www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; SP-9(12): 26-30

www.thepharmajournal.com
Received: 18-10-2020
Accepted: 21-11-2020

Rajneesh
M.V.Sc. Scholar, Livestock Production Management Section, NDRI, Karnal, Haryana, India

AK Misra
Principal Scientist, Livestock Production Management Section, NDRI, Karnal, Haryana, India

Shwetambri Jamwal
M.V.Sc. Scholar, Livestock Production Management Section, NDRI, Karnal, Haryana, India

S Praveen
M.V.Sc. Scholar, Livestock Production Management Section, NDRI, Karnal, Haryana, India

Corresponding Author:
Rajneesh
M.V.Sc. Scholar, Livestock Production Management Section, NDRI, Karnal, Haryana, India

Evaluation of body parameters of lactating Murrah buffaloes on supplementation of bypass fatty acids and *Tinospora cordifolia*

Rajneesh, AK Misra, Shwetambri Jamwal and S Praveen

Abstract
During early lactation high producing animals may undergo negative energy balance (NEB) which is having ill-effect on health of animal. Considering this, present investigation was undertaken to assess the effect of supplementation of bypass fatty acids and *Tinospora cordifolia* on body parameters of lactating Murrah buffaloes. Twenty freshly calved and healthy buffaloes were selected from institutional herd of NDRI, Karnal and divided into four groups having five buffaloes each on the basis of their previous milk yield, body weight and parity. Four groups were treated as T0 (control), T1 (fatty acid), T2 (Tinospora) and T3 (mix) and were fed with specific amount of supplements for 90 days. T0 was kept without any supplementation and given standard feed (ICAR-2013 standards) whereas T1, T2 and T3 were supplemented with 150gm of bypass fatty acids, 150gm of Tinospora and combination of 150gm bypass fatty acids and 150gm Tinospora, respectively. Results showed significant ($P<0.05$) improvement in BCS of buffaloes and decreased rate of reduction of body weight in treatment group buffaloes as compared to control group. On the basis of results, it was concluded that bypass fatty acids and *Tinospora cordifolia* supplementation helps in attaining good body conditions in lactating Murrah buffaloes.

Keywords: Buffaloes, bypass fatty acid, health, supplementation, tinospora

Introduction
A healthy animal herd is first and foremost requirement for maintaining productive and economic livestock venture. After parturition the health and immune system of animals gets compromised [1]. This is mainly due to negative energy balance (NEB), which occurs due to the gap between the energy requirements and availability [2]. The demand of energy during early lactation gets increased due to increased requirement for milk production and dry matter intake of the animal gets lowered because of physiological stress [3, 4]. The incidences of metabolic diseases like ketosis and milk fever during early lactation are the evidences of the animal's inability to meet the elevated metabolic demands and such health concerns further elicit economic losses in dairy farming and also related to animal welfare issue [5]. Hence care and management of dairy animals during early stage of lactation plays a crucial role in coping the negative impacts of NEB and maintaining sound health of the animals.
Supplementation involves adding specific quantity of feed additives into animal feed and expected to give desired effect. NEB energy balance and its ill effect on dairy animals can be prevented by the supplementation of high energy density feed along with immunomodulator [6]. Bypass fat is considered as high energy supplement and used in ruminant feeding since ages [2, 6-10]. Similarly, herbal supplements were popular among farmers and also used in animal feeds [11-13]. Use of specific bypass fatty acids in place of bypass fat is recently developed technique and it ensures higher energy and better health of animals in comparison to bypass fat. *Tinospora cordifolia* is an herbal immunomodulator having multidimensional properties which aids to health of animal. Previous reports on individual feeding of bypass fat [14-17] and Tinospora [18-20] revealed positive effect on health of dairy animals and improved body parameters. However, no systematic information is available on the use of bypass fatty acids along with combination of Tinospora in lactating Murrah buffaloes. Therefore, the present study was undertaken to evaluate the influence of supplementation of bypass fatty acid and *Tinospora cordifola* on body parameters of lactating Murrah buffaloes.

