SHORT COMMUNICATION

Effect of urea-molasses-mineral-block and azolla (*Azolla pinnata*) as feed supplements on nutrients utilization and production

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Abstract: The aim of this research was to evaluate the effect of feed supplements on nutrients utilization and production performance in crossbred cows. Fifteen lactating crossbred cows were divided into three groups based milk yield and body weight and subjected to 3 dietary treatments viz.,- T₀: Wheat straw and concentrate mixture; T₁: T₀ + UMMB; and T₂: T₁ + azolla. UMMB was offered during morning for 30 minutes and fresh Azolla was incorporated @ 1.5 kg/animal/d. Average DMI/100 kg body weight was higher (P<0.05) in group T₁ cows as compared to other groups. Average daily water intake was higher (P<0.05) in group T₁ as compared to T₀ and T₂ group. Average milk production (litre/cow) was higher (P<0.05) in T₁ (7.54) as compared to T₂ (7.27) and T₀ (7.13). It was concluded that UMMB supplementation on wheat straw based diet improved the utilization of nutrients, water intake and milk production in crossbred cows during winter season.

Keywords: Crossbred cows, UMMB, Azolla, Nutrients utilization, Milk yield

The productivity of the dairy animals in India is much below the genetic potential. The main constraint for low productivity is the scarcity and fluctuation of the quality and quantity of feed and

fodder resources. The cereal crop residue and agricultural by-products are the major forages for dairy animals in Rajasthan. The major factor that limits animal production from these feed resources is nutritional imbalances (Misra et al. 2009), and are insufficient to support nutrients requirements, optimal reproductive performance and sustainable milk production from dairy animals. Many researchers (Misra et al. 2006; Gowda et al. 2015; Lawania and Khadda, 2017) have identified many unconventional feed and fodder resources to maintain the milk production particularly in off season. Supplementation of UMMB and Azolla holds good promise as a feed supplement to dairy animals maintained on low quality feed resources. Misra et al. (2006) has documented the importance of urea molasses mineral block (UMMB) as supplement for livestock. The UMMB lick allows the slow ingestion of urea that efficiently utilized by the rumen microbes. Several experiments have demonstrated the beneficial effects of UMMB supplementation on feed intake, milk production and reproduction of the cows (Kayastha et al. 2012; Misra et al. 2007; Lawania and Khadda, 2017). Azolla has been used as a protein supplement to dairy animals (Meena et al. 2017) and milk yield was increased by 15 to 20% after feeding azolla in the diet of dairy cows (Gowda et al. 2015). Hence, the present study was conducted to see the effect of UMMB and azolla supplementation on nutrients utilization and milk production in crossbred cows during winter season.

The experiment was conducted for 90 days at the animal farm of LPM department, SKN College of Agriculture, Jobner. Fifteen lactating crossbred (Tharparkar/Sahiwal x Holstein Friesian) cows in early stage of lactation were selected based on body weight and milk yield and randomly divided into three groups as: T₀ - Control: The animals were maintained on conventional diet of wheat straw ad lib. and concentrate mixture, T₁ - T₀ + UMMB and T₂ - T₀ + Azolla, respectively. The animals were dewormed with anthelmintic before the start of actual experiment and were kept individually during experimental period in cattle shed. All cows were fed wheat straw (*Triticum aestivum*) ad lib. as dry fodder and concentrate mixture (Saras Gold) / as per ICAR, (2013). Animals in group T₁ were offered UMMB (Urea molasses mineral bricks) additionally allowing licking for 30 minutes in the morning. Animals of group T₂ were supplemented @ 1.5 kg/h/d fresh Azolla in concentrate mixture. The animal had free access to clean and

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fresh drinking water. A digestibility trial of 6 days duration was conducted at the end of experiment. The milk yield was recorded daily in the morning and evening. The samples of feed, fodder and faeces, residue left were collected and analyzed for proximate principles (AOAC, 2005). The experimental data were statistically analyzed (Snedecor and Cochran, 1994). The proximate composition of feed and fodder offered to animals has been given in Table 1

Daily DMI (kg/d % BW) was higher ($P<0.05$) in group T_1 as compared to group T_0 and T_2 , indicating that wheat straw deficient in nitrogen, energy and minerals, was consumed in higher quantities when these deficiencies were removed by supplementing with UMMB. Similarly higher voluntary consumption of straw *vis-à-vis* total DM was observed in crossbred calves offered wheat straw and supplemented with UMMB lick (Tiwari et al. 1990; Tripathi et al. 2006; Sahoo et al.

