



Solutionsⁿ Caliber³: What are tannins and what do they do?

Product Description:

Solutionsⁿ Caliber³ is a proprietary blend of condensed and hydrolysable tannins and essential oils that positively affect rumen fermentation when fed at low inclusion rates as well as reduce effects of internal parasites and pathogenic organisms (both bacteria and protozoa) in ruminant animals. Caliber³ is specifically formulated for small ruminants.

Background:

- Secondary plant metabolites (tannins, saponins, and essential oils) exist in plants in low concentrations and act as their natural defense mechanism against pathogens.
- Secondary does not mean less important or non-essential to a plant. Rather, primary metabolites are involved in cell growth while secondary metabolites contribute to the resistance of pests, diseases, and stressors and as attractants of pollinators. Feeding **Solutionsⁿ Caliber³** is a way to take advantage of these functions in animals.
- **Solutionsⁿ Caliber³** reduces urinary N excretion and methane production (a greenhouse gas), which both effects are environmentally friendly.
- Tannins and essential oils are naturally effective against many common internal parasites and pathogenic organisms (both bacteria and protozoa).

The Science:

- There are huge differences in structures of tannins. Generic classifications of tannins (e.g. condensed vs. hydrolysable) doesn't adequately explain differences in effects from tannins

- Tannins **mitigate methane production** (a waste gas of fermentation) and improve amino acid supply to the lower gut.
- Reduction in methane production by tannins is related to modification of the rumen microbial population.
- Tannins complex with proteins allowing **more true protein to escape fermentation** and reduces frothy bloat from soluble proteins.
- Meta analysis with sheep clearly shows that low doses of tannins fed for extended days improves animal performance (ADG, DMI, and F/G).
- Hydrolysable tannins exhibited bactericidal activity against *E. coli* O157:H7 which is **important for food safety.**
- Tannins act as an anti-virulent inhibitor against salmonella which means the mode of action involves signaling or interference with quorum sensing rather than killing the bacteria.
- Tannin-containing forages have decreased coccidiosis. Tannins fed with a total mixed ration to late gestation and early lactation beef cows has been reported from field experience to reduce coccidiosis and cryptosporidiosis in young calves.
- Previous research indicates that tannins are very effective against intestinal worms and essential oils are effective against stomach worms.
- A recent field study showed a 50-percentage unit decrease in stomach worms compared to a non-additive control after being fed Caliber³ 10 days.

How to use:

Feed 3 g per head per day.

Feeding Rate	Caliber ⁴
	Lbs./ton
0.25	52.9
0.50	26.4
1.00	13.2

References:

Aguerre, M. J., M. C. Capozzolo, P. Lencioni, C. Cabral, and M. A. Wattiaux. 2016. Effect of quebracho-chestnut tannin extracts at 2 dietary crude protein levels on performance, rumen fermentation, and nitrogen partitioning in dairy cows. *J. Dairy Sci.* 99:4476.

Butter, N. L., J. M. Dawson, D. Wakelin, and P. J. Buttery. 2002. Effect of dietary condensed tannins on gastrointestinal nematodes. *J. Agric. Sci.* 137(4):461-469.

Katiki, L. M., A. M. E. Barbieri, R. C. Araujo, C. J. Verissimo, H. Louvandini, and J. F. S. Ferreira. 2017. Synergistic interaction of ten essential oils against *Haemonchus contortus* in vitro. *Vet Parasitol.* 243:47-51

Kommuru, D. S., T. Barker, S. Desai, J. M. Burke, A. Ramsay, I. Mueller-Harvey, J. E. Miller, J. A. Mosjidis, N. Kamisetti, T. H. Terrill. 2014. Use of pelleted sericea lespedeza (*Lespedeza cuneata*) for natural control of coccidia and gastrointestinal nematodes in weaned goats. *Vet. Parasitol.* 204(3-4):191-198.

Min, B. R., W. E. Pinchak, R. C. Anderson, and T. R. Callaway. 2007. Effect of tannins on the in vitro growth of *Escherichia coli* O157:H7 and in vivo growth of generic *Escherichia coli* excreted from steers. *J. Food Protection* 70(3):543-550.

Orzuna-Orzuna, J. F., G. Dorantes-Iturbide, A. Lara-Bueno, G. D. Mendoza-Martínez, L. A. Miranda-Romero, and H. A. Lee-Rangel. 2021. Growth performance, meat quality and antioxidant status of sheep supplemented with tannins: A meta-analysis. *Animals.* 11:3184.

Shu, J., H. Liu, Y. Liu, X. Chen, Y. Yu, Q. Lv, J. Wang, X. Deng, Z. Guo, and J. Qiu. 2022. Tannic acid inhibits salmonella enterica serovar typhimurium infection by targeting the Type III secretion system. *Front. Microbiol.* 12:784926.

Solutionsⁿ provides practical and cost-effective technologies that address real world production issues so that producers can produce wholesome, healthy animals that perform profitably.