The major concern in the country for sometime has been to meet the primary need, the food. The minimum nutritional requirement of an adult per day is estimated at 60 g of protein and 2000 Kcal of energy. The part played by the animals as food for mankind has to be reviewed from their ability to provide meat and milk for vast population. Through the concerted efforts of farmers and scientists, India has achieved the self-sufficiency in cereals production. However, the deficit in 'protective foods' for human is still enormous. The country is looking forward to boost up milk production by proper planning so as to achieve the 'white revolution'. The goal is being sought through a nation-wide cross-breeding policy in cattle, selective breeding in buffaloes and vigorous programme of forage production and conservation.

The country today is producing about 22 million tonnes of milk, out of which buffalo milk contributes to more than fifty per cent of the total production. Due to this fact the buffalo (Bos bubalis) is the backbone of the dairy industry in India and it has to play an important role as a milk producing animal in times to come till the cross-bred cows replace them.

The buffalo has also come to occupy an important place as a milch animal in certain other developing countries of the world. The recent beef shortages and fall in milk surplus in the Western countries
have brought about a new interest in buffalo, the milk and meat potential of which remained untapped due to sheer neglect. Excepting India and Pakistan, the buffalo is primarily a work animal in the paddy fields.

The Animal Husbandry Commission of the United Nations Food and Agriculture Organisation (FAO) in its recent surveys has recognized the tremendous potential of the buffalo in South East Asian countries and is planning to set up a special project for its development.

In any buffalo development programme, India will have a major role as it has some of the finest breeds and the largest number of animals in comparison to other 37 countries having buffaloes. Like in Pakistan, Brazil, Thailand, Phillipines, Nepal and U.A.R. the milch buffalo is almost as important as the cow in Indian dairying, as it accounts for some 60 per cent of milk solids produced in the country (NDDB, 1974).

Indian buffalo, on an average, produces about 500 kg milk in one lactation as compared to less than 200 kg produced by an average Indian cow. Whereas, on established farms a Murrah buffalo produces 1360 to 2270 kg during its 9-10 months of lactation while the same may yield 4500 kg or more in one lactation (Phillips, 1949). Buffalo milk finds wide acceptance with dairymen who go for ghee manufacture, clarified butter and toning of milk as buffalo milk is richer in fat (6-7%) and total solids (16-17%) than cow milk (4-5% fat and 13-14% total solids).
The buffalo is the animal which thrives well under Indian climate (hot and humid). The milk potential of buffalo has tempted the small India farmers to adopt buffalo as milch animal and cattle as draught animal. This diversion on the attitude of farmers has definitely encouraged the growth of this species. India has now become the concentrated centre of good number of buffaloes. The buffalo population of India is 54.5 million which is nearly half of the world population. Well defined Indian breeds like Murrah, Surti, Jaffarabadi, Nilli and Nagpuri have been widely used for buffalo development elsewhere in the world (Sundaresan, 1974).

The buffalo also finds favour with Indian farmers and milk producers for various other reasons. In addition to its adaptability to Indian climate, milk potential and richness of milk, this animal can thrive well on coarse roughages and other agro-industrial bye-products than the Indian cattle. This trait has made this animal most likeable to Indian farmer who has limited land resources.

The country today has an estimated 228 million heads of cattle and buffaloes and 106 million sheep and goats. These animals compete for food along with 600 million human beings on the 305 million hectares of land available for cultivation, 139 million hectares are under crops, 54 million hectares of land is under pastures, grazing land, fallow and waste. The major part of the animal industry gets food resources from these 54 million hectares and from bye-products of the cultivated 139 million hectares except in some tracts of the country, like Punjab, Haryana and parts of Andhra Pradesh where cultivated land is available
for animal feeding (Sundaresan, 1974). In general, the level of nutrition for milch animals is poor. It is estimated that Indian milch animals receive about 70 per cent of the roughages and 30 per cent of concentrates which they would need to express their full milk production potential. The milk production is, therefore, a matter of bye-product conversion mainly.

Scientific information leading to systematic feeding of this class of animal is very scanty. At present, Sen and Ray (1961) standards are used for feeding the milch buffalo at organised farms, which are not meant for this category of animals. The Morrison's feeding standard (and also the standards recommended by National Research Council, Washington, 1966) are based primarily upon the early dairy cattle feeding trials of Haecker (1903, 1914). In Morrison's feeding standards two values are given for crude protein requirements for milk production -- the lower being Haecker's (loc. cit) and the higher from Savage's (1912). Similarly, two values are also given for total digestible nutrients. In early feeding standards, digestible proteins, fats and carbohydrates were added together to give 'total digestible nutrients' (TDN). Later on, the current practice of multiplying fat by 2.25 was introduced from the consideration of physiological fuel value of Atwater which gives to fats two and one quarter times the energy value of either carbohydrates or protein, whereas no consideration has been given to the high calorific value for digestible protein (as compared to carbohydrates), considering the energy losses through urea in urine. Thus the term total digestible nutrients represents neither digestible nor metabolizable energy (Maynard, 1953).
The total digestible nutrient system is commonly in use in North and South America. Another feeding system most commonly in use in Great Britain and other European countries expresses energy requirements as starch equivalent (SE) and protein as protein equivalent (PE) (Woodman, 1938; Evans, 1960). The 14th edition of Bulletin No. 48 (Woodman, 1957) gives requirements as digestible protein (DP). The starch equivalent system was evolved by Kellner (1926) which is based on net energy for fat production in mature bullocks. The Scandinavian Feed Unit system followed in Scandinavian countries and USSR is also based on net energy system and is now closely related to the starch equivalent system (Greenhalgh, 1969).

The present feeding standards followed are based on the work on cattle and that too in temperate countries. Therefore, the same feeding standards may not hold good for tropical zone and again on buffaloes which probably may have different nutritional and physiological behaviour. For instance the buffaloes can utilize the coarse feeds as its staple diet in a better way than cow (Smith, 1927; Kartha, 1934 and Dastur, 1956). The better utilization may be due to the slower rumen movements than cattle (Bhattacharya and Mullick, 1965) and thereby more time for complete digestion. The digestibility of cellulose and crude fibre have been found higher in buffaloes than cows (Ichhponani et al., 1962 and Singh and Mudgal, 1967). Saini (1964) found that Murrah bulls can utilize ether extract better than Tharparkar bulls. The heat production per hour of Hariana, crossbred cattle and buffaloes was 386 ± 37, 394 ± 37 and 485 ± 31 calories per hour, respectively (Mullick and Kehar, 1952). Associated with microbial
activity it has been shown that acetic acid produced in buffaloes is much higher than the cow which may be associated along with other biochemical constituents for higher fat content in buffalo milk (Ray and Mudgal, 1962). Further more buffalo milk contains higher fat, protein and total solids than the cow milk.

Observing the above facts, the present study has been taken up to evolve the suitable economic rations for buffaloes with two main objectives.

1. To study the nutritional requirements for maintenance and milk production.

2. To study the effect of different levels of protein and energy on the quality and quantity of milk secreted.

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