Executive Summary

The International Dairy Research Consortium was formally proposed in 2011 to increase research capacity, share best practices, and optimize resources— to improve worker health and productivity in the global dairy industry. Since the initial meeting in Colorado in July 2011 the consortium has experienced significant growth. The 2013 International Dairy Research Consortium (IDRC) Workshop was held July 25 and 26, 2013 in Fort Collins, Colorado. The purpose of the meeting was to review progress on objectives, evaluate the IDRC collaboration, and to develop specific projects that would address the major gaps in dairy health and safety research and practice.

The IDRC has been successful and productive. Highlights include: CDC/NIOSH funding for the IDRC and several collaborative projects within the High Plains Intermountain Center for Agricultural Health and Safety 2011 – 2016; development of important partnerships and projects with dairy producers and equipment manufacturers; acceptance as a valuable resource with invitations to lead and contribute to national and international meetings, and to contribute regularly to dairy industry publications. The special issue of the Journal of Agromedicine (Vol 18, No 3) Global Perspective on Modern Dairy: Occupational Health and Safety Challenges and Opportunities an especially important effort to systematically review the status of research and practice, identified major gaps in need of attention. National press coverage of that publication and this workshop reinforced the value of IDRC efforts.

The outcome of this workshop was the identification of 8 projects addressing gaps in global dairy health research and practice: Speakers Bureau; Training/Scholarships; ATV/Quad bikes; (Immigrant) Workforce; Zoonotic diseases; Interdisciplinary Masters Project/Status of Safety Culture and Management; Development and Evaluation of Management/Safety Culture Programs; and Precision Agriculture. Working groups were tasked with developing an action plan summarizing project goals, proposed methods, and potential funding sources by December 1, 2013. IDRC members who were not able to attend the Workshop are asked for their input and participation. A discussion to follow up on next steps is planned for early December.

As the IDRC continues to grow and seek support it was suggested that we may need to develop a more formal structure. Further work is needed on potential benefits and the optimal organization.

A special thank you is due to the following organizations that provided support for this workshop:
Table of Contents

Executive Summary ................................................................................................................................ 1
Meeting Overview & Objectives ............................................................................................................. 3
Discussion Group Results ....................................................................................................................... 4
Future Steps: Working Groups ............................................................................................................... 6
Appendices ............................................................................................................................................. 8
A. Participant List ................................................................................................................................. 9
B. Agenda ........................................................................................................................................... 12
C. Meeting Objectives ........................................................................................................................ 14
D. Discussion Group Guide ................................................................................................................. 15
E. Funding Ideas ................................................................................................................................... 16
F. Country/Regional Reports on the status of health and safety in dairies ......................................... 21
G. Presentations (in chronological order) .......................................................................................... 72
   IDRC Progress by Steve Reynolds ........................................................................................................ 73
   Australia/New Zealand Update by Sue Reed ........................................................................................ 76
   Northern Europe Update by Christina Lunner Kolstrup and Peter Lundqvist ...................................... 78
   Southern Europe Update by Claudio Colosio ..................................................................................... 81
   West Coast United States Update by Marc Schenker ........................................................................ 85
   Midwest United States Update by Matthew Nonnenmann ............................................................... 88
   Mountain West United States Update by David Douphrate ............................................................. 93
   IDRC Voting Results from Discussion Groups by Vicky Buchan and Annie Keeney ...................... 99
H. Complete Notes from Discussion Groups ......................................................................................... 100
Meeting Overview & Objectives

The 2013 International Dairy Research Consortium (IDRC) was held July 25 and 26, 2013 in Fort Collins, Colorado. Researchers from 7 different countries attended the meeting to discuss how to collaborate in occupational safety and health research for the dairy industry. Researchers from 3 additional countries also contributed to the meeting by writing a report on their country. The meeting was hosted by the High Plains Intermountain Center for Agricultural Health and Safety and organized by Steve Reynolds, David Douphrate, and Allison DeVries (all from HICAHS). Vicky Buchan (HICAHS), Claudio Colosio (International Centre for Rural Health in Italy), and Peter Lundqvist and Christina Lunner Kolstrup from the Swedish University of Agricultural Sciences assisted in developing the agenda.

The primary objectives of the meeting were to:
1. Develop collaborative dairy research projects.
2. Identify funding opportunities for IDRC research and outreach.
3. Explore dairy research and outreach opportunities in economically developing regions.

A list of detailed, measurable objectives was also created to reinforce these primary objectives. See Appendix C.

Description of Events

In preparation for the meeting, the attendees submitted funding ideas and a report on the status of health and safety in the dairy industry of their home country or region (see Appendices E & F). Steve Reynolds began the meeting with a short history of our group, which began in 2011 with the first International Dairy Research Consortium and most recently authored a special issue on the dairy industry in the *Journal of Agromedicine*. Steve solicited comments on whether the group should have a formal structure. There is currently no membership process to join the IDRC meetings; attendees at this meeting were selected by Steve Reynolds, Dave Douphrate, or other HICAHS staff members. Some attendees expressed support for a more organized structure for a variety of reasons including funding, applying for grants, etc. Others thought that the informal approach works very well.

Following the discussion, presentations were given on the status of the dairy industry in select countries or regions. These presentations were given by someone from that country/region, and the presentations corresponded to the country/regional reports that were submitted before the meeting. See Appendix G for presentations.

The remainder of the meeting was spent in discussion groups discussing how to improve health and safety in the dairy industry 1) by addressing the needs of the immigrant workforce, 2) through standardizing methods/approaches and definitions in dairy health and safety research, 3) by creating or identifying effective interventions for the dairy industry, and 4) identifying global trends in the dairy industry and partnering with developing countries. Attendees voted on the top ideas from the discussion and Vicky Buchan and Annie Keeney presented a summary of the results, as shown below. (See Appendix H for complete notes).
Discussion Group Results

**Topic 1: Immigrant Workforce**
- Management commitment & training to safety culture (24 votes)
  - Develop protocols, include middle management
- Develop protocols for safe work practice (21 votes)
  - A model OHSMS & show to be profitable
- Require culturally sensitive training (20 votes)
  - Refer to other industries for model safety culture
- Develop a worker safety or a “healthy worker” certification (16 votes)
  - To go along with animal welfare certification

**Topic 2: Standardized Methods and Approaches**
- Prioritize environmental/physiological surveillance measures (32 votes)
  - Accurate measurement of denominator
  - Environmental monitoring
- Put together stakeholder group within IDRC to compare international protocols (21 votes)
  - Standardization of terminology/definitions that are worldwide
- Work process risk analysis (18 votes)
  - Track “near misses” and deviations from protocol
- Utilize an uniform survey tool (17 votes)
  - Draw on internationally recognized instruments
  - Include EU

