GENERAL SUMMARY AND CONCLUSION

To day rodents form an important group of pests detrimental to the well being of man. In fact numerically, rodents comprise the largest and most widely distributed order of mammals. The gravest single danger to stored food is from rodents. Besides destroying food-grains, rodents also play havoc with forest growth, grass and fodder crops and soil conservation efforts.

Most of the earlier studies of the rodents are related to their typical behaviour and social organization. Moreover, the work done so far was concerned mainly with the problem of the spread of diseases and destruction of food.

For devising efficient control measures against any pest, the knowledge of its reproductive activity is necessary. Rats are found in almost every part of the world, except the Antarctic and some islands of polar region. The possibilities of controlling the agricultural pests depends on their fertility and breeding habits. As such, knowledge of their reproductive biology is likely to be of great value to the human beings.

The aim of this investigation has been to develop a panoramic view of the female reproductive changes in the
rat *Rattus rattus rufescens* (Gray). The observation has uncovered several gaps in our knowledge of the reproduction of the female rat. The work included in this thesis is divided into eight chapters. The summary and conclusions of investigations for each chapter are given below:

**Chapter I**

General notes on reproduction in the rat *Rattus rattus rufescens* (Gray)

The rat is mainly polyoestrous all the year and litter are invariably few in summer.

The parturition usually occurs in 6 p.m. to midnight least frequently in the afternoon. It takes 25 to 90 minutes. The rats usually devour extravasated placentae after parturition. A mean litter size is 5.93±0.82, with primary sex ratio at birth being 44.64±10.07 per cent male. The average weight of the neonate is about 2.571±0.8283 grams. The values of calculated and actual observations on litter size and their weight show linear co-relation. The value of constant K is 0.3250 ± 0.1508 and that of C value computed is 2.955±0.02676.

The reproductive activity shows seasonal variations. Percentage of occurrence of pregnant female of species was
low at certain months of the year. More pregnant females of *Rattus rattus rufescens* were observed during monsoon months.

The lactating females also show seasonal variations. They were reported in all months of the year with distinct peak during monsoon.

The oestrous rat in collections were observed during all months. The percentage of oestrous female in collection varied from 5 to 20 per cent during different months of the year.

Chapter II

Vaginal changes in the rat *Rattus rattus rufescens* (Gray)

A. The oestrous cycle.

The oestrous cycle in *Rattus rattus rufescens* as revealed by daily vaginal smear examination was evaluated. The characteristic cell types and sequence of their occurrence are analogous to those described in laboratory rats and mice. The length of the cycle ranges from 5 to 9 days with mode of 7 days and mean length during 7.5±0.31 days.
B. Vaginal changes during reproduction

During oestrous cycle the vaginal smear shows the following striking features as proestrous, oestrous, metoestrous and dioestrous.

During gestation the pregnant vagina of the rat may be divided into 1) early gestational changes and 2) late gestational changes. The proliferation of epithelial cells and mucification of epithelial cells occur during early gestational changes. It is maintained mucification and an increased vascularization of the vaginal wall in late gestational changes.

Chapter-III

Gestational changes in the rat Rattus rattus rufescens (Gray)

During development of the rat Rattus rattus rufescens following stages are observed: 1) Differentiation of egg cylinder. The egg cylinder enlarges and will soon be divided into embryonic and extraembryonic areas. The trophoblastic and uterine reaction are described. 2) Neural plate is clearly determined. 3) Placental
disposition and structure is described. The location of chorical allantoic placenta in relation to morphology of the uterus is mesometrial. It is deciduous and discoidal. Histologically it is classified as haemochorial type.

The biochemical estimation of carbohydrates, proteins, amino acids and fats were undertaken during gestation.

Chapter - IV

Histological changes in the ovary of the rat Rattus rattus rufescens during gestation

The corpus luteum of ovary of newly implanted blastocyst of female rat is observed to be $729 \pm 1.5 \mu$ which gradually increases during gestation to maximum $1620 \pm 2.57 \mu$ at full term.

Follicles and ovum increased in average size from $36.7 \pm 1.65 \mu$ to $56.0 \pm 0.93 \mu$ respectively during gestation which indicates production of follicles at intervals in the pregnant rat.

Chapter - V

Changes in the ovary during lactation in the rat Rattus rattus rufescens (Gray)

The average size of corpora lutea of full term
measures 1620 ± 2.67 μ, while average size of corpora lutea up to 48 hours 1313 ± 14.83. Significant changes occur in the ovary of lactating rat at 48 hours, 15 and 17th day after parturition. A slight, but definite increase in size of vascular follicles suggests the release of higher level of gonadotrophins. The first post-partum oestrus occurs at 48 hours after parturition. The second oestrus observed on 15th and 17th day after parturition.

Chapter VI

Biological rhythm in rat birth in Rattus rattus rufescens (Gray)

Cyclic variation is innate in biological creation. e.g. diurnal rhythm of temperature variation, excretion from mammalian body ACTH etc. Similar periodicity was observed in relation to time of birth, in relation to hours greater incidence was observed between 6 p.m. to 12 midnight in relation to phase of the moon, full moon and new moon, as also different months of the year, as more percentage was observed in the latter half of the year with peak increase in August. Biochemical variations are also observed. How the geophysical variation interact with general factors and modifies each other are worth more serious study.
Chapter - VII

Changes during lactation in the rat
_Rattus rattus rufescens_ (Gray)

The analysis of variance revealed highly significant differences in weight that may be related to the time, period after parturition. Rapid decline in weight of genitalia occurred from zero hour to 48 hours of lactation. There was then relatively slight change in weight remainder of lactating period.

At parturition the vagina was lined with highly mucified zone of cells. As lactation continued mucification of vagina increased until at oestrous and it resembled the vagina immediately after parturition. The vaginal picture indicates that enough oestrogen is present to cause mucification through interaction with progesterone. This is further revealed by vaginal histology that occurred in half of the lactation period of the rat at 15th and 17th day, suggests oestrogenic activity.

Chapter - VIII

Biochemical changes during lactation in the rat _Rattus rattus rufescens_ (Gray)

The knowledge of the biochemical composition of
the uterine tissue of lactating rat will provide means for understanding maternal uterine tissue composition and its relationship with functional status of organ during lactation phase of reproduction. Biochemical estimations were carried out for the uterus during lactation. Estimation of tissue glycogen, protein, fat, water and ash were carried out. The estimation of trace elements such as sodium, potassium and calcium were also undertaken. The tissue water content is slightly higher during early lactation period with slight increase at 48 hours, 15th and 17th day after parturition, which coincide with the post-partum oestrous. During lactation period of reproduction the biochemical composition variation in the uterine tissue can be considered as the net requirement of the mother for lactating uterine physiological activity.