Since the origin of mankind, the major thrust derives through its natural instincts has been on the search for food for existence. Thus, the biggest challenge was to create and sustain the ability to manipulate the nature to provide a continuous supply of food. Animal resources still continue to play an important role to provide food, employment and income to millions of rural population particularly to landless, marginal and small farmers in India.

Presently, about 26 percent of country’s GDP is derived from agriculture of which about 9 percent comes from animal husbandry. Small ruminant sectors play an important role in the national economy. This enterprise is associated with social and cultural fabrics of millions of resource poor farmers. Goat is one of the earliest discovery of mankind in prehistoric times as ready and easy source of meat and gain importance mainly on account of their short generation intervals, higher rate of prolificacy and the ease with which they can be marketed (Sharma and Kumar, 2004). Goats are well documented as a potential genetic resources for meat, milk, fibre and skin throughout the tropical and developing countries (Hussain et al., 1996).

The goat is a versatile animal and is very important species of livestock in India for 40% landless farmers below the poverty line. This species can survive under extreme agro-climatic conditions especially in harsh and hot regions where vegetation is sparse and with the exception of camel no other species is likely to survive. Therefore, goat keeping is a sort of insurance against effects of draught, famine, disasters and other natural calamities. It has advantage over large animals on account of their short generation intervals and their ability to grow at a faster rate with low input concomitantly with economical production of milk, meat, skin, fibre and a number of by-products. Moreover, Goats can be kept with little expense. Marginal and undulating lands unsuitable for other type of livestock, may be used and any inexpensive shelter will suffice. People belonging to poorest section of the community are mainly attracted in rearing of goat due to its small size and prolificacy, adaptability, temperament, behavior and high resistance to the disease. Besides this, readily available market for the disposal of milk, meat and hide.
is also most significant factors for the attraction Therefore, goat is frequently referred to as “Poor man’s cow” (Tiwari, 2004) in India and as “wet nurse” of infants in Europe.

Among the ruminants, goat is prized for its subsistence only on roughages containing high percentage of cellulose. This species thrive in general meet their requirements through grazing and browsing. Goat milk is cheap, wholesome, easily digestible and nutritious. It is recommended for use in dyspepsia, peptic ulcer and pyloric stenosis, and is preferred than cow milk in liver dysfunction, jaundice, biliary disorders, acidosis and insomnia.

Rearing of goat in India is an important source of income to small farmers, landless peasants and agricultural labourers. In light of the significant contribution of food, fiber and associated products of goats and the vital niche, its products fills particularly in underdeveloped / developing countries. Relatively sporadic efforts have been made to study various facts of goat production in general and reproduction in particular.

Breed

The goat belongs to the mammalian order Artiodactyla, sub-order Ruminantia, family Bovidae and either of the genera Capra or Hemitragus.

The importance of goat in agrarian country can be judged from its number. India posses 105 million goat out of 520 million goats available in the world.

There is large genetic variability in goats. There are 102 descript breeds and a large number of less descript or less known breeds. Of these half of the recognized breed remaining in Asia, India having 20, Pakistan 25, China 25 types of breeds of goat. However, about 75% of goat is non-descript due to indiscriminate breeding and intermixing of flocks. The development and the research efforts for improving goat production have been serously lacking (Acharya, 1992). India has contributed superior goat ‘germ plasm’ for improvement of goats in South Asia and South East Asia. Unfortunately some of these are fast declining in numbers (Banerjee, 1998).

Population

The tropical developing countnes contribute 94.5% goat population while the developed countries contributes 5.5% goat population. The statistics of total goat population in the world is 790 million (FAO, 2005).

Goat population in India has increased as a faster rate than the other species of farm animals. In 1952, there were 47.0 million goats which become 117.0 million in 1993.
FAO, 1994), giving an overall rise of 148.9%. Annual growth rate in goat is 3.72% even through 87.0 million goat skin was recovered from slaughtered as well as from fallen animals (1990-1991). India, with a goat population of 120.6 million heads (FAO, 1997) stands first among the countries of world. In India, the goat population is about 126 million which is 23% of total animal population in the country (Tiwari, 2004). India registers about 20% (117 million) of total goat population of the world, majority to which are non-descript (FAO, 1994). The importance of goat rearing in India can be gauged by an increase in goat population @ 3.39% per year (FAO, 1990).