Material and methods

Description of the study area

Present study was carried out at Livestock Research Centre of National Dairy Research Institute (N.D.R.I.), Karnal, Haryana, India which is located on 29°42" N and 79°54" E longitudes at an altitude of 245 meters above the mean sea level in the beds of Indo-Gangetic alluvial plain. The minimum temperature falls to near freezing point in winter and maximum goes approximately up to 45ºC in May/June months of summer. The annual rainfall is close to 700 mm, most of which is received from July to September. A subtropical climate prevails in the area.

Selection of animals and design of experiment

Twenty freshly calved Murrah buffaloes were selected from Livestock Research Center of NDRI, Karnal and further divided into four groups of 5 buffaloes each on the basis of previous milk yield, parity, and body weight. It was ensured that the selected animals for study were free from any anatomical, physiological and infectious disorders. The experiment was conducted as per the guidelines of institutional ethical committee. Four groups of animals were assigned as T0, T1, T2 and T3. T0 was taken as control whereas T1, T2 and T3 were given supplementations. T0 was kept without any supplementation and given standard feed (ICAR-2013 standards) whereas T1, T2 and T3 were supplemented with 150gm of bypass fatty acids per animal per day, 150gm of Tinospora per animal per day and combination of 150gm bypass fatty acids and 150gm Tinospora per animal per day, respectively. Supplementations were given for a period of 90 days after calving in buffaloes and each buffalo was kept under observations. Buffaloes were kept in loose hosing system and given enough space as per BIS requirements but they were tied for 1 hour for individual feeding of supplements. The daily feeds of buffaloes include green fodders like oats, maize, jowar, sugar graze and berseem depending on their availability and mixture of maize silage and wheat straw. Supply of clean and fresh drinking water was available to buffaloes for whole day.

Parameters observed

Body parameters which were evaluated during experimental period includes body condition score (BCS) and body weight.

Body condition score

Body condition Score (BCS) was assessed by 5-point scale method as per Wattiaux [21]. Buffaloes having varying degrees of fat cover were scored a numerical value from 1 to 5. BCS was analyzed at 15 days interval depending on the fat cover in the brisket, on the ribs, back, hooks, pins and around the tail head regions.

Body weight

Body weight of the buffaloes was measured with the help of electronic weighing machine at fortnightly intervals. Recording of body weight was done early in the morning around 7:30 A.M. before offering feed and water to animals and it was taken for two consecutive days and then the average value was considered.

Statistical Analysis

Analysis of data was done by SPSS software using one way ANOVA. Mean and standard error were calculated and comparisons between different groups were made.

Results

Body weight (Kg)

The differences in mean body weights of buffaloes of all the treatment groups and control group were non-significant. However numerical difference was there in the mean values of body weight of different groups (Table 1; Fig 1). The initial body weights of Murrah buffaloes at day-1 of trial after parturition in all the groups were in the range of 539.36 ± 40.67 to 484.98 ± 23.77 kg and were non-significant (Table 1; Fig 1). The overall body weight during postpartum period was numerically higher for all the animals in treatment groups than control group. During 90 days of lactation, the body weight for fatty acid (T1) group ranges between 539.36 ± 40.67 to 522.68 ± 28.18 kg, for Tinospora (T2) group the range was 537.12 ± 18.72 to 523.20 ± 19.78 kg, for mix (T3) group it was 486.42 ± 26.17 to481.78 ± 20.64 kg and for control (T0) group the range was 484.98 ± 23.77 to 452.72 ± 23.06 kg. The finding of the study showed that body weight is not significantly affected by the supplementation of fatty acids and Tinospora in lactating Murrah buffaloes As the lactation progress the body weight of the buffaloes decreases in all the groups. The rate of reduction of body weight from day 1 to day 90 was lowest in T3 (mix) group (0.95), followed by T2 (Tinospora) group (2.59) and then T1 (fatty acid) group (3.09) whereas it was highest in T0 (control) group (6.65). The values of body weight of buffaloes at fortnightly intervals were presented in Table 1.

