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The study of digestibility and metabolizable energy of *Avena Fatuna* and *Aeluropus lagopoides* species of Sistan region by gas production technique

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ABSTRACT: Identification of chemical compositions and nutritional quality of range species which are fed to stocks is really important. Plant covering of arid regions like Sistan is mostly semi wheat plants among which Avena Fatua and Boni(Aeluropus lagopoides)would be mentioned. So, the purpose of this study was determination of chemical compositions, organic matter digestibility, and metabolizable energy of two species of Avena Fatuna and Aeluropus lapopoides in Sistan region by the use of gas production method. In order to do this, first, samples were gathered and chemical compositions by the use of standard method and organic matter digestibility (OMD) and metabolizable energy (ME) and gas production method were determined. Obtained results from this study showed that there is a meaningful difference between two species in term of chemical compositions (p<0/05). Ash content, crude protein, crude fat, cellular wall, and cellular wall without cellulose in two species of Avena fatua were more than Aeluropus lagopoides . Gas production percent in 96 hours incubation in Boni species was more than Aena fatuna (39/29 ml vs. 37/05 ml), but ME and OMD content were more in Avena Fatuna (p<0/05).

***Keywords*:** food value, wild, Boni, Sistan.

INTRODUCTION

In Iran condition due to the limitation of rainfall and shortage of excellent foliage sources, digestion has the greatest share of cost in stocks' productions.(Bashtini and Tavakoli).in order to obtain cheapest stock raising , economic issues on foliage production has been studied broadly. It is accepted in a global level that correct application and management of ranges is the most cost saving method in qualities and quantities of producing necessary feeding nutrition for producing and taking care of stocks. There is an extensive variety in chemical compositions, nutritional quality of edible material, due to the specie varieties, environmental condition, planting, growing, and harvesting condition, intensity and food processing condition. Therefore, determining nutritional quality of each one seems necessary from quality and quantity point of view based on mentioned condition. Different Foliage material are usually used to feed stocks and will partially or completely replace common edible material especially foliage and concentrated foods without causing any increase in productive performance of stock but they should decrease food- related costs (Abo El-Nor,1993).

Foliage food value represents energy which would be available for stocks(Arzani, 1994). So, knowledge about it will approach stock holder to his purpose. Bell (2002) have studied effective factors on foliage quality and have considered plant specie, growth season, phonological steps, and the proportion of stem to leave in plant, plant's dry material, crude protein, crude tissues, digestible dry material, all digestible edible material, and soil's nutritional elements condition as the most important ones. So, the purpose of this study was determination of nutritional quality of two species of Avena Fatua and Boni (Aeluropus Lagopodes) by the use of gas production technique.

MATERIALS AND METHODS

Studiedediblematerials

In order to do experiments, two range species of Avena Fatua and Boni (Aeluropus Lagopodies) from Sistan region were collected.

Samplingmethod

For each sample in each stage, 5 basses in three replicates were cut from aerial organs of studied specie randomly. Sampling time was on 2008, June. Removed samples in each step were put in special packages and then were transferred to stock feeding laboratory of Zabol University and were put for 72 hours in an open air in shadow and then after drying, plant samples were milled with a mill device with 2 mm diameter holes.

Chemicalcompositions

By the use of standard methods, factors like dry matter, crude protein with Kajaldol vehicle, crude fat with Souksle vehicle, organic matter and ash with burning in a with 550 degree centigrade (AOAC,1990), and cellular wall and cellular wall without hemi cellulose by the use of Van Souset and et al method (1991) were measured.

Gasproductionexperiment (invitro)

Gas production experiment has been done in stock feeding laboratory of Zabol University based on Menke and Estingash (1988). In order to perform gas production experiment, at first, nutrition sample milled with a net with 1mm diameter and 200+_15 mg dried matter in each 100 ml glass syringe. Stomach liquid of two male cows which were digested with foliage included and concentrated rations to holding extent gathered before morning digestion. Producing Culture environment by the use of mentioned solutions and increasing temperature to 39 degree centigrade and continuous stream of carbonic gas continued up to obtaining anaerobic condition and then stomach liquid and culture environment in suggested proportion (1 stomach liquid volume and 2 culture environment volumes) were mixed together and after continuous entering of Carbonic gas , 30 ml of mixture of stomach liquid and culture environment in each syringe were placed in incubator. Produced gas during 2, 4, 6, 8, 12, 24, 48, 72, and 96 hours after incubation was read and then necessary corrections in each incubation period were applied in each incubation period by the use of witness syringe (syringes without food sample).

