



Tri County Dairy Goat News

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Control and Management of Common Internal Parasites of Goats

Internal parasites are probably the most important health problem affecting small ruminants. Infection with parasites can cause substantial losses to goat owners. However, the adoption of a good management program, including prevention, control and treatment of internal parasites, can minimize these losses.

In a goat herd, the older animals are more resistant to parasitism due to prior exposure to the various parasites. However, this immunity against the parasite is fairly effective in preventing disease, but not infection. Therefore, adult goats may serve as reservoirs of infection for the younger members of the herd. On the other hand, young animals under 5 months of age are the most susceptible to parasitic infection because of very little exposure to parasites and lack of immunity against them. Parasitic infections in young animals may lead to reduced growth rates as well as increased susceptibility to other diseases. In lactating goats, we may see a decrease in milk production depending on the type and size of the parasite population in the organism.

Eradication of these parasites is impossible, but the simple presence of a parasite in an animal does not indicate disease. In fact, we do not want to completely eliminate all of the parasites because the presence of some parasites will force the animal to build up specific immunity against them.

The internal parasites of most relevance in California are the gastrointestinal parasites, specially roundworms and 2 types of protozoa: coccidia and cryptosporidia. Understanding of the life cycle of these parasites is necessary to control them most effectively using certain drugs and adequate management practices.

The adult parasite lives in the host's gastrointestinal tract and produces eggs (roundworms) or oocysts (coccidia and cryptosporidia) in large numbers that are then passed in the manure. In the environment, these eggs and oocysts develop to the infective stage of larvae and sporocysts, respectively. Once they are infective, they need to be ingested by the goat to complete the life cycle. Goats ingest these parasites while they are on pasture or even when they are confined in barns or dry-lots (contamination of the environment and water and feed sources).

In the environment, these parasites will develop in warm and wet conditions (most suitable for survival). In California, parasitism is more of a problem in the spring when we have these ideal conditions. However, we do see problems during other times of the year when the weather permits. For example, last year we had unexpected rains in mid-fall and we observed some deaths caused by parasites in some herds where the goats hadn't been dewormed previously.

On the other hand, during our summer, when the weather is normally hot and dry, the number of infective larvae and sporocysts in the environment are most likely to be low.

Some types of roundworms have developed a strategy called "hypobiosis" or "arrested development" for surviving environmental stresses. In hypobiosis, infective larvae consumed by the host during periods of environmental adversity remain voluntarily dormant and progress to adulthood only when environmental conditions favor survival of eggs or larvae outside the host. During this time, the worms are metabolically very inactive and quite resistant to treatment. In regions of cold winter,

larvae are conditioned to arrested development in late autumn. When spring comes, the dormant worms become active again, resulting in a rise in the number of eggs excreted. In regions of hot, dry summer, larvae are conditioned to arrested development in late spring.

In general, the outcome of disease will depend on the interaction of several factors: host resistance, severity of infection, types of

parasites involved and the administration of appropriate treatment.

Diagnosis

The table below shows some characteristics of goats' infections by coccidia, cryptosporidia and nematodes (roundworms) of the gastrointestinal tract.

DISEASE	AGE OF AFFECTED ANIMALS	CLINICAL SYMPTOMS
Coccidiosis	Highest incidence: kids between 3 weeks to 5 months of age	<u>Subclinical form</u> : poor growth, weight loss or loss of fecal pellet formation. <u>Clinical form</u> : decreased appetite, apathy, and weakness. The feces may first be unpeleted, then pasty, and then a watery yellowish-green to brown diarrhea (blood may be seen).
Cryptosporidiosis	Usually kids younger than 3 weeks of age	Acute watery diarrhea (white to yellow). In addition to diarrhea, kids may show depression, loss of appetite, and a rough hair coat.
Nematodiasis (Roundworms)	Usually kids after weaning and adults	Gradual and progressive loss of condition, poor growth, a dull attitude, and decrease in feed intake. Dark green to black diarrhea may occur in more severe cases. Chronically infected animals may develop intermandibular edemam and a rough and dry hair coat as well as a flaky skin. Anemia is only pronounced with blood feeding parasites such as <i>H. contortus</i> .

It is important to keep in mind that there are other diseases caused by bacteria and viruses that have symptoms like the ones presented in this table.

Diagnosis of coccidiosis, cryptosporidiosis and nematodiasis can be made based on clinical signs and fecal microscopic examination. Therefore, if your goats are experiencing symptoms similar to the ones described above, we encourage you to take some fecal samples of sick animals (for identification of eggs or oocysts) and, if possible, submit dead animals for necropsy. The California Animal Health and Food Safety Laboratory (CAHFS) in Tulare performs both fecal exam and necropsy. The necropsy may be fundamental to confirm or determine the cause of an animal's death,

especially in situations when the body shows signs of multiple infections. The result of a necropsy may also give you valuable information about possible treatments that could save the life of other affected goats in your herd. At CAHFS in Tulare (559 688-7543), necropsy of 3 animals less than 3 months of age have the same cost as the necropsy of 1 adult animal (\$75 as of May 2006).

