STRATEGIES FOR IMPROVING FEED AND FODDER RESOURCES AND UTILIZATION FOR SUSTAINABLE MILK AND MEAT PRODUCTION FROM LIVESTOCK IN INDIA

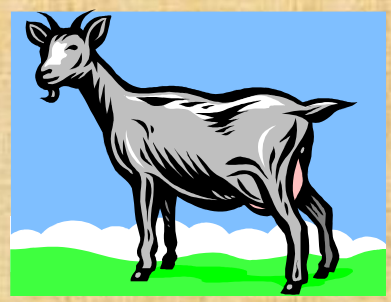


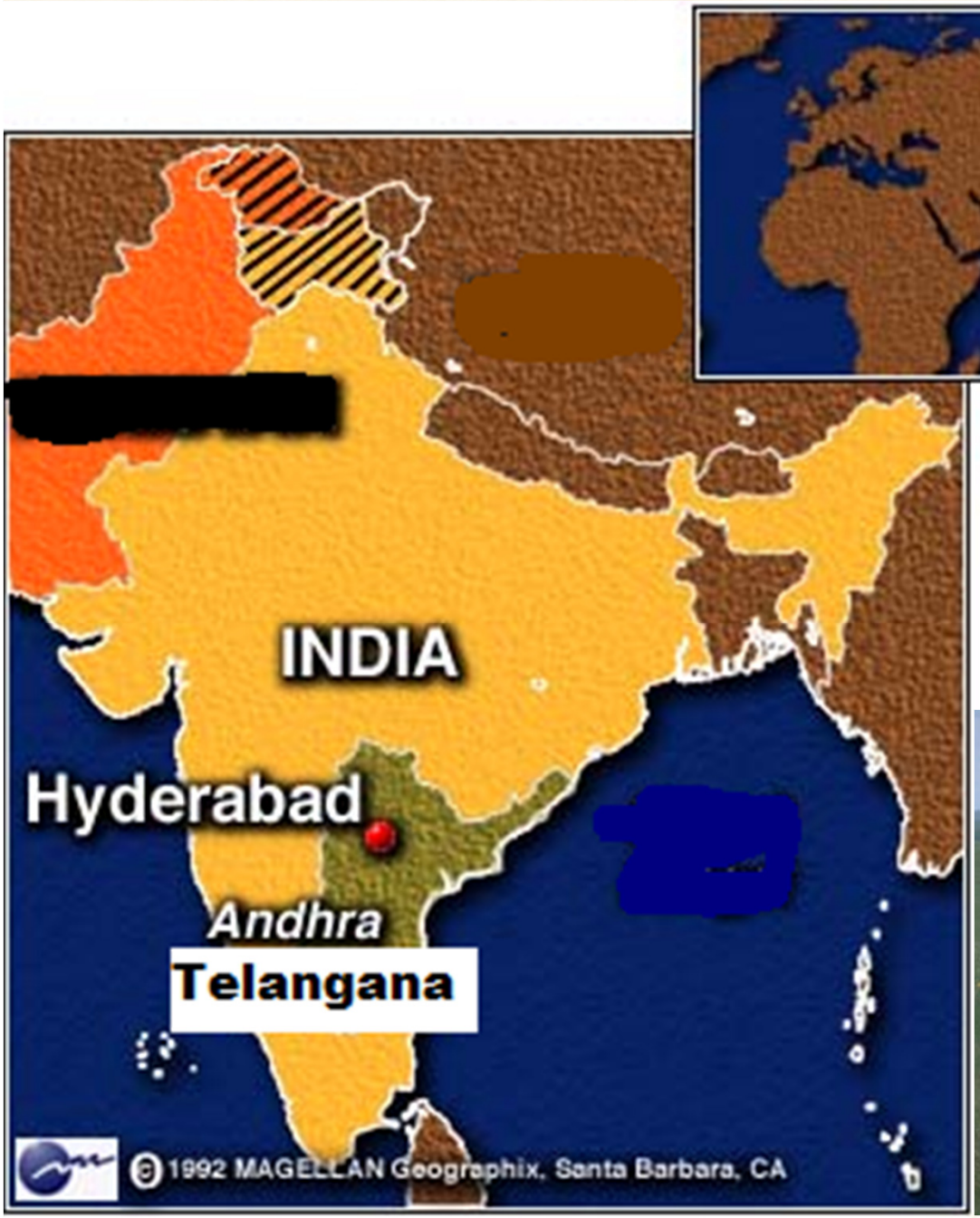
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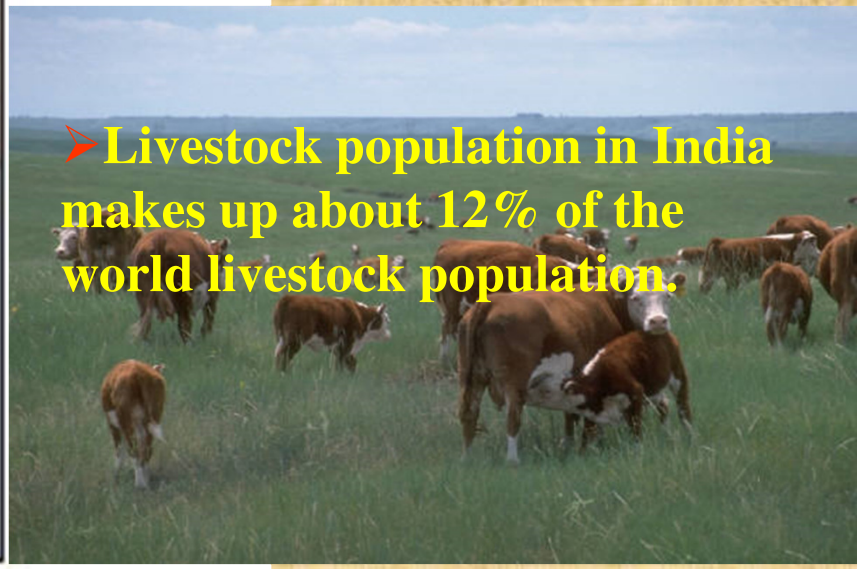






