

ANNALI

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ALFALFA HAY DIGESTIBILITY IN SARDINIAN DOES⁽¹⁾

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SUMMARY

A feeding trial was carried out on ten Sardinian does. 5 does (group F) were fed with alfalfa hay and the other 5 (group C+F) with alfalfa hay + 0.6 kg of concentrate to measure the digestibility of these feeds. The digestibility was measured by marker method (lignin) and by the enzymatic method. The marker method showed that the addition of concentrate to the hay increased the OM digestibility. The second method showed similar results. The Authors calculated a regression equation between "in vivo" and "in vitro" digestibility of OM in the C+F group. The changes in lignin composition before and after the digestion were analyzed.

Keywords: Sardinian does, Alfalfa hay, Digestibility.

RIASSUNTO

Digeribilità del fieno di medica in capre sarde

In una prova condotta su 10 capre Sarde, di cui 5 (gruppo F) alimentate con fieno di medica e 5 (gruppo C+F) alimentate con fieno di medica + kg 0,6 di concentrati, è stata misurata la digeribilità delle razioni con il metodo dei marcatori interni (lignina) e con quello enzimatico. L'aggiunta di concentrati al fieno ha comportato un aumento, rilevato da entrambi i metodi, della digeribilità della SO. Sui dati del gruppo C+F è stata calcolata un'equazione di regressione fra digeribilità della SO "in vivo" ed "in vitro". È stata analizzata inoltre la composizione chimica della lignina prima e dopo la digestione.

Parole chiave: Capre Sarde, Fieno di medica, Digeribilità.

⁽¹⁾ Comunicazione presentata al 41° Congresso Annuale della Federazione Europea di Zootecnica, Tolosa (F) 9-12/7/1990. Lavoro eseguito con il contributo finanziario del C.N.R. (Contratto n. 88.02376.06-89.00502.06; Titolare Prof. Paolo Brandano).

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INTRODUCTION

The Sardinian goat population is almost exclusively made up of the local Mediterranean type: the Sardinian breed (2) (3). There are about 300,000 head and they account for about a quarter of the Italian goat population.

The importance of the breeding of these goats stems from their capacity, typical of the species (6), to make use of the roughgrazing found in vast areas of Sardinia which is not suitable for cattle and sheep. Their production level, however, is low, due, among other factors, to the feed, which is mostly based on shrubs and grass, with few concentrates.

Feeding with concentrates and alfalfa hay during periods of scarce grazing produces a good milk yield whilst maintaining the quality (4). It is particularly important to calculate correctly the nutritive value of the feedstuffs, and this depends on their digestibility (9) (17). This is usually determined with sheep (15). The digestibility both "in vivo" and "in vitro" of equal rations was different for the two species (11) (12) (14) (10). Therefore it was important to have the "in vivo" data on lactating goats, and in particular on animals of indigenous breeds (19). Lignin is an easily applied endogen marker for the determination of the digestibility in normal breeding conditions.

However, this technique is not very reliable, due to the degradation and solubilization of varying amounts of lignin in the digestive tract (7) (8) (1). In spite of this, the technique has sometimes produced some good results (e.g. the digestibility of alfalfa hay by goats (14)) comparable to those of the traditional method of total collection (18).

A feeding trial was conducted on Sardinian does with the aim of studying the digestibility and the changes in the lignin composition (5) (13) (before and after digestion) of rations made up of alfalfa hay and alfalfa hay + concentrate.

MATERIALS AND METHODS

10 mature does, at the start of lactation, were divided into two groups and one group was fed alfalfa hay *ad lib.* (group F) while the other received alfalfa hay + kg 0.6 of concentrate (group C+F) for 12 weeks. During the eleventh week, daily samples were taken from the total faeces of each individual goat. The individual milk yield and feed intake were registered and feedstuff samples were taken.

Standard ASPA chemical analyses (16) were used on the feedstuff (tab. 1) and faeces samples. The digestibility was calculated by the internal lignin (8) marker method (ADL).

Using the same samples, the organic matter digestibility was determined by the enzymatic pepsin-cellulase method (16).

