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Determination of Cottonseed meal degradability with nylon bag Technique

Reza Ebrahimpour azhdari, Ramin SalamatDoust, Ali Lak

Department of Animal Science, Shabestar Branch, Islamic Azad University, Shabestar, Iran

ABSTRACT

The effect of the duration of the cottonseed meal on the degradability of DM in the rumen was determined using the in situ technique. The degradation of DM was determined in nylon bags suspended in the rumen for 2, 4, 8, 16, 24 and 48h. The rumen degradability of cottonseed meal dry matter at ruminal outflow rate of 0.02/h, 0.05/h and 0.08/h were 64.6, 51.9 and 45.2 respectively. Dry matter degradability of Cottonseed meal at 0, 2, 4, 8, 16, 24 and 48 h incubation were 21.64, 29.29, 35.13, 44.63, 51.93, 62.11 and 76.68 percent respectively.

Keywords: cottonseed meal, nylon bag, degradability, *in-situ*.

INTRODUCTION

Cottonseed meal (CSM) is used in dairy diets because of its lower price, limited use in nonruminant diets, and greater escape protein when compared with soybean meal [1]. However, limited access to CSM superimposed on its low Lys and Met concentrations and variable gossypol content appear to limit its dietary use for lactating cows [1]. Because of the process by which oil is extracted, cottonseed meal yields a predominately bound form of gossypol compared to whole cottonseed. After they are separated from the hull, the cottonseed meats are moistened, flaked and cooked before being put through an expander, extracted, and then desolventized and toasted (in another type of stacked heater called a DTDC) before being ground into a meal [3]. This processing method binds much of the gossypol leaving only 0.1- 0.2% as free gossypol. More than 97% of the meal from plants in the United States is made using this process (National Cottonseed Products Association, personal communication). This level of free gossypol is a decrease of nearly 50% from the 1960s and 1970s because of expander technology introduced to the oilseed industry. Surveys conducted by the National Cottonseed Products Association (NCPA) in the early 1990s and again in 2000 showed that the levels of free gossypol in meal manufactured with expander-solvent technology continue to remain low (< 0.18%). [3,6]

After oil, cottonseed meal is the second most valuable and most abundant byproduct of the crushing process. The nutrient analysis of CSM will depend on the process used to extract the

cottonseed oil. The standard CSM is 41% crude protein on an as fed basis. The crude fiber level of CSM is significantly higher (13 vs.5%) than that of soybean meal. Consequently, the protein and energy content of CSM is approximately 10 and 5%, lower respectively than soybean meal. According to Coppock (1987) [1], the nutritional protein degradability of CSM is similar to that of peanut meal, canola meal, and soybean meal for lactating dairy cows, and to that of canola meal and soybean meal for young calves.

The aim of this study is that degradability of dry matter cottonseed in different incubation time with nylon bag technique.

MATERIALS AND METHODS

2.1. Samples preparation

The sample is cotton seed meal that prepared.

2.2. Animal and diets

Three ruminal cannulated Iranian Ghezel male sheep weighing approximately $54\text{kg} \pm 0.5$ were placed in individual $2.2 \times 1.8\text{m}$ 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 a day..

2.3. In situ evaluation of dry matter degradability

Nylon bag technique was used to measure disappearance in the rumen of the cottonseed meal. Nylon bags (45- μ m pore size. $8\text{cm} \times 16\text{cm}$ bag size) containing $5\text{g} \pm 0.5$ of dry cottonseed were incubated in the rumen of each sheep. The rubber tube was connected to two bags Dacron the other two bags of 10 cm was considered. Two bags of cotton seed 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 and outlet water become clear. Bags were then dried to a constant weight at 55°C for 48h and weighed. Washing loss was determined by soaking samples in water at $37-40^\circ\text{C}$.

RESULTS AND DISCUSSION

The chemical composition of cottonseed meal that used in this study is 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 and also oil separation.

Table 1 .The chemical composition Cottonseed meal (As g/kg of DM)

Dry Matter	ether extract	Crude fiber	Crude Protein	Ash
91.7%	1.6%	13 %	43.6 %	6.6 %

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 23.79%, 58.57%, 82.36% respectively and the rate degradability(c) 0.046/ 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) [7]. Soluble fraction of dry matter in the zero time of incubation is the 23.79 percent and with ascending rate reached to 28.9 and 33.6 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 (54.3 percent) could be pass to small intestinal. Winterholler et al. (2009) [8] was

reported that the Dry matter degradability of Cottonseed meal was 63.7 percent for cottonseed meal. Kiumarsi et. Al. (2009) [5] was reported the Dry matter degradation of cottonseed meal. (a fraction, b fraction and c fraction is 35.6, 18.6 and 0.07 respectively). Estrada et. Al. (2011) [2] reported the Rumen degradation of Dry matter in cottonseed. (a fraction, b fraction and c fraction is 21.30, 35.10 and 0.09 respectively).