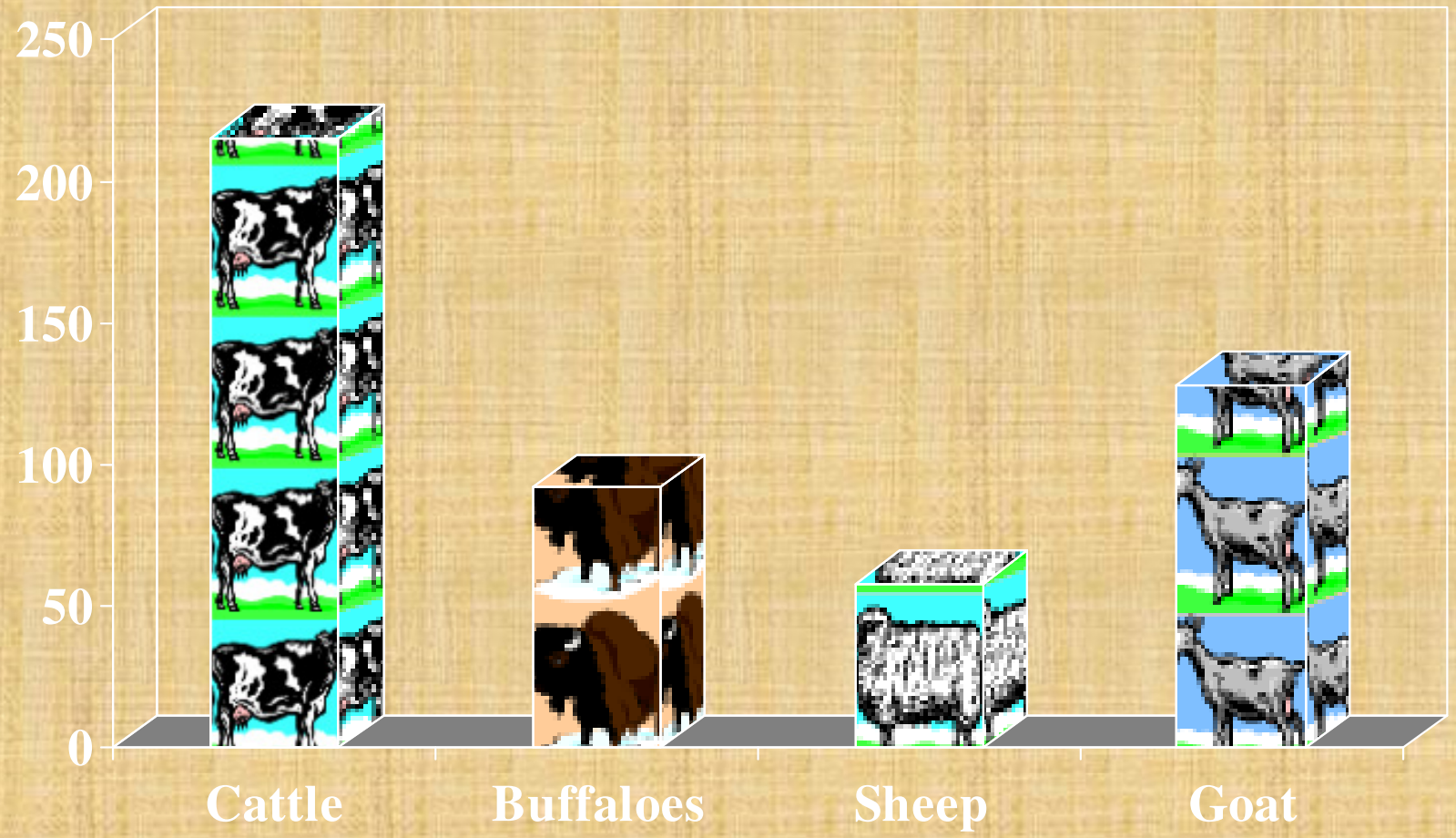


➢India with 3.28 million sq. km of land surface is endowed with diverse livestock species.

