



Pixel-Shot/shutterstock.com

Abstract

This article serves as a general guide to treating sheep, goats, and camelids; it includes an overview of husbandry practices, common disorders, recommendations on when to refer, and a formulary. All small ruminants and camelids require appropriate diets, husbandry, and preventive health management as core components of their care. According to U.S. Food and Drug Administration terminology, small ruminants are a minor species. Many of the drugs referenced in this article are not approved for use in these food-producing species, and knowledge of extra-label drug use regulations in these species is imperative. Contacting the Food Animal Residue Avoidance Databank for withdrawal interval advice is highly recommended when using drugs in these species.



CONTINUING EDUCATION

PREVENTIVE MEDICINE

The General Practitioner's Guide to Small Ruminants and Camelids

Brittany N. Diehl, DVM, MS

University of Florida College of Veterinary Medicine, Gainesville, Florida

Small ruminants, specifically sheep and goats, were among the first animals to be domesticated. Sheep and goats are primarily used as a source of meat, milk, and fiber, yet they are small and versatile enough to also be considered pets.¹ Nonetheless, in terms of veterinary care for sheep and goats, these species are considered food animals and should be treated as such in accordance with veterinary law.

Camelids (e.g., llamas, alpacas, vicuñas) are considered pseudoruminants because of their 3-chamber stomach that is different from the 4-chamber stomach of ruminants. Their classification as food animals is less clear because they typically do not enter the food chain in the United States. It is the veterinarian's responsibility to ensure proper guidelines for drug administration are followed.

Few products are labeled for small ruminants and camelids, further complicating the decision-making process (**TABLES 1 AND 2**). For example, in the United States, the only injectable antimicrobials currently approved by the U.S. Food and Drug Administration for use in small ruminants are penicillin G procaine (approved for use in sheep but at an inadequate dose), ceftiofur sodium (for sheep and goats), and tilimicosin (for sheep). The Animal Medicinal Drug Use Clarification Act of 1994 and extra-label drug use regulations for these species describe requirements for veterinarians who work with them.⁵

HUSBANDRY PRACTICES

Husbandry practices for small ruminants, specifically sheep and goats, vary widely

Take-Home Points

- Because of a lack of approved drugs by the U.S. Food and Drug Administration for small ruminants and camelids, extra-label drug use is necessary.
- The minimum core vaccine requirement for small ruminants and camelids includes *Clostridium perfringens* types C and D and *Clostridium tetani*.
- The most common health concern affecting small ruminants is anemia secondary to *Haemonchus contortus* infection.
- The most common urinary tract disease in small ruminants is urolithiasis in males.

according to the client's goals and animal's purpose (i.e., pet or production animal).

Vaccination

Standard vaccine recommendations for sheep, goats, and camelids are an initial booster vaccine series as lambs/kids/crias, followed by an annual booster for protection against *Clostridium perfringens* types C and D and *Clostridium tetani* (often referred to as a combination "CD/T" vaccine). A newborn birthed from a dam with an unknown or no vaccination history should receive an initial vaccine or antitoxin at 2 to 3 days of age, then a booster vaccine 3 to 4 weeks later; a third booster 3 to 4 weeks later can also be considered. The initial series should be followed by an annual booster for all adults.

For breeding females, consider administering the annual vaccine booster 4 to 6 weeks before parturition. If the dam is vaccinated before parturition, lambs/kids/crias can receive an initial vaccine at 4 to 6 weeks of age, a booster vaccine 3 to 4 weeks later, then an annual booster vaccine. Rabies vaccines are often recommended for camelids, depending on their likelihood of exposure.

Numerous other vaccines may be given to sheep, goats, and camelids but are not broadly recommended unless certain risk factors are present. Those risk factors are associated with the likelihood of flock/herd exposure and if a disease is endemic to that region or known to be present within a flock/herd. Many vaccines are not approved for use in these species; thus, extra-label administration must be utilized.

