ANIMAL GENETICS & BREEDING

UNIT – III

The Principles of Animal Breeding

Theory

BREEDING PROGRAMME

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OBJECTIVES OF BREEDING IMPROVEMENT PROGRAMME

(i) Genetic improvement of indigenous livestock breeds through selective breeding, upgrading and cross breeding.

(ii) Rearing and distribution of improved bulls & bull calves for natural services.

(iii) Expansion and strengthening of infrastructure to propagate the elite germplasm using modern reproductive technologies.

(iv) Conservation of indigenous breeds.

(v) Castration of scrub bulls and their subsequent replacement by the elite Bulls.

Importance of indigenous breeds

- Unique characteristics of Heat Tolerance.
- Tick and Pest resistance.
- Resistance to diseases.
- High draught power.
- Most of the Indigenous cattle Breeds possess A2 allele of Beta Casein as compared to Exotic Cattle A1 milk is possibly associated with some metabolic disorders like diabetes, heart diseases .

CATTLE AND BUFFALOES IMPROVEMENT PROGRAMME

- Central Herd Registration Scheme(CHRS)
- Key Village Scheme (KVS)
- Intensive Cattle Development Project (ICDP)
- Progeny Testing Scheme
- All India Coordinated Research Project (AICRP) & now converted in Network Project
- Military Dairy Farm

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- Project Directorate On Cattle, Meerut
- Gaushalas
- Milk Producer Cooperatives
- Nucleus Breeding Schemes
- National Programme For Cattle & Buffalo Breeding (NPCBB)
- National Programme For Bovine Breeding & Dairy Development (NPBBDD)
- RASHTRIYA GOKUL MISSION (RGM)
- National Dairy Plan (NDP)

CENTRAL HERD REGISTRATION SCHEME (CHRS)

- In 1949,the ICAR established a nucleus organization for the registration of important breeds .
- Registration of cattle is considered to be one of the essential steps towards the improvement of their economic traits.
- The herd book is a list of animals which qualify the condition of production and breed characteristics.
- The herd books had been started for Red sindhi, sahiwal, Tharparkar, Hariana, Gir, Ongole, Kankrej breeds of cattle & Murrah buffaloes.

Registration Standards

1.Type of body colour.

2. Body Shape.

3.Produce a minimum quantity of milk production during a lactation.

- **Implementing Agencies:**

- CHRS Unit Rohtak in Haryana
- CHRS Unit Ahmedabad in Gujarat
- CHRS Unit Ajmer in Rajasthan
- CHRS Unit Ongole in Andhra Pradesh

Key village scheme

- After Independence the first organized attempt to develop village cattle on an effective scale was initiated with the launch of key village scheme (KVS) in 1951 during first five year plan.

- It employing scientific methods for improvement of cattle viz.:-

1. Artificial insemination
2. Grading up
3. Selective breeding

The important features of KVS

1. Artificial insemination was introduced at most of the KVS.

2. Establishment of Gosadans and Goshalas .

3. Developing dual purpose breed was to provide good bullocks and increase the milk production.

4. Propagation of cross breeding Programme.

5. Protecting the animals against prevalent contagious diseases.

Gaushalas

- The Govt. of India in 1949 set up a central Gaushala Development Board for development of Gaushala as center for cattle breeding.

- In 1952 the Govt. of India established the Central Council for Gosamvardhana (CCG) to act as the coordinating and advisory body on cattle development.

- It can be used as a source of in situ conservation of indigenous breeds associated by progeny testing programme.

Objectives:-

1. To preserve the Indian cow and progeny and to breed and upgrade them for the villagers.

2. Prepare best pedigree Indian Bulls & supply to villagers for breeding and upgrading village cows.

3. Production of best healthy bullocks for draught work and preserve male calves for distribution to agriculturists.

Intensive Cattle Development Project (ICDP)

- ICDP was started in 1966-67.
- This ICDPs were to be started in breeding tracks of indigenous breeds of cattle & buffaloes.
- At present about 130 ICDP exist.
- Each ICDP was to cover 1 lakh breedable cow & she buffaloes population.
- The target of covering 70 percent of cattle population for breeding purpose and increasing milk production by 30 percent in a period of 5 years was kept.
- Steps are involved for successful ICDP like breeding, feeding & veterinary practices.

PROGENY-TESTING SCHEME

- It was started in the 3rd five year plan (1961-66) to ensure production & identification of superior bulls tested on the basis of performance of their progenies .

- Tested bulls were used extensively through AI for achieving higher genetic gain.

- The programme was first stated with Hariana(cattle) and murrah (buffalo)breeds at Hisar.

- Types:-
  1. Single herd P.T. scheme
  2. Associated herd P.T. scheme
  3. Field P.T. scheme

Cont…

1. Single herd P.T. scheme :-

- located at a particular small herd size and hence a few sires could be tested.

2. Associated herd P.T. scheme:-

- Associate different herds and testing the sires simultaneously based on the data of all herds.
- This programme has been started for 3 breeds namely Sahiwal, Hariana & Ongole.

3. Field P.T. Scheme:-

- The project Directorate on cattle, Merrut has also taken up the Field progeny testing of crossbred bulls during 8^{th} five year plan.

All India Coordinated Research Project (AICRP)

- The AICRP on Cattle was started at 1968 & now AICRP converted into networking project.

- The ICAR had launched a coordinated research project with the objective of evolving high yielding breeds of different species for different utility.

