



SHORT COMMUNICATION

Dietary Micro-Nutrients Supplementation in the Ration of Transition Crossbred Cows Influences the Growth Performance and Hemato-Biochemical Parameters of Newborn Calves

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ABSTRACT

The present work was planned to access the effect of dietary micronutrient supplementation to the transition crossbred cows affecting the performance of newborn calves. Twenty healthy advanced pregnant crossbred cows (average body weight 408.25 ±12.93 kg) reared under similar conditions were selected randomly and divided into two equal groups. Control cows fed on the existing ration while the treatment cows additionally fed with antioxidant micronutrients (trace minerals Cu and Zn with vitamin A and E) as per the recommendations. Experimental feeding was started about two months pre-partum till two months post-partum. The influence of dietary micro-nutrients supplementation in transition crossbred cows was judged by measuring birth weight, fortnightly body weight, and some haemato-biochemical parameters of their calves. The mean birth weight (kgs) of calves was higher (P=0.06) in the treatment group (34.15±0.88) as compared to the control group values (32.08±1.55). Bodyweight at the termination of the experimental feeding though remained statistically comparable between the two groups but high in treatment (53.25±1.67 kg) than in the control (49.75 ±1.61 kg) group. The hematological parameters i.e. Hb (g/dl) was 9.53±0.53 and 11.03±0.70; total leukocytes count ($\times 10^3 \text{ mm}^{-3}$) 9.64±0.35 and 9.01±0.55 and percentages of neutrophil 34.67±1.94 and 29.33±1.67, lymphocyte 63.50±2.0 and 68.83±1.89, monocyte remained 2.00±0.68 and 1.67±0.33% in un-supplemented and supplemented group, respectively without any significant difference between two groups. It may be concluded that supplementation of antioxidant micro-nutrients in the transition dairy cow's ration was unable to influence the growth and hemato-biochemical parameters in their calves.

HIGHLIGHTS

- Study focused on effect of dietary supplementation of Cu and Zn with vitamin A and E to the transition crossbred cows.
- Effect of dietary micronutrient supplementation of Cu and Zn with vitamin A and E did not effect birth weight, fortnightly body weight, and some haemato-biochemical parameters of calves.

Keywords: Body weights, Calves, Hematobiochemical, Micro-nutrients, Transition cows

In the Malwa region of Madhya Pradesh crossbred dairy cattle in advanced pregnancy mostly fed on leguminous straw-based ration with an inadequate quantity of imbalanced concentrate mixture without vitamin and mineral supplementation (Jain *et al.*, 2012ab; Mudgal *et al.*, 2003; Sharma and Jain, 2016). Seasonal green fodders were offered in a limited amount depending upon the availability. A similar feeding pattern was followed after parturition except for the quantity of concentrate

portion was increased. Under such a feeding situation, the availability of antioxidant minerals (Se, Cu, and Zn) and vitamins (vitamin E and beta-carotene) which are having

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importance in production and reproduction may greatly be reduced to animals (Spears and Weiss, 2008; Singh *et al.*, 2020). Thus, dairy animals and their calves remain prone to suffer from many problems. Vitamin and mineral supplementation during the transition period improved the performance of newborn calves in terms of their birth weight, immune and antioxidant systems, and body weight gain (Bordignon, *et al.*, 2019). Considering this fact, the present work was planned to study the effect of dietary micronutrient supplementation in the transition crossbred cows on the performance of newborn calves.

Twenty healthy (average body weight 408.25 ±12.93 kg) advanced pregnant crossbred cows (around the last two months of gestation) reared under similar conditions were selected randomly and divided into two equal groups. Control group cows were fed on the existing ration, while the treatment cows were additionally supplemented with antioxidant nutrients i.e. trace mineral Cu and Zn with vitamins A and E as per the normal dose of recommendations. Experimental feeding was continued for about two months during advanced pregnancy and followed by two months post-calving. The effect of dietary micronutrient supplementation in transition crossbred cows was assessed by determining the performance of their newborn calves. Parameters considered were the birth weights, fortnightly body weights and some haemato-biochemical parameters like blood glucose, total plasma protein, albumin, globulin, total and differential leucocytes count at about one week of age in six calves from both groups. Birth weight and subsequent weight (at fortnightly intervals) of calves were determined with the help of spring balance (100 Kg) during the period of study.

