

Animal  
Breeding  
The  
Modern  
Approach

A Post Graduate Foundation Publication

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# Animal Breeding

*The Modern Approach*

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# **Animal Breeding**

## ***The Modern Approach***

***A Textbook for Consultants, Farmers,  
Teachers and for Students  
of Animal Breeding***



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# Preface

This book is not so much about the science, but about **how the science can be used in the field** to take advantage of the huge amount of biological variation which exists in our livestock industries. As such, *Animal Breeding - The Modern Approach* will be of use to all people concerned with achieving genetic change in livestock populations used in meeting human needs for food & fibre, students, advisors and consultants, teachers, administrators and of course farmers themselves.

The book is intended to relate to the range in level of application, viz. the individual herd or flock, groups of herds or flocks, national industries for a number of livestock species, and international initiatives in livestock improvement.

This first issue was developed to commence a series of symposia for which the participants were active field consultants, government and privately employed, and with Animal or Veterinary Science backgrounds. Hence the authors of the sections of this text also delivered the first symposium of the series, and we thank them for both contributions.

The approach taken in the book recognises that successful manipulation of biological variation in modern animal agriculture depends not only on genetic principles and procedures but also on the integration and packaging of these together with a number of other disciplinary areas, including information science and computing, mathematical statistics, economics and what is commonly termed operations research. **Successful applications are based on clear and rather simple principles** and are not complicated and too difficult as is sometimes heard of genetics, **and on the close integration of these principles with particular production systems.**

It is this integration of disciplines and their incorporation with production systems, aimed at efficiently and effectively capitalising on biological diversity over time, that we term **Animal Breeding.**

The book's design is based on a simple concept termed The Modern Breeding Approach. The book can be read either from start to finish or its section can be used separately.

Keith Hammond  
Hans-Ulrich Graser  
Alex McDonald

Armidale, September 1992

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# The New Era in Genetic Improvement

## The Fundamentals

Genetic improvement is the process of changing the genetic composition of a population of animals to produce desirable traits.

- The basic principle of genetic improvement is the selection of individuals with desirable traits and breeding them together.
- The selection process is based on the heritability of the trait.
- The selection process is based on the genetic variation within the population.

The selection process is based on the heritability of the trait. Heritability is the proportion of the total variation in a trait that is due to genetic factors. The higher the heritability, the more likely it is that the trait can be improved by selection.

The selection process is based on the genetic variation within the population. Genetic variation is the difference in the genetic composition of individuals within a population. The greater the genetic variation, the more likely it is that the trait can be improved by selection.

## PART I: Modern Animal Breeding

The modern era of animal breeding began in the early 20th century. This was due to the development of new statistical methods for analyzing breeding data and the discovery of the principles of genetics.

One of the key figures in the modern era of animal breeding was R. A. Fisher. Fisher developed the theory of the genetic variance-covariance matrix, which is a fundamental concept in modern animal breeding.

Another key figure in the modern era of animal breeding was Lancelot Hogben. Hogben developed the theory of the genetic variance-covariance matrix, which is a fundamental concept in modern animal breeding.

## What is Animal Breeding?

Animal breeding is the process of selecting and breeding animals to produce offspring with desirable traits. This process is based on the principles of genetics and the theory of the genetic variance-covariance matrix.