TABLE 1 Drug Formulary for Small Ruminants and Camelids

DRUG	DRUG USE (EXTRA LABEL)	DOSAGE			WITHDRAWAL TIME ^{a,b}
		SHEEP ²	GOATS ²	CAMELIDS ^{3,4}	
Acepromazine maleate	Sedative	0.05–0.1 mg/kg IM	0.05–0.1 mg/kg IM	0.04–0.1 mg/kg IM, 0.01–0.02 mg/kg IV	Consult FARAD
Butorphanol	Sedative, analgesia	0.2–0.5 mg/kg IM or SC	0.2–0.5 mg/kg IM or SC	0.1 mg/kg IV, IM, or SC	Consult FARAD
Ceftiofur crystalline-free acid	Antimicrobial	6.6 mg/kg SC	6.6 mg/kg SC	6.6 mg/kg SC	Consult FARAD
Ceftiofur sodium	Antimicrobial (camelids)	1–2.2 mg/kg IM q24h	1–2.2 mg/kg IM q24h	4.4 mg/kg SC q24h	0 days meat, 0 hours milk
Dexamethasone	Anti-inflammatory	0.05–0.44 mg/kg IM	0.44 mg/kg IV once	0.05–0.1 mg/kg IM once	Consult FARAD
Epinephrine	Increase cardiac output	0.01 mg/kg IV, IM, or SC	0.01 mg/kg IV, IM, or SC	0.01–0.02 mg/kg IM	Consult FARAD
Florfenicol	Antimicrobial	20–30 mg/kg IM, 40 mg/kg SC	20 mg/kg IM	20 mg/kg IM	Consult FARAD
Flunixin meglumine	NSAID	1 mg/kg IV	2.5 mg/kg IM	1.1–2.2 mg/kg IV	Consult FARAD
Meloxicam	NSAID	1 mg/kg PO	0.5 mg/kg PO	1 mg/kg PO	Consult FARAD
Midazolam	Sedative	0.3–0.4 mg/kg IV, 0.5 mg/kg IM	0.3–0.6 mg/kg IV	0.3–0.5 mg/kg IM or IV	Consult FARAD
Oxytetracycline (long acting)	Antimicrobial	20 mg/kg SC	20 mg/kg SC	10–20 mg/kg SC	Consult FARAD
Penicillin G procaine	Antimicrobial (sheep, not approved for goats)	10 000–50 000 IU/kg IM q24h	10 000–50 000 IU/kg IM q24h	20 000 IU/kg SC q12h	Consult FARAD

FARAD=Food Animal Residue Avoidance Databank; NSAID=nonsteroidal anti-inflammatory drug.

^aCamelids are not considered food animals in the United States; withdrawal times are for drugs approved by the U.S. Food and Drug Administration for use in sheep and/or goats as indicated.

^bConsulting FARAD (www.farad.org) is recommended for advice on extra-label drug use withdrawal intervals.

Hoof Trimming

Sheep, goats, and camelids should undergo regular hoof trimming; frequency is influenced by genetics, diet, and environment. A routine hoof trim is recommended at least 1 to 2 times per year, and more often for those with lameness or pathology.

Diet

Nutrition is a complex point of consideration for sheep, goats, and camelids. The most reliable source for guidance on feeding small ruminants is the most recent version of *Nutrient Requirements of Small Ruminants* by the National Research Council.⁶ All 3 species are primarily foragers, yet other nutritional and mineral requirements are determined by life stage.

Production animals require specific diets that must be adjusted during phases of growth, reproduction, and lactation. Alternatively, pets require less intensive dietary management because production phases do not apply. Pets can generally be fed a basic maintenance diet.

Trace minerals should be supplemented according to species-specific needs. Sheep and camelids are sensitive to excess copper; therefore, dietary copper supplementation should not exceed toxic levels.⁷

Water, which is commonly overlooked, is the most essential nutrient. Water intake should be adjusted according to an animal's dry matter intake and life stage. Maintenance requirements for water intake increase with pregnancy, lactation, growth, and heat stress.⁶

Dental Health

Dental health of sheep and goats is not routinely evaluated. However, for camelids, routine dental examinations are advised to detect and prevent dental disease. Note that the routine floating of sharp enamel points that is recommended for equids is *not* advised for camelids.⁸ The primary pathology of dental disease in camelids, specifically tooth root abscesses, often occurs at the cheek teeth and, to a lesser extent, the incisors and canine teeth.⁹