**Topic 3: Interventions**
- Develop interventions which focus on changing culture in the workplace (35 votes)
  - Address difference between “thinking” and “doing”
  - Involve workers and owners in developing solutions
  - Involve management
  - Empower natural leaders
- Create trans-disciplinary teams to identify risks/plan interventions (31 votes)
  - Develop model risk maps for dairies
  - Utilize experience of other industries
- Relate interventions to business profitability (20 votes)
  - E.g. National Milk Producers Federation
  - Address responsible management
  - Examine customer values

**Topic 4: Global Areas**
- IDRC needs to identify partners to collaborate with (44 votes)
  - Dairy organizations, producers
  - International organizations
- Funding sources (lending/banking, agencies, OIE/WHO/WONCA/ICOH/USAID/ILO, insurance, rotary club)
- Document Best Practices & Innovations (18 votes)
  - “One Health”
  - Basic occupational health services
- Awareness of international differences (14 votes)
  - Need to feed 9 billion by 2050
  - Hand milking vs. robotic milking
  - Lack of surveillance
  - Increasing immigrant workforce
  - Safety and quality of milk supply
**Future Steps: Working Groups**

To conclude the meeting, the group created its own list of working groups under the direction of Steve Reynolds. These working groups did not necessarily correspond to the topics and project ideas identified through the discussion groups. Each working group was charged to develop an action plan that included goals, methods, and funding sources to address the selected topic by December 1, 2013.

These notes do not contain a list of all members of these working groups. Contact HICAHS to obtain the current list of working group members ([hicahs@colostate.edu](mailto:hicahs@colostate.edu)).

** Indicates group leader

1. **Share a common list of speakers by expertise and presentations**
   - **Steve Reynolds** (Colorado, U.S.A.)
   - Common messages from the IDRC
   - List to be used as a resource at Dairy Producer meetings or other clients

2. **Resources for training/scholarships for international educational exchange**
   - **Robert Hagevoort** (Texas, U.S.A.)

3. **Survey of ATVs/quads used on dairies**
   - **Dave Gilkey** (Colorado, U.S.A.)
   - Number of deaths/injuries?
   - Is this a problem on dairies?
     - Work towards a nationwide survey exploring if they are used on dairies and if it is a problem
     - Potentially expand to include international data

4. **(Immigrant) workforce**
   - **Marc Schenker** (California, U.S.A.)

5. **Zoonotic diseases**
   - **Matt Nonnenmann** (Iowa, U.S.A.)
   - Project identifying different zoonotic diseases
     - Are they among workers?
     - Are they among the animals?
   - Provide training to address problems
   - Look at using animals as an early indication for potential sickness in humans for highly transmittable diseases
   - Global comparison
   - Human/animal costs
   - Multidisciplinary specialty with one health goal

6. **Interdisciplinary master’s program for students on dairy health and safety**
   - **Bill Brazile** (Colorado, U.S.A.)
   - Schenker-education needs to be supported so that younger people can be trained to carry on these projects
     - Suggests creating an interdisciplinary master’s program for students combining aspects of business, agriculture, animal science, and occupational health and safety
• Project could provide initial data on industry problems, provide training and trying to instill safety culture, then measure results
• Potential problem would be finding funding
  o Initial data set of the state of training programs, management programs, and safety culture indicators in the dairy industry. Resurvey industry over time.

7. Safety culture
  o **Dave Douphrate (Texas, U.S.A.)
  o Management Programs
  o Training: The “middle manager” position is very important; have to train people to care about health and safety
  o Need to work to collaborate “academic” and “production” aspects of dairies; working together will benefit all parts of the enterprise
  o Potential idea: consider creating a safety workshop where dairies could send their middle management to for a fee
    ▪ Need to market/incorporate the profitability/production benefits to get people to buy into it
    ▪ Some potential grants/programs exist that share similar ideas that may help with funding, but most haven’t been critically evaluated yet
  o Need to figure out what measurements/evaluation methods are most effective to collect data and then figure out the next step
    ▪ We can’t push safety on the industry
    ▪ Very important to build partnerships with dairies
    ▪ New Zealand has found targeting women most effective because they are usually more concerned about worker safety/husband’s safety
    ▪ Australia has had success targeting children in rural schools that can relay messages to parents and encourage safe practices
  o Social media
    ▪ Could provide a possible outlet to market safety information
    ▪ Australia-found that some “old time” farms were not receptive to new technologies
    ▪ New Zealand-in the process of instituting Twitter/Facebook 30-45 second videos, which is time consuming for the staff, but well received by workers
    ▪ Reuvekamp-dairy workers are very active on social media; it provides an affordable way for them to get news

8. Precision Ag (robots, etc.) – understanding tech advances and their impact on health and safety
  o **Mark Kinsel (Washington, U.S.A.)
Appendices

A. Participant List ........................................................................................................................................... 9
B. Agenda ...................................................................................................................................................... 12
C. Meeting Objectives .................................................................................................................................. 14
D. Discussion Group Guide .......................................................................................................................... 15
E. Funding Ideas ........................................................................................................................................... 16
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   IDRC Progress by Steve Reynolds ................................................................................................................ 73
   Australia/New Zealand Update by Sue Reed ............................................................................................... 76
   Northern Europe Update by Christina Lunner Kolstrup and Peter Lundqvist ............................................ 78
   Southern Europe Update by Claudio Colosio ............................................................................................. 81
   West Coast United States Update by Marc Schenker ............................................................................... 85
   Midwest United States Update by Matthew Nonnenmann ......................................................................... 88
   Mountain West United States Update by David Douprrate ..................................................................... 93
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The attendees of the 2013 International Dairy Research Consortium included eight international researchers, six dairy Extension specialists, three dairy producers, one person from dairy manufacturing (Agrimetrica), one person a dairy producer organization (Western Dairy Association) and 20 researchers or dairy industry stakeholders from the United States for a total of 39 attendees. An additional eleven international researchers and two domestic researchers contributed to the meeting but did not attend.

