Eighth Edition

ANIMAL NUTRITION

P. McDonald, R.A. Edwards, J.F.D. Greenhalgh, C.A. Morgan, L.A. Sinclair, R.G. Wilkinson



ANIMAL NUTRITION

Animal Nutrition

Table of Contents

F	r۸	nt	C_{i})VE	١
	,		\ /\	, v –	- 1

Half Title

Title Page

Copyright Page

Contents

Preface to the eighth edition

Part 1 THE COMPONENTS OF FOODS

- 1 The animal and its food
 - 1.1 Water
 - 1.2 Dry matter and its components
 - 1.3 Analysis and composition of foods

Summary

Questions

Further reading

2 Carbohydrates

- 2.1 Classification of carbohydrates
- 2.2 Monosaccharides
- 2.3 Monosaccharide derivatives
- 2.4 Oligosaccharides
- 2.5 Polysaccharides
- 2.6 Lignin

Summary

Questions

Further reading

3 Lipids

3.1 Classification of lipids



- 3.2 Fats3.3 Glycolipids3.4 Phospholipids
- 3.5 Waxes
- 3.6 Steroids
- 3.7 Terpenes

Summary

Questions

Further reading

- 4 Proteins, nucleic acids and other nitrogenous compounds
 - 4.1 Proteins
 - 4.2 Amino acids
 - 4.3 Peptides
 - 4.4 Structure of proteins
 - 4.5 Properties of proteins
 - 4.6 Classification of proteins
 - 4.7 Nucleic acids
 - 4.8 Other important nitrogenous compounds
 - 4.9 Nitrates
 - 4.10 Alkaloids

Summary

Questions

Further reading

5 Vitamins

- 5.1 Introduction
- 5.2 Fat-soluble vitamins
- 5.3 The vitamin B complex
- 5.4 Vitamin C
- 5.5 Hypervitaminosis
- 5.6 Vitamins and gene expression

Summary

Questions



Further reading

6 Minerals

- 6.1 Functions of minerals
- 6.2 Natural and supplementary sources of minerals
- 6.3 Acidbase balance
- 6.4 Major elements
- 6.5 Trace elements
- 6.6 Other elements

Summary

Questions

Further reading

Part 2 THE DIGESTION AND METABOLISM OF NUTRIENTS

7 Enzymes

- 7.1 Classification of enzymes
- 7.2 Nature of enzymes
- 7.3 Mechanism of enzyme action
- 7.4 Specific nature of enzymes
- 7.5 Factors affecting enzyme activity
- 7.6 Nomenclature of enzymes

Summary

Questions

Further reading

8 Digestion

- 8.1 Digestion in monogastric mammals and fowl
- 8.2 Microbial digestion in ruminants and other herbivores
- 8.3 Alternative sites of microbial digestion
- 8.4 Nutrient digestion and the environment

Summary

Questions

Further reading

Historical reference



9 Metabolism

- 9.1 Energy metabolism
- 9.2 Protein synthesis
- 9.3 Fat synthesis
- 9.4 Carbohydrate synthesis
- 9.5 Control of metabolism

Summary

Questions

Further reading

Part 3 QUANTIFYING THE NUTRIENT CONTENT OF FOODS: DIGESTIBILITY, ENERGY AND PROTEIN SUPPLY

- 10 Evaluation of feeds: digestibility
 - 10.1 Measurement of digestibility
 - 10.2 Validity of digestibility coefficients
 - 10.3 Digestibility in different sections of the digestive tract
 - 10.4 Factors affecting digestibility
 - 10.5 Measurement of mineral availability

Summary

Questions

Further reading

- 11 Evaluation of foods: energy content of foods and energy partition
 - 11.1 Energy demand
 - 11.2 Energy supply and partition
 - 11.3 Animal calorimetry: methods of measuring heat production and energy retention
 - 11.4 Utilisation of metabolisable energy

Summary

Questions

Further reading

- 12 Evaluation of foods: systems for expressing energy supply and requirements
 - 12.1 Energy systems and energy models



- 12.2 Energy systems for ruminants
- 12.3 Energy systems for pigs and poultry
- 12.4 Energy systems for horses
- 12.5 Energy systems for dogs and cats
- 12.6 Predicting the energy value of foods

