

PROCEEDINGS



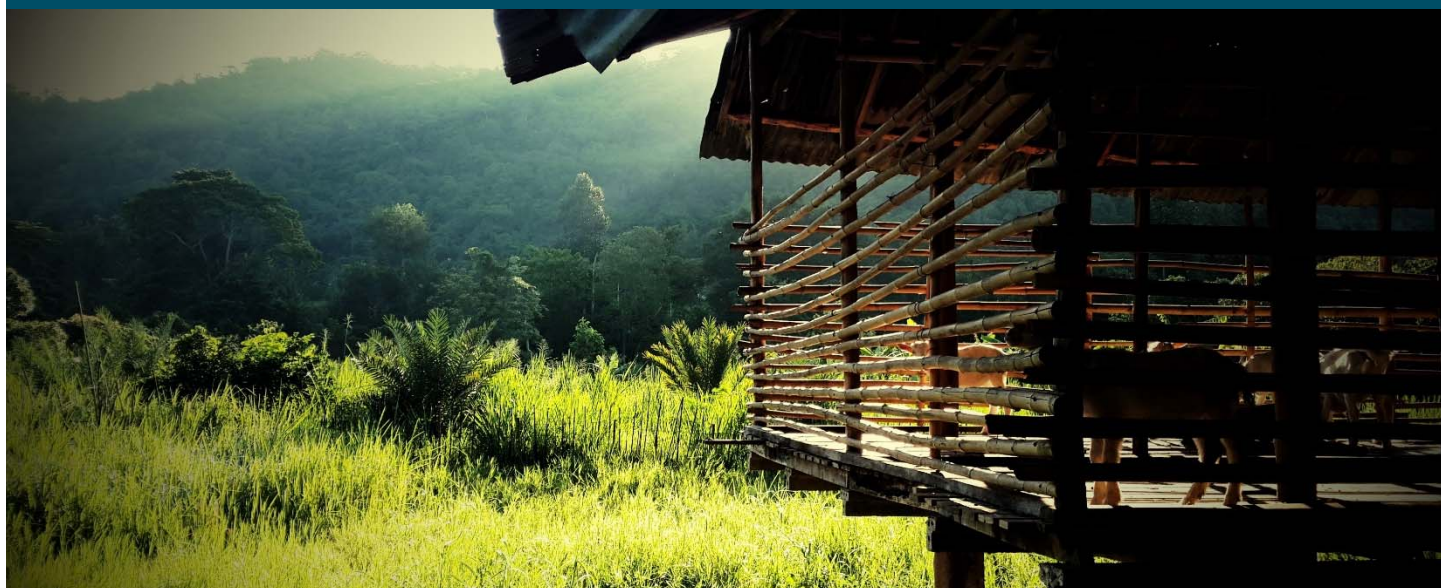
5th

SAADC 2015

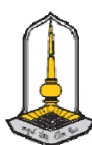
The 5th International Conference on
Sustainable Animal Agriculture for Developing Countries

**“CLIMATE SMART SUSTAINABLE ANIMAL AGRICULTURE FOR FOOD SECURITY
AND LIVELIHOOD IMPROVEMENT IN THE DEVELOPING COUNTRIES”**

October 27-30, 2015, Dusit Thani Pattaya Hotel, THAILAND



Jointly organized by



To compare intestinal available protein of *Ulva Fasciata* with alfalfa hay using a new gas technique

Eyni, B., Paktinat*, M. & M. Danesh Mesgaran

Department of Animal Science, Faculty of Agriculture, Ferdowsi University of Mashhad, P. O. Box 91775-1163, Mashhad, Iran

