



Initiatives for Preservation of Indigenous Cattle Breeds

[Source: TH](#)

The **National Institute of Animal Biotechnology (NIAB)** is working on a number of initiatives for preservation and sustainable development of the **livestock sector**.

National Institute of Animal Biotechnology

- **National Institute of Animal Biotechnology (NIAB)** is an autonomous institute under the **Department of Biotechnology**, Ministry of Science and Technology.
- NIAB is aimed to harness **novel and emerging biotechnologies** and take up research in the **cutting edge areas** for improving animal health and productivity.
- Its mission is development of a **sustainable and globally competitive livestock industry** through innovative technology.
- The Institute's focus of research is on **Animal Genetics and Genomics, Transgenic Technology, Reproductive Biotechnology, Infectious Diseases, Bioinformatics and Nutrition Enrichment**.

What are NIAB's Initiatives for Conservation of Indigenous Cattle Breeds?

- **Genetic Sequencing of Indigenous Cattle:** NIAB is using **Next Generation Sequencing (NGS)** data and genotyping technology to establish **molecular signatures** for registered **cattle breeds**.
 - Molecular signatures help in accurately identifying and maintaining the **purity of indigenous cattle** breeds and conserving unique **genetic traits**.
- **Vaccine Development:** NIAB is focussing on developing new-generation **vaccines** against diseases like **brucellosis** to improve animal health and reduce economic losses.
 - Efforts are aligned with the **'BioE3 (Biotechnology for Economy, Environment, and Employment)'** policy to enhance biomanufacturing.
- **Advanced Research and Models:** NIAB is focussing on development of **'bio-scaffolds'** for **tissue repair** and drug delivery using natural and **3D-printed materials**.
 - Scaffold is a **base material** in which cells and growth factors are embedded to construct a substitute tissue.
 - A bovine lung cell-based 3D model has been created for tuberculosis drug screening and disease modelling.
- **Promoting Sustainable Bio-Economy:** NIAB is working in line with **six thematic areas** set by the Department of Biotechnology (DBT) to promote a **circular bio-based economy**, focusing on alternative proteins and sustainable biomanufacturing.
- **Alternatives to Antibiotics:** NIAB has plans to use **bacteriophages** and their **'lytic' proteins** as antibiotics alternatives to target bacteria such as **staphylococci, E. coli and streptococci**.
 - **Bacteriophages**, also known as phages, are viruses that infect and replicate only in **bacterial cells**. Bacteriophages kill bacteria.
 - Phage lytic proteins are a clinically advanced class of **enzyme-based antibiotics**, so-

called [enzybiotics](#).

- **Biomarkers for Nutritional Stress:** A **biomarker** (metabolite and protein) has been developed for early assessment of nutritional stress which may lead to decreased productivity and infertility in cattle population.
- **Community Outreach and Sustainable Farming:** NIAB promotes sustainable livestock farming through community engagement and programs like **MILAN**, which connects with livestock farmers to demonstrate new technologies.

What is Next-Generation Sequencing (NGS)?

- NGS is a new technology used for [DNA and RNA sequencing](#) and **variant/mutation detection**.
- NGS can sequence hundreds and thousands of genes or **whole genome** in a **short period** of time.
- It involves **DNA fragmentation, massive parallel sequencing, bioinformatics analysis**, and variant/mutation annotation and interpretation.
- NGS is also known as **massively parallel sequencing or deep sequencing**.

What is BioE3 Policy and Biotechnology in India?

- In **August 2024**, the Union Cabinet approved the proposal '**BioE3 (Biotechnology for Economy, Environment and Employment) Policy**' of the **Department of Biotechnology**.
- BioE3 is designed to enhance **biomanufacturing**, focusing on producing **bio-based products** like **fuel additives** across multiple sectors.
- It supports national objectives like achieving a '[Net Zero carbon economy](#)' and [Mission LIFE \(Lifestyle for environment\)](#) through a **circular bioeconomy**.
- It focuses on **R&D** innovation and entrepreneurship, sets up [Biomanufacturing and Bio-AI hubs](#), and seeks to expand India's biotechnology workforce.
- **Precision Biotherapeutics** (precision medicine) to improve healthcare outcomes is one of the **core themes** of the BioE3 Policy.

What are Government Schemes for Development of the Livestock Sector?

- [Rashtriya Gokul Mission](#)
- [Animal Husbandry Infrastructure Development Fund \(AHIDF\)](#)
- [National Animal Disease Control Programme](#)
- [National Artificial Insemination Programme](#)
- [National Livestock Mission](#)
- [National Kamdhenu Breeding Centre](#)

Read More: [Long Read Sequencing](#)

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q1. Consider the following crops of India: (2012)

1. Cowpea
2. Green gram
3. Pigeon pea

Which of the above is/are used as pulse, fodder and green manure?

(a) 1 and 2 only

(b) 2 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (a)

Q2. At present, scientists can determine the arrangement or relative positions of genes or DNA sequences on a chromosome. How does this knowledge benefit us? (2011)

1. It is possible to know the pedigree of livestock.
2. It is possible to understand the causes of all human diseases.
3. It is possible to develop disease-resistant animal breeds.

Which of the statements given above is/are correct?

(a) 1 and 2 only

(b) 2 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (c)

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