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COMPARISON OF DRY MATTER DIGESTIBILITY OF THREE VARIETY OF SORGHUM SILAGES WITH SPEED FEED VARIETY BY NYLON BAG TECHNIQUE

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ABSTRACT: *In this study, four types of sorghum silages were tested with nylon bag technique. Tow fistulae Gizel sheep with average BW 50.5±2.5 kg used in a complete randomized design. Ruminal DM disappearance were measured 0,4,8,12,16,24,36,48,72 and 96 h. Dry matter degradability of R161 and R165 at 96h were 66.88 and 62.35%, respectively were higher and lower DM degradability that showed significant differences (P<0.05). Sorghum silages have high DM degradability and its nutritional composition showed that its can used instead of Alfalfa. It can decrease feed price.*

Key words: *Sorghum Silage, Degradability and Nylon Bags*

ORIGINAL ARTICLE

INTRODUCTION

Feeding costs are one of the major problems in the economic balance of the sheep farmers. It has been well established that ruminant animals are capable of utilizing cellulose and hemicelluloses from forages, wood and other complex fibrous carbohydrates (Singh and Kamstra, 1981). Non-traditional by-products must search in order to decrease the relay on traditional resources to fill the gap and decrease feeding costs (Afaf et al., 2009).

Exposure to air during feeding and storage can cause silages to spoil. Yeasts that are able to metabolize lactic acid are the primary initiators of spoilage, which leads to an increase in silage pH. This change in the silage environment allows for the growth of opportunistic bacteria and fungi, causing further spoilage. Predicting the feeding value of feedstuffs as accurately as possible and with methods of low cost and easy to handle is an important economical target. This goal is of particular importance for grazing and browsing ruminants that valorize local resources often of low and variable nutritive value. Chemical composition can give an idea of the nutritive value of feeds, but it is not sufficient (Krishnamoorthy et al., 1995). Biological methods involving microorganisms and enzymes that are sensitive to factors influencing the rate and extent of digestion seem more appropriate in this case than chemical methods. Among them, the most popular are the *in situ* dry matter degradability (Mehrez and Ørskov, 1977).

The *in situ* technique has been widely used to study ruminal digestion kinetics of feeds for cattle. Although in this technique the incubated feed is not subject to mastication and passage, it is no better way to simulate the rumen environment to study ruminal digestion kinetics (Nocek, 1988). This technique has been reported to be well correlated with animal performance (Orskov, 1989; Khazaal et al., 1993), with voluntary feed intake and in vivo dry matter digestibility (Khazaal et al., 1995). In Brazil, researchers have used the *in situ* method to evaluate tropical forages, agricultural residues and industrial by-products for feeding cattle (Vilela et al., 1994; Gomes et al., 1994; Aroeira et al., 1995).

MATERIALS AND METHODS

Animals and feeding

Two yearling (Gizil) wethers (50.5±2.5 kg) were used. At least 30 d before initiation of the experiment, each wether was surgically fitted with a ruminal cannula. The wethers were housed in tie stalls under controlled environmental conditions with continuous lighting and constant temperature (24 to 26°C). All whether were fed a diet containing of 60% hay and 40% concentrate. The feed was fed in equal portions every 8 h to maintain a relatively stable rumen environment.

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Sample Collection

Sorghum samples harvested from Golestan, Research Center field. Samples were collected from at least 7 different areas of field. All 7 samples were thoroughly mixed, and a composite sample (100g) was taken. And all of the samples put inside the rubber bucket to prepare silo environment. After 21 days, all samples were dried in an oven at 100°C until a constant weight was achieved. Samples were then ground to pass thought a 2-mm screen in Wiley mill (model 4, Arthur H. Thomas Co., Philadelphia, PA) before incubation.

Chemical analysis

Feedstuffs dry matter (DM, method ID 934.01), ash (method ID 942.05), ether extract (EE, method ID 920.30) and crude protein (CP, method ID 984.13) were determined by procedures of AOAC (1999). The neutral detergent insoluble fiber (NDF) and acid detergent fiber (ADF) concentrations were determined using the methods of Van Soest et al. (1991), without sodium sulphite. Neutral detergent insoluble fiber was analyzed without amylase with ash included.