### International Attendees

1. Sue Reed, Ph.D. (Australia)  
   *Associate Professor, Edith Cowan University*

2. Vivi Schünnissen, Ph.D. (Denmark)  
   *Associate Professor and Consultant, Aarhus University*

3. Jarkko Leppälä, Ph.D. (Finland)  
   *MTT Agrifood Research Finland*

4. Claudio Colosio (Italy)  
   *International Centre for Rural Health at the University Hospital San Paolo, Milan*

5. Grant Hadfield (New Zealand)  
   *National Manager, FarmSafe*

6. Christina Lunner Kolstrup, Ph.D. (Sweden)  
   *Swedish University of Agricultural Sciences*

7. Lena Elfman (Sweden)  
   *Associate Professor, Uppsala University Hospital*

8. Peter Lundqvist, Ph.D. (Sweden)  
   *Swedish University of Agricultural Sciences*

### USA Attendees

   *Senior Director of Producer Relations, Western Dairy Association*

10. Bill Wailes (Colorado, U.S.A.)  
    *Former Department Head Animal Sciences (retired 2012), Colorado State University*

    *Postdoctoral Fellow, Department of Animal Sciences, Colorado State University*

12. Craig McConnel, D.V.M. (Colorado, U.S.A.)  
    *Assistant Professor, Dairy Population Health Management at Colorado State University*

13. Frank Garry, D.V.M., M.S., DACVIM (Colorado, U.S.A.)  
    *Dairy Veterinary Extension, Colorado State University*

    *Director, NIOSH Southwest Center for Agricultural Health, Injury Prevention, & Education, University of Texas Health Sciences Center at Tyler*
15. Jon Slutsky (Colorado, U.S.A.)  
   **Owner, La Luna Dairy**

   **E.V.P., Aurora Organic Farms**

17. Marc B. Schenker, M.D., M.P.H. (California, U.S.A.)  
   **Director, Western Center for Agricultural Health and Safety**  
   **Professor, University of California, Davis School of Medicine**

   **Agrimetrica**

19. Matt Nonnenmann, M.S., Ph.D. (Iowa, U.S.A.)  
   **Assistant Professor, Department of Occupational and Environmental Health, University of Iowa**

20. Olga Reuvekamp (South Dakota, U.S.A.)  
   **Owner, Hilltop Dairy**

   **Dairy Veterinary Extension, Colorado State University**

22. Risto Rautiainen, Ph.D. (Finland & Nebraska, U.S.A.)  
   **Director, Central States Center for Agricultural Safety and Health**  
   **Professor, University of Nebraska Medical Center**

23. Robert Hagevoort, Ph.D (New Mexico, U.S.A.)  
   **New Mexico State University Dairy Chair, Extension Dairy Specialist, Ag Science Center at Clovis**

USA Attendees from HICAHS (Colorado State University)

   **Coordinator of HICAHS**

25. Amanda VanDyke (Colorado, U.S.A.)  
   **Ph.D. Candidate, Department of Environmental Health & Radiological Sciences**

26. Annie Keeney (Colorado, U.S.A.)  
   **Ph.D. Candidate, School of Social Work**

27. Bill Brazile, Ph.D., CIH (Colorado, U.S.A.)  
   **Assistant Professor, Department of Environmental Health & Radiological Sciences**

   **Assistant Professor, University of Texas**

   **Associate Professor**

30. Florencia Pezzutti, M.A. (Colorado, U.S.A.)  
   **Ph.D. Candidate**

   **Professor**

32. Josh Schaeffer, Ph.D. (Colorado, U.S.A.)  
   **Researcher**

33. Julie Gibbs (Colorado, U.S.A.)  
   **Colorado Injury Control Research Center**

34. Laura Krause (Colorado, U.S.A.)  
   **Student Researcher**

35. Maggie Davidson, Ph.D. (Colorado, U.S.A.)  
   **Postdoctoral Researcher**
   *Assistant Professor & Dairy Extension*

37. Paul Gunderson, Ph.D. (North Dakota, U.S.A.)
   *Director, Dakota Precision Ag Center*

38. Stephen J. Reynolds, Ph.D., CIH, Fellow AIHA (Colorado, U.S.A.)
   *Director of HICAHS*

   *Professor and Ph.D. Program Director, School of Social Work*

The following people contributed to the meeting by writing a dairy industry report, but they did not attend the 2013 Meeting held in Fort Collins.

1. Robert Mulley, Ph.D., MScAg (Australia)
   *Emeritus Professor, University of Western Sydney*

2. Susan Brumby, R.N. (Australia)
   *Director National Centre for Farmer Health*

3. Shelley Kirychuk, Ph.D. (Canada)
   *Associate Professor, Canadian Centre for Health and Safety in Agriculture (CCHSA)*

4. Ioannis Basinas, Ph.D. (Denmark)
   *Postdoctoral Researcher, Aarhus University*

5. Torben Sigsgaard, Ph.D. (Denmark)
   *Professor, Aarhus University*

6. Janne Karttunen (Finland)
   *Ph.D. Candidate, Researcher, TTS*

7. Martina Jakob, Ph.D. (Germany)
   *Leibniz Institute for Agricultural Engineering Potsdam-Bornim*

8. John McNamara (Ireland)
   *Health and Safety Officer, Teagasc*

9. Emanuela Bossi (Italy)
   *International Centre for Rural Health at the University Hospital San Paolo, Milan*

10. Federica Masci (Italy)
    *International Centre for Rural Health at the University Hospital San Paolo, Milan*

11. Massimiliano Mazzi (Italy)
    *International Centre for Rural Health at the University Hospital San Paolo, Milan*

12. Allen Young (Utah, U.S.A.)
    *Associate Professor, Dairy Extension Program, Utah State University*

13. J.W. Schroeder (U.S.A.)
    *Associate Professor, Extension Dairy Specialist, North Dakota State University*
AGENDA

International Dairy Research Consortium
July 25, 2013- Hilton Hotel
July 26, 2013 – CSU Veterinary Teaching Hospital

Wednesday, July 24
6 – 8 pm  Wine and Cheese Reception
The Gardens at Spring Creek: 2145 Center Ave, Fort Collins

Wine and Cheese Reception sponsored by DeLaval, the Western Dairy Association, and the Dairy Producers of New Mexico

Thursday, July 25 (Day 1)
The Hilton Fort Collins (Green and Gold Room):
425 W. Prospect Road, Fort Collins

8:30 am  Welcome & Introductions
by Steve Reynolds

9 am  Review progress on goals
by Steve Reynolds

9:45 am  Updates from each Region/Country
Australia/New Zealand – Sue Reed
Northern Europe – Christina Lunner
Kolstrup and Peter Lundqvist
Southern Europe – Claudio Colosio

10:45 am  Break

11 am  Updates from each Region/Country, continued
West Coast United States – Marc Schenker
Midwest United States – Matthew Nonnenmann
Mountain West United States – David Douphrate

Meeting Objectives

1. Develop collaborative dairy research projects.

2. Identify funding opportunities for IDRC research and outreach.

3. Explore dairy research and outreach opportunities in economically developing regions.
12 pm  Lunch at the Hilton, sponsored by Aurora Organic Dairy

1:00 pm  Discussion Groups

1:15 pm  Discussion Groups, Topic 1 – Immigrant Workforce

2:45 pm  Break

3:15 pm  Discussion Groups, Topic 2 – Standardized methods and approaches, similar definitions

4:45 pm  Closing Remarks

6:30 pm  Dinner
The Agave Room at Rio Grande Mexican Restaurant: 143 W Mountain Ave, Fort Collins. Meet in the Hilton lobby at 6:15 pm for shuttle service.