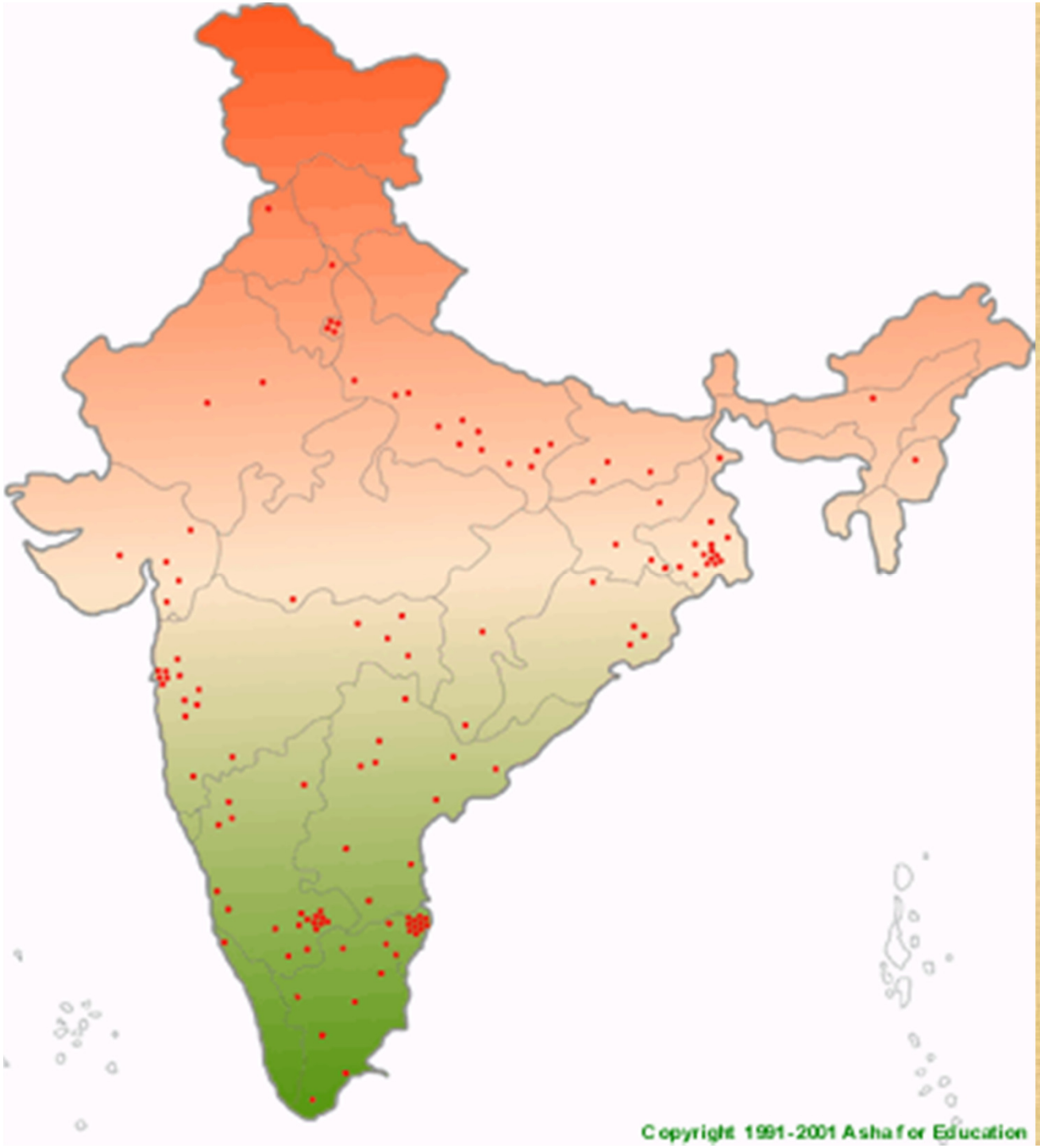


➢Livestock population in India makes up about 12% of the world livestock population.

LIVESTOCK WEALTH OF INDIA (IN MILLIONS)



➢India occupies premier portion in its livestock wealth with 215 million cattle, 98 million buffaloes, 61 million sheep and 124 million goats (FAO 2006).



