AGRICULTURAL MEDICINE
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Rural Occupational and Environmental Health, Safety, and Prevention

Second Edition

KELLEY J. DONHAM AND ANDERS THELIN

WILEY Blackwell
We dedicate the book to the millions of farmers, ranchers, their families, and workers who have either died or suffered disabling injuries or illnesses from their work producing food, fiber, and fuel for the people of this planet. We also dedicate this book to those who have lost a family member or loved one from a farm-related injury or illness. This author (KJD) dedicates this book to his eight first-level relatives who have suffered fatal or disabling farm injuries. Furthermore, we dedicate this book to the healthcare and safety professionals, veterinarians, governmental and non-governmental agencies, and the many volunteers who care for and work to prevent injuries and illnesses within farming communities.

This author (KJD) thanks his mentors (especially Pete Knapp and Clyde Berry) who in 1973 gave him the opportunity to engage in an educational and research program in agricultural medicine at the University of Iowa.

We thank the International Commission in Occupational Health for advocating this text and the more than 30 agricultural health and safety professionals who participated in the two consensus processes that set out the core topics and learning objectives that guided the contents of this book.

We thank the six added authors of Chapters 11 and 15, and the 14 reviewers who volunteered their time and talents for their expert review of the various chapters of this book. I thank my wife Jean Donham for her dedicated and detailed reading of every chapter.

Finally, we thank our families for their support and understanding through this effort, which like farming in so many ways is a labor of love.

Kelley J. Donham
Anders Thelin
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About the Authors

Primary Author and Editor
Kelley J. Donham MS, DVM, DACVPM

Kelley was born and raised on a swine and beef cow farm in Johnson County, Iowa, where he was actively involved in the family farm operation for many years. He still is actively involved in agriculture, and owns and manages, with a colleague, a 440-acre farm in Mahaska County, Iowa. Kelley obtained a BS in Premedical Sciences, and an MS in Preventive Medicine and Environmental Health from the University of Iowa, and a Doctorate of Veterinary Medicine degree from Iowa State University. He was in a rural veterinary practice before returning to the Institute of Agricultural Medicine at the University of Iowa in 1973, achieving the rank of Professor in the College of Public Health in 1984.

In 1974 Dr. Donham founded the first – and one of the few – didactic teaching programs today in agricultural medicine, which provides specialty training for healthcare professionals, occupational and public health professionals, and veterinarians in occupational and environmental health to serve agricultural communities. Dr. Donham is also the founder of the occupational health service for farmers (now the AgriSafe Network), and founding Director of Iowa’s Center for Agricultural Safety and Health (ICASH) and the Agricultural Health and Safety Training program at the University of Iowa, which includes MS and PhD programs, a continuing education program, and the Building Capacity program, which has initiated training in nine states in the United States and facilitated similar training in Australia, Turkey, and Sweden.

Dr. Donham’s research has focused on diseases of agricultural workers, particularly respiratory diseases, zoonotic infectious diseases, and interventions for prevention. He conducted the original studies in regard to air quality and respiratory illnesses in workers and swine in intensive livestock housing. He has published over 150 peer-reviewed articles, three books, and 25 book chapters in the field of agricultural medicine.
Dr. Donham is a Diplomate and past President of the American College of Veterinary Preventive Medicine, and in 2002 received the Helwig-Jennings Award for sustained and lasting contributions to the field of veterinary preventive medicine. In 2003, he received the outstanding faculty award for service and in 2009 the Outstanding Teacher Award, both from the University of Iowa College of Public Health. Also in 2003, he received the Stange outstanding alumni award from the Iowa State University College of Veterinary Medicine.

Currently as Professor Emeritus, Dr. Donham remains active in the field, writing, speaking and leading a national consensus group to form a national Certified Safe Farm Program. He also co-founded the Rural Health and Safety Clinic of Eastern Iowa.