Friday, July 26 (Day 2)
The CSU Veterinary Teaching Hospital (Room 118): 300 W. Drake Road, Fort Collins

8:15 am  Welcome by Steve Reynolds

8:30 am  Discussion Groups, Topic 3– Interventions

10:00 am  Break

10:30 am  Discussion Groups, Topic 4 - Global Areas

12:00 pm  Lunch at the Veterinary Teaching Hospital

1:00 pm  Feedback on Voting from 4 Gap Topics - Vicky Buchan Organizing Project Working Groups Steve Reynolds

1:30 pm  Project Working Groups

1:30 – 2:15  Session 1
2:15 – 2:45  Break
2:45 – 3:30  Session 2

3:30 pm  Full Group Specific Action Plan and Assignments

4:30 pm  Evaluation by Vicky Buchan and Steve Reynolds

4:50  Closing Remarks

6:30 pm  Dinner sponsored by Zoetis
Enzio’s Italian Restaurant: 126 W. Mountain Ave, Fort Collins. Meet in the Hilton lobby at 6:15 pm for shuttle service.
2013 IDRC Meeting Objectives

1. Review progress on goals since last workshop
   a. identify both short and
   b. long term remaining priorities.

2. Develop three collaborative research projects.

3. Identify funding opportunities for:
   a. Research
   b. Outreach

4. Characterize opportunities/needs in economically developing countries:
   a. Document emerging trends
   b. Document needs
   c. Identify potential partners
   d. Identify potential research opportunities
   e. Identify potential outreach opportunities

5. Identify procedures to help standardize definitions in dairy research:
   a. List potential ways of standardizing research methods
   b. Pinpoint resources for standardizing definitions in Dairy research.

6. Develop methods to improve immigrant workforce health and safety.
   a. Identify partnering organizations
   b. Identify core information necessary to develop culturally appropriate risk management systems

7. Identify current health and safety interventions being used...to address the following:
   a. Are the identified interventions evidence-based?
   b. What are the best methods of sharing evidence based interventions?
   c. Can we develop interventions that cut across multiple aspects of dairy health and safety problems? (ergonomics, psychosocial, zoonoses, etc.)
   d. How can interventions that address multiple aspects of dairy H & S be evaluated?
Discussion Groups, Topic 1 – Immigrant Workforce

- How can we improve the health and safety of the immigrant workforce in the dairy industry?
- How can we partner with organizations that focus on immigrant health issues? For example, the U.S. Migrant Clinic system now specifically includes dairy workers.
- What core information is needed to develop culturally appropriate risk management systems for the dairy industry?
- Can we engage the “highly educated fraction” present among immigrant workers in dairy occupational health and safety programs?

Discussion Groups, Topic 2 – Standardized methods and approaches, similar definitions

- How can standardized methods and approaches (including definitions) for research and surveillance be developed (e.g. injury epidemiology, aerosol/ergo exposure)?
- Are there resources that could be used as a basis for standard definitions?

Discussion Groups - Topic 3 – Interventions

- What interventions are currently being used? Are these evidence-based interventions?
- How can we share or create evidence-based interventions?
- How can we develop and evaluate interventions that cut across/address multiple aspects of dairy health and safety problems (e.g. ergonomics, psychosocial, zoonoses)?

Discussion Groups - Topic 4 - Global Areas

- What are the emerging global trends? What do emerging markets look like?
- What are the needs in South America, India, Africa, and the Pacific Rim?
- How do we identify partners in these countries?
## USA

John Volckens and Paul Gunderson

1. **US Department of Labor, National Farmworker Jobs Program**: $9 million for career training to migrant and seasonal farmworkers

   The National Farmworker Jobs Program (NFJP) is a nationally-directed, locally-administered program of training, employment services, and related assistance that helps migrant/seasonal farmworkers (MSFWs) and their dependents. NFJP is designed to serve economically disadvantaged persons who primarily depend on employment in agricultural labor performed within the United States, including Puerto Rico, and who experience chronic unemployment or underemployment. The program is intended to assist eligible MSFWs and their dependents to prepare for and retain jobs that provide stable, year-round employment, both within and outside agriculture.

   Funding for 2013 was only available to the following service areas: California (central California service area covering Merced, Madera and Stanislaus Counties), Hawaii, Indiana, Michigan, Mississippi, New Jersey, and Puerto Rico.

   The deadline has passed for 2013, but perhaps they will likely have another request for applications in February 2014 with an expanded service area.


2. **Grand Challenges in Public Health** (supported partly by the Bill and Melinda Gates Foundation)

   The "One Health" Concept: Bringing Together Human and Animal Health for New Solutions

   Over the last century, both human and veterinary medicine have made great advancements. In spite of the many overlaps between the two disciplines, they have become distinctly separate with very little cross-sharing of the knowledge. If the artificial barrier that separates the fields of human and animal health could be broken down, many opportunities would emerge across the discovery-development-delivery spectrum for knowledge and practices in one field to accelerate progress in the other.

   We seek applications that apply the existing knowledge/tools/approaches from animal health to solve problems in human health, and vice versa. We are looking for novel and innovative ideas within the concept of One Health to address the issues in the following areas, ranging from early discovery concepts to delivery of solutions to measurement of impact: (1) Specific human and livestock diseases (see website); (2) Human nutrition; (3) Health service delivery; and (4) Measurement of impact.

   [http://www.grandchallenges.org/Explorations/Topics/Pages/OneHealthRound11.aspx](http://www.grandchallenges.org/Explorations/Topics/Pages/OneHealthRound11.aspx)
3. **Scientists without Borders**: Data collection in global dairy sector

Scientists Without Borders, in partnership with The Sackler Institute for Nutrition Science at the New York Academy of Sciences and the Bill & Melinda Gates Foundation seeks bold, innovative, feasible, and scalable ideas to leapfrog existing approaches and significantly improve the collection, reporting, aggregation, and sharing of data associated with dairy production and consumption all along the smallholder dairy production value chain in, but not limited to, Sub-Saharan Africa and South Asia.


**Australia**

Sue Reed

**Potential Research Funding Sources:**

4. **ARC Linkage Grant** – Joint projects are supported if money is also provided by industry. Estimated closure date end of the year although Expressions of Interest need to put in earlier to Universities i.e where Sue B is from the date is July 24, 2013.

