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Effect of formaldehyde treated concentrate, urea and soybean meal on yield and ouality of cow milk

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ABSTRACT : Present investigation entitled "effect of formaldehyde treated concentrate, urea and soybean meal on yield and quality of cow milk" was undertaken at Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Feeding of 1.5 per cent formaldehyde treated 70:30 sugras : SBM concentrate mixture with 2 per cent added urea diet to lactating cows (T_3) was evaluated in relation to sugras untreated ration (T_1). It is concluded that lactating cows reared on HCHO treated 70:30 sugras:SBM concentrates with 2 per cent added urea ration produced 15 and 19 per cent more milk and 4 per cent FCM in comparison to control diet comprising feeding of sugras milk ration. Feeding of HCHO treated concentrate with 3 per cent added urea (T_5) and untreated concentrates with 3 per cent added urea (T_4) rations did not influence significantly on fat content of milk, being 4.23 and 4.24 per cent, respectively. There was increase in protein content of milk by 9.30 per cent on formaldehyde treatment (T_3) as compared to T_1 control group. The average SNF content in milk in order of significance was 8.87, 8.74 and 8.60 per cent under T_3, T_5 and T_1 groups, respectively. While the SNF content of milk noticed on feeding untreated 70:30 sugras:SBM with 2 per cent (T_2) and 3 per cent (T_4) added urea diets was significantly lower than that of T_3 and T_5 respective treated groups On the other hand, TS content of 12.74, 12.78 and 12.96 per cent were noticed under T_1, T_4 and T_5 treatments, respectively.

KEY WORDS : Formaldehyde, Sugras, Urea, Soybean meal, Milk yield, Milk quality, 4 per cent FCM, Fat, Protein, Solid not fat, Total solids

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INTRODUCTION

Livestock contributed 27 per cent of agriculture are allied GDP and therefore, Government of India has targeted 4 per cent growth in agriculture (Chakravarthy, 2010). This means a growth of 7.5 would be needed in livestock sector (Rekhate, 2010). Hence, to cope up with the situation, it is necessary to maintained the present growth in milk production on one hand and to accelerate the milk production by 39 per cent over the present level within a span of 8 to 10 years *i.e.* a production target of 150 million tonnes by 2020, to fulfil the demand of milk for human population on the other hand. However, the target is to achieved with available animal wealth, feed and fodder resources. No doubt the large bovine population of 220 million cattle and 105 million buffaloes are the major contributors for milk production. Maharashtra posses 16.73 and 5.56 million cattle and buffalo population, of which 2.50 and 0.48 million cattle and buffalo are locate in Amaravati division of Vidarbha region. Moreover, Gaolao and Nagpuri breed of cattle and buffalo are habitat in Vidarbha region (Anonymous,

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2012). The focus on the development of dairying by the animal husbandry department Government of Maharashtra through the implementation of different schemes like distribution of milch animal on subsidy to farmers, AI facilities and milk procurement network will provide a base for enhancement of milk production in the state in general and particular in the region. Hence, to cope up with the situation, it is necessary to maintained the present growth in milk production on one hand and to accelerate the milk production by 39 per cent over the present level within a span of 8 to 10 years *i.e.* a production target of 150 million tonnes by 2020, to fulfil the demand of milk for human population on the other hand. Thus to achieve these needs the roughage diet is supplemented with limited quantity of cereal grains, costly cakes and byproduct of pulses without considering the requirement of animal, resulting either low nutritional status or mal nutrition. This feeding approach has direct influence on production potential of animals. However, under present scenario it appears that feeding of full quota of concentrate is not possible as a result of unbridgeable gap between availability and requirement of concentrates. A gap of 35 to 44 per cent between availability and requirements of concentrate is estimated during 2010 which would have increase in coming years. In view of this the strategic approach for increasing protein supply to the productive functions from the available concentrate feeding seems to be the need of the day.

However, limited studies with regards to the effect of feeding formaldehyde treated soybean meal to lactating cows and buffaloes have been conducted so far as apparent from documented literature. Where a positive significant effect on increase in milk yield of cows, goats and sheeps was noticed due to feeding of formaldehyde treated SBM. Thus, an attempt has been made in the present study to enhance the rumen by pass protein value of soybean meal (SBM) by treating with 1.5 per cent formaldehyde/ 100 g CP and its feeding effect on yield and chemical quality cow milk.

