ISSN 2278 – 0211 (Online)

Effect of Feed Supplementation with UMMB on the Reproductive Performance in Anestrous Buffaloes

Shatrughan Shah

Livestock Development Officer, Department of Livestock Service,
District Livestock Service Office, Nepal

Abstract:

The aim of this study was to evaluate the effect of supplementation of UMMB on the reproductive performance of post-partum anestrous buffaloes. The experimental trial was conducted in the farmer's field around the vicinity of Livestock farm of Agriculture and Forestry University, Chitwan, Nepal from February to April 2015. 30 post-partum anestrous buffaloes were selected and divided into two treatment T_1 and T_2 . T_1 group of animal having 10 numbers of buffaloes were fed with normal feeding (control) whereas T_2 groups having 20 numbers of buffaloes were supplemented with UMMB along with normal feeding. Body condition score (BCS) and blood serum nutritional parameter were measured. Pregnancy was determined after 45 days of post-insemination. Data were analyzed by MS-Excel 2010 and SPSS version 20 software. Out of 20 buffaloes in T_2 group, 90% of animals came into estrous as compared to control group (50%). Similarly, overall pregnancy rate was found to be 65% in T_2 group as compared to T_1 group (40%). Mean BCS (2.92) of buffaloes supplemented with UMMB was significantly ($p < 0.05$) higher than the control group (2.65) at the end of the trial. BCS had significant ($p < 0.05$) effect on the pregnancy rate. Serum nutritional parameter (glucose, total protein, total cholesterol) was significantly ($p < 0.05$) higher than the control group. So UMMB supplementation during dry summer season when green fodder is scarce helps to improve the body condition score and reproductive efficiency.

Keywords: UMMB, reproductive efficiency, BCS

1. Introduction

Agriculture is the main sector in Nepal and contributes 33.55 % Gross Domestic Products (GDP) (MOAC, 2010). Among the agriculture sector, livestock is an important component, which has 27.66 % contribution to Agriculture Gross Domestic Products (AGDP) (MOAC, 2008). The total milk production of Nepal is 1495897 Mt. (MOAC, 2010) which comes from cattle and buffalo.

Buffalo is the most important economic dairy animal in Nepal making an important contribution to milk, meat, power, fuel and leather production. Buffalo contributes 68.68% of the total milk and 58.30% of the total meat production in the country (MOAD, 2017). Buffaloes however suffer from reproductive problems such as poor estrous expression, seasonal breeding pattern, and prolonged inter-calving intervals, which limit its production potential. This limitation is exacerbated during the hot season when fertility decrease dramatically (De Rensis and Lopez-Gatius, 2007).

Shortage of forages material is one of the major constraints of livestock production in Nepal since earlier (Pande, 1997) date. Supply of quality feed and fodders round the year, in general, and during the lean period from October to March is especially severe. This is because ruminant animals primarily depend on natural pastures and crop residues for the greater part of the year in Nepalese situation. Fodders and forages available at the farmer field are natural pastures. Crop residues available for animals after crop harvest are usually fibrous and devoid of most essential nutrients including proteins, energy, minerals, and vitamins that are require for increased rumen microbial fermentation and improved performance of the animal. Inadequate nutrition in ruminant animals has often been associated with heavy economic losses to the farmers because of animal weight and condition losses, reduced reproductive capacity and increased mortality rates.

UMMB contains urea, molasses, rice bran, and binding agents. Different ingredients used in UMMB have major roles in ruminant feeding such as (1) Urea: provides small amount of extra nitrogen required for utilization of the dry matter. Nitrogen must be sufficient to maintain the ammonia level in the rumen, at a constant and sufficient amount for better development of the rumen microbes leading to better degradation of the cellulosic components. (2) Molasses: a good source of energy, being a concentrated plant juice, provides a range of minerals (except phosphorus) and a complete mixture of vitamins. It should have more than 800 Brix. (3) Minerals: they correct the macro and trace minerals deficiency in animal diet (4) Cement or quick limes: it is used as binding agent. The use of UMMB feed as supplement is to improve on the nutrient contents and straw utilization. The blocks are easy to handle, transport, and commercially feasible to manufacture (Avilla 2006).

