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USE OF SODIUM HYDROXIDE TREATED RICE STRAW IN SHEEP FATTENING RATIONS

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An experiment was designed to study the effect of sodium hydroxide treatment on the nutritive value of rice straw and its effect on growth rate, feed consumption, feed efficiency and digestibility when fed to sheep. Sixty-four lambs were included in the trial and randomly divided into four equal groups having four replicates in each group. Four rations (A, B, C & D) containing rice straw, untreated (A) and treated with 2% (B), 4% (C) and 6% (D) NaOH were prepared and allotted to four groups of lambs. The experiment lasted for 84 days. There was a significant improvement ($P<0i05$) in the weight gain, feed consumption and feed efficiency of lambs fed rations containing rice straw treated with 6% NaOH as compared with lambs fed rations containing untreated rice straw. The digestibility trial revealed that the lambs fed ration containing rice straw treated with 2, 4 and 6% NaOH had significantly higher ($P<0.05$) value of digestibility of dry matter, crude protein, crude fibre, ether extract and nitrogen free extract than the lambs fed ration containing untreated rice straw.

INTRODUCTION

In most of the developing countries, straw constitutes a major component of livestock feed. Rice straw is a cheaper source of energy and is abundantly available in Pakistan but it is not being fully utilized due to its poor digestibility and low nitrogen contents. However, it can be efficiently utilized if its digestibility is increased through chemical treatment (Fiest *et al.*, 1970 and Fernandez and Greenhalgh, 1972).

A number of chemicals have been tested for their ability to increase the digestibility and voluntary consumption of roughages affecting the weight gain of sheep. Shah *et al.* (1981) reported quicker and greater weight gain when the straw was treated with sodium hydroxide. A fattening trial was conducted on

lambs to study the effectiveness of sodium hydroxide treatment on rice straw, using different levels of the alkali.

MATERIAL AND METHODS

Sixty-four male lambs of approximately the same age and weight were randomly selected from the stock available at Livestock Experiment Station, Bahadurnagar, District Okara. These were divided into four groups having four replicates in each group. Four rations (A, B, C & D) having rice straw untreated or treated with 2, 4, and 6% sodium hydroxide, respectively, were formulated (Table 1). Each ration was randomly allotted to four different groups, each having four replicates. Ration A (untreated) was fed to control group and other three rations B, C and D were fed to three experimental groups. The ration for each group was prepared for one week at a time.

Weighed quantity of ration at the rate of 2 kg/ head was offered twice a day and the amount of feed consumed was recorded. In addition 1/2 kg of green fodder was given to fulfil the carotene requirements. The experiment lasted for 84 days. Digestibility and feed efficiency were calculated. The data were statistically analysed for weight gain, feed consumption, feed efficiency and the digestibility of different nutrients, using the completely randomized design.

Table 1. *Percentage composition of experimental rations*

Ingredients	Rations			
	A	B	C	D
Rice straw (untreated)	23	—	—	—
Rice straw (2% NaOH)	—	23	—	—
Rice straw (4% NaOH)	—	—	23	—
Rice straw (6% NaOH)	—	—	—	23
Cotton seed cake (undecorticated)	22	22	22	22
Rape seed cake	13	13	13	13
Wheat bran	16	16	16	16
Molasses	25	25	25	25
DCP	0.5	0.5	0.5	0.5
Common salt	0.5	0.5	0.5	0.5

D. P. (%) = 10.4 T. D. N (%) = 60.0 Calcium (%) = 0.356
Phosphorus (%) = 0.781

RESULTS AND DISCUSSION

Weight Gain : The weight gain observed in experimental lambs fed rations A, B, C and D was 9.25, 9.56, 10.56 and 10.87 kg respectively. Maximum weight gain was observed in lambs fed ration D containing rice straw treated with 6% NaOH. The differences in weight gain amongst experimental lambs were significant ($P<0.05$). The results were in agreement with the findings of Jayauria (1980). He reported quicker and better weight gain with straw treated with sodium hydroxide.

Feed Consumption : The average feed consumed by experimental lambs fed rations A, B, C and D was 134.25, 132.06, 133.06 and 133.56 kg respectively. Significant differences ($P<0.05$) in feed consumption were observed between the lambs fed treated and untreated rice straw. The results were in agreement with the findings of Zainur (1980) who observed higher feed intake when the straw was treated with sodium hydroxide.

Feed Efficiency : The average feed consumed per kg weight gain in experimental lambs fed rations A, B, C and D was 14.51, 13.81, 12.61 and 12.28 kg respectively. The amount of feed consumed/unit of weight gain was significantly higher ($P<0.05$) in lambs fed untreated ration as compared with those fed ration treated with 6% NaOH. These results were in agreement with the findings of Dulphy *et al.* (1983) who reported increase in feed conversion ratio of straw treated with NaOH as compared with untreated straw.

Table 2. *Average weight gain, feed consumed and feed efficiency in experimental lambs after 84 days*

Ration	A	B	C	D
Weight gain (kg)	9.25	9.56	10.56	10.87
Feed consumption (kg)	134.25	132.06	133.06	133.56
Feed efficiency	14.51	13.81	12.61	12.28

Digestibility : A trial was conducted to determine the digestibility of dry matter, crude protein, ether extract, crude fibre and nitrogen-free-extract. The average values for digestibility of different nutrients in experimental lambs fed ratians A, B, C and D are given in Table 3.

Table 3. *Digestion coefficients of different nutrients in experimental lambs*

Ration	Dry matter	Crude protein	Crude fibre	Ether extract	Nitrogen-free-extract
A	57.03	67.05	52.30	80.68	61.58
B	59.83	70.83	60.00	81.88	65.30
C	62.43	73.83	62.00	82.45	66.90
D	64.12	75.25	62.83	82.43	67.53

The results of present study for digestibility of dry matter, crude protein and crude fibre showed significant differences ($P<0.05$) between the rations containing untreated rice straw and that treated with 2, 4 and 6% NaOH. Non-significant differences were observed in the digestibility of crude fibre, ether extract and nitrogen-free-extract between the rations C and D treated with 4 and 6% NaOH and between the rations B and C containing rice straw treated with 2 and 4% NaOH, respectively. These findings were supported by Jayasuria (1980) who observed that the digestibility of the straw was increased by the alkali treatment due to delignification. Improvement in the digestibility of dry matter, crude protein and crude fibre due to sodium hydroxide treatment was also reported by Shah *et al.* (1981) who observed that the digestibility of barley and rice straw treated with 1% NaOH increased by 22.2 and 36.3% respectively.

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