IMPROVED REPRODUCTIVE PERFORMANCE OF CROSSBRED CATTLE IN PURI DISTRICT OF ODISHA FOLLOWING SUPPLEMENTATION OF AREA SPECIFIC MINERAL MIXTURE

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ABSTRACT

Recently parturated thirty crossbred cattle were selected for the study from Kakatpur block of Puri district of Odisha. A group of cattle (n=15) were supplemented with specially formulated area specific mineral mixture @ 50 g/animal/day for 90 days, whereas, the remaining (n=15) were kept as unsupplemented controls. An increase ($p<0.05$) in serum mineral (Ca, P, Zn, Mn, Cu) concentration was observed in supplemented cattle on day 90 in comparison to controls. In brief, the reproductive performance in terms of days to first postpartum estrus, number of services per conception and service period decreased ($p<0.05$) following mineral supplementation in crossbred cattle.

Keywords: ASMM, Cattle, Crossbred, Mineral, Reproduction

Trace element deficiency is linked to reproductive problems such as delayed puberty, anestrous, repeat breeding, retained fetal membranes, abortion and weak calf syndrome (Gupta *et al.,* 2005). However, the mineral supplementation decreases days to first service, days open and improves conception rate in bovines (Koley and Biswas, 2004). The supplementation of area specific mineral mixture (ASMM) containing minerals like calcium (Ca), phosphorous (P), zinc (Zn), manganese (Mn) and copper (Cu) was reported to improve the reproductive efficiency of dairy animals (Gowda *et al.,* 2008). Hence, this study was conducted to assess the efficacy of ASMM supplementation in improving reproductive performance of crossbred dairy cattle under field conditions.

The study in a participatory rural approach involving the dairy farmers in Kakatpur block of Puri district of Odisha was carried out on crossbred cattle with normal parturition (n=30). Fifteen crossbred cattle were kept under normal feeding practice and other 15 cattle were additionally supplemented with ASMM @ 50 g/animal/day for 90 days. Area specific mineral mixture was formulated considering the actual mineral requirement vis-à-vis supply to the animals (Mohapatra *et al.,* 2008) and was prepared using the salts of Ca, P (di-calcium phosphate), Cu (copper sulphate), Zn (zinc sulphate), Mn (manganese sulphate) and iodine (potassium iodide). From the jugular vein of each animal, 10 ml blood was collected at the start (0 d) and on day 90 after the start of mineral supplementation. The serum was separated by centrifugation (5000 rpm, 10 min) and stored at -20°C. The diagnostic kits manufactured by Span Diagnostic Limited, Surat (India), were used for the analysis of serum Ca and P, whereas, serum Cu, Mn and Zn was estimated by Atomic Absorbance Spectrophotometer (Model 4141, Electronic Corporation of India Limited, Hyderabad, India). The reproductive performance was recorded as per the standard procedures. The tests of significance ($p<0.05$) were made by standard Student's paired 't' test.

The supplementation of ASMM lead to an

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Table 1: Serum minerals profile and reproductive performance of crossbred cattle supplemented with or without Area Specific Mineral Mixture (ASMM)

Parameter	Day	**-ASMM** (n=15)	**+ASMM** (n=15)
Minerals			
Ca, mg/dl	0	7.39±0.79	7.40±0.84
	90	7.28±0.68[a]	8.51±0.45[b]
P, mg/dl	0	3.91±0.13	4.12±0.26
	90	4.04±0.26[a]	5.12±0.17[b]
Zn, ppm	0	0.82±0.10	0.82±0.06
	90	0.82±0.10[a]	1.39±0.11[b]
Mn, ppm	0	0.32±0.08	0.32±0.07
	90	0.32±0.03[a]	0.64±0.02[b]
Cu, ppm	0	0.71±0.13	0.71±0.15
	90	0.79±0.08[a]	1.07±0.05[b]
Reproductive performance			
Days to first postpartum estrus		92.1±10.4[a]	78.4±8.9[b]
Services per conception, n		2.16±0.37[a]	1.80±0.23[b]
Service period, d		117.7±9.3[a]	92.6±2.1[b]
Conception rate		60%	80%

[a vs. b]$p<0.05$, within a row

improvement in serum mineral profile by day 90 post-supplementation ($p<0.05$, Table 1). Similar results were reported in dairy cattle by other workers (Samanta *et al*., 2005). The reproductive performance of dairy cattle improved following ASMM supplementation as indicated by decrease in number of days to first postpartum estrus, shorter service period and less number of services required per conception as compared to unsupplemented cattle ($p<0.05$, Table 1). The conception rate was also better in supplemented cattle ($p>0.05$, Table 1). Also, in other studies, 80% cattle exhibited estrus and 60% achieved conception following supplementation of mineral mixture (Jain *et al.,* 2003). Moreover, heifers and cattle supplemeted with ASMM exhibited estrus in higher percent compared to untreated cattle (Mohapatra *et al*., 2012). The improvement in reproductive efficiency may be attributed to the beneficial action of minerals on the neuro-endocrine axis and reproductive function. Contrary to our findings, a study reported absence of difference in conception rate following administration of organic and inorganic sources of the trace minerals (Cu, Zn, Mn) for a period of 2 years (Olson *et al*., 1999). This may be due to the fact that the animals may be already in healthy mineral status.

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