Abstract

This study was carried out in to compare the amount of ruminant intestinal available crude protein (uCP) of *Ulva Fasciata* (seaweed) with alfalfa hay. using a new modified gas technique. The plant samples of particle size of 2 mm were oven dried at 65°C for 48 h. To perform the gas test, rumen fluid was collected before the morning feeding from two rumen fistulated Holstein dairy cows (640 ± 38 kg, body weight). Feed samples (200 mg) and blanks (only 30 ml of buffered rumen fluid) incubated simultaneously in three repeats for 8, 24 and 48 hours. At the end of the each incubation time, the uCP was calculated as non-ammonia N which was calculated by subtracting the amount of ammonia N released in the incubation medium of the total incubated N (sum of N content of feed sample and ammonia N in blanks). Effective uCP (EuCP) was calculated via an exponential equation using the estimated uCPs at 8, 24 and 48 h post incubation. Effective uCP (at the passage rate of 0.06/h) of *Ulva fasciata* (122/91) were significantly ($P < 0.01$) higher than that of alfalfa hay (152/67). The result showed that uCP in 24 and 48 h was higher in *Ulva Fasciata* (149.58, 125/1) than the value obtained from alfalfa hay (105/43, 49/91) respectively ($P < 0.05$).

Keywords: *Ulva fasciata*, alfalfa hay, protein

*Corresponding author: Paktinat55@yahoo.com

Introduction

Seaweeds could be a potentially valuable resource for ruminants feeding but not yet valued by the Algerian scientific community, although their utilization as feed supplements for livestock is not new. Arieli et al (1993) showed that seaweed *Ulva lactuca* is an interesting feed supplement for sheep, but not for poultry. Ventura & Castanon (1998) pointed out that this species represents medium quality forage for goats, with high protein content. Hansen et al (2003) concluded that seaweeds *Laminaria digitata* and *Laminaria hyperborea* have the potential to be used as an alternative feed source for small ruminants under some conditions. Mora castro et al (2009) suggested that marine algae *Macrocystis pyrifera* represents a good unconventional feeding as a nutritional supplement for goats. Rjiba ktita et al (2010) concluded that seaweeds *Ruppia maritima* and *Chaetomorpha linum* could be used as alternative feed resources for growing lambs during drought periods. The objective of this study was determining utilizable crude protein of *ulva fasciata* and alfalfa hay, and investigating possibility of replacement of alfalfa with this seaweed.

Material and methods

In our study rumen fluid 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%). The fluid was extracted before the morning feeding and transported in a pre-warmed thermos, which was completely filled, and immediately sealed. The rumen fluid was filtered through two layers of cheesecloth into a warm flask and then added to the reduced buffer solution. After allowing 15 min to acclimatise, 30 ml of the solution was added to a pre warmed syringe containing 200 ± 30.0 mg substrate. Syringes were immediately placed in a rotary incubator which had been prewarmed to 39°C . The starting time of the incubation was recorded after all syringes had been filled. Each feedstuff was analysed in duplicate (analytical replicates) and over two runs using different batches of rumen fluid (statistical replicates). At the end of each incubation time (8 and 48 h) gas volume was recorded and syringes put on ice to stop microbial activity. Syringes remained in the ice for a minimum of 2 h and until required for ammonia analysis. Gas production (GP) was also recorded at 24 h for use in calculation of ME. At both the 8 and 24 h readings, the plunger was set back to 30 ml (not for the blank). A blank, containing rumen fluid/buffer solution without added substrate ($\text{NH}_3\text{N}_{\text{blank}}$), was also incubated in duplicate alongside the samples for 8 and 48 h. Ammonia-N (mg $\text{NH}_3\text{-N}/30$ ml) from both the blank and from the syringes containing substrate ($\text{NH}_3\text{N}_{\text{sample}}$) was measured by distillation and used in the following calculation:

$$\text{uCP (g/kg DM)} = \frac{\text{NH}_3\text{N}_{\text{blank}} + \text{N}_{\text{sample}} - \text{NH}_3\text{N}_{\text{sample}}}{\text{weight (mg DM)}} \times 6.25 \times 1000$$

to calculate effective uCP to assumed passage rates (K_p) of 0.02, 0.04 and 0.06/h using the formula:

$$\text{effective uCP} = y + a \times \ln \left(\frac{1}{K_p} \right)$$

Data analysis was carried out with the SAS GLM procedures (SAS, 1996).