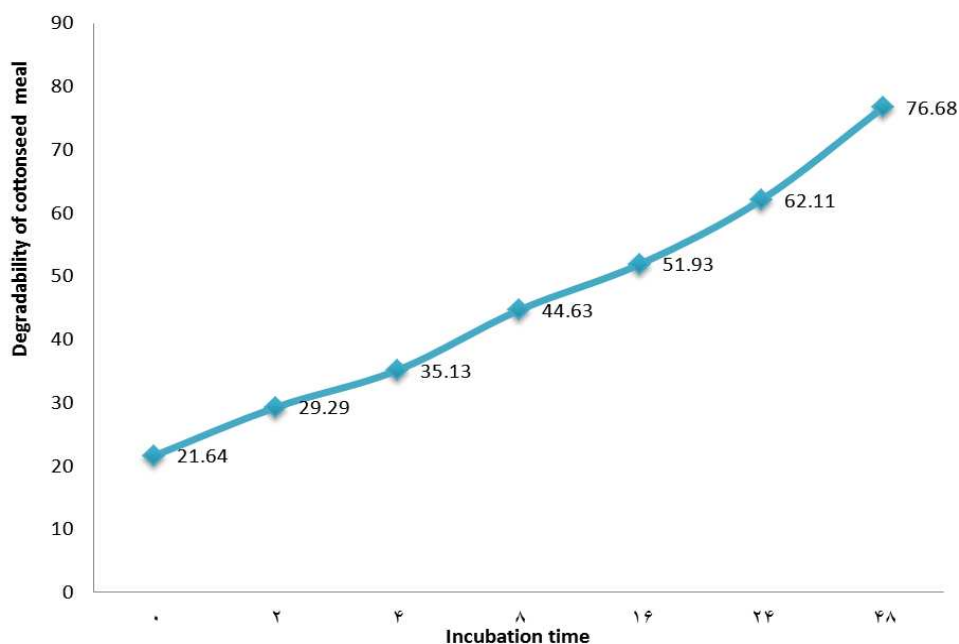
Table2: In situ dry matter degradability of cottonseed meal

Incubation times						
0	2	4	8	16	24	48
21.64	29.29	35.13	44.63	51.93	62.11	83.96

Parameters of Degradability				Effective degradability (%) at passage rate (% at hour)		
A	b	a+b	C	2	5	8
23.79	58.57	82.36	0.046	64.6	51.9	45.2

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 cottonseed meal



CONCLUSION

Cottonseed meal is commonly fed in the diet of dairy cattle to provide protein, energy as fat, and fiber. The cottonseed meal has 43.6 percent crude protein and in the 16 hour incubation approximately half of Dry matter is the degraded and is good for passage that. Degradability of cottonseed meal increased by during the incubation time.

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REFERENCES

- [1] Coppock C E, J K Lanham, and J L Horner. **1987**. *Anim. Feed Sci. Technol.* (18): 89–129
- [2] Estrada A, O La O, J J Portillo, Rafael S Herrera, Beatriz I Castro and F G Ríos. **2011**. *Cuban Journal of Agricultural Science*, (45): 288
- [3] Forster L A, Jr and M C Calhoun. **1995**. Nutrient values for cottonseed products deserve a new look. *Feedstuffs* (44):16- 67
- [4] Jones L, and C King. **1996**. Chapter 4. Cottonseed Oil. In: Baileys Industrial Oil and Fat Products. Volume 2, Edible Oil and Fat Products: Oils and Oilseeds. Y.H. Hui, Ed. J.W. Wiley and Sons Inc. New York.
- [5] Kioumars H, K Jafari Khorshidi, K Jafari Khorshidi, M Ahmady, G Mokhtarpour, Z Shariman. **2009**. World congress on oil and fats & 28th isf congress.. Sydney Australia.
- [6] National Cottonseed Products Association, **2001**. Cotton: America's True Food & Fiber Crop. <http://www.cottonseed.com/about2.htm> Memphis, TN.
- [7] Ørskov E R, Deb Hovell F D , Mould F. *Trop. Anim. Prod*, **1980** (5):195-212.
- [8] Winterholler S J, D L Lalman, T K Dye, C P McMurphy and C J Richards, **2009**. *J. Anim Sci* (87): 2996-3002.