# Contents

## PART I: MODERN ANIMAL BREEDING

<b>1</b>	<b>The New Era in Genetic Improvement of Livestock</b>	<b>1</b>
	<b>Keith Hammond</b>	
	The Fundamentals	1
	What is Animal Breeding	1
	Basic Breeding Biology	2
	Does Animal Breeding Work	3
	Developments Relevant to Modern Animal Breeding	4
	Information in Animal Breeding	7
	The New Era in Animal Breeding	9
	Taking on New Technology	9
	Product Pricing Systems and Genetic Improvement	11
	Overview	12
<b>2</b>	<b>The Modern Breeding Approach</b>	<b>13</b>
	<b>Keith Hammond</b>	
	Introduction	13
	What are the Key Decision Areas in Animal Breeding?	13
	The Three Primary Components of Breeding Operations	16
	The Extent of Genetic Differences	18
	Which Genetics is Important in Animal Breeding?	19
	Some Poorly Understood Concepts in Animal Breeding	23
<b>3</b>	<b>Designing Performance Recording Operations</b>	<b>27</b>
	<b>Keith Hammond</b>	
	Introduction	27
	What is Performance Recording	27
	What Decisions are Required, and When?	29
	What Output is required and When?	31
	What Inputs are Required	32
	What measurements?	32
	What makes a measurement useful?	32
	How to take measurements?	33
	Direct vs indirect measures	35
	Measuring Locations	37
	What animals to measure?	37
	What other data should be collected?	37

Which identification system to use?	39
What added labour requirements are needed?	39
What management system	39
Managing Stock to Maximise Effectiveness of Recording	40
Planning the Whole Performance Recording Program	40
Evolution of the program	41
Further Items	41
Recording is not a spare time job!	41
GIGO operates!	41
Artificial breeding and performance recording	41
Graduating from within- to across-herd/flock recording	42
How many EBVs?	42
Dos and Don'ts in Performance Recording	43
The don'ts	43
The dos - Approach	44
The dos - Detail	44

## **PART II: GENETIC EVALUATION**

<b>4</b>	<b>Principles of Estimated Breeding Values</b>	<b>47</b>
	<b>Brian Kinghorn</b>	
	Heritability and EBV or EPD	47
	Using Estimated Breeding Values	50
	An Example - Yearling Weight in Beef Cattle	51
	Dollar EBVs	52
	Use of Dollar EBVs	52
	Accuracy of EBVs	55
<b>5</b>	<b>The Alternative Evaluation Procedures</b>	<b>57</b>
	<b>Markus Schneeberger</b>	
	Historical Development of Genetic Evaluation Procedures	57
	Best Linear Unbiased Prediction (BLUP)	58
	Statistical method	59
	Classification of models	60
	The Numerator relationship matrix	62
	Obtaining the solutions	63
	Accuracy of Estimated Breeding Values	64
	The BLUP Animal Model	65
	Genetic Evaluation for Categorical Traits	67

<b>6</b>	<b>Within-herd <i>versus</i> Across-herd Evaluation</b>	<b>71</b>
	<b>Keith Hammond</b>	
	Across-Herd or Flock Comparisons are Important	71
	Across-Herd or Flock Procedures	72
	Central Testing	73
	Sire Referencing	74
	Across-Herd or Flock Analyses	75
	Across-Herd or Flock Evaluation for Meat Yield and Quality	76
<b>7</b>	<b>Genetic Evaluation of Beef Cattle</b>	<b>77</b>
	<b>Alex McDonald</b>	
	Introduction	77
	Changing Attitude of Breed Associations	78
	Growth Traits	79
	Reproduction Traits	81
	Scrotal Size and Days to Calving	81
	Gestation Length	82
	Carcase Traits	83
	The Future	84
	Genetic Evaluation of Calving Ease for Australian Beef Cattle	84
<b>8</b>	<b>Genetic Evaluation in Wool Sheep</b>	<b>85</b>
	<b>Michael Carrick</b>	
	Introduction	85
	Within Flock Evaluation	85
	Current Woolplan	85
	The Future - Genetic Evaluation using BLUP	86
	Across Flock Evaluation	87
	Advantages and Disadvantages of Central and On-Farm Tests	88
<b>9</b>	<b>Genetic Evaluation in Meat Sheep</b>	<b>89</b>
	<b>Robert Banks</b>	
	Evaluation Structure in LAMPLAN	89
	Statistical Models for Genetic Prediction	90
	Selection Indices	91
	Across-flock Genetic Evaluations	92
	Delivering Genetic Evaluations through LAMBPLAN	92
	Summary	93