In comparison to other species of livestock the average growth rate of goat in India is very high about 3.5% per year (FAO, 1990) in spite of heavy rate of slaughter its extensive use as meat animal.

**Geographical distribution of goats**

The wide distribution of goats in the tropics and sub-tropics reflects their ability to adapt to a variety of environment. However, the preferred environment is on the lighter sandy soils in the drier tropics, rather than in the wet humid tropics. They performed best in the dry tropics and thrived in large numbers. The inherent characteristics of goats such as resistance to dehydration, for browse and wide ranging feeding habit, enable them to thrive in regions that receive less than 750 mm of rainfall.

In tropical Africa and Americas goats are found in largest numbers in the drier steppe and savanna regions. In India, approximately 47 percent of all goats are found in the rather dry states of Rajasthan, Bihar, Uttar Pradesh and Madhya Pradesh. The dwarf goat, unlike other species, thrives throughout the humid tropics and must be specially adapted to humid environments.

Goats are found in most part of the world except the Polar Regions and are suited to farm on rough mountainous terrains as well as planes. Goat keeping is related to living standard to human population and most of the goats are found in third world (Alojaili, 1995).

The Black Bengal goat is highly prolific meat producing breed in India. Goats is the most prolific breed of ruminants under tropical and subtropical condition with average litter size of 1.5 or more because of higher twinning rates. The tropical and quadruplets are also frequent. Goats in India subcontinent are reported to be seasonal breeders and this seasonality is primarily governed by photoperiodicity (Moulik and Systard, 1970).
Production

The Black Bengal varieties of goats are very popular for their excellent quality of meat and skin not only in India but also in abroad. India earns a significant amount of foreign exchange through the disposal of meat and skin of goats. Moreover, the Black Bengal goats are well known for their prolificacy, twin birth, early sexual maturity, short kidding interval and high ovulation rate. They can be bred throughout the year and exhibit high reproductive efficiency than exotic breed of goats. The only drawback or discouraging feature of Black Bengal goat is very low milk producing trait.

The goat treated as a most valuable species to the human beings especially for its high quality of milk as well as meat which have secured an important place in the human diet. Goat fulfills about 75 percent of total meat requirement in India (Upase et al., 1982). The goat is also known as “running dairy” as it can be milked as per requirement. It’s milk is valuable since it resembles human milk more closely than the cow and buffaloes milk. It plays major role in nutrition of the pregnant mother, infants, invalids and convalescents owing to less allergic problems and easily digestible property. The goat milk is easily digestible as it contains small fat globules having short chain fatty acids and can fed to the infant, as a substitute of human milk. In Switzerland, the milch goat is said to be the Swiss baby’s foster mother (Singh and Moore, 1982)

India Agriculture economy is delicately based on the significant contribution from goats to the tune of about Rs 2000 crore per year through production of 1345 thousand metric tones of milk, 345 thousand metric tones of meat, 76 thousand metric tones of milk and 50 metric tones of pashmina. About 390 thousand metric tones of quality manure are introduce by the goats. Goat meat (chevon) and milk production in India registered an increase of 50.99 and 129.40% respectively between 1979-81 to 1992 and skin production during the corresponding period increased by 45.68%

The estimated value of different types of produce (0.48 million tones meat, 1.648 million tones of milk, 0.085 million tones of pashmina, 0.019 million kg. of skin and 390 thousand metric tones of manure) from goat is about Rs 2612.00 million per year. Besides, it also generates about 4.2% rural employment per year as nearly 15 millions families of poor and weaker sections of society are keeping goats (Annual report 2001-2002, CIRG, Makhdoom).

