

**METABOLIC MODIFIERS**  
**Effects on the**  
**Nutrient Requirements of**  
**Food-Producing Animals**

Subcommittee on Effects of Metabolic Modifiers on the  
Nutrient Requirements of Food-Producing Animals  
Committee on Animal Nutrition  
Board on Agriculture  
National Research Council

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# Metabolic Modifiers Effects On The Nutrient Requirements Of Food Producing Animals

**National Research Council, Division on Earth and Life Studies, Board on Life Sciences, Board on Agriculture and Natural Resources, Committee on Agricultural Biotechnology, Health, and the Environment, Committee on Defining Science-Based Concerns Associated with Products of Animal Biotechnology**

## **Metabolic Modifiers Effects On The Nutrient Requirements Of Food Producing Animals:**

Metabolic Modifiers National Research Council, Board on Agriculture, Subcommittee on Effects of Metabolic Modifiers on the Nutrient Requirements of Food-Producing Animals, 1994-02-01 In the past decade animal scientists have learned that administering recombinantly derived somatotropin growth hormone to cows improves milk production and that giving beta adrenergic agonists to meat animals improves productivity and leanness In order for these metabolic modifiers to yield benefits however sound management of the animals nutrition is necessary This volume reports on how these substances work in the animals metabolism what effects they might have on nutrient requirements of domestic livestock and what information should be developed further by investigators The book explores the current understanding of the biology structure mechanisms of action and treatment effects of somatotropin beta adrenergic agonists and anabolic steroids A companion volume to the Nutrient Requirements of Domestic Animals series this authoritative volume will be required reading for animal scientists researchers veterinarians livestock farmers and faculty and students in university animal veterinary science programs

**Nutrient Requirements of Laboratory Animals**, Subcommittee on Laboratory Animal Nutrition, Committee on Animal Nutrition, Board on Agriculture, Institute for Laboratory Animal Research, National Research Council, 1995-01-15 In the years since the third edition of this indispensable reference was published a great deal has been learned about the nutritional requirements of common laboratory species rat mouse guinea pig hamster gerbil and vole The Fourth Revised Edition presents the current expert understanding of the lipid carbohydrate protein mineral vitamin and other nutritional needs of these animals The extensive use of tables provides easy access to a wealth of comprehensive data and resource information The volume also provides an expanded background discussion of general dietary considerations In addition to a more user friendly organization new features in this edition include A significantly expanded section on dietary requirements for rats reporting substantial new findings A new section on nutrients that are not required but that may produce beneficial results New information on growth and reproductive performance among the most commonly used strains of rats and mice and on several hamster species An expanded discussion of diet formulation and preparation including sample diets of both purified and natural ingredients New information on mineral deficiency and toxicity including warning signs This authoritative resource will be important to researchers laboratory technicians and manufacturers of laboratory animal feed

*Nutrient Requirements of Nonhuman Primates* National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Ad Hoc Committee on Nonhuman Primate Nutrition, Committee on Animal Nutrition, 2003-02-01 This new release presents the wealth of information gleaned about nonhuman primates nutrition since the previous edition was published in 1978 With expanded coverage of natural dietary habits gastrointestinal anatomy and physiology and the nutrient needs of species that have been difficult to maintain in captivity it explores the impact on nutrition of physiological and life stage considerations infancy weaning immune function obesity aging and more The

committee also discusses issues of environmental enrichment such as opportunities for foraging Based on the world s scientific literature and input from authoritative sources the book provides best estimates of nutrient requirements The volume covers requirements for energy carbohydrates including the role of dietary fiber proteins and amino acids fats and fatty acids minerals fat soluble and water soluble vitamins and water The book also analyzes the composition of important foods and feed ingredients and offers guidelines on feed processing and diet formulation

