

.POULTRY SCIENCE – UNIT-1

(4BZOE2B)

ECONOMIC IMPORTANCE OF POULTRY

- ❖ *Poultry makes a substantial contribution to household food security throughout the developing world.*
- ❖ *It helps diversify incomes and provides quality food, energy, fertilizer and a renewable asset in over 80 percent of rural households.*
- ❖ *Since the year 1970s, global production, consumption, and trade of poultry meat have grown faster than any other meat.*
- ❖ *During 1990s, when demand growth slowed for other meats, including fish, demand growth for poultry meat increased.*
- ❖ *Hence, poultry continued to lead the expansion of meat trade.*
- ❖ *Expansion has been most rapid in the developing Asia region, including China, South Asia, and Southeast Asia, as well as in Latin America.*
- ❖ *The emergence of the poultry sectors in developing countries, such as India, has the potential to affect global and U.S. markets for poultry products, feeds, and related inputs.*
- ❖ *With a population of more than 1 billion and real per capita incomes now growing 3-4 percent annually, India constitutes a large potential market for poultry meat.*
- ❖ *USDA estimates that India's poultry meat production grew about 6 percent annually during the 1980s, accelerating to 11 percent annually in the 1990s and nearly 19 percent during the 1997-2002 period.*
- ❖ *With poultry production of 1.4 million tons in 2002, India ranked as the sixth largest poultry producer in the world.*
- ❖ *India's poultry industry represents a major success story.*
- ❖ *While agricultural production has been rising at the rate 2-3 % per annum over the past two to three decades, poultry production has been rising at the rate of 8-19 % per annum.*

- ❖ *The annual turnover of poultry in India is around US\$ 7 500 million.*
- ❖ *Another major development in Indian poultry production is the spread of integration, especially in broiler production, both in southern and western parts of India.*
- ❖ *The most conservative estimates predict two- to three-fold increase in poultry production over the next ten or fifteen years in India.*
- ❖ *The poultry industry in India represents a major success story with an annual turnover of Rs 30 000 crores.*
- ❖ *Today, India is the third largest egg producer in the world (after China and the United States of America), and the nineteenth largest broiler producer.*

GROWTH AND STRUCTURAL CHANGE

- ❖ *Annual per capita consumption in India is only 42 eggs and 1.6 kg of poultry meat, which is below the levels recommended by the Nutritional Advisory Committee:- 180 eggs and 10.8 kg of poultry meat.*
- ❖ *Both egg production and poultry meat production appear to have registered a 100 percent growth in value terms over the 1995 to 2005 period.*
- ❖ *Meat is the most important product in the poultry sector having a 66.7 percent share of poultry.*

IMPORTANCE OF POULTRY IN THE NATIONAL LIVESTOCK SECTOR

- ❖ *India is one of the most important livestock-rearing countries, with a large population of cattle, buffaloes, sheep, goats and other species of livestock.*
- ❖ *The country has 1/6 of the world's cattle and about 1/2 of the world's buffalo population.*
- ❖ *India ranks sixth terms of sheep and goat population. The pig population is about 12.79 million.*
- ❖ *The improved layer bird population is around 104 million.*
- ❖ *Compared with the rest of livestock sector, the poultry industry in India is better organized and is progressing towards modernization.*

- ❖ *The relative share of poultry in the national economy has remained below 1 percent, but its share in the livestock sector is continuously rising.*
- ❖ *The relative share of poultry in total livestock production has risen from 10 % (1996-1997) to 12 % in 2003-2004.*
- ❖ *The relative importance of poultry meat over other meats*
- ❖ *Poultry is today the major source of meat in India. Its share in total meat consumption is 28 percent, as against 14 percent before 10 years.*
- ❖ *Expanding domestic production and increasing integration have pushed poultry meat prices downward and stimulated its consumption.*

ROLE OF POULTRY IN EMPLOYMENT

- ❖ *In 1980, when the poultry sector produced 10 billion eggs and 30 million broilers, respectively, total levels of employment in the sector were not very encouraging.*
- ❖ *As the income and employment in the agriculture sector started to decrease, there was a big shift to poultry and dairy.*
- ❖ *With demand increasing and the production level reaching 37 billion eggs and around 1 billion broilers in 1999-2000, the sector is estimated to employ around 1.6 million people.*
- ❖ *Whereas 80 percent of the employment is generated directly by the farms, 20 percent is generated in the provision of feed, pharmaceuticals, equipment and other services required by the poultry sector.*
- ❖ *Additionally, there may be a similar number of people who are engaged in marketing and other channels servicing the sector.*
- ❖ *By 2005, the total egg production in the country had passed 46 billion, and with higher broiler production, the estimated employment was 2.5 million (Desai, 2004).*
- ❖ *Presently, India's per capita annual consumption is 42 eggs and 1.6 kg of poultry meat.*

