

The effect of wilting or soaking on the nutritive value of two invasive weed species in Nepal

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Introduction Goats are an important component of the livelihoods of resource poor livestock keepers (RPLK) in Nepal. A major constraint is the poor health (and low economic value) of goats in the early part of the wet season, and this is partly brought about by the shortage of available forage in the dry season. Two invasive weeds (*Eupatorium adenophorum*, EA, and *Chromolaena odorata*, CO) now grow throughout Nepal. The plants grow year round, and so could be used as a source of forage, but their voluntary intake and perceived nutritive value by goats is low. If an appropriate means of treating EA and CO could be developed, their nutritive value may increase. EA and CO could then be included in the forage harvested for goats. The objective of this experiment was therefore to determine the effect on the nutritive value of EA and CO of either wilting or soaking these plants.

Materials and methods Samples of EA and CO were harvested in November, 2000 at the beginning of the dry season. Samples were collected from the forests used by the communities with whom the project is working. CO was taken from the district of Dhanusha, in the plains, whereas EA was collected from Makawanpur, in the mid hills. Each sample was split into three, and either left untreated (U), wilted for 2 h (W) or soaked in water for 2 h (S). Samples were then oven dried (60°C), before being ground (1 mm screen). They were then analysed for organic matter (OM), crude protein (CP), neutral detergent fibre (NDF) and acid detergent fibre (ADF). Samples (1 g) were also incubated in triplicate on two occasions for 72 h with buffered rumen fluid taken from three sheep to estimate the rate and extent of gas production (GP). At the end of the incubation period, the samples were filtered through glass fibre paper (Whatman GF/A) to estimate degradability. The GP profiles obtained were fitted to a modified Michaelis-Menten model and from this, estimates of the total volume of gas produced (a), the time to half total gas volume (k), the maximum rate of gas production ($R_{M\text{ Gas}}$) and the time to $R_{M\text{ Gas}}$ ($t_{R_{M\text{ Gas}}}$) were calculated. Analysis of variance was used to determine the effects of treatment and species on the estimates of degradability and the parameters of the GP profiles obtained.

Results CP, NDF and ADF content, and the ADF:NDF ratio was higher for CO than EA (Table 1). The ADF content, and ADF:NDF ratio was reduced by both wilting and soaking. Total gas production and degradability of CO was lower than EA (Table 2). Soaking increased the degradability of EA, but had no effect on CO, while wilting increased the degradability of both species. Wilting also increased $R_{M\text{ Gas}}$, particularly for CO.

Table 1 Chemical analysis of *E. adenophorum* and *C. odorata*

	Chemical composition, g/kg DM									
	OM		CP		NDF		ADF		ADF/NDF	
	EA	CO	EA	CO	EA	CO	EA	CO	EA	CO
U	929	979	111	146	492	533	449	506	0.912	0.949
W	924	918	114	161	485	546	413	505	0.852	0.925
S	926	929	118	133	494	525	400	430	0.810	0.819

Table 2 Effect of treatment on the degradability and GP profile of EA and CO

	<i>E. adenophorum</i>			<i>C. odorata</i>			SEM	Significance of contrast		
	U	W	S	U	W	S		Sp ¹	Tr ¹	Sp ¹ Tr ¹
	Degradability	0.456	0.488	0.484	0.362	0.445		0.373	0.0392	***
a (ml)	161	182	174	133	156	135	11.4	*	ns	ns
k (h)	8.8	8.8	8.7	10.1	7.8	9.8	0.71	ns	ns	ns
$R_{M\text{ Gas}}$ (ml/h)	11.4	13.2	12.6	9.9	16.4	9.8	0.73	ns	**	*
$t_{R_{M\text{ Gas}}}$ (h)	2.5	2.1	3.3	0.8	0.3	1.0	0.65	*	ns	ns

¹Sp: species, Tr: treatment, Sp¹Tr¹: species x treatment interaction ns not significant, * P<0.05, *** P<0.001

Conclusions EA appears to have a higher nutritive value than CO. Soaking had only a limited effect on EA, and none on CO, whereas wilting increased the nutritive value of both species. Wilting is therefore the more effective treatment. If acceptable to farmers, this intervention would increase the effective availability of forage in the dry season, and thereby help to improve the livelihoods of RPLK in Nepal.

Acknowledgements This document is an output from a project funded through the Livestock Production Programme of the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID. Project R7632, Livestock Production Programme.