EFFECT OF FEEDING PROCESSED SWEET SORGHUM BAGASSE BASED COMPLETE RATION ON MILK PRODUCTION AND BODY CONDITION SCORE IN GRADED MURRAH BUFFALOES

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Abstract: Experimental complete rations were formulated with sweet sorghum (*Sorghum bicolour* (L) moench)bagasse (SSB) and concentrate (50:50) and processed in to SSB chopped and concentrate (SSBC), mash (SSBM) and Pellets (SSBP) which were compared withsorghum straw based complete feed mash (SSM).The effect of different experimental rationson feed intake, milk production and body condition scorewas studied in 24 lactating graded Murrah buffaloes divided into four groupsin a completely randomized design for a period of 150 days. The dry matter intake (kg/d), milk yield, 6% FCM yield (kg/d) and total solids, solids not fat, milk fat and protein yield (g/d) was significantly ($P<0.05$) higher in the buffaloes fed SSBP ration than those fed SSBC, SSBM and SSM rations and the difference was not significant among SSBC, SSBM and SSM rations. The feed conversion ratio (kg/kg milk yield and kg/kg FCM yield) and cost of feed (₹) per kg milk yield and FCM yield was significantly ($P<0.05$) lower in lactating buffaloes fed SSBP ration compared to SSBC, SSBM and SSM rations, while the difference was not significant among SSBC, SSBM and SSM rations. However, there was no significant difference was observed in body condition score of buffaloes fed different experimental rations.The present study indicated that SSBcan be used as an alternative roughage source to SS economically and feeding of complete rations in the form of expander-extruder pellets proved superior over chopped and mash forms.

Key words: sweet sorghum bagasse, complete diet, buffaloes, milkproduction.

Introduction: Sweet sorghum (*Sorghum bicolour* (L) moench), a dry land crop is more water use efficient than sugar cane and recently gaining importance as a feedstock for ethanol production (Reddy *et al.,* 2005). In general, it can produce stalk 54 - 69 t/ha ((Almodares*et al.,* 2008). The bagasse produced after juice extraction from stalks can be used as animal feed (Jafarinia*et al.,* 2005). Feeding of roughages under complete diet system improved the palatability and utilization of bulky crop residues (Nagalakshmi*et al*., 2006).Various processing methods like grinding (Reddy *et al*., 1992), pelleting (Reddy, 1990) improved the DM intake and digestibility of nutrients. Now a day's expanders are being used in feed industry as an alternative for pelleting for processing of livestock feeds (Prasad, 2003 and Nagalakshmi*et al*.,2006). Thus, an attempt has been made in the present study to evaluate SSB as a sole roughage source in a complete diet processed into varying forms like chopping, grinding into mash and expander-extruder pelleting and studied the effect of processing on milk and its constituents yield in lactating graded Murrah buffaloes and comparing with conventional sorghum straw (SS) based complete feeding system.

Materials and methods: Sweet sorghum bagasse was procured from the decentralized sweet sorghum crushing unit, established by ICRISAT at Ibrahimbad village of Medak District of Andhra Pradesh. Experimental complete rations were formulated with SSB and concentrate in a roughage:concentrate ratio of 50:50 and processed in to chopped SSB and concentrate (SSBC), mash form (SSBM) and expander-extruder pellet form (SSBP). The control complete ration was sorghum straw (SS) based mash (SSM) in the same roughage to concentrate ratio.The cost of the rations was calculated on the basis of processing cost and the prevailing market prices of the feed ingredients.

Twenty four lactating graded Murrah buffaloeswere selected from Dairy Experimental Station, college of Veterinary Science, Rajendranagar, Hyderabad and distributed randomly into four experimental groups of six animals each in acompletely randomized design (CRD) considering number of lactation, stage of lactation, daily average milk yield and butter fat content, as uniform as possible at the start of experiment. Daily feed intake, water intake and milk yields were recorded for a period of 150 days. The milk samples were collected fortnightly during the lactation trial to evaluate quality and quantity of milk constituents. The feed samples were analysed for proximate constituents (AOAC, 1997) and fibre fractions (Van Soest*et al.,* 1991). Milk samples were analysed for fat (ISI, 1961) and solids not fat (SNF) (ISI, 1965).

