

## UTILIZATION OF COTTON STRAW IN THE RATIONS OF SHEEP

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### **Abstract**

Relative performance of sheep fed complete diets containing cotton straw with that of conventional rations were studied. Expander extruded processed ground cotton straw (50%) based complete diet (R<sub>1</sub>), Corresponding mash diet (R<sub>2</sub>) and two conventional diets containing concentrate mixture and ground cotton straw (R<sub>3</sub>) and chaffed jowar straw (R<sub>4</sub>) were fed to Deccani rams using 4 X 4 latin square design to assess the palatability, nutrient utilization and rumen fermentation pattern. The DMI/100 kg body weight was significantly higher in complete diets compared to conventional diets. The digestibility of DM, OM, CP and EE were significantly (P<0.05) higher in complete diets compared to conventional diets except CF. Significantly (P<0.05) higher CF digestibility was observed in conventional ration containing ground cotton straw (R<sub>3</sub>). Positive balances of N, Ca and P were observed in all the treatment groups. All the rumen nitrogen fractions except NH<sub>3</sub> – N and TVFA concentrations were significantly (P<0.05) higher in complete rations than conventional rations. These results indicated that complete rations were better utilized in terms of nutrients digestibility and nitrogen utilization as compared to conventional rations.

### **INTRODUCTION**

Cotton (*Gossypium*) is growing in a vast area (4,36,500 ha) in Andhra Pradesh, India. Cotton straw is the by-product obtained from whole cotton plants after last picking of cotton. About one lakh tones of DM is estimated to be produced every year from these waste cotton plants. Hence an attempt was made to process complete diets using ground cotton straw (GCS) as sole roughage source for feeding native sheep under intensive system and also to study the relative performance of sheep fed complete diets (Expanded extruded pellets and mash) with that of conventional ration containing ground cotton straw and chaffed jowar straw on palatability, nutrient utilization and rumen fermentation pattern.

### **MATERIALS AND METHODS**

The whole cotton plants after last picking of cotton obtained from fields were dried and ground in a hammer mill using 5 mm sieve. Two complete rations (Expanded extruded pellets (R<sub>1</sub>) and corresponding Mash (R<sub>2</sub>) were formulated using ground cotton straw 50, maize grain 24, groundnut cake 11, rice polish 3, cotton seed cake 3, molasses 7.5, mineral mixture 1 and common salt 0.5 percent with Rovimix @ 10g/100kg. Two conventional rations comprising of concentrate mixture (400 gms/day) and ground cotton straw (R<sub>3</sub>) and chaffed Jowar straw (R<sub>4</sub>) as such basis were fed to four adult Deccani rams weighing 28.32 kg in a metabolism trial using 4X4 latin square design to assess the palatability, nutrient utilization and rumen fermentation pattern. The concentrate mixture used in the conventional rations contained maize grain 30, groundnut cake 30,

rice polish 27, molasses 10, mineral mixture 2 and common salt 1 percent with Rovimix 20g/100kg. In each trial, a 7-day collection period was followed after a 21 day preliminary period. A 7-day switch over period was allowed between the trials. At the end of each metabolic trial, rumen fluid was collected at 0, 2, 4, 6 hr post feeding. The pH and ammonia nitrogen were estimated immediately after collection of rumen liquor. Samples of rumen liquor were preserved by adding saturated mercuric chloride @ 1ml/100ml and stored at sub zero temperature for further analysis. The feed, faeces and urine samples were analysed for proximate principles, p<sup>1</sup> and Ca<sup>2</sup>. The rumen liquor samples were analyzed for various nitrogen fractions<sup>3, 4, 5, 6</sup> and total VFA<sup>7</sup>. Statistical analysis of the data was done<sup>8</sup>.

## RESULTS AND DISCUSSION

The CP, CF, EE, Ca and P content in ground cotton straw (GCS) were higher and NFE and total ash contents were lower than chaffed jowar straw. Ground cotton straw was having higher OM content compared to jowar straw. The DMI/100kg body weight was significantly ( $P < 0.01$ ) higher in complete rations (R<sub>1</sub> and R<sub>2</sub>) than conventional rations (R<sub>3</sub> and R<sub>4</sub>) due to increased palatability as a result of blending concentrate and roughage in the former. Similar results were reported<sup>9, 10</sup>. Complete rations showed higher digestibility of DM, OM, CP and EE compared to conventional rations except CF. Increased CP digestibility in complete rations as compared to conventional rations might be due to higher intake of DM as well as higher protein content. Lower CF digestibility in complete rations as compared to conventional ration containing GCS (R<sub>3</sub>) was due to increased rate of passage of ground material and decreased digesta retention and lowered digestibility of fibre thereby not providing sufficient time for microbes in the rumen for attacking the fibrous materials. This was in accordance with the reports of earlier workers<sup>11, 12</sup>. The digestibility of fibre fractions (NDF, ADF) were higher in conventional ration containing chaffed jowar straw (R<sub>4</sub>). All the experimental animals were in positive N, Ca and P balances indicating that these diets could supply nutrients in required proportion.

The DCP and TDN contents (Table) were significantly ( $P < 0.01$ ) higher in complete rations compared to conventional rations. The higher intakes of DCP and TDN recorded in complete rations than the recommended levels<sup>13</sup> were due to better palatability, higher nutrient content and digestibility of nutrients in these rations.

All the nitrogen fractions except ammonia -N were significantly ( $P < 0.01$ ) higher in complete rations (R<sub>1</sub> and R<sub>2</sub>) compared to conventional rations (R<sub>3</sub> and R<sub>4</sub>). Significantly ( $P < 0.05$ ) low pH values and higher TVFA concentration values were observed at 4 hr post – feeding. The cost per Kg of these rations inclusive of processing cost was Rs.7.23, 1.91, 4.65 and 4.70 respectively.

The results of this study indicated that complete rations were better utilized in terms of nutrient digestibility and nitrogen utilization compared to conventional rations. Ground cotton straw could be utilized as sole roughage source at 50% level in complete feeds for native sheep without any deleterious effect. Conventional ration containing ground cotton straw could meet the protein and energy requirements of sheep fed (as such basis) in the experiment. Expanded extruded pellet form was proved to be more efficient over mash ration in providing nutrient requirements to sheep.

*Plane of nutrition as affected by experimental rations*

Ration	Body Weight (Kg)	DMI% body weight (Kg)	DCP		TDN	
			l% in ration	Intake/ Day (g)	l% in ration	Intake/ Day (g)
R <sub>1</sub>	29.01	4.77	8.40	115.96 <sup>a</sup>	56.29	776.86 <sup>a</sup>
R <sub>2</sub>	31.17	3.89	8.52	102.36 <sup>b</sup>	53.45	653.70 <sup>b</sup>
R <sub>3</sub>	30.47	2.95	8.14	70.51 <sup>c</sup>	51.88	519.58 <sup>d</sup>
R <sub>4</sub>	29.47	3.60	6.38	70.25 <sup>c</sup>	50.91	597.30 <sup>c</sup>
ICAR (1985)	30.00	2.50		32.00		360.00

NB: abcd values with different superscripts in a column differ significantly.

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