- ❖ *The National Institute of Nutrition recommends that a balanced diet should contain 30 grams of eggs/day (i.e. 180 eggs per annum) and 30 grams of meat (11 kg per annum).*
- ❖ *Thus, the gap between the present per capita and the recommended per capita consumption is 138 eggs and 7 kg of chicken meat. This will be expected to provide employment to over 9 million people.*

TRADE SCENARIO

- ❖ *Eggs and egg-based products account for 90 percent of India's poultry exports. Exports of hatching and table eggs have increased dramatically - from Rs 196 million in 1996-1997 to Rs 408 million in 2005-2006.*
- ❖ *Similarly, exports of egg powder have increased from Rs 351 million in 1996-1997 to Rs 1126 million in 2005-2006*
- ❖ *Another egg item that shows a rapid increase is "egg dried, frozen"; exports of this item have gone up from Rs 49 million in 1996-1997 to 107 million in 2005-2006.*

MAIN EXPORT MARKETS

- ❖ *Kuwait, Oman, Saudi Arabia, the United Arab Emirates and Yemen have been major importers of India's table and hatching eggs.*
- ❖ *Similarly Germany, Austria, Japan, the Netherlands and the Republic of Korea have been the most important markets for India's egg powder.*
- ❖ *India also exports live poultry in the form of day-old chicks (DOCs).*
- ❖ *The main export markets for India's live poultry are countries of the SAARC (South Asian Association for Regional Cooperation) region.*

BREEDS OF POULTRY

BREED:

Breeds of a livestock are belonging to the same species. But, each and every breed is morphologically and physiologically different from other breeds. Pure breeds are genetically closed for mating with other breeds. Pure breeds are maintained for genetic improvement.

Example: White leghorn, Rhode Island Red (RIR), Ancona, Plymouth Rock etc.

STRAIN:

Strains are the animals come under the same species and same breed. Different strains of a particular breed may be morphologically similar but physiologically dissimilar. Strains are developed to improve one or more genetic traits. For example white leghorn is a breed. Under this breed there may be many strains. One strain may have immune resistance against a particular disease another strain may have the capacity to give more eggs.

EGG LAYING BREEDS:

- Egg laying breeds are those who give more eggs per annum.
- Usually **Leghorns** and **Anconas** are considered as best layers.
- They are small breeds having high egg production.
- They are non broody and poor mothers.
- They never waste time in sitting on eggs.
- They need less feed and space but give more eggs.
- White leghorn, a Mediterranean breed is suitable for hot climate.
- **Minorca** is suitable for free range.

GENERAL PURPOSE BREED:

- General purpose breeds are grown for laying and meat purpose.
- They need more space, feed and mature later in about 7 to 8 months.
- **Rhode Island Red (RIR), Wyandottes, Plymouth Rocks and Langhans** are examples.
- RIR lay tinted eggs which are prepared by others.

- RIR is an American breed with rich red plumage, yellow skin, yellow shank tinged with reddish horn.
- **White barred Plymouth Rocks** are American breed.
- **Wyandottes** lay tinted egg.
- Dark tinged eggs are produced by **Langhans**.

TABLE BREEDS:

- These breeds have light bone but heavy flesh and they come to maturity at the earliest.
- They have delicious flesh and large part of flesh is in the breast region.
- They quickly grow and attain heavy weight.
- Example: **Red Sussex** and **Dorking**.

COMMERCIAL PRODUCTION OF LAYING STOCK

Commercial laying chicken available today belong to one or four categories.

- 1 Pure line strain.
- 2 Strain crosses
- 3 Four line crosses

Pure line strain:

- A strain that is remind closed for outside genome over a period of time is called pure line strain.
- Until commercial hybrids, pure line strain had been the important method for production of more eggs.
- Even **today modern commercial chicken are produced from the pure line stock.**

Strain crosses:

A strain cross is crossing of two different strain belong to the same breed.

