Summary
VI. SUMMARY

This study was undertaken to evaluate the effect of feeding slow release nitrogen product (SRNP) on the growth performance of crossbred calves and the lactation performance of crossbred dairy cows. This objective was achieved by conducting two feeding trials viz. (1) a growth trial using growing heifer calves fed two treatment diets viz. T1, containing 1.5 per cent urea in the diet, and T2, containing SRNP (urea replaced by SRNP on equal nitrogen basis), and comparing the growth performance and (2) a lactation trial using crossbred dairy cows fed two treatment diets viz. T1 containing 2.0 per cent urea in the diet, and T2, containing SRNP (urea replaced by SRNP on equal nitrogen basis), and comparing the lactational performance (milk yield and composition of nutrients in milk). In both trials, the feeding trial was followed by metabolism trials, to estimate the digestibility of nutrients and N balance of animals due to incorporation of SRNP in the diets.

In the growth trial, six crossbred heifer calves (Holstein Friesian x Sahiwal) of about one year age and comparable body weight were used. The experiment was a switch over design comprising two blocks of 3 animals each. The trial comprised of two periods of six weeks. The calves within each block were designated to receive either treatment T1 (containing 1.5 per cent urea) or T2 (urea replaced with SRNP on nitrogen equivalent basis) diets in two periods. The SRNP was a commercial product containing 43 per cent Calcium chelated urea. The diet was made from finger millet (*Eleucine coracona*) straw as roughage and a compounded feed mixture (CFM) containing known metabolisable energy (ME) and crude protein (CP) content. Diets for the experimental calves were
formulated individually to meet the energy and protein requirement as per ARC (1984). Finger millet straw was fed *ad libitum*. The allowance of CFM for individual calves was fixed at 1 per cent of the body weight. The total duration of the trial was 84 days, during which time the body weight gain and feed intake were recorded.

There was no difference in the intake of dry matter or body weight gain due to SRNP supplementation. The initial and final body weight (kg) for the T1 and T2 groups were 149.17, 165.54 and 150.17, 167.19 respectively. The mean total body weight gain (kg) for the T1 and T2 groups during experimental period was 16.42 and 17.02 kg respectively. The average body weight gain for T1 and T2 groups during experimental period was 390.2 and 405.4 g per day respectively. The difference in body weight gains between the two groups was not statistically significant.

The percentage digestibility of DM, OM, CP, NDF and ADF in the diets for T1 group was 59.45, 61.64, 47.79, 50.19 and 43.00 respectively. The corresponding values for T2 diet group were 62.01, 65.45, 53.08, 52.64 and 44.72 respectively. There was no significant difference between T1 and T2 groups in the digestibility of different nutrients. The N balance values (g per day) for treatment groups T1 and T2 were 14.57 and 13.21 respectively.

Similar dry matter intake, digestibility of nutrients and the N balance between the two experimental groups of animals indicated that the supplementation of SRNP has no influence on the utilization of nutrients. Considering the similar body weight of animals and the average daily gain of calves between the two treatment groups, it was concluded
that replacing urea with the SRNP has no beneficial effect on the growth of crossbred heifer calves.

In lactation trial, eight crossbred cows (Holstein × Sahiwal) in mid lactation were used in a switch over design. The cows were divided into two blocks based on milk production and number of days in lactation. Cows within each block were assigned to one of the two treatment diets T1, containing 2.0 per cent urea or T2 containing SRNP, (replaced with urea on nitrogen equivalent basis). Each period of the study comprised of five weeks duration with one week adjustment period and four weeks of observation. Diets were formulated to meet the maintenance and lactation requirement. Diet of cows comprised finger millet straw and a CFM. The experimental cows were fed *ad libitum* finger millet straw while the allowance of CFM was varied to provide the required energy in the total diet. The proportion of CFM to roughage in the experimental diet was approximately 61:39. The treatment diets contained the desired levels of energy and adequate amounts of CP and RDP to meet the requirement of the animals. The total duration of the study was 70 days during which time milk yield, milk composition and body weight change of animals were recorded.

There was no difference in the feed dry matter intake, milk yield (total or 4 per cent FCM) or milk constituents between the treatment groups. The total milk yield and 4 per cent FCM yield (kg per day) for T1 and T2 groups were 8.46, 9.08 and 8.25, 8.83 respectively. The SNF (9.42 and 9.43 per cent for T1 and T2, respectively), protein (3.62 and 3.65 per cent for T1 and T2, respectively), fat (4.48 and 4.38 for T1 and T2,
respectively), and lactose (5.04 and 5.00 per cent for T1 and T2, respectively) in the milk of cows of two groups were not significantly different.

The results of the metabolism trial indicated that the digestibility of nutrients were not significantly different between the treatment groups. The percentage digestibility of diets in T1 and T2 groups for DM, OM, CP, NDF and ADF were 58.72, 61.15, 56.25, 56.55 and 47.30 for T1 and 61.18, 62.54, 59.71, 54.10 and 42.15 respectively. Similarly the N balance (g per day) for T1 and T2 groups of cows were 2.51 and 3.78 respectively. The N balance for two groups were not significantly different. Similar digestibility of nutrients in the diet of two experimental groups and the N balance indicated that the supplementation of SRNP had no influence on the utilization of nutrients in the lactating dairy cows.

Data on the milk yield and milk composition of the experimental cows suggests that substitution of slow release nitrogen product for urea in the diet as having no beneficial effects on the lactational performance of crossbred dairy cows.

Mean ammonia concentration in the ruminal fluid of experimental cow fed SRNP was higher (30.93 mg per dL) than during urea feeding (25.74 mg per dL). Nevertheless, feeding of SRNP did not exert any influence on digestibility of nutrients viz. DM, OM, CP, NDF and ADF constituents in the diets. Despite the favourable rumen ammonia levels, lack of any improved performance of growing calves or lactating dairy cows was difficult to explain. However, since the incorporation of urea in the diet at levels higher than 1 per cent has a potential hazard of toxicity, it is concluded that the feeding of SRNP can be advantageous from the safety point of view.
Considering the overall results of this study, replacement of urea by SRNP in the diet of growing calves at 1.5 per cent has no influence on the growth of crossbred heifer calves, and similarly replacement of urea by SRNP in the diet of dairy cows at 2.0 per cent exerted no influence on the lactational performance. Therefore it was concluded that replacing urea by SRNP in the diet has no beneficial effect on the performance of growing heifer calves or lactating dairy cows.