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EFFECT OF UREA TREATED LOCAL GRASS '*BHATHDU*' (*THEMEDA CYMBARIA*) ON MILK PRODUCTION OF CROSSBRED COWS

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Abstract: A study was conducted in which effect of urea treated local grass was compared with urea treated to paddy straw (Oryza sativa L) on milk production, fat percentage and 4% FCM in crossbred cows reared under mixed farming system in farmers field condition. The experiment was conducted at two locations in Surat district. For the purpose ten crossbred cows were selected at each location which further divided into two groups each with five animals. During the experiment one group was fed with the paddy straw and another group with local grass for fifteen days of lactation and milk yield was recorded and considered as control. After fifteen days cows of respective groups were fed with 4 % urea treated paddy straw and local grass for 60 days and daily milk yield was recorded. The analysis of paddy straw and local grass before and after treatment for their feed quality with respect to Crude Protein revealed that treatment of paddy straw and local grass with urea increased Crude Protein (CP) content from 3.2 to 7.1 per cent and 3.4 to 8.3 per cent. The data on daily milk yields in paddy straw and dry local grass groups as affected by urea treatments revealed that treatment of urea to paddy straw increased milk yield from 8.54±0.97 to 9.49±0.96 liters and from 8.51±0.76 to 9.50±0.80 liters in local grass. With respect to average 4% FCM, it increased from 7.92±0.93 to 10.17±0.99 liters and from 8.01±0.70 to 10.39±0.82 liters in local grass as a result of urea treatment to paddy straw and local grass. Similarly, the average fat percentage was also increased from 3.47±0.09 to 4.48±0.09 per cent and from 3.6 ± 0.08 to 4.63±0.04 per cent in paddy straw and local grass, respectively as a result of urea treatment. Other parameters like body weight and post partum estrus were not affected as a result of urea treatment to both paddy and local grass. From present study, it can be concluded that local grass *Bhathdu* can be effectively used after treating with 4 per cent urea to feed lactating HF cows for getting higher milk production and without affecting animal health, particularly in hilly area where plenty of dry grass available in scarcity season.
Keywords: Urea treated, Local grass, Milk production, Crossbred cow.

Introduction

Increasing demand of milk day by day, enforced the dairy business to be a global business and the growth of dairy industry is much faster as compared to many other agricultural products. Small and marginal farmers are major milk producers in India and they are adopting mixed crop-livestock production system. In India, dairy production is mainly based

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on use of agricultural byproducts and crop residues as feed resource with cereal straws contributing 45-66% of the feed consumed by the dairy animals (Ranjhan 1999, Parthasarathy Rao and Hall 2003) In hilly forest areas, naturally grown local grasses in monsoon season used as green fodder in monsoon and as major source of dry fodder in late winter and summer season. In south Gujarat, one such grass *Bhathdu* (*Themeda cymbaria*) available in plenty in eastern forest dominated hilly belt. This grass is low quality roughages same as paddy straws, low in nitrogen and high in fiber. It also contain high amount of lignin which restrict its intake and digestibility in animals. Urea treatment has been found to be most promising and practical chemical method for improving the nutritive value of crop residues (Yadav and Yadav 1989; Devendra 1997; Singh and Prasad 2002) for ruminants. Paddy straw as well as dry local grass are low in available energy, protein and vitamins and has an imbalance of essential minerals, but it contains a large pool of structural carbohydrates which can potentially be degraded by rumen microbes in to volatile fatty acids (Wanapat 1999). Urea treatment increases the palatability, digestibility and adds a significant amount of nitrogen into the straw (Singh and Prasad 2002; Verma *et al*., 2006). Untreated straws having 3 to 4% crude protein initially could be improved to have potential crude protein levels of 7 to 9 % after treatment. It gave higher NH_3-N concentration and total volatile fatty acids in the rumen than did untreated paddy straw (Chanthai *et al*., 1987). The effect of urea treatment in increasing palatability, digestibility and nutritive value in paddy and other cereals straw have been well documented but there is no research work done on effect of urea treatment to local grass '*Bhathdu'* (*Themeda cymbaria*) and its role in improving nutritive value and milk production. So to Study the effect of urea treatment to local grass (*Themeda cymbaria*) and compared it with urea treatment to paddy straw (*Oryza sativa L*) on milk production, fat percentage and 4% FCM in crossbred cows reared under mix farming system in farmer's field condition this experiment was conducted.

Materials and methods

Experimental site

The experiment was conducted at two locations *i.e.* at Umarda village of Umarpada block and Kantvav village of Mangrol block of Surat district. Both the villages fall under Agro Ecological Situation I under Agroclimatic Zone South Gujarat II with annual rainfall of 900-1200 mm. Both these villages are in hilly forest area and the agriculture totally dependent on rain.

Animals Groups

Twenty cross breed HF second / third lactating cows were selected, ten at each location with average body weight 293±26.21 kg, de-wormed and further divided in to two groups with five animals in each group.