<b>10</b>	<b>Genetic Evaluation in the Dairy Industry</b>	<b>95</b>
	<b>Michael Goddard</b>	
	Calculation of EBVs for Milk Production Traits	95
	Comparison Across Breeds, Herds and Age-Groups	96
	Weighting and Standardisation of Yields	96
	The Base	96
	Overseas Bulls	97
	Reliability	97
	Interpretation of EBVs	98
	Use of EBVs	98
	Traits other than Production	99
	Australian Dairy Herd Improvement Scheme (ADHIS)	100
	Extension Problems	100
	Why didn't my cow Flossy get an EBV?	100
	Cow 1379 produced 200kg of fat last year while 1721 produced only 150kg, yet 1721 got the higher EBV. How can this be?	100
	Why did the EBV of bull ABCD drop 10kg between 1990 and 1991?	101
<b>11</b>	<b>Genetic Evaluation in the Pig Industry</b>	<b>103</b>
	<b>Tom Long</b>	
	Introduction	103
	Traits of Economic Importance	104
	On-Farm Testing	105
	Central Testing	105
	Methods of Evaluation	106
	Visual appraisal	106
	Single trait selection	106
	Selection index	107
	BLUP and PIGBLUP	108
	Fully Integrated Genetic Evaluation System	109
	Guide for Consultants	110
<b>12</b>	<b>Across-Breed Genetic Evaluation</b>	<b>111</b>
	<b>Andrew Swan</b>	
	Across- <i>versus</i> Within-Breed Evaluation	111
	Understanding Crossbreeding Effects	111
	Simple Across-Breed Genetic Evaluations	114
	More Complex Evaluation Procedures	115
	Industry Application of Across-Breed Evaluation	117
	Guide to Consultants	119

## **PART III: BREEDING OBJECTIVES**

<b>13</b>	<b>Introducing Economics to Modern Animal Breeding</b>	<b>121</b>
	<b>Stephen Barwick</b>	
	Introducing the Breeding Objective	121
	Some Important Distinctions	121
	Selection for More than One Trait	122
	Some Background to the Derivation of Selection Indices	123
	A single-trait objective	123
	The multi-trait objective	125
	Selection Index Examples	126
	Example 1. One trait in the objective, two selection criteria available	126
	Example 2. Two traits in the objective, two selection criteria available	128
	Selection for Compound Traits	130
	Using Economics to Formulate the Breeding Objective	131
	Definition of an economic value	131
	Describing the relativity of economic values	132
	The measurement basis for economic values	132
	Steps in defining the breeding objective	133
	Issues in the Derivation of Trait Economic Values	134
	The level of detail attempted	134
	Whose economics to consider?	135
	Estimation methods	135
	Effects of differing perspectives and management and marketing constraints	135
	Non-linearity of economic values	136
	The need for optimal management	136
	Accounting for feed costs	136
	Accounting for competitive position	136
	Discounting	137
	Other Ways of Selecting for More than One Trait	137
	Guide for Consultants	138
<b>14</b>	<b>Breeding Objectives for Beef Cattle</b>	<b>141</b>
	<b>Stephen Barwick and Willi Fuchs</b>	
	The Need	141
	B-OBJECT: A Breeding Objective and Selection Index Package	141
	Basis of the procedure	141
	Formulating the breeding objective	142
	Identification of the breeding, production and marketing system	142
	Identification of sources of returns and costs in commercial herds	143
	Determination of the biological traits influencing returns and costs	144
	Derivation of the economic value of each trait	145
	Deriving the Selection Index	146

