INTRODUCTION

India has a wide range of agro-climatic diversity. The resources, constraints and technological advancement may differ from one region to other. Therefore research focused to specific region may be the appropriate option to address the issues related to the livestock farmers of that region. The study area, i.e. Bundelkhand region, covers 71,618 km² in the Central part of Northern India (Fig.1), crosses two states, 7 districts being in Uttar Pradesh (U.P.) and 6 in Madhya Pradesh (M.P.). Although it has no administrative function, the 12.45 million people (1991 census) who live in the region having a distinct cultural identity and speak their own dialect of Hindi. Bundelkhand is characterized by an undulating and rugged topography, limited underground water resources, high proportion of wasteland, high summer temperature, erratic rainfall in a short monsoon period and low fertile soil. Despite all these difficulties, 67% of the working population depend on agricultural activities for their income, cultivating food crops such as cereals, pulses and oil seeds and raising livestock, mainly cattle, buffaloes, goats and sheep. The low productivity of soils and the unreliable rains have encouraged the majority of population to keep animals as an
insurance against crop failure, a particular risk during drought years, occurring
normally once in four year. Animals provides milk for consumption and sale, dung for
fuel and manure and power for agricultural operations, they have additional benefits of
giving owner an increased status within the community and are often used to sale to
provide cash in emergency.

Fodder shortage exists across most part of the region. Negligible quantities of
fodder are cultivated in the area (only 1% of the land) and the animal fed on the crop
residues which constitute the main source of roughage but even this is far from enough
to meet the requirements. Such shortage means that the majority of farmers have little
option except to leave their animals for free grazing, mainly in forest areas, on
wastelands or the residues which left in the field after crops harvesting.

In year 1985 there were 5141456, 1490511, 1699874, 361833 cattle, buffalo,
goose and sheep respectively. Buffalo and goats were more in U.P. part while cattle
and sheep were more in M.P. part of the region. In 2001 the populations of cattle,
buffalo, goat and sheep have changed to 4327750, 1764373, 1837052 and 408269
respectively. In Bundelkhand there are only about 0.25% crossbred cattle. During
2001, it was found that the cattle population was more in Chhatarpur, Sagar, Lalitpur
and Hamirpur districts. The buffalo population was more in Banda, Jalaun and
Chhatarpur. The goat population is more in Chhatarpur, Banda, Hamirpur and Jhansi
district. The sheep population was more in Chhatarpur, Tikamgarh, Jhansi and
Hamirpur.
The recommended maximum animal density for the type of land found in the region, was 0.78 adult cattle unit/ha (Tyagi, 1997). Whereas huge number of animals existing in Bundelkhand (1.16 animals/ha). About 1% land is spared for cultivated fodder making the animals almost dependent on crop residues, which are in deficit. This compels farmers for free range grazing of forest areas, on wastelands or the residues, which remains in the field after harvesting crops. These figures clearly indicate that area is over grazed and consequence of this high animal pressure has led to widespread deforestation and grassland degradation in the region (Gomez et al. 1998). Few farmers having sufficient fodder supply, adopted managed feeding system (which includes stall feeding as well as rotational grazing).

In Bundelkhand, among 26 recognized breeds of cattle only Kenkatha breed is found. Others are non descriptive and there is small population of crossbreds, Haryana and Tharparkar breed. The home tract of Kenkatha breed is Ken basin around Banda district. The main reasons for its insecurity are crossbreeding with non-descript breeds, inbreeding and loss of natural grasslands. Kenkatha is good breed for draught purpose. Bhadawari breed of buffalo is found in Bundelkhand. However, Murrah is increasing in number along with other desi buffalo breed in Bundelkhand. Bhadawari is well known for its high fat percent(10-14) of their milk, but because of their low milk yield (600-1000 kg), they are being upgraded with Murrah. Among a total of 40 sheep breeds in India, Muzaffarnagari and Jalauni breed of sheep are found in Bundelkhand.
Mainly landless and small farmers rear goats. The local goat breed "Bundelkhandi" is popular in most of the villages, although in some villages crossbreed and Barberi goats are there. Goat farming is mainly practiced in villages away from cities. Most of the farmers sold their goats for meat. Farmers considered goat farming as less risk enterprise. There is traditional system of rearing. Goats graze on community land and degraded forest along with tree leaves browsing. The kidding seasons are October to December and April to May.

The housing system and management are not proper and do not provide conducive microclimate to exhibit the production efficiency. The protection from the adverse climate especially during dry summer is not adequate. The tropical stress management practices are not followed properly. The management of animals during heifer stage is very much ignored resulting in adult animal of poor potential.

The vegetation of grazinglands of Bundelkhand region comprising Vindhyan plateau and hilly tracts, propagate grasses such as Heteropogon sp., Themeda sp., Digitaria sp., Iseilema sp., Dichanthium sp., Sehima sp. etc.

Free grazing system or Anna Pratha, in which animals are let loose in the open harvested fields after the harvesting of Rabi crops allowed free grazing in summer and part of rainy season. Most of the animals remain underfed and this practice result in low livestock productivity in the region. Free range grazing system adversely affect the breed improvement programme because open free grazing herds are mainly covered by local bulls and produce undiscript and low producing off springs. Farmers kept their land fellow during Kharif in some part of the region and
Anna pratha is one of the reason for not growing crops in the Kharif. Comparison of free range grazing and managed feeding (in which controlled grazing and supplementary stall feeding is followed) may focus on problems and opportunities of both the system for farmers benefit and sustainable livestock production.

There are some reasons or conditions which force the free range grazing and stall-feeding in Bundelkhand. The villages have high proximity to forests, wastelands and fallow lands had a high proportion of free range grazing. The small holders and the landless, even in irrigated areas, practice free range grazing. In high cropping intensity villages, where crop residue production is more, there is stall feeding. Reverses is true for villages with low cropping intensity. Villages with access to the milk and fodder markets had a higher proportion of stall feeding than villages in remote and inaccessible areas. Easy access to milk markets, provided farmers with an incentive to keep high producing animals. This is so because of the large differences in land resource and fodder availability and thus differences in development potential.

There is huge livestock population in the region but its production has not exploiting the full potential. Free grazing system of animals, called Anna Pratha or Chhutta, is a major socio-economic constraint in the livestock development programme. From April onwards, thousands of animals are used to graze in forests and grazinglands and they remain there up to September for grazing. Most of the animals remain underfed and result in low productivity.

The information on feed resources of Bundelkhand region, seasonal availability and nutritional value of the feed, feeding pattern of livestock and possible
reasons for low productivity etc. are need to be analyzed. This information may be helpful to recommend the feed required to supplement for optimum livestock production. The comparative study of both free range grazing and managed feeding system may help to address the problems related to overgrazing and free range feeding and will highlight the prospects and constraints related to both the systems. The feeding management based on appropriate nutritional technology may be adopted by the farmers to sustain the production potential even by low producing animals.

Keeping above points in view this study has been undertaken with the following objectives:

1. To identify feed resources available in the region in different seasons and their nutritional value.

2. To study the feeding practices of the livestock in the region and their comparison with standard feeding (NRC/ICAR feeding standards)

3. To make a comparative analysis of free range grazing and managed feeding system.

4. To identify the constraints and opportunities for conversion of free range grazing to managed feeding system.

5. To make recommendations for the development of new need based technologies where existing technologies do not meet the requirements of the different zones farmer type in the Bundelkhand.