Int.J.Curr.Microbiol.App.Sci (2019) *8*(7): 779-784

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 8 Number 07 (2019)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2019.807.094

Effects of Dietary Supplementation Rumen Protected Methionine, Lysine and Choline Supplementation on Feed Intake in Transition Murrah Buffaloes

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Keywords

Murrah Buffaloes, Lysine and choline supplementation, Intake

Article Info

Accepted:
07 June 2019
Available Online:
10 July 2019

A B S T R A C T

A study was carried out to discern the effect of dietary incorporation of rumen protected methionine (RPM), lysine (RPL) and choline (RPC) on feed intake in transition Murrah buffaloes. Based on previous lactation milk yield and body weight, 20 buffaloes (2^{nd} to 4^{th} lactation) in their third trimester were divided into four groups and fed as follows, Group I (control): basal diet consisting of wheat straw ad lib+ green fodder + concentrate mixture as per ICAR (2013) feeding standard; Group II: basal diet supplemented with 7g RPM + 15g RPL; Group III: basal diet supplemented with 50g RPC and Group IV: basal diet supplemented with 7g RPM + 15g RPL + 50g RPC. The feeding trial was of 180 days duration (90 days before and 90 days postpartum). The DM intake was recorded at fortnightly interval for two consecutive days. And the results showed that there was no significant difference in total dry matter intake of buffaloes of all four groups both in pre-partum and post- partum period due to dietary supplementation of rumen protected methionine, lysine and choline.

Introduction

Transition period defined as last 3 weeks before parturition to first 3 weeks after parturition is often a disastrous experience for the buffaloes (Goff and Horst, 1997). This period is characterized by dramatic physiological and metabolic adaptations, and the animal is at the highest risk of succumbing to health disorder during this period (Loor *et al.*, 2013). There is reduction in appetite and low intake of dry matter which is responsible for depressed performance specifically during the transition period. As the gestation advances, the dry matter intake (DMI) of dairy animals declines and DMI is at lowest (1.7–

2.0% of body weight) at parturition. So, proper nutritional management during this period regulates both the milk production in the proceeding lactation as well as the reproductive efficiency of the animal. Free methionine and lysine as the most limiting amino acids in dairy cows would be mostly degraded in the rumen and usually supplemented in the rumen-protected form.

Choline, a component of phospholipid and methyl donor, plays an essential role in very low density lipoprotein synthesis and thereby contributes to fat export from the liver. Supplementation of rumen protected methionine, lysine and choline has shown to improve milk production in dairy animals (Socha *et al.,* 2005, Noftsger *et al.,* 2005 and Xu *et al.,* 2006). Effect on DMI due supplementation of rumen-protected methionine, lysine and choline in dairy animals had an inconsistent outcome. So, this study was conducted to see the effect of these rumen protected nutrients on DMI in transition Murrah buffaloes.

Materials and Methods

Twenty Murrah buffaloes of 2nd to 4th lactation, in 3rd trimester of their pregnancy were divided into four groups having 5 animals in each group on the basis of their previous lactation yield and body weight. The concentrate mixture was offered twice daily i.e. half of the daily allowance at 9:00 AM and remaining half at 3:00 PM. Green fodder was offered at around 5:00 PM after the evening milking. All the animals had *ad lib* access to wheat straw. The dry matter intake was recorded every fortnightly over two consecutive day and the animals were kept tied in the shed during these two days.

G I: (Basal diet) available green 20 kg + concentrate mixture as per ICAR (2013) feeding standard + wheat straw *ad lib*

G II: Basal diet + 7g rumen protected methionine + 15g rumen protected lysine

G III: Basal diet + 50g rumen protected choline

G IV: Basal diet + 7g rumen protected methionine + 15g rumen protected lysine + 50g rumen protected choline

The feeding trial was carried out for 6 months period during transition period of buffaloes i.e.

3 months before parturition to 3 months after parturition when animal transits from dry to lactation stage.

Results and Discussion

Dry matter intake (DMI) was recorded fortnightly for two consecutive days by recording feed offered and residues.

The dry matter of different feed ingredients was also estimated every 15 days.

Pre-partum feed intake

The results of pre-partum feed intake of Murrah buffaloes due to dietary incorporation of rumen protected methionine, lysine and choline are shown in Table 1.