TABLE 2 Antiparasiticide Formulary for Small Ruminants and Camelids

TRADE NAME (MANUFACTURER)	INGREDIENT	FDA APPROVAL	DOSAGE			WITHDRAWAL TIME ^{b,c}
			SHEEP ²	GOATS ²	CAMELIDS ^{3,4}	
Cydectin (Elanco)	Moxidectin	Sheep	0.2 mg/kg PO	0.4 mg/kg PO	0.4 mg/kg PO	7 days for sheep meat; consult FARAD for goats
Ivomec (Boehringer-Ingelheim)	Ivermectin	Sheep	0.2–0.3 mg/kg PO	0.2–0.3 mg/kg PO	0.2 mg/kg PO	11 days for sheep meat (label dose); consult FARAD for goats
Prohibit (Huvepharma)	Levamisole	Sheep	8 mg/kg PO	8 mg/kg PO	5–8 mg/kg PO	3 days for sheep meat; consult FARAD for goats
Valbazen ^a (Zoetis)	Albendazole	Sheep	10 mg/kg PO	20 mg/kg PO	5–10 mg/kg PO	1 day for sheep meat; consult FARAD for goats
Safeguard (Merck)	Fenbendazole	Goats, but appropriate dose is ELDU	10–20 mg/kg PO	10–20 mg/kg PO	5–15 mg/kg PO	Consult FARAD
Corid (Huvepharma)	Amprolium	ELDU	50 mg/kg PO q24h for 5 days	50 mg/kg PO q24h for 5 days	5 mg/kg PO q24h for 21 days	Consult FARAD
Albon (Zoetis)	Sulfadimethoxine	ELDU	50 mg/kg PO q24h for 5 days	50 mg/kg PO q24h for 5 days	—	Consult FARAD

ELDU = extra-label drug use; FARAD = Food Animal Residue Avoidance Databank; FDA = Food and Drug Administration.

^aValbazen has a narrow margin of safety. Do not use in crias < 6 months of age, and do NOT use in pregnant animals.

^bCamelids are not considered food animals in the United States; withdrawal times are for drugs approved by the FDA for use in sheep and/or goats as indicated.

^cConsulting FARAD (www.farad.org) is recommended for advice on ELDU intervals.

COMMON HEALTH CHALLENGES

Obesity

Obesity is a common problem in pet sheep and goats, and owners should be educated about diet and appropriate body condition. Body condition score (BCS) can be used to monitor an animal's body reserves and track changes over time. BCS of sheep and goats is measured on a 5-point scale with 0.25, 0.5, and 0.75 being used between whole numbers. An emaciated animal has a BCS of 1, and an obese animal has a BCS of 5. An ideal BCS ranges from 2.75 to 3.5, depending on an animal's life stage and energy demands. BCS should not be determined solely by visualization; it should be determined by visualization and palpation of the dorsal lumbar region to assess fat and muscle deposition along the animal's topline.

Obesity is also a problem in camelids and can lead to excess fat infiltration of the liver. Conversely, camelids are predisposed to hepatic lipidosis after extreme or chronic weight loss.

Obesity is also a problem in camelids and can lead to excess fat infiltration of the liver. Conversely, camelids are predisposed to hepatic lipidosis after extreme or chronic weight loss.

Gastrointestinal Parasitism and Anemia

Gastrointestinal parasitism is the most significant health issue in small ruminants with its inestimable effects on production through treatment costs (including additional necessary treatment for anthelmintic resistance), ill thrift (poor doers), and fatalities. The most effective way to assess gastrointestinal parasites is to run a modified McMaster fecal egg count (FEC), which identifies and quantifies parasite burden.¹⁰ Treatment effectiveness can be monitored with a fecal egg count reduction test (FECRT) 10 to 14 days after anthelmintic administration.¹⁰ More information about conducting a modified McMaster FEC is available at go.navc.com/3WXZrKK.

Pathogenic Nematodes

The most important clinical disorder of sheep and goats is anemia, of which gastrointestinal parasitism with *Haemonchus contortus* worms is the most common cause.¹¹ Anemia can be presumed if the animal has pale mucous membranes, specifically the conjunctiva. Conjunctiva color is evaluated by using the Faffa Malan Chart (FAMACHA) scoring system go.navc.com/4cmFkKP.^{12,13} In addition to conjunctiva pallor, signs of anemia include weakness, lethargy, tachycardia, and tachypnea.¹²

The FAMACHA scoring system has been used for camelids as well. Their clinical signs and scores seem to mirror those of sheep and goats; however, FAMACHA scoring for camelids is much more challenging because of difficulties handling the animals and differences in mucous membrane pigmentation.¹³

Regularly scheduled assessments of FAMACHA scores, ideally every 2 to 4 weeks, are recommended for sheep, goats, and camelids. Records should document FAMACHA scores as well as any clinical findings.