UMMB feeding to cattle increases its digestibility and feed intake by 25-30 % (Aartset al. 1990; Upreti, 2008). Marginalized and small holder farmers have low quality feed resources which lacks essential nutrients due to which rumen fermentation is not efficient. Rumen fluid containing low ammonia concentration limits the growth of essential microbes and its digestibility. UMMB will provide essential nutrients such as molasses as a readily available energy, nitrogen as urea and minerals for efficient microbial fermentation in the rumen. UMMB cuts of the expensive cost of concentrates and increase the microbial protein in the animal body. UMMB feeding increases production performance and body condition score on straw feeding and shortage of green fodder. Therefore, UMMB is considered as a complete diet for ruminants' animal as it supplements all the most of the nutrients. The aim of this study is to evaluate the effect of supplementation of UMMB on the reproductive performance of buffaloes.

2. Materials and Methods

The study was conducted in the farmer's field around the vicinity of Livestock farm of Agriculture and Forestry University, Chitwan, Nepal from February to April, 2015. 30 post-partum anestrus buffaloes were selected for the experiment. And each animal were ear tagged for identification of animal. All the management of the animal was normal management which was done in the farm. Fresh drinking was given to the animal through-out the experimental period. Rice straw was offered ad libitum. And the animals were taken to the grazing as usual like other animals. Animals were divided into two groups, i.e. T₁ and T₂. 10 buffaloes were treated with Treatment 1 (T₁) and 20 animals were treated with treatment 2 (T₂).

T₁ = normal feeding (control)

T₂ = T₁ + 500 g UMMB/day (normal feeding + UMMB)

Ingredients	Percentage
Urea	10%
Molasses	32%
Rice bran	36%
Minerals	6%
Common salt	5%
Cement	5%

Table 1: Block Composition

	UMMB
Dry Matter	92.8%
Ether Extract	2.9%
Crude Fiber	8.1%
Crude Protein	19.90%
Ash (minerals)	8.2%

Table 2: Nutrient Analysis of UMMB Blocks

The feeding trial was done only for 3 months but buffaloes were monitored for 5 months. Body condition score was measured as a parameter indicating nutritional status of animal. BCS was recorded in 1 to 5 range scale. The buffaloes were classified into two BCS groups, <2.75, ≥2.75. BCS was recorded two time, before the start of the trial and at the end of the trial. Along with that blood sample was collected from jugular vein at the end of the trail. Serum was separated and total cholesterol, glucose, total protein was analyzed by Spectrophotometry at laboratory of Chitwan Medical College, Bharatpur. Pregnancy was diagnosed by transrectal palpation and ultrasonography after 45 days of post insemination.

Data were tabulated in MS-Excel 2010 and analyzed using SPSS version 20 software. Independent t-test was used to compare the two means. The output variable was pregnancy, estrus expression and input variables were nutritional status, BCS.

3. Results

Parameter	Control (T ₁)	With UMMB (T ₂)
Number of animal in trial	10	20
Number in animal in estrus	5 (50%)	18 (90%)
Number inseminated	5 (50%)	18 (90%)
Number conceived to 1 st AI	2 (20%)	7 (35%)
Overall pregnancy	4 (40%)	13 (65%)
BCS		
Initial	2.60	2.58
Final	2.65 ^a	2.92 ^b
Increment percentage	1.92%	13.75%

Table 3: Effect of UMMB on the Reproductive Performance of Buffaloes
Superscript with Different Letter Differed Significantly (P<0.05)

Overall 30 post-partum anestrous buffaloes (2nd -7th parity) were used for trial. Out of which 10 were under control group (normal feeding) and 20 buffaloes were supplemented with UMMB for three month (February to April). Out of 20 animals, 90 % (18/20) of animals came into estrus as compared to control group (50%). Likewise, 90% of animals supplemented with UMMB were inseminated as compared to control group (50%). Similarly, overall pregnancy rate of UMMB supplemented group was found to be 65% (13/20) as compared to control group (40%). Mean BCS of buffaloes supplemented with UMMB (2.92) was found to be significantly higher at the end of the trial as compared to control group (2.65). Overall increment percentage was found to be 13.75% in the animals supplemented with UMMB as compared to control group (1.92%).

