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## Effect of additional energy supplementation on dry matter intake and body weight gain in lactating Murrah buffaloes

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**Abstract**

The experiment was planned to investigate the effect of additional energy through use of either 5% additional concentrate (T2) or soybean oil @ 100ml/animal/day (T3) or bypass fat @100/ animal/day (T4) or roasted soybean @100g/ animal/day (T5) on the dry matter intake and body weight gain in lactating Murrah buffaloes. The results revealed non-significant increase in the body weight and dry matter intake in lactating Murrah buffaloes in different groups.

**Keywords:** additional energy, Murrah buffaloes, body weight and dry matter intake

**Introduction**

The buffalo population in the world is estimated to be 195 million and India is having 109.85 million buffalo which contributes 57.3% of world buffalo population (Livestock census, 2019) [6]. These buffaloes share 49% of the India's total milk production (BAHS, 2019) [2]. Most of the animals in developing countries including India suffer shortage of feed resources and are fed on agriculture by-products and low quality crop residues, which have got inherent low nutritive value and digestibility, responsible for low productivity of dairy animals. Energy is one of the most important nutritional factors that limit production in dairy buffaloes. It has been realised that the high producing dairy animals in early lactation remain in negative energy balance for first 8 to 12 weeks because of lack of sufficient dry matter intake which results into weight loss, metabolic disorders and fertility problems, affecting their peak milk yield and overall lactation yield besides causing delayed post-partum ovarian activity (Garnsworthy and Webb, 1999) [5]. Maximizing energy intake by increasing the energy density of the diet is a logical feeding strategy for early lactating buffalo. The additional energy in the diet of lactating animals has been found to affect the efficiency of animals as an output of a combination of caloric and non-caloric effects. Caloric effects are attributable to greater energy content of feed and energetic efficiency of lipids as compared to that of carbohydrates or proteins. The non-caloric effects include improved reproductive performance and altered fatty acids profile of milk. Hence, the present experiment was planned to investigate the effect of additional energy supplement on the dry matter intake and body weight gain of lactating Murrah buffaloes.

**Materials and Methods**

The present experiment was conducted at Livestock Farm Complex, Adhartal, College of Veterinary Science & Animal Husbandry, NDVSU, Jabalpur (M.P.). A total of 30 lactating Murrah buffaloes were selected on the basis of similarity in the body weight, parity and age, milk yield and stage of lactation and free from any anatomical, physiological and infectious disorders and were randomly distributed into five groups each containing 6 animals. The experiment was conducted as per the guidelines of Institutional Animal Ethics Committee (IAEC). All the animals were maintained under intensive system of farming. Basal diet was formulated using maize, cotton seed cake, mustard seed cake, wheat bran, rice polish, ararah chuni along with mineral mixture and salt, as per ICAR (2013) feeding standards. All supplementation was started from 15<sup>th</sup> day post-partum and was continued up to 3 months post-partum.

**Table 1:** The experimental design during the experiment

Groups	Animals	Treatment
T1	6	Basal diet (Control)
T2	6	Basal diet + 5% additional concentrate feeding
T3	6	Basal diet + Soybean oil supplementation @ 100 ml/animal/day
T4	6	Basal diet + By pass fat energy @ 100 g/animal/day
T5	6	Basal diet + Roasted Soybean supplementation @ 100 g/animal/day

For dry matter intake of the animals, the quantity of various feed ingredients consumed by the animals (green fodder, wheat straw and concentrate) was measured and based on the dry matter content of the feed ingredients total dry matter intake was calculated. The intake of green fodder, wheat straw and concentrate were recorded daily by subtracting the amount of left over from the quantity offered. The data was pooled and averaged for monthly basis. The body weight of the animals was measured at monthly interval up to 3 months post-partum and thereafter it was done after every 2 months interval with the help of electronic weighing balance. Samples of feed ingredients like soybean, feed and fodder were collected for analysis of proximate principles viz. dry matter

(DM), crude protein (CP), ether extract (EE), crude fiber (CF), nitrogen-free extract (NFE) and total ash by the standard methods (AOAC, 2012). The analysed proximate composition (% DM basis) of ingredients used to prepare concentrate mixture i.e. yellow maize, wheat bran, rice polish, arhar chuni, mustard cake, Cotton seed cake, Roasted soybean, Concentrate mixture, Wheat straw, Berseem fodder and Sorghum(MP chari).