B-OBJECT Applications	148
Who will use B-OBJECT?	148
Further reasons for using B-OBJECT	148
B-OBJECT Examples	149
Guide for Consultants	152
Steps in Using B-OBJECT	152
<b>15 Breeding Objectives in Wool Sheep</b>	<b>155</b>
<b>Michael Carrick</b>	
Direction of Genetic Change is Important	155
Which Approach to Use	155
The Formal Approach Aims to Maximise Profit Increase	156
An Example	156
Integrating Economic Value and Genetics	157
Heritability - How Easy to Move Traits	157
Genetic Correlation - How One Trait Tends to Move Another	157
Variability - How much Room to Move Traits	158
Finalising the Selection Index	158
The Data Needed from the Breeder	160
<b>16 Breeding Objectives in Meat Sheep</b>	<b>169</b>
<b>Robert Banks</b>	
Introduction	169
Industry Structure in Australia	169
Industry Use of Genetics	171
LAMBPLAN and Breeding Objectives in Meat Sheep	171
Approaches to Breeding Objectives in other Countries	174
Conclusions	175
<b>17 Breeding Objectives for Dairy Cattle</b>	<b>177</b>
<b>Michael Goddard</b>	
Introduction	177
Economic Weights	177
Selection Criteria in Australia	180
Value for Money in Semen	181

<b>18</b>	<b>Breeding Objectives in the Pig Industry</b>	<b>183</b>
	<b>Tom Long</b>	
	Direction and the Breeding Business	183
	Defining the Goal	183
	Traits Contributing to the Breeding Objective	184
	\$Index	186
	Example - Terminal Sire Line vs Maternal Line	188
	Guide for Consultants	191

#### **PART IV: DESIGN OF BREEDING PROGRAMS**

<b>19</b>	<b>Principles of Genetic Progress</b>	<b>193</b>
	<b>Brian Kinghorn</b>	
	Manipulating Genetic Differences	193
	Simple Selection Theory	193
	Selection Intensity	197
	Selection Based on other Sources of Information	200
	Genetic Progress in Open Nucleus Schemes	201
<b>20</b>	<b>Design of Straight-Breeding Programs - Common Problems</b>	<b>205</b>
	<b>Keith Hammond</b>	
	What are the Available Options for a Selection Program?	205
	How Far Ahead to Plan?	207
	Key Points in the Design of Selection Programs	207
	Definition	207
	Herd size	207
	Selection	207
	Generation turnover	208
	Inbreeding depression	208
	Mating	208
	Records	208
	Integrating the Selection Program and Management System	209
	Common Problems in Selection Programs	209
	Labour Requirements and Design of Selection Programs	210
	Where are the Payoffs?	213
	Single Genes in the Breeding Program	213
	The breeding program for single gene traits	214
	Record keeping	215



<b>21</b>	<b>Maximising Improvement with AI, MOET and Cloning</b>	<b>217</b>
	<b>Brian Kinghorn</b>	
	Introduction	217
	Improvements in Genetic Gain with AI and MOET	217
	Increased selection intensity	217
	MOET: Increased selection intensity and more information for	
	Estimating Breeding Value	217
	Improvements Due to Cloning	221
	Use of AI and MOET in Open Nucleus Schemes	222
<b>22</b>	<b>Design of Crossbreeding Programs</b>	<b>227</b>
	<b>Andrew Swan</b>	
	Straight <i>versus</i> Crossbreeding	227
	The Benefits of Crossbreeding	227
	Problems Associated with Crossbreeding	228
	Crossbreeding Systems	229
	A Dynamic Approach to Establishing Crossbreeding Programs	231
	Practical Application of Crossbreeding in Livestock Industries	232
	Guide for Consultants	235

## **PART V: THE BREEDING BUSINESS**

<b>23</b>	<b>Other Economic Considerations in Animal Breeding</b>	<b>237</b>
	<b>Keith Hammond</b>	
	Background	237
	The Seedstock Producer	237
	The Commercial Producer	239
	The Breeding has Been Done for Today!	239
<b>24</b>	<b>Management of Risk</b>	<b>241</b>
	<b>Markus Schneeberger</b>	
	The Risk About Selection of Replacements	241
	A Portfolio of Sire Usage	242

<b>Index</b>	<b>247</b>
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