

UREA BASED STRAW TREATMENTS FOR DAIRY CATTLE FEEDING MANAGEMENT UNDER FARMERS' CONDITION IN CHITWAN, NEPAL.

D.P. Paudel¹, R. Dhakal² and N. Bhattarai³

¹SAHAMATI, Baglung, Nepal, ²LI-BIRD, Pokhara, Nepal

³Agriculture and Forestry University, Chitwan, Nepal.

ABSTRACT

A study was conducted at Gitanagar VDC of Chitwan during May to August 2012, to find the effect of chopped and un-chopped rice straw in relation to with/ without treatment of urea (4%) on milk yield and its composition. Repeated Measure Design (RMD) was conducted in 8 cows and four treatments namely; T1 (un-chopped straw), T2 (chopped straw), T3 (un-chopped straw with urea solution @ 4%) and T4 (chopped straw with urea solution @ 4%) providing all four treatments to each cow at an interval of 15 days to match with the design. The samples of treatments were analyzed for CP, EE, CF, Moisture level, and total ash content. Urea treated rice straw consumption was significantly different ($p < 0.05$) among treatments. The average uptake of rice straw in T1, T2, T3 and T4 was found to be 3.39, 3.73, 3.81 and 3.9 kg/cow/day respectively. Similarly, milk yield from urea treated chopped rice straw was found significantly different ($p < 0.01$) among other treatments. The average milk yield in four treatments T1, T2, T3 and T4 was found to be 9.449, 9.697, 10.011 and 10.264 liters/cow/day. In milk composition, urea treated rice straw had positive impact on increment of protein and fat % which was significantly different ($p < 0.01$) and ($p < 0.05$) respectively. While SNF, lactose, density, solubility, freezing point were statistically similar ($p > 0.05$). Net income/cow was higher (Rs. 86.912) in T4 than other treatments.

Keywords: Chopped, un-chopped, urea, milk yield

INTRODUCTION

Livestock, considered as the major aspect in agriculture, contributes 15% of the overall GDP and 31% of the AGDP (MOAC, 2010/11). Dairy sector contributes 62.6% within the country to livestock GDP (MOAC, 2008). Nearly about two third of the milk comes from buffalo and one third from cow (Krishi diary, 2069).

Rice straw is one of the widely used cattle feed and is deficient in context to nutrient content (O'Donovan, 1983). There are different options to overcome the nutritional limitations i.e. supplementation with specific nutrients of improvement of quality by chemical or physical means (Ibrahim, 1983). Feeding of low quality roughages in chaffed form is also considered beneficial as it reduces wastage and avoids selective consumption (Badurdeen *et al.*, 1994). Supplementation of poor quality feeds with nitrogen sources increases the rate and extent of digestion resulting in improved dry matter intake (Preston and Leng, 1987).

MATERIALS AND METHODS

The study was conducted using controlled experiment under farm condition to investigate the effect of urea treatment on rice straw in production and composition of milk in dairy cattle.

Research site

The study was conducted during June to August, 2012 (3 months) in a selected herd of Annapurna Milk Producers Cooperative Limited (AMPCL) farm in Gitanagar VDC of Chitwan district.

Experimental animal's selection

Altogether 8 cows of same breed with nearly equal blood level, parity and same stage of lactation were selected for the study. Animals were vaccinated against FMD, BQ and HS and dewormed orally using bolus containing Zanide-L (Oxyclozanide + Levamisole) to cope out with internal parasites.

Diet feeding and management

Roughage was given 3 times @ 9 kg each time daily at 07:00, 13:00 and 19:00 h, while the concentrate was given twice daily @ 5kg/cow during milking. The different types of roughages used during the study period were teosinte, maize stover, napier, and paspalum. Water was made available at all times in a water trough, which were cleaned every day. The treatments were provided @4kg/individual animals as per the research design.

Table 1: Different treatments allotted for eight cows in the experimental period

Cow	Days interval			
	0-15 days	16-30 days	31-45 days	46-60 days
1	Diet A	Diet B	Diet C	Diet D
2	Diet C	Diet A	Diet D	Diet B
3	Diet B	Diet D	Diet A	Diet C
4	Diet D	Diet A	Diet B	Diet C
5	Diet D	Diet B	Diet C	Diet A
6	Diet B	Diet C	Diet A	Diet D
7	Diet C	Diet B	Diet D	Diet A
8	Diet A	Diet D	Diet B	Diet B

Data collection

Feed intake:

Feed intake was calculated by using a simple formula:

$$\text{Feed intake (kg)} = \text{Feed offered (kg)} - \text{Feed refused (kg)}$$

Milk yield

Each cow was individually milked each day at the same time. Daily milk yield both in morning and evening was recorded with the help of graduated jug in each experimental animals for the whole research period.

Milk composition

Analysis was done by using Lactoscan to analyze fat, SNF, protein, density conductivity and other constituents of milk.