Dry matter was determined by drying the treatments at 105°C over night and ashed by igniting the treatments in muffle furnace at 525°C for 8 h. Nitrogen (N) content was measured by the Kjeldahl method (AOAC, 1999). Crude protein was calculated as CP=N×6.25.

In situ degradation

In situ methods procedures was determined using Nocek (1988) and reviewed by Taghizadeh et al. (2005), the ground samples (5g) were placed in Dacron bags (5.5×10 cm;47-µm pore size) and were sealed with waterproof glue. Each feed sample was incubated in 4 replicates (2 replicates for each whether) in the rumen. The incubation times for silage samples were 0,4,8,12,16,24,36,48,72 and 96 h. Nylon bags were suspended in the rumen in a polyester mesh bag (25×40 cm;3mm pore size) and were removed from the rumen at the same time so that all bags could be washed simultaneously. The nylon bags were then removed from the mesh bag and washing until the rinse water remained clear. Samples were then dried in an oven at 55˚C until a constant weight was achieved before determination of DM disappearance. The DM degradation data was fitted to the exponential equation P = a+b (1–e-ct), where P: is the disappearance of nutrients during time t, a: the soluble nutrients fraction which is rapidly washed out of the bags and assumed to be completely degradable, b: the proportion of insoluble nutrients which is potentially degradable by microorganisms, c: is the degradation rate of fraction b per hour and t is time of incubation.

Calculations and Statistical Analysis

Data were analyzed as a completely randomized design using a general linear model (GLM) procedure of SAS, with Duncan's multiple range test used for the comparison of means. Feeds were the only sources of variation considered.

RESULTS AND DISCUSSION

Average of DM disappearance of four sorghum silages were shown in Table 1. Data showed that the R161 were showed higher ruminal degradability in 96h compared with R165 samples. The obtained results for DM degradability were according to NRC (1989). There were differences among levels of disappearance for DM of silages at the different incubation times ($P<0.05$). Since disappearance of DM was little during the first 8h of fermentation, R166 showed lower ruminal disappearance of DM ($P<0.05$), but processing of ruminal DM degradation showed that R165 have a lowest ruminal degradation in other times ($P<0.05$). The chemical composition of silages influenced ruminal degradation process. Sorghum silages have high ruminal DM degradability and recommended to use in ruminant ration.

Table 1 - *In situ* DM disappearance (% of DM)

Silages	Incubation time (h)									
	0	4	8	12	16	24	36	48	72	96
R161	12.03^{a}	18.83^{a}	23.1^{a}	26.59^{a}	40.94^{a}	48.61^{a}	56.71^{a}	63.18^{a}	65.99^{a}	66.88^{a}
R166	7.10^{d}	11.45^{d}	14.33^{c}	21.64^{d}	29.03^{d}	40.46^{c}	51.10^{b}	57.43^{b}	60.70^{bc}	62.68^{c}
R165	9.78^{c}	13.55^{c}	15.75^{b}	23.06^{c}	34.28^{c}	42.20^{c}	51.94^{b}	56.95^{b}	60.09^{c}	62.35^{c}
Speed Feed	11.04^{b}	16.00^{b}	22.52^{a}	24.97^{b}	36.82^{b}	47.05^{b}	54.82^{a}	57.02^{b}	62.34^{b}	65.17^{b}
SEM	0.2011	0.2477	0.2860	0.1878	0.5140	0.4679	0.8092	0.3987	0.5398	0.3546
P-Value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0040	<0.0001	0.0002	<0.0001

Ruminal degradability of sorghum silages were higher than alfalfa or other hays (Taghizadeh et al., 2008). These results showed that sorghum silages can used widely in ruminants rations without metabolic problems and to eliminate the need for costly waste management programs.

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Andrighetto et al. (1993) showed the values of soluble and insoluble fraction for DM of alfalfa about 17.9% and 45.1%, respectively that is higher than the obtained data for a fraction and lower than the b fraction in this experiment. The difference values for degradability's parameters of different hay can be resulted from the variance of growth rate, NDF content, soluble and insoluble fractions and environment temperature. The found data in this experiment showed high values for soluble fraction of DM compared to that the reported by Taghizadeh et al (2008), but the its insoluble fraction lower than finding of mentioned study. The achieved differences can be depended on the differences in variety, drying processing, climate conditions, soil, maturity, sample size: square area in used nylon bag and microbial contamination.

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