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# The Use of Chambourcin Grape Extract as a Natural Anthelmintic in Goat Kids

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## Abstract

Gastrointestinal nematode parasitism is one of the greatest economic threats to goat production in the United States. With elevated incidences of anthelmintic resistance there is an increased interest in alternative natural dewormers, such as plants containing condensed tannins. Therefore, the objective of this study, supported by the NCR-SARE graduate grant program, was to evaluate the effects of fermented Chambourcin grape extract on parasite level and performance of goat kids. On October 14, 2014, a total of 45 mixed-breed goat kids (17.17 kg ± 0.79) were stratified by fecal egg count, weight, breed, and sex, and were allocated randomly to one of three treatments: 1) an oral dose (10 mL per 4.54 kg of BW) of fermented Chambourcin grape extract at 7-day (D7) intervals, 2) the same dose at 14-day (D14) intervals, or 3) control (30 mL oral dose of water at 14-day intervals). Condensed tannins were extracted, purified, and standardized by the Protein-Precipitable Phenolics method and found to have a concentration of 0.33 mg/mL. Goats were naturally exposed to gastrointestinal parasites on pasture consisting primarily of endophyte-infected tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh] and mixed browse with access to 16% crude protein corn-soybean meal based creep feed for the duration of the 63-day study. Fecal egg counts, packed cell volumes, FAMACHA<sup>®</sup> scores, weights, and body condition scores were measured every 7 d. Data were analyzed by the PROC MIXED procedure of SAS and treatments were reported as least square means. Two contrast statements were used to compare the mean of control versus D7 and D14 and the mean of D7 versus D14. Animal was the experimental unit. Start, final, and change from start to final fecal egg counts, packed cell volumes, FAMACHA<sup>®</sup> scores, and body condition scores did not differ ( $P \geq 0.12$ ) across treatments. Average daily gain and total weight gain also did not differ ( $P \geq 0.42$ ) across treatments. Therefore, fermented Chambourcin grape extract may not be an effective natural anthelmintic for controlling nematodes in creep-fed goat kids.

## Introduction

- Plant extracts can be high in certain phenolics such as Proanthocyanidins or condensed tannins (CT). Condensed tannins have been shown at certain levels to produce benefits in ruminants such as:
  - better utilization of dietary protein.
  - faster growth rates.
  - an improvement in animal health through a decrease in fecal egg counts (FEC).
- Red grapes and red grape by-products such as juice, fermented grape extract (wine), and grape pomace should be examined because they contain high levels of CT.
- Condensed tannin-rich products could make small ruminant production in the United States more sustainable by:
  - reducing synthetic anthelmintic use.
  - reducing the instance of parasite resistance.



## Objective

The objective of this study was to evaluate the effects of fermented Chambourcin grape extract on parasite level and performance of goat kids.

## Materials and Methods

### Animals

- 45 mixed-breed and mixed-sex goat kids (17.17 kg ± 0.79).

### Treatments

- Goats were stratified by FEC, weight, and sex, and allocated randomly to 1 of 3 treatments:
  - 1) Oral dose (10 mL/4.54 kg of body weight) of Chambourcin grape extract every 7 days (D7).
  - 2) Oral dose (10 mL/4.54 kg of body weight) of Chambourcin grape extract every 14 days (D14).
  - 3) Oral dose of water every 14 days (control).
- Fermented Chambourcin grape juice tannins were extracted, purified, and standardized by the Protein-Precipitable Phenolics method and found to have a CT concentration of 0.33 mg/mL.

### Kid Management

- Goat kids were grazed on primarily endophyte-infected tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh] and mixed browse pastures.
  - 63-day grazing period.
  - Naturally exposed to gastrointestinal parasites.
  - Ad libitum access to water and trace minerals.
  - Continuous access to 16% crude protein corn-soybean meal based creep feed.

### Measurements

- Taken every 7 days from each kid.
  - BW.
  - BCS.
  - Fecal egg count.
  - FAMACHA<sup>®</sup> score.
  - Packed cell volume.

