

EFFECT OF DIFFERENT INTAKE LEVELS OF TANNINIFEROUS BROWSE FORAGE ON THE NUTRIENT UTILIZATION BY SHEEP

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Introduction

Shrub and tree fodders are an important source of supplementary feeds for ruminants. Many of these forage species contain tannins, a group of plant secondary compounds that can influence animal performance. Their effect may be either beneficial or harmful depending on the type of tannin (hydrolysable and condensed tannins) consumed, the amounts ingested, and the animal species involved (Frutos et al., 2004). Since the amounts and types of tannins present vary with the plant species, the beneficial or harmful effect on animal performance may depend on the forage species consumed and the level of inclusion of these forages. This study was conducted to investigate the effect of different intake levels of three tannin containing browse supplements namely, *Gliricidia sepium* (Gliricidia), *Artocarpus heterophyllus* (Jak), and *Tithonia diversifolia* (Wild sunflower, WSF) on the in vivo digestibility and N utilization by sheep.

Materials and Methods

Three feeding trials were conducted using 12 crossbred male sheep (mean body weight 13.5 ± 2.5 kg). The animals were randomly allocated to four treatment groups. All animals received guinea grass to meet the dry matter intake of $1.0 \pm 0.2\%$ of body weight/day. In addition, the animals

in each treatment received either gliricidia, jak, wild sunflower or a concentrate mixture up to a total dry matter intake (DMI) of 2 % (trial 1), 3% (trial 2) or *adlib* amounts (trial 3). The feed samples were analyzed for total tannin content (Makkar, 2003). Feeds, faeces and urine samples were also analyzed for dry matter, organic matter and N contents (AOAC, 1980). Daily DMI, in-vivo digestibility of N and organic matter (OMD), and N-Balance were determined for each treatment. Data were statistically analyzed using GLM procedure of (SAS, 1988).

Results and Discussion

The N contents of guinea grass, gliricidia, wild sunflower, jak and concentrates were 2.96, 4.41, 5.46, 2.68 and 2.92%, respectively. At 2 % DMI, the daily total tannin intakes varied between 0.45 (gliricidia) and 5.70 (jak) g/day (Table 1). Sheep supplemented with gliricidia and wild sunflower showed higher ($P < 0.05$) OMD and N digestibility than those fed with jak leaves. High total tannin intake in sheep fed jak leaves appear to reduce OMD and N digestibility confirming previous observations (Das and Gosh, 2007).

At 3% DMI (Trial 2), the total tannin intakes were 0.79, 2.73, and 5.70 g/day, respectively in gliricidia, wild sunflower and jak treatments. Nitrogen digestibility of gliricidia,

WSF and jak treatments were 82.36, 90.07, and 64.29%, respectively. Nitrogen balance varied ($P < 0.05$) between 5.94 (jak) and 12.10 (gliricidia) g/day.

Total tannin intakes were 1.29, 4.24 and 12.82 g/day in gliricidia, WSF and jak treatments, respectively at *adlib* feeding levels (Table 2). Jak leaves supplemented sheep had the lowest OMD, N digestibility and N balance suggesting that increased tannin intake in this group lowered the digestibility of organic matter and N as well as N retention. Both gliricidia and wild sunflower supplemented sheep exhibited high OMD, N digestibility and N balance

implying that increased total tannin intakes in sheep fed these forages did not influence the organic matter and N utilization.

Conclusion

The effect of tannins on the organic matter and N utilization by sheep varies with the browse species and the level of inclusion of tannin containing forage. When total tannin intake is elevated by increasing the level of inclusion of jak leaves, the organic matter digestibility and N utilization was lowered. Increased total tannin intakes did not influence the organic matter digestibility and N utilization in sheep supplemented with gliricidia and wild sunflower.

Table 1. Total tannin intake, organic matter digestibility (OMD) and N utilization of sheep fed guinea grass with browse species or concentrate at 2% DMI/day.

Parameter	Treatment			
	Gliricidia	WSF	Jak	Concentrate
Tannin Intake (g/day)	0.45 ^c	1.60 ^b	5.70 ^a	ND
OMD (%)	67.32 ^a	65.28 ^a	57.79 ^b	63.54 ^a
N Intake (g/day)	8.79	9.16	9.19	7.89
N Digestibility (%)	79.58 ^a	83.43 ^a	51.79 ^b	79.02 ^a
N Balance (g/day)	+3.91	+4.10	+2.87	+3.20

*For each row, means lacking a common superscript differ ($P < 0.05$)

Table 2. Total tannin intake, organic matter digestibility (OMD) and N utilization of sheep fed guinea grass with browse species or concentrate at *adlib* DMI/day.

Parameter	Treatment			
	Gliricidia	WSF	Jak	Concentrate
Tannin Intake (g/day)	1.29 ^c	4.24 ^b	12.82 ^a	ND
OMD (%)	73.43 ^{ab}	79.20 ^a	65.19 ^b	69.33 ^b
N intake (g/day)	28.97 ^a	30.99 ^a	19.04 ^b	15.89 ^b
N Digestibility (%)	84.01 ^{ab}	89.41 ^a	57.87 ^c	77.74 ^b
N Balance (g/day)	+17.64 ^a	+19.15 ^a	+8.48 ^b	+9.01 ^b

*For each row, means lacking a common superscript differ ($P < 0.05$)

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