Protozoa

Eimeria infections, especially in camelids, can be a major problem. Gastrointestinal parasitism with *Eimeria* species, also known as coccidiosis, can cause anemia in addition to hypoproteinemia and failure of young or immunocompromised animals to thrive.

Coccidiosis can be classified as either clinical or subclinical. Clinical signs range from none (in acute cases) to severe diarrhea, weight loss, and lethargy. A diagnosis of coccidiosis can be made with an FEC. Prompt treatment is critical to ensure that the animal's intestinal lining is not permanently damaged.

Treatment

Extensive multidrug anthelmintic resistance worldwide necessitates proper and judicious use of anthelmintics. Determining which anthelmintic is appropriate must be done at the individual farm/ranch level through routine use of FECRTs. In the United States, the most commonly used anthelmintics belong to 1 of 3 classes: benzimidazoles, membrane depolarizers, or macrocyclic lactones. Rotational use of anthelmintic products is no longer recommended and will upregulate the development of resistance. Targeted treatment strategies are critical for maintaining refugia within a population.¹⁴

The decision to deworm an animal should be based on its FAMACHA score, FEC, and clinical signs of anemia. Small ruminants should not receive anthelmintics via injection; these products should be administered via the oral route only (**TABLE 2**). The American Consortium for Small Ruminant Parasite Control (wormx.info) has recommendations for small ruminant parasite management.

Typically, anticoccidial drugs for small ruminants are administered as a 5-day treatment regimen of sulfadimethoxine (Albon; Zoetis, zoetisus.com) or amprolium (Corid; Huvepharma, huvepharma.us). It is important to note that amprolium contains a thiaminase, which can induce polioencephalomalacia if the animal is slightly deficient in thiamine (vitamin B₁). Therefore, precautionary thiamine administration should be considered before treatment.

Treatment of anemia should focus on the primary cause, yet a whole-blood transfusion may also be indicated for patients with a hematocrit of 12% or lower. More than 1 transfusion may be necessary because the half-life of transfused red blood cells ranges from 5 to 20 days, depending on the source of red blood cells.¹⁵

Other management strategies for mitigation of parasite load include appropriate pasture management and rotation, feeding tannin-rich forages, and maintaining records of necessary data to make management decisions.

Urolithiasis

Urolithiasis is a common health problem in sheep and goats and primarily affects males.¹⁶ The stone composition is predominately calcium apatite or calcium phosphate, yet struvite calculi are common as well.¹⁷ An obstruction secondary to calculi can form in the urethra of castrated and intact males, typically at the urethral process and/or sigmoid flexure.¹⁸

Many factors influence the development of urolithiasis, including diet, age, sex, breed, and water intake.¹⁹ A common predisposing factor is consumption of grain, followed by excess urinary phosphorus excretion. Another common predisposing factor in pet sheep and goats is obesity.

When calculi form in the urinary bladder, the animal often remains asymptomatic; however, when calculi migrate to the urethra, they can cause partial or

complete obstruction of urinary flow.²⁰ Clinical signs are variable and tend to progress as the severity of obstruction intensifies and include those of discomfort (e.g., vocalizing, restlessness, frequent posturing or straining to urinate). An animal may exhibit nonspecific signs such as poor appetite and lethargy. Obstruction can result in rupture of the bladder or urethra.

Urolithiasis is a common health problem in sheep and goats and primarily affects males.¹⁶

Numerous factors determine the available treatment options, such as the clinician's expertise, the client's goals and finances, and the patient's response to treatment. Initial evaluation should include physical examination, basic laboratory testing (i.e., complete blood count and chemistry), intravenous catheter placement, fluid therapy as indicated, diagnostic imaging, and cystocentesis or temporary percutaneous urinary bladder catheterization.²⁰ Often the first treatment effort to resolve the obstruction is urethral process amputation, which can be performed in the field. If urethral process amputation does not resolve the obstruction, further evaluation and surgical intervention may be performed either by the general practitioner or at a referral hospital.

Urolithiasis cases are often expensive and unrewarding. Thus, clients should be informed of the value of preventing and need to prevent urinary calculi. Paramount is minimizing grain concentrate and maximizing forage intake for male small ruminants. To limit phosphorus availability, the calcium:phosphorus ratio of the ration should be maintained from 1:1 through 2:1. Management strategies to maximize water intake also help prevent urolithiasis.

