatable creep feed.

The following medications can be used to control coccidiosis in lambs and kids. With one exception, all require a veterinary prescription to be used or incorporated into the feed.

## Lasalocid

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### Lasalocid as a Feed Additive

Lasalocid (Bovatec or Avatec, Alparma Animal Health), an ionophore antibiotic, is licensed for use in lambs but not kids. It kills the “free living” stages of the coccidia (sporozoites and merozoites) as they move from cell to cell in the intestine. Because it kills the coccidia, it may help control disease after the animal is infected. In lambs it is approved as a feed additive to be fed free choice, at a concentration of 36 ppm = 36 mg of drug per kg of feed. To be effective a kid/lamb needs to eat 1 mg lasalocid /kg body weight per day. Under-dosing is a big problem in animals that are nursing as they may not be eating enough creep to get that dose level. To determine if they are getting enough, weigh feed consumed daily, weigh the animals and calculate what they are eating. E.g. a 10 kg (22 lb) kid must eat 0.28 kg of creep daily (at 36 ppm of lasalocid) to receive a therapeutic dose.

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### Lasalocid in the Mineral

Lasalocid is sometimes mixed in the mineral although nursing animals definitely won't eat enough, so this may be only useful for weaned kids or lambs on pasture or to control the periparturient rise in oocysts that occurs during late pregnancy and lactation in does and ewes. Again, it is necessary to be sure of intakes to prevent under or overdosing. The estimated intake of a free choice loose salt/mineral premix is 15 gm/head/day (or ½ ounce) for an adult goat or sheep. E.g for a 75 lb young adult: 34 kg bw (75 lb) so need 34 mg/day.  $2265 \text{ mg lasalocid/kg} = 2.265 \text{ mg lasalocid/gm} = (2.265 \times 15) = 34 \text{ mg lasalocid per } 15 \text{ gm premix}$ . But you must manage the salt premix carefully to make sure you know how much is consumed. Too high of a dose may be toxic to sheep and goats but fortunately lasalocid is the least toxic of the ionophores. The dose that kills 50% of animals (LD<sub>50</sub>) is 50 to 100 mg/kg bw for cattle although it is unclear if that is the same for goats and sheep.

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### Lasalocid in a Calf Starter

Are feeds formulated for calves suitable for kids? Legally the feed company needs a veterinary prescription to sell for use in goats. Again, you need to assess intakes in your kid group to make sure they are eating enough on a daily basis to achieve a therapeutic dose. Lasalocid is labeled for increased weight gain & improved feed efficiency for cattle and there is some evidence in the literature that it improves feed efficiency in kids too, although this may be because of the control of coccidiosis.

## Monensin

Monensin (Rumensin, Elanco Animal Health), another ionophore antibiotic, is licensed for goats in the USA (20 gm/ton of complete feed which is the same as 22 gm/ton here in Canada). It is not licensed for sheep in either country. It works the same as lasalocid. It requires a veterinary prescription to use in small ruminants in Canada. Generally, suggested feeding rates to achieve a therapeutic dose of 1 mg/kg bw /day are 11 gm/tonne (ppm) free choice feed and 22 ppm limit fed. Monensin is more toxic than lasalocid. The LD<sub>50</sub> for sheep is

11.9 mg/kg bw/day (i.e. only slightly more than 10 times the therapeutic dose will kill 50% of the lambs!) and for goats is 26.4 mg/kg bw/day. “Decimal place” errors commonly kill lambs when the monensin is included at 110 ppm rather than 11 ppm. Feed refusal and stiffness, as well as death may occur if the levels are too high in the feed. Lambs and kids must be introduced to a ration slowly over 2-3 weeks to acclimate the rumen organisms.

Monensin is commonly used in lactating dairy cattle to reduce the risk of metabolic disease in early lactation. It is not approved for lactating dairy goats or dairy sheep and there is little evidence that it has the same benefits in those species. Regardless, to use in adults you need a veterinary script. Using a label claim to prevent coccidiosis in adult goats or sheep while milking for human consumption is difficult to justify as this disease is very rare in adults.

