Materials and Methods

MATERIALS AND METHODS

Agricultural community living in rural India derive most of their income. The crop production mainly depends on the type of soil, irrigation facilities climatic conditions and financial resources. These conditions vary from place to place and influencing the agricultural as well as animal production of particular place or region. The large proportion of terraneous topography and varied climatic conditions have placed many limitations on the economic development of agricultural sector. Therefore, there is need to study the different agroclimatic zones of India in general and the Uttar Pradesh in particular. The state of Uttar Pradesh may be divided in to four agroclimatic zones namely Bhavar and Tarai, Western Uttar Pradesh, Eastern Uttar Pradesh and Bundelkhand region.

3.1 Description of Study Area

3.1.1 Geographic and demographic features

Jaunpur district is situated on the bank of Gomati river in the Eastern part of Uttar Pradesh. Geographically, the district is situated between latitude of 25° 18' N and altitudes 83° 01' E. The geographical area of the district is 4021 squire kilometers. In Jaunpur district, there are six Tehsils, 21 Community Development Blocks, 218 Gram Panchayats, 1517 Gram Sabhas and 3391 villages. The human population of the district during 1991 was 32,14,636. Total female population was 1602474 whereas, the total male population was

1612162. Of the total human population, 2993297 (93.1%) rural and 221339 (6.9%) were urban. Overall literacy rate of the district was 42.2 per cent, the male literacy was 62.2 per cent and female literacy was 22.4 per cent. The density of population was 800 per square kilometer. The overall growth rate of population was 26.9 per cent from 1981 to 1991. In the district there were 89.71 per cent Hindus, 9.74 per cent Muslims, 0.03 per cent Christians, 0.02 per cent Sikhs, 0.49 per cent Baudh and 0.01 per cent those persons who did not register their religion (Sankhyakiya Patrika, Janpad Jaunpur, 1999).

The net sown area, forest land, barren land suitable for agriculture, cultivable fallow land, other fallow land, land unsuitable for agriculture and the land of other use other than agriculture in the district during 1996-97 was 356544 hectares (79.84%), 43 hectares (0.0096%), 7272 hectares (1.63%), 21916 hectares (4.92%), 15002 hectares (3.36%), 6564 hectares (1.47%) and 39222 hectares (6.78%), respectively. During 1996-97 the total area under agriculture was 446563 hectares (Sankhyakiya Patrika, Janpad Jaunpur, 1999).

The main crops of the district were wheat, paddy, jowar, bajra, maize, urd, lentil, gram, pea, pigeon pea, moong, mustard, til, groundnut, sunflower, sugarcane, potato, tobacco, jute and sun hemp. Cultivation of vegetables and fruit crops was also the occupation of some people in the district. Out of total cultivated area, 76.3 per cent were irrigated during 1997-98.

There were 34 veterinary hospitals. 43 Livestock Development Centres. 24 Natural Insemination Centres. 40 Artificial Insemination Centres and 3 Sheep Development Centres during 1998-99 in the district **(Sankhyakiya Patrika, Janpad Jaunpur, 1999)**.

3.1.2 Agroclimatic conditions

Soil

The land is mostly plain and allows the cultivation of cereals. pulses. oil crops, vegetables and fruit crops. In general, the type of soil in the district are loam, sandy loam and alluvial. The soil is good for cultivation of grain and vegetables.

Climate

The climatic condition in the district is mostly homogenenous. The climate is hot and not moist. Average annual rainfall was 625.6 mm. the average temperature was 32°C during 1998-99 **(Sankhyakiya Patrika, Janpad Jaunpur, 1999)**.

3.2 Selection of villages

The present investigation was planned to study the nutritional status of cattle and buffaloes under mixed farming system of Jaunpur district in Varanasi Division at Uttar Pradesh. There are 4 Tehsils in the district namely. Shahganj. Kerakat. Badalapur and Jaunpur. From each Tehsil. one block was selected

namely Shahganj, Badalapur, Kerakat and Karanjakala from Shahganj, Badalapur, Kerakat and Jaunpur Sadar Tehsil, respectively (Table 3.1).