**Environmental Effects of Transgenic Plants** National Research Council,Division on Earth and Life Studies,Board on Agriculture and Natural Resources,Committee on Environmental Impacts Associated with Commercialization of Transgenic Plants,2002-03-22 Transgenic crops offer the promise of increased agricultural productivity and better quality foods But they also raise the specter of harmful environmental effects In this new book a panel of experts examines Similarities and differences between crops developed by conventional and transgenic methods Potential for commercialized transgenic crops to change both agricultural and nonagricultural landscapes How well the U S government is regulating transgenic crops to avoid any negative effects Environmental Effects of Transgenic Plants provides a wealth of information about transgenic processes previous experience with the introduction of novel crops principles of risk assessment and management the science behind current regulatory schemes issues in monitoring transgenic products already on the market and more The book discusses public involvement and public confidence in biotechnology regulation And it looks to the future exploring the potential of genetic engineering and the prospects for environmental effects

Animal Care and Management at the National Zoo National Research Council,Division on Earth and Life Studies,Institute for Laboratory Animal Research,Board on Agriculture and Natural Resources,Committee on the Review of the Smithsonian Institution's National Zoological Park,2005-11-27 This report follows up on an interim report released in February 2004 that focused on immediate needs in the areas of animal care and management recordkeeping and pest control The report finds that the zoo has made good faith efforts to correct deficiencies noted in the interim report and has made some noticeable improvements in the past year in zoo operations and animal care However problems in areas such as staff training workplace culture and strategic planning still need to be addressed Specifically the report recommends that the zoo immediately develop and implement animal care training programs to ensure that people who are directly responsible for the well being of its animal collection are adequately prepared and competent The report commends a zoo initiated strategic planning process as a positive step but recommends it contain a more detailed comprehensive strategy of how it will meet short term goals and that it should link plans to upgrade facilities with those to acquire animals The zoo should also focus on improving communication among keepers veterinarians nutritionists senior managers and curators

**Nutrient Requirements of Swine** Subcommittee on Swine Nutrition,Committee on Animal Nutrition,National Research Council,1998-04-03 The tenth edition of this essential reference presents new knowledge about the nutritional needs of swine that consider such factors as growth rate carcass leanness

gender health environment and repartitioning agents New sections are presented on requirements for amino acids and other nutrients In addition an original modeling approach to arriving at energy and amino acid needs for given animals is incorporated in this revision The book comes with a CD ROM that allows users to create tables of nutrient requirements for swine of a specific body weight and level of productivity Nutrient Requirements of Swine covers Biological concepts that underlie nutrient needs for growth and function New data on amino acid and energy requirements and the factors that shape them New findings on lysine and the bioavailability of amino acids New research results on minerals and vitamins Nutrient composition of an expanded list of feedstuffs The role of water in swine physiology including factors that affect the quality of drinking water Expanded tables of feed ingredients and their nutrient composition provide bioavailability estimates fatty acid composition of fats typically used in swine diets and important information on estimating the amino acid content of crude protein

**Nutrient Requirements of Beef Cattle** Subcommittee on Beef Cattle Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council, 2000-05-16 As members of the public becomes more conscious of the food they consume and its content higher standards are expected in the preparation of such food The updated seventh edition of Nutrient Requirements of Beef Cattle explores the impact of cattle's biological production and environmental diversities as well as variations on nutrient utilization and requirements More enhanced than previous editions this edition expands on the descriptions of cattle and their nutritional requirements taking management and environmental conditions into consideration The book clearly communicates the current state of beef cattle nutrient requirements and animal variation by visually presenting related data via computer generated models Nutrient Requirements of Beef Cattle expounds on the effects of beef cattle body condition on the state of compensatory growth takes an in depth look at the variations in cattle type and documents the important effects of the environment and stress on food intake This volume also uses new data on the development of a fetus during pregnancy to prescribe nutrient requirements of gestating cattle more precisely By focusing on factors such as product quality and environmental awareness Nutrient Requirements of Beef Cattle presents standards and advisements for acceptable nutrients in a complete and conventional manner that promotes a more practical understanding and application

