https://doi.org/10.29321/MAJ.10.A02781

Madras agric. J. 69. (11): 733—735 November 1982

In vitro organic matter digestibility of certain legumes.

J. ERNEST

A comparative study has been conducted on Lucerne (*Medicago sativa*), Cowpea (*Vigna sinensis*) and Sunhemp (*Crotalaria juncia*) with regard to the *in vitro* digestibility of organic matter at different days of cutting. Maximum organic matter digestibility was seen at 20th day of cutting for all three legumes. A highly significant correlation ($P < .01$) between *in vitro* organic matter digestibility and stage of cutting was observed in this study.

The *in vitro* mehod has been used in evaluation of fodder for assessing the nutritive value of feed stuffs. One of the most promising laboratory methods for estimating forage nutritive value has been the *in vitro* fermentation techniques. Reymond and Terry (1966) found a correlation between *in vitro* organic matter digestibility and average daily gain. Barnett and Reid (1957) have studied the production of VFA from grass by rumen liquor in an artificial rumen. A comparative study was made on different legumes to determine their nutritive values based on VFA production by Sarma *et.al.* (1980). The present investigation has been carried out to find out the maximum organic matter digestibility *in vitro* for the three legumes namely Lucerne (*Medicago sativa*), Cowpea (*Vigna sinensis*) and Sunhemp (*Crotalaria juncia*) at different days of cutting.

MATERIAL AND METHODS

Three experimental plots 8'x8' were prepared and manured. The legume seeds such as Lucerne, Cowpea and Sunhemp were sown in respective plots and watered regularly. Each plot was divided into four quarters. At 20, 40, 60 and 80 days. the legumes were cut from each plot and from each quarter in order. The cut legumes were dried in hot air oven, ground to a mesh size of 0.42 m m. and preserved. The proximate analysis of legume samples was determined as per A.O.A.C. (1970). Rumen liquor was drawn from fistulated animal (Ernest and Thomas, 1973, 1976) through a rubber tube connected to a vacuum pump in to a prewarmed and Co filled conical flask. It was filtered through six layers of cheese cloth. A 25 ml. portion of this strained liquor was added to 30 ml. nutrient solution as per Baumgardt *et al.* (1962).

One gram of each sample was weighed in duplicate and transferred to series of 150 ml. boiling tube fitted with a rubber stopper for incubation. Anaerobic conditions were maintained by passage of a very slow stream of Co_2 over the contents in the tube. Each tube served as an individual artificial rumen. The tubes were then incubated for 24 hours at 39°C in a thermostatically controlled water bath. Control

Associate Professor, Sheep Breeding Research Station, Sandynallah.

tubes in duplicate were also incubated without the substrate. At the end of 24 hours of incubation, the cotents of the tubes were transferred to centrifuge tube (Cellulose nitrate plastic tubes) and centrifuged at 2000 rpm. for 10 minutes. The supernatant decanted. The precipitate was transferred to a previously weighed silica dish. The contents were dried in hot air oven and then ashed in muffle furnace. The *in vitro* organic matter digestibility was calculated as per the method described by Baumgardt *et al*. (1962).

RESULTS AND DISCUSSION

The chemical composition of all three legumes at different days of cutting and the data for *in vitro* organic matter digestibility are presented in Table1. The analysis of variance showed that the differences among the stage of cutting ($P < .01$) and *in vitro* organic matter digestibility ($P > .01$) were highly significant for all the three legumes.

The organic matter digestibility was higher for Cowpea than the other two legumes. Physical structure of the herbage is of great importance in determining the resistance to break down of herbage in the rumen (Ulyatt, 1973). Church and Peterson (1960) have stated that not only the amount of structural carbohydrate in the herbage but also the way it was organised within the plant cell wall are responsible for the rate of breakdown in the rumen. The overall mean acid insoluble ash content was lower for Cowpea than in the other two legumes. There was a linear relationship between soluble ash content and organic matter digestibility *in vitro*. Reymond and Terry (1963) have found a correlation be tween *in vitro* organic matter digestibility and average daily gain.

Eventhough the organic matter digestibility was more at 20 days of cutting for all the legumes, considering the economics 40 days of cutting would be more preferable. Highly significant correlations ($P < .01$) were observed betweend ifferent stages of matutity and *in vitro* organic matter digestibility in all the three legumes.

The *in vitro* organic matter digestibility can serve as an inexpensive means for preliminary testing prior to actual feeding trials. It can also provide a reliable clue to the quality of hercage.

REFERENCE

A.O.A.C. 1970. Officiar Methods of Analysis, Washington. D.C.Association of Official Agricultural Chemists.

BARNETT, A. J. G. and R. L. REID 1957. Studies of the production of VFA from grass by rumen liquor in artificial rumen. 1. Volatile fatty acid production. *J. Agric Sci*: 48: 315

BAUMGARDT, B. R. M. W. TAYLOR and J. L. CASON 1962. Evaluation of forage in the laboratory *J. Dairy Sci*. 45:62.

CHURCH, D.C. and R. G. PETERSON, 1960. Effect of several variables on *In vitro* rumen fermentation *J. Dairy Sci*. 43:81.

ERNEST J. and R. O. THOMAS 1973. Levels and sources of sulphur for *in vitro* protein production. *Indian Vet. J.*50: 1092.

ERNEST J. and THOMAS 1976. Sulphur utilization: Acetic acid production *In vitro*. Indian Vet. J. 53:28.

REYMOND W.F. and R.A. TERRY 1966. Studies on herbage digestibilities by *in vitro* method *Outlook on Agriculture* 5:60

SARMA P.V., K.T.K. NAMBIAR and M.V.N. RAO 1980. Comprative evaluation of certain herbages. *Indian, J. Anim. Res.* 14:6.

ULYATT M. J. 1973. In chemistry and biochemistry of herbages, 3;131 Ed. G. W. BUTLER and R. W. BAILEY. Academic press, London.

Table 1. Chemical composition experimental legumes at different days of cutting.

Days of cutting	Types of experimental legumes	Crude protein %	Crude fibre %	Ether extract %	Total ash %	Nitrogen free extract %	Acid insoluble ash %	*In vitro* organic matter digestibility %
20	Lucerne	26.7	21.0	3,28	11.8	37.2	5.47	31.5
	Cowpea	23.2	19.7	3.31	12.9	41.0	5.82	32.0
	SunHemp	18.6	23.1	3.30	12.5	42 5	6.12	29.3
40	Lucerne	28.0	24.7	3.01	12.4	31.8	6.15	29.5
	Cowpea	24 6	20.1	2.89	13.1	39.3	6.54	29.9
	SunHemp	20.5	26.0	2.46	12.9	38.1	6.11	27.8
60	Lucerne	29.0	25.1	2.62	12.9	30.4	6 42	26.3
	Cowpea	25.0	23.1	2.72	12.4	36.2	6.15	27.2
	SunHemp	18.5	29.0	2.37	10.8	39.3	5.58	25.9
80	Lucerne	28.0	28.9	2.08	12.0	28.9	5.85	24.4
	Cowpea	23.6	25.0	2.45	11.4	37.6	5.58	25.9
	SunHemp	15.9	31.6	2.30	9.7	40.5	5.23	25.1