Experimental feed sample analysis

Dry matter, crude protein, crude fiber, ether extract and ash were found out by method of Association of Official Analytical Chemist (AOAC, 1990).

Economic analysis of different treatments

The economics of milk production of different treatment were calculated at the end of the experiment to calculate the net income per cow and benefit cost ratio among different treatments.

Statistical tool

Analysis of Repeated measure experiment was done manually using Excel formulae while analysis of variance was done through M-Stat C (Michigan University Version 1.3, 1994).

RESULTS AND DISCUSSION

Chemical composition of treatments

Chemical analysis (AOAC, 1990) was done at laboratory of Animal Nutrition Department, IAAS, Rampur. The table given below shows higher percentage of Ether extract (EE), Moisture, and Crude Protein (CP) in T4 as compared to other treatments. Agrawal *et al.*, (1989) also reported that treatment of rice straw increased the protein content from 3.94% to 12.96% and that of wheat straw from 3.43 % to 7.83%. The result also seems in similar range as found by Han Verdonk *et al.*, (1989) who reported an increase in crude protein from 3.86 to 11.25% and decrease in crude fibre from 36.03 to 33.21% in wheat straw due to urea treatment (4%).

Table 2. Nutrient composition of different treatments

Sample (treatments)	Moisture %	Fat %	CF	CP	Ash %
T1	17.2	0.9	32.2	5.25	5.9
T2	12.6	1	32.8	5.68	5.6
T3	20.4	1.2	31.6	6.91	5.7
T4	18.4	1.4	30.4	8.18	5.4

Feed intake

The average feed intake of different treatments fed to different cows is shown in the Figure 1. The average intake of un-chopped rice straw was found to be 3.393 ± 0.06 kg which was slightly lower than intake of chopped rice straw which was 3.737 ± 0.06 kg. However, higher amount of straw fed by cattle was urea (4%) treated chopped rice straw 3.904 ± 0.02 followed by urea (4%) treated un-chopped rice straw 3.818 ± 0.04 kg. Intake of urea treated chopped rice straw was found to be significantly different among the different treatments at $p < 0.01$. The straw intake pattern was found to be similar to that reported by Biswas *et al.*, (2002) who found an increase in DM feed intake from 4.6kg/day in the untreated form to 5.6 kg/day in the treated straw.

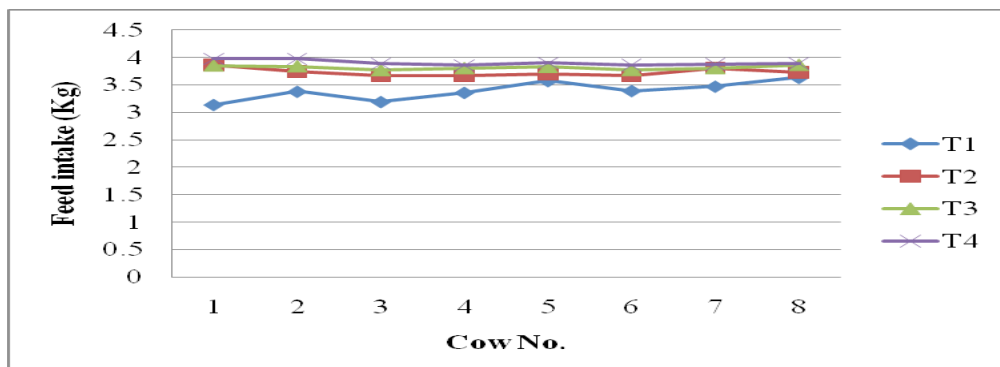


Figure 1: Average feed intake (kg) by dairy cows in different treatments

Milk yield

Significant difference ($p < 0.01$) in milk yield among various treatments was found at. Significantly maximum milk yield (10.264L) was recorded in chopped urea treated rice straw followed by un-chopped urea treated rice straw (10.011L) and chopped rice straw (9.697L). However, significantly lower milk production (9.449L) was found in un-chopped rice straw without urea treatment. The observed results are similar to the past reports that indicated an extra yield of 0.5-1.5 kg milk and/ or saving of 20-30% concentrate with a reduction of feed wastage of 20-30% (Singh *et al.*, 1993).

