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Effect of various Iranian native medicinal herbs or spices on *in vitro* ruminal disappearance of lucerne hay

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Introduction Recently, some studies have been conducted to determine the effects of medicinal herbs and spices on rumen microbial fermentation and nutrient disappearance (Busquet *et al.*, 2006; Hart *et al.*, 2008). However, a wide range of different results have been obtained when various medicinal herbs and spices have been added to different feed sources. The aim of the present study was to determine the effect of various Iranian native medicinal herbs or spices on *in vitro* disappearance of dry matter (DM), crude protein (CP) and neutral detergent fibre (NDF) of lucerne hay incubated with buffered rumen fluid.

Material and methods *In vitro* incubation was carried out as proposed by Menke and Steingass (1986). Approximately 300mg of dried and ground (through 2mm screen) lucerne hay (control, NDF = 537 and CP = 150g/kg DM) or lucerne hay plus 18mg DM of either garlic, nutmeg, cinnamon, cumin, or rosemary were placed in 100 ml glass syringes (5 replicates per each sample). Each syringe contained 40ml of buffered rumen fluid (ratio of buffer to rumen fluid, 2:1). Rumen fluid was obtained from three adult ruminally fistulated sheep (49.5 ± 2.5kg, body weight), before their morning feed; the rumen fluid was immediately strained through four layers of cheesecloth. Syringes were incubated under a CO₂ atmosphere at 38.5°C. After 24h of the incubation, the syringe contents were filtered (48µm pore size) and residues were dried at 60 °C for 48h. Dry matter, CP and NDF concentrations of the residues were determined. Data were analysed using SAS (V. 9/1) and the Dennett's test used to compare the means (P<0.05).

Results The effect of medicinal herbs and spices on *in vitro* DM, CP and NDF disappearances of lucerne hay are shown in Table 1. Results of the present study indicated that turmeric and garlic caused a significant (P<0.05) increase in DM disappearance of lucerne hay. Under the conditions of the present study, medicinal herbs and spices caused also a significant (P<0.05) increase in the ruminal disappearances from lucerne hay, of CP and also, with the exception of rosemary, NDF.

Table 1 *In vitro* disappearance of dry matter, crude protein and neutral detergent fibre from lucerne hay, alone (control) or with Iranian native herbs or spices, following 24h incubation with buffered rumen fluid

Treatments	Nutrients		
	Dry matter	Crude protein	Neutral detergent fibre
Lucerne hay (control)	0.542	0.617	0.369
Lucerne hay + Garlic	0.603 *	0.696*	0.533*
Lucerne hay + Nutmeg	0.572	0.720*	0.468*
Lucerne hay + Cinnamon	0.574	0.722*	0.471*
Lucerne hay + Cumin	0.584	0.677*	0.452*
Lucerne hay + Turmeric	0.623*	0.756*	0.489*
Lucerne hay + Rosemary	0.556	0.705*	0.417
s.e.m	0.003	0.002	0.004

In each column an asterisk (*) indicates P<0.05 compared with the control using Dennett's test.

Conclusions Results suggested that the medicinal herbs or spices used under the experimental conditions of this study (24h *in vitro* incubation) might alter ruminal disappearance of the lucerne hay nutrients. It was previously demonstrated that some medicinal herbs or spices may improve the cellulolytic and proteolytic activities of rumen microbiota (Khan and Chaudhry, 2008). These natural additives have the potential to alter the ruminal digestibility of ruminant feeds when used at appropriate concentrations. However, there is a need to test these herbs and spices under *in vivo* conditions using a wide range of different feedstuffs.

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