

Ruminal dry matter, neutral detergent fibre and acid detergent fiber degradation kinetics of dominant pasture forages in Kurdistan province of Iran

A.A. Sadeghi¹, P. Shawrang² and A. Nikkhah²

¹Department Of Animal Science, Faculty of Agriculture, Science & Research campus, Islamic Azad University, Ponak, Hesarak, Tehran, Iran, Email: draasadeghi@yahoo.co.uk, ²Department Of Animal Science, Faculty of Agriculture, Tehran University, Tehran, Iran

Introduction Neutral detergent fiber (NDF) is a major chemical component of forages and its degradability (dNDF) is an essential parameter in predicting their energetic value. Moreover, dNDF has been used in models to estimate the physical fill of fibrous feeds in the rumen and, therefore, the intake capacity of animals. As the available information on the nutritive value of pastoral forages is limited a study was undertaken to measure chemical composition and cell wall degradation kinetics of eight pasture forages in the rumen.

Materials and methods Forage samples (*Vicia villosa*, *Bromus tomentellus*, *Hordeum bolbusum*, *Festuca ovina*, *Agropyron tauri*, *Agropyron trichophorum*, *Prangus ferulacea* and *Ferula orientalis*) were collected at the pre-flowering stage (30th April) from pastures within the Kurdistan province of Iran (altitude 1480 m, latitude 35° 19' N and longitude 47° 00' E). Forage collected for *in situ* procedure was freeze dried and ground to pass a 3-mm screen. The samples were incubated for 0, 12, 24, 48 and 72-h within the rumen of three Varamini rams (BW = 46.4 ± 4.2 kg) n. Zero time washing losses were determined by soaking 3 bags in warm water (39°C) for 1 h. All bags were then washed within a washing machine on a cold water cycle prior to freeze drying. The NDF and acid detergent fiber (ADF) concentrations were determined (Van Soest *et al.*, 1991). The kinetics of degradation for dry matter (DM), NDF and ADF were determined by way of the Ørskov and McDonald (1979) model. Effective rumen degradability (ERD) of DM, NDF and ADF were analyzed by a variance analysis GLM procedure of SAS (SAS, 1996) in a completely randomized design according to this model: $Y = \mu + T_i + E_{ij}$, where μ is overall average, T_i is the feed effect and E_{ij} is the residual error.

Results and discussion The NDF and ADF contents of *V. villosa*, *B. tomentellus*, *H. bolbusum*, *F. ovina*, *A. tauri*, *A. trichophorum*, *P. ferulacea* and *F. orientalis* were 39.8 and 35.7, 45.1 and 27.3, 61.1 and 19.2, 62.6 and 19.0, 60.4 and 34.8, 63.8 and 37.8, 25.1 and 24.5, 23.9 and 23.3 % (DM basis), respectively. *In situ* results showed that the effective DM, NDF and ADF degradability of eight pasture forages differed significantly (Table 1). Effective DM degradability at rumen out flow rate 0.02/h was highest for *P. ferulacea* (78.0%) and lowest for *F. ovina* (37.1%). Effective NDF and ADF degradability was greatest for *P. ferulacea* (61.8% and 59.6%) and lowest one for *H. bolbusum* (32.0% and *F. ovina* (31.4%) respectively.

Table 1 Ruminal DM, NDF and ADF degradation parameters of forage samples

Pasture forages	DM degradation traits (%)			ERD (%)	NDF degradation traits (%)			ERD (%)	ADF degradation traits (%)			ERD (%)
	a	b	c		a	b	c		a	b	c	
	<i>Vicia villosa</i>	31.0	43.7		5.5	63.0d	8.1		54.6	3.6	43.3 e	
<i>Bromus tomentellus</i>	29.1	56.3	4.1	67.2c	10.6	72.3	1.7	52.8 c	7.3	76.1	2.7	51.0b
<i>Hordeum bolbusum</i>	16.5	36.2	4.9	39.4g	2.8	44.5	3.8	32.0 g	0.1	46.1	1.2	35.1g
<i>Festuca ovina</i>	11.3	33.0	7.3	37.1h	10.8	45.6	2.1	34.0 f	7.3	74.6	6.2	31.4f
<i>Agropyron tauri</i>	19.2	51.5	6.0	57.9e	2.7	60.5	5.8	47.7 b	1.2	61.1	5.7	46.6c
<i>Agropyron trichophorum</i>	19.9	45.0	3.7	49.4f	4.9	52.5	3.5	38.3 d	3.6	48.9	3.5	34.8e
<i>Prangus ferulacea</i>	41.6	48.3	6.0	78.0a	11.6	81.5	3.2	61.8 a	9.9	82.5	3.0	59.6a
<i>Ferula orientalis</i>	49.0	37.7	4.4	75.0b	9.4	53.3	2.5	39.2 c	1.0	79.5	3.0	49.2e

a: immediately soluble fraction, b: potentially degradable fraction, c: degradation rate; significant level (p<0.05).

Conclusion Differences between pasture species in the rate and extent of fiber degradation could affect intake, under such conditions they should be considered as main parameters in ration formulation of ruminants.

References

- Ørskov, E.R., & I. McDonald (1979). The estimation of protein disappearance in the rumen from incubation measurements weighted according to rate of passage. *Journal of Agriculture Science (Cambridge)*, 92, 499-503.
- SAS Institute Inc., 1996. Statistical Analysis System (SAS) User's Guide, SAS Institute, Cary, NC, USA.
- Van Soest, P.J., J.B. Robertson & B.A. Lewis (1991). Methods for dietary fiber, neutral detergent fiber and non starch- polysaccharides in relation to animal production. *Journal of Dairy Science*, 74, 3583-3597.