Conservation of Poultry Genetic Resources: A Key to Sustainable and Resilient Poultry Production

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ABSTRACT

Poultry genetic resources represent a vital component of global agricultural biodiversity, contributing to food security, rural livelihoods, and climate resilience. Indigenous poultry breeds like aseel, kadaknath etc. possess unique adaptive traits such as disease resistance, heat tolerance, and efficient feed utilization under low-input systems. However, the rapid expansion of commercial poultry production has led to the erosion of these valuable genetic resources. This article explores the importance of conserving poultry biodiversity, outlines major conservation strategies including in situ and ex situ approaches, and highlights current challenges and future opportunities. A balanced conservation approach is essential to ensure sustainable poultry production and safeguard genetic diversity for future generations.

INTRODUCTION

Poultry farming is one of the fastest-growing livestock sectors worldwide (FAO, 2015) and plays a crucial role in providing affordable protein through meat and eggs. In countries like India, poultry also supports the livelihoods of millions of smallholder farmers. Alongside commercial poultry strains, a wide variety of indigenous

and local breeds exist, each adapted to specific agro-climatic conditions.

These native breeds such as aseel, kadaknath etc. are genetically diverse and often exhibit traits such as resistance to local diseases, tolerance to extreme temperatures, and the ability to survive on minimal feed resources. However, increasing industrialization and the dominance of high-yielding commercial hybrids have resulted in a gradual decline of indigenous poultry populations. This loss of genetic diversity poses a serious threat to long-term sustainability, making conservation efforts more important than ever.

Why Poultry Genetic Resources Matter?

Genetic diversity in poultry is essential for:

- **Adaptation to Climate Change:** Indigenous breeds can withstand heat stress and harsh environments better than commercial breeds.
- **Disease Resistance:** Local birds often show natural resistance to endemic diseases (Hoffmann, 2009).
- **Nutritional and Economic Security:** Backyard poultry contributes significantly to rural nutrition and income.
- **Future Breeding Programs:** Genetic traits from indigenous breeds can be used to improve commercial lines.

Loss of these resources reduces the ability of the poultry sector to respond to emerging challenges such as new diseases and changing climatic conditions.

Conservation Strategies

1. In Situ Conservation (On-Farm Conservation)

In situ conservation involves maintaining poultry breeds within their natural production systems, such as backyard or small-scale farming.

Key features:

- Birds continue to evolve naturally under local conditions
- Low initial cost and minimal infrastructure required
- Supports rural livelihoods and traditional farming practices

Limitations:

- Small and scattered populations
- Lack of organized breeding programs
- Risk of disease outbreaks (e.g., avian influenza)

Despite these challenges, in situ conservation is highly valuable because it preserves both genetic material and traditional knowledge associated with poultry rearing.

2. Ex Situ Conservation (Off-Farm Conservation)

Ex situ conservation involves preserving genetic material outside the natural environment, typically in gene banks.

Methods include:

- Cryopreservation of semen (Silversides *et al.,* 2012)
- Storage of genetic material for future use

Advantages:

- Long-term preservation of rare genetic traits
- Protection against sudden population loss

Challenges:

- High initial investment and technical expertise required
- Lower efficiency of semen freezing in poultry compared to mammals (Silversides *et al.,* 2012)
- Limited use of advanced techniques like germ cell preservation due to cost

Ex situ conservation acts as a "**genetic insurance policy**" and complements in situ efforts.

Major Challenges in Conservation

The conservation of poultry genetic resources faces several constraints:

- Rapid replacement of indigenous breeds with commercial hybrids
- Lack of awareness among farmers and policymakers
- Limited funding and institutional support
- Declining interest among younger generations in traditional poultry farming
- Vulnerability to disease outbreaks and environmental disasters

These factors collectively contribute to the risk of extinction of many local poultry breeds.

Future Directions and Recommendations

To ensure effective conservation, the following measures are essential:

- Policy Support: Government initiatives to promote indigenous breeds
- Farmer Awareness: Training and education programs
- Youth Engagement: Encouraging young farmers to participate in breeding programs
- Research and Innovation: Development of cost-effective cryopreservation techniques
- Integrated Approach: Combining in situ and ex situ methods for better outcomes

Strengthening collaboration between farmers, researchers, and policymakers will play a crucial role in conserving poultry biodiversity.

CONCLUSION

Poultry genetic resources are invaluable assets for sustainable agriculture, food security, and climate resilience. Indigenous breeds, with their unique adaptive traits, provide opportunities for future genetic improvement and sustainable production systems. However, these resources are under serious threat due to modernization and neglect. A strategic combination of in situ and ex situ conservation methods, supported by strong policies and awareness programs, is essential to safeguard poultry genetic diversity. Immediate and coordinated efforts are required to ensure that these genetic resources are preserved for future generations.

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