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EFFECT OF SUGARCANE BY-PRODUCT BASED COMPLETE RATIONS ON NUTRIENT UTLIZATION AND MILK PRODUCTION IN MURRAH BUFFALOES*

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ABSTRACT

Seven rations (six complete rations were formulated by using sugarcane by-products and other crop residues and balanced concentrate mixture in the mash form and one conventional ration comprised with hybrid Napier and concentrate mixture) were prepared and fed to 28 Murrah buffaloes for a period of 180 days using Randomized Block Design to study the effect of processing of complete diet on nutrient utilization and milk production. The DMI (kg/100kgbody wt) was significantly (P<0.01) higher in buffaloes fed on complete rations than on control. The DCP and TDN contents were significantly (P<0.01) higher in complete rations, when compared to control ration. The digestibility coefficients of proximate nutrients (P<0.01) and cell wall fractions (P<0.05) were significantly higher in buffaloes fed with complete rations than those fed on conventional diet. The milk yields of buffaloes were 11.60 1.60,11.90 1.05,12.25 0.59,11.85 0.65,12.05 0.44, 11.80 0.91 and 9.20 0.46 kg in buffaloes fed with CR-I, II, III, IV, V, VI and control, respectively though insignificant. However, 6% FCM yields were significantly (P<0.05) higher in buffaloes fed on complete rations when compared to conventional diet. The cost per kg sugarcane by-product and other crop residue based complete ration was ranged from Rs.2.73 to 3.41.The cost per kg complete ration was lower by 10.24, 14.28 and 11.42 percentage units in CR-IV, V and VI rations, respectively when compared to control ration (Rs.3.12).

Keywords: Sugarcane by-products, complete ration, milk production, Murrah buffaloes

The most important by-products of sugarcane farming are sugarcane tops and sugarcane trash and those of industry are sugarcane bagasse, molasses, and sugarcane sludge and press mud. India stands 2nd in sugarcane production in the world next to Brazil with an annual production of 265 million tons. Hence there is a necessity to use the by-products of sugarcane farming and sugar industry to

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livestock feeding systems since they have all the nutrients required for large animal feeding.

There is a large gap(current requirements for nutrients are estimated to be 40.9 mt of digestible crude protein (DCP) and 454.8 mt of total digestible nutrients (TDN) against the availability of 22.01 mt of DCP and 253.9 mt of TDN. between the requirements and availability with regards to roughages in livestock feeding in India[7].

MATERIALS AND METHODS

Required quantity of feed and fodder were procured from the farmers fields of sugarcane production areas surrounding the Buffalo Research Station, Venkataramannagudem. The method for urea enrichment of sugarcane trash was followed as per the method suggested.[5] Complete rations were formulated by using the sugarcane by -products and other crop residues for lactation experiments. These complete rations were formulated based on *in vitro* studies. Complete rations were formulated in the experiment as CR-I, CR-II, CR-III, CR-IV, CR-V and CR-VI, respectively. Control ration comprised of green fodder and concentrate mixture in milch buffaloes. The lactation trial of 180 days was conducted on Murrah buffaloes at Buffalo Research Station, Venkataramannagudem, West Godavari District, A.P. Twenty eight lactating Murrah buffaloes, which were in second and third lactation were selected and distributed randomly into seven equal groups in Randomized Block Design (RBD) considering daily milk yield, order of lactation and stage of lactation. The buffaloes were producing an average of 7.18 ± 0.34 kg of milk per day at the start of experiment. The concentrate mixture contained 17.85 and 70 per cent CP and TDN respectively.

The milk samples were subjected to determination of fat, SNF and total solids. The milk fat was determined by the Gerber's method.[2] using special Butyrometer and pipette with BIS marking. The SNF was calculated by using gravimetric method[3] based on estimation of specific gravity using corrected lactometer reading (CLR). Lactometer standardized at 20° C was used according to the temperature of milk in Fahrenheit using BIS chart.

$$\text{SNF \%} = \frac{\text{CLR} + 0.25\ F + 0.6}{4}$$

Where CLR = Corrected Lactometer Reading,

F = Fat percentage

From the milk yield and fat yield of animals 6 per cent fat corrected milk yield (FCM) was calculated[12].

6% FCM = 0.308 X Total Milk Yield +11.54 X Total Fat Yield (kg)

The total solids content of the milk was also arrived by the addition of fat and SNF percentages. The experimental data were subjected to statistical analysis according to the procedures.[13]

RESULTS AND DISCUSSION

The daily dry matter intake / 100 kg body weight of experimental animals were presented in Table 1. The daily average DM intake for 100 kg body weight ranged from 2.79 ± 0.04 to 3.33 ± 0.02 and was significantly ($P<0.01$) higher in milch buffaloes fed with sugarcane by-product based complete rations than those fed on control diet (Table 1). However, all the animals met the DMI requirement as suggested.[4] Similar observations were also reported with regards to DM intake in buffaloes fed with maize cob based (2.86) and sugarcane bagasse based (2.30) complete diets, respectively[10]. These observations made by the above authors were in agreement with the present study.