MATERIAL AND METHODS

The present investigation entitled "effect of formaldehyde treated concentrate, urea and soybean meal on yield and quality of cow milk" was carried out at Livestock Instructional Farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola for a experimental period of 90 days with 10 days prior pre experimental period. Twenty five early to mid-lactation stage lactating cows were selected from the herd on the basis of nearness in stage of lactation, milk production and body weight. The selected cows were divided in the five groups on the basis of nearness in different productive characters.

The maintenance and milk production requirements of the cows were worked out on the basis of the thumb rules suggested by Prasad and Neeraj (2008) and Banerjee (2008). The cows in all the treatments (T_1 to T_5) were given 5 kg green Hy. Napier and one kg sugras milk ration grade 1 (17.60% CP) to fulfill the maintenance requirements. Treatments were planned like T_1 – Wheat straw + sugras concentrate (17.60 % CP) 40 per cent of milk yield (production ration), T_2 – Wheat straw + untreated 70:30 sugras:SBM mixture (27.47 %CP) 30 per cent of milk yield (75% of production ration) + 2 % urea of the production quantity, T_3 – Wheat straw + 70:30 sugras:SBM mixture (27.47 %CP) treated with HCHO at 1.5 g/100CP 30 per cent of milk yield (75% of production ration) + 2% urea of the production quantity, T_4 - Wheat straw + untreated 70:30 sugras:SBM mixture (27.47 %CP) 20 per cent milk yield (50% of production ration)+ 3% urea of the production quantity and T_5 – Wheat straw + 70:30 sugras:SBM mixture (27.47 %CP) treated with HCHO at 1.5 g/100CP 20 per cent milk yield (50% of production ration) + 3% urea of the production quantity.

Milk yield was recorded separately for morning and evening milking of individual cow for whole experimental period. Milk samples were collected once a week during morning and evening milk from individual cow. The composite samples were prepared for estimating fat, protein, SNF and TS contents. Fat content was determined weekly by using standard Gerber method as described in ISI: 1224 (Part - I), 1977. Protein per cent was determined weekly by formal titration method as recommended in ISI: 1479 (Part - II), 1961. The solids-not-fat content of milk was determined weekly by difference method as per Indian Standard Institution, IS: 1183 (1965). The total solid content of milk was determined weekly as per the methods prescribed by Indian Standard Institution BIS – IS: 1183 (1965). 4 per cent FCM was calculated by using following formula as suggested by Sastry and Thomas (1976).

4% FCM = 0.4 M + 15 F,

where, M= Milk yield (kg) and F= Fat production (kg).

The data were arranged in Factorial Randomized Block Design (FRBD) and analyzed by standard statistical method as per Amble (1975).

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads:

Milk production of cows :

The milk production of cows under different treatments are tabulated in Table 1.

A reference to Table 1 indicated that feeding treatments significantly influenced the daily milk production in cows. Significantly highest milk production of 6.73 kg/d/cow was obtained from the cows fed with HCHO treated concentrates with 2 per cent added urea ration T_3 whereas significantly lowest milk production of 5.69 kg/d/cow was produced by the cows reared on feeding untreated concentrate with 3 per cent added urea diet (T_4). On the other hand, daily milk production in order of significance was 6.15 in T_5, 6.13 kg in T_2 and 5.83 kg in T_1 cows. Despite of the reduction in concentrate feeding by 15.90 per cent in T_3 cows in comparison to T_1 control group, the cows from T_3 group produced more milk by 15.43 per cent over T_1 control group. Beside this the daily production level of T_3 cows was significantly more by 9.78, 18.27 and 9.43 per cent over that of adopting the practice of feeding untreated concentrate with 2 per cent added urea (T_2), untreated concentrate with 3 per cent added urea (T_4) and HCHO treated concentrate with 3 per cent added urea (T_5) rations, respectively. This means feeding of 1.5 per cent HCHO treated concentrate with 2 per cent added urea ration was more effective to increase the milk production in cows as compared to feeding either normal control diet or untreated and HCHO treated concentrate with 3 per cent added urea rations to cows. This trend do not agree with Guru *et al.* (2006) where it was reported that feeding of higher by pass protein without additional concentrate was more effective feeding strategy than combination of higher energy with bypass protein. The lower milk yield on feeding HCHO treated concentrates with 3 per cent urea supplementation (T_5) in reference to HCHO treated concentrate with 2 per cent urea (T_3) might be on account of the factors: (a) provision of 1 kg of treated concentrates in T_5 against supply of 1.5 kg of treated concentrated in T_3 cows, thereby less intake of bypass proteins in T_5 cows. (b) lower intake of CP in T_5 reflected on the availability of proteins and amino acids at intestine level and inturn availability of milk precursor for milk production.(c) increasing urea level in the diet would have increased the availability of RDP in rumen for microbial protein synthesis and not the supply of UDP to cows. This contention gets support of the observation of Gulati *et al.* (2002); Garg *et al.* (2004) and Sampath *et al.* (2004) where they suggested that inclusion of higher level of bypass proteins in the ration of lactating animal improved the milk production performance under the Indian conditions of feeding and management.

