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Annals of Biological Research, 2012, 3 (3):1318-1321
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Determination of whole L17 soybean seed degradability with nylon bag Technique

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ABSTRACT

This study was carried out to determine whole seed soybean L17 (WSB) dry matter degradation characteristics by using nylon bags. The rumen degradability of WSB dry matter at ruminal outflow rate of 0.02/h, 0.05/h and 0.08/h were 72.90, 54.56 and 45.36 respectively. Dry matter degradability of WSB at 0, 2, 4, 8, 16, 24 and 48 h incubation were 21.79, 22.75, 27.17, 34.84, 53.04, 79.56 and 83.96 percent.

Key words: Whole soybean seed, L17 variety, Dry matter degradation, *in situ*.

INTRODUCTION

Soybean is one of the major sources of protein. They are an excellent source of essential amino acids. Soybeans provide protein and energy to the ration. Soybeans that have not been heated provide a source of degradable and soluble protein. Raw soybeans do contain a trypsin inhibitor and possibly other antienzymes, which may reduce protein digestion and utilization by single-stomached animals. Whole soybeans typically contain 35 to 42 percent crude protein and 16 to 20 percent fat (dry matter basis). Protein-rich feeds of plant origin, such as soybean (Glicine max L.) have high ruminal degradability [11, 10, 12]. Thus, the advantages of using good quality protein, in terms of the balance between essential AA and digestibility, are lost due to extensive protein degradation in the rumen to peptides, amino acids, and ammonium [10]. Rapidly growing ruminants and lactating dairy cattle rely on both microbial protein and rumen undegradable protein (escape protein) digested in the small in testing to meet their amino acid requirements. When good quality protein is fed to ruminants, it is subject to extensive microbial fermentation. During fermentation most protein is degraded to peptides, amino acids, and finally to ammonia [1]. Incubation of feeds in nylon bags in the rumen of fistulated ruminants has been used to determine the extent to which the protein fraction of feeds is degraded in the rumen [6, 8]. Ørskov et al (1980) [7] observed that the nylon bag technique was not only a powerful tool for indexing the relative degradability of feedstuffs, but that it may also be used to study rumen processes, as it is possible to vary the factors within the bag, or within the rumen. The aim of this experiment was to determine L17 whole fat soybean degradability with nylon bag technique.

MATERIALS AND METHODS

2.1. Samples preparation

The verity of the soybean samples is the soybean L17.

2.2. Animal and diets

Three ruminal cannulated Iranian Ghezel male sheep weighing approximately 54kg were placed in individual 2.2 * 1.8m pens with concentrate. Floors that cleaned were regularly. Sheep's were fed 4kg dry matter, a total mixed ration containing concentrate and alfalfa hay, diets twice daily at 08:00 and 14:00 h.

2.3. In situ evaluation of dry matter degradability

Nylon bag technique was used to measure disappearance in the rumen of whole soybean. Nylon bags (45-m pore size. 8cm * 16cm bag size) containing 5g of dry whole soybean samples were incubated in the rumen of each sheep. two bags of whole soybean were removed after 2, 4, 8, 16, 24 and 48h of incubation in the rumen. Then individual bags with content were washed in running tap water until the bags were free of rumen matter. Bags were then dried to a constant weight at 55oC for 48h and weighed.

Washing loss was determined by socking samples in water at 37- 40 °C.

RESULTS AND DISCUSSION

The chemical composition of whole soybean shown in Table 1. There are many factors affecting chemical composition of concentrate feedstuffs such as stage of growth, maturity, species or drying method, growth environment [3] and soil types [9].

Chemical composition, including dry matter, ether extracts, crude protein, crude fiber and Ash, 92, 17, 6, and 35.32 percent, respectively measured.

Table 1 .The chemical composition whole soybean seed (As g/kg of DM)

Dry matter	ether extract	Crude fiber	Crude protein	Ash
92%	17%	6%	35.32%	6.02%

The rumen degradation characteristics of dry matter are presented in Table 2.

