Analysis of Pedigree in Livestock Breeding

Historical Development, Advantages, Limitations, and Core Concepts

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Historical Background

- First documented pedigrees (e.g., Arabian horses, royal bloodlines)

- Development in livestock (19th–20th century)

- Role of herdbooks and breed associations

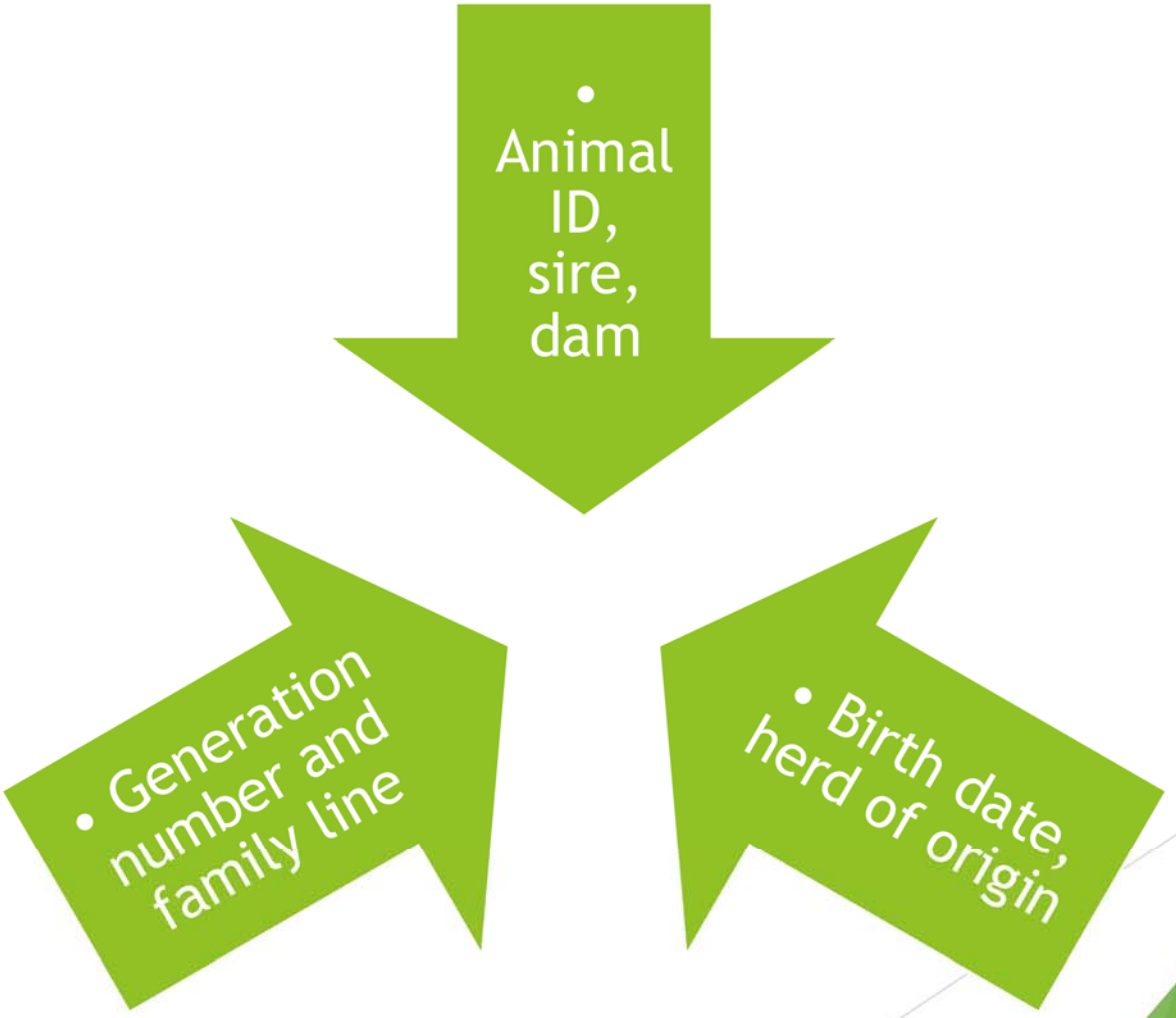
Pedigree in Modern Animal Breeding

- Integration into breeding programs

- Use in selection and conservation

- Relationship with performance recording

Components of Pedigree Data



Pedigree Completeness and Quality

- Depth (number of generations)