Table 1: Effects of treatments, periods and its interaction on milk production of cows (kg/d/cow)

Periods	Treatments					Mean
	T_1	T_2	T_3	T_4	T_5	
P_1	5.54	5.74	5.90	5.40	5.80	5.68 [a]
P_2	5.54	5.90	6.14	5.50	6.09	5.83 [ab]
P_3	5.67	6.03	6.41	5.62	6.11	5.97[b]
P_4	5.92	6.22	6.78	5.70	6.23	6.17 [b]
P_5	6.09	6.36	7.26	5.84	6.30	6.37[c]
P_6	6.22	6.52	7.88	6.07	6.35	6.61[d]
Mean	5.83[a]	6.13[b]	6.73[c]	5.69[a]	6.15[b]	6.11
	Period		Treatment			Interaction P x T
F test	Sig.		Sig.			Sig.
S.E.±	0.073		0.080			0.178
C.D. (P=0.05)	0.204		0.224			0.500
CV%	6.54					

Pooled treatments means in row and pooled period means in column with similar superscripts do not differ significantly

Moreover, the experimental period had a significant effect on milk yield of cows, where milk yield of cows irrespective of treatments remained constant from 2nd to 3rd period of trial as the differences did not reach the level of significance and ranging from 5.97 to 6.17 kg/d/cow. There after increased significantly reaching to a level of 6.61 kg/d/animal in 6th period of trial indicating an increase of 16.37 per cent over the initial value of 5.68 kg/d/cow.

4 per cent fat corrected milk production (FCM) :

The energy status of milk is dependent on its fat content. Beside this the procurement of milk at collection center is done on the basis of fat content of milk. The cow milk having fat content more than legal standards (3.5 %) receives additional bonus prize. It is, therefore, necessary to have a uniform comparison of milk at constant fat level so as to evaluate the precise effect of feeding treatments on milk production. In this context 4 per cent FCM production was calculated and is shown in Table 2 along with analysis of variance in Table 2.

It was observed that FCM production varied significantly between the feeding treatments being 5.95, 6.21, 7.07, 5.90 and 6.36 kg/d/cow under T_1, T_2, T_3, T_4 and T_5 treatments, respectively. This means the cows fed with HCHO treated concentrate with 2 per cent added urea ration (T_3) produced significantly more FCM milk by 18.95 and 11.16 per cent over that of T_1 control and HCHO treated concentrated with 3 per cent added urea diet (T_5) to cows, respectively.

The trend further indicated that the cows from untreated concentrates with 2 per cent (T_2) and 3 per cent (T_4) added urea groups produced significantly less FCM milk by 13.84 and 19.83 per cent, respectively as compared to T_3 group cows. Therefore, it can be said that feeding HCHO treated 70:30 sugras : SBM concentrate with 2 per cent added urea (T_3) ration distinctly proved beneficial for increasing 4 per cent FCM production in cows. Higher milk production with more fat content in T_3 cows was the reason to raise the FCM production, there by possibility of increasing monitory returns.

This trend of results are collaborative with results of past workers like Chaturvedi and Walli (2002); Garg *et al*. (2003c); Yadav and Chaudhary (2004); Sahoo and Walli (2005); Guru *et al*. (2006) and Bugalia *et al.* (2008a) where they noticed significantly higher FCM production in cows and goat by feeding formaldehyde treated by pass proteins, rape seed meal, GNC and til cake.

Milk quality :

The milk quality obtained on feeding different treatments was evaluated on the basis of its fat, protein, SNF and TS content. The data obtained in respect to various quality attributes are tabulate in Table 3.