### Statistical Analyses

- One year summary.
- PROC MIXED of SAS.
- Experimental unit: animal.
- Treatment means were reported as least squares means.
- Contrast statements:
  - 1) The mean of control versus D7 and D14.
  - 2) The mean of D7 versus D14.

## Results

### Effects of organic fermented grape extract on parasite level in goat kids

Item	Treatment <sup>1</sup>			SEM <sup>2</sup>	Contrast <sup>3</sup>
	C	D7	D14		
Start FEC, eggs/g <sup>4</sup>	8.5	7.1	22.1	6.50	ns
End FEC, eggs/g <sup>4</sup>	21.7	19.7	19.9	5.57	ns
FEC change, eggs/g <sup>4</sup>	12.9	11.9	-1.0	9.79	ns
Start FAMACHA <sup>®5</sup>	3.3	3.5	3.7	0.20	ns
End FAMACHA <sup>®5</sup>	2.4	3.0	2.7	0.13	W
FAMACHA <sup>®</sup> change <sup>5</sup>	-0.7	-0.5	-0.9	0.24	ns
Start PCV, % <sup>6</sup>	27.4	28.8	28.6	1.42	ns
End PCV, % <sup>6</sup>	33.0	32.8	34.4	1.00	ns
PCV change, % <sup>6</sup>	3.9	2.7	5.0	1.50	ns

<sup>1</sup>Treatments C = Control.  
D7 = Oral dose of Chambourcin every 7 days.  
D14 = Oral dose of Chambourcin every 14 days.

<sup>2</sup>SEM Pooled standard error of the mean.

<sup>3</sup>Contrasts W = mean of C goats versus the mean of D7 and D14 lambs ( $P \leq 0.05$ ); ns = no significant difference ( $P > 0.10$ ).

<sup>4</sup>FEC Fecal egg count.

<sup>5</sup>FAMACHA<sup>®</sup> Mucus membrane of the eye, color system based on a scale of 1 to 5; 1-best color to 5-devoid of all color, near death.

<sup>6</sup>PCV Packed cell volume.

### Effects of organic fermented grape extract on performance in goat kids

Item	Treatment <sup>1</sup>			SEM <sup>2</sup>	Contrast <sup>3</sup>
	C	D7	D14		
Start BW, kg	17.3	17.1	17.1	0.79	ns
End BW, kg	23.1	22.4	23.4	1.27	ns
Start BCS <sup>4</sup>	2.9	3.0	3.0	0.13	ns
End BCS <sup>4</sup>	2.8	2.9	2.8	0.13	ns
BCS change <sup>4</sup>	-0.25	-0.17	-0.21	0.140	ns
ADG, kg	0.09	0.08	0.10	0.010	ns
Gain, kg	5.4	5.2	5.9	0.66	ns

<sup>1</sup>Treatments C = Control.  
D7 = Oral dose of Chambourcin every 7 days.  
D14 = Oral dose of Chambourcin every 14 days.

<sup>2</sup>SEM Pooled standard error of the mean.

<sup>3</sup>Contrasts ns = no significant difference ( $P > 0.10$ ).

<sup>4</sup>BCS Body condition score based on a scale of 1 to 5; 1-thin to 5-obese.