Co-primary Author

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Dr. Thelin obtained his medical doctorate degree at the University of Lund, Sweden in 1970. He was active in medical practice, connected to the hospital of Växjö, Sweden, where he served for several years and worked as a practitioner in the rural service area of the hospital. He then transitioned into the occupational health service for that region. A rising interest in farmers’ lives and working conditions brought him back to the University of Lund for further studies, resulting in a PhD, with his thesis focused on the panorama of farmers’ occupational health and risks.

In the 1970s, Dr. Thelin was a principal in establishing the first occupational health service in the world specifically for farmers (the Swedish Farmers Health and Safety Association, or Lantbrukshälsan). Later he was head of research and development of Lantbrukshälsan and was active in designing innovative service programs to promote health and safety in dangerous agricultural working conditions.

Dr. Thelin lives in the countryside in Southern Sweden and, together with his family, operates a farm. The Thelin family is active in horse breeding, sheep production, and development of a novel fodder for horses.

Dr. Thelin’s research has focused on diseases of agricultural workers, especially rheumatic disorders and injuries of the musculoskeletal system. He conducted several original studies and is currently responsible for a large prospective research program established in 1990 involving more than 1000 farmers. Dr. Thelin noticed early on the significant risk of osteoarthritis among farmers and has authored a number of publications over the years focusing on hip and knee joint osteoarthritis. Dr. Thelin’s daughter is also a physician, and practices general medicine focusing on the rural population. She collaborates with her father, having published several joint research papers on musculoskeletal conditions in the cohort of farmers they have established in the rural region where they live.

Dr. Thelin’s special knowledge and connection to the farm community provide him with a unique background for writing about farmers’ health.
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Dr. Yoder began his professional career in agricultural safety and health at Pennsylvania State University as an instructor and Extension safety associate. There he provided leadership for the National Safe Tractor and Machinery Operation Program by coordinating online instructor training and educational programs. In addition, he taught in Penn State’s Department of Agricultural and Biological Engineering and participated in other research and outreach programs for the Penn State Agricultural Safety and Health Program.

He graduated from Penn State University with a BS and MS in Agricultural Systems Management and Environmental Pollution Control, respectively. He earned his PhD degree in Agricultural and Biological Engineering from Purdue University. He serves on the Board of Directors for the International Society for Agricultural Safety and Health (ISASH) and the Agricultural Safety and Health Council of America (ASHCA). Dr. Yoder also maintains leadership roles in the eXtension.org/AgSafety Community of Practice, American Society of Agricultural and Biological Engineers, and the USDA NCERA197 Committee for Establishing Priorities in Land Grant University Research and Education Programs.

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Mr. Grafft was born and raised on a crop and livestock farm in Eastern Iowa. He received his BS and MS degrees from Iowa State University, and was an Extension Livestock Specialist for several years after moving off the farm. He worked part-time as a paramedic and flight paramedic for 25 years.

From 1993 to 2013 Mr. Grafft served as a Rural Health and Safety Specialist at the University of Iowa. During that time, he taught both occupational safety and agricultural safety classes. He was a member of the team that developed, researched, and coordinated the Certified Safe Farm audit tool, and taught implementation
of the program. As part of that effort, he conducted safety audits on dozens of farms, including a 26,000-acre Iowa farm and the Navaho Nation’s 63,000-acre farm in New Mexico.

In his current position, he develops, implements, and presents safety information in local programs, as well as presenting at national and international conferences. He has the additional responsibility of helping to determine priorities of research, intervention/prevention, and outreach/education. He is currently the co-chair of the Research and Development Committee of the International Society of Agricultural Safety and Health.