Usually two, three or four lines are crossed to produce a commercial pullet.

The progeny will show a heterosis or hybrid vigour in egg production and often excel pure line parents.

Today all commercial white egg lines of chicken are pure lines of single comb white leghorn.

Four line cross:

Generally birds from four pure lines are used to produce commercial chick. For example if there are four lines say A, B, C AND D are used to produce a commercial chick, then each pure line has some excellent quality. Expected crosses are as follows.

Male of line A is mated with female of line B. They produce chicks of AB.

Likewise male of line C is mated with female of Line D. They produce chicks of CD

When male of AB is mated With female of CD, they produce chicks of ABCD.

Female of ABCD combination chicks are the commercial chicks that farmers grow.

Foundation Breeders Pure Lines	Franchise Hatcheries Grant Parent	Associate Hatchery Parent	Commercial Chicks
A	A MALES x B FEMALES	AB MALES	ABCD FEMALES
B		X	
C	C MALES x D FEMALES	CD FEMALES	
D			

GRAND PARENTS or PURE LINES:

In poultry terminology, ABCD are females of commercial chicks. AB male and CD females are parents stock and A males B females, C males and D females are grandparent stock. The pure line can be maintained only if you have both sexes in the A, B, C and D genetically pure lines. When you have both sexes of genetically pure line then it is called pure line stock. In India most hatcheries and farms do not have pure line and they have to get it from US, Canada and Europe.

But now, in India more than 10 farms have pure lines with special arrangement from their foreign partner. They are Kegg Farms, Poona Pearls, Venketeswara Hatcheries, Deejay

Enterprises, Basic breeders etc. Maintaining pure line is very costly. They have to appoint a genetist with supporting research staffs.

HEN HOUSED PRODUCTION:

Hen Housed Production = Total number of eggs produced by a flock for one year / Number of hens housed at the beginning.

HEN DAY PRODUCTION:

Hen day production = Total number of egg laid in a laying cycle/ Average number of birds in the house

BREED CROSS:

Offspring obtained on crossing two or more breeds is called breed cross.

Example:

Parent Male Line

Parent Female Line

Rhode Island Red

X

Barred Plymouth Rock

The offspring will lay brown shelled eggs.

White Leghorn

X

Rhode Island Red

The offspring obtained will lay more egg, large eggs and white shelled eggs.

Breed crosses are wildly used in meat type chicken.

FOUNDATION BREEDERS:

- They mainly concerned with research and development.
- They maintain pure lines (Grand parent).
- They are responsible for the genetic improvement of the stock.
- He only decides the final product is strain cross or breeds cross or inbred cross.

FRANCHISE HATCHERIES:

They get the grandparents from foundation breeders and supply stock to Associate hatcheries.

ASSOCIATE HATCHERIES:

Associate hatcheries maintain parent stock and supply commercials to the poultry farms.

COMMERCIAL HYBRIDIZATION OR HETEROSIS OR HYBRID VIGOUR

When birds of different breeds or strains are crossed their offspring will often perform well than their parents. The extra vigour produced by the offspring are called heterosis or hybrid vigour.

SEXING DAY OLD CHIKEN

Female chickens are raised to become egg producers while roosters (male) chickens, are raised to become meat producers. It takes four to six weeks for secondary sex characteristics to appear and become visible enough to identify the difference between the two sexes. Hence, sexing is done in day old chicken itself.

Sexing day-old chickens can be done by five methods as follows.

- A] Cloacal or vent sexing method.
- B] Machine method.
- C] Feather sexing method.
- D] Color sexing method.
- E] Pubic bone sexing method.

Among the five methods, cloacal or vent sexing method is most commonly accepted.

CLOACAL OR VENT SEXING METHOD:

1. Cloacal, or vent sexing, was the first method and even used today to distinguish between day-old hens and roosters.
2. This method involves examining the baby chicken's vent, located under its tail, looking for a genital organ.
3. If the genital organ is present in the vent, it is a rooster.
4. The genital organ will resemble a small pimple.
5. If the genital organ is not seen then it is a female.

MACHINE SEXING:

- 1 Machine sexing is the second oldest method of determining the sex of day-old baby chickens.
- 2 These machines worked by a telescopic tube with a light.
- 3 The telescopic tube is inserted into an evacuated vent of the baby chicken.
- 4 The sex of the chicken is determined by seeing whether the chicken has testes or ovaries.