Introduction to Animal Science Wilson G. Pond, Kevin R. Pond, 2000-02-11 Pond is for the mainstream introduction to animal science taught in every university that has a school of agriculture or animal science department The result of years of teaching the book provides students with a comprehensive and balanced overview of animal agriculture in contemporary society taking into account the needs of students with highly varied cultural backgrounds and educational objectives

**Exploring a Vision** National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Planning Group for a Workshop on Exploring a Vision: Integrating Knowledge for Food and Health, Debra P. Davis, Tina I. Rouse, 2004-04-30 Centuries of scientific advances in agriculture have increased the quantity quality and variety of our food supply Food in the United States is abundant and affordable incomes are at record

levels nutrition and health knowledge is at an all time high Yet many Americans are not eating a proper diet The result is an obesity epidemic that contributes to rising healthcare costs from increased rates of heart disease stroke diabetes and several cancers Whether we see food as medicine or as the cause of disease medical and agricultural research have the potential to come together in innovative ways to help consumers and producers understand and face the challenges of following a healthful diet More than 100 leaders in agriculture health research education policy and industry convened at the National Academies in June 2003 to share their opinions on what would be a more efficient and effective system for conducting food and health research Some of their thoughts follow Participants concluded that no one organization or agency can solve food related health issues alone the nation needs better mechanisms for bringing together its agriculture and health care infrastructures to address food related health problems Addressing the obesity issue in particular will require a multidisciplinary strategy that includes research on foods consumer knowledge and behavior and the economics of food and health related activities including food pricing health care costs and agricultural support programs

**Improving the Sensory and Nutritional Quality of Fresh Meat** Joseph Kerry, 2009-01-22 Understanding of the scientific basis of quality attributes in meat is becoming more advanced providing more effective approaches to the control of meat eating and technological quality This important collection reviews essential knowledge of the mechanisms underlying quality characteristics and methods to improve meat sensory and nutritional quality Part one analyses the scientific basis of meat quality attributes such as texture and tenderness colour water holding capacity and flavour development Chapters on the nutritional quality of meat and meat sensory evaluation complete the section Part two discusses significant insights into the biology of meat quality obtained from genomic and proteomic perspectives with chapters focussing on different types of meat Parts three and four then review production and processing strategies to optimise meat quality considering aspects such as production practices and meat nutritional quality dietary antioxidants and antimicrobials carcass interventions chilling and freezing and packaging Methods of meat grading and quality analysis are also included With its distinguished editors and international team of contributors Improving the sensory and nutritional quality of fresh meat is a standard reference for those industrialists and academics interested in optimising meat quality Reviews methods to improve meat sensory and nutritional quality considering the effects of different production practices such as chilling freezing and packaging Analyses the scientific basis of meat quality attributes covering texture tenderness colour and water holding capacity Examines production and processing strategies to optimise meat quality including the current state of development and future potential

**California Agricultural Research Priorities** National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Committee on California Agricultural Research Priorities: Pierce's Disease, 2004-10-28 The glassy winged sharpshooter is one of the more recent invasive pests to afflict California agriculture The insect transmits a bacterial pathogen that causes Pierce's disease which has impaired production of wine table and raisin grapes in California

The report recommends strengthening the process and the priorities for research funded by state agencies and wine industry groups to address Pierce's disease and its vector. Research should be focused on identifying feasible options for controlling the spread of the disease and providing sustainable approaches that are adaptable and affordable over the long term. Several avenues of research be pursued more intensely including the genetic makeup of the pathogen that triggers Pierce's disease, understanding the mechanisms that make grapes resistant to the disease, the possibilities of introducing predator enemies to the sharpshooter and new ways to manage the planting of crops to help avoid spread of the disease.