The average monthly daily DMI (kg/animal) of lactating Murrah buffaloes at the start and end of experiment (i.e. during 90 days post-partum) and the overall average monthly DMI in T1, T2, T3, T4 and T5 groups is given in table 1. However, statistically, there was no significant difference in the average daily DMI in lactating Murrah buffaloes among the groups. The overall average monthly daily DMI was numerically higher in T3 group followed by T4, T2, T5 and T1 groups. After calving there was continuous increase in the dry matter intake of different groups of buffaloes. The overall average percent improvement in daily DMI during 90 days post-partum study in T1, T2, T3, T4 and T5 groups was 9.79, 9.26, 3.69, 5.57 and 4.33 in T1, T2, T3, T4 and T5 groups, respectively. While, the percent increase in daily DMI at the end of lactation was 1.33, 3.98, 2.60 and 1.27 in T2, T3, T4 and T5 groups, respectively in comparison to T1 group.

**Table 2:** Monthly average daily dry matter intake (kg/animal) of lactating Murrah buffaloes in different treatment groups

Days	Trts	T1	T2	T3	T4	T5
	Initial	17.36 ± 0.14	17.61 ± 0.39	18.14 ± 0.41	17.58 ± 0.36	17.56 ± 0.15
30 <sup>th</sup>	17.75 ± 0.15	17.99 ± 0.43	18.51 ± 0.38	18.13 ± 0.31	17.91 ± 0.14	
60 <sup>th</sup>	18.19 ± 0.26	18.46 ± 0.42	18.91 ± 0.35	18.86 ± 0.32	18.48 ± 0.16	
90 <sup>th</sup>	19.06 ± 0.40	19.24 ± 0.43	19.68 ± 0.34	19.68 ± 0.38	19.32 ± 0.15	
Average	18.09 ± 0.37	18.33 ± 0.35	18.81 ± 0.33	18.56 ± 0.46	18.32 ± 0.39	
Increase (kg) in comparison to T1	-	0.24	0.72	0.47	0.23	
Increase (%) in comparison to T1	-	1.33	3.98	2.60	1.27	

### Dry matter intake percent of body weight

The average monthly DMI (% BW) of lactating Murrah buffaloes at the start and end of experiment (i.e. during 90 days post-partum) and the overall average monthly DMI in T1, T2, T3, T4 and T5 groups is given in table 2. Statistically, there was no significant difference in the average DMI (% BW) in lactating Murrah buffaloes among the groups. The

overall average monthly DMI (% BW) was numerically higher in T3 group followed by T4, T5, T2 and T1 groups. The percent increase in average monthly DMI (% BW) at the end of lactation in T2, T3, T4 and T5 groups in comparison to control group T1 was 0.28, 2.00, 1.42 and 0.85 respectively however, difference among them were non-significant.

**Table 3:** Monthly dry matter intake (%) BW during 90 days post-partum of lactating Murrah buffaloes in different treatment groups

Days	Trts	T1	T2	T3	T4	T5
	Initial	3.28 ± 0.05	3.32 ± 0.10	3.44 ± 0.08	3.33 ± 0.10	3.34 ± 0.08
30 <sup>th</sup>	3.49 ± 0.07	3.50 ± 0.11	3.57 ± 0.08	3.51 ± 0.11	3.52 ± 0.09	
60 <sup>th</sup>	3.57 ± 0.05	3.55 ± 0.14	3.62 ± 0.11	3.64 ± 0.11	3.65 ± 0.09	
90 <sup>th</sup>	3.70 ± 0.05	3.71 ± 0.11	3.70 ± 0.09	3.75 ± 0.10	3.66 ± 0.11	
Average	3.51 ± 0.05	3.52 ± 0.11	3.58 ± 0.08	3.56 ± 0.10	3.54 ± 0.09	
Increase in comparison to T1	-	0.01	0.07	0.05	0.03	
Increase (%) in comparison to T1	-	0.28	2.00	1.42	0.85	

Overall average dry matter intake was highest in T3 group followed by T4, T2, T5 and T1 groups. Statistically, there was

no significant difference in the average DMI in lactating Murrah buffaloes of different groups.