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Dr. Grigioni is a medical doctor, trained in head and neck surgery. He was born in a family closely related to agricultural production and teaching, and is a farmer as well as a surgeon. He began working in hospitals in Argentina, in the "pampa" (the large plain and agricultural region of South America) of that country, where he has treated over 5000 patients with different types of surgical pathologies. Most of these originated from agricultural exposures (e.g., skin cancer, injuries from machinery, animals, electricity, burns, firearms, rural roadway crashes, and zoonoses (e.g., hydatid disease)). In addition, he has treated congenital malformations and related behavioral conditions in the population, including alcoholism and smoking-related cancers. He also taught in the area of head and neck surgery and in organizations such as the League against Cancer Fights of Argentina. For the last 10 years he has focused his efforts on prevention and agricultural health and safety research, developing a program which has been incorporated into a farmers’ cooperative that brings together 35,000 farmers. He has designed multiple activities to disseminate agricultural medicine among all the institutions that make up the Argentine agricultural sector (professional associations of veterinarians, agronomists, cooperatives, government institutions, private companies, universities, etc.). He is currently working with farm machinery manufacturers to create safer agricultural machinery for Argentinian farmers.

Australia and New Zealand, Section B
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Dr. Brumby began her career as a registered nurse and midwife working in rural Australia and has held executive positions in health services since 1998. She has been actively involved in agriculture, running the family beef and wool property
for 12 years. These two career paths provided unique insight into the health, wellbeing and safety of farm men and women, and the barriers that prevent them enjoying the same health outcomes as other populations.

Combining these two passions (health and agriculture), Sue became the founding Director of the National Centre for Farmer Health, a partnership between regional health service Western District Health Service and Deakin University. She leads the Graduate Certificate in Agricultural Health and Medicine, has obtained numerous research grants, and provides direct health services to farm men and women. She has been recognized for her contribution to rural health and has presented and published nationally and internationally on farmer health and community involvement. She has led the innovative, multi-award winning farm community wellness program called Sustainable Farm Families™. This program has been delivered across Australia and recently piloted internationally.

Dr. Brumby has published numerous articles in the field of agricultural health. She is active in several national and international working groups in the field and has received numerous awards for her work in rural and farm community health and wellness.

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Dr. Lunner Kolstrup was raised on a small farm in Denmark. She worked for some years on dairy and pig farms. In 1991 she received a degree in animal science from the Royal Veterinary and Agricultural University (KVL) in Denmark. Her interest in agricultural health and safety brought her to the Swedish University of Agricultural Sciences (SLU). In 2008 she received her PhD degree on the topic “Work Environment and Health among Swedish Livestock Workers.” For several years Dr. Lunner Kolstrup has conducted multidisciplinary research and teaching with an emphasis on physical and psychosocial hazards related to health and safety in agriculture. She serves as an associate editor for the Journal of Agromedicine, reviews for several scientific journals, and is a member of International Society for Agricultural Safety and Health (ISASH) and the International Dairy Research Consortium (IDRC). In 2013, she published International Perspectives on Psychosocial Working Conditions, Mental Health, and Stress of Dairy Farm Operators, and co-authored several other review articles on the topic health and safety in the dairy industry.

Peter Lundqvist PhD
Dr. Lundqvist was born and raised on a farm in southern Sweden. He received his PhD from the Swedish University of Agricultural Sciences with a dissertation on working conditions in farm buildings (1988). He achieved his rank of full professor (work science) in 1999 and since 2007 has served as the head of his department. His research is focused on injury prevention, ergonomics, and leadership in agriculture. Recently a Swedish Center for Agricultural Business Management was established in his department. It will integrate health and safety in all aspects of agricultural business management. He also serves as associate editor for the Journal of Agromedicine and was named as the Peer Reviewer of the Year for 2015. He also serves on the editorial board for the Journal of Agricultural Safety and Health. He is heavily involved in the International Society for Agricultural Safety and Health (board of directors), the International Association of Agricultural Medicine and Rural Health (executive board), the International Section of the International Social Security Association on the Prevention of Occupational Risks in Agriculture (advisory board), and the International Ergonomics Association (vice chair and member of the Technical Committee Agriculture) and is an active member of the International Dairy Research Consortium.
About the Reviewers