**Direct and Indirect Human Contributions to Terrestrial Carbon Fluxes** National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Stephanie Johnson, Rob Coppock, 2004-06-30 Human induced climate change is an important environmental issue worldwide as scientific studies increasingly demonstrate that human activities are changing the Earth's climate. Even if dramatic reductions in emissions were made today, some human induced changes are likely to persist beyond the 21st century. The Kyoto Protocol calls for emissions reporting that separates out management induced changes in greenhouse gases from those changes caused by indirect human effects, e.g., carbon dioxide fertilization, nitrogen deposition, or precipitation changes, natural effects, and past practices on forested agricultural lands. This book summarizes a September 2003 workshop where leaders from academia, government, and industry came together to discuss the current state of scientific understanding on quantifying direct human induced change in terrestrial carbon stocks and related changes in greenhouse gas emissions and distinguishing these changes from those caused by indirect and natural effects.

**Diagnosis and Control of Johne's Disease** National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Committee on Diagnosis and Control of Johne's Disease, 2003-09-13 Johne's disease is a chronic progressive intestinal disease caused by infection with *Mycobacterium avium* subspecies *paratuberculosis* Map that affects primarily ruminant animals. In recent decades there has been growing concern over the lack of effective control of this disease and questions have arisen regarding the possibility that Map infection could be a cause of some cases of Crohn's disease in humans. This report presents a broad outline of the steps that should be taken to control Johne's disease, reduce the spread of Map, and minimize effects of the disease in animals. The report also describes the weaknesses of our current research agenda and provides recommendations for a new research strategy to resolve the question of whether there is a link between Johne's and Crohn's diseases.

**Animal Biotechnology** National Research Council, Division on Earth and Life Studies, Board on Life Sciences, Board on Agriculture and Natural Resources, Committee on Agricultural Biotechnology, Health, and the Environment, Committee on Defining Science-Based Concerns Associated with Products of Animal Biotechnology, 2002-12-29 Genetic based animal biotechnology has produced new food and pharmaceutical products and promises many more advances to benefit humankind. These exciting prospects are accompanied by considerable unease, however, about matters such as safety and ethics. This book identifies science based and policy related concerns about animal

biotechnology key issues that must be resolved before the new breakthroughs can reach their potential The book includes a short history of the field and provides understandable definitions of terms like cloning Looking at technologies on the near horizon the authors discuss what we know and what we fear about their effects the inadvertent release of dangerous microorganisms the safety of products derived from biotechnology the impact of genetically engineered animals on their environment In addition to these concerns the book explores animal welfare concerns and our societal and institutional capacity to manage and regulate the technology and its products This accessible volume will be important to everyone interested in the implications of the use of animal biotechnology

*Air Emissions from Animal Feeding Operations* National Research Council, Division on Earth and Life Studies, Board on Environmental Studies and Toxicology, Board on Agriculture and Natural Resources, Committee on Animal Nutrition, Ad Hoc Committee on Air Emissions from Animal Feeding Operations, 2003-05-07 Air Emissions from Animal Feeding Operations Current Knowledge Future Needs discusses the need for the U S Environmental Protection Agency to implement a new method for estimating the amount of ammonia nitrous oxide methane and other pollutants emitted from livestock and poultry farms and for determining how these emissions are dispersed in the atmosphere The committee calls for the EPA and the U S Department of Agriculture to establish a joint council to coordinate and oversee short and long term research to estimate emissions from animal feeding operations accurately and to develop mitigation strategies Their recommendation was for the joint council to focus its efforts first on those pollutants that pose the greatest risk to the environment and public health

