



*The Newsletter for the BEHAVE
Research and Outreach
Program*

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Learning in Utero



In this experiment sheep were fed a control diet of concentrate and alfalfa hay. Ewes in one group were fed a concentrate ration flavored with oregano essential oil from 50 to 130 days of pregnancy.

After birth, lambs were tested at 3, 4.5, 6, 7.5 months of age and offered a choice three foods containing either eucalyptus,

Self-Medication on the Range

Animals adapt to changes in their environment and bodies not only through physiology changes that correct for deviation from homeostasis, but also by engaging in certain behaviors. Thus, a behavior like selecting a food containing a



needed nutrient is no different than the secretion of insulin from the pancreas in response to rising blood sugar levels: both responses restore homeostasis. Behavioral homeostasis has been shown experimentally. Livestock modify their intake and diet selection to rectify nutritional imbalances. Besides balancing nutrient intake, herbivores are faced with other challenges such as disease. If behavioral homeostasis exists, then sick animals should self-medicate with substances that restore their health, even substances that contain no nutrients or could be potentially toxic at high levels like plant secondary compounds.

Parasitism is one of the greatest disease problems in grazing livestock. Controlling parasites with drugs is challenging, particularly in recent times due to the rise in drug-resistant internal parasites. Evidence suggests that parasitized apes use natural plant secondary compounds (PSC) as anti-parasitic agents. Can parasitized domestic sheep and goats also learn to use PSC? If the answer is yes, they could learn to self-medicate with PSCs and eat PSC-rich vegetation, either on rangeland or pasture, when needed, while having other nutritious and safe forages available to meet their nutritional requirements.

In a controlled experiment, lambs with parasites ate more of a supplement containing tannins than non-parasitized animals, even when the supplement was very low nutrients. In contrast, lambs without parasites ate more of the supplement without tannins than parasitized lambs.

In another study, lambs with and without parasites were given a choice of alfalfa and alfalfa mixed with 10% tannin. Lambs with parasites had a greater preference for alfalfa with tannins than lambs without parasites. These differences in preference did not exist before lambs with parasites experienced the positive effects of tannins or later after parasites were killed with drugs.

orange or oregano essential oils. Lambs born to oregano-fed ewes ate more of the oregano-flavored feed during preference tests compared to control lambs.

Lambs without exposure to oregano did not prefer one flavor to another. Total intake of lambs did not differ between groups during all preference tests. Prenatal exposure to oregano essential oil via maternal ingestion drastically influences feeding preferences of lambs till adulthood.

Simitzis, P.E., S.G. Deligeorgis, J.A. Bizelis, and K. Fegeros. 2008. Feeding preferences in lambs influenced by prenatal flavour exposure. *Physiology and Behaviour* 93:529-536.

Photo: BotheredByBees / Foter / CC BY



Collectively, the information above suggests herbivores are "aware" of the presence of parasites infecting their bodies. If herbivores are able to sense their parasitic burdens and if there are anti-parasitic substances in plants, which can potentially provide relief, then parasitized animals should increase their preference for such plants relative to healthy animals.

Besides being aware of their parasitic burdens, a second step of self-medication is that after eating or using a certain medicinal plant, herbivores should experience relief from the upset or discomfort caused by the parasites. Animals are more likely to learn about the benefits of a medicine when they experience illness or discomfort and then eat a medicine or plant that leads to recovery.

How is self-medication knowledge acquired? Individual foraging behaviors are mainly acquired by learning from social models, first from mother, then from peers, and from individual post-ingestive experiences. The spread of the self-meditative behavior within a group seems to be influenced by social models.

Juan J. Villalba and Serge Y. Landau. 2012. Host behavior, environment and ability to self-medicate. *Small Ruminant Research* 103:50-59

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Diet Boost Through Water

Ingesting small amounts of condensed tannins (CTs) by ruminants may improve their productivity, their protein use efficiency, and reduce **1)** the negative impact of gastrointestinal parasites, **2)** bloat, **3)** excretion of urine urea, and **4)** ammonia and methane emissions. Therefore, a reliable method is needed to provide small amounts of beneficial CTs to ruminants eating readily digestible, high-protein forages.

Consuming small amounts of some condensed tannins by ruminants can provide nutritional, environmental and economic benefits. Crude extracts of quebracho or black wattle tannin are not readily ingested by cattle or sheep when these tannins are added to water.



Researchers conducted a trial to determine if cattle and sheep would learn to prefer water containing purified grape seed tannin (GST). Cattle and sheep were fed a base diet of alfalfa pellets. Animals were offered increasing amounts of GST in water for 15 (sheep) or 20 days (cattle). Both sheep and cattle learned preferred water with GST over plain water.

This preference developed more quickly for sheep than for cattle. For

sheep, mean daily intake of water alone and tannin solutions was 0.6 and 6.1 L, respectively. For cattle, intake of water and tannin solutions were similar for the 10 days of first half of the trial and 10.8 and 26.1 L in the remaining 10 days.

Compared with other tannin solutions, cattle and sheep drank more of the solution with the highest tannin concentration than of plain water on more trial days. Ingestion of the solution with the highest concentration of GST reduced blood plasma urea concentrations in cattle by 9% to 14% compared to water alone. Providing GST and perhaps other CTs via drinking water may be a practical way to introduce CTs into sheep and cattle diets.

References

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Sincerely,



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