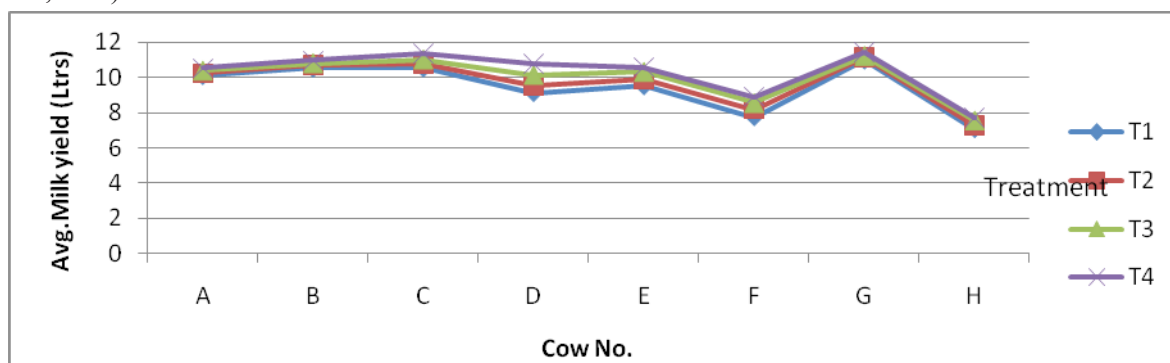


Figure 2: Average milk yield (liters) by dairy cow in different treatments

Milk composition

In the field experiment only, fat and protein was seen significantly different among different treatments while others were insignificant. The result agrees with the findings of Chauhan *et al.*, 2000 and Lamba *et al.*, 2002 who reported that milk quality is not reduced or affected by feeding treated rice straw. Saadullah *et al.*, 1981 added that urea incorporated in fibrous diet increases body weight and milk production.

Table 3: Mean nutrient content (Milk Composition) of cattle milk fed with different levels of urea treated rice straw

Treatment	Fat	SNF	Protein	Density	Conductivity	Lactose	FP	Solubility
T0: Farmers practice	3.664 ± 0.59	7.079 ± 0.62	2.510 ± 0.18	23.645 ± 2.83	3.649 ± 0.38	3.678 ± 0.34	0.433 ± 0.04	0.651 ± 0.05
T1: Unchopped rice straw	3.491 ± 0.33	7.238 ± 0.31	2.597 ± 0.13	24.379 ± 1.31	3.717 ± 0.19	3.760 ± 0.18	0.442 ± 0.02	0.663 ± 0.03
T2: Chopped rice straw	3.754 ± 0.43	7.266 ± 0.44	2.631 ± 0.11	24.456 ± 1.36	3.591 ± 0.25	3.774 ± 0.21	0.443 ± 0.03	0.665 ± 0.04
T3: Unchopped rice straw + Urea 4%	4.113 ± 0.60	7.370 ± 0.13	2.735 ± 0.09	24.055 ± 0.74	3.561 ± 0.14	3.730 ± 0.10	0.440 ± 0.01	0.659 ± 0.02
T4: Chopped rice straw + Urea 4%	4.144 ± 0.49	7.430 ± 0.26	2.780 ± 0.09	24.261 ± 1.03	3.691 ± 0.15	3.714 ± 0.13	0.441 ± 0.02	0.663 ± 0.03
F-value	3.265*	0.967 ^{ns}	6.232**	0.320 ^{ns}	0.613 ^{ns}	0.263 ^{ns}	0.191 ^{ns}	0.177 ^{ns}
Probability	<0.05	>0.05	<0.01	>0.05	>0.05	>0.05	>0.05	>0.05
Cv%	13.01	5.34	4.62	6.72	6.52	5.64	5.76	5.47
Lsd p<0.05)	0.497		0.124					

Economic analysis of different treatments

The result based on market price of NRs. 33/kg of milk shows higher benefit per day/cow is in T4 (NRs.86.91) while benefits from other treatments T3, T2 and T1 were NRs. 79.39, 78.80 and 71.48 respectively. The Table 4 shows net gain/day/cow is NRs. 15.428 more in T4 compared to T1, NRs. 7.91 more in T3 compared to T1 and NRs. 7.31 more in T2 compared to T1. T4 has the highest B/C ratio indicating to be most profitable one.

Table 4. Income and expenditure of dairy cattle fed diet at Gitanagar VDC, Chitwan

Treatments	Gross expenditure/ day (NRs.)	Gross income/ day (NRs.)	Net Income/ cow/ day (NRs.)	B/C ratio
T1	240.3333	311.817	71.4837	1.297
T2	241.1667	319.968	78.8013	1.326
T3	250.9667	330.363	79.3963	1.316
T4	251.8	338.712	86.912	1.345

CONCLUSION

The results of this study indicated that chopped rice straw treated with urea 4% fed to dairy cattle have positive effects on the body health, milk production and consumption of straw. Treatment of straw with urea improved the crude protein and *In vitro* organic matter digestibility. Thus, urea treated (4%) chopped rice straw can be considered as a potential diet for dairy cattle due to its higher digestibility, good yielding effect with better composition creating better health. Thus, it could be suggested that this feeding pattern could be used as an alternative to feeding un-chopped straw alone. However further research is needed determine the appropriate level of concentrate supply in addition to feeding urea treated rice straw to dairy cows. However, proper precautions should be taken under consideration to prevent harmful effect and damage on animal health. Investigation on how to replace urea with other nitrogen rich compounds that might be available locally is also needed to be done.

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