CHAPTER I

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India ranks the first among the countries of the world in goat population. The goat is the principal meat animal in the country contributing approximately 35 per cent of the total meat production from livestock except poultry. It contributes 2.7 per cent of the total milk production which is the principal source of protective food for the economically backward classes. The current meat production from goat is around 255 million kg, the milk production is around 570 million kg and the goats' skin production is around 34.9 million pieces. In addition, goat contributes about 60,000 kg of pashmina, 34 million quintal of mohair, casings and offals, etc. The total contribution of goat to the gross national product would be about rupees 350 crores. Further the export of goat skin earns valuable foreign exchange.

The exploding human population and the resulting socio and agro-economic situations are pressing hard on the direct use of land not only in India but also in several other countries of the world. The use of land for raising livestock is being gradually eliminated and the rearing of larger animals like cattle and buffaloes is becoming more and more difficult day by day. Smaller animals like goats, which have no specific and exacting demands, offer a befitting economy to such situations for providing milk and meat to the traditional poorly balanced diets (Singh and Sengar, 1970).
Despite the fact that goat is undoubtedly the first ruminant to have been domesticated by man, it is also the most neglected one by agriculturists, veterinarians and nutrition experts. Many misconceptions have been perpetuated regarding their nutritional requirements. Most people believe that goats can thrive on any feed not good enough for cattle and sheep but contrary to belief, goats have fastidious eating habits then it is necessary that considerable care in feeding is required if goats are to produce large quantities of milk or are to grow quickly and yield high quality meat. In addition to hay or pasture the concentrate supplements are also required for sustained lactation by milking goats and growing and fattening kids.

The Government of India has planned a massive programme to eradicate rural poverty. Goat keeping is one of the ways which can provide remunerative opportunities to rural life especially in tribal and hilly areas and help raise productivity and it can also provide the easily available sources of animal protein to the vast population of economically backward class suffering from malnutrition.

Keeping these aspects in view, Indian Council of Agricultural Research had launched an All India Co-ordinated Project on Goat Breeding to improve the production performance of Indian goat during the 4th Five Year Plan. Further in 5th Five Year Plan this project has been strengthened.

Nutritional aspects play an important role in the economy of goat production. It is an admitted fact that regardless of the
great genetic capabilities, the animals cannot produce what they are capable of on an inadequate ration. To get more milk and meat from goats, balanced efforts in all directions of goat rearing are, therefore, the felt need of the day and the major nutritional factors viz., energy and protein, have to play a major role in determining their productivity. Efforts have, therefore, to be oriented to their scientific feeding, leading to efficient utilization of feed nutrients and ultimately harvesting more quantity of better quality milk and meat from them.

As a result of the dramatic global change in the price structure of raw materials for animal feeds during the past years, the primary task before the nutritionist has been one of devising means by which they can reduce the dependance on those high quality raw materials which have been taken for granted over the past few decades. We are once again searching for newer sources of proteins and also for industrial or agricultural fibrous by-products which have been largely ignored in the past.

In view of limited availability of protein rich concentrates and restricted scope of increasing the production of leguminous fodders, every effort has to be made to utilise non-specific sources for filling up the protein gap in the ration of our ruminants.

An ancient but still economically attractive method makes use of ruminants which can convert poor quality protein and NPN to high quality protein for human food. This feature, which is unique to ruminants among the food producing animals has prompted much
optimistic speculation about the addition of NPN to protein deficient forages and fibrous trash to produce meat and milk.

Theoretical considerations suggest that large potential exists for the use of urea in animal feeds. Urea is much cheaper than the natural proteins which are the most expensive constituents of natural foodstuffs. Urea has assumed importance for ruminants as a result of reports from Bartlett and Cotton (1938), Reid (1953), Belasco (1956), Colovos et al. (1963), Virtanen (1966), Helmer et al. (1970), Helmer and Bartley (1972).

Biuret, a derivative of urea has been shown to be a nutritionally suitable and safe source of nitrogen for ruminants. The slow enzymatic hydrolysis of biuret in rumen retards \( \text{NH}_3 \) production. This is cited as the primary reason that biuret is readily consumed by animals at high levels. Biuret, in contrast to urea, is safely fed with low quality roughage found in large areas of the world, since ammonia from the biuret is released at a slower rate in the rumen.

It is well established that for the utilization of NPN, it must pass through the ruminal ammonia pool and become incorporated into the rumen microbial biomass (Chalupa, 1973). Thus NPN utilization is a function of the basic mechanism involved in the production and utilization of ammonia by rumen microbes.

Hydrolysis of NPN is mediated by enzyme action and the rate as well as magnitude of ammonia release depends upon the presence
and activity of proper enzymic system. Urease is a constitutive enzyme and is, therefore, probably present in many bacteria. This is in contrast to biuretase that must be induced in a few hours whereas adaptation periods are required before biuret is efficiently utilized.

Conflicting reports on its usefulness have appeared but according to Schaadt et al., (1966) this variability may have arisen from a comparison of results obtained from in vitro experiments with those from in vivo work. Hatfield et al., (1959) have shown that growth, reproduction and wool production were not adversely affected when sheep were fed diets containing either biuret or urea in amounts equal to 75 per cent of the daily nitrogen intake for 593 days. Results of South African studies using biuret as a source of NPN have been encouraging (Clark et al., 1963, 1965; MacKenzie and Altona, 1964 a,b) and one manufacturing plant was built in South Africa and one in America where DDW Chemical Company produces biuret with the name of Kedlar for use in livestock feed.

In the present study efforts have been made to elucidate the comparison of widely accepted NPN sources i.e. urea and biuret as the protein substitutes for the various aspects of goat nutrition. The present work was, therefore, undertaken with the following objectives:

1. To study the adaptability and metabolism of biuret in goats,
2. To compare the effect of urea and biuret feeding on nutrient utilization and growth of kids, and

3. To study the effect of urea and biuret feeding on the quantity and quality of milk production in goats.

The primary emphasis of this study is to provide information about the adaptation and metabolism of biuret so that it can be used effectively and economically for various aspects of production in comparison to urea, for ruminants. Being smaller in size, goats are easy to handle and it is less expensive to conduct the experiment on this species. The encouraging results of this study could also be applied in the cattle feeding programme in the country.