Prevention and Control

Effective control of these parasites will make a significant contribution to your goats' health and well-being. An internal parasite control program has to be customized to each herd, taking into consideration the past parasitic problems, housing facilities, and climate information.

Independent of what parasite may be affecting your goats' health, you should remember that parasite control starts with good management and use of common sense.

Below are listed some general management practices that you should consider:

- Good sanitation practices:
 - Water should always be clean and free from fecal matter.
 - Feed should not be fed on the ground. Feeders that minimize waste and contamination should be used. Avoid poorly designed feeders in which goats can stand, climb or defecate.
 - Floors should be scraped frequently.
 - Good drainage of the areas where the goats are kept. Make sure that your watering system doesn't leak or overflow. Don't forget: environmental moisture will benefit the proliferation of parasites.
 - Clean and disinfect the pens where the kids will be introduced. Most disinfectants do not work well against coccidia and cryptosporidia; steam cleaning or a 10% ammonia solution are the best methods to kill coccidia.
 - Colostrum should be fed in clean nipple bottles.
 - The use of bedding for kids is recommended. Clean bedding should regularly be provided.
 - Flies can mechanically carry coccidia and cryptosporidia from one place to another. Therefore, insect control is also important to prevent coccidiosis and cryptosporidiosis.
- Pens and pastures should not be overcrowded.
- Segregate kids by age.
- All new arrivals to the farm should be isolated for at least 30 days.
- Isolation of sick animals may help prevent the spread of diseases.
- Offer a balanced diet to your animals. Nutrient deficiency may impair the ability of the animal to build a good immunity system.

- Minimize the stress of the weaning period. Kids should have access to grain and forage well in advance of weaning.

Control of Coccidiosis

Coccidiosis control can be achieved by the combination of good management and hygiene practices with the use of coccidiostats. Coccidiostats do not prevent infection, but instead reduce the rate of growth of the parasite in the intestines. This allows the kids to develop natural immunity to the coccidia without severe disease. In addition, the use of coccidiostats will reduce the number of additional cases of coccidiosis in a group of animals at risk. The only coccidiostatic licensed for nonlactating goats is decoquinate (Deccox®, Alpharma). It has a wide margin of safety for goats. Goats that survive a disease outbreak are usually immune to future problems.

Control of Cryptosporidiosis

There are no drugs available for the control of cryptosporidiosis. A very important aspect of this disease is that it can be transmitted to humans. In addition to isolation of sick animals and good sanitation practices, employees handling diarrheic kids should not handle healthy kids. Hands must be washed and disinfected thoroughly after handling sick animals.

Control of Nematodiasis (Roundworms)

Anthelmintics or dewormers are the most common method for controlling roundworms. In order to be effective they must be applied properly. Unfortunately, parasites have become increasingly resistant to many of the anthelmintics. As a result, producers can no longer rely on anthelmintics alone to control parasites in their herds. A more integrated approach, with the adoption of management practices that minimize the exposure of parasites, is necessary.

There are many drugs available on the market to treat worms. Some are more effective than others. The choice of drug depends on experience and worm resistance. There are very few products approved by FDA for use in goats. Drugs that are not FDA approved for use in goats require a prescription by a licensed veterinarian.

The major modern dewormers are grouped in 3 families. It is important to remember that once worms become resistant to one dewormer, they will be resistant to the other dewormers of the same family group. If you are rotating dewormers annually, it is fundamental to

consult this table before you make your choice of the next dewormer. Never choose a dewormer belonging to the same drug family of your previous dewormer.

The table below lists some drugs that are used as dewormers.

Drug Ingredient	Drug Family	Trade Name	Approved Species	Efficacy Against
Albendazole	Benzimidazole	Valbazen®	Cattle Sheep	Roundworms Lungworms Tapeworms Adult liver fluke
Fenbendazole	Benzimidazole	Safe-Guard® Panacur®	Cattle Non-lactating goats Horses Swine	Roundworms Lungworms Tapeworms
Oxfendazole	Benzimidazole	Synanthic®	Beef Non-lactating dairy cattle	Roundworms Lungworms Tapeworms
Levamisole	Imidazothiazole/ Tetrahydropyrimidine	Tramisol® Levasole®	Cattle Sheep	Roundworms Lungworms
Morantel	Imidazothiazole/ Tetrahydropyrimidine	Rumatel®	Cattle Goats	Roundworms
Moxidectin	Macrocyclic Lactone	Cydectin®	Beef Non-lactating dairy cattle	Roundworms Lungworms External Parasites
Doramectin	Macrocyclic Lactone	Dectomax®	Cattle Swine	Roundworms Lungworms External Parasites
Ivermectin	Macrocyclic Lactone	Ivomec®	Beef Swine Sheep	Roundworms Lungworms External Parasites

Source: Product labels and FDA Approved Animal Drug Products Database System @ <http://dil.vetmed.vt.edu/>.