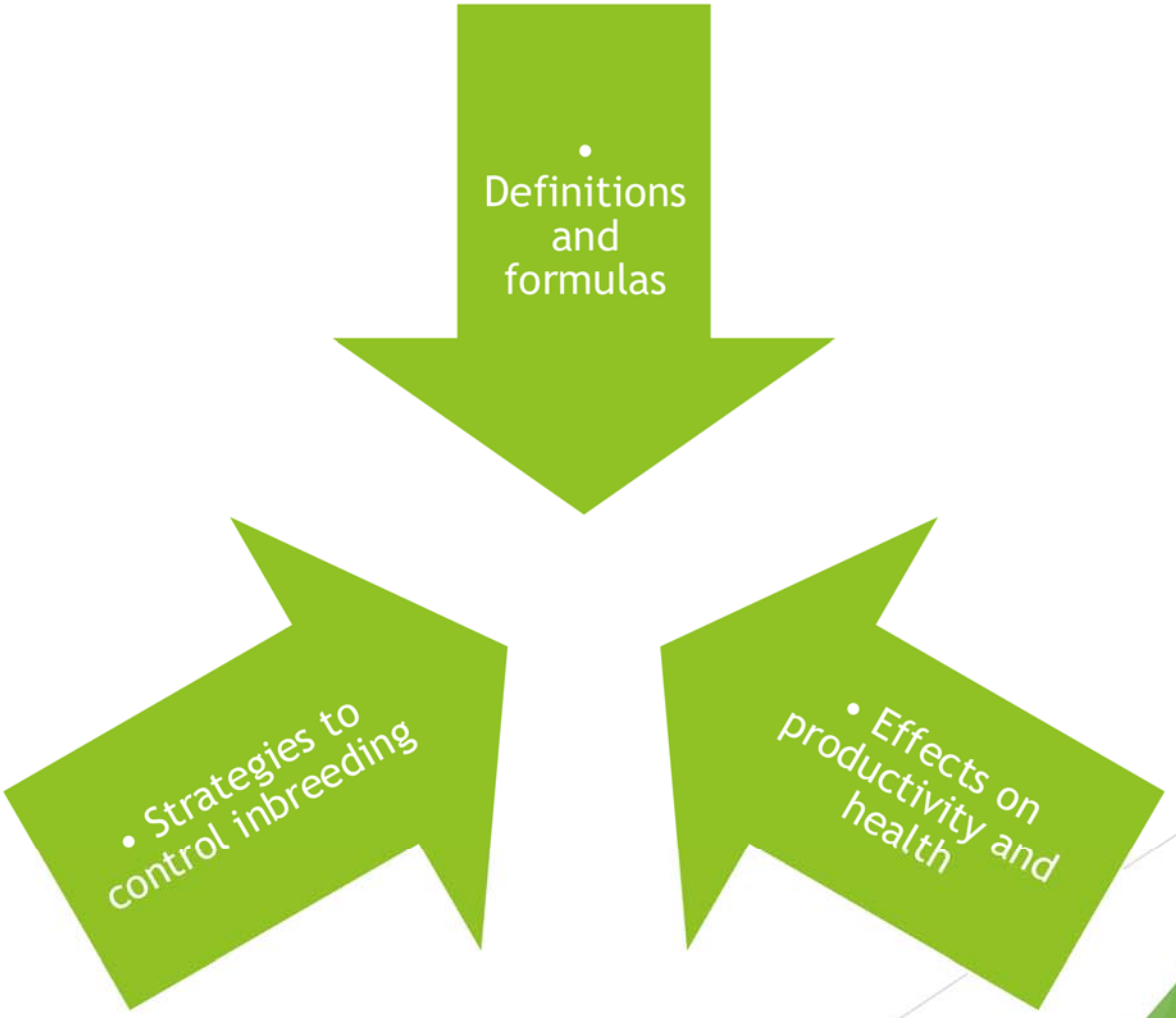
- Completeness index

- Influence of missing data

Applications of Pedigree Analysis

- Estimating inbreeding coefficients
- Calculating relationship coefficients
- Estimating effective population size (Ne)
- Managing genetic diversity

Inbreeding and Kinship



Effective Population Size (Ne)

- Why Ne matters in livestock conservation

- Pedigree-based vs. genomic-based Ne

- Estimation methods

Advantages of Pedigree Analysis

- Long-term data availability

- Cost-effective

- Useful for conservation and selection

Limitations of Pedigree Analysis

- Errors in parentage
- Incomplete or shallow pedigrees
- No direct information on genetic variants

Tools and Software

- PEDIG software

- ENDOG, GRain, EvaPig

- Integration with BLUP and genetic evaluation

Pedigree vs. Genomic Data

- Complementary roles

- Pedigree: expected relationships

- Genomics: realized relationships

- Use in combined breeding strategies

Case Study: Local Breed Conservation

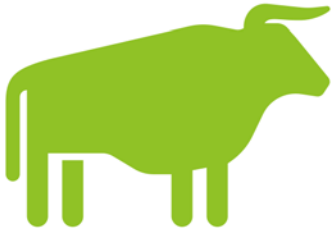
- Pedigree analysis in indigenous breeds

- Managing genetic erosion

- Reconstructing pedigrees

Best Practices in Pedigree Management

- Data recording and validation



- Animal identification systems

- Regular pedigree audits

Future Perspectives

- Digitization and blockchain

- Integration with genomics and AI

- Pedigree reconstruction using inference tools

Summary

- Pedigree analysis is essential for genetic management

- Strengths: accessible, interpretable

- Weaknesses: dependent on data quality

Questions and Discussion

- Thank you!

- Questions?