From the results, it was observed that total DMI, DMI per 100 kg

Body weight and DMI per metabolic body weight ($W^{0.75}$) were comparable in buffaloes of all four groups in all fornights.

Post-partum feed intake

The results of post-partum feed intake of Murrah buffaloes due to dietary incorporation of rumen protected methionine, lysine and choline are shown in Table 2.

Table.1 Prepartum Average dry matter intake (DMI) of Murrah buffaloes supplemented with methionine, lysine and choline

Fornights	Dry matter intake (g)					
	G1	G2	G3	G4	Mean±SEM	P-value
Ist Fornight						
Total DMI (kg)	12.63±1.03	12.30±0.56	12.83±0.30	12.58±1.12	12.58±1.56	0.796
DMI/100 kg BW(kg)	2.27±0.20	2.20±0.20	2.34±0.09	2.22±0.20	2.25±0.34	0.718
DMI/W$^{0.75}$ kg (g)	19.92±1.12	19.35±2.85	20.45±1.10	19.07±1.97	19.70±0.94	0.764
IInd Fornight						
Total DMI (kg)	12.73±1.16	12.68±1.76	13.68±0.81	12.47±1.31	12.89±0.58	0.484
DMI/100 kg BW(kg)	2.26±0.25	2.23±0.34	2.44±0.15	2.16±0.27	2.27±0.12	0.401
DMI/W$^{0.75}$ kg (g)	19.63±3.06	19.31±3.42	21.13±1.35	18.39±2.73	19.57±1.22	0.472
IIIrd Fornight						
Total DMI (kg)	12.90±1.15	12.59±1.27	12.89±0.79	12.60±0.86	12.75±0.44	0.935
DMI/100 kg BW(kg)	2.26±0.26	2.16±0.25	2.26±0.16	2.14±0.17	2.21±0.10	0.733
DMI/W$^{0.75}$ kg (g)	19.37±3.11	18.26±2.85	19.39±1.56	17.97±1.65	15.75±1.02	0.701
IVth Fornight						
Total DMI (kg)	12.94±1.05	12.43±1.50	13.18±0.81	12.52±0.68	12.78±0.44	0.653
DMI/100 kg BW(kg)	2.21±0.13	2.10±0.32	2.25±0.16	2.08±0.16	2.16±0.40	0.507
DMI/W$^{0.75}$ kg (g)	18.74±1.75	17.57±3.46	18.91±1.61	17.20±1.68	18.10±0.98	0.564
Vth Fornight						
Total DMI (kg)	12.58±0.56	12.47±1.11	13.10±0.70	12.45±0.81	12.65±.34	0.567
DMI/100 kg BW(kg)	2.12±0.10	2.07±0.24	2.20±0.13	2.03±0.18	2.10±0.08	0.516
DMI/W$^{0.75}$ kg (g)	17.74±1.50	17.11±2.74	18.12±1.33	16.56±1.82	17.38±0.82	0.599
VIth Fornight						
Total DMI (kg)	12.54±0.59	12.19±1.31	12.95±0.52	12.53±0.57	12.55±0.34	0.548
DMI/100 kg BW(kg)	2.08±0.19	1.99±0.23	2.14±0.09	2.02±0.16	2.06±0.06	0.519
DMI/W$^{0.75}$ kg (g)	17.22±1.65	16.32±2.61	17.54±0.89	16.30±1.66	16.84±0.08	0.621

Value with different superscripts between columns differ significant (P< 0.05). (G1= Control group, G2= RPM + RPL supplemented group, G3= RPC supplemented group and G4= RPM +RPL+RPC supplemented group)

Table.2 Postpartum Average dry matter intake (DMI) of Murrah buffaloes supplemented with methionine, lysine and choline