The degradability for the soluble fraction (a), insoluble fraction (b) and Potential degradability (a+b) were 16.77%, 80.99%, 97.77% respectively and the rate degradability(c) 0.042/ h were estimated. Effective degradability (ED) of the examined nutrient components was calculated using the outflow rates of 0.02, 0.05 and 0.08/h, according to Ørskov et al. (1980) [5].

Table2: In situ dry matter degradability of whole soybean seed

Incubation times						
0	2	4	8	16	24	48
21.79	22.75	27.17	34.84	53.04	79.56	83.96

Parameters of Degradability				Effective degradability (%) at passage rate (% at hour)		
A	B	a+b	C	2	5	8
16.77	80.99	97.77	0.042	72.90	54.56	45.36

Soluble fraction of dry matter in the zero time of incubation is the 16.77 percent and with ascending rate reached to 22.5 and 27.17 percent in the 2 and 4 time respectively, 16 time of incubation is critical for passage post rumen and its as a source of escape protein and approximately half of soybean seed dry matter (53.04 percent) could be pass to small intestinal.

All discrepancies reported in varietal differences in the meal incubated, in situ technique, basal diet or variation. In the extent of microbial contamination were incubated samples [2].

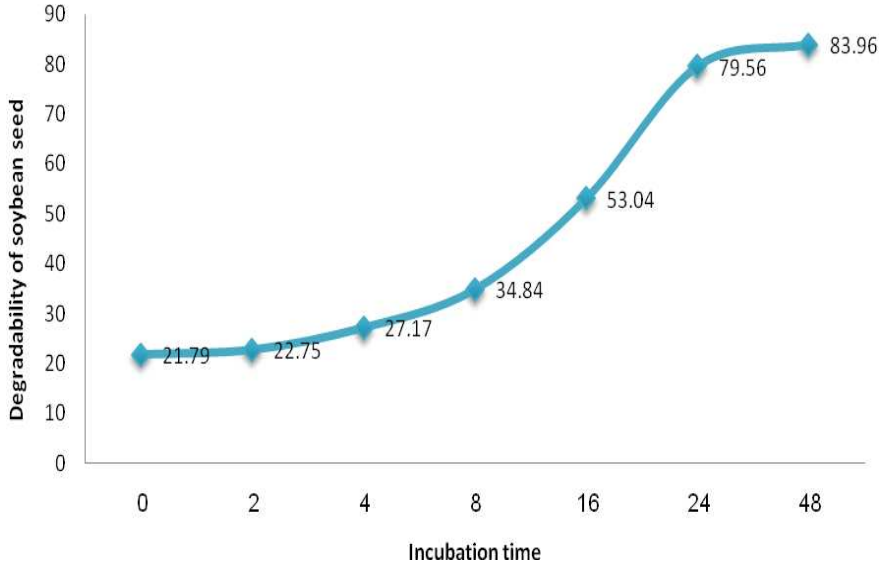

Fig. 1. In situ dry matter degradability of whole soybean seed

CONCLUSION

The crude protein percent in the whole soy bean seed were to 35.32%, therefore recommended the use of these resources be used to supplement protein in ruminant diets. Soluble fraction of dry matter is relative low but slowly degradable fraction (b) is high and this condition show that processing method is good for improve decrease rate of degradation.

Whole soybean CP was effectively protected from degradation in the rumen by extrusion without negative effect on intestinal digestibility of UDP [4]. Various methods have been used to increase ruminal bypass protein; with one of this methods are treat soybeans. Of these methods, roasting, extrusion and expeller treatment are most commonly used in the U.S. feed industry. All of the methods involve the Maillard reaction. Controlling this reaction by optimizing the heating process is the key to successful protection of soybean protein. The properly treated soybeans produces through each of these processes significantly reduced its ruminal protein degradation without affecting its intestinal protein digestion and absorption. Substantial benefits in term of increased milk production and improved growth can be obtained by feeding properly treated soybeans as a protein supplement to dairy and beef cattle over untreated soybeans. To the product quality through better controlling the Millard reaction. Further research is also needed to increase the understanding of animal responses to inclusion of heat-treated soybeans in dairy or beef cattle diets.

Acknowledgement
The authors gratefully thank the Islamic Azad University Shabestar Branch for financial support and especially like to thank Dr. R. Salamatdust

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