Days	Control (without UMMB), n = 10		With UMMB, n = 20	
	Number of cows	Percentage (%)	Number of cows	Percentage (%)
First AI service				
< 60	2	20	8	40
60-90	1	10	5	25
90-150	2	20	5	25
UMMB Feeding to conception				
< 60	1	10	6	30
60-90	1	10	3	15
90-150	2	20	4	20

Table 4: Effect of UMMB Supplementation on the First AI Service and Conception

Out of 90% animals showing estrous sign, 40% of animals showed within 60 days, 25% animal showed estrous in between 60-90 days and 25% animals showed estrous in between 90-150 days of trial. And in control group, 20% of animals show estrous within 60 days, 10% in between 60-90 days and 20% in between 90-150 days. Similarly, animals of T2 group 30% of animals get conceived within 60 days and 15% were conceived in between 60-90 days and 20% in between 90-150 days whereas in control group, 10 % of animal conceived within 60 days and 10% in between 60-90 days and 20% in 90-150 days.

BCS	Pregnancy Rate	p-value
<2.75	30% (3/10)	0.04
≥2.75	70% (14/20)	
Total	56.66 % (17/30)	

Table 5: Comparison of Pregnancy Rate on the Basis of Body Condition Score (BCS)

BCS has significant ($P < 0.05$) effect on the pregnancy rate. Buffaloes having BCS more than or equal to 2.75 had significantly higher pregnancy rate (70%) as compared to the BCS below 2.75 (30%).

Parameter	Control (T ₁)	UMMB (T ₂)	p-value
Glucose (mg/dl)	82.9 ± 4.06	92.05 ± 2.75	0.02
Protein (mg/dl)	6.07 ± 0.06	6.44 ± 0.26	0.03
Total cholesterol (mg/dl)	98.9 ± 4.35	125.30 ± 3.15	<0.01

Table 6: Serum Nutritional Parameter of Buffaloes

The serum glucose and protein level of animals of fed with UMMB were significantly ($P < 0.05$) higher than the control group. Similarly total cholesterol level of T₂ group was highly significant ($P < 0.01$) than the control group (T₁).

4. Discussion

It is well documented that the breeding frequency in buffaloes is highest during good breeding season (July to December) and lowest during summer season (January to June) as per the findings of "Devkota and Bohara, 2009". Since this research was conducted in Summer season (February to April) and it comes under poor breeding season in which buffaloes suffer from reproductive problems such as poor estrous expression, seasonal breeding pattern, and prolonged inter-calving intervals, which limit its production potential.

Out of 20 animals 18 (90%) animals came into estrous within 150 days of start of feeding trail which indicates positive effect of UMMB supplementation on the reproductive efficiency during nutritional scarcity as compared to control group. Similarly block supplementation led to increment of pregnancy rate by 25% as compared to control group (65% vs 40%). A similar study in Indonesia has recorded 15.8% increase in conception rate (Makkar, 2001).

Body condition score (BCS) was a strong positive indicator of the likelihood of conception rate. Female with BCS ≥2.75 had 70 % conception rate, whereas females with BCS <2.75 had only 30% which attain significant difference ($p < 0.05$) among the different BCS. Lower BCS has been correlated with postpartum anestrus. Rasby et al. (1992) reported that nutrition restriction has a negative influence on LH release. Other studies also demonstrated the negative effect of low BCS on ovarian cyclicity and pregnancy rates in beef cows (D'occhio et al., 1990; Viscarra et al., 1998). Furthermore, investigations on postpartum reproduction indicate that BCS is a useful indicator of energy status and rebreeding potential

(DeRouen et al., 1994). The results suggest that buffaloes supplemented UMMB had positive effect on BCS due to which it leads to higher pregnancy rate.

