

## CHAPTER 9

# STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION



- 9.1 *Animal Husbandry*
- 9.2 *Plant Breeding*
- 9.3 *Single Cell Proteins*
- 9.4 *Tissue Culture*

With ever-increasing population of the world, enhancement of food production is a major necessity. Biological principles as applied to animal husbandry and plant breeding have a major role in our efforts to increase food production. Several new techniques like embryo transfer technology and tissue culture techniques are going to play a pivotal role in further enhancing food production.

### 9.1 ANIMAL HUSBANDRY

Animal husbandry is the agricultural practice of breeding and raising livestock. As such it is a vital skill for farmers and is as much science as it is art. Animal husbandry deals with the care and breeding of livestock like buffaloes, cows, pigs, horses, cattle, sheep, camels, goats, etc., that are useful to humans. Extended, it includes poultry farming and fisheries. Fisheries include rearing, catching, selling, etc., of fish, molluscs (shell-fish) and crustaceans (prawns, crabs, etc.). Since time immemorial, animals like bees, silk-worm, prawns, crabs, fishes, birds, pigs, cattle, sheep and camels have been used by humans for products like milk, eggs, meat, wool, silk, honey, etc.

It is estimated that more than 70 per cent of the world livestock population is in India and China. However, it is

surprising to note that the contribution to the world farm produce is only 25 per cent, i.e., the productivity per unit is very low. Hence, in addition to conventional practices of animal breeding and care, newer technologies also have to be applied to achieve improvement in quality and productivity.

### 9.1.1 Management of Farms and Farm Animals

A professional approach to what have been traditional practices of farm management gives the much needed boost to our food production. Let us discuss some of the management procedures, employed in various animal farm systems.

#### 9.1.1.1 Dairy Farm Management

Dairying is the management of animals for milk and its products for human consumption. *Can you list the animals that you would expect to find in a dairy? What are different kinds of products that can be made with milk from a dairy farm?* In dairy farm management, we deal with processes and systems that increase yield and improve quality of milk. Milk yield is primarily dependent on the quality of breeds in the farm. Selection of good breeds having high yielding potential (under the climatic conditions of the area), combined with resistance to diseases is very important. For the yield potential to be realised the cattle have to be well looked after – they have to be housed well, should have adequate water and be maintained disease free. The feeding of cattle should be carried out in a scientific manner – with special emphasis on the quality and quantity of fodder. Besides, stringent cleanliness and hygiene (both of the cattle and the handlers) are of paramount importance while milking, storage and transport of the milk and its products. Nowadays, of course, much of these processes have become mechanised, which reduces chance of direct contact of the produce with the handler. Ensuring these stringent measures would of course, require regular inspections, with proper record keeping. It would also help to identify and rectify the problems as early as possible. Regular visits by a veterinary doctor would be mandatory.

You would probably find it interesting if you were to prepare a questionnaire on diverse aspects of dairy keeping and then follow it up with a visit to a dairy farm in your locality and seek answers to the questions.

#### 9.1.1.2 Poultry Farm Management

Poultry is the class of domesticated fowl (birds) used for food or for their eggs. They typically include chicken and ducks, and sometimes turkey and geese. The word poultry is often used to refer to the meat of only these birds, but in a more general sense it may refer to the meat of other birds too.

As in dairy farming, selection of disease free and suitable breeds, proper and safe farm conditions, proper feed and water, and hygiene and health care are important components of poultry farm management.

You may have seen TV news or read newspaper-reports about the 'bird flu virus' which created a scare in the country and drastically affected egg and chicken consumption. Find out more about it and discuss whether the panic reaction was justified. How can we prevent the spread of the flu in case some chicken are infected?

### 9.1.2 Animal Breeding

Breeding of animals is an important aspect of animal husbandry. Animal breeding aims at increasing the yield of animals and improving the desirable qualities of the produce. For what kind of characters would we breed animals? Would the selection of characters differ with the choice of animals?

What do we understand by the term 'breed'? A group of animals related by descent and similar in most characters like general appearance, features, size, configuration, etc., are said to belong to a breed. Find out the names of some common breeds of cattle and poultry in the farms of your area.

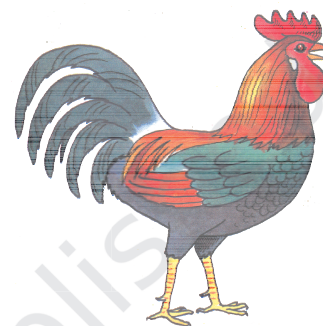
When breeding is between animals of the same breed it is called **inbreeding**, while crosses between different breeds are called **outbreeding**.

**Inbreeding** : Inbreeding refers to the mating of more closely related individuals within the same breed for 4-6 generations. The breeding strategy is as follows – superior males and superior females of the same breed are identified and mated in pairs. The progeny obtained from such matings are evaluated and superior males and females among them are identified for further mating. A superior female, in the case of cattle, is the cow or buffalo that produces more milk per lactation. On the other hand, a superior male is the bull, which gives rise to superior progeny as compared to those of other males.

Try to recollect the homozygous purelines developed by Mendel as discussed in Chapter 5. A similar strategy is used for developing purelines in cattle as was used in case of peas. Inbreeding increases **homozygosity**. Thus inbreeding is necessary if we want to evolve a pureline in any animal. Inbreeding exposes harmful recessive genes that are eliminated by selection. It also helps in accumulation of superior genes and elimination of less desirable genes. Therefore, this approach, where there is selection at each step, increases the productivity of inbred population. However, continued inbreeding, especially close inbreeding, usually reduces fertility and even productivity. This is called **inbreeding depression**. Whenever this becomes a problem, selected animals of the breeding population should be mated



(a)



(b)

**Figure 9.1** Improved breed of cattle and chickens (a) Jersey (b) Leghorn

# Breed (नस्ल)

A) cattle / cow Breed  
 ↳ BOS indicus on the basis of uses — They are divided in some groups

1) मिल्क (Breeds (milk cattle))

2) ड्राउट (Breeds) बोझ ढोले वाले

3) Normal utility Breed ⇒ Both are used

ड्राउट (Breeds)

Malvi	M.P. Raj
Jagori	U.P. Delhi Haryana

	मिल्क बोईस	distribution
1	गाँव	Raj, Guj'
2	Sahiwal (Best in India)	Punjab, Hary. U.P
3	रेड सिंधी (Sandhi)	Andhra pradesh
4	Dawni	Andhra pr
5	Rathi रती	Rajasthan

⇒ Holstein Friesian  
 Jersey, Guernsey  
 Ayrshire, Swiss  
 Brown Swiss