The livestock sector is the backbone of India's economy interms of

- **Income**
- **Employment**
- **Equity**
- **Sustainability**
- **Foreign exchange earnings**

HUMAN AND LIVESTOCK POPULATION (in million) FAO, 2006

Population	India	Position in the world	Annual groth rates(1997-2003%)	World
Human	1000.9	-	-	-
Livestock				
Cattle	215	-	-1.18	1350.9
Buffaloes	92	I	1.43	170.3
Sheep	58	VI	1.12	1038.7
Goats	123	I	0.22	771.5
Pigs	16	-	0.28	941.5
Total	504	-	-	4401.6

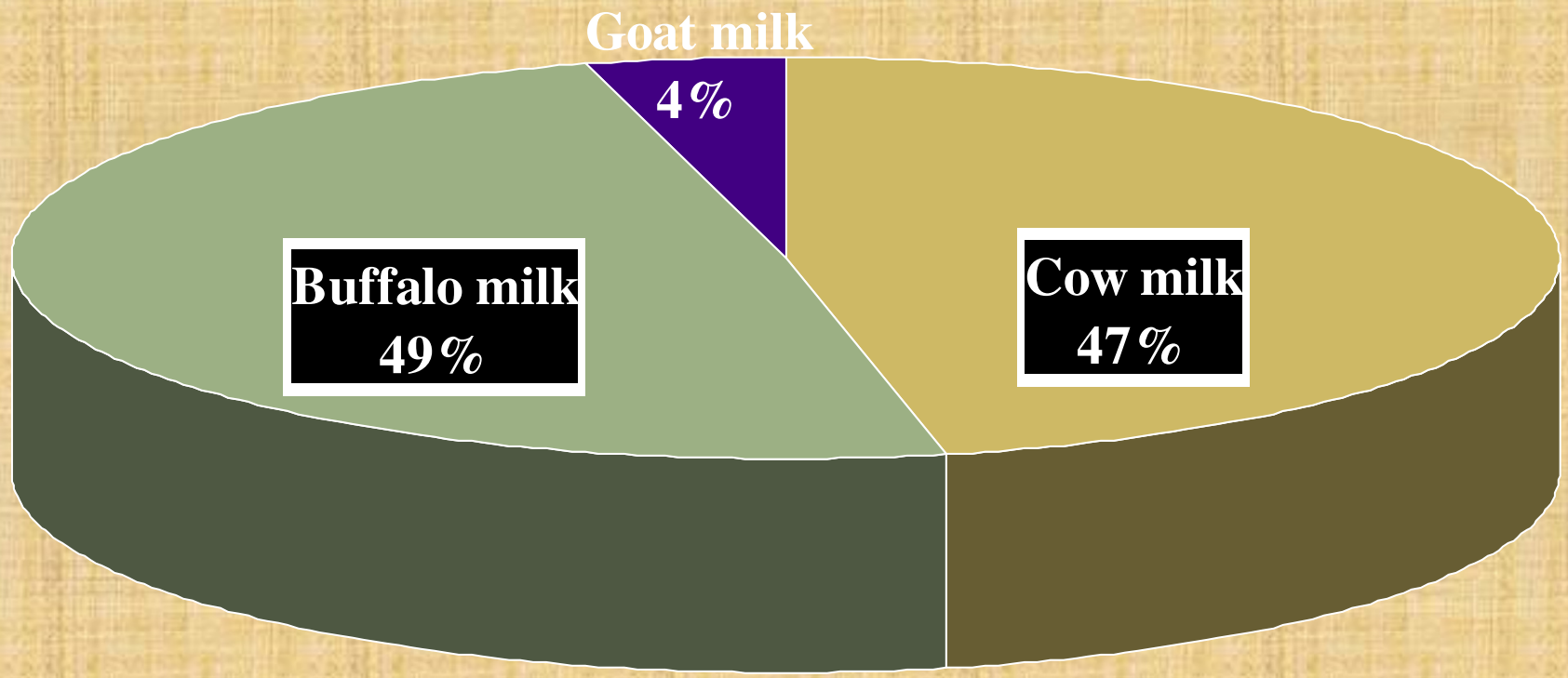
- Dynamics of livestock population and annual growth rate trends(1997-2003),indicate positive trend in the annual growth rates of buffaloes(1,43%),sheep(1.12%),goats(0.22%),
- Pigs(0.28%),negative trend in cattle(-1.18%).
- Buffaloes and goats, occupies FIRST in the world population ,are ANIMALS OF FUTURE INDIA , for poverty alleviation programme.
- With regard to cattle ,there is a clear shift of preference towards high yielding, cross bred population increased(22.8%), decreased indigenous cattle population (10.2%) . Increasing female cross bred population and female populations by 34% and 12.3%, respectively
- These trends reflected in milk production at 97.1 million tones in 2005-2006 which is 4.97% more than in 2004-05.

MILK PRODUCTION (M.MT/ANNUM) IN INDIA

	India	Andhra Pradesh
Cow milk	36	1.09
Buffalo milk	38	3.13
Goat milk	3.18	-
Total milk	77.18	4.22

Now, India is the largest milk producer in the world with 105 million, m tones/anum

AUGMENTATION OF MILK PRODUCTION IN INDIA



- LIVESTOCK-RURAL ECONOMY
- In India,70-80% of the total livestock produce is contributed by landless, marginal farmers and small land holders, who are under privileged(kurup,2004).
- Livestock are important assets for rural people and play a ctitical role in building their livelihood.
- Livestock rearing can provide a pathway out of poverty through improvements to household children, cash income, asset building and employment to womenfolk.
- More than 73% rural folk keep animals, which hold secutity and income from livestock accounts for 30-40% of tatal farm income.

