Animal biotechnology is an integral component of agriculture. Applicable in science and engineering, it is used for modifying living organisms. *Textbook of Animal Biotechnology* discusses topics including economically important livestock breeds, paradigm shifts in livestock production, biotechnology in animal nutrition and in livestock-assisted reproduction. Genomics and genetic engineering tools in livestock production and management are also discussed at length.

Divided into 41 chapters, the book is supported with over 50 figures and more than 30 tables. A must have for undergraduates and postgraduates of various agriculture and animal husbandry academia, teachers, professionals, it will also prove helpful for researchers dealing with basic as well as applied animal sciences including biotechnology, nutrition, physiology, and reproduction.

**Key Features**

- Provides cutting-edge technologies in livestock and fish production
- Gives various aspects of biotechniques aimed to improve fish nutrition, stem cell technology, and transgenesis
- Explains food and dairy biotechnology
Textbook of
ANIMAL
BIOTECHNOLOGY

B Singh • S K Gautam • M S Chauhan • S K Singla

The Energy and Resources Institute
Animal Biotechnology is contributing immensely to human health, nutrition, and economy. *Textbook of Animal Biotechnology* is the first book of its kind to provide researchers and readers with comprehensive information to aid animal health, production, and biodiversity conservation through genetic engineering and biotechnological interventions. The book covers various topics of interest, including economically important livestock breeds, paradigm shifts in livestock health and production, biotechnology in animal nutrition, and livestock-assisted reproduction and genomics.

The insightful and thought-provoking collection of chapters is aimed to appraise cutting-edge technologies in livestock and fish production. Supported with plentiful illustrations, tables, and boxes, this textbook is a must for undergraduates and postgraduates, academia, teachers, professionals, and researchers in basic and applied animal sciences.

The book begins with a general discussion of animal cell culture and tissue culture lab wherein authors have provided insights into fundamental technologies such as cell culture technology, recombinant DNA technology, model organisms used in biotechnology and biomedical science, developments in genomics and molecular markers in livestock, and use of various bioresources for livestock and industrial development.

The book discusses various aspects of biotechniques aimed to improve fish nutrition, stem cell technology, transgenesis and exploitation of marine bioresources. It presents thorough and avant-garde feats of biotechnology of gut microbiome, nutrigenomics, metagenomics, and utilization of unconventional forages and feeds. The chapters on assisted reproduction presents a comprehensive overview of the state-of-the-art and opportunities to augment reproduction efficiency of various livestock species. Two chapters are devoted to food and dairy biotechnology.

Finally, an overview of genomic reprogramming and its prospects in animal production, livestock in post-genomic era of biology and medicine, applications of nanotechnology in veterinary health and animal production, and managing livestock resources in the era of burgeoning global climatic stress is provided.
## Contents

**Preface**  

1. **ANIMAL CELL AND TISSUE CULTURE LABORATORY**  
   - Introduction  
   - Sterilization  
   - Basic Equipment in Cell and Tissue Culture Laboratory  
   - Hazards and Safety in Cell Culture Laboratory  
   - Opportunities and Challenges  
   - Conclusions  
   - References  

2. **BASICS OF CELL CULTURE TECHNOLOGY**  
   - Organisms and Cells  
   - Basics of Animal Cell Culture  
   - Media Preparation  
   - Role of Important Components of Culture Media  
   - Opportunities and Challenges  
   - Conclusions  
   - References  

3. **APPLICATIONS OF CELL CULTURE TECHNOLOGY**  
   - Introduction  
   - Advances in Cell Technology  
   - Products Obtained from Animal Cells  
   - Opportunities and Challenges  
   - Conclusions  
   - References
### 4. SYNTHETIC BIOLOGY

- **Introduction** 37
- What is Synthetic Biology? 37
- Recent Advances in Synthetic Biology 38
- Applications of Synthetic Biology 40
- Opportunities and Challenges 41
- Conclusions 42
- References 42

### 5. RECOMBINANT DNA TECHNOLOGY

- **Introduction** 45
- What is Recombinant DNA? 45
- Major Steps Involved in the Technology 46
- How Does rDNA Work? 52
- Applications of RNA Technology 52
- References 54

### 6. MODEL ORGANISMS IN BIOTECHNOLOGY AND BIOMEDICAL SCIENCE

- **Introduction** 55
- What are Model Organisms? 55
- Significance of Model Organisms 56
- Opportunities and Challenges 60
- Conclusions 60
- References 60

### 7. DEVELOPMENTS IN MOLECULAR MARKERS IN LIVESTOCK

- **Introduction** 63
- Developments in Livestock Genomics 63
- Types of Molecular Marker 66
- Classification of Molecular Markers 67
- Applications of Molecular Markers 73
- Opportunities and Challenges 77
- Conclusions 78
- References 79
## Contents

8. **EXPLORING VARIOUS BIORESOURCES FOR INDUSTRIAL APPLICATION** 81  
   Introduction 81  
   Enzymes in Industrial Development 82  
   Need to Explore Novel and Inexhaustible Source of Raw Biomaterials 87  
   Potential Microbial Niches for Industrial Applications 88  
   Alternative Strategies to Enhance Enzyme Production 93  
   Opportunities and Challenges 95  
   Conclusions 96  
   References 96

9. **ADVENT OF NANOSCIENCE AND NANOTECHNOLOGY: AN OVERVIEW** 99  
   Introduction 99  
   Defining Nanotechnology 101  
   What are Nanoparticles? 102  
   Tools of Nanoscience 103  
   Nanobiotechnology 103  
   General Applications of Nanotechnology 104  
   Opportunities and Challenges 106  
   Conclusions 107  
   References 107

10. **AQUATIC BIORESOURCES: PROSPECTS FOR HEALTH AND LIVELIHOOD** 111  
    Introduction 111  
    Aquatic Food Resources—A Global and National Perspective 112  
    Importance of Aquaculture 113  
    Emerging Trends for Sustainable Aquaculture 115  
    Opportunities and Challenges 118  
    Conclusions 119  
    References 120

11. **BIOTECHNOLOGY IN FISH NUTRITION, REPRODUCTION, AND DIVERSITY CONSERVATION** 121  
    Introduction 121  
    Role of Biotechnology in Fishery 121  
    Cryopreservation 127
Textbook of Animal Biotechnology

Publisher: TERI Press
ISBN: 9788179933275
Author: B Singh

Type the URL: http://www.kopykitab.com/product/8509

Get this eBook