EFFECT OF SUPPLEMENTATION OF CHOPPED VERSUS UNCHOPPED WHEAT STRAW WITH UREA MOLASSES BLOCKS FED TO BUFFALO CALVES

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ABSTRACT

Sixteen male buffalo calves, with an average age of 18 months, and average body weight of 160 $\pm$ 16 kg were used for the present study. Chopped wheat straw (CS) + urea molasses blocks (UMB) having cottonseed meal (UMBC); Unchopped wheat straw (US) + UMBC; CS + UMB having sunflower seed meal (UMBS); and US + UMBS were treatment I, II, III and IV, respectively. Average daily UMB intake (grams/head) remained same ($P>0.05$) across all four treatments and was: 941, 829, 808 and 814 for treatment I, II, III and IV, respectively. Daily wheat straw intake (grams/head) in treatment I (2210) and III (2315) was significantly higher ($P<0.05$) than treatment II (1623) and IV (1793). Feed conversion ratio was found to be 10.98, 25.81, 15.61 and 31.4 for treatments I, II, III and IV, respectively, and treatment I and III differed ($P<0.05$) from other 2 treatments. Dry matter, crude protein, crude fibre and total ash digestibilities remained similar ($P>0.05$) across all treatment. Daily net benefit (Rs/h) was 15.52, 2.64, 9.65 and 1.93 for treatments I, II, III and IV, respectively. It can thus be concluded that CS gave better intake, weight gain, and economics than untreated straw, and UMBC was better than UMBS.

Key Words: Urea molasses block; Sunflower seed meal; Cottonseed meal; Wheat straw; Buffalo calves.

INTRODUCTION

Energy and protein deficiency and their high cost are the major constraints for improving the productivity and profitability of livestock in Pakistan. Wheat straw is the main roughage for ruminants during many months of the year. Because of its lignified, bulky and unpalatable nature, wheat straw adversely affects its intake and digestibility (Preston and Leng, 1987). Crop residues like wheat straw are also generally deficient in nutrients like energy, protein, sulphur, phosphorus and cobalt which are essential for ruminal microorganisms (FAO, 2002), and these nutrient deficiencies adversely affect animal growth, milk production and fertility.

Feeding of low quality roughages in chaffed form is considered beneficial as it reduces wastage and avoids selective consumption (Badurdeen *et al*., 1994). The particle size of a feedstuff affects surface area available for microbial attack, feed intake and digesta passage along the gastrointestinal tract (Ehle *et al*., 1982).

Most of the wheat straw fed to dairy animals is chopped. However, in the recent past use of combined wheat harvester has increased which gives straw with much longer particle size and it is hard for farmer to further chaff this straw for feeding to livestock. There is not enough information available on the comparative feeding value of chopped vs unchopped wheat straw in ruminants.

Supplementing cereal straws with fermentable nitrogen, soluble carbohydrates, minerals and other nutrients improve their utilization by ruminants (Badurdeen *et al*., 1994, Rafiq *et al*., 1996).

Sugarcane molasses is a cheap source of energy in Pakistan and urea-molasses blocks (UMB) technology also proved to be the best way of increasing its utilization in the ruminants' feeds (Mirza *et al*., 2002). Availability of fermentable nitrogen and readily available carbohydrates and minerals supplied through UMB facilitates the growth of cellulolytic microbes which results in better utilization of wheat straw (Leng, 1984).

The objectives of this study were to study the effects of feeding chopped vs unchopped wheat straw as the basal roughage for growing buffalo calves supplemented with UMB having CSM vs SFM as the vegetable protein sources, on performance, digestibility and economics.

MATERIALS AND METHODS

Buffalo calves, housing and feeding: Sixteen male buffalo calves of Nili-Ravi breed (average 18 months age; and 160 $\pm$ 16 kg mean live weight) were used. Wheat straw and UMB were offered *ad libitum*. All the calves were fed individually under uniform management conditions. The experiment lasted for a period of 60 days (June to August-2004). Animals were weighed at start of experiment and then fortnightly. Daily feed intake was noted. Water was offered twice daily i.e. morning and evening. Wheat straw used was from same variety of wheat, which was obtained as a result of use of combined harvester and part of it was chaffed by using wheat thresher, to act as chopped straw. There were four treatment groups i.e. Chopped Straw (CS) + Urea Molasses Block (UMB) containing cottonseed meal

(UMBC) as treatment 1; Unchopped Straw (US) + UMBC (treatment II); CS + UMB having sunflower seed meal (UMBC) as vegetable protein sources (treatment III), and US + UMBC (treatment IV).