General Scientific Reviewer

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Dr. Bender is a Professor at the University of Minnesota, College of Veterinary Medicine and the School of Public Health. He previously worked for the Minnesota Department of Health, as an infectious disease epidemiologist. He is currently the Co-Director for the Upper Midwest Agriculture Safety and Health Center. Previously, he was the Director for the Center for Animal Health and Food Safety and Co-Director of Human-Animal Interface Studies at the National Institutes of Health-funded Minnesota Center of Excellence for Influenza Research and Surveillance. He has had over 80 peer-reviewed publications and has received funding from the US Department of Agriculture, the Center for Disease Control and Prevention, the National Institutes of Health, the National Institute for Occupational Safety and Health, and the US Agency for International Development. He has served on several national committees related to public health and veterinary medicine, including the US Food and Drug Administration Science Advisory Board, the American Veterinary Association Companion Animal Antibiotic Stewardship Committee (Chair), and the Public Health Committee for the National Pork Board. His primary teaching and research interests include infection prevention, disease surveillance, emerging zoonotic diseases, occupational safety, food safety, and antimicrobial resistance.

External Reader

Jean Donham PhD
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Dr. Donham received her BA degree from the University of Iowa in English and Latin. She received her MA in Library and Information Science from the University of Maryland. Her PhD was awarded from the College of Education, University of Iowa. Her career has focused on teaching and librarianship in school and college settings, and teaching at the graduate level in library and information science. She has published three books in library and information science as well as numerous articles in the field.

Chapter Reviewers

Chapter 1: Introduction and Overview
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Chapter 2: Special Risk Populations in Agricultural Communities  
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Ms. Tutor-Marcom is responsible for ensuring that the institute is true to its mission of promoting the health and safety of farmers, fishermen, loggers, their workers, and their families through research, prevention/intervention, and education/outreach. Under her leadership, the AgriSafe Network of North Carolina was recognized as the first state affiliate of the national AgriSafe Network in 2008 with Certified Safe Farm – North Carolina coming online in 2009. These programs have been complemented by the addition of the North Carolina AgrAbility Partnership, Fit to Farm, and Risk Mitigation Measures initiatives. Ms. Tutor-Marcom is a member of the International Society for Agricultural Safety and Health, Farm Safety for Just Kids, Childhood Agricultural Safety Network, and the FResh (Farm and Ranch Safety and Health) eXtension Community of Practice. She also serves on the Advisory Board for the North Carolina Farmworker Health Program and the Member Relations Committee for the Agricultural Health Safety and Health Council of America. In fulfillment of requirements to receive her Doctorate of Education in Agricultural and Extension Education she is investigated the social-emotional support needs of men and women farmers in North Carolina.

Chapter 3: Agricultural Respiratory Diseases  
John May MD  
Deputy Director of the Northeast Center and Director of the Bassett’s Research Institute, Cooperstwon, New York, USA

John May is a graduate of the University of Notre Dame and Case Western Reserve School of Medicine. He trained in internal medicine and pulmonary disease at the Mary Imogene Bassett Hospital in Cooperstown, New York, and the University of Colorado Medical Center, Denver, Colorado. In addition to his pulmonary practice at Bassett Hospital in Cooperstown, Dr. May began seeing patients with various farm-related occupational health problems over three decades ago. He continues to have a regular farmers’ clinic that focuses on occupational issues affecting rural workers. John is a cofounder and director of the New York Center for Agricultural Medicine (NYCAMH). NYCAMH’s Northeast Center, one of the national centers designated by the National Institute for Occupational Safety and Health, has active projects involving agriculture and commercial fishing in a number of northeastern and Middle Atlantic States. Dr. May has published widely in research areas that include respiratory, musculoskeletal, hearing, and other disorders affecting both family farmers and farm workers in the northeastern region of the United States. Areas of particular interest are social marketing-based interventions and the application of community-based intervention methods in addressing occupational health challenges for migrant farmworkers.

Chapter 4: Agricultural Skin Diseases  
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Dr. Arpey began his higher education at Colgate University, receiving a BS in chemistry. He earned his medical degree from the School of Medicine and Dentistry, University of Rochester. Dr. Arpey trained in dermatology at the University Hospital in Cleveland, and the University of Iowa. He is currently Professor of Dermatology at the Mayo Clinic in Rochester, Minnesota. He is Director of Surgical Education in his department and has strong interests in education. He has been a member of the boards of directors of several large dermatological surgical boards, and recently completed a 9-year term on the American Board of Dermatology. He has a particular interest in caring for patients with skin cancer. Dr. Arpey has participated in the University of Iowa Agricultural Medicine Core Course for over 10 years. His subject in that
course was agricultural-related skin diseases, focusing on sun-induced skin cancers.