Statisticalanalysis

Data in a completely random framework were analyzed by the use of SAS statistical software (2002) and comparison of averages was performed based on Duncan method.in order to draw diagrams, Excel software and in order to evaluate gas production super measures, Fit curve software were applied.

Results

Chemicalcompositions

Related data to the average of chemical composition of two species of Avena Fatua and Aeluropus Lagopoides are shown in table 1. Among chemical compositions there was a meaningful difference except for dry matter ($p<0/05$). The highest percent of crude protein was observed while the lowest percent was 9/30 in two species. Varen (1990) reported the percent of crude protein obtained from chemical decomposition of some semi wheat species from 9 to 22. Kochaki and Mahalati (1994) reported the percent of crude protein for 12 wheat species from 8/20 to 19/16. Ash, crude protein, NDF, ADF in Boni were more than Aeluropus lagopoides but organic matter and WSC in Aeluropus Lagopoides were more than Boni($p<0/05$).Aljolood (2001) reported NDF percent of S. vermiculata and S.fruticosa species as 37/6 and 35/6 percent, he , in his study on some of semi wheat in Saudi Arabobtained the percent of NDF in four semi wheat species of S. vermiculata , S. fruticosa, Avena fatua and Anabasis as 10/1, 22/6, 17/6, 15/3 percent respectively which show some differences with obtained results from present study. Generally, observed differences will be attributed to the variability of studied species and difference in growing condition (Hassan and Saher, 1993). Erfanzadeh (2001) reported that quality of range plants in different locations and times is variable because different factors affect their quality and food value. One of these factors is growth phonologic step.

Gasproduction

The average of produced gas ((ml in 200 mg dry matter) during different incubation times and measurements of that two species are shown in table 2. As it is observed by increasing incubation time, produced gas increases. (diagram1). The highest percent of gas production in 96 hours is related to Boni(39/42 ml).($p<0/05$) .Organic matter digestibility percent (OMD) and metabolizable energy (ME)in Avena Fatua were more than Boni but a meaningful

difference was not observed. B part (potential production part) in Boni (42/11 ml) was more than Avena Fatua(38/91).(p<0/05) organic matter digestibility percent in studied species was from 47/99 to 48/33 and metabolizable energy was from 6/91 to 6/98 mega joule in kg of dried matter. Varn et al (1990) reported the digestibility of three Atriplix species from 44 to 69 percent. Kochaki and Mahalati (1994) reported the digestibility of 12 species from 41/5 to 78/5 percent. Obtained results by mentioned researchers are to large extent correspondent with present study.

Table1. the average of chemical compositions of Avena Fatua and Aeluropus lagopoides(percent)

(WSC)	(ADF)	(NDF)	(EE)	(CP)	(Ash)	(OM)	(DM)	species
^{a}11/95	^{b}28/64	^{b}41/14	^{b}2/26	^{b}9/30	^{b}33/67	^{a}66/33	^{a}94/96	Avena Fatua
^{b}8/99	^{a}31/27	^{a}47/54	^{a}2/76	^{a}11/46	^{a}36/23	^{b}63/77	^{a}94/51	Aeluropus lagopoides

Numbers with similar alphabet in each row have no meaningful difference from statistical view.

Table 2. the volume of produced gas (ml in 200 mg dry matter) in different incubation times of two Avena Fatua and Aelluropus lagopoides and their measurements

ME	OMD	c	b	*96*	72	48	24	12	6	4	species
^{a}6/98	^{a}48/33	^{a}0/072	^{b}38/91	^{b}37/07	^{b}37/05	^{b}36/96	^{a}34/93	^{a}19/81	^{a}12/18	^{a}9/11	Avena Fatua
^{a}6/91	^{a}47/99	^{a}0/063	^{a}42/11	^{a}39/42	^{a}39/29	^{a}38/60	^{a}34/18	^{b}18/92	^{b}10/91	^{b}8/42	Aeluropus lagopoides

Numbers with similar alphabet in each row have no meaningful difference (p<0/05) b: potential gas production part, c: gas production's constant rate, OMD: digestibility of organic matter, ME: metabolizable energy.

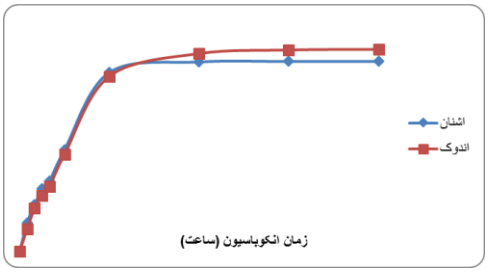

Diagram 1. produced gas volume (ml in 200 mg dry matter) of two species in different incubation times

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