Milk fat content :

Fat content of milk as affected by feeding formaldehyde concentrate to cows over the experimental period are tabulated in Table 3 and mean sum of squares in Table 4.

Feeding of HCHO treated concentrate with 3 per

Table 2: Average daily fat corrected milk production (FCM at 4%) over experimental period under different treatments

	T_1	T_2	T_3	T_4	T_5	Mean
P_1	5.57	5.72	5.99	5.53	5.89	5.74 [a]
P_2	5.59	5.88	6.34	5.67	6.24	5.94 [ab]
P_3	5.77	6.06	6.72	5.81	6.29	6.13 [b]
P_4	6.08	6.31	7.16	5.92	6.49	6.39 [c]
P_5	6.27	6.53	7.72	6.09	6.60	6.64 [d]
P_6	6.44	6.77	8.52	6.38	6.67	6.96 [e]
Mean	5.95 [a]	6.21 [b]	7.07 [c]	5.90 [a]	6.36 [b]	6.30
	Treatment		Periods		Interaction	
F test	Sig.		Sig.		Sig.	
S.E.±	0.075		0.082		0.184	
C.D. (P=0.05)	0.210		0.230		0.514	
CV %			6.52			

Pooled treatments means in row and pooled period means in column with similar superscripts do not differ significantly

cent added urea (T_5) and untreated concentrates with 3 per cent added urea (T_4) rations did not influence significantly on fat content of milk, being 4.23, and 4.24 per cent, respectively. However, the fat content noticed in milk (4.14 %) on feeding T_1 control diet was found significantly lower over that of rest of the treatments except T_2. Moreover, it is specifically pointed out that the milk produced by the cows in all treatments were meeting out fat content standards (3.5%) according to PFA rules prescribed for cow milk in Maharashtra. On the contrary fat content of milk was possessing higher values by 0.64, 0.59, 0.83, 0.74 and 0.73 per cent over that of PFA standards under T_1 to T_5 treatments, respectively. As a result one could except that milk produced under T_3 group would fetch more prizes followed by T_5, T_1 and T_2 groups on the basis of prevailing policy for purchase of milk at Govt. Milk Scheme.

The results also did indicate that milk produced by T_3 cows was containing more fat by 0.19 and 0.10 per cent over that of T_1 control and T_5 treated concentrate with 3 per cent added urea ration group, respectively. This trend clearly demonstrated that feeding of HCHO treated concentrate with 2 per cent added urea diet to cows was beneficial to increase fat content of milk and in turn more economic returns than that of T_1 and T_5 groups. Perhaps lower intake of concentrates (2.75 kg/d/cow) and promoting more intake of WS (4.70 kg/d/cow) in T_3 cows in comparison to T_1 (3.27 and 4.33 kg) and T_5 (2.14 and 4.57 kg) cows might be the cause to increase fat content of milk. As a result these situations might have created favourable conditions for production of acetic acid in rumen and in turn changing ratio between Acetic acid and Propionic acid in rumen. These views get support of Yadav and Yadav (1989) where they reported that urea feeding increased the concentration of Acetic acid and Propionic acid and total volatile fatty acids. Sengal *et al*. (1990) opined that probable reason for higher milk fat on feeding urea treated WS to buffaloes might be due to more quantity of fibre intake and may be due to higher intake of less degradable proteins. Whereas Yadav and Chaudhary (2004) attributed the significantly higher fat content of milk on feeding HCHO treated GNC to supply of methionine through protected proteins. This explanation justifies the present results on the ground that fibre intake in T_3 cows was more compared to other groups and feeding formaldehyde treated concentrate with 2 per cent added urea ration might have increased intake of less degradable proteins in cows.

Beside this Morgan (1985) noted increase in fat content of milk on HCHO treated soya + urea diet while Chaturvedi and Walli (2000) and Guru *et al*. (2006) observed significant increase in milk fat content of cows and goat as a result of increase feeding of UDP in ration. On the other hand Chatterjee and Walli (2003); Yadav and Chaudhary (2004); Bugalia *et al*. (2008b) and Doskey *et al*. (2011) reported significant increase in fat content of milk by feeding HCHO treated mustard cake to cows, GNC to cows, til cake to cows and SBM to goats, respectively. These observations are supportive to present results on feeding HCHO treated concentrates to cows.

Milk protein content :

The protein content of milk as influenced by the different feeding treatments are presented in Table 3 and mean sum of squares in Table 4.