## **Decoquinat**

Decoquinat (Deccox 6%, Alparma Animal Health) is not an antibiotic nor will it improve feed efficiency. The therapeutic dose is 0.5 mg/kg bw daily for sheep and goats although there is strong evidence that 1 mg/kg bw is much more effective in those species. It is licensed for use in goats in the USA but not Canada and is not licensed for sheep in either country. Again, it can be used by veterinary prescription only. Although this drug is not toxic it is much more expensive than lasalocid or monensin. Decoquinat works very early in the life cycle, killing only the sporozoites as they first infect the kid or lamb, and so is not effective in animals that already have disease. Because it is so effective early in the cycle, for the kid or lamb to develop immunity, it should be treated for a minimum of 3 cycles (e.g. 70 days) and perhaps longer.

The UK label for lambs is 1.67 kg of 6% premix per tonne of creep feed. This gives 100 grams decoquinat/tonne feed (100 ppm) and should deliver 1 mg/kg bw if fed appropriately. Feed continuously for a minimum of 28 days (too short in our opinion).

The USA label for young goats and sheep is different: The intent is to deliver 0.5 mg/kg body weight. The USA label is: Decoquinat should be included at 13.6 grams decoquinat per ton of feed (0.0015%) or 0.5 lbs of Deccox 6% premix per ton of feed. Limitations: Feed Type C feed or milk replacer at a rate to provide 22.7 milligrams per 100 pounds of body weight per day (0.5 milligrams per kilogram). Do not feed to goats or sheep producing milk for food. Feed for at least 28 days during periods of exposure to coccidia or when it is likely to be a hazard. Bentonite should not be used in decoquinat feeds. To compare metric to USA measures requires a bit of calculation:  $[0.5 \text{ lbs} / \text{ton of feed} = (0.227 \text{ kg of Deccox} / 909 \text{ kg of feed})] = 0.25 \text{ kg of Deccox} / \text{tonne of feed}$  or 15 grams decoquinat/tonne of feed – very different from the UK label! A 30 lb lamb or kid should be fed this at a rate of 1 lb/day.

Decoquinat can also be scripted by your vet to add to salt/mineral premix but again, they need to know how much is being consumed in order to make sure enough is added to be effective. However, because decoquinat is non-toxic, it is less dangerous to error on the high side to make sure they receive enough.

As with the ionophores, it is difficult to get nursing kids and lambs to eat enough decoquinat in the feed to be effective, particularly when they are very young and very susceptible to coccidiosis. This is because the milk intake as a portion of their body weight is high so feed intake tends to be low. Winter kidding/lambing does in confinement increases this risk as does having heavily milking does and ewes (which is a good thing – but decreases the desire for the lambs / kids to eat solid feed containing the coccidiostat). Your veterinarian can increase the level of decoquinat in the creep ration to compensate for this if necessary; reducing it once the kids are weaned. Again this needs to be calculated based on the measured daily intake of creep and the average weight of the kids in the pen.

Decoquinatate is available in another form as an additive to milk or milk replacer for kids being raised artificially (Deccox M 0.8%). It contains 8 gm decoquinatate / kg premix and you must mix it so that the kids/lambs receive 0.5 to 1 mg/kg bw / day. The amount added will depend on whether the milk is limit or free-choice fed. E.g. 10 kg kid needs 10 mg/day. 1 gm of premix contains 8 mg decoquinatate, so each kid will need to consume 0.6 to 1.2 gm/day. 1 level tsp contains 3.5 gm (28 mg decoquinatate), so each kid will need ~ 1/3 of a tsp per day at that body size. If consuming 10% of bw, then 1 tsp per 3 litres of milk to 3 kids. However, it is important to remember: the milk must be agitated for 5 minutes before feeding as well as during feeding to prevent settling out and under dosing, so only use to feed individuals (e.g. don't use with a kid bar).

## **Amprolium**

Amprolium (Amprol 9.6%, Huvepharma AD) is not approved for sheep or goats in Canada. It is more effective as a treatment than a control. Its mode of action is that it acts on second generation schizonts and so kills the coccidia later in the life cycle, after the coccidia have already done some damage. However, it also interferes with thiamine uptake by the intestine and so overdosing or chronic use can cause thiamine (vitamin B<sub>1</sub>) deficiency, also call polioencephalomalacia. Resistance of coccidia to amprolium has been reported in goats.