5. Dairy Australia. No date available

6. Chemical Suppliers to the Dairy Industry eg Pfizer – will need to make contacts


8. Rotary or Lions – will need to make contacts

**Finland**

Janne Karttunen, Jarkko Leppälä, and Risto H. Rautiainen

9. **Farmers' Social Insurance Institution** (Finnish acronym: Mela), located in Espoo, Southern Finland.
   - Contact person: Occupational safety specialist Erik Lindroos.
   - Administration of the statutory workers' compensation scheme for Finnish farmers.
   - Annual grants (typically a’ 30-40,000 € = 35-45,000 USD, 100% funding, i.e., does not require any self-financing) for the promotion of occupational safety and health among the self-employed farming population including dairy farmers. Research projects need to both produce and distribute practical information that supports the farmers' working careers.
   - TTS (Janne) is preparing a grant application regarding the health and safety issues of automatic milking systems to Mela this fall (9/2013). Janne Karttunen (TTS) contacted Erik Lindroos 19.6.2013. Consultation/co-op of some of the IDRC members will be requested.
10. **Valio Ltd**, head office located in Helsinki, Southern Finland.
   - Valio is Finland's largest milk processor, producing 86% of Finland's milk. One of the largest companies in Finland. Owned by 18 dairy cooperatives formed by private dairy farmers.
   - Contact person: Jaana Kiljunen, Esa Manninen, Laura Kulkas, etc. depending on the matter.
   - Occasional support to research institutions, up to tens of thousands of Euros, as a part of large-size (ейчас more than 100,000 €) research projects focusing on dairy production. Funding focuses on issues such as milk quality and quantity, cost efficiency of the dairy production, and animal welfare, but does not exclude the wellbeing of the farmer.

11. **Research Foundation of Agricultural Machinery** (Maatalouskoneiden tutkimussäätiö), located in Helsinki, Southern Finland.
   - Contact person: Pekka Korhonen
   - Annual grants (about 50,000 € per each institution (TTS, MTT, Dept. of Agrotechnology in the University of Helsinki, 100% funding). Funding focuses on issues regarding agricultural machinery including dairy production.
   - TTS (Janne) is preparing a grant application regarding the technical issues, including health and safety, of automatic milking systems to RFAM on 1/2014. Consultation/co-op of some of the IDRC members will be requested.

12. **Development Fund of Agriculture and Forestry** (Finnish acronym: Makera), Ministry of Agriculture and Forestry, Finland.
   - No specific contact person.
   - Annual grants, typically a > 100,000 €, highly competed, requires self-financing about 20-30%. Funding focuses on wide spectrum of issues including development of dairy production. Typically cross-scientific approach with some practical and easy to adopt solutions is required.
   - Next application period 9-10/2013.
   - MTT (Risto Rautiainen and Jarkko Leppälä) is preparing dairy research project from Makera and TTS as subcontractor.

13. **MTT Agrifood Research** Finland’s project funds (only for MTT internal research)
   - Contact person: Anu Harkki, Research Director, (Risto Rautiainen/Jarkko Leppälä MTT)
   - Annual grants, typically a > 20 000 – 100 000 € used typically as self-finance part in public or EU fund projects.

**Germany**

Martina Jakob

14. Potential Funding Source: **Leibniz-Institute for Agricultural Engineering** Potsdam-Bornim e.V., Germany **ATB (abbreviation)**
   - Contact person: Dr. Martina Jakob, mjakob@atb-potsdam.de
   - Purpose of organization and geographic representation:
We develop sustainable technologies for a resource-efficient utilization of biological systems to produce food, raw materials, and energy to meet the challenges of the changing climate and global requirements. To achieve our goals we combine high quality basic research with practical applications. Our tasks include the development of processes for sustainable land management as well as innovative technical solutions for agriculture and industry.

- Opportunities for collaborative efforts: We can join projects as well as initiate own research projects.

15. Examples of non-traditional funding sources that Martina Jakob has engaged with:
   - ILO – Working out a worldwide code of good practice
   - Bilateral Cooperation funded by program of each country (this would work for partners explicitly mentioned in the programs offering travel grants, expenses for guest scientists, money to organize workshops etc.)
   - Industry (I am trying this for project B mentioned under 2)
   - Workers compensation in Germany (I am in touch with, but so far I have positive feedback to finance master students, one or two per year, not more) failed

16. Ideas for the IDRC:
   - Create an app for dairy farmers or a video with instructions and sell it
   - Organize workshop and exhibition for industry who has to pay for it
   - Write a book and sell it

Those last three examples would gather money to be administered by all of us. This would need some extra structure such as a foundation or association where we become members and form a committee that decides on how to spend the money.

17. Opportunities for future collaborative research projects

I do have two projects running (A+B), that could easily be extended for collaboration.

A) Survey of musculoskeletal pain and disorders among milking parlour operatives and simultaneous workload assessment
B) Long-term effects of improvements in milking parlours on the rate of MSD and pain
C) work out improvement strategies for existing parlours
D) extend workload assessment and especially define a consent which methods to use and parameters for description of work load
E) illuminate the complex situation of factors causing pain and disorders among milkers.

18. Thoughts on research and outreach opportunities in economically developing regions

I suppose that the so called new industrializing countries encounter similar problems as anyone else. The milking system (tethering or loose housing) depends on farm size. The decision of parlor type depends on farm size, too. Some influence might come from early settlers of other countries (colonialisation) such as for example the British often implement swing-over parlours. The development in those countries will be faster, and investments possibly larger. Here we have the opportunity to help investors to make the right decisions
(regarding ergonomics, work organization etc.). We will also find a reasonable amount of small scale farmers.
Eastern Europe is different I would think, as farm structures are larger already.

Ireland
John McNamara

19. European Union

Ireland held the Presidency of the European Union for the first 6 months of 2013 and was active in promoting OHS in Agriculture. The European Parliament held a public hearing on ‘Farming: Hazardous occupation – how to improve health and safety’ during March which was co-chaired by Mr. Liam Aylward an Irish Member of the European Parliament Patrick Griffin, Senior Inspector with responsibility for OHS policy in the Agriculture sector, Health and Safety Authority was a speaker. It is believed that a clause has been included in Common Agricultural Policy (CAP), Rural Development Policy (Pillar 2) along the lines that ‘measures be included to address the high level of occupational injuries in agriculture’. It will take some time to see if such a commitment is contained in legal texts but if this happens it may cause opportunities for funding OHS projects within Europe for research related to: risk awareness, risk perceptions and general proactive safety related actions in agriculture.

Also under the CAP reforms the EU Commission proposes to extend the role of Farm Advisory Services through development of new European Innovation Partnerships to improve agricultural productivity and sustainability. These would involve a range of stakeholders and an Innovation Partnership which could be either national or transnational. It is our understanding that OHS could be included in this initiative but again the legal text of CAP Reform must be finalised to allow this development. Teagasc recently held a Conference jointly with the EU Commission entitled ‘Future of the Farm Advisory Services, Delivering Innovative Systems’ and the proceedings can be located at: http://www.teagasc.ie/publications/view_publication.aspx?PublicationID=2629

Professor Stephan Van den Brouke, Head of Health Psychology and Prevention at the Catholic University of Louvain, Belgium, was key note speaker at the National Farm Health and Safety Conference in (Wednesday 26th June). Professor Stephan Van den Brouke has been successful in gaining EU funds for OHS research on determinants of behavioural change among farmers. Professor Van den Brouke is agreeable to become engaged in future applications to secure funding for OHS Research.