Table 1: Effect of bypass fatty acid and *Tinospora* supplementation on body weight (kg)

Days	Control (T0)	Fatty Acids (T1)	Tinospora (T2)	Mix (T3)	P Value
1	484.98 ± 23.77	539.36 ± 40.67	537.12 ± 18.72	486.42 ± 26.17	0.366
15	474.86 ± 24.78	518.98 ± 38.16	510.90 ± 11.86	468.54 ± 24.86	0.460
30	455.40 ± 25.04	509.08 ± 31.67	498.80 ± 20.87	461.18 ± 23.39	0.378
45	427.21 ± 17.21	497.20 ± 31.77	505.28 ± 21.92	457.60 ± 27.39	0.143
60	457.45 ± 23.13	512.36 ± 31.90	505.48 ± 21.42	467.42 ± 22.80	0.350
75	441.9 ± 21.09	514.70 ± 29.34	512.32 ± 20.96	477.02 ± 20.60	0.131
90	452.72 ± 23.06	522.68 ± 28.18	523.20 ± 19.78	481.78 ± 20.64	0.129
Mean ± SE	456.37 ± 19.61	516.34 ± 32.37	513.30 ± 18.20	471.42 ± 23.19	0.235

The values are Mean ± SE of seven observations on five animals in each group.

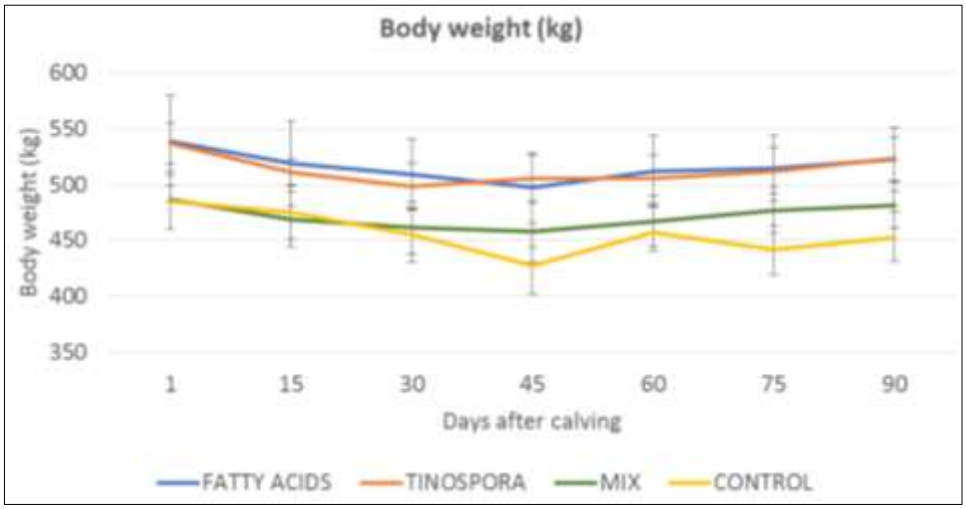

Fig 1: Mean body weights (kg) of buffaloes during different fortnights of experimental period.

Body condition score (BCS)

The BCS of buffaloes differs significantly (P<0.05) between groups and within group (Table 2; Fig 2). During experimental period BCS range for fatty acid (T1) group was 2.75 ± 0.11 to 3.30 ± 0.25, for Tinospora (T2) group the range was 2.80 ± 0.12 to 3.20 ± 0.20, for mix group (T3) it was 2.75 ± 0.11 to 3.05 ± 0.25 and for control (T0) group the range was 2.45 ± 0.05 to 3.15 ± 0.27 (Table 2; Fig 2). Overall average BCS at the end of feeding trial was significantly (P<0.05) highest for fatty acid (T1) group (2.91 ± 0.11) followed by Tinospora (T2) group (2.90 ± 0.13) and mix (T3) group (2.86 ± 0.10) whereas control (T0) group (2.56 ± 0.07) is having least BCS value. The results of body condition score (BCS) revealed that BCS of the supplemented buffaloes was better in comparison to control group. In fatty acid (T1) and mix (T3) group the loss in BCS of animals is significantly lower than the Tinospora (T2) and control (T0) groups.

