**RESEARCH PAPER**

# Effect of formaldehyde treated soybean meal on chemical composition and cost of treatments

D.M. NALAWADE, R. M. ZINJARDE AND M.V. WAGH

## ABSTRACT

An experiment was conducted to study the effect of formaldehyde treated soybean meal on chemical composition and cost of treatments at Department of Animal Husbandary and Dairying, Nagpur during 2008-2009. The result showed that formaldehyde treatments did not affect the chemical composition of soybean meal. All the parameters like dry matter(DM), crude protein (CP), crude fiber (CF), ether extract ( EE), nitrogen free extract (NFE) and total ash (TA) was found non significant in different treatments. Whereas protection of protein was done with minimum cost (Rs. 112 per qtls). Hence, formaldehyde treatments of soybean meal prove to be economic to animal feeding.

KEY WORDS : Incubation period, Formaldehyde, Protein, Soybean meal

## INTRODUCTION

Protein content of ration is the important nutritional consideration for feeding animals. However, protein supplements being more expensive ingredients in ruminant ration. Protection of natural proteins of high biological value from degradation in the rumen seems to have great potential in ruminant nutrition for better growth and production. (Malik and Chopra, 1978. Tiwari and Yadav, 1989). Soybean seed is one of the richest protein source and suitable feed for high yielding animals to meet their increased nutritional demands but the soybean protein is highly degradable, therefore, it is being less efficiently utilized. Hence, the extent of protein degradation must be reduced without affecting its nutritional value by some means. Formaldehyde treatment has been found to be an efficient and comparatively cheaper method to protect highly degradable protein sources. Soybean meal is the important vegetative protein source for feeding livestock. Soybean meal is an excellent source of protein, because nearly 450 g/kg of the DM is protein and the protein quality is high

(Fan *et al.*,1995). Any process which leads to better utilization of such supplements will be of great value in livestock feeding. Hence, present study was undertaken to asses the protection of protein of soybean meal by different levels of formaldehyde treatments.

## MATERIALS AND METHODS

The soybean meal was treated with formaldehyde (37 per cent) solution at 0.0 (untreated), 1.0 ($T_2$), 1.5 ($T_3$), 2.0($T_4$) and 2.5 ($T_5$) per cent per 100 g CP. The crude protein content of soybean meal was 46 per cent. Hence, amount of formaldehyde solution required was 0.0. 12.42, 18.60, 24.84 and 31.04 ml, respectively. The volume of the solution was made to 40 ml with water and formaline solution were sprayed over the samples and mixed immediately. There after, these samples were sealed airtight in polythene bags and kept for 7 days for proper reaction of formaldehyde with proteins. After 7 days the polythene bags were opened and dried the sample at 75ºC for 24 hrs. The treated samples were ground finely after drying. These samples were used for further analysis.

The dried ground samples treated and untreated soybean meal were analysed on dry matter basis for the chemical composition *viz.*, dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), and total ash (TA) were determined as per the procedure recommended

**Correspondence to:**
**D.M. NALAWADE,** College of Agriculture, Department of Animal Science and Dairy Science, NAGPUR(M.S.) INDIA

**Authors' affiliations:**
**R.M. ZINJARDE AND M.V. WAGH,** College of Agriculture, Department of Animal Science and Dairy Science, NAGPUR (M.S.) INDIA

by *AOAC M. method (1975).* Nitrogen free extract (NFE) was calculated by subtracting total sum of crude protein (CP), ether extract (EE), crude fiber (CF), and total ash (TA) from 100. The data were arranged in Factorial Completely Randomized Design (FCRD) and analyzed by standard statistical method as per Snedecor and Cochran (1989).

# RESULTS AND DISCUSSION

The results obtained from the present investigation are presented below:

**Chemical composition:**

The result recorded in Table 1 showed that the chemical composition of treated soybean meal was non significantly affected by the different levels of formaldehyde solution.

The DM, CP, CF, EE, NFE and TA content in untreated soybean meal ($T_1$) were 90.41, 45.30, 5.29, 1.02, 42.45 and 5.94 per cent while at 1% level ($T_2$) for 100 g of CP of soybean meal were 91.24, 45.85, 5.27, 0.97, 41.80 and 6.11, respectively.

At 1.5% and 2% level for 100 g of CP were 90.86 and 90.17 (DM), 45.38 and 45.70 (CP), 5.01 and 5.22 (CF), 1.00 and 0.99 (EE), 42.43 and 41.92 (NFE), 6.14 and 6.17 (TA), respectively.

Similarly, the DM, CP, CF, EE, NFE and TA content at 2.5% level for 100 g of CP were 89.60, 45.43, 5.14, 1.01, 42.32 and 6.10, respectively. These results are in accordance with Mathur and Mathur (1994) and Brown and Valentine (1972)

| Table 1 : Chemical composition of soybean meal treated with different levels of formaldehyde (per cent on DM basis) | | | | | | |
|---|---|---|---|---|---|---|
| Treatments | DM | CP | CF | EE | NFE | TA |
| $T_1$ | 90.41 | 45.30 | 5.29 | 1.02 | 42.45 | 5.94 |
| $T_2$ | 91.24 | 45.85 | 5.27 | 0.97 | 41.80 | 6.11 |
| $T_3$ | 90.86 | 45.38 | 5.01 | 1.00 | 42.43 | 6.14 |
| $T_4$ | 90.17 | 45.70 | 5.22 | 1.99 | 41.92 | 6.17 |
| $T_5$ | 89.60 | 45.43 | 5.14 | 1.01 | 42.32 | 6.10 |
| S.E. (M) | 0.56 | 0.36 | 0.09 | 0.06 | 0.91 | 0.06 |
| C.D.5%level | N.S. | N.S. | N.S. | N.S. | N.S. | N.S. |

**Cost of formaldehyde treatment:**

The cost of formaldehyde treatment of soybean meal was calculated on the basis of prevailing market rates. The values presented in Table 2 show the calculations leading to the cost of different levels of formaldehyde treatment of soybean meal.

The cost of formaldehyde treated soybean meal in

$T_2$, $T_3$, $T_4$ and $T_5$ treatments were Rs. 121, 176, 233 and 288 per quintal and Rs. 1.21, 1.76, 2.33 and 2.88 per kg, respectively while the untreated soybean meal treatment ($T_1$) was found nil. The per cent protection of protein in treatment $T_3$ is indicated that cost of formaldehyde treated soybean meal was done with minimum cost. It is inferred that formaldehyde treatment of soybean meal proved to be economical to the feeding animals. These results are in agreement with Yadav *et al.* (2005), Sangle (2009), Chatterjee and Walli(2003).

| Table 2 : Cost of formaldehyde treatment of soybean meal (Rs.). -Cost of formaldehyde solution (37%) = Rs. 90/lit. -Labour cost for applying formaldehyde per quintal soybean meal = Rs,. 9.00 | | | |
|---|---|---|---|
| Treatments | Cost of formaldehyde per q. soybean meal (Rs.) | Total cost of formaldehyde treatment per quintal soybean meal including labour charges | Cost of formaldehyde treatment for kg. soybean meal. |
| $T_1$ | - | - | - |
| $T_2$ | 112 | 121 | 1.21 |
| $T_3$ | 167 | 176 | 1.76 |
| $T_4$ | 224 | 233 | 2.33 |
| $T_5$ | 279 | 288 | 2.88 |

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