SUMMARY

The variability in management practices and veterinary care of small ruminants and camelids is extensive. Many more management considerations and health challenges exist than are discussed in this article. Client education on conscientious husbandry and

management techniques is immeasurably beneficial. Extra-label drug use is necessary for most patients, with attention to withdrawal periods for food animal species.

Brittany N. Diehl

Dr. Diehl is a clinical assistant professor and the small ruminant extension specialist at the University of Florida College of Veterinary Medicine. She earned her Bachelor of Science degree in animal and nutritional sciences at West Virginia University in 2015. In 2019, she received her DVM degree from Virginia-Maryland College of Veterinary Medicine at Virginia Tech. She then completed an internship, Master of Science degree, and residency at the University of Florida College of Veterinary Medicine in the food animal reproduction and medicine service. She is involved in production-based ram and buck performance testing, primarily with regard to parasite resistance and growth parameters. Her research focuses on clinical applications of small ruminant parasitology and theriogenology.



The popularity of small ruminants and camelids is increasing and, along with it, the need for general practice veterinarians to be familiar with their husbandry and treatment. **TVP**

References

1. Walker EL, Hudson MD. Species of meat animals—sheep and goats. In: Dikeman M, Devine C, eds. *Encyclopedia of Meat Sciences*. 2nd ed. Academic Press; 2014:374-379.
2. Pugh DG, Brown KR, Fajt VR. Appendix 1: commonly used drugs and veterinary feed directive in sheep, goats, and cervids. In: Pugh DG, Baird AN, Edmondson M, et al, eds. *Sheep, Goat, and Cervid Medicine*. 3rd ed. Elsevier; 2020:518-524.
3. Aarnes TK. Anesthesia and pain management. In: Niehaus AJ, ed. *Medicine and Surgery of Camelids*. 4th ed. John Wiley & Sons, Inc.; 2022:160-173.
4. Cebra CK, Cebra ML. Antimicrobial drug use in New World camelids. In: Giguere S, Prescott JF, Dowling PM, eds. *Antimicrobial Therapy in Veterinary Medicine*. 5th ed. John Wiley & Sons, Inc.; 2013:541-551.
5. Bowen JS, Snyder J. Ethical responsibilities of small ruminant veterinarians in selecting and using therapeutics. In: Anderson DE, Rings DM, eds. *Food Animal Practice*. 5th ed. Elsevier; 2009:457-460.
6. National Research Council. *Nutrient Requirements of Small Ruminants*. National Academy Press; 2007.
7. Van Saun RJ, Cebra C. Nutritional diseases. In: Cebra C, Anderson DE, Tibary A, et al, eds. *Llama and Alpaca Care: Medicine, Surgery, Reproduction, Nutrition, and Herd Health*. Saunders; 2013:121-139.
8. Niehaus A. Dental disease in llamas and alpacas. *Vet Clin North Am Food Anim Pract*. 2009;25(2):281-293. doi:10.1016/j.cvfa.2009.03.007
9. Proost K, Pardon B, Pollaris E, Flahou T, Vlaminc L. Dental disease in alpacas. Part 1: prevalence of dental disorders and their mutual relationships. *J Vet Intern Med*. 2020;34(2):1028-1038. doi:10.1111/jvim.15741
10. Paras KL, George MM, Vidyashankar AN, Kaplan RM. Comparison of fecal egg counting methods in four livestock species. *Vet Parasitol*. 2018;257:21-27. doi:10.1016/j.vetpar.2018.05.015
11. Johns J, Heller M. Hematologic conditions of small ruminants. *Vet Clin North Am Food Anim Pract*. 2021;37(1):183-197. doi:10.1016/j.cvfa.2020.10.004
12. Kaplan RM, Burke JM, Terrill TH, et al. Validation of the FAMACHA eye color chart for detecting clinical anemia in sheep and goats on farms in the southern United States. *Vet Parasitol*. 2004;123(1-2):105-120. doi:10.1016/j.vetpar.2004.06.005
13. Williamson L, Storey W. FAMACHA system: history and use for control of *Haemonchus contortus*. Presented at: International Camelid Health Conference; March 12-15, 2009; Corvallis, Oregon.
14. Zajac AM, Garza J. Biology, epidemiology, and control of gastrointestinal nematodes of small ruminants. *Vet Clin North Am Food Anim Pract*. 2020;36(1):73-87. doi:10.1016/j.cvfa.2019.12.005
15. Balcomb C, Foster D. Update on the use of blood and blood products in ruminants. *Vet Clin North Am Food Anim Pract*. 2014;30(2):455-474. doi:10.1016/j.cvfa.2014.04.001
16. Haven ML, Bowman KF, Engelbert TA, Blikslager AT. Surgical management of urolithiasis in small ruminants. *Cornell Vet*. 1993;83(1):47-55.
17. Tibary A, Peterson LK, Van Metre DC, Ortved K. Surgery of the sheep and goat reproductive system and urinary tract. In: Fubini SL, Ducharme NG, eds. *Farm Animal Surgery*. 2nd ed. Elsevier; 2017:571-595.
18. Constable PD, Hinchcliff KW, Done SH. Diseases of the urinary system. In: Constable PD, Hinchcliff KW, Done SH, eds. *Veterinary Medicine: A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats*. 11th ed. Elsevier; 2017:1095-1154.
19. Cook MJ. Urinary calculi of small ruminants. *Vet Clin North Am Food Anim Pract*. 2023;39(2):355-370. doi:10.1016/j.cvfa.2023.02.006
20. Mejia S, McOnie RC, Nelligan KL, Fubini SL. Small ruminant urinary obstruction: decision trees for treatment. *JAVMA*. 2022;260(S2):S64-S71. doi:10.2460/javma.22.02.0071