Developments with the Initiatives described must await EU CAP Reform legal texts. In Ireland, John McNamara, Teagasc and Patrick Griffin H.S.A. will be keeping the situation regarding EU developments under review.
Country/Regional Reports
on the status of health and safety in dairies

Hosted by the High Plains Intermountain Center for Agricultural Health and Safety
Colorado State University, Fort Collins, Colorado, U.S.A.

Funding and in-kind support for the 2103 meeting is provided by the following organizations:
TABLE OF CONTENTS

Europe

Northern Europe

Denmark ................................................................................................................................. 2
Finland ................................................................................................................................. 5
Germany/Brandenburg ...................................................................................................... 12
Republic of Ireland ........................................................................................................ 15
Sweden ............................................................................................................................... 17

Southern Europe

Italy .................................................................................................................................. 20

Pacific Nations

Australia .............................................................................................................................. 25
New Zealand .................................................................................................................. 27

North America

Canada ............................................................................................................................... 31
United States .................................................................................................................. 33

Mountain West Region .................................................................................................. 33
Southwest Region ........................................................................................................... 41
Utah ................................................................................................................................. 42
Midwest Region .............................................................................................................. 43
California ....................................................................................................................... 47
Europe
Northern Europe

Denmark

Authors: Vivi Schlünssen, Ioannis Basinas, Torben Sigsgaard

Denmark is a country with 5.6 million inhabitants, 43,000 km², 64% of Denmark is cultivated land. The agricultural area provides employment to around 100,000 subjects including 50,000 directly engaged in farming. Gross Domestic Product for Denmark 2012: 1,600 billion Dkr.

Health and Safety Research

The most recent contribution has been to investigate dust, endotoxin and allergen exposure levels in Danish cattle farms based on results from the Danish SUS Study (Elholm et al 2010). Associations between exposure levels and health outcome (lung function, symptoms, and sensitization) are in progress. Levels of dust and endotoxin are not negligible (table 1), and allergen levels are high (table 1).

Table 1. Personal inhalable dust and endotoxin levels in Danish Cattle farmers (From Basinas et al 2012)

<table>
<thead>
<tr>
<th>Cattle</th>
<th>n</th>
<th>Inhalable dust (mg/m³)</th>
<th>Endotoxin (EU/m³)</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AM</td>
<td>GM (GSD)</td>
<td>Min-Max</td>
</tr>
<tr>
<td>Overall</td>
<td>124</td>
<td>1.6</td>
<td>1.0 (2.7)</td>
<td>&lt;LOD - 9.8</td>
</tr>
<tr>
<td>Summer</td>
<td>62</td>
<td>1.5</td>
<td>0.9 (2.5)</td>
<td>0.2 - 9.8</td>
</tr>
<tr>
<td>Winter</td>
<td>62</td>
<td>1.8</td>
<td>1.1 (2.9)</td>
<td>&lt;LOD - 9.4</td>
</tr>
</tbody>
</table>

n, number of measurements; AM, arithmetic mean; GM, geometrical mean; GSD, geometrical standard deviation; r, Pearson correlations between measured dust and endotoxin concentrations; ***p<0.0001.
Table 2. Levels of cow hair allergen (ug/m²) among farmers and never farmer stratified by season and stable/bedroom measured by electrostatic dustfall collector (From Schlünssen et al 2011)

<table>
<thead>
<tr>
<th></th>
<th>Stable summer N; median (min-max)</th>
<th>Stable winter N; median (min-max)</th>
<th>Bedroom summer N; median (min-max)</th>
<th>Bedroom winter N; median (min-max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer, dairy</td>
<td>20; 6.79 * 10^4 (9543-1.96*10^5)</td>
<td>25; 3.46<em>10^4 (1741 - 2.03</em>10^5)</td>
<td>25; 9.53 (1.42 – 66.8)</td>
<td>26; 7.91 (0.84 -122)</td>
</tr>
<tr>
<td>Farmer, pig</td>
<td>45; 2.09 (ND – 24.08)</td>
<td>48; 1.44 (ND - 8638)</td>
<td>49; 0.49 (ND - 10.35)</td>
<td>55; 0.540 (ND – 7.09)</td>
</tr>
<tr>
<td>Never farmer</td>
<td>-</td>
<td>-</td>
<td>27; 0.18 (ND - 0.51)</td>
<td>24; 0.11 (ND - 0.92)</td>
</tr>
</tbody>
</table>

*Dairy Industry Status*

Economy, milk prices, etc.: Totally 4,500 dairy farms produce milk for sale, of which 46% deliver more than 100,000 kg milk/year. The production of milk was in 2007 4,650 mil. kg. The value of the milk production in Denmark is estimated to around 11 billion Dkr, and the export of dairy products is also estimated to around 11 billion Dkr.

*Health and Safety Issues*

Regulatory Issues affecting health and safety: All employees are included in an insurance system covering occupational accidents and diseases. This insurance is paid by the employer (mandatory for the employer). All Danes have access to a tax paid free health care system, including access to physicians specialized in occupational medicine. Health and safety issues on the farms are in principle controlled by the Danish Working Environment Authority, but they seldom visit the farms. The farming society has their own organization (“Videnscenter for Landbrug”) with some expertise in health and safety issues.

*Immigration policies affecting the dairy workforce*

Not a big issue in Denmark

*Dairy Farm Profile*

Number of Dairy Farms: Next to pig farming, dairy farming is the most important farming industry in Denmark with around 1,500,000 cows from 8,000 farms, mostly dairy.

Typical Dairy Farm Structure: The average size of a dairy farm is 100 cows/farm. On average 3 works on each farm, including the owner.
Worker Characteristics: Around 80% of the farmers are males, and 80% are native Danes. The rest is primarily from eastern European countries. Illegal immigrants are not regarded as a substantial problem. Around 20% of dairy farmers smoke.

