

## Diet and parasite association (in 15 minutes or less)

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Internal parasitism is the most significant health risk affecting production and causes economic losses for producers. Parasitic infections can cause death, loss of function, poor reproductive performance, depressed weaning weights, decreased milk production, poor fiber/wool/mohair production, etc. Due to the difficulty in parasite control and the widespread resistance to deworming compounds, clinicians should focus their efforts on management, and away from simply ‘deworming’. The clinician should attempt to utilize some of the following management practices:

(1) Employ husbandry and feeding practices that minimize parasite infection. Increasing the intake of dietary protein rich in sulfur-containing amino acids will help prevent clinical signs seen with parasitism particularly in those animals in greatest need. Supplemental soybean meal and energy can improve resilience after animals are dewormed. Providing good forages and meeting protein, energy, mineral and vitamin requirements are critical to maximizing flock or individual goat production. Insuring adequate macro and trace minerals (with emphasis on Ca, P, Zn, Cu, and Se) and allowing access to condensed tannin containing forages will aid in the reduction of internal parasite burdens.

Animals fed to improve health are usually prone to have better resistance and resilience. Providing supplemental protein, particularly with protected protein, improves resistance and resilience. Feeding forages with condensed tannins may help prevent parasitic disease.

Some dietary/herbal modifications of the diet include: Feeding small ruminants sericea lespedeza hay or pelleted sericea lespedeza. Feeding birdsfoot trefoil and sainfoin for  $\approx$  two weeks appears to reduce the fecal egg count (FEC). Feeding 600 mg/kg bw of orange oil emulsion can reduce the FEC by over 90%. Feeding *Albizia anthelmintica* bark has some effect by reducing the FEC by nearly 80% in some studies. *Lippia sioides* essential oil may also reduce the FEC by over 50%. Ethanolic extracts of *Iris hookeriana* rhizome may reduce the FEC by about 45%, whereas feeding *Azadirachta indica* (neem) leaves does not affect FEC when studied. Feeding *Azadirachta indica* seed may reduce FEC by up to 40%.

Rotate pastures, allowing small ruminants access to tannin and/or protein rich forages (legumes); use proper pasture fertilization techniques, and administer dewormers to maximize herd production while minimizing the harmful effects of internal parasites. Animals fed to meet nutritional requirements for optimal growth/production are more prone to have better resistance and resilience.

(2) Identify the goat, sheep, or camelids that need to be dewormed and only treat only those animals. This will help maintain refugia, thus diminishing or slowing the onset of anthelmintic resistance in parasite populations in that flock or herd. (Note: FAMACHA is the most popular of these targeted deworming systems).

(3) Ensure adequate intake of all deworming products by weighing each animal; avoid administering an “average body weight” dose, and properly use administration equipment. Dosing or administering an anthelmintic based on average body weight will result inappropriate drug use by under-dosing some animals over-dosing others.

(4) Check the efficacy of deworming agents yearly via fecal egg reduction testing. When a class of anthelmintic is no longer efficacious, switch to another class.

### Other reading

Pugh DG, Baird AN: Sheep and goat medicine, 2nd ed. Philadelphia: Elsevier; 2011.

Smith MC, Sherman DM: Goat medicine, 2nd ed. Ames (IA): Wiley-Blackwell; 2009

Committee on the Nutrient Requirements of Small Ruminants: Nutrient requirements of small ruminants: sheep, goats, cervids, and new world camelids: animal nutrition series. Washington DC: The National Academies Press; 2007.

