SUMMARY & CONCLUSION

Due to paucity of information on the use of solvent and expeller extracted mustard oil cakes, the study "Utilization Of Solvent Extracted Mustard Cake As A Source Of Protein For Growth And Its Effect On Rumen Metabolic Profile In Male Buffalo Calves" was planned with the following objectives 1) To study the effect of expeller and solvent extracted mustard cake on growth, nutrient utilization, thyroid hormonal status, mineral retention and blood mineral status in buffalo calves; 2) To investigate the effect of different dietary treatments on rumen metabolic profiles in buffalo calves; and 3) To study the economics of feeding expeller and solvent extracted mustard cakes.

The study was conducted at Central Institute for Research on buffalo, Hisar in two phases. In phase one, isonitoginus and isocaloric dietary treatments were applied on 24 male buffalo calves divided into four groups of six each for four dietary treatments consisting of T₁-Conventional Concentration Mixtures (Groundnut cake, wheat bran, barley, mineral mixtures and common salt), T₂-Groundnut cake of T₁ completely replaced with Expeller Pressed Mustard cake (EMC), T₃-50 percent of EMC of T₂ replaced with Solvent
Extracted Mustard Cake (SMC) and T₄ mustard cake of T₂ completely replaced with SMC. This continued for 8 months. Daily dry matter intake and forthrightly body weight changes were recorded. Blood samples were analyzed for the estimation of tri-iodothyronine, thyroxine, thiocynate and for Ca, P, Zn and Cu. Digestibility trials, to determine the nutritive value of rations and to for the balances of N, Ca, P, Zn and Cu were conducted for seven days collection period. Economics of feed was also calculated. In phase II, fistulated calves in 4 x 4 latin square switch over design were used. The dietary treatments consisted of the same as in phase I. Rumen liquor was analyzed for pH, total VFA, fractional VFA, total nitrogen, NH₃ nitrogen, TCA precipitable nitrogen, non-protein nitrogen at 0, 2, 4, 6 and 8 hours post feeding after an adaptation period of 21 days. Data were analyzed statistically. Following results were obtained.

Feeding of mustard cake showed a depressing effect on dry matter intake as compared to groundnut cake and solvent extracted mustard cake. Dry matter intakes of T₁, T₂, T₃ and T₄ were 4.58±0.17, 3.69±0.08, 4.08±0.26 and 4.52±0.14 kg/d, respectively. Digestibility co-efficient of DM, CP, CF, NFE and organic matter were not affected appreciably due to the treatments. However, digestibility coefficient of EE was found the highest in T₂ (69.45±2.6) as
compared to $T_1$ (66.05±2.05) and $T_4$ (60.84±2.6). Water intake (l) in $T_1$, $T_2$, $T_3$ and $T_4$ were 14.89±0.01, 11.79±1.01, 14.77±0.57 and 17.39±0.28, respectively. These were found to be statistically similar in $T_1$ and $T_3$, however, it was highest in $T_4$ and lowest in $T_2$. Balance of nitrogen (g/h/d) was found the highest in $T_1$ (25.86±1.67) which was significantly ($P<0.05$) superior over to $T_2$ (21.84±1.67) and $T_3$ (23.28±2.23) but was comparable to $T_4$ (25.46±1.39). The values of $T_2$ and $T_3$ were, however, comparable. The balances of calcium and phosphorus (g/h/d) of $T_3$ (19.84±2.08; 11.71±0.73) and $T_4$ (20.78±2.21; 12.14±0.58) were comparable, these were significantly ($P<0.05$) higher than $T_1$ (17.64±2.18; 9.66±0.26) and $T_2$ (17.24±1.68; 9.81±0.47). Balances of $T_1$ and $T_2$ were also comparable. Copper balance (mg/h/d) of $T_3$ (347.20±16.93) and $T_4$ (339.96±13.44) mg/h/d which were not significant different. The balance of these mineral in $T_1$ (318.03±10.67) were significantly ($P<0.05$) lower than $T_3$ and $T_4$. The body weight gains in $T_1$, $T_2$, $T_3$ and $T_4$ were 496.50±18.93, 408.17±7.82, 429.50±18.51 and 476.83±14.77 g/d, respectively. Body weight gains (g/d) were found to be similar in which were significantly ($P<0.05$) higher than whereas, the gains in the treatment $T_3$ were par. The feed : gain ratios in the four tr.
9.23±0.06, 9.03±0.03, 9.52±0.04 and 9.47±0.03, respectively. The feed cost (Rs.) per kg gain was significantly \((P<0.05)\) higher in T1 (36.13±0.26) compared to T2 (32.61±0.18), T3 (33.40±0.16) and T4 (32.30±0.12). Feed : gain ratio in T2, T3 and T4 were not significantly \((P<0.05)\) affected.