The statistical analysis revealed that the DM digestibility coefficient were significantly ($P<0.01$) different among the experimental rations. The digestibility (%) of DM was significantly ($P<0.01$)

higher by 8.58 to 19.88% on complete diets when compared to conventional rations. In buffaloes fed with processed cotton straw based complete diets the DM digestibility are at par with the finding of the present study.[6]

The OM digestibility coefficients of experimental complete rations were significantly (P<0.01) higher than that of control diet. The OM digestibility in crossbred cows fed complete diets prepared with conventional rations had 62.54 to 66.52.[9]

The CP digestibility coefficients of experimental complete rations were significantly (P<0.01) higher than the control diet. The CP digestibility on experimental complete diets was significantly (P<0.01) higher by 4.10 to 22.64 per cent units, when compared to control ration. But, higher CP digestibilities observed in lactating buffaloes on complete diets were on par with the findings of the present study[11].

Significant (P<0.01) differences were recorded among the experimental diets with regards to CF digestibilities but control ration had a lower digestibility of crude fibre (47.07 %) than the experimental groups.

Ether extract digestibility coefficients were significantly (P<0.01) higher for the experimental rations than for control diet. Similar results were reported in buffaloes fed complete diets.[11&6]

Significantly (P<0.01) higher DCP and TDN values were observed for complete rations when compared to conventional ration (control ration). Similar findings were reported in buffaloes fed with complete ration.[5&11]

The TDN values of experimental complete diets were significantly (P<0.01) higher by 22.86 to 60.40 per cent in lactating buffaloes than those fed conventional rations. The values reported were in close agreement with the present study.[1]

Lactating graded Murrah buffaloes fed with sugarcane by-products based complete rations, the butter fat percentage ranged from 7.97 ± 0.19 to 8.32 ± 0.34, and was not significantly (P>0.01) different from control ration (8.32± 0.14). The results of the present study were in agreement with the findings of the some of the research workers [5, &11] in buffaloes and cows fed on various agricultural by-products based complete rations. The fat yields were significantly (p< 0.05) higher by 25.0, 28.95, 30.26, 26.32, 26.32 and 25.0 percent units in buffaloes fed with CR-I, CR-II, CR-III, CR-IV, CR-V and CR-VI when compared to buffaloes fed with controlled ration.

Cost of milk production

The cost per kg milk production ranged from Rs.3.99 to 5.37 in buffaloes fed complete rations and control ration (Table 1). With the exception of CR-I the cost of milk production (Rs./kg) was lower by 8.83 to 24.72 per cent in buffaloes fed experimental complete rations than those fed control ration. Significant (P<0.05) decrease in cost (Rs.) of ration / kg milk produced was observed in buffaloes fed experimental complete rations than those on control ration except CR-I (Table 1). This might be due to less DMI per kg milk production, which was noticed with the buffaloes fed sugarcane by-products based complete rations. Lower feed cost/kg milk production was also reported in lactating buffaloes[8] fed on differently processed complete diets and in graded Murrah buffaloes[11] fed differently processed complete diets.

Table 1: Dry matter intake and economics of feeding lactating Murrah buffaloes fed on various sugarcane by-product based complete rations

Parameter	Experimental rations						Control
	CR-I	CR-I I	CR-III	CR-IV	CR-V	CR-VI	
Live weight (kg.)	580.25 ±12.32	600.67 ±16.73	530.62 ±23.32	587.80 ±16.11	559.20 ±19.50	591.87 ±18.50	560.0 ± 13.65
DMI per 100 kg Body wt	3.13 ±0.02	3.05 ±0.01	3.33 ±0.02	2.85 ±0.05	3.14 ±0.08	3.00 ±0.02	2.79 ±0.04
Avg. daily milk yield(kg.)	11.60 ±1.11	11.90 ±0.99	12.15 ±0.44	11.85 ±0.50	12.05 ±0.30	11.80 ±0.63	9.20 ±0.40
Feed efficiency (kg DM consumed / kg milk produced)	1.51 ±0.17	1.48 ±0.11	1.46 ±0.05	1.42 ±0.08	1.46 ±0.03	1.52 ±0.07	1.70 ±0.08
Cost /kg complete ration (Rs)	3.41	3.17	3.33	2.83	2.73	2.80	3.12
Cost of complete ration / kg milk production (Rs.)*	5.37^{a} ±0.59	4.83^{ab} ±0.35	4.87^{ab} ±0.17	4.04^{b} ±0.22	3.99^{b} ±0.08	4.25^{b} ±0.21	5.30^{a} ±0.25

Each value is the average of 4 observations

^{a,b,c,d} values bearing different superscripts in a row differ significantly P<0.05)*

CONCLUSION

The sugarcane by-product and other crop residues instead of wasting and burning in the fields they can be utilized up to the level of 30-40% to formulate complete rations to feed livestock for economic milk production.

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