Refer to the drug manufacturer for drug dose and withdrawal time. Consult your veterinarian for prescription and extra label use information of non-FDA approved drugs.

A good way to start your roundworm control program is to utilize the fecal egg count method. Fecal egg counts can help to:

- Identify the type of roundworm your animals have
- Estimate the severity of the infection
- Determine if it is the correct moment to deworm your goats. Instead of examining the feces of your whole herd, you may examine the manure of 5-10% of all goats. If one goat of your group sample has more than 500 eggs/gram manure, then it is time to treat the herd.
- Select more appropriate drugs to decrease the parasite population
- Monitor the effectiveness of your deworming program or, in other words, determine anthelmintic resistance. In this case, a fecal egg count should be done just before deworming and 10-14 days afterwards. If the anthelmintic kills 90 percent or more of the worm eggs, it is considered to be effective. If it kills 60 to 90 percent of worm eggs, it is considered to have a moderate level of resistance. Anthelmintics killing less than 60 percent of worm eggs are considered to have severe resistance.

Also, consider the following recommendations to implement your own deworming program.

- New goats may bring resistant parasites with them. Never mix new animals with residents without deworming them first. The new arrivals should be kept isolated for at least a week after deworming before introduction to the herd.
- The most important time to deworm goats in California is at kidding season (there is moisture and temperature is starting to get warmer). This deworming will reduce the number of eggs that the doe sheds into her environment that could potentially infect her newborn kids.
- Goats tend to pick up fewer roundworms during the hot and dry summer months because the larvae cannot survive for long without

moisture. However, treatment during mid-summer is important to destroy hypobiotic (dormant stage) larvae in the host. Use anthelmintics that are effective against hypobiotic larvae (ivermectin, doramectin, moxidectin, fenbendazole and oxfendazole).

- Other strategic times to treat with anthelmintics is prior to moving animals to a safe or "cleaner" pen.
- For dewormers to be effective, it is important to correctly estimate the weight of the animals. In a group of animals, calculate dose for the heaviest animal. Underdosing is a problem that can lead to parasite drug resistance. A slight overdose on smaller animals is generally not harmful due to the large margin of safety of most dewormers.
- Regularly check that dosing equipment is functioning properly to insure proper dosage.
- Rotate dewormers on an annual basis or when a resistance develops. The longer the worms are exposed to a drug, the more likely it is that resistance will develop.
- Regardless of product choice, oral dosing is the recommended route of administration.
- The need to use dewormers can be reduced if the parasite burden can be kept to a minimum, and by keeping the goats on well-managed dry lots or uncontaminated pastures.
- Do not use a different product each time your goats are dewormed. This ensures that each generation of worms is only exposed to one drug at a time, so that if a generation of worms has the potential to develop resistance it will only develop resistance to one drug and not several during the same time period.
- Drugs to which worms have developed a resistance should be eliminated from the deworming program on that farm for at least two full years. Then it should be safe to use these products again.
- Anthelmintics in which widespread resistance has been reported may still be effective for your farm.

Treatment

When clinical signs of disease become apparent, the damage to the intestines and/or stomach has already been done. Recovery is not immediate and some animals may need several days until they show some signs of recuperation. Special attention must be paid to ensure that the affected animals continue to eat and drink. An electrolyte solution should be given by stomach tube. Kids with diarrhea should drink about 15-20% of their body weight a day.

Animals should be kept in quiet conditions of confinement with food (good quality forage hay with a gradual supplementation of concentrate) and water provided.

Coccidiosis

Coccidiostats do not kill the coccidia, but rather inhibit their reproduction capabilities. By stopping the ability of the protozoa to reproduce, time is allowed for the kid's own immunity to develop and remove the organisms.

Coccidiosis is treated with sulfa drugs and amprolium (Corid®). With the use of amprolium, coccidia experience thiamin deficiency and starve from malnutrition. Amprolium is not FDA approved for use in goats and you will need to consult your veterinarian for prescription and general information about this product. Sulfa drugs will only prevent secondary infections by other organisms to occur.

Fluid therapy is also recommended.