Table 3.1. **Study area**

	Tehsils	Blocks	Villages
1.	Shahganj	Shahganj	Godhana, Khuduaili, Barouna, Surish, Sarai, Khawaja
2.	Badalapur	Badalapur	Raghunathpur, Khanpur, Hariharpur, Pithapur, Inamipur
3.	Kerakat	Kerakat	Amihit, Bhaura, Sultanpur, Basgeet, Charanadeeh
4.	Jaunpur Sadar	Karanjakala	Bhakura, Jamuhai, Kafoorpur, Chadigahana Patahana.

3.3 Selection of farmers

From each village, 10 farmer families were selected randomly for study purpose therefore, 200 families were studied. These families were categorized on the basis of size of their land holdings as under:

Sl.No.	Category	Land holding (acre)
1.	I	0.0
2.	II	0.0 < 2.0
3.	III	2.1 – 5.0
4.	IV	5.1 – 10.0
5.	V	>10.0

The complete information regarding particulars of sample households in terms of land holdings, total number and composition of family members, social

status. Infrastructure, other sources of income, details of dairy animals, milk production and utilization, details of crop production, availability of feeds and fodders, utilization of family and hired labour and limitation of farmers including the role of the family members in different activities were collected by one time interview of the head of the family on a proforma developed (Appendix I).

3.4 House Hold Assets (HA)

3.4.1 Human units (HU)

One man or woman (above 14 years) or two children up to 14 years of age were considered equal to one adult unit.

3.4.2 Bovine units (BU)

One adult, male or female were considered equal to one bovine unit. Two heifers or males (between the age of 1 years to 3 years) were equal to one adult unit.

3.4.3 Social Status (SS)

The proforma given in Appendix II was used for calculating a numerical value of social status of family.

3.4.4 Infra Structure (IS)

The proforma given in Appendix III was used for giving a numerical value to prepare Indices for the infra Structure, possessed by a family.

3.4.5 Service Income (SI)

The annual off farm income (Rs. 10^3/hours hold) form service rendered by the members of the farms house hold in Government and/or private Institution was recorded and designates as service income.

3.4.6 Labour man day

The eight hours of work on a day done by man, woman or two children up to 14 years of age constituted one man day.

Labour distribution was done for crop and bovine production, assuming that one man day could take care of two acres of land or 4 BU annually. Distribution of family labour on different activities for maintenance of cattle like feeding and watering of animals, cleaning and waste disposal, fodder procurement, milking, milk processing, sale of milk and general care worked out by considering numbers of house devoted for different woman by different categories of labours.

3.5 Details of Livestock

3.5.1 Classification of buffaloes and cows

The total buffaloes and cows divided into milch, dry and non pregnant, young and growing and draft.

M	:	Milch animals
Dr	:	Dry animals
P	:	Pregnant animals
G	:	Young and growing animals
DF	:	Draft

3.5.2 Grading of Animals on the basis of health

The health grading of bovine was done on the basis of their physical appearance.

Animal Health Grades	Visual Physical appearance
1.	Weak and depleted
2.	Fair
3.	Good
4.	Very good
5.	Excellent

3.5.3 Grading of feeds and fodders based on the basis of their composition

The feeds and fodders asked by the family were graded as following:

Animal feed grades	Composition of diet
1.	Crop residue (as such) + grazing
2.	Crop residue + non leguminous green forage in the ratio of 50:50 on DM basis
3.	Crop residue and green forage in the ratio of 20:60 on DM basis
4.	Non-leguminous green forage
5.	Green forage and crop residue in the ratio of 80:20

3.5.4 Milk production (MP)

Total quantity of milk produced daily (liter/day) by cattle and buffaloes in a family was recorded on the basis information given by the family at the time of interview.

3.5.5 Milk disposal

The quantity of milk sold and consumed daily by the farm family was recorded on the basis of information provided by the family at the time of interview.

3.5.6 Wet average (WA)

The total milk produced on the day of survey was divided by the total number of lactating cows and buffaloes.

3.5.7 Herd average (HA)

The total milk produced on the day of survey was divided by total number of breedable cows and buffaloes.

3.5.8 Livestock Income

Annual gross livestock income was considered from the sale of milk. Herd composition and number was considered static though out the year. The milk production was multiplied with the sale price @ Rs. 10.00 per litre prevailing in the study area, irrespective of type of milk.

3.5.9 Breeding pattern

Breeding pattern of dairy animals was studied by interviewing different categories of farmers as to how many of them went for natural service or artificial insemination.

