

# BURLEIGH DODDS SERIES IN AGRICULTURAL SCIENCE

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## Advances in sustainable dairy cattle nutrition

Edited by Professor Alexander N. Hristov  
The Pennsylvania State University, USA



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### About the book

This collection provides a comprehensive review of the wealth of research on recent advances in understanding and improving dairy cattle nutrition to reduce the carbon footprint of the dairy sector.

The book explores the role of nutritional requirements in optimising gut function and overall animal health, as well as its influence on milk yield and quality. Chapters also review the use of dietary supplements to optimise dairy cattle nutrition.

### About the editor

**Dr Alexander N. Hristov** is Distinguished Professor of Dairy Nutrition in the Department of Animal Science at The Pennsylvania State University, USA. With over 200 publications, he is internationally renowned for his research on sustainable dairy nutrition to improve feed efficiency and reduce environmental emissions.

### Advances in sustainable dairy cattle nutrition

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### Part 1 Nutritional requirements

1. Advances in understanding carbohydrate requirements and utilization in dairy cattle: *L. E. Chase, Cornell University, USA; and M. B. Hall, U.S. Dairy Forage Research Center - USDA-ARS, USA*
2. Advances in understanding protein requirements and utilization in dairy cattle: *Jeffrey L. Firkins, The Ohio State University, USA; and Hélène Lapierre, Sherbrooke Research and Development Centre, Agriculture and Agri-Food Canada, Canada*
3. Advances in understanding lipid requirements and utilization in dairy cattle: *James K. Drackley, University of Illinois at Urbana-Champaign, USA*

### Part 2 The use of dietary supplements to optimise dairy cattle nutrition: plant extracts

4. The use of plant extracts as dietary supplements in dairy cow nutrition: plant essential oils: *Sergio Calsamiglia and María Rodríguez-Prado, Animal Nutrition and Welfare Service, Universitat Autònoma de Barcelona, Spain; Gonzalo Fernández-Turren, Instituto de Producción Animal, Facultad de Veterinaria, Universidad de la República, Uruguay; and Lorena Castillejos, Animal Nutrition and Welfare Service, Universitat Autònoma de Barcelona, Spain*
5. The use of tannins as dietary supplements in dairy cattle nutrition: *Michael Kreuzer, ETH Zurich, Switzerland*
6. The use of plant extracts as dietary supplements in dairy cow nutrition: saponins: *Chaouki Benchaar, Sherbrooke Research and Development Centre, Agriculture and Agri-Food Canada, Canada*

### Part 3 The use of direct-fed microbials (DFM) and other supplements to optimise nutrition

7. The use of bacterial probiotics and direct-fed microbials as dietary supplements in dairy cow nutrition: *Zhongtang Yu, The Ohio State University, USA; Amlan Patra, West Bengal University of Animal and Fishery Sciences, India and American Institute for Goat Research, Langston University, USA; and Ming Yan, The Ohio State University, USA*
8. The use of exogenous enzymes as dietary supplements in dairy cow nutrition: *Diwakar Vyas, Kathy G. Arriola, Felipe X. Amaro, Halima Sultana, Mohammad Malekhhahi, Samia Farooq, Adeoye Oyebade and Adegbola T. Adesogan, Institute of Food and Agricultural Sciences, University of Florida-Gainesville, USA*
9. Amino acids in dairy nutrition: enhancing milk protein synthesis and beyond: *Juan J. Lóor, University of Illinois, USA*
10. The use of supplements to mitigate enteric methane emission in dairy cattle: *Alexander N. Hristov, The Pennsylvania State University, USA; Claudia Arndt, International Livestock Research Institute, Kenya; Audino Melgar, Instituto de Innovación Agropecuaria de Panama, City of Knowledge, Panama and The Pennsylvania State University, USA; and Derek Wasson, The Pennsylvania State University, USA*

### Part 4 Assessing alternative feed sources from agricultural co-products

11. Assessing alternative fiber sources from by-products: *Maurice L. Eastridge, The Ohio State University, USA*
12. Assessing alternative protein sources from by-products: *Zachary E. Carlson and Gregory Lardy, North Dakota State University, USA*