Table 1 - Chemical composition of feeds (in %).

	Alfalfa hay	Concentrate
Dry matter	89.46	89.86
On dry matter		
- Crude protein	19.63	14.44
- Ether extract	1.24	2.44
- Crude fibre	28.42	11.54
- Ash	12.62	8.78
- N-free extract	38.09	62.80
- NDF	43.38	28.87
- ADF	30.52	12.30
- ADL	5.87	0.68

A PERKIN-ELMER 240B analyzer was used to carry out elementary chemical analysis on the ADL of the feedstuff and faeces samples.

ANOVA and regression analyses were carried out on the data to show the differences between treatments and the relationship between enzymatic and "in vivo" digestibility. Finally, the energetic values of the ingested rations were calculated by the INRA method (20).

RESULTS AND DISCUSSION

The dry matter intake and milk production, per kilo of metabolic weight for group F and C+F, were $g\ 91 \pm 20$ vs 107 ± 8 (DMI) and $g\ 21 \pm 2$ vs 45 ± 15 (MP).

The apparent digestibility (tab. 2) calculated by the lignin method, of nearly all the main nutrients examined was statistically higher in group C+F.

The OM enzymatic digestibility of C+F rations was higher than that in the F ration (73.78% vs 68.95%).

Correlation analysis has showed a strong relationship between organic matter digestibility obtained by the enzymatic method and that obtained by the marker method. The regression equation was:

$$y = -60.77 + 1.691x \quad (r=0.8125; \text{RSD}=0.637; P \leq 0.05)$$

in which y and x are the digestibility percentage of the organic matter in vivo and in vitro respectively.

Energy intake in both groups expressed in UFL calculated on the in vivo digestibility, was very similar to the requirements calculated by MORAND-FEHR et al. (17).

Elementary lignin analysis (tab. 3) showed a slight reduction of nitrogen, carbon and

Table 2 - Apparent digestibility coefficients (ADC) by lignin (ADL) method and energetic value of diets.

ADC (in %)	F	C+F
Organic matter	57.2 ± 2.1	63.4 ± 1.3**
Crude protein	64.8 ± 5.1	67.0 ± 1.5
Ether extract	3.0 ± 12.4	39.4 ± 2.0**
Crude fibre	48.1 ± 1.9	51.0 ± 1.4*
N-free extract	62.6 ± 1.6	69.5 ± 1.5**
NDF	52.7 ± 1.8	54.3 ± 2.2
ADF	49.1 ± 2.9	51.3 ± 2.5
UFL/kg DM	0.6344	0.7661

* P ≤ 0.05; ** P ≤ 0.01.

Table 3 - Elementary composition (in % of M.W.) of the ADL in alfalfa hay, the concentrate and faeces.

	N	C	H	O*
Alfalfa hay	2.44	52.82	6.83	37.91
Concentrate	2.58	47.80	5.43	44.19
Group F	2.03 ± 0.42	49.12 ± 2.80	5.51 ± 0.22	43.34 ± 3.38
Group C+F	2.19 ± 0.58	47.77 ± 1.40	5.35 ± 0.11	44.70 ± 1.65

* Calculated by difference.

hydrogen, which was, however, the same in both groups. This demonstrates that any degradation of the compound has not been influenced by feeding and therefore the apparent digestibility data of the rations are comparable.

CONCLUSIONS

The ADL method for estimating the digestibility of rations made up alfalfa hay with or without concentrates is easy to use under the normal breeding condition of the Sardinian goat.

Although it is not very accurate, it is technically useful for the estimation of the nutritive value of the rations fed to lactating goats.

The energy requirements of the lactating Sardinian does, calculated by the INRA standard, conform with the intake of energy that we observed.

The doses of concentrates used in this work do not seem to limit the technical application of the method. They produced an increase in the digestibility of the principal nutrients, as was to be expected.

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Si ringrazia il Dr. P. Rassa ed il Sig. R. Rubattu per la collaborazione prestata.

Lavoro pervenuto in redazione il 30-9-1990.

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