Technologies: A combination of parlor styles, mostly robotic milking. Mostly open or semi open stables

References


Basinas I. Dust and endotoxin exposure in animal farming populations. PhD thesis Faculty of Health Sciences Aarhus University 2011

Landbrug og fødevarer. Dansk landbrug i tal [The Danish agriculture in figures 2009]. An annual report by the Danish Agriculture and Food Council. Axelborg, Copenhagen 2009
Finland

Authors: Janne P. Karttunen (TTS - Work Efficiency Institute), Jarkko Leppälä and Risto H. Rautiainen (MTT Agrifood Research Finland)

Health and Safety Research
Recent research, published in 2013:


Recent research projects: The aim of an ongoing (2011-2013) joint research ("Lyto2") of TTS - Work Efficiency Institute, University of Helsinki, and MTT Agrifood Research Finland is to improve dairy production in large dairy farms through better management, methods, and barn design based on research knowledge from actual farms. This research includes dairy farms by size of 80–300 dairy cows. TTS focuses on working methods, labor time, labor force, and the functionality of the barn. The aim is to find out how the grouping of animals is carried out on large dairy farms and how it affects the above mentioned factors. Both farms with parlor and automatic milking system (AMS) were included in the study. Labor inputs and animal welfare data were collected from 82 large dairy units in Finland.

Dairy Industry Status
Dairy farming has been traditionally regarded as the backbone of the Finnish agriculture, but the relative importance of it has diminished along with the constantly decreasing number of dairy farms. There are two dairy companies in Finland: Valio Ltd (owned by Finnish dairy cooperatives) and Arla Ingman (owned by Swedish-Danish Arla Foods). About 8,900 dairy farms produce milk for Valio and the rest, about 700 farms, for Arla. Both companies pay about 0,43 € (0,54 USD) per liter of milk. Thanks to surprisingly good producer price of milk and various national/EU-based subsidies, the economic situation of milk production has remained somewhat satisfactory creating encouraging prospects for many dairy farmers. This deduction is supported by the results of the recent CAP-negotiations of EU.

Demographics & Insurance
According to a recent article of Karttunen and Rautiainen (2013), "In Finland, agriculture is mostly based on traditional family farming. However, the structural change in agriculture has been rapid since the 1960’s. During the past decade the numbers of farms and insured farmers have reduced notably and the proportion of male farmers has increased. In 2000, there were 104,377 insured persons (62% male, 38% female) on 70,326 farms, and by 2010, these numbers had reduced to 77,399 insured persons (67% male, 33% female) on 54,059 farms. These figures include both full-time and part-time farmers."

Karttunen and Rautiainen continue: 'Farmers' Social Insurance Institution (Finnish acronym: Mela) administers an accident insurance (workers’ compensation) scheme which started in 1982. This insurance is mandatory for all farms with at least 5 hectares (12.4 acres) of farmland. Most farms have
also forestland which is included in the farmland calculation using conversion ratios that depend on the geographical location of the farm. Smaller farms may obtain this insurance voluntarily. Self-employed owner-operators of the farm, their spouses, and salaried family members are covered (salaried non-family workers are insured by other workers’ compensation insurance carriers). Premiums and benefits are based on the size of the farm operation and each family member’s contribution to farm work."

According to the PhD thesis of Karttunen (currently under review), "In Finland, the self-employed farming population with the farmers' pension insurance may voluntarily join the farmers' occupational health services (hereinafter FOHS). In 2010, almost two-fifths (39%) of this population had joined the FOHS. FOHS is most commonly utilized by full-time farmers, especially dairy and other livestock farmers. Also farm relief worker services are available to those with the statutory pension insurance. Livestock farmers with a defined number of livestock are entitled to take an annual vacation free of charge while the relief worker takes care of the animal husbandry."

**Declining Number of Farms**

Karttunen continues: "The total number and proportion of livestock farms continued to decline during the late 1990's and the first decade of the 2000's. In 2001, there were 34,825 livestock farms representing less than half (45%) of all active farms. In 2010, there were 20,829 livestock farms left, which represented one third (33%) of all active farms. Only the horse husbandry farms showed an increasing trend both in absolute and relative terms. Along with all the other livestock farms except for the horse husbandry farms, the number of dairy farms has declined, and the remaining dairy farms have enlarged their operations (Figure 1). In 2001, there were 21,376 dairy farms with the average of 16 dairy cows and 34 hectares of arable land. In 2010, there were 11,256 dairy farms left with the average of 24 dairy cows and 51 hectares of arable land."

Karttunen continues: "During the first decade of the 2000's the proportion of dairy farms in the smaller herd sizes (<30 dairy cows) has steadily declined (Figure 1). As for the larger herd sizes (≥30 dairy cows), their proportion has steadily increased. Despite of that, nearly 2,000 dairy farms had less than ten dairy cows in 2010, and half of all had less than 20 dairy cows.

Karttunen continues: "Self-employed farming population...composed approximately 90%, and hired nonfamily workers with regular work, and municipal or private farm relief workers with permanent contracts composed the rest of the workforce in Finnish agriculture in 2010. These figures do not include the seasonal workforce on farms."
However, there is no current information on the number or characteristics of farms with hired workers. It is relatively safe to say that particularly labor-intensive livestock farms that have expanded their production have hired either domestic or foreign workers. Both outdoor and indoor horticulture farms hire both seasonal and permanent foreign workforce. Foreign workers, typically younger persons without a family, come from countries such as Estonia and Ukraine. Finnish society in general and construction, cleaning branch, and catering-business in particular have some problems with illegal workforce but this issue is a lesser problem in Finnish farms. There is a constant demand of skillful workforce on Finnish farms. Younger and more educated farmers have no problem in hiring foreign workforce as long as they speak satisfactory English.

**Dairy Farm Profile**

In 2012, there were approximately 9,600 dairy farms in Finland, majority of them owned by a single family, typically a married couple. The average number of dairy cattle was about 29 cows per farm. There are still hundreds of traditional stanchion barns with older farmers, just a few cows (<10), and manual working methods. These barns will most likely become extinct within the next 5–10 years.

Majority (estimation 70-80%, exact proportion not available) of the current barns are stanchion barns. Annually, there are only a couple of new stanchion barns build but hundreds of them are renovated. Renovated stanchion barns have typically 30–40 milking cows, a pipeline milking system with about 4 milking units, and at least partly automated feeding systems. In Finland, separate roughage and concentrate feeding is used in majority of the stanchion barns. There are a couple of thousands of older and not recently renovated stanchion barns with 10–30 dairy cows. These barns will be either replaced...
by a new barn build by the next generation or the older farmer will at least stop producing milk in them within the next decade or so.

During the mid and late 2000's, almost all new dairy barns have been loose housing systems, built for at least 60–70 dairy cows, with or without a milking robot, and most often with a mixed feed system. Milking parlors have been autotandems (2x3–4) or herringbones (2x6–8). The most recent trend during the early 2010's is to build a curtain wall loose housing barn with two milking robots and 120–140 dairy cows. Heifers and calves are then typically kept in another building. Smaller barns typically contain both the milking cows and the replacement cattle. Modern barn with 120-140 cows and AMS is typically operated by a farming couple and one hired worker, and contractors are of help during the seasonal crop farming periods. The use of contractors or becoming one (majority of them are crop farmers) has become popular. Dairy farmers are focusing on their core business.