Goat is the principal meat producing animal in India. Goat annually contributes 410 thousand metric tones of meat amounting 35% of total meat production in country. On an
average each goat contributes 10 53 kg mutton Pashmina production ranges from 100 to 450 gm per goat. The annual production of Pashmina is more than 80 metric tones. Goat contributes 1500 thousand metric tones milk contributing 2.9% in the total milk production of the country. Goat industry contributes 101 thousand metric tones of skin annually (Amle and Mhase, 2001).

The knowledge of blood norms is important in diagnosis of reproductive failure / disorder in domestic animals (Vaidya et al., 1970) as well as to elucidate many physiopathological mechanisms.

The importance of establishing the mineral constituents of blood from different species of farm animals, at different stages of growth, at different seasons of the year and for different breeds of species, have been found to have an immense significance in diagnosing various pathological and metabolic disorders. The status of micro and macro-mineral elements varies with the growth and other physiological conditions of the animal (Prasad et al., 1979). Serum copper level acts as an indicator of pituitary gonadotropins and gonadal steroid levels (Desai et al., 1978). The administration of oestradiol or testosterone in rats (Sato and Henkin, 1973) increased copper level.

For efficient and profitable livestock production adequate mineral supplementation is very much essential. This can be done after knowing the exact level of deficiency and / or excess of minerals of the species concerned by estimating serum mineral concentration (Kalita and Mahapatra, 1999). Minerals are not only participating as co-factor in activators of various enzymes in the carbohydrate energy metabolism, but also associated with normal reproduction behavior in domestic animal. Low level circulatory minerals result in impaired reproductive functions leading to cessation of cyclic activity (Martson et al, 1972).

Efficient reproduction is a prime criteria for the prosperity of livestock industry and reproduction is closely associated with interaction of hormonal and nutritional status of the body. The effect of dietary trace materials on physiological functions in general and reproduction in particular (Hidiroglou, 1979) Goats like other farm animals require various nutrients for growth, maintenance, reproduction and production. Among them energy and protein are more important. Besides above, minerals and vitamins are equally essential for them to grow, reproduce and to produce (Goel, 1998).

Reproductive well being and performances of farm animals is largely depend on their nutritional status, which is often less than optimum in developing Tropical countries.
More often than not, they are malnourished particularly with regards to micro-nutrients (Tiwari, 2004)

Reproductive behavior of Indian goats varies considerably owing to large no of genetically distinct and well defined breeds inhabitating in diverse agro-ecological regions of country. It is also influenced by system of management, climate, tradition and socio-economic factor. Successful reproduction comprises of a number of discrete and largely independent process viz, occurrence of estrus and ovulation, conception, embryonic survival and survival of kids from kidding to weaning (Goel, 1997)

Reproductive efficiency in goats is determined by many different processes which results from interaction among genetic and environmental factors. The processes involved singly or in concert, include age of puberty/maturing, pattern of estrous cycle and oestrus behaviors, length of breeding season, ovulation rate, fertilization rate, embryofetal development and survival, length of gestation period, parturition, viability and growth of newborn, lactation, anoestrous period, interval to first post partum estrus, interkidding period, reproductive life span (Agrawal and Goel, 1991)

The information about growth, reproductive traits etc are available but little has been put together in a coordinated way with reference to some transaminase and phosphatase enzyme. It is important to evaluate the SGOT, SGPT, serum alkaline and acid phosphatase enzyme activity of goat and the relationship of these enzymes with different parameters of growth, pregnant, non pregnant, estrous cycle in different types of goats of Eastern and North Eastern India

There are various substances which regulate different physiological status of the animal. Among them enzymes are the most important biocatalysts which activate and enhance the velocity of many biochemical and physiological activities in the animal body and their produce. Serum glutamic oxaloacetic transaminase (SGOT) or Aspartate amino transferase (AST), Serum glutamic pyruvic transaminase (SGPT) or Alanine amino transferase (ALT), Alkaline phosphatase and Acid phosphatase enzymes is considered in the present study