Chapter 5: Cancer in Agricultural Populations
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Dr. Lynch received his MD and PhD degrees from the University of Iowa in 1979 and 1984, respectively. In 1986, he received board certification in anatomic pathology. Currently, he is a professor with a joint appointment in the Department of Epidemiology in the College of Public Health and the Department of Pathology in the College of Medicine at the University of Iowa. Since 1990, he has been Principal Investigator and Medical Director of the State Health Registry of Iowa, Iowa’s statewide cancer surveillance program that is part of the National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) Program. Since 1992, he has been the Director of the Iowa Field Station for the Agricultural Health Study. Since 1995, he has led the Cancer Epidemiology and Population Science Program of the Holden Comprehensive Cancer Center, and since 2000 he has been Associate Head of Research in the Department of Epidemiology. His research interests include cancer surveillance, cancer epidemiology, and environmental epidemiology. He has co-authored over 330 peer-reviewed publications. From the College of Public Health, he received the Faculty Research Award in 2002, the Outstanding Alumni Award in 2004, and the Faculty Achievement Award in Community Engagement in 2008.

Chapter 6: Health Effects of Agricultural Pesticides
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Dr. Rohlman’s research has focused on the design, development, and validation of computerized test methods to assess neurotoxic effects and neurological disorders in humans exposed to chemical and physical agents. These methods have been applied in research examining the effects of pesticide exposures in adolescent cotton workers in Egypt, migrant workers and families in the United States, and wartime stressors in Persian Gulf veterans. Her current research is focused on identifying and characterizing adverse effects of organophosphate exposure on neurobehavioral performance.

Chapter 7: General Environmental Hazards in Agriculture Communities
David Osterberg BS, MA, MS
Clinical Professor, Department of Occupational and Environmental Health, University of Iowa, Iowa City, Iowa, USA

David Osterberg is Clinical Professor of Environmental Policy in the Department of Occupational and Environmental Health, College of Public Health at the University of Iowa. He holds a secondary appointment at the University of Iowa’s Department of Geography. From 1983 to 1998 Professor Osterberg served as a State Representative in the Iowa House of Representatives. During that time he served as the Chair of the Committee on Agriculture and as Chair of the Committee on Energy and Environmental Protection. He was the Iowa Farmers’ Union Legislator of the Year in 1987. He later worked for the Iowa Department of Natural Resources. Professor Osterberg holds a BA in economics from Washington State University, and an MA in economics, an MS in agricultural economics, all from the University of Wisconsin-Madison. In 2001 he founded the Iowa Policy Project, which produces papers on the Iowa budget, empowerment of low income Iowans and improving the environment. His organization has published widely on Iowa environmental issues. His work with the University of Iowa Superfund Research Program’s Research,
Translation and Outreach Corps has led him to educate many diverse groups from state legislators to seventh-grade students.

Chapter 8: Musculoskeletal Disorders

Steven R. Kirkhorn MD, MPH, FACOEM
Director/Section Chief Occupational Health
Minneapolis Veterans Administration Health Care System, Assistant Professor, Department of Medicine,
University of Minnesota School of Medicine, Saint Paul, Minnesota, USA

Dr. Kirkhorn has responsibility for the overall supervision of occupational/employee health issues of employees for the healthcare system. He also chairs the ergonomics committee and is a National Consultant in the Veterans Hospital Administration for Occupational/Environmental Medicine (OE Medicine Consult Program). He develops the occupational health curriculum and precepts Internal Medicine and Occupational Medicine residents.

He was previously Chair of the North American Agromedicine Consortium and Editor-in-Chief of the *Journal of Agromedicine* (2004–2011).