**From large to small,
USB handles it all!**

- Equine
- Bovine
- Caprine
- Porcine
- Ovine
- Canine
- Feline



ONE SYSTEM • ALL PATIENTS

Find out what our USB Endoscopy can do for your mixed practice

endoscopy.com/VetUSB



**endoscopy
support
services, inc.**

Better Products for Better Medicine

endoscopy.com

P: (845) 277-1700

E: sales@endoscopy.com



CONTINUING EDUCATION

The General Practitioner's Guide to Small Ruminants and Camelids

TOPIC OVERVIEW

This article serves as a general guide to treating sheep, goats, and camelids; it includes an overview of husbandry practices, common disorders, recommendations on when to refer, and a formulary. All small ruminants and camelids require appropriate diets, husbandry, and preventive health management as core components of their care.

LEARNING OBJECTIVES

After completing this article, small animal general practitioners should be able to provide basic care to small ruminants and camelids and recognize common health challenges in these species, keeping in mind extra-label drug usage and regulatory withdrawal times for production animals.

This article has been submitted for **RACE approval for 1 hour of continuing education credit** and will be opened for enrollment upon approval. To receive credit, take the test at **vetfolio.com** by searching the name of the article or scanning the QR code below. Free registration is required.

Questions and answers online may differ from those below. Tests are valid for 2 years from the date of approval.



- Both camelids and sheep are sensitive to an excess of the trace mineral:**
 - Copper
 - Zinc
 - Selenium
 - Calcium
- In small ruminants, a hematocrit of ____ or lower is the point at which a blood transfusion should be considered.**
 - 5%
 - 20%
 - 12%
 - 15%
- The excess of which major mineral is commonly responsible for contributing to urolithiasis in male sheep and goats?**
 - Potassium
 - Magnesium
 - Calcium
 - Phosphorus
- In addition to *Haemonchus contortus* worms, which gastrointestinal parasite causes anemia in young lambs and kids?**
 - Moniezia* species
 - Coccidia
 - Strongyloides* species
 - Ostertagia* species
- If administering a drug off label to a food-producing animal, which resource should be consulted to establish the appropriate meat and milk withdrawal time?**
 - U.S. Food and Drug Administration
 - Food Animal Residue Avoidance Databank
 - U.S. Department of Agriculture
 - Applicable state veterinary board
- Routine floating of camelids' teeth is recommended.**
 - True
 - False
- Which of the following is not part of the core small ruminant vaccine?**
 - Clostridium perfringens* type D
 - Clostridium botulinum*
 - Clostridium perfringens* type C
 - Clostridium tetani*
- Which antibiotic label includes sheep and goats with regard to indications for use?**
 - Florfenicol
 - Tulathromycin
 - Oxytetracycline
 - Ceftiofur sodium
- Camelids are considered food animals in the United States.**
 - True
 - False
- Injectable and pour-on cattle anthelmintic products are acceptable to administer to small ruminants.**
 - True
 - False