Chapter 1
CHAPTER-1

Introduction
INTRODUCTION

India is predominantly an agricultural country with about 70% of its population dependent on income from agriculture. Animal husbandry is an adjunct to crop agriculture and cattle and buffaloes are kept for milk production, motive power for various farm operations, village transport, irrigation, and production of manure. The animals are generally maintained on agricultural byproducts and crop residues. Mostly small and marginal farmers and landless labourers with holding size of 2-3 animals per farm household do animal rearing. Average land holding with these owners is very meager, being ½ to 2 acres. Livestock rearing provides employment and supplementary income to the vast majority of rural households, the majority of who are landless and marginal farmers.

India had 204 million cattle and 84 million buffaloes. The total crossbred female population, including young stock was estimated to be about 10.6 million in 1992, of which the southern region accounted for about 45%. The share of other regions was: northern (25%), eastern (20%) and western (10%). In areas where crossbreeding is getting popular, the population of low producing desi cows is declining. The density of bovine population varied as per land area, agricultural conditions, availability of feed and fodder
and socio-economic conditions. On an average 100 ha of cropped area sustained 151 bovine comprising 111 cattle and 40 buffaloes. Stocking rate differed significantly in different regions. The cattle density per 100 ha of cropped area was highest in the eastern region (182) and lowest in the northern region (90) whereas reverse was true for buffaloes (52 in northern and 26 in southern region).

Cattle were fairly distributed all over the country (18-31%). The concentration of buffaloes was highest in northern region (46%) and lowest in eastern region (11%). The productivity per animal between regions varied due to quality of cattle and buffaloes and availability of inputs as especially feed and fodder.

The gross value of output from livestock sector alone at current prices was about Rs. 1114 billion (1997-98), which is about 25% of the value of the output of Rs. 4495 billion from agriculture sector. This excludes the contribution of the animal draught power. Milk alone contributed around 63% to the total output from livestock. Cattle and buffaloes in addition to providing much needed milk and to some extent meat play an important role in utilization of agricultural by-products, which are non-edible to human beings. They also provide raw materials/ by-products such as hides and skins, blood, bone, fat and casings for industrial use. Farm manure is a useful income generating products of the sector. Animal power for transportation and agricultural operations, particularly in rural areas also makes a significant contribution.

A marginal increase in milk production from 17 million tones in 1995-51 to 22 million tones in 1970-71 was achieved. The increase,
however, was large between 1980-81 (31.6 million tones) and 1990-91 (53.7 million tones). The production of milk for the year 1998-99 was 74.7 million tones which would make per capita availability to be 2.12 g per day against the recommended level of 220g. This enhanced growth in milk production is because of various cattle and buffalo development programmes and large scale crossbreeding indairy cattle.

Around 70.6 million draught animals (mostly cattle and buffalo) contribute 20% of the energy input into crop farming. Although contribution of draught (DAP) sharply reduced from 72% in 1961 to 23% in 1991 mainly due to mechanization, the requirement of DAP shall continue to be around 20% in years to come.

A large increase in buffalo meat production both for internal consumption and export has been noted in the last few years. The export of buffalo meat went up from 101,666 tonnes valued at Rs. 2,808 million in 1995-96 to 176,329 tonnes valued at Rs. 7,293 million in 1997-98. This export is going to go up in view of establishment of export abattoirs and improvement of existing abattoirs. Considerable export earnings are obtained from export of animal by-products.

Artificial insemination network in addition to providing semen of indigenous cattle and buffalo breeds and crossbred cattle is also used for dissemination of semen of temperate dairy cattle through crossbreeding to increase milk production. To meet the semen requirement, sires of various cattle breeds maintained at the main
germplasm units some of which also have the facilities of deep freezing of semen. Improvement in cattle and buffalo production is also directed at improvement through feeding, generation of marketing facilities, advisory service and veterinary aid.

Institutional structures funded by government also exist. These maintain herds of cattle and buffalo, which act as nucleus or multiplier herds for purposes of training and research. Some farms have been established for production quality bulls and undertaking progeny testing programmers for some important indigenous breeds. Large government herds like military dairy farm also exist for commercial milk production. These herds are being used for developing new dairy breeds and for spreading superior germplasm to rural areas for improvement of native cattle.

The operation flood (FO), which has been implemented in three, phases over 26 years covers some nine million-farmer families in 170 milk – sheds in 22 states union territories under co-operative umbrella. The operation flood programmed also provides animal health, breeding and marketing facilities. It also available compound and other feed and related technologies for improved cattle and buffalo productivity.

The advances in animal husbandry, in general, and dairying (crossbred cattle and buffalo) in particular have greatly helped in improving the economic status of rural population in India. The availability of crossbred dairy animals and high producing buffaloes has made dairying a remunerative business. Crop and dairy enterprise combination among various livestock is best suited for most of the
areas. Milk production through crossbred chattel has led to increase in income of the farmers in almost all the regions of the country including drought prone, dry land and rainfed areas. Dairy enterprise was on the top with regard to profit in marginal, small and medium category of farmers.

The organized dairy industry in India is estimated at INR 345 billion (US$ 7 billion) and is expected to witness a CAGR of over 7% over the next four years, to reach a size of INR 460 billion (US$ 9 billion) by 2005. India offers several attractive features to players interested in coming to the country. Free regulatory regime, providing equal opportunities for domestic as well as foreign players.

-Huge scope for growth - organized industry accounts for less than 15% of milk produced in India. The rest of the milk is either consumed at farm level, or is sold as fresh, non-pasteurized milk through unorganized channels. The share of organized industry is expected to rise rapidly especially in the urban region.

-Large growth expected in consumption of packaged dairy products due to several demographic factors, including increased affordability, increased number of nuclear families and working women and rising exposure to western dairy products, as well as packaged dairy products such as youngsters and UHT milk. The rise in the market for ethnic products is likely to witness the fastest growth at over 20-30 per annum.

-The emergence of organized food retail chains has led to greater availability of self-space for chilled/frozen dairy products, which is expected to boost growth in sales of packaged dairy
products. Organized food retail in India is expected to grow from INR 11 billion (USD 230 billion) to INR 110 billion (USD 2.3 billion) by 2006.

Some of the major international dairy companies, which have already established operations in India, are, include Nestle, Unleveled (through Hindustan Lever Ltd.) Danone (through Britannia) and nutrition. Britannia has recently entered into an alliance with Fonterra for accessing technology and providing market access to Fonterra. The Britannia-Fonterra alliance has heightened other Indian companies' need for securing international partnerships in order to remain competitive and this is an opportune time for international dairy companies to establish alliance-led entry into the Indian market. While evaluating the potential partners in India, the new player would need to consider parameter such as management fit, quality of procurement infrastructure (and therefore additional investment that would be required in upgrading the milk quality) product capabilities and strength of brand and distribution network.

The larger cooperatives, such as APDDCF provide a large processing capacity, and an established national brand and distribution network for foreign companies envisaging entry into India. On the other hand, smaller private sector players such as Hatsun Agro Nilgiris and Vadilal provide processing capacity, good management fit, strong regional brand and distribution network to a new entrant.

The key product segments that would be attractive to new players include ethnic products like curd, panner and ethnic sweets
and infant milk products. These products face low competition and are expected to witness very high growth rates.

GLOBAL DEMAND AND SUPPLY

India is the largest milk producing country. Contributing over 80 million MT to the total world milk producing of 574 million MT. The global demand for milk and milk products has been growing consistently and is expected to growth at approximately 2% per annum over the next five years. Maximum growth in demand is expected in Asia, with most Asian regions expecting growth of 3-4 percent per annum. Middle East and North Africa are also expected to witness growth rates of 2-3%.

As against the expected demand growth of 2% production has been growing at a marginal ret of 1 % and is therefore, expected to lag behind demand. The low growth rate in production is primarily due to the decline in production in Western Europe (CEEC+CIS). On the other hand, production is increasing in regions such as South Asia, South America and Oceania. In 2000 South Asia became the second largest production region in the world, following Western Europe.

Use of milk varies vastly across different regions in the world. It is important to understand the differences in order to identify key markets for dairy export. In general the production of cheese has witnessed the greatest growth over the last four years.
DAIRY POLICY STRUCTURE

The dairy industry has been one of the most heavily subsidized and protected industries in the world. The EU's dominance in dairy is primarily due to subsidy and encouragement it has received from the EU commission. However, it is expected that is protection will diminish drastically in the near future as a result of various factors the prime ones being.

-WTO pressure-this is likely to reduce import tariffs. Provide minimum market access and lower export subsidies.

-The entry of the EU applicants Poland, Hungary, Czech Republic, Estonia and Slovenia will put additional pressure on the funds available for subsidies. The new members will increase the EU milk supply by 11%, while more than doubling the number of dairy farmers.

The US dairy policy is also likely is also likely too be liberalized, with reduced price support from the government and relaxation of import restrictions.

WORLD TRADE PATTERN

World trade in dairy products is cheese, skimmed milk power (SMP). Whole milk power (WMP) and butter. World trade in cheese has witnessed high growth rates in the recent past. While the deficit regions have a self-sufficient of less than 100%, the surplus regions
self-sufficient of over 100%. Western Europe for example, has 110% self –sufficient, which means it has a 10% surplus after meeting its own requirements. The EU plays a dominant role in the world dairy trade. Nevertheless, its share has been declining in recent years; from 53% in 1995 to 40% in 1999. The key gainers in world trade have been New Zealand (from 19% to 25%), Australia (from 13% to 19%) and Argentina (from 3% to 6%).