The mean birth weight of calves was 32.08±1.55 and 34.15±0.88 kg in cows of the un-supplemented and supplemented group, respectively. Birth weight was higher in supplemented group than the un-supplemented group, although the difference between groups was non-significant (P=0.06). Overall mean body weight (kg) after 60 days was 41.68±3.10 and 44.15±3.34 in the un-supplemented and supplemented group showed non-significant difference between two groups.

In contrast to present findings, Khan *et al.* (2015) studied that vitamin E and mineral supplementation during the prepartum period augmenting the improvement in reproductive performance in Murrah buffaloes. They

observed that supplementation improved the performance not only of buffalo but also their calves in terms of their birth weight, body weight gain up to 90 days, and calf weight to dam ratio. In contrast to our finding Panda *et al.* (2006) found a higher average birth weight of calves in the dietary vitamin E (α-tocopheryl acetate) supplemented group than the un-supplemented group. Similarly, when Moeini *et al.* (2009) studied the effect of dietary vitamin E and selenium supplementation in cattle during the prepartum period they observed that calf had higher birth weight in the treatment group as compared to the control group. Similar to present findings Modi *et al.* (2018) when administered injection of vitamin E and selenium prepartum did not report any effect on the birth weights of calves.

The hematological parameters including hemoglobin, the total count of leukocytes, and differential leukocyte counts are presented in Table 1. Hemoglobin (g/dl) values were numerically (P>0.05) higher in the treatment group (11.03±0.70) than it was in the control (9.53±0.53) group. Average values of total leukocyte count (×10³ mm⁻³) were 9.64±0.35 and 9.01±0.55 in the control and treatment groups, respectively. The average percentage values of neutrophils were 34.33±1.94 and 29.33±1.67, lymphocytes were 63.50±2.0 and 68.83±1.89, monocytes remained 2.00±0.68 and 1.67±0.33 in control and treatment groups, respectively and the data did not differ statistically, with similar values of eosinophils (0.17%) in two groups.

Table 1: Effect of dietary antioxidant nutrients supplementation to transition crossbred cows affecting haemato-biochemical profile of newborn calves

Attributes	Control	Treatment	P-Value
Glucose (mg/dl)	90.50±4.66	96.86±3.09	0.19
Total protein (g/dl)	6.09±0.58	6.43±0.26	0.19
Albumin (g/dl)	2.38±0.09	2.25±0.12	0.37
Hb (g/dl)	9.53±0.53	11.03±0.70	0.33
TLC (×10 ³ mm ⁻³)	9.64±0.35	9.01±0.55	0.25
Neutrophils (%)	34.33±1.94	29.33±1.67	0.55
Lymphocytes (%)	63.50±2.00	68.83±1.89	0.72
Monocytes (%)	2.00±0.68	1.67±0.33	0.10
Eosinophils (%)	0.17±0.00	0.17±0.00	1.00

Bordignon *et al.* (2019) evaluated the nutraceutical effect of vitamins and minerals on the performance of dairy calves during the nutritional transition period and reported

an increase in total leukocyte, DLC, Hb, globulin, and glucose as a result of elevation in neutrophil counts (day 45) and monocytes (days 30 and 45) in the treatment group, but levels of serum copper, selenium, zinc, and manganese were not deficient in these calves. Likewise, Solda *et al.* (2017) observed the nutraceutical effect of vitamins and minerals on calves and reported an increased number of total leukocytes and decreased levels of Hb and glucose.

The data about the biochemical profile of cross-bred calves during the experimental period is furnished in Table 1. Results revealed that the blood glucose levels were higher in the treatment group (96.86 ± 3.09 mg/dl) than control (90.50 ± 4.66 mg/dl), although the difference was non-significant.

Values of total protein (6.43 ± 0.26 Vs. 6.09 ± 0.58 g/dl) and globulin (4.18 ± 0.15 Vs. 3.71 ± 0.28) also remained numerically ($P > 0.05$) high in the treatment group as compared to control values and albumin (g/dl) remained 2.38 ± 0.09 and 2.25 ± 0.12 in control and treatment groups, respectively.

Bedwal and Bahuguna (1994) found that newborn calves from a selenium-deficient mother suffer from muscular weakness, but the concentration of selenium during pregnancy does not have any effect on the weight of the baby or length of pregnancy. The selenium requirements of a pregnant and lactating mother are increased as a result of selenium transport to the fetus via the placenta and to the infant via breast milk.

CONCLUSION

The dietary supplementation of micronutrients (Cu, Zn, vitamin A, and E) in the ration of crossbred cows during the transition period was unable to influence the birth weight and subsequent body weights and hematobiochemical parameters of the newborn calves.

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