Preparation of Urea Molasses Blocks: Ingredient and chemical composition of UMB and wheat straw is given in Table 1. The ingredients of UMB were mixed in the mechanical mixer and then converted into blocks of 5 kg each in hydraulic press and wrapped in plastic sheets to increase their shelf life.

Digestibility Measurements: Daily samples of UMB, wheat straw and feaces obtained during digestibility trial were analyzed using AOAC (1995) methods. Digestibility trial was conducted in the middle of experiment and digestibility data were recorded for 6 days. Digestibility was determined by subtracting the nutrients excreted in dung from the nutrients intake in feed.

Statistical Analysis: The data on feed intake, weight gain and feed conversion ratio were subjected to analysis of variance technique using randomized complete block design, with 2 x 2 factorial arrangements (*Steel et al*, 1997). Means were compared using Duncan's Multiple Range Test. Economic analysis was done by the method of Perrin *et al*. (1979). In calculating economic analysis, purchase price of feed ingredients was used. Live weight gain was given a price of Rs.75 per kilogram, and net benefit was calculated by subtracting feed cost from weight gain price.

RESULTS AND DISCUSSION

Average daily feed intake, live weight gain and feed conversion ratio of the experimental animals are presented in Table 2. Average daily gain was higher ($P<0.05$) in calves supplemented with UMBC compared to UMBS. These results are in line with Hennessy and Williamson (1988), who reported that cattle fed on carpet grass and supplemented with SFM and CSM showed better growth and feed efficiency (FE) with CSM compared to SFM. The better performance of buffalo calves fed UMBC vs UMBS may be due to higher crude protein and lower crude fiber in CSM vs SFM. This may also be due to higher non-degradable fraction of nitrogen in CSM i.e. 44.5% vs 22.4% in SFM (Hennessey and Williamson, 1988). These workers also reported higher production of total volatile fatty acids in animals fed CSM compared to SFM, which ultimately can positively affect production. Karim *et al*. (1996) reported that SFM gave lower gain compared to CSM. However, Jabbar *et al*. (1996) reported almost similar feeding value of CSM vs SFM.

Average daily UMB intake was statistically similar ($P>0.05$) among all the four treatments. Average daily wheat straw intake of treatment II and IV was significantly ($P<0.05$) lower than the other two treatments. Our results of feed intake and weight gain are also in agreement with the findings of Yunus *et al*. (2004). Weight gain of our calves is also close to that reported by Habib *et al*., (1991) who found that buffalo calves fed wheat straw and supplemented with UMB gained 187 grams daily. Our results of feed intake are also supported by the findings of Susmel *et al*., (1991) who reported that chopping the hay of significantly higher NDF content increased the daily feed intake. Lower weight gain in animals fed long wheat straw may also be due to stress of higher heat of digestion in summer months. Reduction of forage particle size is generally considered to increase intake owing to the shorter time needed for rumination and faster passage of digesta (Martz and Belyea, 1986). Even though increased intake would result in lower digestibility, the net effect in terms of intake of digestible dry matter would be higher. Castillo *et al*; (1982) found that buffaloes consumed more chopped than long rice straw. Jaster and Murphy; (1983) and Kerley *et al*., (1985) reported that diets of 6.5mm and 5.4mm vs 0.8mm size required a longer mastication time and a greater quantity of saliva would need to be produced. Also, the larger particles in diets required a longer chewing time (Santini *et al*., 1983) to reduce digesta particles size so that passage out of the rumen could occur.