Fornights	Dry Matter Intake (DMI)					
	G1	G2	G3	G4	Mean±SEM	p-value
Ist Fornight						
Total DMI (kg)	12.28±1.39	13.29±1.93	13.44±0.67	13.19±0.95	13.05±0.48	0.338
DMI/100 kg BW(kg)	2.32±0.26	2.45±0.21	2.51±0.11	2.38±0.12	2.41±0.36	0.427
DMI/W$^{0.75}$ kg (g)	21.04±3.03	21.87±2.81	22.48±1.21	20.84±1.11	21.55±4.2	0.632
IInd Fornight						
Total DMI (kg)	12.00±1.26	12.66±1.45	13.13±0.77	12.52±0.59	12.58±0.44	0.373
DMI/100 kg BW(kg)	2.37±0.29	2.44±0.25	2.56±0.12	2.34±0.09	2.42±0.08	0.388
DMI/W$^{0.75}$ kg (g)	22.32±4.07	22.58±3.47	23.69±1.56	21.02±1.13	22.40±1.2	0.542
IIIrd Fornight						
Total DMI (kg)	11.84±1.02	12.73±1.27	12.35±0.70	12.34±1.27	12.32±0.48	0.653
DMI/100 kg BW(kg)	2.36±0.16	2.48±0.29	2.38±0.16	2.30±0.17	2.38±0.8	0.588
DMI/W$^{0.75}$ kg (g)	22.33±2.83	23.08±3.79	21.97±1.71	20.72±1.29	22.02±1.12	0.555
IVth Fornight						
Total DMI (kg)	11.80±1.19	12.70±1.79	12.66±1.12	12.68±0.74	12.46±0.54	0.630
DMI/100 kg BW(kg)	2.34±0.18	2.49±0.37	2.45±0.20	2.35±0.11	2.41±0.10	0.666
DMI/W$^{0.75}$ kg (g)	22.06±2.89	23.38±4.35	22.72±1.91	20.98±1.31	22.28±1.24	0.601
Vth Fornight						
Total DMI (kg)	11.87±1.14	12.81±1.03	12.68±0.37	12.63±1.42	12.50±0.46	0.513
DMI/100 kg BW(kg)	2.35±0.27	2.51±0.27	2.47±.08	2.35±0.21	2.42±0.10	0.593
DMI/W$^{0.75}$ kg (g)	22.32±3.90	23.47±3.75	23.02±1.06	21.19±1.96	22.50±1.26	0.638
VIth Fornight						
Total DMI (kg)	12.31±0.70	13.03±1.31	12.98±0.42	12.89±0.94	12.80±0.38	0.576
DMI/100 kg BW(kg)	2.45±0.27	2.52±0.33	2.54±0.12	2.40±0.13	2.48±0.10	0.754
DMI/W$^{0.75}$ kg (g)	23.15±4.36	23.48±4.18	23.70±1.61	21.54±1.63	22.96±1.38	0.715

Value with different superscripts between columns differ significant (P< 0.05). (G1= Control group, G2= RPM + RPL supplemented group, G3= RPC supplemented group and G4= RPM +RPL+RPC supplemented group)

From the results, it was observed that in all fornights during postpartal period, there was no effect of supplementation of rumen protected methionine, lysine and choline on total DMI, DMI per 100 kg body weight and DMI per metabolic body weight ($W^{0.75}$) of buffaloes of all treatment groups.

The present study indicated that dietary supplementation of rumen protected methionine, lysine and choline had no effect on DMI of buffaloes and are in agreement with the study conducted by Donkin *et al.*, (1989); Armentano *et al.*, (1993) and Chung (2003) who also reported that rumen protected methionine and lysine had no effect on DMI in Holstein dairy cows. Similarly no effect on DMI was reported by Ahmed *et al.*, (2016) in Nili-ravi buffaloes on supplementation of rumen protected lysine and methionine. Lima *et al.*, (2007) and Leiva *et al.*, (2015) also noticed no effect on DMI due to RPC supplementation in transition cows. Elek *et al.*, (2008); Suksombat *et al.*, (2012); Guretzky *et al.*, (2006) and Rahmani *et al.*, (2014) showed no effect on DMI in choline supplemented group in Holstein cows.

Contrary to our findings, Ordway *et al.*, (2009) observed greater postpartum intake in rumen protected methionine supplemented group in Holstein Friesian cows. Soltan *et al.*, (2012) also reported improved DMI in RPM and RPC supplemented groups of Holstein Friesian cows. Sheikh *et al.*, (2014) also indicated that supplementation of rumen protected methionine, lysine and choline in Karan Fries cows improved dry matter intake.

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How to cite this article:

Khwairakpam Ratika and James Singh, R.K. 2019. Effects of Dietary Supplementation Rumen Protected Methionine, Lysine and Choline Supplementation on Feed Intake in Transition Murrah Buffaloes. *Int.J.Curr.Microbiol.App.Sci.* 8(07): 779-784.
doi: https://doi.org/10.20546/ijcmas.2019.807.094