**Wood in Our Future: The Role of Life-Cycle Analysis** Board on Agriculture, National Research Council, 1997-05-12 The United States produces 25% of the world's wood output and wood supports a major segment of the U S industrial base Trees provide fiber resins oils pulp food paper pharmaceuticals fuel many products used in home construction and numerous other products The use of wood as a raw material must consider production efficiencies and natural resource conservation as well as efficient profitable use of solid wood its residues and by products To better assess the use of wood as a raw material the U S Department of Agriculture's Forest Service asked the National Research Council's Board on Agriculture to bring together experts to review the analytical techniques used to follow the life cycle of wood production from tree to product and assess the environmental impacts This resulting book provides a base of current knowledge identifying what data are lacking where future efforts should be focused and what is known about the methodologies used to assess environmental impacts The book also focuses on national and international efforts to develop integrated environmental economic and energy accounting methodologies

*Wood in Our Future: The Role of Life-Cycle Analysis* National Research Council, Board on Agriculture, 1997-04-28 The United States produces 25% of the world's wood output and wood supports a major segment of the U S industrial base Trees provide fiber resins oils pulp food paper pharmaceuticals fuel many products used in home construction and numerous other products The use of wood as a raw material must consider production efficiencies and natural resource conservation as well



as efficient profitable use of solid wood its residues and by products To better assess the use of wood as a raw material the U S Department of Agriculture s Forest Service asked the National Research Council s Board on Agriculture to bring together experts to review the analytical techniques used to follow the life cycle of wood production from tree to product and assess the environmental impacts This resulting book provides a base of current knowledge identifying what data are lacking where future efforts should be focused and what is known about the methodologies used to assess environmental impacts The book also focuses on national and international efforts to develop integrated environmental economic and energy accounting methodologies

Emerging Animal Diseases National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Debra P. Davis, 2002-09-05 Recent outbreaks of foot and mouth disease FMD and bovine spongiform encephalopathy BSE in Europe and Japan set off alarm bells in the United States and other nations prompting a flurry of new regulations border controls inspections and other activities to prevent incursions of the diseases The terrorist attacks in New York City and Washington DC added a new note of urgency to the alarm Concerned about additional acts of terror or sabotage in various sectors of the economy including agriculture U S government and industry officials have begun to reevaluate emergency management plans in response to these threats and to shift the focus of research and planning More than 200 representatives of government industry academia and nongovernmental organizations gathered at a one day workshop in Washington DC on January 15 2002 to assess what the United States is doing about emerging animal diseases and related issues and to explore what still needs to be done Major objectives of the workshop include 1 elucidating information on the U S position with regard to potentially threatening animal diseases 2 identifying critical problems barriers and data gaps and 3 defining potential future National Academies activities Emerging Animal Diseases describes the issues presented and discussed by the workshop participants This report summary extracts the key technical issues from the presentations and discussions rather than presenting each session and panel discussion separately Many issues were touched upon repeatedly by several speakers in different sessions and this format is intended to allow readers who did not attend the workshop to have a good understanding of the discussions in the context of the entire workshop

Publicly Funded Agricultural Research and the Changing Structure of U.S. Agriculture National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Committee to Review the Role of Publicly Funded Agricultural Research on the Structure of U.S. Agriculture, 2002-03-18 The U S Department of Agriculture USDA requested that the Board on Agriculture and Natural Resources of the National Research Council NRC convene a panel of experts to examine whether publicly funded agricultural research has influenced the structure of U S agriculture and if so how The Committee to Review the Role of Publicly Funded Agricultural Research on the Structure of U S Agriculture was asked to assess the role of public sector agricultural research on changes in the size and numbers of farms with particular emphasis on the evolution of very large scale operations

Swine Nutrition Austin J. Lewis, L. Lee Southern, 2000-12-21 With 42 chapters authored by leading

international experts Swine Nutrition Second Edition is a comprehensive reference that covers all aspects of the nutrition of pigs Content includes characteristics of swine and the swine industry with emphasis on the gastrointestinal tract various classes of nutrients how these nutrients are metabolized by swine and the factors affecting their utilization the practical aspects of swine nutrition from birth through gestation lactation in sows and the feeding of adult boars and nutritional aspects of the various feedstuffs commonly fed to swine Rounding the book is coverage of various techniques used in swine nutrition research

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