CONSOLIDATED WAVE

The trend towards a growing demand supply gap and improved market access are in creasing the world trade in dairy products. These factors have also led to an increasing number of complains trying to acquire global operating platform. In the period January 1998 to, November 2001, there were 548 mergers and acquisitions in the dairy sector. European companies led the great majority of alliances. European companies have been the acquires in 70% of the 548 deals. Asia, on the other hand, figures in only about 15 deals.

DAIRY CONSUMPTION IN INDIA: -

Key products and expected market sizes

The organized dairy industry is estimated at INR345 billion (USD7 billion) and is expected to witness a CAGR of over 7%
during the next four years reaching INR 460 billion (USD 9 billion) by 2005. The main dairy products being sold in India can be categorized into two types:

**HIGH GROWTH PRODUCTS:**

These are primarily products that have been traditionally prepared at home or bought from the unorganized sector. Owing to various demographic changes in Indian society described later, consumer preference is shifting to branded, packaged versions of the same products. Such products include liquid milk and ethnic Indian dairy products.

The high growth category also includes certain products such as cheese and infant milk foods that are expected to grow at high rates on the back of huge market development and quality improvements made by markers.

**MATURE PRODUCTS:**

These products are likely to witness low–medium growth rates, and include products such as milk powder and condensed milk.

**LIQUID MILK:**

As mentioned earlier, about 45% of the total milk produced is consumed as liquid milk. This market is estimated at 36 million MT,
and valued at INR 470 billion (USD 9.8 billion). Owing to the preference of many consumers for non-pasteurized milk, which is perceived to be fresher than pasteurized (packaged) milk, over 80% of the milk sold in urban areas is non-pasteurized milk from the unorganized sector. Packaged, branded milk accounts for liquid milk is growing at about 4% per annum. In the recent past, as a result of rising awareness about poor hygiene standards and much adulteration of loose milk, consumers in urban area began switching to packaged milk and this segment is expected to grow at over 8% per annum.

Packaged liquid milk offers a huge opportunity to dairy players, because a large population still consumes loose milk. Consumer education about the problems associated with loose milk needs to be stepped up. Given that liquid milk players operate on thinks margins and are reluctant to spend large sums on consumer marketing and education, it is imperative that various milk players from associations to undertaken educational campaigns.

The activities of liquid milk players are mainly limited to particular cities or regions because the limited shelf life of pasteurized milk restricts their geographical reach. This segment is dominated by various cooperative.
INDIAN DAIRY PRODUCTS: -

Ethnic sweets: this is the largest segment in Indian dairy products, estimated at INR 130 billion (USD 2.7 billion). The segment is dominated by organized sweet shops selling sweets in loose form. Ethnic sweets are also made at home and are consumed as snakes. The segment has been sporadic efforts by the organized sector from players such as Haldirams and Chhappan Bhog are primarily Indian snake players and have extended their presence in to packed sweets.

Paneer or cottage cheese is made almost exclusively at home. Small dairies in the unorganized sector also make it. A few dairy cooperatives and private sector dairies sell branded paneer in urban areas, such as Nilgiris, Amul, Nandini and Vijaya.

CURD / BUTTERMILK/lassi: -

This is a popular dairy product in India and is associated with tremendous Nutritional benefits. Like other Indian dairy products, it is prepared and consumed at home, which account for 75% of the 5000 MT consumed per day and bought at organized sweet shops or restaurants. Some cooperatives have been selfing this product under regional brand names. The product is packed in plastic pouches or cups but has a short shelf- life. The recent entry of Amul, Nestle and
Mother Dairy in to the market with curd that has a longer shelf life is multiplying the size of the market.

SHRIKHAND: -

This is sweetened, flavored curd. Popular primarily in West India, its market, estimated at 7000 MT, is dominated by Amul. Several regional brands such as Warana and Aarey are also significant.

This segment of Indian dairy products offers a huge growth opportunity because the Indian consumer is becoming more aware of the low hygiene standards and risk of contamination in ethnic sweet shops. Concurrently, changing demographic patterns in India suggest women will have less time to prepare sweets at home. As a result packaged, branded traditional dairy products are experiencing rising demand and increasing acceptance, especially among urban consumers. The success of the branded curd launched by amul suggests the potential for introducing other such products at economical prices to capture mass markets.

CHEESE: -

The cheese market is estimated to be 9000 MT and valued at INR 1.8 billion (USD38 million). Cheese is primarily consumed in urban areas, with the four main metropolitan cities accounting for
over 50% of total consumption. The key players are G CMMF (Amul), APDDCF (vijaya) and Britannia. Recent launches include some French players such as Bongrain and Fromageries Bel (Laughing Cow). The cheese market is witnessing fierce competition and marketing activity. Growth rates are expected to be more than 15% per annum.

The only cheeses with mass markets in India are processed cheddar and mozzarella. Most other varieties are imported and have very small markets.

**BUTTER:**

The butter market is estimated at over 50,000 MT and valued at INR 6.5billion(USD135million). It is growing at 7-8% per annum. This market is more fragmented than the cheese market. However Amul still has the lion’ share of the national market and other cooperatives have large shares in their regional markets.

**BUTTER OIL (GHEE):**

Butter oil or ghee, is used as a premium cooking medium in most Indian household. The ghee segment is large at about 1.5million MT and is an overcrowded segment: almost all the dairy plants in India manufacture the product as a means of using the fat remaining after processing liquid milk. The segment is witnessing low growth
rates of less than 5%; the product is used as a cooking medium and is substituted by edible oils when its prices are high.

**MILK POWDER:** -

The total market for milk powder is estimated at 100,000MT. SMP accounts for 70% of this market. The segment is dominated by cooperatives, which together have a 40% share of the market. Amul dominates the WMP segment with 65% market share. Manufacturing demand from biscuit and ice cream companies takes up 70% of total market.

**INFANT MILK FOODS:** -

The infant milk food segment is estimated at 110,000MT and valued at over INR 25 billion (USD521 million). The segment is dominated by Nestle. Other important players are Heinz and Amul. The segment is expected to be on the verge of witnessing rapid growth with the recent entry of Nutricia is planning the launch of several new infant food formulae.

**ICE CREAM:** -

The total market for ice cream is estimated at INR 11 billion (USD229). The Organized sector accounts for over 50% of the
market (approx. INR 6million or USD125million). Per capita consumption is low at about 106 ml per year. The key player is Hindustan Lever Ltd (Kwality Walls) with a 50% share of the market. Amul is the second largest player, followed by Vadilal, Arun and Mother Dairy. This segment is also has some strong regional brands such as Arun (Hatsun Food) in Chennai. Joy in Bangalore, Nirula’s in Delhi and Metro and Rollicks in Calcutta.

The ice cream segment is also witnessing strong growth of 15-20% per annum. The strongest growth is expected in the economically priced softy cones segment. Several players are in the race to establish a national network of dispensing machines. At the other end of the market, players such as movenpick (own retail outlets), Blue Bunny (sold through select retail outlets) and Baskin Robbins (own retail chain) are targeting the niche, premium segment within ice cream.

OTHER PRODUCTS: -

These include products such as dairy whitener (48,000 MT), condensed milk (11,000MT) and flavoured milk (5000MT) and are likely to remain marginal product categories.
DEMAND DRIVERS: -

The demand for packaged dairy product is expected to rise very rapidly on the back of both supply and demand-related factors. On the supply side, several new players have emerged with new product offering, promising better quality and convenience to the consumer. Moreover, the increased competition in the sector is prompting players to enhance their efforts to develop the market. This has resulted in greater awareness and levels of acceptance for packaged dairy products among Indian consumers.

On the demand side, several factors are causing a shift towards the consumption of packaged ethnic dairy products- and some Western dairy products. These factors include: - Increased affordability of packaged dairy products- approximately 30% of the Indian population resides in urban regions and over 25% of the urban population has a monthly household income of over INR 5,000 (USD 104). This represents a large target group.

- Higher propensity to try new products – projected age distribution of Indian consumers shows a steadily rising percentage in the 20-34 age group, the age group that is the most receptive to new products. This age group is projected to increase from 247 million in 2001 to 312 million 2010. This is a percentage increase from 24% to 27% of the total population.
- More nuclear families and working women, giving women less time to prepare airy products at home. In urban India about 80% of women live in nuclear families. This percentage is higher (83-85%) in the more developed cities such as Mumbai, Bangalore and Chennai and lower (about 75%) in smaller cities such as Jaipur and Surat. Over 30% of the women in nuclear families in urban India work. This percentage is higher in the larger and more developed cities and is expected to rise as other demographic changes take place in Indian society.

- More Indian traveling aboard and being exposed to packaged dairy products, like yoghurts and UHT milk. The number of outbound Indian tourists rose from 3.5 million in 1997 to 4.8 million in 2000. The number is expected to rise at a CARG of over 25% during the next four to five years. Furthermore, the emergence of organized food retail chains has led to more shelf space for chilled and frozen dairy products. This too, will lead to growth in the sales of packaged dairy products. Organized food retail in India is expected to grow from INR 11 billion (USD 230 million) to INR 110 billion (USD 2.3 billion) by 2006.