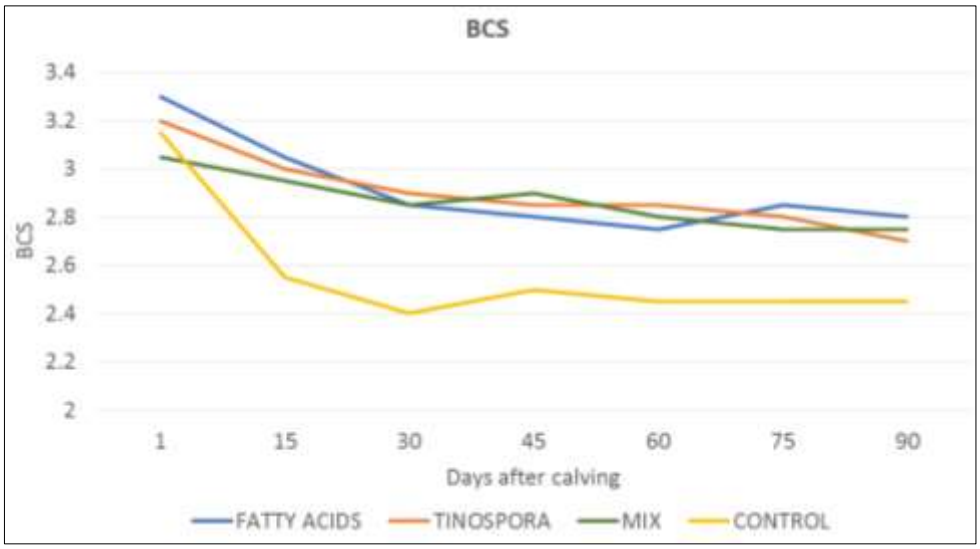

Fig 2: Mean BCS during different fortnights of experimental period in buffaloes

Table 2: Effect of bypass fatty acid and *Tinospora* supplementation on BCS (5-point scale)

Days	Control (T0)	Fatty Acids (T1)	Tinospora (T2)	Mix (T3)	P value
1	3.15^{ay} ± 0.27	3.30^{ay} ± 0.25	3.20^{ax} ± 0.20	3.05^{ax} ± 0.25	0.909
15	2.55^{ax} ± 0.05	3.05^{axy} ± 0.20	3.00^{ax} ± 0.21	2.95^{ax} ± 0.22	0.234
30	2.40^{ax} ± 0.17	2.85^{axy} ± 0.10	2.90^{ax} ± 0.17	2.85^{ax} ± 0.23	0.185
45	2.50^{ax} ± 0.08	2.80^{ax} ± 0.12	2.85^{ax} ± 0.19	$2.90a^{x}$ ± 0.19	0.275
60	2.45^{ax} ± 0.05	2.75^{bx} ± 0.11	2.85^{bx} ± 0.10	2.80^{bx} ± 0.09	0.031
75	2.45^{ax} ± 0.05	2.85^{bxy} ± 0.10	2.80^{bx} ± 0.12	2.75^{bx} ± 0.11	0.050
90	2.45^{ax} ± 0.05	2.80^{bx} ± 0.12	2.70^{abx} ± 0.12	2.75^{abx} ± 0.11	0.134
Mean ± SE	2.56^{ax} ± 0.07	2.91^{bxy} ± 0.11	2.90^{abx} ± 0.13	2.86^{abx} ± 0.10	0.105
P value	0.004	0.220	0.545	0.927	

- The values are Mean ± SE of seven observations on five animals in each group.
- Values with different superscripts a,b and w,x,y,z differ significantly (P<0.05) in a row and column respectively.