- ANIMAL VS PLANT PRODUCTS
- Animal products are inevitably costlier than plant products. due to double conversion of basic food constituent apart from cost of processing of by-products into feeds.
- Soil nutrients are firstly converted into plant products, which upon feeding to animals, are converted into animal products. For example of double conversion is that the average efficiency of conversion of fertilizer nitrogen into plant protein is 50%, where as average efficiencies of convertion of plant protein are approximately 25,26,23,11 and 4%,for milk, egg, broiler chicken, meat, pork beef/mutton, respectively

- JUSTIFICATION FOR ENHANCING LIVESTOCK
- Animal relieves the ill health of resource poor rural people, resulting from essential energy-protein deficiencies.
- Animal products ,even in tiny quantities ,support physical and intellectual development of children and pregnant mothers.
- Human are omnivorous and majority are willing to pay higher prices for foods of animal origin, as they prefer mixed diet.
- The consumption of meat, milk, fish and eggs contribute to meet amino acids and trace elements for human ,have a considerable enjoyment value and are indicators of living standards
- Livestock farming facilitates recycling of nutrients and reduces environment pollution as well.

- Mixed crop-livestock farming contributes stability and sustainability. Stability is promoted by keeping of animals which serve as a form of insurance. Sustainability is promoted because of mixed crop-livestock system which is environmentally the most desirable system.
- Livestock proved to be a crucial link in nutrient recycling on small farms ,maintaining viability and environment sustainability of agricultural production.
- Intensive integrated mixed farming system has a variety of agriculture, aquaculture and livestock farming systems, involves intensive use of all biological resources of the farm to optimise the farm productivity per unit of soil, water and air. In India the prevailing and predominant system is integrated mixed farming system.

- In the last 25 years (1978-2003) the proportion of dietary calories coming from livestock products (milk, meat and eggs)in India has increased from 6-10 % where as in developed countries the proportion remained constant at 20%.

- There is a definite demand for animal products in India leading to LIVESTOCK REVOLUTION ,which is a consumer driven or demand driven.

Average percapita availability of milk consumption in India is 210g/d

Total milk produced is – 77.18 m MT/annum at present

As per RDA Recommendations milk consumption should be – 250g/d

Total milk required to be produced is – 91 m.MT/annum

A deficit of milk production shows the marked potential for growth in the dairy Industry

Productivity potential milk from livestock is very low because of

- poor genetic potential

For example in India the average milk production from cattle and buffaloes will be around 520kg/animal in 300 d of lactation

For example in developed nations milk production is 4000-6000 kg/per animal in 300d of lactation

- Inadequate feed and fodder resources,
- poor management and
- health cover.

MEAT PRODUCTION (M.MT/ANNUM) IN INDIA

Beef and Veal	1.41
Buffalo meat	1.410
Mutton and lamb	0.228
Goat meat (Chevon)	0.466
Pig meat (pork)	0.409
Other meats	0.406
Total	4.400

- **Intake of meat – 1.30 Kg/head/annum**
- **Requirement – 6.57 m. MT as against availability of 4.4 m.MT at present**

- **Similarly carcass weight of sheep and goats is around 10kg each, as against 25Kg in the developed countries which is also very low. This is mainly because most of the animals are not exclusively reared for meat purposes.**

- **FEED SUPPLY SYSTEM**

- **Feed and fodder are the major important inputs representing 50-75% of the total cost of production in any livestock products production like milk, meat and other livestock products influencing the survivability of the livestock enterprises.**

- **Milk production in India is increasing fast(at present at 105 million metric tones (FAO,2006). The feed and fodder resources are depleting very fast due to increased human population, urbanization and pressure on land to grow cereal and cash crops This lead to qualitative and quantitative insufficiency of feed and fodder resources.**

VIS AVIS COMPARISION AND DEFICIT BETWEEN REQUIREMENTS AND AVAILABILITY

NCA (1976)	**Roughages**	**Green fodders**	**38 % deficit**
		Dry fodders	**45 % deficit**
	Concentrates	**-**	**44 % deficit**
Ranjhan (1994)	**Roughages**	**Green fodders**	**25 % deficit**
		Dry fodders	**40 % deficit**
	Concentrates	**-**	**47 % deficit**
NIANP (Bang)	**Roughages**	**green fodders**	**44 &45%**
	Concentrates		**38%**

- Government of INDIA had initiated several research schemes to bridge the gap between avilable feed and ffodder resources and to meet the requirements during the five year plan periods.
- 1.ICAR has initiated AICRP on the **utilization of Agricultural by-products industrial waste materials (ABIP) for evolving economic rations for livestock**, as early as in 1967 at 4 research centres .
- 2.In the fifth five year plan 4 more centre were started.
- 3.In the sixth five year plan 2 more centres were started at APAU,Hyderabad and AAU Gouhathi.
- 4.In the eventh five year plan scope of the project was expanded and 3 more centre were added.