- cattle and buffalo for milk production, sheep for wool and mutton production, goat for milk & meat production, pig for meat and poultry for egg & meat .

Networking project for Cattle

- The AICRP on cattle involved the crossing of indigenous cattle breeds (Hariana, ongole, Gir, Tharparkar, Sahiwal, Red sindhi, and local) with superior exotic cattle breeds (H.F., Jersey, Brown swiss).

- The objective of AICRP on cattle was to know the optimum combination and level of exotic inheritance based on the production and reproduction performance of the crossbreds in different agro-climatic region.

Networking project for buffalo

- The AICRP on buffaloes was started in 1970-71 by ICAR for two buffalo breeds viz. Murrah & Surti at two centers for each breeds.
- 1. Murrah breed center were NDRI Karnal and PAU Ludhiana .
- 2. Surti breed center at CVAS , Navania (Udaipur) & UAS Dharwar.

- The breeding plan for all the 4 centers was to maintain 220 breedable females.

- It was decided to evaluate 8 bulls at each center and finally selecting only 2 bulls for matting with elite buffaloes. It coverage of 3000-4000 breedable females in field units attached to each center.

- The semen of bull had to be used in testing herds and fields units & freeze a minimum of 2000 doses of semen of each bulls .

MILITARY DAIRY FARMS

- The first military dairy farm in India was started in 1889 at Allahabad to supply the milk to the British troops and their families.

- The crossbreeding of zebu cattle with European breeds was started on large scale first time in the country at MDF in 1907 for the reason of low productivity and breeding efficiency of indigenous cattle.

Project Directorate on cattle(PDC, Meerut)

- The **Central Institute for Research on Cattle - Meerut** came into existence in Nov. 1987.

- It evolve a new breed of cattle **"Frieswal"** and other crossbred genotypes for high milk production.

- The vision of CIRC is **"Improvement of cattle for high productivity and profitability."**

Milk producer cooperatives

1. AMUL(Anand Milk Producer's union Ltd.)

- The milk producer's cooperative societies were formulated at village levels which were federated into a district union & this founded the **AMUL**.
- The headquarter was located at Anand, a district town of Kalra district.
- It was a 2 tier cooperative structure as village societies & district union.

2. Operation flood project:-

- NDDB in 1969 formulated the programme of operation flood for the development of dairy industry in India.
- Operation flood was to create a flood of rurally produced milk with remunerative price to the farmers and to supply the milk to urban consumers at stable and reasonable price.
- Operation flood was implemented in three phase.

✓ Operation Flood Phase I (1970-1980)

✓ Operation Flood Phase II (1981-1985)

✓ Operation Flood Phase III (1985-1996)

Nucleus Breeding Schemes(NBS)

- The genetic improvement in productivity per animal in the shortest possible times with nominal cost is the main aim of animal breeder.
- A new concept introduces to increase the overall genetic merit of the breed & has been named as NBS.
- The NBS are two type depending upon the direction of gene flow.

Terminology

I. Nucleus herd/ tier:-

- ✓ It composed top breeding stock.
- ✓ It consists of 10-15% of total breed population .
- ✓ Animals are selected exclusively on their breeding value.
- ✓ It acts as supplier of replacement male & female breeding stock for itself, multiplier tier & commercial tier at field levei.

II. Multiplier tier:-

- ✓ It consists by 30-40 %of breeding population.
- ✓ It exclusively receives stud males & sometime breeding females from the nucleus herd with the purpose of producing sufficient no. of breeding animals thereby satisfy the demand of herd in the commercial tier.

III. Commercial tier:-

- ✓ It consists by 40-60 % of breed population.
- ✓ It’s intension of increase the production & genetic improvement.
- ✓ It acts as terminal tier of hierarchical breeding struct.ure

CNBS

- One way gene flow from top to bottom.
- Nucleus herd ⇨ multiplier herd ⇨ commercial herd
- Mainly used for pig & poultry.
- **Merits :-** to control for disease chance.
- **Demerits :-**

a. High rate of inbreeding.

b. Reduced genetic progress.

ONBS

- Three tier multiplication system as nucleus herd, multiplier, commercial herd.
- Gene flow bidirectional.
- Mainly used for cattle, buffalo, sheep, goat.
- **Merits :-**

a. High annual rate of genetic improvement.

b. Lower rate of inbreeding.

- **Demerits:-** disease control

National Dairy Plan (NDP)

- National Dairy Plan Phase I (NDP I) is a Central Sector Scheme for a period of 2011-12 to 2018-2019.

- World Bank assisted Central Sector Scheme of GoI implemented by National Dairy Development Board through End Implementing Agencies.

National Dairy Plan Phase I
(Key components and expected outputs)

Component A: Productivity Enhancement	
Production of HGM cattle and buffalo bulls • Production of 2,500 HGM bulls • Import of 400 exotic bulls/ equivalent embryos	
Strengthening of "A" and "B" graded Semen Stations • Production of 100 million semen doses annually in the terminal year	
Pilot Model for Viable Doorstep AI delivery Services • 3000 MAITs carrying out annual 4 million doorstep AIs by the terminal year	
Ration Balancing Programme • Coverage of 2.7 million milch animals in 40,000 villages	
Fodder Development Programme • Production of 7,500 tonnes of certified/ truthfully labeled fodder seed • 1350 silage making/ fodder conservation demonstrations	
Component B: Village Based Milk Procurement System	
Strengthening and Expanding Milk Procurement System at Village level • 23,800 additional villages to be covered • 1.2 million additional milk producers	


THANK
YOU!