Summary

Questions

Further reading

Historical references

13 Evaluation of foods: protein

- 13.1 Crude protein (CP)
- 13.2 Digestible crude protein (DCP)
- 13.3 Determination of endogenous nitrogen
- 13.4 Measures of protein quality for monogastric animals
- 13.5 Measures of food protein used in practice in the feeding of pigs and poultry
- 13.6 Measures of food protein used in practice in the feeding of horses
- 13.7 Measures of food protein quality for dogs and cats
- 13.8 Measures of protein quality for ruminant animals
- 13.9 The UK metabolisable protein system
- 13.10 The UK feed into Milk (FiM) protein system for dairy cows

Summary

Questions

Further reading

Part 4 THE NUTRIENT REQUIREMENTS OF ANIMALS

14 Feeding standards for maintenance and growth

- 14.1 Nutrient requirements for maintenance
- 14.2 Nutrient requirements for growth
- 14.3 Nutrient requirements for wool production
- 14.4 Mineral and vitamin requirements for maintenance and growth
- 14.5 Nutritional control of growth

Summary

Questions



Further reading

Historical reference

15 Feeding standards for reproduction

- 15.1 Nutrition and the initiation of reproductive ability
- 15.2 Plane of nutrition, fertility and fecundity
- 15.3 Egg production in poultry
- 15.4 Nutrition and the growth of the foetus

Summary

Questions

Further reading

16 Lactation

- 16.1 Sources of the milk constituents
- 16.2 Nutrient requirements of the lactating dairy cow
- 16.3 Nutrient requirements of the lactating ewe
- 16.4 Nutrient requirements of the lactating dairy goat
- 16.5 Nutrient requirements of the lactating sow
- 16.6 Nutrient requirements of the lactating mare
- 16.7 Nutrient requirements of the lactating dog and cat

Summary

Questions

Further reading

17 Voluntary intake of food

- 17.1 Food intake in pigs and poultry
- 17.2 Food intake in ruminants
- 17.3 Food intake in horses
- 17.4 Food intake in dogs and cats
- 17.5 Prediction of food intake

Summary

Questions

Further reading

Part 5 THE NUTRITIONAL CHARACTERISTICS OF FOODS



18 Grass and forage crops

- 18.1 Pastures and grazing animals
- 18.2 Grasses
- 18.3 Legumes
- 18.4 Other forages

Summary

Questions

Further reading

19 Silage

- 19.1 Silage, ensilage and silos
- 19.2 Role of plant enzymes in ensilage
- 19.3 Role of microorganisms in ensilage
- 19.4 Nutrient losses in ensilage
- 19.5 Classification of silages
- 19.6 Nutritive value of silages
- 19.7 Whole crop cereal and legume silages

Summary

Questions

Further reading

20 Hay, artificially dried forages, straws and chaff

- 20.1 Hay
- 20.2 Artificially dried forages
- 20.3 Straws and related by-products

Summary

Questions

Further reading

21 Roots, tubers and related by-products

21.1 Roots

21.2 Tubers

Summary

Questions

Further reading



22 Cereal grains and cereal by-products

- 22.1 The nutrient composition of grains
- 22.2 Barley
- 22.3 Maize
- 22.4 Oats
- 22.5 Wheat
- 22.6 Other cereals
- 22.7 Cereal processing

Summary

Questions

Further reading

23 Protein concentrates

- 23.1 Oilseed cakes and meals
- 23.2 Oilseed residues of minor importance
- 23.3 Leguminous seeds
- 23.4 Processed animal protein (PAP)
- 23.5 Milk products
- 23.6 Single-cell protein and microalgae
- 23.7 Insect protein
- 23.8 Synthetic amino acids
- 23.9 Non-protein nitrogen compounds as protein sources

Summary

Questions

Further reading

24 Food additives

- 24.1 Antibiotics
- 24.2 Probiotics
- 24.3 Oligosaccharides
- 24.4 Enzymes
- 24.5 Organic acids
- 24.6 Spray-dried plasma
- 24.7 Modifiers of rumen fermentation



24.8 Plant extracts

Summary

Questions

Further reading

Part 6 ANIMAL PRODUCTS AND HUMAN NUTRITION

25 Animal nutrition and the consumers of animal products

25.1 Comparative nutrition

25.2 The contribution of animal products to human requirements

25.3 Objections to the use of animal products

25.4 Animal products: past, present and future

Summary

Questions

Further reading

Appendix 1: Solutions to numerical questions

Appendix 2: Notes on tables

Index

Publisher's acknowledgements

Back Cover