- **5. During this VII plan 3 more centres were added and project functioned at 11 centres.**
- **6.An Indo US project Conversion of Biodegradable Animal Wastes for Animal Feed was initiated and functioned at 5 centres.**
- **7. In the IX plan the project was renamed as Net work Programme on Agricultural By-products as Animal Feeds-Complete feeds. Functioned at 4 centres.**
- **8. In the X plan , the 3 net work projects were converted into ICAR- AICRP entitled Improvement of feed resources and nutrient utilizations in raising animal production at NIANP Benguluru with 22 centres .The objectives are to address different feeding systems and livestock production systems in the country through nutritional interventions in raising animal productivity and profitability.**

- SUSTAINABLE STRATEGIES FOR IMPROVING LIVESTOCK PRODUCTIVITY FOR ENHANCED MILK AND MEAT PRODUCTIN FROM LIVESTOCK

AVAILABILITY OF GREEN FODDERS

- Green fodder is not available as per the requirements for livestock feeding.
- The area under permanent pastures and other grazing lands in India is only 3.3% as against the recommendations of 8% of total cultivable area.
- Grazing lands are under continuous degradation due to exploitative stress
- Shrinking due to competing demand of cultivating food crops for meeting the demands of increasing human population
- Due to urbanization
- Due to industrialization.

Meeting the demands of quality forages to our livestock feeding is gigantic and challenging task.

•a. Only alternative is to increase the fodder production with in the limited area.

It is essential to improve fodder production by efficiently and effectively utilizing the available resources of land, water, and other sources for improved milk and meat production for future food security of huge population of the country.

THIS CAN BE ACHIEVED THROUGH MULTIPRONGED APPROACH

- **Strategies to increase forage production per unit area.**
- **Encouraging forage production in mixed farming systems**
- **Putting to good use of waste lands denuded, degraded, marginal and sub marginal lands for the development of pastures and agro forestry systems.**
- **Strategies for efficient utilization of available resources like crop residues non-conventional feeds and fodders.**
- **Representing to the governments for augumentation of feed and fodder resources**

1. STRATEGIES TO INCREASE FORAGE PRODUCTION PER UNIT AREA

- ☞ Evolving intensive fodder production systems with efficient utilization of land and other farm inputs for maximum forage production.
- ☞ Identifying improved fodder varieties on the basis of
  - High production potential
  - Better quality traits
  - Adaptability to different agroclimatic zones
  - Suitability to different farming situations
- ☞ Utilizing state Agril.University farms, AH departments and progressive farmers for production of quality seeds for distribution.
- ☞ Developing a system for assessing farmers needs and arranging timely supply of quality seed.
- ☞ Growing improved varieties of forage crops.

Contd……

- Taking up intensive forage crop sequences and /or intercropping systems for increasing herbage yield, improving forage quality and for year round forage production in milk shed areas.
- Taking up intergradations of forages as mixed inter or rotation crops with the existing food or commercial crops.
- Taking up grass and tree based systems like lay and alley farming for dry land areas and draught prone areas.
- Intercropping of legume fodders with grain crops.
- Taking up fodder production in tank beds in summer.
- Taking up forage production in problematic soils.
- Utilization of the electronic media to educate farmers through distant education about cultivation practices of various high yielding fodder varieties

2.ENCOURAGING FORAGE PRODUCTION IN MIXED FARMING SYSTEMS

- ☞ By inclusion of fodder crops in crop sequence.
- ☞ By growing short duration forage crops in the gap periods of main crops.
- ☞ By increasing the production of crops which provide forage as by products like sugar cane, sunhemp, cowpea, turnip, carrot, cauliflower etc.,
- ☞ By growing suitable fodder crops in fruit orchards for fodder as well as enriching the soil fertility. for example
- Mango, citrus, guava orchards – Anjan, Rhodes, Stylo, Siratro.
- Coconut and Banana orchards - Pillipesara
- Around Vegetable orchards – 3-4 rows of NB 21, Leucaena plants.
- Beettlenut Vine orchards – Sesbania plantation

3. PUTTING TO GOOD USE OF WASTE LANDS DENUDED, DEGRADED, MARGINAL AND SUBMARGINAL LANDS FOR THE DEVELOPMENT OF PASTURES AND AGROFORESTRY SYSTEMS

☞ **The following steps are suggested to restore the degraded grazing lands.**

- **Close the grazing lands from grazing for a period.**
- **Clearing off the undesirable bushes /trees**
- **Adopting soil and water conservation practices**
- **Preparation of land and manuring in strips**
- **Introduction of improved perennial grasses like *sehima nervosum*, *cenchrus ciliaris***
- **Application of fertilizers**
- **Introduction of desirable trees like *Acacia catecheu*, *Azadirachta indica***

Contd……

- **Adopting improved systems of grazing like**
  - **Continuous**
  - **Controlled grazing**
  - **Rotational grazing**
  - **Differred grazing**
  - **Differed and rotational razing**
- **Afterwards VILLAGE GRAZING LAND SAMRAKHAKA SAMITHIS are to be formed for proper maintenance of developed pasture lands.**