Chapter 9: Physical Factors

Jeffrey Levin MD, MSPH, FACOEM, FACP
Professor and Chair of the Department of Occupational Health Sciences, University of Texas Health Science Center, Tyler, Texas, USA

Dr. Levin is a graduate of the University of Texas Medical School at San Antonio. He completed his internal medicine training at the University of Missouri and occupational medicine at the University of Kentucky, where he also obtained his MS degree in public health. He is board-certified in both internal medicine and occupational medicine. Dr. Levin is founding Director of the Occupational Medicine Residency Program at Tyler (since 1994). He is past President of the Texas Occupational Medical Association. He holds the Jesse H. Jones Distinguished Professorship of Occupational Health Sciences and the Houston Endowment Inc. Professorship in Environmental Science. He is the author of two books, numerous chapters, and many scholarly publications as well as articles for agriculture and fishing/hunting magazines.

Presently, Dr. Levin is Senior Vice President for Clinical and Academic Affairs at the University of Texas Health Science Center. He is Medical Director of the Texas Institute of Occupational Safety and Health. He received the Marcus Key Award from the Texas College of Occupational and Environmental Medicine in 2013, and has recently been appointed as a board member to the American Board of Preventive Medicine. He is a clinician, educator, and researcher.

Chapter 10: Psychosocial Conditions in Agriculture

Michael Rosmann PhD
Private practice clinical psychology and writer in behavioral health for farmers, and academics, Harlan, Iowa, USA

Michael R. Rosmann is a clinical psychologist and farmer in western Iowa. He received his undergraduate degree in psychology from the University of Colorado and his MS and PhD degrees in clinical psychology from the University of Utah. He writes a weekly column about the behavioral health issues of people involved in agriculture that is syndicated in the United States, Canada, and Australia to about 4 million readers. He is the author of two books, numerous chapters, and many scholarly publications as well as articles for agriculture and fishing/hunting magazines.

Dr. Rosmann is Adjunct Professor in the Department of Occupational and Environmental Health at the University of Iowa. He was inducted into the Iowa Center for Agricultural Safety and Health Hall of Fame and is the recipient of leadership awards from the American Psychological Association and the National Association for Rural Mental Health for his work to improve the behavioral health of rural and agricultural people.

Brandi Janssen MA, PhD
Clinical Assistant Professor, Occupational and Environmental Health, The University of Iowa College of Public Health, and Director, Iowa's
Center for Agricultural Safety and Health (I-CASH), Iowa City, Iowa, USA

Trained as an anthropologist, Dr. Janssen conducts qualitative and ethnographic research among agricultural populations. As director of Iowa’s Center for Agricultural Safety and Health, she oversees the work of a statewide coalition of public and private organizations devoted to reducing injuries and fatalities on Iowa farms.

Dr. Janssen serves on the board of directors for the Iowa Rural Health Association and eastern Iowa non-profit Local Foods Connection and is a member of the Center for Rural Health and Primary Care Advisory Board.

Chapter 11: Acute Injuries in Agriculture
LaMar Grafft MS (see above)

Chapter 12: Veterinary Pharmaceuticals: Potential Occupational and Community Health Hazards
Jeffrey Bender DVM MPH (see above)

Chapter 13: Zoonotic Diseases: Overview of Occupational Hazards in Agriculture
James Wright DVM, MPVM, DACVP
US Air force (retired), Texas Department of Health, Austin Texas, USA (retired).

Dr. James Wright earned his BS and DVM degrees at Texas A&M University, and is a Master of Preventive Veterinary Medicine (MPVM) at the University of California at Davis. He is a Diplomate of College of Veterinary Preventive Medicine.

Dr. Wright was in private practice before entering a career in public health in the US Air Force, where he worked on food safety, industrial occupational health, communicable disease epidemiology and surveillance, disaster preparedness, medical facility employee health, and environmental health and sanitation. In 1992, he joined the Texas Department of State Health Services, where he served in the Meat Inspection and Zoonosis Control Programs until his retirement in December 2011. His duties included consulting with veterinarians, the general public, local government officials, patients, and physicians on zoonotic diseases and animal control.