Dry matter, crude protein, crude fibre and total ash digestibilities were similar ($p>0.05$) across all treatments (Table 3), which are in agreement with the findings of Richardson *et al* (1981). Overall, numerically digestibility parameters were little better in animals fed long wheat straw. Kinser *et al* (1985) reported higher DM digestibility in lambs offered longer particle size (6.5mm) compared to 0.8mm size diet.

Economic analysis showed a daily net benefit ratio (Rs/h) of 15.52, 2.64, 9.65 and 1.93 for treatment I, II, III and IV, respectively which is in line with the findings of Yunus *et al*. (2004).

It can thus be seen that straw fed in chopped form significantly improved intake and weight gain but did not influence digestibility. Under the prevailing situation it can be concluded that chopped straw proved to be better than non-chopped; and on weight to weight basis replacement of CSM with SFM in urea-molasses blocks went in favour of CSM; and economics also went in favour of CSM and chopped straw.

Table 1. Ingredient and chemical composition (%) of urea molasses blocks and wheat straw fed to buffalo calves

Ingredients	Sunflower meal Block	Cottonseed meal Block
Cottonseed meal (%)	-	08.50
Sunflower seed meal (%)	08.50	-
Molasses (sugarcane) (%)	42.00	42.00
Urea (Fertilizer grade) (%)	05.30	05.30
Common salt (%)	04.20	04.20
Dicalcium phosphate (%)	01.00	01.00
Limestone powder (%)	08.50	08.50
Vitamin Mineral mixture (%)	01.00	01.00
Rice bran (%)	21.00	21.00
Wheat bran (%)	08.50	08.50
Chemical composition (%) on DM basis		
Dry matter	78.40	78.46
Crude protein	17.37	18.94
Crude fibre	06.11	05.60
Total ash	24.31	24.21

Table 2. Daily feed intake, live weight gain and feed conversion ratio (FCR) of experimental animals

Treatments*	Parameters				
	Av.Wt. gain (gms)	Block Av. intake (gms)	Wheat straw Av. intake (gms)	Total intake (gram/head)	FCR kg feed/kg gain
Blocks					
UMBC	382 ± 42[a]	1770 ± 50	3833 ± 32[b]	5603 ± 77	14.67 ± 7.5
UMBS	283 ± 79[b]	1722 ± 16	4108 ± 53[a]	5830 ± 45	20.24 ± 15.1
Wheat straw					
Chopped (CS)	487 ± 33[a]	1749 ± 125	4525 ± 142[a]	6273 ± 155[a]	12.88[a] ± 6.2
Unchopped (US)	178 ± 57[b]	1643 ± 155	3416 ± 193[b]	5059 ± 167[b]	28.42[b] ± 7.0
Blocks x Wheat straw (Interaction effect)					
UMBC x CS	287 ± 86[a]	941 ± 25	2210 ± 32[a]	3151 ± 67[a]	10.98[a] ± 6.3
UMBS x CS	200 ± 43[a]	808 ± 16	2315 ± 42[a]	3123 ± 36[a]	15.61[a] ± 6.8
UMBC x US	95 ± 45[b]	829 ± 18	1623 ± 28[b]	2452 ± 79[b]	25.81[b] ± 23.7
UMBS x US	83 ± 69[b]	814 ± 18	1793 ± 19[b]	2607 ± 45[b]	31.40[b] ± 21.5

[ab] Value in columns with different superscripts differ (P<0.05)

* UMBC: Cotton seed meal block; UMBS: sunflower seed meal block; CS; Chopped wheat straw and US: Unchopped wheat straw

Table 3 Nutrient digestibility (%) in experimental animals

Treatments	Digestibility			
	DM	**CP**	**CF**	**Ash**
Blocks				
UMBC	45.46	49.85	45.69	56.66
UMBS	49.20	52.95	44.91	58.58
Wheat straw				
Chopped (CS)	44.67	50.28	45.93	56.84
Unchopped (US)	49.99	52.52	44.67	58.35
Blocks x Wheat straw				
UMBC x CS	44.13	49.56	46.07	57.18
UMBC x US	48.80	50.15	45.32	56.15
UMBS x CS	47.90	51.01	45.79	56.50
UMBS x US	51.18	54.90	44.03	60.55

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