Cryptosporidiosis

No drugs have been reported effective for the treatment of cryptosporidiosis. The principal treatment is fluid therapy. Diarrheic kids should receive a balanced electrolyte solution according to the degree of dehydration.

The volume of milk fed to kids should be reduced while the frequency of feeding increased.

Nematodiasis (Roundworms)

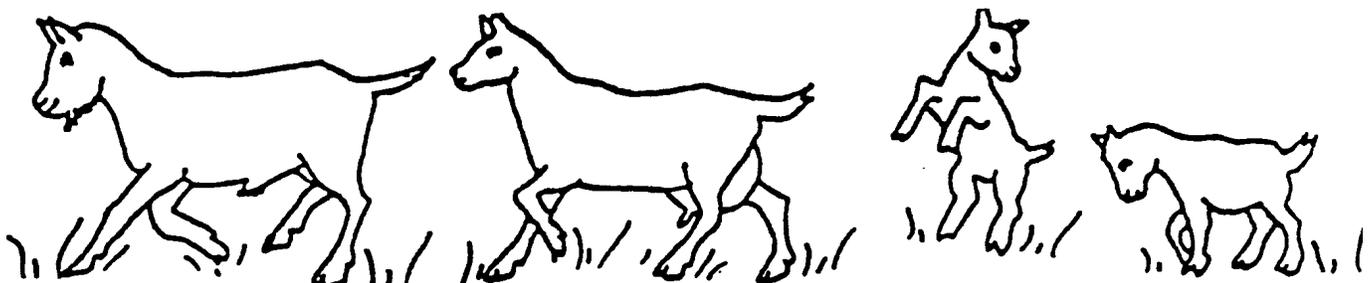
Affected goats require fluid therapy and anthelmintic treatment (deworming). The use of anthelmintic of low toxicity (thiabendazole, fenbendazole, ivermectin) is highly recommended in severe cases.

In anemic goats, administration of iron as iron dextran will stimulate the production of red blood cells in the blood.

Conclusion

Recognizing infection with these parasites and knowing how to prevent and treat infection caused by them, is important to any goat owner wishing to maintain animals with optimal health. Goat owners need to be aware of how to reduce the potential of these parasites becoming resistant to currently available drugs.

Prevention, rather than cure, is the key in developing control programs against internal parasites. It should be assumed that worms cannot be eradicated, but infections can be limited to the extent that they will not cause economic loss to the producer.





University of California Cooperative Extension
Humboldt County
5630 South Broadway
Eureka, CA 95503
(707) 445-7351 (phone)
(707) 444-9334 (fax)



Commercial Goat Milk Producers' Workshop

June 6th, 2006

SHONE FARM CLASSROOM of the SRJC,
North of Santa Rosa at Forestville, CA
(see map)

9:00	<i>Registration : Coffee and bagels</i>
9:15-9:20	<i>Introductions & Program Overview - Peter Robinson, UCCE Specialist, Davis</i>
9:20-9:30	<i>Overview of Goat Milk Industry in California</i>
9:30 – 10:30	<i>Dairy Goat Nutrition Steve Hart, USDA Langston, Oklahoma</i>
10:30 – 11:00	<i>Milk Quality - what is different about goat milk? - Debora Bacon, UCCE Farm Advisor</i>
11:00 – 11:15	BREAK
11:15 – 11:45	<i>Cost Study and Business Planning for Ranches - Karen Klonsky, UC Davis</i>
11:45- 12:30	<i>DHIA Records in Commercial Herd Management- Bill VerBoort, CDHIA</i>
12:30 – 1:30	LUNCH (Provided) There will be several displays by local service providers
1:30 – 2:15	<i>Nutrition Software - How to use the software to determine your feed ration- Steve Hart, USDA Langston, Oklahoma</i>
2:15 – 2:45	<i>Good Food Manufacturing Practices - Barbara Reed, UC Dairy Advisor</i>
2:45 – 3:00	<i>Goat dairies in Portugal and Spain- Filipa Sacadura</i>
3:00 - 3:15	<i>Producer Association - Benefits to small business owners</i>
3:15 – 3:45	<i>Using lights for off season breeding and year round milk production- Scott Bice</i>
3:45 depart	Drive to St. Helena for tour and discussions at Goat's Leap Cheese - a vertically integrated operation with goats, dairy and cheese manufacturing
4:30 - 5:30	Tour of Ranch - Rex Backus
6:00	Dinner for speakers

For questions or more information please call Deborah Giraud at 445-7351.

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**UC Cooperative Extension
680 N. Campus Drive, Suite A
Hanford, CA 93230**

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Debora Bacon
Dairy Farm Advisor, Tulare Co.

Carol Collar
Dairy Farm Advisor, Kings Co.

Gerald Higginbotham
Dairy Farm Advisor, Fresno Co.