**CONTRIBUTION OF LIVESTOCK TO THE NATIONAL ECONOMY:**

India accounts for a significant share of world’s livestock resources with nearly 57 percent of world’s buffaloes, 16.2 percent of
cattle, 16.2 percent of goats, 5.7 percent of sheep and 5 percent of poultry (FAO, 2004). Though the contribution of agriculture and allied sectors to the national gross domestic (55 percent in the early 1950s to 39.5 percent in 1981-82 and 23.9 percent in 2001-02), livestock sector has been among the few high-growth sectors in rural India. The importance of livestock sub-sector can be gauged from the contribution it makes to the national economy. Livestock sector accounted for 25.5 percent of agricultural GDP, and about 5.6 percent of total GDP in 2001-02. The share of livestock in the gross value of agricultural outputs (at 1993-94 prices) has increased from 18.6 percent in 1971-72 to 35.5 percent in 2001-02 (CSO, 2003). The dairy sector contributes the largest share in agricultural GDP. The large contribution that livestock sector makes to the national economy is a reflection of multiple roles that livestock plays in the farming systems in the country.

The growth in value of output of major livestock products in the country at 1993-94 constant prices over the last five decades. The total livestock output has increased more than four times in the last five decades. According to the Central Statistical Organisation (CSO) estimates, the gross value of output from Rs. 20,856 crores in 1950-51 to Rs. 88,331 crores in 2001-02 (CSO, 2003). The dairy and poultry are high-growth sectors and is reflected in the growing importance of the contribution of these sub-sectors in the livestock economy. While output in dairy sector increased by 11.2 times and poultry meat by five times. The wool and hair, and dung are the slow-growth sub-sector. The share of milk group in total value of
Table 1.1: Value of output (Rs. crores) and share (precent) of major production in total value of output from livestock sector (at 1993-94 prices)

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<tbody>
<tr>
<td>1- Milk group</td>
<td>11,399</td>
<td>12,866</td>
<td>14,864</td>
<td>24,301</td>
<td>40,018</td>
<td>60,340</td>
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<td>[1]</td>
<td>[55.4]</td>
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<td>[58.1]</td>
<td>[62.3]</td>
<td>[65.7]</td>
<td>[68.3]</td>
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<td>4,890</td>
<td>6,356</td>
<td>10,702</td>
<td>14,876</td>
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<td>[20.8]</td>
<td>[21.5]</td>
<td>[19.1]</td>
<td>[16.3]</td>
<td>[17.6]</td>
<td>[16.8]</td>
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<tr>
<td>2:1 Poultry meat</td>
<td>927</td>
<td>1,354</td>
<td>1,066</td>
<td>2,027</td>
<td>4,172</td>
<td>5,902</td>
</tr>
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<td>[4.5]</td>
<td>[5.8]</td>
<td>[4.2]</td>
<td>[5.2]</td>
<td>[6.9]</td>
<td>[6.7]</td>
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<tr>
<td>3- Eggs</td>
<td>269</td>
<td>386</td>
<td>543</td>
<td>1,041</td>
<td>2,045</td>
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<td>[2.7]</td>
<td>[3.4]</td>
<td>[3.6]</td>
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<tr>
<td>4- Dung</td>
<td>4,495</td>
<td>5,040</td>
<td>4,862</td>
<td>5,772</td>
<td>6,207</td>
<td>6,546</td>
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<td>[21.8]</td>
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<tr>
<td>5- Others</td>
<td>133</td>
<td>98</td>
<td>412</td>
<td>1,540</td>
<td>1,917</td>
<td>3,419</td>
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<td>[0.6]</td>
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<td>[1.6]</td>
<td>[3.9]</td>
<td>[3.1]</td>
<td>[3.9]</td>
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<tr>
<td>Total livestock</td>
<td>20,586</td>
<td>23,421</td>
<td>25,571</td>
<td>39,010</td>
<td>60,889</td>
<td>88,380</td>
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<td>[100.00]</td>
<td>[100.00]</td>
<td>[100.00]</td>
<td>[100.00]</td>
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Source: CSO (2003, various issues).
Figure in parentheses show the percentages to the total value of output from Livestock sector.
Value of Output from Livestock Sector

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
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<tbody>
<tr>
<td>1951-52</td>
<td>0</td>
</tr>
<tr>
<td>1961-62</td>
<td>10,000</td>
</tr>
<tr>
<td>1971-72</td>
<td>20,000</td>
</tr>
<tr>
<td>1981-82</td>
<td>30,000</td>
</tr>
<tr>
<td>1991-92</td>
<td>40,000</td>
</tr>
<tr>
<td>2001-02</td>
<td>70,000</td>
</tr>
</tbody>
</table>

Milk Group ( ), Meat ( ), Eggs ( )

Figure 1:1
output from livestock sector has increased from about 55 percent in 1951-52 to over 68 percent in 2001-02 (Table-1: 1). The share of meat sector has declined from 20.8 percent to 16.8 during the same period but the share of poultry sector (meat and eggs) has increased from 5.8 percent to 10.3 percent. The share of dung (fuel and manure) has declined significantly from 21.8 percent in 1950-51 to about 7 percent in 2001-02. The use of dung as fuel has declined significantly from 12.3 percent in early 1950s to nearly 4 percent in 2001-02, while the share of dung as source of manure has fallen from 0.9 percent to 0.25 percent over the same period. The importance of poultry sector has increased at a faster rate compared to other sub-sectors during the last two decades. The share of poultry has increased from about 7.7 percent has in 1881-82 to little over 10 percent in 2001-02, while the share of meat sector has remained almost constant.

The value of output from livestock sector grew at an annual compound growth rate of 3.12 percent between 1950-51 and 2001-02, ranging from 0.72 percent in the sixties to 4.77 percent in the 1980s (Table-1: 2). Among all livestock products, eggs witnessed the highest growth (5.37 percent), followed by poultry meat (3.94 percent), and milk growth (3.65 percent). The wool and hair sub-sector registered a negative growth. All livestock sub-sector registered the highest growth during the decade of 1980s except for meat products and dung, while in 1990s there was deceleration in growth in all sub-sector is mainly attributed to the successful implementation of the Operation Flood and other dairy development
Table 1.2, Annual compound growth rates in value of output (at 1993-94 prices) of different livestock products, 1950-51 to 2001-02

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<tbody>
<tr>
<td>1- Milk group</td>
<td>1.13</td>
<td>1.11</td>
<td>4.9</td>
<td>5.19</td>
<td>4.27</td>
<td>3.65</td>
</tr>
<tr>
<td>2- Meat group</td>
<td>1.51</td>
<td>-0.36</td>
<td>2.99</td>
<td>5.22</td>
<td>2.67</td>
<td>2.56</td>
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<tr>
<td>2.1-Meat</td>
<td>1.64</td>
<td>-0.43</td>
<td>3.34</td>
<td>6.26</td>
<td>3.38</td>
<td>2.79</td>
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<tr>
<td>2.1.1-Mutton</td>
<td>0.93</td>
<td>0.03</td>
<td>0.09</td>
<td>5.02</td>
<td>1.53</td>
<td>1.78</td>
</tr>
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<td>2.1.2-Poultry meat</td>
<td>3.77</td>
<td>-4.12</td>
<td>7.49</td>
<td>7.71</td>
<td>3.82</td>
<td>3.94</td>
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<tr>
<td>2.2-Meat product</td>
<td>0.98</td>
<td>-1.64</td>
<td>6.52</td>
<td>1.58</td>
<td>2.55</td>
<td>1.91</td>
</tr>
<tr>
<td>3- Eggs</td>
<td>3.84</td>
<td>4.48</td>
<td>6.16</td>
<td>7.55</td>
<td>4.04</td>
<td>5.37</td>
</tr>
<tr>
<td>4- Wool and hair</td>
<td>0.52</td>
<td>0.39</td>
<td>-9.81</td>
<td>2.75</td>
<td>3.98</td>
<td>-0.23</td>
</tr>
<tr>
<td>5- Dung</td>
<td>1.01</td>
<td>-0.53</td>
<td>1.63</td>
<td>1.06</td>
<td>0.75</td>
<td>0.8</td>
</tr>
<tr>
<td>5.1-Dung fuel</td>
<td>1.09</td>
<td>-1.53</td>
<td>1.58</td>
<td>1.72</td>
<td>0.45</td>
<td>0.95</td>
</tr>
<tr>
<td>5.2-Dung manure</td>
<td>0.96</td>
<td>229.4</td>
<td>1.66</td>
<td>0.55</td>
<td>0.99</td>
<td>0.67</td>
</tr>
<tr>
<td>All livestock</td>
<td>1.51</td>
<td>0.72</td>
<td>4.12</td>
<td>4.77</td>
<td>3.72</td>
<td>3.12</td>
</tr>
</tbody>
</table>

Source: Computed from National Statistics, CSO
Different Livestock Products

Value (Rs.)

Year

Livestock Production

Figure 1:2
programmes implemented by the central and the state governments, while growth in poultry sector can be attributed to a large part to the private poultry industry initiatives. The development of poultry industry in India within a span of just two decades is remarkable. From rural backyard poultry production catering to the domestic market prior to the 1980s, the sector has transformed itself into advanced industrial production in some states.