It was noticed that protein content of milk was more

Table 3: Effect of feeding treatments on quality of cow milk over experimental period(Mean values)

Treatments	Fat	Protein	SNF	TS
T_1	4.14[a]	3.44[a]	8.60[a] (2.932)	12.74[a] (3.571)
T_2	4.09[b]	3.45[a]	8.64[a] (2.940)	12.48[b] (3.534)
T_3	4.33[c]	3.76[b]	8.87[c] (2.978)	13.24[c] (3.639)
T_4	4.24[d]	3.43[a]	8.57[c] (2.928)	12.78[b] (3.576)
T_5	4.23[d]	3.57[c]	8.74[d] (2.956)	12.95[d] (3.599)
Mean	4.23	3.53	8.68	12.84
F test	Sig.	Sig.	Sig.	Sig.
S.E.±	0.014	0.009	0.013	0.003
C.D. (P=0.05)	0.039	0.025	0.038	0.009
CV %	1.792	1.40	0.85	0.505

Figures in parenthesis shows the square root transformation

or less similar between T_1, T_2 and T_4 groups as the differences did not reach the level of significance, being 3.44, 3.45 and 3.43 per cent, respectively. However, significantly highest content of 3.76 per cent was obtained on feeding HCHO treated 70:30 sugras : SBM with 2 per cent added urea (T_3) ration to cows followed by content of 3.57 per cent on feeding of same ration with 3 per cent added urea (T_5) to cows. Moreover, the protein content (3.57%) in T_5 was also significantly lower than that of protein content of T_3 group. This means 1.5 per cent formaldehyde treatments was effective to increase protein content of milk. The probable reason could be increase intake of UDP dietary nitrogen in T_3 and T_5 treatments and thereby supply of more nitrogen for protein synthesis. To support this contention Yadav and Chaudhary (2010) reported that higher protein availability for digestion in intestine due to formaldehyde treatment and thereby increasing supply of precursors for milk synthesis. These views support the present trend. On the other hand Croociker *et al.* (1983); Chatterjee and Walli (2003); Sahoo and Walli (2005) and Guru *et al.* (2006) reported non-significant effect of feeding formaldehyde treated SBM, mustard cake, high bypass protein to cows, buffaloes and goats, respectively. Moreover Leonard *et al.* (2004) expressed that feeding of treated SBM with different methods depressed protein content of milk. These results do not agree with present results. As in the present study there was increase in protein content of milk by 9.30 per cent on formaldehyde treatment (T_3) as compared to T_1 control group.

Milk solid-not-fat (SNF) content :

The results on SNF content of milk under different treatments over the experimental period are shown in Table 3 and analysis of variance in the form of square root transformation is presented in Table 4.

It was observed that feeding treatments influenced significantly SNF content of milk. SNF content of milk produced on feeding HCHO treated concentrates with 2 per cent (T_3) and 3 per cent (T_5) added urea ration to cows were significantly more by 0.27 and 14 per cent over that of SNF content of milk obtained under T_1 control group. The average SNF content in milk in order of significance was 8.87, 8.74 and 8.60 per cent under T_3, T_5 and T_1 groups, respectively. While the SNF content of milk noticed on feeding untreated 70:30 sugras : SBM with 2 per cent (T_2) and 3 per cent (T_4) added urea diets was significantly lower than that of T_3 and T_5 respective treated groups But was at par with that of T_1 control group. However, it is pointed out that milk produced in all the treatments was fulfilling SNF content PFA standards of 8.5 per cent prescribed for cow milk in Maharashtra (De, 1990).

Morgan (1985) opined that there was increase in lactose content of milk on feeding HCHO soya + urea diet to cows. Moreover, lactose concentration was influenced by the level of fibre and its digestibility in diet. This explanation strengthen the present result as fibre intake and its digestibility were more on feeding formaldehyde treated diet to cows. Moreover, the past workers like Chatterjee and Walli (2003); Yadav and Chaudhary (2004); Sahoo and Walli (2005); Guru *et al*. (2006) and Bugalia *et al.* (2008a) did not notice significant difference in SNF content of milk on feeding untreated and formaldehyde treated concentrates to buffaloes, cows, goat and Doe, respectively.