Dr. Wright has taken the University of Iowa Agricultural Medicine core course, and was certified by examination. Dr. Wright remains active with the Texas Veterinary Medical Association, where he chairs the Public Health Committee, and with the Southwest Center for Agricultural Health, Injury Prevention, and Education. In 2013, the Texas A&M University College of Veterinary Medicine and Biological Sciences selected him as an Outstanding Alumnus.

Christine Petersen DVM, PhD
Associate Professor, Department of Epidemiology, Director, Emerging Infectious Diseases Center, College of Public Health, University of Iowa, Iowa City, Iowa, USA

Dr. Petersen graduated with her DVM from Cornell University in 1998, and completed her PhD in immunology and infectious diseases at Harvard School of Public Health in 2004.

With the first seeds planted as a veterinary student doing a summer research project on African trypanosomiasis at the International Livestock Research Institute in Nairobi, Kenya, Dr. Petersen's scientific career has focused on the prevention of zoonotic diseases.

Dr. Petersen is Director of the Center for Emerging Infectious Diseases, a One Health collaboration between the Iowa Department of Public Health and Regents’ Colleges of Medicine, Public Health and Veterinary Medicine. As an Associate Professor at the University of Iowa College of Public Health, she also teaches joint veterinary, medical, and global public health coursework and conducts outreach related to the diagnosis, treatment, and prevention of zoonotic diseases within animal and human populations. Additionally, she collaborates with Iowa State University regarding infection control and prevention in populations ripe for the spread of zoonotic infectious diseases.
Chapter 14: International Agricultural Safety and Health
Section A and B: Kelly J. Donham (see above)
Section C: Anders Thelin (see above)

Chapter 15: Prevention of Illness and Injury in Agriculture
Jean McCandless MSW
Director, Vermont Farm Health Task Force, Burlington, Vermont, USA

During her 40 years working in medical, disability, social service, and clinical settings, Jean McCandless has learned that prevention is of critical importance. In addition to her current position running the Vermont Farm Health Task Force, Jean is a Geriatric Care Manager and Social Worker in private practice.

She began working to improve the health and safety of Vermont farmers and farm workers in 2005, when she became the Arthritis Program Manager for the Vermont Department of Health. A statewide Farmer Health Survey in 2006 confirmed that most farmers had osteoarthritis, making them the highest risk occupational group for arthritis in the state. In 2007, Jean began the Vermont Farm Health Task Force, a statewide organization with 70 members from key state agencies, community health and agricultural organizations, and, farmer representatives.

With support from the Iowa’s Center for Agricultural Safety and Health, the Task Force became an organizational participant in the NIOSH-funded Building Capacity Grant Program. Both the I-CASH Program and the National AgriSafe Network helped establish regular Agricultural Medicine and Occupational Safety Trainings in Vermont. As both the training director and a faculty presenter, Jean has helped train many Vermont and New England medical and agricultural professionals.
Preface

Agricultural Medicine, second edition

Agricultural Medicine is the long-term outcome of the first known academic course in agricultural medicine initiated by Kelley Donham in 1974 at the University of Iowa. The Agricultural Health Working Group of the International Commission for Occupational Health (ICOH) proposed the need for a new text to guide education to a broad field of health and safety professionals. The experience of Dr. Thelin in agricultural health and safety made him an ideal collaborator for this project.

To provide direction, two multi-professional consensus processes were convened. The first consisted of 13 people who met in 2006 in Iowa City, Iowa, USA to establish the topics and learning objectives for the first edition of this text. Six years later, it was deemed a second edition of the book was necessary to incorporate new information in the rapidly evolving industry of production agriculture and the related occupational illnesses and injuries. In 2012 the second consensus process was formed by many of the original participants and supplemented by many more (a total of 30 persons), including an increased safety and international representation. That process resulted in the review and revision of the topics and learning objectives. The recommendations included:

• an increase in attention to regional and international coverage
• increased coverage on prevention, both in the individual chapters and an enhancement of the general prevention chapter (Chapter 15)
• increased coverage for safety professionals, especially coverage of risk management
• a text that would serve as an international standard for core topic coverage
• a recommendation that production of two additional chapters (i.e., agricultural safety and climate change effects on agriculture and the health and safety of its workers) should be pursued to serve as the basis for a more complete academic curriculum in agricultural health and safety.