GROWTH AND COMPOSITIONAL CHANGES IN LIVESTOCK POPULATION: -

BOVINE POPULATION: -

The livestock population in the country increased from 292.8 million in 1951 to 485.39 million in 1997 at annual growth rate of nearly 1.1 per cent but the total livestock in the country has decreased to 482.78 million in 2003 showing an overall decrease of 0.54 per cent (annual compound growth rate of −0.09 per cent) (Government of India, 2004a). There were some changes in the composition of livestock in broad groups like bovine, ovine and other livestock during the last four and half decades. The proportion of bovines (cattle and buffaloes) declined from nearly 68 per cent in 1951 to 58.8 percent in 2003 whereas the proportion of bovines increased from 29.5 per cent to 37.7 per cent between 1951 and 2003. The cattle population, which accounts for nearly 66 per cent of
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</tr>
</thead>
<tbody>
<tr>
<td>Total cattle</td>
<td>155.3</td>
<td>158.7</td>
<td>175.6</td>
<td>176.2</td>
<td>178.3</td>
<td>180</td>
<td>192.45</td>
<td>199.69</td>
<td>204.58</td>
<td>198.88</td>
<td>187.38</td>
</tr>
<tr>
<td>Adult femal cattle</td>
<td>54.4</td>
<td>47.3</td>
<td>51</td>
<td>51</td>
<td>53.4</td>
<td>54.6</td>
<td>59.21</td>
<td>62.07</td>
<td>64.36</td>
<td>64.42</td>
<td>-</td>
</tr>
<tr>
<td>Total Buffalo</td>
<td>43.4</td>
<td>44.9</td>
<td>51.2</td>
<td>53</td>
<td>57.4</td>
<td>62</td>
<td>69.78</td>
<td>75.97</td>
<td>84.21</td>
<td>89.92</td>
<td>96.62</td>
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<tr>
<td>Adult femal buffalo</td>
<td>21</td>
<td>21.7</td>
<td>24.3</td>
<td>25</td>
<td>28.6</td>
<td>31.3</td>
<td>32.5</td>
<td>39.13</td>
<td>43.81</td>
<td>46.77</td>
<td>-</td>
</tr>
<tr>
<td>Total bovine*</td>
<td>198.7</td>
<td>203.6</td>
<td>226.8</td>
<td>229.2</td>
<td>235.7</td>
<td>242</td>
<td>262.36</td>
<td>275.82</td>
<td>289</td>
<td>288.74</td>
<td>284</td>
</tr>
<tr>
<td>Sheep</td>
<td>39.1</td>
<td>39.3</td>
<td>40.2</td>
<td>42</td>
<td>40</td>
<td>41</td>
<td>48.76</td>
<td>45.7</td>
<td>50.78</td>
<td>57.49</td>
<td>61.79</td>
</tr>
<tr>
<td>Goat</td>
<td>47.2</td>
<td>55.4</td>
<td>60.9</td>
<td>64.6</td>
<td>67.5</td>
<td>75.6</td>
<td>95.25</td>
<td>110.21</td>
<td>115.28</td>
<td>122.72</td>
<td>120.1</td>
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<tr>
<td>Other</td>
<td>7.8</td>
<td>8.3</td>
<td>7.5</td>
<td>8.3</td>
<td>10.2</td>
<td>10.4</td>
<td>13.22</td>
<td>13.55</td>
<td>15.8</td>
<td>16.44</td>
<td>16.89</td>
</tr>
<tr>
<td>Total livestock</td>
<td>292.8</td>
<td>306.6</td>
<td>335.4</td>
<td>344.1</td>
<td>353.4</td>
<td>369</td>
<td>419.59</td>
<td>445.28</td>
<td>470.86</td>
<td>485.39</td>
<td>482.78</td>
</tr>
<tr>
<td>Share(percent) of bovines in total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>livestock</td>
<td>67.9</td>
<td>66.4</td>
<td>67.6</td>
<td>66.6</td>
<td>66.7</td>
<td>65.6</td>
<td>62.5</td>
<td>61.9</td>
<td>61.4</td>
<td>59.5</td>
<td>58.8</td>
</tr>
<tr>
<td>Poultry</td>
<td>73.5</td>
<td>94.8</td>
<td>114.2</td>
<td>115.4</td>
<td>138.5</td>
<td>159.2</td>
<td>207.74</td>
<td>275.32</td>
<td>307.07</td>
<td>347.61</td>
<td>440696</td>
</tr>
<tr>
<td>Density/ha of net sown area</td>
<td>2.45</td>
<td>2.34</td>
<td>2.48</td>
<td>2.51</td>
<td>2.58</td>
<td>2.6</td>
<td>2.99</td>
<td>3.32</td>
<td>3.3</td>
<td>3.42</td>
<td>-</td>
</tr>
</tbody>
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Note: * Total bovine includes cattle and buffaloes only; P: provisional.
! Annual compound groth rate (ACGR) is calculated using the formula: Pt = Livestock population in period t,
Livestock Population in India

Figure 1:3
bovine population and about 39 per cent of total livestock population showed a declining trend. The share of other animals like ponies, horses, mules, donkeys, camels and pigs increased marginally from 2.7 per cent to 3.4 per cent. The population of the bovine stock consisting of cattle and buffalo increased at a rate of 0.69 per cent per year during 1951 and 2003 period ranging from nearly zero growth during 1992-97 to 2.18 per cent during 1956-61. Between the two species, buffalo stock increased at a faster rate (1.55 percent/year) compound to cattle population (0.36 per cent) indicating the rising importance of buffaloes because of higher price for buffalo milk and substitution of draught animal with mechanical power in the country. The livestock density per hectare of net sown area has increased from 2.45 in 1951 to 3.42 in 1997, indicating more pressure on land resources.

The trend in the composition of bovine and milch animal stock over the years signifies that the breed able cow and buffalo population is important from the milk production point of view. The composition of bovine breeding stock has improved in terms of increased share of in-milk animal in breeding stock as well as in total adult females. While adult females among cattle account for about 32 percent of the cattle stock, and in case of buffaloes, it is about 51 percent of the buffalo stock. The rise in buffalo numbers is seen even more clearly in terms of the ratio of buffaloes to cows in the stock of adult females, or the milch animal. This ratio of milch buffaloes to milch cow increased from 0.46 in 1951 to 0.50 in 1966, 0.58 in 1977 and then to 0.73 in 1997. In other words, the trends in ovine stock
indicate that there is an increasing shift to milk production as a major objective of rearing of bovines in India agriculture.

The trends in the animal growth rates of livestock population over the period 1951-97 have show that the livestock population grew at annual average compound growth rates of 0.97 percent between 1951 and 2003, ranging from 0.44 percent during 1966-72 to 2.57 percent during 1977-82. The results show that population of in-milk bovine consisting of lactating buffaloes and cows has increased at a faster rate and growth rate has accelerated over time since the mid-sixties and then again declined between 1987 and 1997. A comparison of growth rates of cattle and buffalo population show that buffalo population in India increased at a faster rate than cattle population during all the inter-census period except for 1977-82 and 1982-87. The incentives, apparently, took longer time to effect cattle stock than in the case of buffaloes.

INVESTMENT PATTERN: -

One of the indicators of a sector’s importance is the budget allocation to that sector. In the investment pattern in livestock sector during various plan periods the plan outlay (at current prices) of the central and centrally sponsored schemes under animal husbandry and dairying has increased from Rs. 22 crores in the First Plan to Rs. 1,545.64 crores in the Ninth Plan and Rs. 1,735 crores in the Tenth Plan. The outlay for dairying increased from Rs. 7.81 crores in the
Fist Plan to Rs. 900 crores in the Eighth Plan and then declined in the Ninth Plan to Rs. 469.5 crores and Tenth Plan to Rs. 355 crores. Though the allocation increased in nominal terms, the allocation the animal husbandry and dairying as percentage of total plan allocation has declined since the Fourth Plan and reached a low level of 0.11 percent during the Tenth Five Year Plan. In most cases the bulk of the budget is eaten up by wages and other administrative costs of the government departments. Although the livestock sector occupies a pivotal and its contribution to the agricultural sector is the highest, the plan investment made so far do not appear commensurate with its contribution and future potential for growth and development. There is a need to increase investment in the livestock sector.

CO-OPERATIVE MOVEMENT OF DAIRY:

MILK PRODUCTION:

The farmer cooperative movement, popularly called operation Flood, has been responsible for the milk revolution in thee country. The movement helped by improving farmer returns on milk and therefore changing the perception that dairy cannot be a revenue earner.

The bulk of the milk production is concentrated in the northern region, with some states such as Uttar Pradesh in the producing more milk than countries such as Australia and Argentina. The east, by contrast is a milk deficit zone. The milk surplus states in the country
are Gujarat, Maharashtra, Rajasthan, Uttar Pradesh, Punjab, Haryana, Karnataka, Tamil Nadu and Andhra Pradesh.

Over 50% of milk produced in India is buffalo milk. This is given preference over cow’ milk in several regions because it has a higher fat content.

The Indian farming system is largely unorganized. The average farmer practices dairy farming to provide supplemental income and has a herd of one or two animals. Milk yields vary between 400kg/year to 3000 kg/year, while the average yield is about 800 kg/year. Typical yield of ethnic breeds: vary between 0.5 kg and 2 kg per day due to inadequate, poor quality feed.