4. STRATEGIES FOR EFFICIENT UTILIZATION OF AVAILABLE RESOURCES LIKE CROP RESIDUES NON-CONVENTIONAL FEEDS AND FODDERS

A. General

- **Proper storage of crop residues and NCFR i.e. protecting them from rain and exposure to sun will prevent wastage and improve utility to an extent of 10-15%.**
- **Chaffing green dry fodders and feeding will prevent wastage and improve utility to an extent of 20-60%.**
- **Harvesting the green fodders at optimum stage to retain maximum nutrient.**
- **Conservation of fodders during lush season**
- **Judicious usage of crop residues at farm level.**

Contd……

Nutritional

- **Formulation of complete rations for efficient utilization of nutrients**
- **Development of low cost feeding strategies by utilizing locally available feed resources.**
- **Strategic supplementation of specific deficit nutrients for intensive milk and meat production.**
- **Catalytic supplementation of legume fodders leucaena fodders etc.,(Ravi and Ramaprasad 2005,2006,2007)**

1. **In India crop residues are the most important feed resources for ruminants COMPLETE RATIONS have been developed to utilize AIBP and NCFR in a more intensive way, by including processed (chaffing, grinding, or pelleting) roughages and concentrates, mixed into a uniform blend to avoid selection of feed ingredients by the animal. The complete feed formulation helps into development of low cost feeds, avoid refusals of unpalatable feeds ,improves nutrient utilization and provide adequate and balanced nutrients in optimum ratios of roughages and concentrates.**

2. **Complete feeds have a particular relevance and considerable future potential when viewed in the context of a shift towards more intensive system of meat and milk production. These rations can be fed to all class of ruminants.**

Contd……

Several researchers (Rama Prasad and Krishna, 1992,Reddy and Reddy 1990, Krishna mohan et al ,1988) conducted several experiments using small ruminants by including various crop residues like ground nut haulms , grass hays etc. At different roughage and concentrate ratios and observed improved feed intake, average daily gain and DM intake per Kg gain

Table5 complete rations for rumnants

Crop residues(Sehima nervosum hay,H.Contotus hay,sorgum/maize stover. Sun flower straw or cotton straw)	25 parts
Grond nut haulms	25 parts
Wheat bran	20 parts
Maize	11-18 parts
G N Cake	9-16 parts
Mineral mixture=Salt	3 parts

Fallen Banyan treeleaves	Lambs: included at 40%		Rama Prasad and Krishna (1992)
Ground nut haulms	Sheep: included at 50%		Rao A R,and Rama prasad (1994)
	Goats: included at 50%		Rao SBN et. Al.(1995)
	Sheep:included at 60%		Rama prasad (1992)
	Adult sheep: at 60%		Asharekha and Rama prasad (2006)
Legume crop residues			
Stylo,Horse gram, Cow pea,/Sunhemp hays	Urad chunie	Sheep: included at 50%	Rao D S and Rama prasad (1998)
	Green gram chunie	Buffaloes : included	Rao D S . et. Al (2000)

COMPRESSED FEED BLOCKS/DENSIFIED FEED BLOCKS

Densification of complete feeds reduces the volume of feed which makes its handling, storage and transportation easy.For production feed blocks ,mixtures of roughages and concentrates are compressed in amachine. Dr Amar Singh and his team from IARI, New Delhi developed block making machine which has been patented.Complete feed blocks for dairy animals are available.

COMPLETE FEED BLOCK (Reddy,D V .,1989)

Ingredient composition%	Nutrient composition%
Urea ammoniated wheat straw.73%	CP,8.4%
Wheat bran ,10%	DCP,5.1%
Molasses ,15%	TDN,58.82%
Minerals =salt ,2%	ME Mcal/Kg DM
Vitamin AD-3 10 g per 1oo Kg	

- **EXPANDER –EXTRUDER PROCESSING OF COMPLETE FEEDS**
- By expander and extrusion of complete feeds further improves its nutritive value. In this system ,combines the features of expanding (application of moisture, pressure and temperature to gelatinise starch) and extruding (pressing the feed through constrictions under pressure)The feed is conditioned to 16-17% moisture by adding water and then fed to machine.
- Expander and extruding processing is simple to operate with less maintenance cost and high production efficiency.

c. New terchnologies

- **Develpemnt of simple and economically viable and sustainable technology for increasing the nutritive value of low quality feeds.**
- **Urea treatment of cereal straw**

  4% urea, 50L water/100Kg, 7-21 d incubation
- **Specific processing techniques to reduce the amount of urea and incubation time like incubating supplementing with horsegram grain etc.,**
- **Use of urea – molasses – mineral UMMB.**

D. By-pass nutrients technology

- **Feeding of BY PASS PROTEIN sources in the rations of high yielding dairy cows more than 10L/d**
- **Feeding of BY PASS FAT in the form of Ca salts of fattyacids to lactating animals for improving milk production.**