2009; Mohini and Singh, 2010; Sharma et al. 2014; Meel et al. 2015). The average daily voluntary water intake in groups T_1 , T_2 and T_3 was 37.44 ± 1.18 , 39.32 ± 0.71 and 37.50 ± 0.35 , respectively (Table-2). The voluntary water intake of cows on treatments T_2 was higher than treatments T_1 and T_3 . The cows in group T_2 consumed more water due to more DM intake as compared to those in groups T_1 and T_3 . There was a positive relationship between water intake and milk production and DM content of the diet. Similar finding were reported earlier (Shekhawat and Chaudhary, 2012; Sharma et al. 2014). The CP and DCP intake in the group T_2 was more than that in groups T_1 and T_3 ($P<0.05$). The higher CP and DCP intake in group T_2 might be attributed to better utility of nutrients through UMMB. Crude protein intake by the animals was sufficient to meet the requirements (Kumar et al. 2012; Parashuramulu et al. 2013). The feed supplements had significant ($P<0.05$) influence on TDN intake by cows. The average daily TDN intake was more ($P<0.05$) in T_2 as compared to T_1 and

Table 1 Chemical composition (% DM basis) of feed and fodders

Ingredient	DM	CP	EE	CF	NFE	Total ash
Wheat straw	90.67	4.40	1.85	32.40	48.85	12.50
Concentrate mixture	90.20	18.70	3.40	09.80	57.92	10.18
UMMB	82.15	31.73	4.89	05.70	34.51	23.17
Azolla	07.80	21.37	2.80	13.20	46.42	16.21

Table 2 Effect of different feed supplements on nutrient utilization, water intake digestibility of nutrients in crossbred cow during winter

Parameter	Group		
	T_0	T_1	T_2
Average body weight (kg)	413.75 ± 23.493	413.45 ± 27.101	412.80 ± 22.434
DM Intake (kg/d/animal)			
Concentrate	$4.23^c\pm0.65$	$4.51^a\pm0.53$	$4.26^{bc}\pm0.51$
Wheat straw	$7.07^c\pm0.05$	$7.64^b\pm0.05$	$7.44^b\pm0.06$
Supplement feed	-	0.24 ± 0.00	0.11 ± 0.00
Total DMI	$11.31^c\pm0.65$	$12.40^a\pm0.49$	$11.82^b\pm0.53$
DMI, % BW	$2.73^c\pm0.14$	$2.94^a\pm0.16$	$2.83^b\pm0.21$
Total water intake	$37.44^c\pm1.18$	$39.32^a\pm0.71$	$37.50^{bc}\pm0.35$
Water intake/ kg DMI	$3.31^c\pm0.025$	$3.17^a\pm0.024$	$3.17^{ab}\pm0.02$
Digestibility of nutrients (%)			
DM	$69.52^b\pm1.142$	$70.16^a\pm0.200$	$68.26^c\pm0.996$
CP	$66.10^{bc}\pm2.941$	$67.09^a\pm2.020$	$65.76^c\pm2.291$
EE	61.97 ± 2.265	61.89 ± 1.503	60.42 ± 1.761
CF	59.94 ± 1.163	60.25 ± 1.462	60.13 ± 0.262
NFE	$71.53^b\pm1.370$	$73.26^a\pm0.796$	$70.33^c\pm1.017$
Nutrients intake (kg/d/animal)			
Crude protein intake	$1.131^b\pm0.084$	$1.296^a\pm0.060$	$0.920^c\pm0.069$
CPI/100 kg BW	$0.273^c\pm0.020$	$0.313^a\pm0.037$	$0.285^{bc}\pm0.026$
DCP intake	$0.757^c\pm0.086$	$0.869^a\pm0.045$	$0.784^{bc}\pm0.062$
DCP intake/100 kg BW	$0.183^c\pm0.021$	$0.210^a\pm0.018$	$0.190^{bc}\pm0.024$
Daily TDN intake	$7.507^c\pm0.456$	$8.095^a\pm0.211$	$7.597^{bc}\pm0.289$
TDN intake/100 kg BW	$1.81^c\pm0.07$	$1.95^a\pm0.18$	$1.84^{bc}\pm0.14$

a,b,c Means having different superscript differ significantly ($P<0.05$)

T₃ groups. It was higher in T₂ group than other two groups. Improved nutrient utilization with higher feed intake resulted higher TDN intake in UMMB supplemented group. The results are in agreement with the findings of Sihag et al. (2006); Kumar et al. (2012) and Choubey et al. (2015).

Apparent digestibility of DM, CP and NFE were significantly ($P < 0.05$) higher in T₂, as compared to T₂ and T₃ group due to higher digestibility (Table 2). These results are in close agreement to the findings of (Sihag et al. 2006; Shekhawat and Chaudhary, 2012; Meel et al. 2015). The milk production (L/animal/d) was higher ($P < 0.05$) in group T₁ (7.54 ± 1.60) compared to T₀ (7.13 ± 1.70) and T₂ ($7.27^{bc} \pm 1.45$). Which may be due to effect of UMMB supplementation (Tripathi et al. 2006; Mohini and Singh, 2010; Mathur et al. 2013; Murthy et al. 2013; Meel et al. 2015).

Conclusion

Supplementation of UMMB increased nutrient digestibility and milk production in crossbred animals maintained on wheat straw based diet during winter season while inclusion of azolla had no significant effect on the performance of animals.

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