- Cross breed yields: up to 10 kg per day. Most dairies have to depend on large catchment areas to source sufficient milk quality. Some dairies use collection agents who are paid a commission of approximately Re 1 per kg to collect milk and bring it to the processing location. Some modern dairies now have collection points linked to chilling centers at numerous in their catchment area. However, few dairies have the resources to invest large amounts in setting up this infrastructure. Setting up a network of bulk coolers can increase the investment required in establishment a dairy plant by over 5%.

The average time elapsed between milk collection and milk conversion is very high in India as compared to international norms. This leads to higher bacteria count in Indian milk and creates quality
issues. New players into Indian dairy industry must be cognizant of the additional investment that would be required to ensure high quality standards in dairy products produced here. Establishment a milk procurement infrastructure poses the single biggest challenge to the dairy industry and forms the greatest barrier to entry.

VALUE CHAIN: -

The organized sector accounts for less than 15% of the milk produced in the country. Of this, the cooperative sector handles 60% and private dairies account for the reaming 40%. The rest of the milk is either consumed at farm level or sold as fresh non-pasteurized milk through the unorganized channels of local milkman. The share of organized sector has been rising steadily for example; the share of cooperative has risen from 1.8% in the 1970s to its current level of 7.5%. This share is likely to grow further at the cost of the share handled by local milkmen. This is due to various demographic factors.

REGULATORY ENVIRONMENT: -

In general, the dairy industry faces little government intervention. The key regulation concerns the setting up of Greenfield capacity, for which government permission is required. The Milk and Milk products Order (MMPO) regulate the production
of milk and milk products in India. The objective of MMPO is to prevent unhealthy competition among dairy plants for the limited quantity of raw milk available in milk sheds. MMPO prescribes state government registration for plants producing 10,000 to 75,000 liters of milk per day or manufacturing milk products containing 500 to 3,750MT of milk solids per year. Plant producing over 75,000 liters per day or more than 3,750 MT per annum of milk solids have to be registered with the central government. The order requires no permission for units handing less than 10,000 liters of liquid milk per day or milk solids up to 500 MT per annum.

A proposal to raise the exemption limit for the compulsory registration of dairy plants from 10,000 liters a day to 20,000 liters is being considered by the Animal Husbandry Department. The 75,000-liter limits are likely to be raised either to 100,000 liters or 125,000 liters in the amended order. Foreign equity participation up to 51% is automatically permitted. Indian producer receive no subsidies, for domestic sales or exports.

For balance of payments reasons, India maintained import restrictions until 1999 on a number of dairy and other agriculture products, consumer and textile goods. However these were removed as India’s balance of payment improved.

While restrictions on SMP and butter oil were wholly removed in 1995, restrictions on other products were removed in two stages as stipulated by WTO requirements from April 2001 as shown below:
-April 2000- Liquid milk and cream of fat content exceeding 6%; milk powder with fat greater than 1.5%; condensed milk without sugar; sweetened condensed milk; sweetened skimmed condensed milk.

-April 2001- Milk powder for babies, milk powder without sugar, butter, dairy spreads, butter oil, fresh/processed cheese. All dairy imports require a sanitation permit issued by the Department of Animal Husbandry.

India’s commitment to the WTO on dairy products relates to binding of tariffs. There were no other commitments on tariff quotas, minimum access levels, domestic support or export subsidies. The basic import duty on the dairy products listed below ranges from 35% to 60% and can be raised to 120% bound rate duty, if necessary. Trade in dairy products is largely limited to export of casein and milk powder, and import of butter oil and milk powders. Imports are chiefly driven by the price differential between the domestic and international markets rather than by domestic shortages.

CO-OPERATIVE DAIRY IN INDIA:-

In India, milk is processed and marketed by 170 Milk Producers’ Cooperative Unions that are grouped to from 15 state Cooperative Milk Marketing Federations.
GCMMF, for example, represents Gujarat state’s federation of milk processing co-operatives, while APDDCF represents it for Andhra Pradesh.

The major dairy cooperatives are identifiable by the strong brands they have created—these include Amul (Gujarat), Vijaya (Andhra Pradesh), Verka (Punjab), Saras (Rajasthan), Nandini (Karanatak), Milma (Kerala) and Parag (Uttar Pradesh).

State cooperatives have had varying degrees of success in organizing milk production. In Gujarat, cooperatives procure 31.4% of the total milk production, against a national average of 7.5%. The other success stories include Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra.

The National Dairy Development Board (NDDB) supports the operations of the dairy cooperatives. NDDB supported their development by providing them with financial assistance and technical expertise.

NDDB also undertakes dairy projects under its own umbrella for the development of the sector. One such projects, called Mother Dairy, marketed milk in key Indian cities. Mother Dairy operations in Delhi were recently incorporated to form a 100% NDDB owned company called Mother Dairy Fruits and Vegetables Pvt. Ltd.
DAIRY COMPANIES IN INDIA

PROCESSING AND DISTRIBUTION: -

Milk is processed into a variety of products in India. Processing takes place substantially in the unorganized sector and in the home.

In the absence of product with long shelf life most dairy products are distributed locally. National dairy brands such as Amul, Nestle and Britannia use multiple dairy plants, which they either own or out sources at various location to source dairy products. The marketing of national brands focuses on products with long shelf lives. These are tropically western products such as cheese, ice cream and butter. Recently, companies have lunched lassi and curd on a national scale on the back of significant advancements in the shelf-life of these products.

DAIRY COMPANIES: -

Both cooperatives and private dairy companies are active in the Indian dairy market. Most companies have a regional presence and a products portfolio limited to liquid milk, ghee and butter.
OVER CAPACITY PROBLEMS: -

Dairy-processing companies are marked by significant over-capacity, especially those in the private sector. Total processing capacity is estimated at 59 million liters per day as compared to the processing average of 33 million liters per day. The key reasons for this are:

- Inability to establish a procurement set-up to source sufficient milk. Several private dairies have set up processing capacity but lack a clear understanding of the challenges posed by milk procurement. Procurement by private dairies is difficult for two reasons. The fact that the average farmer has just one or two animals means that the dairy needs to tap a very large area to procure sufficient quantity.

The investment required for setting up appropriate procurement infrastructure becomes prohibitively expensive. The procurement problems of private dairies are compounded in regions where the dairy cooperatives have a stronghold and farmers are not willing to sell milk to private dairies.

INADEQUATE MARKETING INFRASTRUCTURE: -

Most dairies have focused on commodity products such as liquid milk and butter oil, which are marked by low margins and huge competition from unorganized players. These dairies have not focused on establishing a marketing platform and their utilization of capacity has therefore, been constrained by their inability to sell.
Indian dairy products, like buttermilk, lassi and curd, have strong demand growth and face limited competition. However, producers have been unable to launch these products successfully because investment in research to increase their shelf life have been lacking.

**FUTURE STRATEGIES**

**PROCUREMENT AND PROCESSING COMPANIES: -**

Such companies will specialize in manufacturing dairy products, primarily on contract for other large players. Many of the Indian dairy companies are likely to be forced to adopt this position, as they find their marketing resources to be inadequate in comparison with other large marketing players, including the dairy MNCs. It likely that these companies would continue to market some products, such as liquid milk, butter and ghee, in their region on a limited scale. These companies would also focus on the production of milk powder, industrial product such as casein and whey protein concentrated (WPC) for export or sale in wholesale markets in India.

The long-term sustainability of these companies would b determine by the contracts that they enter into with other marketing companies. The other factors that would affect their sustainability are: *the procurement infrastructure they establish *the quality of milk and milk products produced *their ability to provide a range of dairy products to meet all the customer requirements *the ability to
supplement their income from contract manufacturing by marketing some products locally under their own brand name.

One company following this positioning strategy is Dynamix Dairy. The company has long-term supply arrangement with several large companies, such as Nestle, Britannia and Mc Donalds. The company supplements this activity with exports of casein, the local sales of products ghee carrying its own brand. Success of such companies would depend on levels of capacity utilization achieved.

MARKETING COMPANIES: -

These are primarily the multinational companies, whose focus has been on marketing dairy products. Either locally sourced or imported form their other manufacturing bases around the world. These companies are likely to adopt pan-Indian presences, for which owning processing capacity at various location across the country is not feasible. In order to successful in this position, the company must have: *a large products portfolio to justify the huge distribution and marketing costs *a products portfolio that may differ across different regions, based on preferences and cultures. *Suitable contract manufacturing arrangements with various dairy companies across the country, such that freight cost is minimized. One example of a company following this positioning strategy is Britannia. The company does not have any manufacturing facility; rather it has long-term sourcing arrangement with Modern Dairy in the, and Dynamix
Dairy in the west. Its products portfolio includes butter, cheese and flavored milk. Even though its dairy sales are not too substantial, the company’s risks are limited by the fact that its fixed costs of distribution are spread across Britannia’s other products, which are primarily backery items.

PROCESSING- CUM-MARKETING COMPANIES: -

These are the large food players with a very strong focus on dairy. They have either evolved from processing player with strong brands that acted as marketing platforms or from smaller marketing companies that established or acquired dairy- processing operations because the dairy sector assumed great importance in their portfolio. For example, cooperatives such as GCMMF and APDDCF commenced operations with a focus on procurement and milk processing.