Calcium and phosphorus levels in blood serum were not affected by dietary treatments. The zinc level (ppm) of T1 (3.42±0.18), T2 (3.56±0.17) and T3 (3.71±0.17) were comparable similarly these levels of T3 and T4 (3.85±0.18), T2 (3.56±0.17) and T3 (3.71±0.17) were comparable similarly these levels of T3 and T4 (3.85±0.13) were also comparable. However, the highest level of zinc was found in T4 which was significantly higher than T1 and T2. The serum copper level (ppm) of 1.13±0.09 of T1 was significantly \((P<0.05)\) higher than T2 (1.01±0.06), T3 (1.02±0.08) and T4 (1.03±0.07). These levels of T3 and T4 were comparable and significantly \((P<0.05)\) higher than T1. Thiocyanates levels (µg/ml) increased progressively and significantly \((P<0.05)\) from T1 (0.00) to T4 (1.72±0.11) and from T4 to T3 (4.82±0.15) and from T3 to T2 (8.06±0.43)). The tri-iodothyronine levels (ng/ml) in the blood plasma of T2 (0.31±0.04) and T3 (0.34±0.08) and T1 (0.38±0.06). T4 (0.38±0.07) were comparable. The levels of T1 and T4 were, however, significantly \((P<0.05)\) higher than
Plasma Thyroxine levels were, however, not affected by the dietary treatments.

The pH of the rumen liquor in T1, T2, T3 and T4 was 6.64±0.02, 6.75±0.04, 6.70±0.03 and 6.64±0.06, respectively. T1 and T4 was comparable which were significantly lower than T2 and T3. The pH of T2 was, however, significantly (P<0.05) higher than T3. The TVFA's (meq/l) in the rumen liquor of T1 was highest (137.77±13.64) which was followed by T4 (131.53±12.51), T3 (127.75±11.79) and T2 (123.20±11.54). The values of T3 and T4 were comparable and better than T2 but were significantly (P<0.05) lower than T1. Acetic acid concentration of T1, T2, T3 and T4 were 84.92±2.82, 77.17±3.16, 79.51±5.02 and 81.62±3.41 (meq/l), respectively. The concentration of T1 was significantly higher than T2, T3 and T4. The concentration of acetic acid at 4 hr post feeding was significantly (P<0.05) higher than concentration of other post feeding hours. Propionic acid concentration (meq/l) of T2 was 29.39±1.81 which was significantly lower than T1 (35.30±1.08), T3 (31.74±2.34) and T4 (32.62±2.08). Butric acid concentration rumen liquor of buffalo calves were not affected by dietary treatments.

Total nitrogen, non protein nitrogen, amonia nitrogen and TCA precipitable nitrogen concentration in the
rumen liquor of buffalo calves did not vary significantly (P<0.05) due to these treatments. The concentration of these nitrogenous fractions at 4 post feeding hours was significantly (P<0.05) higher than other post feeding hours.

It is, thus, concluded that costlier protein can be economically replaced by solvent extracted mustard cake in the ration of growing buffalo calves without affecting the growth and the rumen fermentation pattern.