INTRODUCTION
INTRODUCTION

Higher demand for protein nourishment of the increasingly fast growing world population is partially met by supply of legume and coarse grains and partly accomplished by the produces of livestock sector. The foods of animal origin, viz. milk, meat and egg, have higher biological value and are said to play a major role in meeting the protein demand (McDonald et al., 1977). It has been realized that ruminants such as cattle and sheep and nonruminants such as rabbit, pig and poultry which convert fibrous agricultural by-products and waste into nutritiously rich food will be more beneficial and acceptable if these animals are reared under economically viable feeding system using the available land for grazing and fodder production (Cheeke, 1987).

Unfortunately the scope to increase fodder production is limited due to pressure of land use for human settlement, urbanization and development of industries. At present, availability of dry fodder is said to be 38% less than the actual requirement (Acharya, 1986). Alternate methods to overcome the current feed shortage are use of unconventional feed ingredient, evolving superior breed, selecting small-sized meat animal which require less feed, increasing feed conversion efficiency and improving the nutritive value of poor quality feed and by-products (Vietmeyer, 1985; Gupta, 1986; Punj, 1991).
In animal husbandry, major portion of maintenance expenditure goes in livestock feed management which includes production, procurement and supply of coarse grain and dry fodder. It is in fact a crucial issue in livestock development system. Although efforts are being made to increase coarse grain production, the feed cost always remained high due to socio-economic factors such as competition between men and animals for food and huge marginal-income group population present in the developing countries. Therefore, the scope for rearing livestock as a viable enterprise remained partially uncertain.

It is now known that agro-industrial wastes which are generated in large quantity and often held responsible for causing environmental nuisances, can be better utilized as animal ration after enrichment through appropriate technology. Several physical, chemical and biological methods have been evolved (Sundstol et al., 1978; Rangnekar et al., 1982; Kundu and Chawla, 1986 and Cheeke, 1987), to improve the nutritive value of lignocellulosic agro-by-products and waste. Unfortunately most of these methods are not practiced due to lack of adaptability of technology. Therefore it was found essential that better alternate and appropriate techniques are developed to sustain the precious livestock farming particularly the nonruminants.
Considerable amount of solar energy is locked up in plants in the form of lignocellulose fibre (Janshekar and Flechter, 1983). These structural carbohydrates constitute the major source of food energy for livestock. However, due to lack of appropriate hydrolytic enzymes in the intestinal tract of animals, the digestibility of fibre is limited. Only 50% of the fibrous feed is generally utilized by the animals and the remaining is voided off as waste (Gupta, 1986). Enzymes known to break down lignocellulose complexes are produced by a number of micro-organisms and several of which are functional in the intestinal tract of ruminants and nonruminants (Gulati, 1991).

Biological conversion of agricultural by-products and waste into animal feed is attempted by several workers (Chahal, 1982; Langar et al., 1989; Zakia Bano and Rajarathnam, 1988; Walli et al., 1991; Gulati, 1991; Chaudhary et al., 1994). Bacteria, fungi and yeast are known to increase the nutritive value of agro-waste and by-products through bioconversion and/or enrichment process (Kiran Singh, 1991; Krishnamoorthy et al., 1996; Rangaswami and Bagyaraj, 1996). Use of filamentous fungi in fermentation of food for human consumption is known to have traditionally practiced in Asia Pacific and East Asian countries for several centuries (Kendrick, 1993; Subramanian, 1995).

Filamentous fungi play an important role in the biodegradation of agro-wastes (Chahal et al., 1979). The complex lignocellulosic substances are
broken down into simpler structures through microbial degradation and thereby the utility of fibrous waste are said to have enhanced (Chahal, 1982; Cheeke, 1987).

Considering various constraints faced in maintaining large-sized animals by marginal farmers in rural sector, it was emphasized in the recent years that the rearing of small animals such as rabbit and poultry which require less housing space, feed and labour is more economical and realistic (Cheeke, 1987).

Rabbit, guinea-pig, poultry and Japanese quail are some of the non-conventional source of meat being popularized in recent times. Rabbit meat is consumed predominantly in Italy, Canada and France. Developing countries such as India, China, Thailand and Philippines in south east Asia and countries in Africa have also commenced rearing rabbit for meat (Cheeke, 1987; Sundaram and Bhattacharya, 1992).

In India, from the point of meat production, rabbit farming was first commenced in 1976 at the Central Sheep and Wool Research Institute, Avikanagar, Rajasthan. Four well known exotic breeds of meat-rabbit, viz. Soviet Chinchilla, New Zealand White, Gray Giant and White Giant, were experimented. The growth performance and suitability of these to Indian agro-
climatic conditions have been investigated and the Soviet Chinchilla variety was found to be suitable especially to coastal environment (Sundaram and Bhattacharyya, 1991). Data on its production performance and economics are being gathered and further analyzed from different parts of the country. It is realized in this context that development of low-cost and suitable feeding and management practices applicable for local climatic condition will greatly enhance meat production in the country.

In the present work, fungal biodegradation of three locally available agricultural by-products and waste, viz. coconut coir-dust, cashew fruit-apple and karad grass, has been worked with an aim to formulate a low-cost, economically viable and enriched feed for rabbit.

*The objectives of the present work were the following:*

1. To select locally available agricultural by-products as substitute for costly feed ingredients.
2. To identify suitable biodegradation technique for enrichment of fibrous wastes and by-products
3. To study changes in chemical composition of agro-wastes on treatment by fungi.
4. To evaluate suitability of the fungus-treated agro-by-products as rabbit feed through digestibility, feed intake and meat quality studies. And,
5. To suggest improved techniques for better utilization of by-products and wastes as animal feed.