In the process they managed to establish very strong brands. In order to leverage the brand equity, they are now exploring a strategy whereby they will sell their own products in their home region while entering into contract manufacturing arrangements with other dairy companies to procure and market dairy products under their brand name in other parts of the company such as Nestle which is primarily known for its marketing skills, preferred to establish its own dairy plant in India. Nevertheless, Nestle also uses a mix of sourcing from own dairy and other dairies to cater to the requirements of different regions across the country.
POSITIONING NEW PLAYERS

New entrants to Indian dairy industry should aim to adopt the positioning strategies outlined in this article. The strategy would depend on:

- The product portfolio envisaged.
- The region of operation, e.g. urban or all India or limited to one region
- The aim of entry into India. Would India be a market for products produced elsewhere or a production base?

It would be important for a new player to enter into a joint venture or alliance with an existing player in order to reduce time to market. Britannia’s recent alliance with Fonterra has heightened the other Indian dairy company’s need to partner with international dairy companies.

While evaluating the potential partners in India, the new player would need consider parameters such as management fit, quality of procurement infrastructure (and therefore additional investment that would be required in upgrading the milk quality), product capabilities, and strength of brand and distribution network.

The larger cooperatives, such as APDDCF, provide a sizeable processing capacity and an established national brand and distribution network for foreign companies envisaging entry into India. On the other hand, smaller private sector players such as
Hatsum Agro, Nilgiris and Vadilal provide a new entrant with processing capacity, good management fit, strong regional brands and a distribution network. Given the extent of overcapacity in the dairy processing sector, the acquisition route in establishing a manufacturing base is not expected to be difficult.

ROLE OF WOMEN IN DAIRY ENTERPRISE: -

In crop husbandry the specialized operations like selection and storage of seeds, seed treatment, transplanting, sowing, weeding, fertilizer application, harvesting, winnowing, threshing are carried out by women. In the small and marginal farm families, women engaged themselves in many of the farm operations either in their own field or others, as hired laborers. The rate of participation of women has been found to be 58.3% in marginal farms, 52.71% in small farms and 53.90% in medium farms.

It has long been recognized that women have an important role in livestock production, care and management and in the processing and sale of livestock production. In this sector, women's work includes collection of fodder and water, cooking grains for cattle, preparation of concentrate feed for animals, feeding the animals, cleaning and washing cattle shed, cleaning and bathing animals, milking, preparation of milk products, taking the animals for roadside grazing, management and marketing of milk, collection of cow-dung, preparation of cow-dung cakes and their storage, and
preparing manure for the farm. Though more than 95% of the work related to animal care is preformed by feminine gender, they do not own cows.

World economic profile of women shows that they represent 50% of the population, make up 30% of the official labour force, perform 66% of all working hours, receive 10% of world income and own even less than 1% of the world's property. Everywhere women as a group enjoy fewer advantages and work and opinions are undervalued. In many countries women earn less than men, and are prevented from owning land, face numerous obstacles to holding position of authority and face many threats of violence just because they are women.

It has been rightly observed that half of the women's work is unpaid and the other half is underpaid. There is no country where considerable differences are not found between the earnings of men and women and they have no control over their earnings.

In India although 87% of women are in agricultural industry only 36% of women have their own land the remaining work as agricultural laborers. In spite of women's preponderance in agricultural, it is estimated that only 5% of rural credit from multilateral banks ever reach women. Women's eligibility to receive technology and credit is questioned on the ground that they are not asset holders and do not have the status of a producer. Further more the existing loaning procedures are very cumbersome and prohibitive for women .In a nutshell woman have access neither to agricultural
information and services nor to production assets. Thus they suffer due to the limited access to the production resources.

Seasonal variation in agricultural timetable brings additional constraint and special problems for rural women. Women bear the brunt of hardship arising out of seasonal unemployment or under-employment.

Women’s activity in production and marketing is strongly influences by the stage of the family life cycle. The prescience of small children inhibits women's labour availability and mobility unless they are part of extended or multi-generation household. The lack of flexibility in terms of working hours, place and duration of work puts definite constraints on women of reproductive age. The lack of maternity care facilities also has negative impact on their productivity.

“BUNDELKHAND REGION”

The Bundelkhand lies between 24°27’ N latitude and 78°10’ to 80°34’E longitude. The river Yamuna, while the south and the west by Madhya Pradesh, demarcates the northern boundary of the region. The eastern boundary is determined by Allahabad district of Uttar Pradesh. The region has two commissioners with head quarters at Jhansi and Banda comprising the seven district, i.e. Jhansi, Lalitpur, Jalaun, Banda, Hamirpur, Mahoba and Chitrakoot (Karvi district). This is one of under developed region of the country,
owning to complexity of climate, edapic and socioeconomic limitation on one hand and significant past history and social customs on other hand.

The Bundelkhand has total geographical area of 29418Sq. Km. (which is the 10% of the area of u.p.) and population 67.30 million with a density of 228 people per Km² (1991 census). The total tonsils are 23, while the block and villages are 47 and 5234 respectively in Bundelkhund. The total number of towns is 51 among which only one, Jhansi class one town. The sex ratio is 847 females per one thousand males. The total literacy percentage stands 34.3 percent, while the female literacy in 19.34 percent and the male is 46.98 percent in the region. The share of geographical area in the different districts has recorded highest in Banda district (7624Sq. Km), followed by Hamirpur and Mahoba (5024 Sq. Km.), Jhansi (5024Sq.Km) and Jalaon (4565Sq.Km.). The land use of Bundelkhund is also noticeable factor, where the net sown area is about 61% of total land, while main other uses are under forest 8.6% garden and groves 6% fallow land 8.17% and parati

CLIMATE:

The location of the region creates a particular type of climate. This central position between monsoon type maritime climate of the east coast (the bay of Bengal) and tropical condimental dry climate of west (Indian desert) imposes the features of transition climate. The
climate of region is characterized by excessive heat during the summer months and mild cold during winter. Thus Bundelkhund falls under semi-arid climate with aridity index of 38 Lang's rain factor 34.9 and N.S. quotient 78.8 in Jhansi.

TEMPERATURE: -

The mean monthly maximum temperature ranges from 24.6°C in January to 42°-5° in May. The mean monthly minimum temperature varies between 99°C in January to 29.2°C in June. The normal mean monthly maximum temperature has been record as 45.7°C while. The peak maximum temperature was 47.8°C.The lowest minimum temperature has been recorded up to 5.8°C.

RAINFALL: -

Amount of annual precipitation in Bundelkhand varies between 90Cm to 100Cm. The study made for the last 50 years reveals. The fact that is uncertain, unreliable and variable. Ninety percent of the annual rainfall is received in 46 days during the rain season. The region gets maximum rainfall during. The months of July and August which provides 35 and 33 percent of the annual rainfall respectively. Area in northwest receives nearly 90Cm while the southeast 120Cm mean annual rainfall.
VARIABILITY OF RAINFALL: -

Analysis of 27 years (1941-1967) weekly rainfall data as regards percentage probability and coefficient of variation reveals wide fluctuation and considerable uncertainties. In the month of July the precipitation is recorded very high while the stage become moderate in the last two week of August. This position remains up to middle of September. In the last week of September it decreases up to 40 percent. Again some probability remains in January this variability leads to uncertainties in agricultural operations.

CLIMATIC CHANGES: -

The magnitude of decrease in mean monthly minimum temperature is conspicuous (3.5°C to 4.6°C) during the period from December to April. In the case of mean maximum temperature, the variation is not more than 1°C. The mean annual precipitation of the last twelve years is 27.5 mm more than that of the easily twenties:

WINDS: -

The average speed of wind is found to be the lowest (4.02Km per hour) during the winter season. In summer the speared becomes double to it (8.15 Km per hour) while in rainy season it is recorded to be decreased (6.5 Km per hour).
SEASONS: -

The seasons gradually convert into cool from mid October to February. December and January are the coldest months of the period. Sometimes, a little winter shower, locally known as Mahawat, occurs but it is not more than five percent of the annual rainfall. It is very useful for Rabi crops. The weather begins to be warmer just after March and temperature starts unceasing with the sun rising and warm speedy winds blow called ‘Loo’. Temperature starts falling from the third week of June and heavy rain starts from July. Maximum amount of total annual rainfall.

AGRO CLIMATE: -

FEATURES OF THE BUNDELKHAND REGION: -

The climate of the region represents a transition zone of tropical sub humid to semiarid and falls under hot moist semiarid and ecological sub region. It is characterized by dry summers and cool winters with mean annual temperatures between 24-25°C. The mean summer (April-May-June) temperature is 34°C that may rise to a maximum of 40-42°C during the months of May and June. The mean winter temperature (December-January-February) is 16°C, which May drop to 6-7°C in December and January.
The mean annual rainfall ranges between 800-1000mm covering 55-63% of mean annual PET (potential evaporanspiration, 1400-1600mm). The intensity of rainfall increase towards east. About 90% of the annual precipitation is received during monsoon season setting in the last weak of June and/or first week of the July and extending to 1st week of October in most of the years. There occurs brief precipitation of less than 30% probability in the first for night of January as winter rainfall.