Results and Discussion

Results of this experiment are in tables 1 and 2. amount of uCP, relative uCP, Effective uCP and relative effective uCP of *ulva fasciata* was higher than alfalfa hay. The uCP is the sum of rumen undegraded feed protein (UDP) and microbial protein available at the duodenum; and effective uCP is the uCP value accounting for a specific passage rate (melesse et al, 2013). In contrast to metabolisable protein (AFRC, 1993), uCP is based on crude protein not taking into account true protein and its intestinal digestibility maybe lower amount of amonia production is result to high amount of CP flow in to deudenum that could be Advantageous for ruminant. this result show that *ulva fasciata* is a good replacement for alfalfa hay although further investigation is required.

Table 1- utilizable crude protein (uCP), Amoniacontent and Relative utilizable crude protein (uCP/CP%) of *ulva fasciata* and alfalfa hay (g/kg DM)

	ulva fasciata			Alfalfa hay		
	8	24	48	8	24	48
Amonia	0.03 ^b ±0.12	0.6 ^b ±0.14	1.38 ^b ±0.15	0.96 ^a ±0.12	2.98 ^a ±0.14	4.89 ^a ±0.15
uCP	167.5±4	149.58 ^a ±4.4	125.1 ^a ±4.5	168.4±4	105.43 ^b ±4.4	49.91 ^b ±4
Relative uCP	99.7 ^a ±2.04	89.03 ^a ±2.2	74.46 ^a ±2	84.75±2.04	53.06 ^b ±2.2	25.12 ^b ±2

Means with letters within each raw differed significantly ($P < 0.05$).

Table 2- Effective utilizable crude protein (EuCP) and Relative Effective utilizable crude protein (EuCP/CP%) of ulva fasciata and alfalfa hay (g/kg DM)

	ulva fasciata	Alfalfa hay	SEM
EuCP (g/kg)	152.67 ^a	122.91 ^b	5.6
EuCP (uCP/CP%)	90.87 ^a	61.85 ^b	2.9

Means with letters within each raw differed significantly ($P < 0.05$), SEM: Standard error of means.

References

- AFRC, 1993: Energy and Protein Requirements of Ruminants. CAB International, Wallingford, UK.
- Arieli, A., D. Sklan and G. Kissil, 1993. A note on the nutritive value of *Ulva lactuca* for ruminants. Anim. Prod. 57: 329-331.
- Hansen, H.R., B.L. Hector and J.Feldmann, 2003. A qualitative and quantitative evaluation of the seaweed diet of North Ronaldsay sheep. Anim. Feed. Sci. Technol. 105: 21-28.
- Melesse A., H. Steingass, J. Boguhn and M. Rodehutschord. 2013. In vitro fermentation characteristics and effective utilisable crude protein in leaves and green pods of *Moringa stenopetala* and *Moringa oleifera* cultivated at low and mid-altitudes. Journal of Animal Physiology and Animal Nutrition. 97: 537–546.
- Mora Castro, N., M. Casas Valdez. A. Marín Álvarez. R N. Águila Ramírez. I. Sánchez Rodríguez. H. Hernández Contreras and L.Sanginés García, 2009. The kelp *Macrocystis pyrifera* as nutritional supplement for goats. Revista Científica. XIX. 1: 63-70.
- Rjiba Ktita, S., A.Chermi and M.Mahouachi, 2010. The use of seaweeds (*Ruppia maritima* and *Chaetomorpha linum* for lamb fattening during drought periods. Small Ruminant Res. 91:116-119.
- Ventura, M.R. and J.I.R. Castanon, 1998. The nutritive value of seaweed (*Ulva lactuca*) for goats. Small Ruminant Res., 29: 325-327.