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Fermentation pattern of alfalfa hay and *Ulva Fasciata* using in gas production technique

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Abstract

The objective of this study was to evaluate fermentation characteristics of alfalfa hay and *Ulva Fasciata*. Samples of particle size of 2 mm were oven dried at 65ºC for 48 h., then 200 mg of each were weighed and placed in four replicates into 125-ml capacity serum bottles. The gas production was continuously measured by incubating samples in buffered rumen from caw for 96hr. Cumulative gas production was recorded at 2,4,6,8,12,24,48,72 and 96 hr of incubation periods. In all of incobation time, gas volume (ml / 200 mg DM) of Alfalfa hay was higher than *Ulva* fasciata. The fractional rates (c) of gas production were highest (0/08) in Alfalfa hay ($p<0.01$). Gas production from the insoluble fraction (*b*) in Alfalfa hay was higher (59/96) than *Ulva Fasciata* (46/93).

Keywords: Gas production, Alfalfa hay, Ulva fasciata

Introduction

The volume of produced gas should reflect the fermentation profile of a feed in the rumen. This led to development of in vitro gas production techniques (IVGPT), which simulate the rumen environment and allows estimation of kinetics of rumen fermentation by measuring cumulative gas production (Menke & Steingass, 1988). Algeria is a country with a littoral stretching over 1200 Km. This ecosystem is not well known, despite that it constitutes a reservoir of rich biodiversity. High quantities of seaweeds are available and very little valued; some species are washed-up and become a source of bad smell and pollution after decomposition (Hind et al. 2014). Over the past fifty years, the use of seaweeds has increased considerably, with the consequent increase in applied research in various related fields (Jiménez-Escrig et al., 2000). As known, seaweeds are used as sources of food for human nutrition in many countries because these natural resources are rich in soluble dietary fibers, proteins, minerals, vitamins, antioxidants and polyunsaturated fatty acids, with a low calorific value (Mohamed et al., 2012). They are also exploited in industry for agar, alginate and carrageenan productions. Their use as fertilizer, as fuel and cosmetics products has been also pointed (McHugh, 2003). ulva sp This is a small genus of marine and brackish water green algae. It is edible and is often called 'Sea Lettuce'.Species with hollow, one-layered thalli were formerly included in *Enteromorpha*, but it is widely accepted now that such species should be included in *Ulva (*Algaebase. 2010*)*.

Material and Methods

This experiment was accomplished at the Mashhad ferdowsi University. alfalfa hay at 50% blooming stage and *Ulva* fasciata from salty water of boshehr were harvested. All feed samples were ground to pass through a 2 mm screen and then oven dried (Behdad Co., BC Oven 70, 3493,

Iran) at 65ºC for 48 h [AOAC]. The gas production procedure was performed as described by (Menke & Steingass, 1988). Rumen inoculum was collected from three ruminally fistulated steers (580 ± 4.5 kg, body weight) prior to offering the morning feeding. Animals were fed 10.4 kg DM, a diet containing alfalfa hay (50%), wheat straw (20%), barley grain (15%), soybean meal (14%) and mineral-vitamin premix (1%). Ruminal content was immediately blended and strained through four layers of cheesecloth to eliminate large feed particles and transferred to the laboratory in a prewarmed thermos. A sample of 200 mg was weighed into a 125-ml serum bottles in 3 runs and 4 replicates. Under continuous flushing of CO2, 30 ml of buffered rumen fluid (ratio of buffer to rumen fluid was 2:1) was dispensed with pipetor pump into a 125 ml serum bottle. Gas production was measured at 2, 4, 6, 8, 10, 12, 16, 24, 48, 72 and 96 h. Cumulative gas production data were fitted to the exponential equation $Y=b\ (1-e^{-ct})$, where b is the gas production from the fermentable fraction (ml), c is the gas production rate constant (ml h^{-1}), t is the incubation time (h) and Y is the gas produced at time t. Data was analysis by completely randomized design using the general linear model procedure of SAS.

Results and Discussion

The results of this experiment showed (Table 1 & figure 1) that gas production parameters of alfalfa hay was higher than *ulva* fasciata. Maybe lower gas production and lower part of b and c in ulva fasciata is due to higher amount of Ash in this treatment higher amount of organic matter is result to higher gas production (Blummel et al, 1997). The low gas production constant rate might be due to the slow releasing of nitrogen content of ulva fasciata in the incubation bottles. Furthermore, the high nitrogen content of the feedstuff caused an elevated amount of gas. The positive correlation between crude protein content and gas production is in agreement with the study of Labri et al who reported a positive correlation between crude protein content and potential gas production.

Table 1- Gas production parameters of alfalfa hay and *ulva* fasciata

Treat	b	c	SEM
alfalfa hay	59.96[a]	0.08[a]	**0.697**
ulva fasciata	46.93[b]	0.07[b]	**0.006**

b **:** gas production from fermentable part (ml), c: gas production rate constant (ml h-1), SEM: Standard error of means, Means with letters within each columns differed significantly (P<0.01).

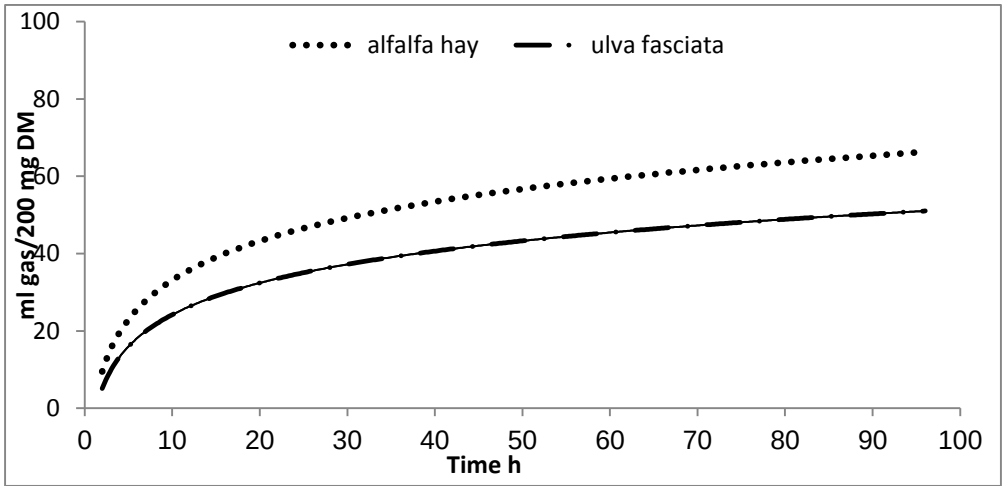

Fig. 1. Gas production profile of different treatments. As the standard errors were the same for all of the treatments, they are not shown in the figure. (SEM=1.46, R2=0.96)

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