E. Use of Non-conventional feed supplement

- Antimicrobial substances
- Enzymes
- Organic acids
- Probiotics

F. Use of Biotechnological products

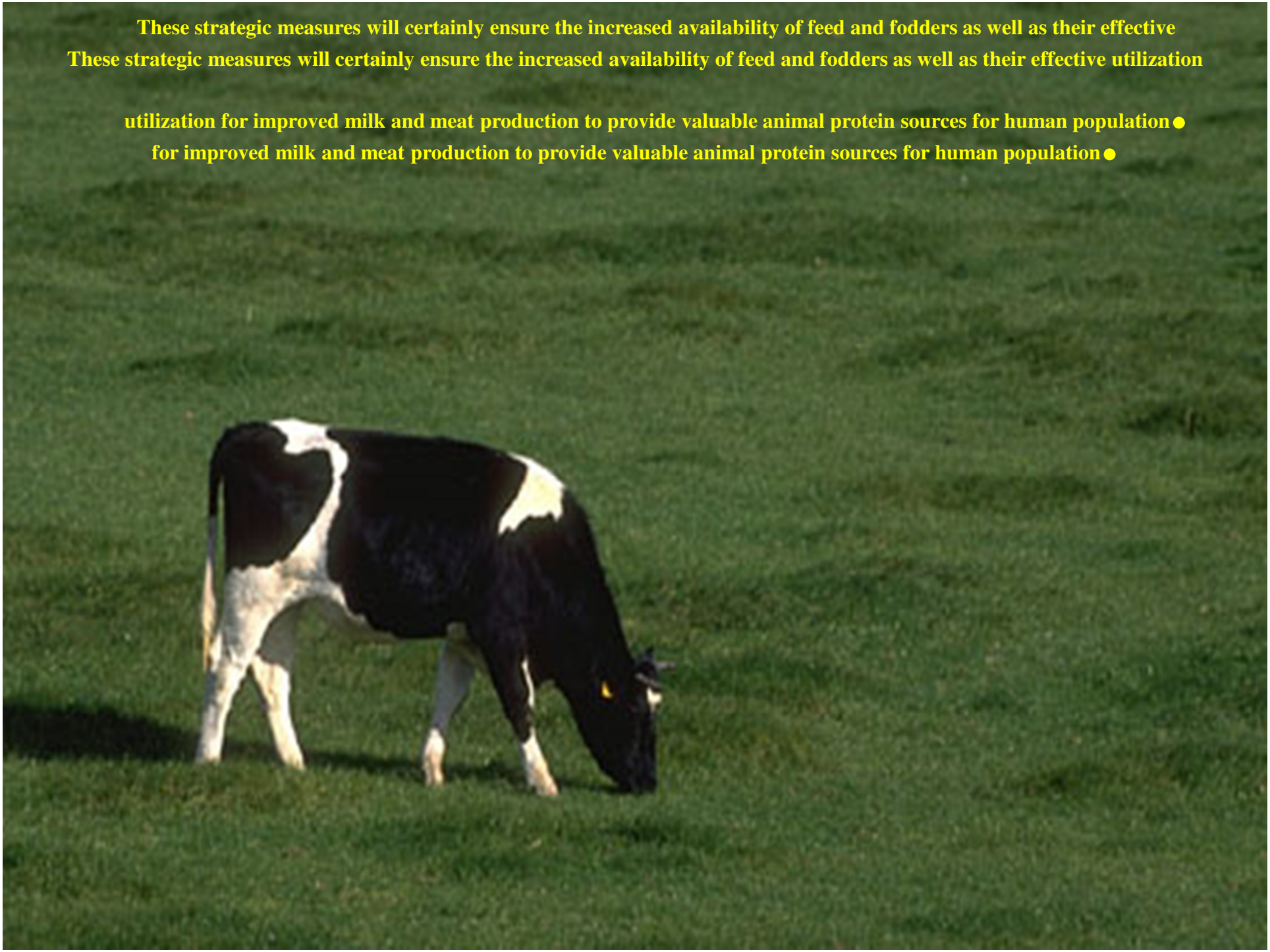
- Parental application of bovine somatotropin (BST) for increased convertion rate of nutrients in the animal system to bring dramatic change in the milk and meat production status. (10-20 better).
- Use of organic trace minerals Zn Methionine, Cu Lysine, Se yeasts etc.,

Addition of bacterial inoculants (Lactobacilli pediococcum sp) in silage making for improved fermentation process and for increased DMI digestibility and milk production.

5. REPRESENTING TO THE GOVERNMENTS FOR AUGUMENTATION OF FEED AND FODDER RESOURCES

- To increase the quota of molasses to reduce feed cost.
- To replace the present practices of exporting oil cakes, ricebran and their animal feed ingredients.
- To impose strict quality control measures for premixed and mineral mixtures.
- To take up plantation of fodder trees as an important component under the social forestry system.
- To constitute ‘Feed authority of India.

- **These sustainable strategic measures will certainly ensure the increased availability of feed and fodder resources as well as their effective utilization for improved milk and meat production from livestock to meet the animal protein requirements of growing human population in coming years in India.**


These strategic measures will certainly ensure the increased availability of feed and fodders as well as their effective
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utilization for improved milk and meat production to provide valuable animal protein sources for human population ●
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THANK YOU