The aim of the second edition was to attempt to respond to these recommendations. A new international chapter has been added to this edition. International authors have written comparative sections covering critical issues in agricultural medicine in Australia and New Zealand, South America, and the European Union. Enhanced discussion of preventive measures has been added to each chapter, as well as a detailed chapter on theory and examples of comprehensive prevention programs are included. There is increased coverage of programmatic approaches for safety professional and coverage of megatrends such as global warming and potential resulting health concerns. Over 1000 new references have been added.

The main effort to produce the manuscript for the second edition began in October of 2013, and it was submitted in manuscript form on 10 March 2015.
Specific Objectives

The authors have three central objectives for this book. The first is to provide core information on the causes and prevention of occupational illnesses and injuries to farmers, ranchers, their families, and workers. A second objective is that the book should serve as a core text for academic and continuing education courses, curricula, and workshops focusing on the occupational health and safety of those involved in production agriculture. The third objective of this text is to motivate readers to apply this information in serving the health and safety needs of agricultural populations.

The Importance of Human Resources in Agricultural Production

Agriculture is an essential industry providing basic needs (food, fiber, and fuel) for society. These essential needs were put into perspective in 1943 by the famous sociologist Abraham Maslow. His well-accepted theory of hierarchy of needs (Psychological Review 1943;50:370–396) is relevant to agriculture. His metaphor of a pyramid of needs suggests that agriculture is at the base, providing the essential food, clothing (fiber), and shelter (timber). Societies cannot progress to a higher level until a sustained and productive agriculture exists. Sustainability of an industry (as described by Andrew Savitz) includes not only the need for profit, but also consideration for the planet (not pollution) and people (human resources). The latter is often the last element that is considered in agriculture yet perhaps it is the most important. If we do not maintain our human capital, the others (profit and planet) are mute points. The agricultural workforce must be protected to assure a sustainable domestic and international food, fiber, and fuel source. The theme of this book is “helping to keep farmers, ranchers, their families and workers alive and well in agriculture”.

The Target Audience and Geographical Coverage

The target audience includes a broad range of health and safety professionals, including healthcare providers, safety specialists, Extension workers, and insurance professionals. The geographic range of the intended audience is international, targeting those countries defined by the United Nations as “more developed”, or industrialized countries, including North America (United States and Canada), countries of the European Union, Australia and New Zealand, and South America (the four major agricultural countries of the Mercosur). Agricultural medicine is highlighted in these countries in a new chapter in this second edition (Chapter 14), which contains comparative treatises on agricultural medicine relative to North America. The reason for the geographic boundaries is to maintain a focus on a very large amount of diverse information. The industrialized countries have similar agricultural industries, and thus similar occupational health and safety concerns. Agriculture in less developed countries is vastly different as general environmental and public health concerns such as inadequate sanitation, water quality, and malaria far outweigh occupational concerns in very different styles of production practices. Proper discussion of these issues would require a separate text.

Practicality and the Farm Connections of the Authors

This book has been written from the perspective of authors who have been involved with agriculture for many years, and who approach the field with direct experience and practicality.

The principal authors of this book are both from agricultural backgrounds, as well as from health profession and academic backgrounds. We are still involved with agriculture today, having more than 40 years of experience each in production agriculture and agricultural medicine. The scenarios provided throughout the text are based
on our actual contact with the cases and the people who suffered these conditions. The reviewers of the chapters were chosen based not only on their experience and knowledge of the field, but also on their knowledge and experience of production agriculture and cultural awareness of the people who work in it. Our personal goal is to bring practical experience to the pages of the text so that the exposures, risks, and preventive measures are based on reality and practicality.

Kelley J. Donham