Discussion

Body weight

The finding of the study showed that body weight is not significantly affected by the supplementation of fatty acids and Tinospora in lactating Murrah buffaloes. As the lactation progresses loss of body weight is there in all the groups. The present findings were in accordance with results were shown by Katiyar [22] who supplemented Murrah buffaloes with 15g rumen protected fat (Ca salt of long-chain fatty acids) per kg milk yield and found no effect on body weight of buffaloes. Tyagi [6] also reported non-significant difference in body weight of supplemented dairy cows. Purushothaman [23] and Ranaweera [24] also reported similar results whereas in contrary to this some researchers showed significant improvement in body weight on supplementation of bypass fat [14, 25].

Body condition score

The results of body condition score (BCS) revealed that as the lactation progresses decrease in BCS of buffaloes in all the groups were there but significant differences were found between the groups. In fatty acid (T1) and mix (T3) group the loss in BCS of animals is significantly lower than the Tinospora (T2) and control (T0) groups. Sharma [26] reported similar results and suggest that additional dietary fat could result in better energy partitioning and improved energy balance in dairy animals. Naik [27] and Singh [25] also reported improvement in BCS through supplementation of bypassfat whereas, Harrison [28] and Ganjkhanlou [29] did not find any influence on body condition scores of cows supplemented with bypass fat.

Conclusions

From the present study it may be concluded that supplementation of bypass fatty acid and *Tinospora cordifolia* in early lactating Murrah buffaloes improve the BCS and decrease the rate of body weight reduction. Hence, in lactating Murrah buffaloes supplementation of bypass fatty acids and *Tinospora cordifolia* is beneficial for maintaining good body parameters.

Acknowledgements

Sincere thanks to NDRI, Karnal for providing all the necessary funds and resources for the smooth conduct of trial. Also, thanks to livestock production management section of NDRI for giving me this opportunity and guidance for the conduct of experiment.

References

1. Sordillo LM. Nutritional strategies to optimize dairy cattle immunity. Journal of dairy science 2016;99(6):4967-4982.
2. Sirohi SK, Wali TK, Mohanta R. Supplementation effect of bypass fat on production performance of lactating crossbred cow. Indian Journal of Animal Sciences 2010;80:733-736.
3. Goff JP. Major advances in our understanding of nutritional influences on bovine health. Journal of Dairy Sciences 2006;89:1292-1301.
4. Rollin E, Berghaus RD, Rapnicki P, Godden SM, Overton MW. The effect of injectable butaphosphan and cyanocobalamin on postpartum serum b Hydroxybutyrate, calcium and phosphorus concentrations in dairy cattle. Journal of Dairy Science 2010;93(5):978-987.
5. Ingvartsen KL, Dewhurst RJ, Friggens NC. On the relationship between lactational performance and health: is it yield or metabolic imbalance that cause production diseases in dairy cattle? A position paper. Livestock production science 2003;83(2-3):277-308.
6. Tyagi N, Thakur SS, Shelke SK. Effect of bypass fat supplementation on productive and reproductive performance in crossbred cows. Tropical Animal Health Production 2010;42(6):1749-1755.
7. Jenkins TC, Palmquist DL. Effects of fatty acids or calcium soaps on rumen and total nutrient digestibility of dairy rations. Journal of Dairy Science 1984;67:978-986.
8. Scott TA, Shaver RD, Zepeda L, Yandell B, Smith TR. Effects of rumen inert fat on lactation, reproduction and health of high producing Holstein herds. Journal of Dairy Science 1995;78:2435-2451.
9. Mudgal V, Baghel RPS, Ganie A, Srivastava S. Effect of feeding bypass fat on intake and production performance of lactating crossbred cows. Indian Journal of Animal Research 2012;46:103-104.
10. Rajesh G. Postpartum physiological adaptation in hormones, metabolites and milk production in crossbred cows fed with prilleded fat. MVSc thesis submitted to NDRI (Deemed University) Karnal Haryana, 2013.
11. Srinivasan K. Spices as influencers of body metabolism: an overview of three decades of research. Food Research International 2005;38:77-86.
12. Tipu MA, Akhtar MS, Anjum MI, Raja ML. New dimension of medicinal plants as animal feed. Pakistan Veterinary journal 2006;26(3):144-148.
13. Mittal J, Sharma MM, Batra A. *Tinospora cordifolia*: a multipurpose medicinal plant- A review. Journal of Medicinal Plants Studies 2014;2(2):32-47.
14. Wadhwa M, Grewal RS, Bakshi MPS, Brar PS. Effect of supplementing bypass fat on the performance of high yielding crossbred cows. Indian Journal of Animal Sciences 2012;82:200-203.
15. Shelke SK, Thakur SS, Shete SM. Productive and reproductive performance of Murrah buffaloes (*Bubalus bubalis*) supplemented with rumen protected fat and protein. Indian Journal of Animal Nutrition 2012;29:317-323.
16. Yadav G, Roy AK, Singh M. Effect of prilled fat supplementation on milk production performance of crossbred cows. Indian Journal of Animal Nutrition 2015;32:133-138.
17. Waghmares P, Meshram RB, Dakshinkar NP, Pajai KS, Siddiqui MF. Effect of supplementation of bypass fat on biochemical profile in dairy cows. The Asian Journal of Animal Sciences 2016;11(2):111-114.
18. Mallick S, Prakash BS. Influence of feeding *Tinospora cordifolia* peripartum on lactation parameters in crossbred cows. Journal of Animal Physiology Animal Nutrition 2011;96(6):1112-1120.
19. Mir AN, Parveen K, Wani SA, Shergojry SA, Ashutosh, Aarif O. Milk production status of lactating Murrah buffaloes on *Tinospora cordifolia* supplemented diet with special reference to immunological, metabolic and hormonal profile. Animal Science Reporter 2014;8(1):18-25.
20. Sharma A, Kumar N, Sankhyan V, Sharma A. Comparative Study on the role of Giloy (*Tinospora cordifolia*) and Fenugreek (*Trigonella foenum-graecum*)