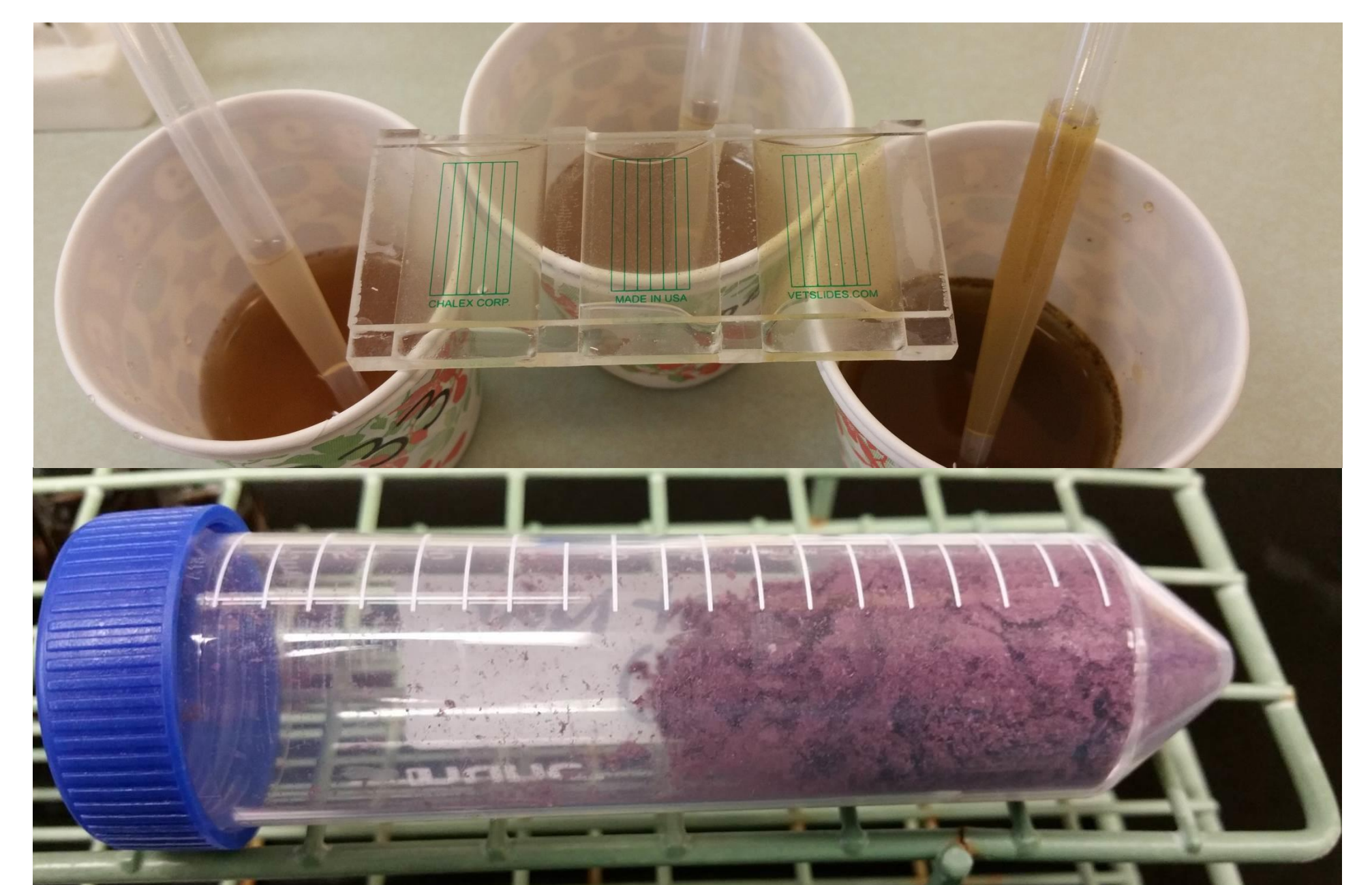


## Discussion

- Start, end, and change from start to final fecal egg counts and packed cell volumes did not differ ( $P \geq 0.12$ ) across treatments.
- End FAMACHA<sup>®</sup> scores were higher ( $P = 0.02$ ) for D7 and D14 versus control.
- Average daily gain and total weight gain also did not differ ( $P \geq 0.42$ ) across treatments.
- Other research (Whitley et al., 2009) suggests that full access to protein provided by creep feed may increase the nutritional plane significantly enough to allow an immune system response to naturally combat parasite loads.

## Conclusion

- Fermented Chambourcin grape extract may not be an effective natural anthelmintic for controlling nematodes in creep-fed goat kids.
- Additional research is needed to see why Chambourcin grape extract may be effective as a natural anthelmintic in some ruminant animals, but was not effective in goat kids.



## Literature Cited

Whitley et al., 2009. Effect of high tannin grain sorghum on gastrointestinal parasite fecal egg counts in goats. Small Rum. Res. 87:105-107.

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