

Manipulation of Rumen Fermentation and Blood Metabolites of Local Sheep Consuming Complete Feed by Tannin Extract from Chestnut

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Introduction

Tannins are plant secondary compounds found in some plant species such as chestnut (1). These phenolic compounds have the ability to bind some nutrients in feed especially to proteins (2). Based on their structure, tannins are divided into two major groups, i.e. hydrolyzable tannins and condensed tannins (3). Tannins can be used to manipulate rumen and blood metabolism of ruminants including sheep. Addition of tannins are expected to increase by-pass and absorption of nutrition, reduce methane enteric fermentation and blood cholesterol. In this research, tannin extract from chestnut was added into complete feed and fed to experimental sheep at different levels.

Materials and methods

This study used a randomized complete block design with twelve sheep at the age of six months. There are three treatments tested in this study, i.e. (1) control (complete feed) without tannin addition (C), (2) complete feed + 0.14% tannin addition from dry matter intake (T1), and (3) complete feed + 0.34% tannin addition (T2). Parameters measured in this research were rumen volatile fatty acid (VFA) profiles, rumen ammonia, methane (estimated from VFA (4)), blood metabolites, dry matter intake, average daily gain, and feed efficiency.

Results and discussion

Result from the present study revealed that tannin addition did not influence total VFA, acetate, propionate and butyrate concentrations, estimated methane emission, dry matter intake, average daily gain, and feed efficiency (Table 1-3). Tannin reduced rumen ammonia concentration with formula $Y = 8.18 - 0.966X$, blood cholesterol content with formula $Y = 67.89 - 32.61X + 7.74X^2$, and increased methane relative to total VFA $Y = 32.3 + 1.08X$ ($P < 0.05$).

Table 1. Influence of tannin addition on volatile fatty acid (VFA) profile, methane and ammonia concentration

Parameter	C (mMol/L)	T1 (mMol/L)	T2 (mMol/L)
Total VFA	136.860±12.530	122.380±17.130	127.0380±20.430
C ₂	93.142±9.760	87.512±10.920	94.326±16.830
C ₃	19.780±4.390	17.541±3.404	14.900±2.410
C ₄	23.940±7.710	17.325±3.496	17.810±2.075
CH ₄	46.050±2.890	41.490±5.230	45.470±7.430
NH ₃	7.420±1.230a	5.838±0.024b	5.488±0.710b
CH ₄ /Total VFA	0.337±0.016a	0.340±0.007a	0.358±0.003b

Table 2. Influence of tannin addition on blood cholesterol, glucose and blood urea nitrogen (BUN) concentrations

Parameter	C (mg/dl)	T1 (mg/dl)	T2 (mg/dl)
Cholesterol	43±5.25 ^b	34±1.35 ^c	40±2.23 ^a
Glucosa	48±6.13	51±4.55	47±5.68
BUN	21.25±4.19	18.25±4.03	21.25±5.97

Table 3. Influence of tannin addition on dry matter intake (DMI), feed efficiency, average daily gain (ADG) of experimental sheep

Parameter	C	T1	T2
DMI (kg)	0.732±0.173	0.965±0.062	0.904±0.121
Feed efficiency (%)	7.048±5.872	7.666±2.750	7.444±5.091
ADG (g)	60.119±50.958	73.810±27.101	76.190±41.084
DMI/BW (%)	3.538±0.347 ^a	4.449±0.145 ^b	4.215±0.407 ^b
CH ₄ /ADG (mMol/L/g)	0.723±0.304	0.648±0.366	0.749±0.559

References

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