There are many suggested doses for kids and lambs but the following has been reported as working well in kids as a treatment without causing problems: 50 mg/kg per day for 5 days; for lambs the dose is reported at 20 to 50 mg/kg bw/day for 5 days. Although the amprolium can be added to the water you are less sure of intakes, particularly in nursing animals, so it is highly recommended to drench individuals. Control dosages (not recommended) are 5-25 mg/kg bw/day in feed or water for 21 days.

## **Sulfonamides**

These are old drugs and are to be used for treatment only. There are several types with efficacy against coccidia: sulfamethazine, sulfaquinoxaline, and sulfadimethoxine are usually given as a drench or in feed or water. Toxicity is a real risk from overdose or long-term treatment and signs are depression and kidney failure. As with amprolium resistance has been reported.

## **Totrazuril**

Totrazuril (Baycox 5% Bayer Animal Health) is a fairly new drug and is licensed to control coccidiosis only for swine in Canada. In Europe it is licensed for use in lambs. It is not a feed additive but a drench to be given at a very specific time of the animal's life. The lamb recommendation is 20 mg/kg bw *once* prior to the first expected onset of disease. There is some evidence in the literature that goats may require a higher dose (30 mg/kg). It is very important to understand that this drug must have a very long withdrawal for meat and must NEVER be used in lactating dairy goats or sheep. The meat withdrawal for lambs in the UK is 40 days, but a much longer withdrawal should be used for goats as we don't know how persistent it is. What is very different about totrazuril is that it kills coccidia in the intracellular stages. All the rest of the coccidiostat drugs only kill the "free-living" stages as they swim to the next cell to infect, but totrazuril kills the coccidia in the cell. This means that they effectively wipe out any infection in the animal when they are treated. Additionally, there is persistency of the drug reducing the need for retreatment.

Because of how it works, totrazuril must be used very differently from other anti-coccidial drugs. It is more suited for pasture-based systems when creep feeding is not used. But there are several factors that must be considered before deciding that this is the method to control coccidiosis in your herd/flock:

- You must drench individual lambs/kids – and all must be treated. Even leaving one untreated lamb or kid can re-infect the remaining animals.

- The animals must be at the correct age. Treatment is done one week prior to the first time you usually see coccidiosis in your kids and usually before there are any oocysts in the faeces. On most farms that is 4 to 5 weeks of age. This often means treating each animal when it reaches 3 to 4 weeks of age. This means you can't treat the group at one time but rather when the individual animal reaches that age.
- To do this, you must have a very good identification system, excellent records and handling facilities – along with enough reliable help, so that it is easy for you to find, catch and treat the lambs/kids when they reach the appropriate age.
- Because of the persistency of the drug, you can't use it for kids or lambs slaughtered at light weights. Our recommendation is to use at least a 70-day meat withdrawal for kids and at least 40 days for lambs.
- You must continue to monitor the animals for signs of coccidiosis. In situations where there is still a large environmental load of oocysts, it sometimes is necessary to retreat in 3 to 4 weeks – although once they show signs of coccidiosis, totrazuril won't work.

## Diclazuril

Diclazuril suitable for use in kids and lambs is not available in Canada. A product containing diclazuril, Clinacox 0.5% (Merck Animal Health) is sold as a feed additive for turkeys and poultry. If your herd veterinarian decides to use this drug, monitoring must be done to make sure it is effective. Because the vehicle carrying the drug is very different in Clinacox (it was designed for a bird gut and not a ruminant gut) we don't know if the drug is available to work in a lamb or kid intestinal tract.

Like toltrazuril, it works against the intracellular forms of coccidia. In the European Union it is available as a sheep drench (Vecoxan, Elanco Animal Health). The label indicates a single administration of 1 mg diclazuril per kg/bw most commonly at about 6-8 weeks of age, or two administrations beginning at 3 to 4 weeks of age and the second about 3 weeks later. Like toltrazuril, you need to give early in disease to prevent damage - it is not a treatment. Unlike toltrazuril, it is not persistent and meat withdrawals are shorter.

## Summary

Coccidiosis is a common cause of disease in kids and lambs and a very important internal parasite. Although environmental control must be part of the herd health approach to this disease, judicious use of anti-coccidial drugs may be necessary to ensure adequate control. Any coccidiosis control program should be designed with your flock veterinarian as each farm and its challenges are unique.