The body condition score (BCS) system developed for Murrah and Graded Murrah buffaloes (Anitha*et al* 2010) was used to estimate the energy reserves of the

buffaloes before and after the experiment to assess the impact of the experimental diets in the gain or loss of body reserves. The data was analysed using't' test (Snedecor and Cochran., 1994)

Results and discussion: Sweet sorghum bagasse on dry matter basis contained 92.50 % dry matter, 90.75 % organic matter, 3.94 % crude protein, 1.89 % ether extract, 37.58 % crude fibre, 47.34 % nitrogen free extract, 9.25 % total ash,74.76 % neutral detergent fiber, 42.93 % acid detergent fiber, 31.84 % cellulose, 37.75 % hemicelluloses and 4.24 % lignin.

The ingredient and chemical composition of differently processed SSB based experimental complete rations and SS based complete mash is presented in Table 1.The average feed intake (kg/d) was significantly higher (P<0.05) in buffaloes fed SSBP ration in comparison to SSBC, SSBM and SSM rations. This might be due to more palatability of pelleted ration resulted into more feed intake. However, the difference was significant among SSBC, SSBM and SSM rations.

The milk yield and 6% FCM yield (kg/day), the daily average total solids, solids not fat (SNF), milk fat and protein yield (g/d) was significantly (P<0.05) higher in buffaloes fed SSBP ration than those fed with SSBC, SSBM and SSM rations(Table 2). The increased milk production and milk constituents might be due to higher feed intake in buffaloes fed SSBP ration than those fed SSBC, SSBM and SSM rations corroborating the findings of Nagalakshmi *et al.* (2004) in graded Murrah buffaloes fed cotton straw based expander-extruder complete pellets over conventional ration.

The feed conversion ratio (kg/kg milk yield and kg/kg FCM yield) was significantly (P<0.05) lower in lactating buffaloes fed SSBP ration compared to SSBC, SSBM and SSM rations while, there was no significant difference observed among SSBC, SSBM and SSM rations (Table 4). This might be due to efficient utilization of nutrients in buffaloes fed SSBP ration over SSBC, SSBM and SSM rations.

The cost of feed (₹) per kg milk yield and FCM yield was significantly (P<0.05) lower in SSBP ration compared to SSBC, SSBM and SSM rations while, the difference was not significant among SSBC and SSBM complete rations(Table 3). This might be due to higher feed efficiency of SSBP ration over SSBC, SSBM and SSM rations. Similarly, higher (P<0.05) cost of feed (₹) per kg milk yield and per kg FCM yield in buffaloes fed SSM ration might be due to lower feed efficiency of the ration compared to SSBP ration and higher cost of sorghum straw (₹ 4) compared to SSB (₹ 1).

There was no significant (P>0.05) difference in monthly body condition scoring of buffaloes fed differently processed SSB based complete rations and SS complete mash (Table 4). However, improvement of 0.35, 0.30, 0.29 and 0.38 points in BCS was observed at the end of lactation trial in buffaloes fed SSM, SSBC, SSBM and SSBP rations, respectively. The improvement in BCS indicates positive energy balance in all animals fed experimental complete rations.

The results of the present study indicated that SSB could be used as roughage source in place of SS in complete feeds for economic milk production. Further, expander-extruder processing improved milk production feed efficiency and reduced cost of feeding compared to conventional ration.