Milk total solids (TS) content :

A reference to Table 3 and 4 reveals that TS content of milk was influenced significantly by the feeding treatments. Significantly higher TS content of 13.24 per cent in milk was obtained on feeding T_3 HCHO treated concentrate mixture with 2 per cent added urea ration to cows. While lowest content of 12.48 per cent was observed in milk of cows fed by untreated concentrate with 2 per cent added urea (T_2) diet. On the other hand,

Table 4: Mean sum of squares of milk production, fat, protein SNF and TS (SQRT)

Source	df	MSS					
		Milk production fortnightly	FCM (4%)	Fat	Protein	Solid not fat (SQRT)	Total solid (SQRT)
Replication	4	0.223	0.288	0.014	0.030	0.00053	0.001
Treatment	4	10.728	12.733	0.264	0.587	0.012	0.046
Period	5	2.664	4.630	0.249	0.029	0.0006	0.004
Treatment x period	20	0.315	0.462	0.007	0.004	0.0018	0.0012
Error	116	0.228	0.212	0.005	0.0024	0.016	0.0033

TS content of 12.74, 12.78 and 12.96 per cent were noticed under T_1, T_4 and T_5 treatments, respectively. Of which, T_1 and T_4 did not differ significantly but were significantly lower over that of T_5 groups. This means feeding of formaldehyde treated concentrate 2 per cent (T_2) or 3 per cent (T_5) added urea ration to cows was beneficial to increase TS content of milk by 0.50 and 0.22 per cent as compared to T_1 control or untreated concentrate with added urea diets to cows. Beside this the TS content of T_3 was more by 0.28 per cent than that of T_5 treatment, indicating the effectiveness of addition of 2 per cent urea to HCHO treated ration rather than increasing the urea level to 3 per cent in treated diet. This trend emerged out as a result of increased fat and SNF content in milk in T_3 and T_5 treatments which are the contributing factor to TS content of milk.

Chaturvedi and Walli (2000); Yadav and Chaudhary (2004) reported higher TS content by 0.36 and 0.61 per cent in milk on feeding more UDP and HCHO treated GNC to cows, respectively over that of lower UDP and untreated ration feeding to cows. Moreover, the TS values reported by them for cow milk as 13.19 and 13.42 per cent for treated groups against content of 12.83 and 12.81 for control groups are comparable with present values of TS content noticed in T_3 and T_1 groups. However, Sahoo and Walli (2005) and Bugalia *et al.* (2008b) did not observe significant difference of feeding HCHO treated mustard cake to goats and til cake to cows, respectively on TS content of milk. But the values reported by them were ranging from 12.85 to 13.30 and 13.24 to 14.11 per cent on feeding untreated and treated rations. These values are nearer to present TS content values.

Thus, the quality of milk in reference to its fat, protein, SNF and TS contents were not hampered due to feeding 1.5 per cent formaldehyde treated 70:30 sugras:SBM concentrate mixture with 2 per cent added urea ration to cows in relation to adoption of normal practice of feeding untreated concentrates.

Conclusion :

It is concluded that lactating cows reared on HCHO treated 70:30 sugras:SBM concentrates with 2 per cent added urea ration produced 15 and 19 per cent more milk and 4 per cent FCM in comparison to control diet comprising feeding of sugras milk ration. Feeding of HCHO treated concentrate with 3 per cent added urea (T_5) and untreated concentrates with 3 per cent added urea (T_4) rations did not influence significantly on fat content of milk, being 4.23, and 4.24 per cent, respectively. However, the fat content noticed in milk (4.14 %) on feeding T_1 control diet was found significantly lower over that of rest of the treatments except T_2. There was increase in protein content of milk by 9.30 per cent on formaldehyde treatment (T_3) as compared to T_1 control group. The average SNF content in milk in order of significance was 8.87, 8.74 and 8.60 per cent under T_3, T_5 and T_1 groups, respectively. While the SNF content of milk noticed on feeding untreated 70:30 sugras:SBM with 2 per cent (T_2) and 3 per cent (T_4) added urea diets was significantly lower than that of T_3 and T_5 respective treated groups But was at par with that of T_1 control group. Significantly higher TS content of 13.24 per cent in milk was obtained on feeding T_3 HCHO treated concentrate mixture with 2 per cent added urea ration to cows. While lowest content of 12.48 per cent was observed in milk of cows fed untreated concentrate with 2 per cent added urea (T_2) diet. On the other hand, TS content of 12.74, 12.78 and 12.96 per cent were noticed under T_1, T_4 and T_5 treatments, respectively.

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