Group-I -During the experiment one group was fed with the paddy straw

Group-II - Another group with local grass

Diet Treatments procedure

After fifteen days cows of respective groups were fed with 4 % urea treated paddy straw and local grass for 60 days and daily milk yield was recorded. Paddy and local grass freshly harvested and properly dried in sun light by farmers were used for urea treatment. For treating 100 kg dry paddy straw, 4 kg of urea was dissolved 50 liters of water in plastic bucket and sprinkled on it by making layers of paddy straws using Sprinkler for ensuring uniform mixing (the quantity of solution needed for each layer is roughly calculated). Two to three farmers pressed the layers of fodder with their feet to compact the stack. The sidewalls and upper side of sheds were covered with a plastic sheet to make it airtight and kept it for three weeks. Similar procedure was followed for treating local grass. After three weeks of treatment, paddy straw and local grass was used to feed the animals. Animals were fed with *ad lib* treated both the fodder after keep half an hour in open air for removing ammonia smell and drying. Animals were also fed *ad lib* with sorghum and sugarcane tops as green fodder and concentrates @ 500 g per 1 kg milk production by the farmers as per thumb rules of feeding at field condition.

The treatment and feeding were synchronized in such a way that animals continued to get urea treated straw without any interruption during the entire treatment period. The HF cows initially took 2-4 days to become accustomed to the treated straw.

Observations

For fifteen days of lactation and milk yield was recorded and considered as control. The trial was initiated in initial phase of lactation and continued for two and half month of lactation period during which monitoring was done for feeding, milk production, milk fat percentage and general health of the animals. First 15 days, without urea treated fodder fed to animal of both the groups and record the same as control data and after that up to 60 days same records collected for treatment groups. Animals were fed in stalls and 4-5 times water in a day. Milking was done twice a day at 06:00 h and 17:00 h by hand. Participated farmers kept daily records of milk yield (two milking/day). Milk samples were drawn every day for fat analysis

after mixing of whole milk after milking and were analyzed at village level local SUMUL dairy collection centre and recorded by farmers (Two times per day).

Body weight of animals was taken at initiation of experiments and after completion experiment in the morning hours before feeding. The body weight was calculated from their heart girth and body length measurements by Shaffer's formula (Sastry *et al.,* 1982). Body weight (lb) = (G^2 x L)/300 where, G is heart girth and L is the body length from shoulder point to pin bone in inches and the factor 0.4536 used to convert these body weights into kilogram. Postpartum estrus was checked daily by visual observation and recorded by farmers.

Sampling and analysis

Samples of the dry fodder of paddy straw and local grass of both urea treated and untreated were obtained during the experimental period and sent for analysis to Animal Nutrition Department, College of Vanbandu Veterinary Science & A. H., Navsari Agriculture University, Navsari. DM was determined by the oven drying method, organic matter by muffle furnace incineration, crude protein (CP) by Kjeldahl method (N x 6.25), ether extract and total ash (AOAC 1995). Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF) were determined by the method suggested by Van Soest *et al.* (1991).

Statistical analysis

The data obtained from the experiment were subjected to analysis of variance by completely randomized design and the significance of the differences between before and after treatment means was determined using ANOVA (Snedecor and Cochran 1989).

Results and discussion

Chemical composition of feeds

During the experimental period, urea treated to straw and local grass increased storage capacity with brownish in coloured straw, strong smell of ammonia and without fungal growth. Treating straw with urea released ammonia from the hydrolyzed urea where it mixed with straw and increase the pH of the straw (pH>8). It prevents the oxidative and microbial fermentation (Wilkins, 1988) and preserved the straw in good condition for the long time. Chemical compositions of paddy straw and local grass with or without urea treatment are presented in Table 1. Urea treatment improved the straw value by increasing Non-protein Nitrogen (NPN) content due to process of ammonization in the fodder and make -NH_3 more available to the rumen. In present investigation, crude protein (CP) content increased from 3.2 to 7.1 per cent in paddy straw and 3.4 to 8.3 per cent in dry local grass as a result of urea

treatment which increase near about 2-2.5 fold over untreated paddy straw and local grass which confirms the findings of Chowdhury *et al.* (1996a), Zorrila-Rios *et al.* (1991) and Chauhan *et al*. (2000) who reported increase in CP content due to urea treatment. Further, this level of 40 g per kg of fodder was optimum as reported by Verma *et al.* (1996). Crude fiber content in both fodders *i.e.,* paddy straw as well as in local grass decreased from 36.8 to 34.2 and 38.7 to 36.1 respectively due to urea treatment which was due to cell wall content degraded by the ammonia and similar observations reported by Verdonk *et al.* (1989) and Lamba *et al.* (2002). Treated paddy straw contains higher percentage of NDF and ADF as compared to urea treated local grass which might be due to high silica and low cellulose content in paddy straw. Similar observations were made by Mgheni *et al.* (1993) and Chowdhury and Huque (1996) in their respective studies.