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Table 1: Ingredient and chemical composition of experimental complete rations

Ingredient/Nutrient	SSM	SSBC	SSBM	SSBP
Ingredient composition (kg/100kg)				
Maize	31.0	31.0	31.0	
Ground nut cake	16.5	16.5	16.5	31.0
Sunflower cake	20.0	20.0	20.0	20.0
Deoiled rice bran	23.0	23.0	23.0	23.0
Molasses	5.0	5.0	5.0	5.0
Urea	1.5	1.5	1.5	1.5
Mineral mixture	2.0	2.0	2.0	2.0
Salt	1.0	1.0	1.0	1.0
Sweet sorghum bagasse	-	50.0	50.0	50.0
Jowar straw	50.0	-	-	-
Vitamin AD_3 (g/qt)	20.0	20.0	20.0	20.0
Chemical composition (% DM basis)*				
Dry matter	91.5	91.92	92.19	94.08
Organic matter	90.32	90.31	90.23	90.27
Crude protein	11.15	11.55	11.66	11.73
Ether extract	1.34	2.00	1.98	1.99
Crude fibre	27.39	26.85	27.13	26.95
Nitrogen free extract	50.44	49.91	49.46	49.60
Neutral detergent fibre	9.68	9.69	9.77	9.73
Acid detergent fibre	31.11	29.48	30.22	29.67
Hemicellulose	21.43	25.52	22.33	22.80
Cellulose	21.46	23.27	23.66	23.35
Lignin	4.19	3.43	3.94	3.78

*Each value is the average of three observations; On dry matter basis except for dry matter

Table 2: Effect of feeding differently processed sweet sorghum bagasse based complete rationson quality and quantity of milk production in lactating graded Murrah buffaloes					
Parameter	SSM	SSBC	SSBM	SSBP	SEM
Milk yield (kg/d)	5.29[b]	5.17[b]	5.54[b]	6.91[a]	0.20
6% FCM yield (kg/d)	6.29[b]	6.24[b]	6.51[b]	7.74[a]	0.20
Milk constituentsyield(g/d)					
Total solids	937.92[b]	940.94[b]	998.31[b]	1217.54[a]	4.20
Solids not fat	549.10[b]	546.99[b]	546.69[b]	731.08[a]	3.45
Milk fat	388.82[b]	393.44[b]	411.62[b]	486.46[a]	2.43
Milk protein	228.53[b]	226.45[b]	242.65[b]	306.80[a]	1.80

Each value is the average of six observations

[a,b]values bearing different superscripts in a row differ significantly (P<0.05)

Table 3: Effect of feeding differently processed sweet sorghum bagasse based complete rations on feed conversion ratio and cost of milk production in lactating gradedMurrah buffaloes					
Parameter	SSM	SSBC	SSBM	SSBP	SEM
Feed intake (kg/d)	12.04[a]	11.76[b]	12.13[a]	12.16[a]	0.10
Feed conversion ratio (kg/kg milk yield)	2.28[b]	2.27[b]	2.19[b]	1.76[a]	0.01
Feed conversion ratio (kg/kg FCM)	1.91[b]	1.88[b]	1.86[b]	1.57[a]	0.12
Cost of feed (Rs/d)	96.62[a]	75.56[c]	79.15[b]	81.78[b]	0.22
Cost of feed/ kg milk (₹)	18.26[a]	14.61[b]	14.29[b]	11.83[c]	0.07
Cost of feed/ kg FCM (₹)	15.36[a]	12.11[b]	12.16[b]	10.57[c]	0.06

Each value is the average of six observations

[a,b]values bearing different superscripts in a row differ significantly (P<0.05)

Table 4: Effect of feeding differently processed sweet sorghum bagasse based complete rations on monthly body condition score in lactating graded Murrah buffaloes

Ration	Body condition score				
	1st month	2nd month	3rd month	4th month	5th month
SSM	2.48±0.04	2.55±0.08	2.66±0.05	2.73±0.06	2.83±0.07
SSBC	2.50±0.03	2.53±0.10	2.64±0.06	2.72±0.07	2.80±0.04
SSBM	2.52±0.05	2.53±0.08	2.66±0.5	2.73±0.04	2.81±0.09
SSBP	2.48±0.07	2.56±0.03	2.69±0.04	2.80±0.04	2.86±0.05

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