FEATHER SEXING:

- 1 Feather sexing method is only possible if a female from a slow-feathering breed is crossed with a male from a fast-feathering breed.
- 2 The sex of the chicks can be determined by looking at the primary and secondary feathers located on the chick's wings.
- 3 The primary feathers will be noticeably longer than the secondary feathers on a female chick.
- 4 On a male, the primary and secondary feathers are the same length.

COLOR SEXING

Color sexing is the newest method of determining the sex of a day-old chicken. The plumage on day-old hens is generally white while the plumage on day-old roosters is brown.

PUBIC BONE SEXING

Pubic Bone sexing in chicks is by placing an index finger on the pubic bones.

If the index finger fits, then the chick is likely a female.

VENT SEXING:

Step 1: Hold the bird upside down. Hold the gosling or duckling with its feet against its belly. Use your index finger to gently press about 1/2 an inch below the vent with your knuckle. The bird might poop at this point just wipe it off and apply pressure again.

Step 2: With your other hand gently tuck the tail toward the bird's back. Gently place your index and thumb at either side of the vent. Gently pinch them together. You only want to push the vent lips together and you will feel them flexing against your fingertips. Hold it like this for a few seconds and then gently push your fingers open and press down with gentle pressure to make the cloaca invert.

Step 3: If the vent doesn't fully invert gently keep applying pressure until it does. At this point if you have a male his penis should be exposed. It will be either white, pink or even dark grey to almost black depending on breed. It should pop out a little if not it should after a second or two.

Step 4: Release pressure on belly and vent. Gently rub the vent if everything doesn't tuck back after releasing pressure. Rubbing should help gently push the vent back in place.



MALE

FEMALE

DEVELOPMENT OF POULTRY DURING FIRST TO SEVENTH FIVE YEAR PLAN IN INDIA

1. First Plan 1951-1955

- ❖ Launched a pilot project in Orissa by Dr.J.N.Panda
- ❖ It is modest beginning for commercial poultry.
- ❖ Pure line chicks imported.

2. Second Five year Plan 1956-1960

- ❖ 5 regional poultry breeding farm set up
- ❖ Genetically improved variety imported from America
- ❖ Second plan failed because of following reasons
 1. Due to absence of balanced feed
 2. Non availability of quality chick
 3. Lack of instruments and training

4. Poor marketing.

3. Third Five Year Plan 1961-1965

- ❖ IPDP Intensive Poultry Development Project started to help farmers.
- ❖ Four multiplication farmers with foreign collaboration started
- ❖ Under freedom from hunger Campaign FFHC 10000 pure line chicks imported from Australia
- ❖ 300 units produced balanced diets
- ❖ Two large scale poultry dressing plant started.

4. Fourth Five Year Plan 1969-1974

- ❖ Importance given to breeding and extension.
- ❖ IPDP projects familiarized.
- ❖ Three private farms viz. K-egg, Poona pearls and Uni-chix imported pure lines.
- ❖ CTIPPM Central Training Institute for poultry Production and Management was established.
- ❖ IVRI Indian Veterinary Research Institute offered refresher courses for poultry scientists.
- ❖ Production of Poultry equipment was at top.

5. Fifth Five Year Plan 1974-1978

- ❖ 17 breeding farms and 17 dressing plants introduced.
- ❖ 55IPDPS expanded
- ❖ National egg marketing grid was organized.
- ❖ New commercial hybrid Hassarghatta -HH260 introduced.

6. Sixth Five Year Plan 1980-1985

- ❖ Six pureline breeding farms started.
- ❖ NAFEED – National Agricultural Cooperative Marketing Federation started.
- ❖ NCC National Egg Coordination Committee fixed the prize.
- ❖ 173 government and 158 private hatcheries started.
- ❖ Four strain cross for layer ILI-80 newly introduced for layers.
- ❖ (CARI) Central Avian Research Institute established.
- ❖ Three broiler strain B-77, IBL-80 and IBP -83 were released.
- ❖ SPF- Specific Pathogen Free eggs produced.

7. Seventh Five Year Plan -1986-1990

- ❖ Government investment increased to Rs. 602/- million
- ❖ Egg production increased to 22,400 Million eggs.
- ❖ Value of poultry production increased to 3454 Crore.