**Table 4:** Change in dry matter intake (kg/animal) in lactating Murrah buffaloes

Months	Trts	T1	T2	T3	T4	T5
	1 <sup>st</sup>	0.39 ± 0.11	0.37 ± 0.08	0.36 ± 0.08	0.55 ± 0.06	0.36 ± 0.07
2 <sup>nd</sup>	0.44 ± 0.19	0.47 ± 0.06	0.40 ± 0.08	0.73 ± 0.04	0.57 ± 0.13	
3 <sup>rd</sup>	0.87 ± 0.15	0.79 ± 0.04	0.77 ± 0.27	0.82 ± 0.09	0.84 ± 0.08	
Average	0.57 ± 0.13	0.54 ± 0.11	0.51 ± 0.11	0.70 ± 0.07	0.59 ± 0.12	
Increase or decrease in comparison to T1	-	-0.03	-0.06	+0.13	+0.02	
Increase or decrease (%) in comparison to T1	-	-5.26	-10.52	+22.80	+3.51	

### Body weight of animals

The average body weight (kg) of lactating Murrah buffaloes (Mean  $\pm$  SE) under different treatments at monthly intervals up to 3 months post-partum and thereafter at 2 months interval is presented in table 5.

The average body weight (kg) of lactating Murrah buffaloes at the start of experiment and the final body weight (kg) at the

end of experiment i.e. up to 3 months post-partum and thereafter at 2 months interval and the overall average body weight in T1, T2, T3, T4 and T5 groups is presented in table 4. Statistically, there was no significant difference among groups; however buffaloes of T2, T3, T4 and T5 groups experienced percent weight gain of 1.25, 2.76, 1.85 and 1.49, the increase was non-significant.

**Table 5:** Average monthly body weight (kg) at monthly interval up to 3 months post-partum and thereafter at 2 months interval of lactating Murrah buffaloes

Months \ Trts	T1	T2	T3	T4	T5
Initial	529.25 $\pm$ 09.55	531.25 $\pm$ 13.24	528.00 $\pm$ 12.65	529.33 $\pm$ 09.51	528.17 $\pm$ 14.42
1 <sup>st</sup>	510.00 $\pm$ 11.27	514.50 $\pm$ 11.04	519.42 $\pm$ 13.37	517.83 $\pm$ 12.29	514.67 $\pm$ 14.40
2 <sup>nd</sup>	509.50 $\pm$ 06.78	516.42 $\pm$ 13.28	525.00 $\pm$ 14.87	519.67 $\pm$ 09.36	513.42 $\pm$ 13.18
3 <sup>rd</sup>	515.08 $\pm$ 04.28	519.67 $\pm$ 08.54	533.50 $\pm$ 15.06	525.75 $\pm$ 07.59	520.83 $\pm$ 13.63
5 <sup>th</sup>	524.50 $\pm$ 06.55	529.50 $\pm$ 10.87	540.50 $\pm$ 14.88	532.83 $\pm$ 12.75	532.42 $\pm$ 14.54
7 <sup>th</sup>	532.08 $\pm$ 07.69	544.58 $\pm$ 12.49	553.75 $\pm$ 12.05	547.17 $\pm$ 12.97	546.67 $\pm$ 14.31
9 <sup>th</sup>	543.75 $\pm$ 06.88	553.92 $\pm$ 12.66	565.25 $\pm$ 08.20	559.50 $\pm$ 11.13	562.50 $\pm$ 12.03
Average	523.45 $\pm$ 04.79	529.98 $\pm$ 5.60	537.92 $\pm$ 06.23	533.15 $\pm$ 05.72	531.24 $\pm$ 06.77
Increase in comparison to T1	-	6.53	14.47	9.70	7.79
Increase (%) in comparison to T1	-	1.25	2.76	1.85	1.49

### Results and Discussion

In the present study, there was loss in body weight in the entire groups after calving followed by gradual increase in body weight in control, extra concentrate ration, soybean oil, bypass fat and roasted soybean supplemented groups and gradual decrease in body weight in soybean oil supplemented group throughout the experiment; however the results were non-significant. The non-significant increase in the body weight of buffaloes in the present study was supported by findings of Encinias *et al.*, (2001) [3] in crossbred cows supplemented with safflower seeds @ 2.5-5 per cent.

The loss in body weight and quick regain of body weight in T3 group might be due to increased energy intake which reduced the mobilization of body fat reserves and thus, minimized the weight loss; however, reduction in BW gain in group T2 might be caused by the utilization of energy which was generated from extra concentrate ration for supporting higher milk production and improving reproductive performance, which is in agreement with the findings of Funston (2004) [4].

### Conclusions

On the basis of the present findings it has been concluded that supplementation of energy over and above the ICAR recommendation in buffaloes either through 5 per cent additional concentrate feeding or use of 100 ml of soybean oil or 100 g each of bypass fat or roasted soybean daily did not produce much significant effect on the body weight and dry matter intake of buffaloes.

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