During the study period (February to April) there was very less availability of fodder grasses in comparison to other season due to which blood nutrient level was very low in control group. Supplementation with UMMB in feed significantly ($P < 0.05$) increase the blood nutrient as compared to control group. In dairy animals, nutrition is one of the major causes of anestrus (Kumar et al., 2014) and other reproductive disorders (Pradhan and Nakagoshi, 2008). Cholesterol is a precursor molecule is needed in the biosynthetic pathway of steroid hormones and its utilization is related to ovarian functional activity (Doisy, 1972). Like in cattle, a direct relationship between cholesterol levels and reproductive performance exists in buffaloes (Murthy and Rao, 1981).

UMMB supplementation during less availability of green fodder improves the body condition score and reproductive efficiency of seasonal anestrus buffaloes along with that serum nutritional level also increases which can prevent buffaloes from negative energy after postpartum. So it is recommended to all the cooperatives to increase the awareness of feeding UMMB to get maximum profit.

5. Acknowledgement

We would like to thank LCC-CRSP project of Colorado State University for providing fund for the research. Staffs of livestock farm of Agriculture and Forestry University and farmers near vicinity of University are also highly acknowledged for helping us throughout the research.

6. References

- i. Aarts, G., R. Sansoucy and G.P. Leveux. (1990). Guideline for the manufacture and utilization of molasses – urea blocks. Animal Production and Health Division, FAO, Rome, Italy. 7pp.
- ii. Avilla, H. F. (2006). Production and utilization of urea molasses mineral block (UMMB). FAO/ Ag./AGP/doc/publicat/VIET95, Pp. 199-204.
- iii. D'oc-chio, M.J., Neish, A., & Broadhurst, L. (1990). Differences in gonadotrophin secretion postpartum between Zebu and European breed cattle. Anim. Reprod. Sci. 22, 311–317.
- iv. De Rensis, F., & Lopez-Gatius, F.(2007). Protocols for synchronizing estrus and ovulation in buffalo (*Bubalus bubalis*):A review. Theriogenology 67:209–216.
- v. DeRouen, S.M., Franke, D.E., Morrison, D.J., Wiatt, W.E., Coombs, D.F., White, T.W., Humes, P.E., & Greene, B.B. (1994). Prepartum body condition and rate influences on reproductive performance of first-calf beef cows. J. Anim. Sci. 72, 1119–1125.
- vi. Devkota, B., & Bohara, T.P. (2009). Effects of season on pregnancy rates in water buffaloes of Southern Nepal evaluated by using different estrus synchronization protocols during active season and low breeding season. Pakistan J. Zool. 9:763-770.
- vii. Kumar, P.R., Singh, S.K., Kharche, S.D., Chethan Sharma, G., Behera, B.K., Shukla, S.N., Kumar, H., Agarwal, S.K.(2014). Anestrus in cattle and buffalo: Indian perspective. Advances in Animal and Veterinary Science 2 (3): 124-138.
- viii. Makkar, H. (2001). Frequently asked questions on urea molasses-multinutrient block technology (UMMB). Report on review meeting - International Atomic
- ix. MoAC. (2008). Statistical information on Nepalese agriculture, 2006/07. Ministry of Agricultural and Cooperatives, Kathmandu, Nepal.
- x. MoAC. (2010). Statistical information on Nepalese agriculture, 2008/09. Ministry of Agricultural and Cooperatives, Kathmandu, Nepal.
- xi. MoAD. (2017). Statistical information on Nepalese agriculture, 2015/16. Ministry of Agricultural Development, Kathmandu, Nepal. Accessed on October 10, 2017
- xii. Murthy, S.N., Rao, A.V.N. (1981). Blood cholesterol profiles in different reproductive phases of graded Murrah buffaloes. Indian Vet J 58, 771–773.
- xiii. Pande, R. S. (1997). Fodder and pasture development in Nepal. Udaya Research and Development Service (P) Ltd. publisher, Kathmandu, 5 pp.
- xiv. Pradhan, R., & Nakagoshi, N.(2008). Reproductive disorders in cattle due to nutritional status. Journal of International Development and Cooperation 14:45-66.
- xv. Upreti, C. R. (2008). Buffalo. In: Livestock poultry and fish nutrition in Nepal. B. Upreti publisher, Kathmandu. Pp. 117-120.