3.5.10 Livestock Expenditure

To calculate gross annual livestock expenditure. the feeding and management cost was calculated. The quantity of feed viz.. Berseem. Bajara and concentrate mixture was multiplied by their prevailing market prices to calculate feed cost. The management cost included cattle shed maintenance. labour charges. veterinary and health charges. It was considered as 25% of the total feed cost.

3.6   Crop Production

Inputs include cost of agriculture operation like preparation of field. seed. sowing. irrigation. pesticides. insecticides. weeding. manures. fertilizers and harvesting. threshing. transportation. value of hired human labour. bullock labour. depreciation. interest on working capital. assets. etc. Input cost was calculated for each farmer. Output in terms at yield (q/acre) was estimated. To calculate gross income. the output was multiplied by prevailing sale price of the farm produces crop (Table 3.2). Net income over variable cost was calculated by subtracting value of input from gross income to calculate input-output ratio. The net income over variable cost was divided by impact of that crop.

It was assumed that farmers grow forage crops only to meet the fodder requirements of their livestock. Therefore. to calculate annual net crop income. the net income of grains and cash crops grown by the farmers were summed up.

Table 3.2. Prevailing market price of cereal, cash and fodder crops in Jaunpur district (Rs./qt.)

Crops	Price (Rs/qt.)
Wheat	600 ± 50
Paddy	400 ± 50
Maize	450 ± 50
Gram	1600 ± 50
Mustard	1100 ± 50
Sugarcane	90 ± 50
Concentrate	700 ± 50
Berseem	40 ± 50
Sorghum	40 ± 50
Potato	200 ± 50

3.7 Availability and utilization of feeds and fodders

3.7.1 Dry fodder

Availability of dry fodder (crop residues) was calculated from the grain yield. Average grain yield as reported by farmer was taken into consideration while calculating the production of dry fodder. A multiple of 1.0, 1.0, 3.0 and 3.0 was considered for calculating the amount of crop residues in wheat, paddy, maize and sorghum, respectively. The crop residues and Stover were considered to contain 90% of DM, 1.48 MCal ME per kg and 3.2 per cent CP on as fed basis. The amount of dry fodder actually offered to animals was considered as the amount consumed.

3.7.2 Green fodder

Availability of green fodder was calculated from the area under forage crop multiplied by the average yield per acre. The forage crops included berseem, maize, sorghum and sugarcane tops. The average green fodder was considered to contain 30 per cent DM, 0.586 M Cal. ME per kg and 2.7% CP on as fed basis. Amount of green fodder actually offered to the animals was considered as the amount consumed.

3.7.3 Concentrate

Availability of concentrate was calculated by considering 5 per cent of total cereal grain produced as livestock feed consisting of gram chuni, maize grain, grain husk, wheat bran, mustard cake, soybean dara, rice bran and rice polish. The average concentrate was considered to contain 90% DM, 2.8 M Cal ME per kg and 20% CP on as fed basis. The amount of concentrate actually offered to the animal was considered as the amount consumed.

3.8 Requirement of nutrients

3.8.1 Lactating animals

The maintenance needs of cattle and buffaloes weighing 400 kg were taken as 12 M Cal ME and 318 gm CP per day. For milk production, additional requirements of 1.64 and 1.4 M Cal ME, 113 and 101 gm CP for each kg of buffalo (Kearl, 1982) and cattle milk (NRC, 1988), respectively, were used.

3.8.2 Pregnant animals

For pregnant and dry animals above 7 months, 15 M Cal ME and 875 gm

CP per BU was taken as requirement (**Anshu, 1998**).

3.8.3 Dry and non-pregnant animals

These were considered to have requirement of 12 M Cal ME and 318 g CP per BU per day (**Anshu, 1998**).

3.8.4 Draft animals

Requirement of 14 M Cal ME and 380 CP per draft animal BU was taken (**Anshu, 1998**).

3.8.5 Young and growing animals

For estimating the requirements of young and growing animals. 16 M Cal ME and 1000 g CP per BU was used (**Anshu, 1998**).

3.9 Cost analysis

To calculated annual net income per BU the net income from bovines was divided by the total number of BU owned by the farmers.

The calculated cost of milk production. (Rs. / litre) the animal expenditure on total herd maintained by the farmer was divided by total quantity of milk produced.

3.10 Statistical analysis

Statistical analysis was done by computer using simple RBD and some objective achieved with the help of simple tabular analysis of aggregate values and percentage of relevant data.