The transfer of an amino group from an amino acid to a keto acid with subsequent formation of different amino acid and keto acid is known as transamination. Transaminase enzymes play an important role in kreb's cycle in glucogenesis. Except that it is reported that transaminase activity is intimately related with protein catabolism and subsequent
production of keto acids which can further be utilized for gluconeogenesis as well as energy requirement and heat production (Smith, 1962)

SGPT and SGOT are widely distributed in animal tissues. SGOT is present in hepatocytes but also found in significant amounts in many other tissues including erythrocytes, cardiac muscles, skeleton muscles, kidney, and pancreas. Considerable amount of SGOT is found in heat muscle especially of myocardium. SGOT is also known as heart specific enzyme. SGOT is also present in mitochondria of the cell.

The major source of SGPT is the hepatocyte for this reason, it is considered as liver specific enzyme. In horse, ruminant, and pigs, these is not enough SGPT in the hepatocyte of this enzyme to be considered liver specific. It is found in the cystol of the cell. Other sources of SGPT are renal cells, cordial muscles, skeleton muscle, and pancreas.

The total serum alkaline phosphatase activity is derived from liver, bone, kidney, placenta, and intestine. The liver and bone isoenzymes represent the greatest functions. Serum acid phosphatase activity is derived from lysosomes from cells in bone, prostate, platelets, erythrocytes, and spleen.

Alkaline and acid phosphatase catalyse the hydrolysis of a number of phosphorylated organic compounds, thus may provide energy in the form of phosphates. Alkaline phosphatase helps in the mineralization of bone by providing inorganic phosphorus in the uphill transport of calcium to the matrix vesicle in the removal of inhibitors of calcification whereas acid phosphatase helps in resorption of bone. Both these enzymes help in the metabolism, active transport, production, and thermoregulation also.

Alkaline phosphatase and acid phosphatase are known to play a vital role in growth through osteoblastic and oesteoclastic activity which helps in bone formation. Both the phosphatase enzyme have a role in certain events of reproductive physiology (Murdoch, 1971).

Higher basal metabolic rate, reflecting higher thyroid activity gives a positive association with alkaline phosphatase (Ghosh et al., 1974). Both the phosphatase reflects thyroid activity. Oestrogen and progesterone may have some effects on their level in the serum. (Jindal et al., 1988). Any disorder on interruption in the enzyme system may cause a metabolic imbalance resulting into disturbance in their produce but in different normal physiological conditions, the level of transaminase and phosphatase enzymes may
increase or decrease than the normal. At the time of growth, pregnant, non pregnant and 
estrous cycle the level of these enzymes will alter

In Eastern India and particularly in West Bengal, the Black Bengal variety of goats holds on enormous economic importance on the rural masses however more informations are yet to be available / required on the reproductive behaviour of the breed for successful goat production especially for economic farming

As most of the India goat breeds have relatively low production potential as compared to exotic breeds, there is tremendous scope for future exploitation of genetic potential besides conservation vis-à-vis there role in poverty alleviation, protection of environment and sustainable development (Goel, 1998)

With a view to these facts as stated, present project aimed to study the following reproductive performances behaviour and extent of reproductive failure in Black Bengal goat maintained on free range system

1 Study of the growth in Black Bengal kid up to puberty in accordance with type of birth, season of birth and sex
2 Study of puberty and first kidding- age and body weight at puberty, age and body weight at first kidding
3 Study of estrus length of estrous cycle, duration of estrus period, and season of estrus
4 Study of gestation period and service period
5 Study of conception rate, birth pattern, sex ratio, kidding rate and still birth
6 Study of abnormal kidding due to abortion and still birth
7 Estimation of Haemoglobin (Hb), Packed cell volume (PCV), Total erythrocytic count (TEC), Total leucocytic count (TLC)
8 Estimation of serum micro minerals- Calcium (Ca), Magnesium (Mg), Phosphorus (P)
9 Estimation of serum micro and trace minerals Copper (Cu), Iron (Fe), Zinc (Zn) and Manganese (Mn)
10 Estimation of Alkaline phosphatase, Acid phosphatase, SGOT and SGPT