International Journal of Science, Environment and Technology, Vol. 4, No 3, 2015, 624 – 627

ISSN 2278-3687 (O)
2277-663X (P)

CHEMICAL COMPOSITION AND IN VITRO DRY MATTER DIGESTIBILITY OF FODDERS

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The *in vitro* gas production technique has been frequently used to assess biological values of feeds based on their pattern of accumulated gas when incubated with rumen fluid under anaerobic conditions. The objective of this paper was to describe the procedures of an *in vitro* gas production technique using a fermentation chamber as previously describe by Tedeschi *et al.* (2008) and to compare the parameter estimates of *in vitro* gas production of fodder samples that have been commonly used to describe gas production profile of fodders for ruminants.

Materials and Methods

The following fodder samples were used in this experiment: Cowpea *(Vigna unguiculata)* is the most important leguminous fodder crop suitable for both summer and rainy seasons, mainly due to its- quick growing habit and high yielding ability. Guinea grass *(Panicum Maximum)* as an excellent fodder it is much valued for its high productivity, palatability and good persistence. Dual purpose sorghum (*sorghum bicolar*) is an ideal tropical forage crop. It is fairly drought resistant and suited for areas where moisture is a limiting factor for crop growth. The crop can be raised during both monsoons. Hybrid Napier *(Pennisetum typhoides* x *P. purpureum)* leaves are larger and greener, the sheaths are softer and the margins less serrated and hence the herbage is more palatable. It is juicier and succulent at all stages of growth. It is less fibrous and more acceptable. Forages were harvested by hand at flowering maturity stage. Samples were taken from each fodder and those samples were dried at 60^0C for 48 h in a fan-assisted oven.

Chemical analysis

After drying samples were milled through a 2mm sieve for chemical analysis and *in vitro* gas production procedure. The DM was determined by drying the samples at 105^0C overnight and

*Received April 17, 2015 * Published June 2, 2015 * www.ijset.net*

ash was determined by igniting the dry samples in muffle furnace at 550^0C for 4 h. The crude fat (EE) content was analyzed using the ether-extraction method. Nitrogen content was measured by the Kjeldahl method (AOAC, 1990). The CP was calculated as N×6.25. The OM was calculated as the difference between DM and ash.

Brief principle of mineral analysis by wet digestion method

- **Determination of calcium**

The calcium in the sample is precipitated as calcium oxalate using ammonium oxalate in acidic medium. The precipitated calcium oxalate is filtered out, washed with ammonium hydroxide to free Ammonium oxalate from the precipitate and dissolved in hot sulphuric acid and the liberated oxalic acid is estimated by permanganimetric titration.

- **Determination of phosphorus**

Phosphorus in the sample is converted to Phospho Molybdo-Vanadate complex and the intensity of colour is measured at 400 nm in a UV-visible spectrophotometer.

- **Determination of magnesium**

Magnesium is separated from calcium and iron in the sample. The solution is brought to pH 10 by the addition of ammonia buffer and complexes with EDTA in the presence of Eriochrome black - T.

- **Determination of iron**

The iron present in the sample is complexed with 2, 2'– bipyridine and the colour developed is spectrophotemetrically measured at 519 nm. Any Ferric ion present in the sample is reduced by thioglycollic acid to ferrous ions.

- **Determination of copper**

Copper forms a complex compound with EDTA, the colour of which is developed by the addition of sodium diethyl dithiocarbamate, which is extracted and estimated colorimetrically at 440 nm.

Determination of manganese

The acid soluble manganese in animal feed is oxidized to potassium permanganate with potassium periodate in an acidified sample solution free from organic carbon. The resultant colour developed is read in a photoelectric colorimeter or spectrophotometer at 530 nm.

In vitro dry matter digestibility

Samples were incubated in a medium prepared as described by Tilley and Terry (1963). Fourty ml of phosphate-carbonate buffer (Mc Dougall, 1948) was supplied into 100 ml bottles that approximately contained 0.5 g of feed (2 replicate). Then, each flask was

inoculated under carbon dioxide with 10 ml of mixed rumen microbes. Rumen fluid was obtained from adult cattle by using rumen fluid collecting pump, before the morning feeding, and immediately strained through four layers of cheesecloth. The flasks were incubated for 24 and 48 h at 38°C. Then, bottle content was filtered through a 42 no. filter paper, and DM of the unfiltered medium was determined.

PROXIMATE ANALYSIS REPORT

S. No	Analysis	Co4	DPS	GG	Cowpea
1.	Moisture %	82.23	68.9	78.14	77.24
2.	Crude protein %	1.2	0.37	0.96	1.51
3.	Crude fibre %	28.24	30.23	30.31	18.41
4.	Ether extract %	1.35	1.31	1.62	2.72
5.	Total ash %	11.17	10.54	9.45	8.81
7.	Sand and silica %	2.91	2.53	1.98	0.53

MINERAL COMPOSITION OF FODDERS

S. No	Analysis	Co4	DPS	GG	Cowpea
1.	Calcium %	2.09	0.7	1.5	3.39
2.	Phosphorus %	0.66	0.37	0.38	0.46
3.	Magnesium %	11	8.3	6	10.78
4.	Sodium %	0.5	0.8	0.6	0.11
5.	Potassium %	2	3.5	10.2	10.7
6.	Copper (ppm)	8.66	9.87	12.07	13.71
7.	Iron (ppm)	338.46	227.88	591.77	559.43
8.	Manganese (ppm)	92.6	59.28	142.73	107.9

IVDMD REPORT

Analysis	24 Hrs				48 Hrs			
	Co4	DPS	GG	Cowpea	Co4	DPS	GG	Cowpea
IVDMD %	38.9	25.02	38	61.26	42.38	39.44	45.04	68.84

INVITRO FERMENTATION CHAMBERS

Analysis	24 Hrs				48 Hrs			
	Co4	DPS	GG	Cowpea	Co4	DPS	GG	Cowpea
AMMONIA %	9.52	11.9	16.66	14.28	7.14	9.52	14.28	11.9
TOTAL VFA (mmol/l)	20	9	28.5	39	22.5	12	31	41.5

DPS – Dual purpose sorghum
GG – Guinea grass

References

[1] Marta López-Alonso, 2012. Trace Minerals and Livestock: Not Too Much Not Too. Little *Department of Animal Pathology, Veterinary Faculty, 27002 Lugo, Spain.* ID 704825.http://dx.doi.org/10.5402/2012/704825

[2] Orskov and Mc Donald, I., 1979. The estimation of protein degradability in the rumen from incubation measurements weighed according to rate of passage. J. Agri. Sci. (camb.) 92: 499.

[3] Sundaram, T.K., A. Natarajan and D. Chandrasekaran, 2012. Standard Operating Procedure manual.

[4] Underwood, E.J and N.F.Shuttle. 1999. The Mineral Nutrition in Livestock CABI Publishing, CAB International, Wallingford. pp 614.

[5] www.cgiar.org/our-research/crop-factsheets/cowpea/

[6] www.dpi.nsw.gov.au/reader/1201