The water balance studies show SMCS (soil moisture control section) gets dry from November onwards with intermittent moist spell during January in most of the years. The moisture index (IM) ranging between 30-40 in the area qualifies for moist semiarid condition. The moisture availability period ranges from 120-150 days, which begins from first fortnight of July and ends by the first fortnight of November with water surplus of 100-300 mm during July to September.

The SMCS remains partly or completely dry from February till middle of June accounting for more than 90 cumulative days in a year and as such the soil moisture regime qualifies to be ustic. The MAST (mean annual soil temperature) is >22°C and the difference between MSST (mean summer soil temperature) and MWST (Mean winter soil temperature is greater than 5°C qualifying for the hyperthermic soil temperature regime (Mandel et. al 1995).
AGRICULTURE AND CROPPING PATTERN:

The region comprises one of the backward regions and traditional agriculture is practiced in major parts although population mostly depends on agriculture for survival. Out of the total geographical area of 2.9 mha. Net sown area is about 2 mha. While grass cropped area is 2.38 mha. Out of the total area, grass irrigated area has been reported as 0.82 mha (34.5%).

The dominant crops are wheat, gram and jowar. The other crops are Arhar, lentil and inseed. Rice also occupies significant area in Band and Jalaun districts.

As rainfed agriculture is predominant, major area is under single cropping. In kharif season, jowar is the dominant crop while lentil, gram and linseed are grown with residual moisture in Rabi. Under irrigated conditions; wheat is mostly grown with Rabi pulses and oilseeds as pure or mixed crops. Cultivation of Arhar on the bounds of paddy fields is a general practice. Major vegetables are potato, onion, ginger and tomato. Mango, guava, ber and citrus are cultivated as fruit crops. Major cash crops of the region are sugarcane, betel leaf, and tobacco and sun hemp.

THE AREA UNDER DIFFERENT PRINCIPLE CROPS IN JHANSI DISTRICT DURING 1993-94:
Once irrigation available it in cropping patterns, cropping system and cropping intensity by including more remunerative high value crops and the integrated intensive holistic farming system. To increase efficiency of irrigation, more efficient methods like sprinkler and drip must be used.

**Table-1: 4 the area under different principal crops in Jhansi district (1993-1994)**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheat</td>
<td>113484</td>
<td>31.50</td>
</tr>
<tr>
<td>2</td>
<td>Groundnut</td>
<td>21417</td>
<td>05.90</td>
</tr>
<tr>
<td>3</td>
<td>Total pulses</td>
<td>170383</td>
<td>47.37</td>
</tr>
<tr>
<td>4</td>
<td>Maize</td>
<td>2565</td>
<td>00.80</td>
</tr>
<tr>
<td>5</td>
<td>Paddy</td>
<td>2143</td>
<td>00.60</td>
</tr>
<tr>
<td>6</td>
<td>Sugarcane</td>
<td>120</td>
<td>00.03</td>
</tr>
<tr>
<td>7</td>
<td>Other prime pulses</td>
<td>49940</td>
<td>13.80</td>
</tr>
<tr>
<td>8</td>
<td>Total area shown</td>
<td>360552</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*CEREALS AREA, PRODUCTIVITY AND GROWTH RATE:*

Among cereal crops paddy and wheat are relatively more important crops than the Jawar and Barley. In Jhansi district paddy is replacing Jawar in Kharif in kabar and to some extent in Mar soils.
Crop paddy is a new innovation for Jhansi district; it has covered kharif fallow land significantly. The area and productivity of Paddy crops has increased by 84.62 percent and 21.74 percent respectively. The area and productivity of Jowar is decreasing by 50.36 percent and 2.82 percent respectively. The productivity of wheat is increasing by 38.67 percent, which indicates the high use of critical inputs and price support announced by Govt. of India. It is also evident from the table -1: 4 that wheat has substituted area of Gram and Lentil. Table-1: 4 indicate area under different principal crops in Jhansi district.

Among oilseeds the area and productivity of Soybean crops and mustard is increasing with as high rate 502.91% and 139.49% respectively. Mustard has occupied the second place. The increase in area and productivity of mustard is as much as 219.81% and 45.38% respectively. The other oilseeds like Til, Groundnut and linseed are also increasing.

It is the evident from the table-1: 4 that potato, tomato, onion and bringer are important vegetables. Ginger, garlic and turmeric spices are grown in baruasagar area of Jhansi, which is famous for ginger and calocacia.

It is evident from the result that a very small area of 6.9% is being used for double cropping. Major cultivated area of 47.3% is utilized for pulse production. Out of total cultivated area 27.5% and 72.0% area is covered under Kharif and Rabi crops respectively. Zaid
crops are grown only in 0.37% of cultivated area where assured irrigation is available.

CROPPING PATTERN:

Introduction of canal irrigation and price support system by government of India through bring dramatic change in cropping pattern in other zones in the state of U.P. during last two decades but failed to do so in Bundelkhand zone, because rained agriculture still dominates in this zone having only 26.9% irrigated area. Cropping intensity of only 111.2% indicates the facts that major area of the zone still remains under single cropping.

Table -1: 5 Existing cropping pattern in Jhansi

<table>
<thead>
<tr>
<th>District</th>
<th>Cropping Intensity</th>
<th>Net area sown (Lakhs ha)</th>
<th>Cropping (% area sown)</th>
<th>Area sown more Then once (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jhansi</td>
<td>111.2</td>
<td>3.33</td>
<td>27.5</td>
<td>72.3</td>
</tr>
</tbody>
</table>
NATURAL RESOURCES OF BUNDELKHAND REGION

(1) SOIL: -

The soils of Bundelkhand fall into two main groups viz. red and black soil. The red soil, which is derived from disintegration of pink granite, exists specially in districts of Jhansi and Lalitpur. The grain size of the soil varies from medium to coarse. Crops suffer more in these soils due to its poor water holding capacity. The black soils are clayey and usually occur in low laying area of dist Jalaun, Hamirpur, and Banda. The grain size of the soil varies from fine to medium having high water retaining capacity. These two main soil groups generate four soil series, locally known as Raka, Parwa, Kabar and Mar. The broad distinguishing feature of each of these soil series are given below: -

RAKAR: -

Raker soils are coarse and gravelly textured, reddish to brownish red in colour. The depth varies from few inches to about two feet with parent rock lying at the bellow. The soils hardly retain moisture for the use of crops. Thus, this soil is fit for growing crops like sorghum, urd, moong, sesame, groundnut etc.
PARWA: -

Parwa soils are loam to sandy loam in texture. The colour varies from gray to brownish gray and deeper to reddish gray. These soils are of medium depth (40-75cm.) and the parent rock is found at the bottom of soil at greater depth than Raker soils. The soils are although poor in orgain matter, is fairly productive. Good management practices including proper irrigation, adequate manuring with bulky organic matter and optimum does of fertilizer all crops can be grown in these soils.

KABAR: -

Kabar soils are clayey, coarse grained in texture and black in colour. These soils are considerable depend the parent rock lies at greater depth. Wetting these soils retain sufficient moisture, where on drying cracks occur and usually associated with poor drainage crop like paddy can be grown successfully during Kharif

MAR: -

Mar soils are black in colour, fine texture and of considerable depth. These soils are prone to a very marked extend of swelling and contracting during wet and dry periods. On drying large cracks and very vide fissures develop. During wet periods, these soils develop
very poor physical condition due to their peculiar characteristics and behavior towards moisture. Being good moisture retentive soil, Rabi crops like wheat and gram can be grown even without any irrigation.

Among four major soil types, parwa predominates in Bundelkhand zone that accounts for 38.50 percent of the total cultivated area fallowed by kabar (31.45%) Rakar (17.63%) and Mar (12.42%). Besides Parwa, Rakar, soil predominates in Lalitpur and Banda districts where as Kabar in Hamirpur, Banda and Jalaon. Almost all soil types suffer from splash erosion to deep gullies.

(2) WATER RESOURCE:

Bundelkhand region receives an average annual rainfall of 1000mm. The annual rainfall ranges from 800mm in the north-west to 1300 mm in south-east about 90 percent of the total rainfall is received during the period July to September.

Thus the total quantity of annual rainwater received in the region is about 7lakh ha.m. Besides, many perennial rivers run through the zone. The major river Yamuna, flowing from west to east from the northern boundary of the region, while its many important tributaries, viz. Sindh, Betwa and Ken along with their tributaries drain the entire Bundelkhand region in to river Yamuna. The important tributaries are; Saprar, Shanjad, Sajnam, Jamin, Pahuj, Dhasan and Sonar. The letters ones are in flow mainly during the rainy season. No estimation of quantity of water is made and only a
fraction of water from Betwa, Saprar, Pahuj, Baghain, Shahjad, Jamini, Ken, Ohan, Barwa, Dhasa, Arjun, mageria, Chadrawal, Kealari, Gunsh and Yamuna (through lift pumps) is being utilized presented for irrigation.

(3) FOREST AND ORCHARD: -

Under forest Bundelkhand zone constitute only 8.1% area. The per capital forest area of the zone found to be 0.044 ha which reduced to 0.036ha in the period of about ten years. The zone has 36000 ha area under fruits. The maximum area under fruits trees in Banda followed by Jhansi and leas in Hamirpur.