Milk yield and milk composition

The analysis of data on daily milk yields in paddy straw and dry local grass groups as affected by urea treatments revealed that treatment of urea to paddy straw significantly increased milk yield from 8.54 to 9.49 liters and from 8.51 to 9.50 liters in local grass (Table 2 & 3). Bhaskar *et al.* (1992) observed that milk production profile was higher in treated straw as compare to untreated straw, indicating that feeding treated straw to cows over their entire period of lactation beneficial in terms of reduction in feed cost with sustained higher milk yield. Similar results were reported by Radotra (2003) and Ahmed *et al.* (1983). With respect to average 4% FCM, it significantly increased from 7.92 to 10.17 liters and from 8.01 to 10.39 liters as a result of urea treatment to paddy straw and local grass, respectively. Perdok *et al.* (1982) reported increase in 0.15 to 1.5 kg of milk by feeding urea treated straw to lactating cow. Similar results were also reported by Datta *et al,* (1992) and Radotra (2003). Similarly, the average fat percentage was also significantly increased from 3.47 to 4.48 per cent and from 3.6 to 4.63 per cent in paddy straw and local grass, respectively as a result of urea treatment which might be due to high level of ammonia content in fodder produced more acetic acid fermentation in the rumen as reported by Misra *et al.* (2006) in the study of supplement feeding of UMMB significantly ($p<0.05$) increased fat content of milk by about 8 per cent as compare to control group.

Body weight, Reproductive performance and other health parameters

Average body weight of animals was 295.9±83.2 kg at initiation of experiment and at end of experiment 297.6±83.8 kg in group of feeding Paddy straw and while in 293.6±82.9 and 295.4±83.2 kg in local grass feeding group, respectively. Here, there was no significant

difference observed in both the feeding groups as compare to control groups as well as in between both the treatment groups also. All the cows showed first estrus 2-3 months after calving, which has been reported as a normal post partum estrus interval by Lap (1998) and Sanh *et al.* (2001). In both the treatment was no difference in reproductive performance. All the animals showed regular heat and were normal in cyclic.

The results indicated that urea treatment of paddy straw as well as local dry grass significantly increased the NH_3- content in the fodder and increased the digestibility of fiber due to degradation of lignin-carbohydrate bonds. Nutrient utilization and milk production efficiency was better in urea treated fodder as compare to simple fodder which reduced the concentrate feed. Further, the results clearly indicated that urea treatment to local grass *Bhathdu* gave same results as that of paddy straw. Thus, it could be concluded that local grass *Bhathdu* can effectively be use as fodder after treating it with urea in place of urea treated paddy straw in hilly area of south Gujarat where it is available in plenty.

Conclusion

Treating the paddy straw and local grass '*Bhathdu'* with 4 per cent urea improved nutritional value of both the fodders. *Ad lib* feeding of both the urea treated fodder to lactating crossbred cows improved daily milk yield and milk fat content without harmful effect on the health of the animals. It can concluded that local grass *Bhathdu* can be effectively used as fodder in place of paddy straw where it is available in plenty in hilly area of south Gujarat after treating it with urea.

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Table 1. Chemical composition (% DM basis) of paddy straw and local grass as dry fodder

%	Paddy straw	UTPS	Local grass	UTLG
Dry matter	88.9	46.1	92.9	48.1
Crude protein	3.2	7.1	3.4	8.3
Ether Extract	1.1	1.1	1.0	1.2
Total Ash	16.4	16.1	13.1	12.5
Neutral Detergent Fiber	79.6	76.7	73.5	71.8
Acid Detergent Fiber	51.5	51.4	48.3	47.1

UTPS: Urea treated paddy straw, UTLG: Urea treated local grass

Table 2. Average milk yield and its composition during the experimental period in different treatment

Parameters	Paddy straw	UTPS	SEM	P value
Daily milk yield (L)	8.54±0.97	9.49±0.96	0.67	<0.0001
Daily 4% FCM yield (L)	7.92±0.93	10.17±0.99	0.66	<0.0001
Milk Fat %	3.47±0.09	4.48±0.09	0.11	0.111
Average Body Weight (Kg)	295.9±83.2	297.6±83.8	1.46	0.9642

UTPS: Urea treated paddy straw

Table 3. Average milk yield and its composition during the experimental period in different treatment

Parameters	Local grass	UTLG	SEM	P value
Daily milk yield (L)	8.51±0.76	9.50±0.80	0.60	<0.0001
Daily 4% FCM yield (L)	8.01±0.70	10.39±0.82	0.62	<0.0001
Milk Fat %	3.60±0.08	4.63±0.04	0.11	0.2744
Average Body Weight (Kg)	293.6±82.9	295.4±83.2	0.70	0.96

UTLG: Urea treated local grass,