as herbal galactogogues in Jersey crossbred dairy cattle-A farm level study. International Journal of Livestock Research 2017;8(5):2277-1964.
21. Wattiaux MA. Body condition scores in dairy essentials. Babcock International Institute for Dairy Research and Development, University of Wisconsin, Madison, 2005.
22. Katiyar GS, Mudgal V, Sharma RK, Bharadwaj A, Phulia SK, Jerome A, *et al*. Effect of rumen-protected nutrients on feed intake, body weights, milk yield and composition in Murrah buffaloes during early lactation. Tropical Animal Health and Production 2019;51(8):2297-2304.
23. Purushothaman Sajith, Kumar Anil, Tiwari DP. Effect of feeding calcium salts of palm oil fatty acids on performance of lactating crossbred cows. Asian Australian Journal of Animal Science 2008;21(3):376-385.
24. Ranaweera KKTN, Mahipala MK, Weerasinghe WMPB. Influence of rumen bypass fat supplementation during early lactation in tropical crossbred dairy cattle. Tropical Animal Health and Production 2019;19:1-9.
25. Singh M, Sehgal JP, Roy AK, Pandita S, Rajesh G. Effect of prill fat supplementation on hormones, milk production and energy metabolites during mid lactation in crossbred cows. Veterinary World 2014;7(6):384-388.
26. Sharma S, Singh M, Roy AK, Thakur SS. Prepartum prilled fat supplementation effect on feed intake, energy balance and milk production performance of Murrah buffaloes. Veterinary World 2016;9(3):256-259.
27. Naik PK, Saijpaul S, Sirohi AS, Raquib M. Lactation response of cross bred dairy cows fed indigenously prepared rumen protected fat - A field trial. Indian Journal of Animal Sciences 2009;79:1045-1049.
28. Harrison JH, Kincaid RL, McNamara JP, Waltner S, Loney KA, Riley RE. Effect of whole cotton seeds and calcium salts of long-chain fatty acids on performance of lactating dairy cows. Journal of Dairy Science 1995;78:181-193.
29. Ganjkhanlou M, Rezayazdi K, Ghorbani GR, Dehghan Banadaky M, Morraveg H, Yang WZ. Effects of protected fat supplements on production of early lactation Holstein cows. Animal Feed Science Technology 2009;154(3):276-283.