More dense forest is found on the banks of the rivers like Betwa, Ken, Sindh, Nevada, Jammer, and Dhasan, which help in the folowishing of local business in the area. These forests are famous for its wood like timber, tendu, mango, macca, neam, pepal, bargad, palash and babul. The wood of semar and mang tree is used for matchsticks, tendu for bide making, khair for preparing kattha, and gum is also prepared from babul tree. Various types of furniture prepared from these wood. Jhansi, Katni, Satna have become the hub of bidi industry. Mana is actually the fruit of Bundelkhand and is used in edible oils, alcohol, medicines, etc. chirongi is found in alrerdance in the forests of Bijawar.

The forests of Bundelkhand contain many wild animals like lion, leopard, wild boor, elephant, neelgari, deer, cheetal, bear, fox,
jackal, rabbits etc. and birds like parrot, koyal, neelkanth, crow, eagle, cultures, etc.

**LAND RESOURCE:**

Land is a scarce resource on which the very existence of man depends. Land cover in Bundelkhand region is a complex and dynamic owing to combination of factors viz. topography, geology, hydrology, soils, micro climates and community of plants and animals that are continuously interacting under the influence of climate and people's activities. Since the availability of this basic resource is limited hence there is an urgent need to strick a balance between the competing elemis on the land resources between various activities and with regard to its sustainability and capability. The continuous misuse and exploitation of land and allied resources have resulted in its degradation and destruction. As result of poor planning and in many cases because of unscientific and ruthless exploitation of natural resources, we have degraded our physical environment. By environment i.e. the whole complex of climatic, soil, water and biotic factors on which we all subsist and on which our entire agricultural and industrial development depends. Rapid economic development is turning India into a vast wasteland. If poverty in pre-independence India was the result of under utilization of resources, there is every possibility that poverty, unemployment and in quality of modern India would continue to paresis due to the destruction of environment.
LAND UTILIZATION:

The utilization of land in Bundelkhand region has total wasteland of about 613880 hectares, which is 20.73% of total geographical area (2960910 hectares). These wastelands can be improved by sustainable land use pattern.

Table-1: 6 Source of irrigation in Bundelkhand region
(2001-2002)

<table>
<thead>
<tr>
<th>Districts</th>
<th>Net-irrigated area</th>
<th>Cannel cesspool</th>
<th>Government cesspool</th>
<th>Personal cesspool</th>
<th>Other sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaloun</td>
<td>159365 (100.00)</td>
<td>117287 (73.60)</td>
<td>9762 (6.12)</td>
<td>20078 (12.60)</td>
<td>12238 (7.68)</td>
</tr>
<tr>
<td>Jhansi</td>
<td>196926 (100.00)</td>
<td>90073 (45.74)</td>
<td>2080 (1.06)</td>
<td>3637 (1.85)</td>
<td>101136 (51.35)</td>
</tr>
<tr>
<td>Lalitpur</td>
<td>187789 (100.00)</td>
<td>55910 (29.77)</td>
<td></td>
<td>12535 (6.67)</td>
<td>119344 (63.55)</td>
</tr>
<tr>
<td>Hamirpu</td>
<td>101447 (100.00)</td>
<td>34494 (34.00)</td>
<td>13240 (13.05)</td>
<td>24880 (24.52)</td>
<td>28833 (28.43)</td>
</tr>
<tr>
<td>Mohoba</td>
<td>101300 (100.00)</td>
<td>34935 (34.49)</td>
<td></td>
<td>1110 (1.10)</td>
<td>65255 (64.41)</td>
</tr>
<tr>
<td>Banda</td>
<td>112477 (100.00)</td>
<td>62434 (55.50)</td>
<td>10289 (9.15)</td>
<td>19655 (17.47)</td>
<td>15099 (17.88)</td>
</tr>
</tbody>
</table>
Table-1: 6 show that in 2001-02, mostly 411935 hectares were irrigated by cannal. Cannal accounts for 46.06 percent of total irrigated area and gradually, by other sources, personal cesspool, government cesspool about 39.62%, 10.39% and 3.93% of total net irrigated area in Bundelkhand Region.

**LIVESTOCK IN BUNDELKHAND REGION**

The Bundelkhand region comprising of parts of Uttar Praddesh (Banda, Jalaun, Hamirpur, Jhansi, Lalitpur, Mahoba and Chitrkoot district) and M.P.(Datia,Tikamgarh,Chhatarpur,Panna) India has a semiarid environment and is predominantly an agricultural economy. Bundelkhand has 9.2 million livestock (cattle, Buffalo, Goat, and sheep are 5.4, 1.6, 1.8 and 0.4 million, respectively) population, which is one of the densest in terms of livestock per unit of cultivated land. Average size of the land holding in Bundelkhand is 1.28 ha. Of which most of them are marginal farmer who dependent wholly or partially on livestock farming of the available land less then1% is
used for the cultivation of fodder crops and majority of the fodder fed to the livestock being sourced from the crop residues. About 19.87-lakh ha.of land is available for grazing of the 30.16-lakh adult cattle units (ACU) in Bundelkhand region. Average production of forage from this grazing area is less than 21/ha/year, which is not even sufficient for one adult cattle unit (ACU) as the normal requirement is 2.55/year. Livestock production in this region heavily depends on traditional feeding methods including most common “Anna Pratha”. Further, sustained and high production growth rates, combined with limited and rapidly diminishing land holds and land for food grains and cash crops led to shortage of feed and fodder to livestock in this region, which resulted in over grazing of the available land and practice of “Anna Pratha”. The over grazing pressure (ACU/ ha) was 4.74 in UP part of Bundelkhand. While it was 2.84 in the MP. part. To over come this problem, efforts are necessary to increase forage production through establishment of proven silvipastoral systems on waste and community land. It produces 4.61 of forage (ha/year) and further practice of rotational grazing will allow belittling damage due to grazing and fulfilling the feeding requirements of livestock.
Table -1: 7 Livestock in Jhansi division[Year-2002-03]

<table>
<thead>
<tr>
<th></th>
<th>Jhansi</th>
<th>Lalitpur</th>
<th>Jaloun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cows</td>
<td>355294</td>
<td>409923</td>
<td>287073</td>
<td>1052290</td>
</tr>
<tr>
<td>Male</td>
<td>127786</td>
<td>145222</td>
<td>86588</td>
<td>359596</td>
</tr>
<tr>
<td>Female</td>
<td>129912</td>
<td>136778</td>
<td>98742</td>
<td>365432</td>
</tr>
<tr>
<td>Calf &amp; She calf</td>
<td>107496</td>
<td>127923</td>
<td>101743</td>
<td>337162</td>
</tr>
<tr>
<td>Total Buffaloes</td>
<td>142118</td>
<td>114091</td>
<td>195775</td>
<td>451984</td>
</tr>
<tr>
<td>Male</td>
<td>1247</td>
<td>2470</td>
<td>5458</td>
<td>9175</td>
</tr>
<tr>
<td>Female</td>
<td>83827</td>
<td>61328</td>
<td>105518</td>
<td>250673</td>
</tr>
<tr>
<td>Calf &amp; Filly</td>
<td>57044</td>
<td>50293</td>
<td>84799</td>
<td>192136</td>
</tr>
<tr>
<td>Sheep</td>
<td>69500</td>
<td>23076</td>
<td>47258</td>
<td>139834</td>
</tr>
<tr>
<td>Goats</td>
<td>205165</td>
<td>13128</td>
<td>214180</td>
<td>432473</td>
</tr>
<tr>
<td>Others</td>
<td>53895</td>
<td>27754</td>
<td>49181</td>
<td>130830</td>
</tr>
<tr>
<td>Total</td>
<td>825972</td>
<td>587972</td>
<td>793467</td>
<td>2207411</td>
</tr>
</tbody>
</table>

**JUSTIFICATION:**

In Bundelkhand region, Majority of farmers is small and marginal engaged in dairy enterprise for their livelihood. They maintain milch animal due to small size of holding and ample amount of family labour. Therefore Dairy
business play an important role in providing employment opportunities in rural area and particularly to the weaker section of the community for the economic development of rural area in long run, it is necessary to encourage agriculture pursuits as the availability of land is getting diminished day by day low cost food and feeding, breeding, management and marketing make the dairy business viable in rural area.

The employment was oriented; women contributed more than 70% of the labour requirement in livestock production.

OBJECTS: -

The study has been conducted keep in mind specially fallowing objectives: -

i. To study of nature and extent of co-operative dairy enterprise in village of Bundelkhand region of Uttar Pradesh.

ii. To analysis cost and return per unit [per litter] of milk in Bundelkhand region.
iii. To examine comparative socio-economic aspects co-operative and non-cooperative dairy enterprising women in Bundelkhand Region of Uttar Pradesh.

iv. To examine marketable surplus and different channels used in marketing of milk and its production Jhansi district.

v. To suggest remedies and measures for stream ling the adoption of dairy innovation in order to uplift the economy of dairy.

**HYPOTHESIS:**

1. The main source of income livestock and dairy enterprise after agriculture crops in different source of income in Bundelkhand Region.

2. Per unit Expenditure decrease to milk production along with size increase of farm unit.
3. Participation of women more than man in dairy enterprise.

4. The share increases in consumer value to productive along with decrease to arbitrator in different channel of milk marketing.

5. Milk and milk product, production and consumption increase along with farm area increase.