Asia’s teeming millions, particularly of the developing countries such as India, are constantly haunted by the fear of under-nutrition, owing to the paucity of balanced food, a fear that may become a reality with rising needs of the increased human population, adding on every year. Due to this explosive human population and the difficult agro-economic situation, the time is pressing hard on the direct use of land not only in India, but also in several other countries of the world. Dairy industry as it stands, primarily aims at providing sufficient milk for human consumption. Milk is the nearest approach to a most perfect single food so far known, which has also the largest measure of acceptance all over the world. There is now a growing awareness of the high nutritive value of milk and milk products. The civilised nations have been using milk and milk products as food or supplement to food, since times immemorial. Milk supplies exceedingly high quality protein that supplements the protein of the traditional vegetarian diet. Milk protein has a high biological value of 85 to 90 percent as against 60 to 70 percent for vegetable proteins. As the nearest approach to the perfect food, milk supplies easily digestible fat, lactose for the proper development and function of brain and tissue, valuable minerals for bone and blood formation and the vitamins which are essential for growth, reproduction, vigour and vitality of the human being.

It is an admitted fact that regardless of the great genetic potentialities, the animal cannot produce enough milk
or meat on an inadequate ration and the optimum reproductive performance is not achieved, which is necessary for the economic maintenance of the livestock. To get more milk and maximum economic returns from the animals, efforts in all directions are required to be made. The nutritional factors such as energy, protein, minerals and vitamins play a major role in determining their productivity. A ration can not be computed merely in terms of calories or of the old conventional concept of mere protein, fat and carbohydrates. It is fully recognised today that the mineral aspect of ration holds a position of equal importance with the so-called proximate principles or organic nutrients.

The animal body contains a large number of mineral elements. At present only fifteen of these can be described with certainty as nutritionally essential elements. They are calcium, phosphorus, sulphur, potassium, sodium, chlorine, magnesium, iron, zinc, copper, manganese, cobalt, iodine, molybdenum and selenium. The first seven i.e., from calcium to magnesium in this list are usually called as 'major or macro elements', because these are required in relatively large amounts by the animals. The remaining are frequently referred to as 'trace or micro elements', as these are required by the system in minute quantities and they occur in traces in the tissues. Out of these trace minerals, copper and cobalt are more important ones from the ruminant point of view.

The livestock malady which has been found to be associated with these trace mineral deficiency has been reported from
various regions of the world. Two major aspects with reference to these trace elements research in animal nutrition seem to be (i) the importance and use of these trace elements to the physiological process, and (ii) the relation of deficiencies or excess of these to diseases and disorders in the animals.

The first of these problems can be resolved into a number of definite phases that will give the outline of the type of research required. For instance, the information regarding effects and mode of action of various trace elements upon the formation and secretion of enzymes and hormones, as well as the changes brought about by trace elements in vital body fluids of complex nature, which influence the dependent physiological processes, is required to be obtained.

The second major problem is to acquire adequate knowledge of the actual requirements of the trace elements for different types of livestock. This knowledge is of great practical importance in order to get the optimum performance and maximum returns from the livestock enterprises in different regions under varied agro-climatic conditions.

In order to increase the milk production, cross-breeding is resorted to in the country. The cross-bred cows which yield good amount of milk also require fairly high level of nutrients. With a view to obtain optimum performance of these animals, it is of paramount importance to know their actual requirements of nutrients including the trace minerals. With a view to obtain the information on some of these aspects, a study was initiated and the findings are presented.
The effect of copper and cobalt supplementation on the performance of cross-bred cows forms the subject matter of the present studies. The various aspects related to the investigation that are dealt in different chapters are as follows.

A short introduction of the subject is given in Chapter I.

History and detailed review of literature on copper and cobalt in ruminant nutrition have been presented in Chapter II and III, respectively.

Materials and Methods those were used in the investigation have been incorporated in Chapter IV.

Results and Discussion on the effects of supplementation of Copper and Cobalt at three different levels on the blood composition, milk production, digestibility of nutrients and reproductive performance of cross-bred milch cows have been presented in Chapters V and VI, respectively.

Summary of the findings, Conclusions drawn and Recommendations made based on these are given in Chapter VII, which is followed by the Appendix and the Bibliography.