In Finland, the largest dairy farms have approximately 300-400 dairy cows. Some of them are operated by a single farming family with the help of few hired workers. Some of them have milking robots, up to 5 units per farm, or large-size side-by-side or carousel milking parlors. Currently there are a few barns with 500+ cows under construction. These dairy farms are typically operated by several farming families and with the help of several hired workers.

Appendix

1. ABSTRACT: Occupational Injury and Disease Incidence and Risk Factors in Finnish Agriculture Based on 5-Year Insurance Records

The aim of this retrospective cohort study was to evaluate the incidence of and risk factors for compensated occupational injuries and diseases in agriculture. The study population consisted of 78,679 Finnish farmers, spouses, and salaried family members covered by mandatory workers’ compensation insurance. This population had a total of 24,424 occupational injuries and 1684 diseases from 2000 to 2004. In the 5-year period, 20.2% of the population had (one or more) injuries and 2.0% had occupational diseases. Multiple claims were common particularly among livestock producers. Using Poisson regression analyses, we identified several personal and farm-related risk factors, with relative risk estimates ranging from 1.07 to 3.08 for injuries and from 1.45 to 3.01 for diseases. Cattle-intensive geographic regions, occupational health service membership, large farm size, and farming alone were identified as risk factors for both outcomes. Further, male gender, higher number of insurance years, and residing on the farm were among risk factors for injury. These risk factors identified from a large longitudinal data set can be considered for developing and targeting interventions for farmers at highest risk of occupational injury and disease.

2. ABSTRACT: Distribution and characteristics of occupational injuries and diseases among farmers: A retrospective analysis of workers’ compensation claims

Background: Research indicates occupational injuries and diseases are not evenly distributed among workers. We investigated the distribution and characteristics of compensated occupational injuries and diseases requiring medical care in the Finnish farming population.
Methods: The study population consisted of 93,564 Finnish farmers, spouses, and salaried family members who were covered by the mandatory workers' compensation insurance in 2002. This population had a total of 133,207 occupational injuries and 9,148 occupational diseases over a 26-year period (1982–2008).

Results: Clustering of claims was observed. Nearly half (47.1%) of the population had no compensated claims while 52.9% had at least one; 50.9% of farmers had one or more injuries and 8.1% had one or more diseases. Ten percent of the population had half of injury cases, and 3% of the population had half of occupational disease cases. Claims frequently involved work tasks related to animal husbandry and repair and maintenance of farm machinery. Injury and disease characteristics (work activity, cause, ICD-10 code) differed between individuals with high and low personal claim rate. Injuries and diseases of the musculoskeletal system had a tendency to reoccur among those with high claim rate. These outcomes were often related to strenuous working motions and postures in labor-intensive animal husbandry.

Conclusions: Analyses of longitudinal insurance data contributes to better understanding of the long-term risk of occupational injury and disease among farmers. We suggest focusing on recurrent health outcomes and their causes among high risk populations could help design more effective interventions in agriculture and other industries.

3. Dairy farm case reports and risk management tools

Milking methods and technology is still rather old fashioned in the dairy sector in Finland. However, new and safer milking technologies have already been developed, but not necessarily used widely in the dairy sector. This may have effects on dairy production sustainability and milk quality. There is an urgent need to change old fashioned technology to new better technologies in dairy production. But farmers have problems to choose and manage dairy technologies. They need better information for decision making and in operative farm management. This work is needed to design new management tools for extension services of the dairy sector in Finland to promote more efficient, profitable and safer primary dairy production.

4. Case analysis of dairy production management in Finland


“Sustainable food production must fulfil ecological, economic and social preconditions in order to produce safe and healthy products. A future concern for every food supplier will be to provide a sustainable food supply in a responsible manner. There has been a lack of sustainable development management tools to provide better information for farm producers and the whole food supply chain. The problem of complexity is seen in those food production supplier units, where a few persons operate rather complex farm units.
The risk analysis on a dairy farm revealed that the case farm had sustainability risks that could have harmful effects for the farm and the sustainability of the whole food supply chain. Risk analysis provides the farm manager and dairy supply chain managers with information that can be used to evaluate farms as suppliers of milk. In this case, the main risks for the whole dairy supply chain were the environmental effects, risks to the image of farming, animal health and disease risks, milk quality risks, profitability and welfare risks, and milk production interruptions in a particular area.

However, despite the problems with sustainability, many positive factors were also noted that contributed towards achieving the goals. These positive factors act like buffers against the risks. There is no sense in collecting risk management information if means for preventing risks are not developed. To use these results in formulating a farm unit development plan, the farmer needs tools for documentation and criteria lists to evaluate the risks. For example, risk identification checklists could be used to evaluate certain risky areas or actions on farms or in other enterprises. Risk analysis, when included in management can give useful information for farm managers to support their decision making. Analysis also revealed the need for better food supply chain management. The goal of a sustainable food chain should be the responsibility of all participants in the food system, including farmers, labourers, policy makers, researchers, retailers and consumers”.

5. Development and Evaluation of Farm Risk Map Tools


The purpose of the study was to develop and test risk management tools that can help farmers identify and manage a broad range of potential risks on and off the farm. The Farm Risk Map tools involve identifying, evaluating, controlling, and monitoring risks. The tools help collect and organize information on risks involving people, production, property, and the environment. Farm risks may cause harmful effects to essential functions on the farm. There is a need for risk management tools that are easy to use by farmers. Ideally, risk management practices should be part of everyday work, and risk management should be incorporated in the farm’s quality management systems (Jokipii et al. 2005). However, quality management systems have been criticized for being too laborious for farm use (Taylor 2004). In this project we aimed to develop systematized risk management tools for farms that are easy to use, relevant, systematic, holistic and allow a possibility for quick visualization (Leppälä et al. 2012; Leppälä et al. 2009).

The Farm Risk Map was found to enhance communication with farmers (see Figure 1 below). The case farmers identified several risks with the Farm Risk Map. A quick preliminary activity check helped in risk identification. After a few minutes, farmers found the Farm Risk Map rather easy to use and required little guidance. The risk type classification helped the risk management process by providing a systematic structure to risk identification. The case farmers identified 65 (dairy farm) and 133 (grain farm) vulnerable items/sections on their farms.
We conducted also a survey which was sent to 930 farm employers in the Spring 2011. We received 230 responses; equal to 25 % response rate. The results indicated 47% of the dairy farmers and 37% of the crop farmers thought that the Farm Risk Map was useful and an important tool for them. Dairy farmers were younger, had more quality management training, and were more commonly members of the Occupational Health Service (OHS) system. Both dairy and crop farm employers used machinery operator’s manuals and found them most useful in labor management and training. Dairy farmers used quality and safety instructions more often than crop farmers. Dairy employers in general seemed to use management tools for labor management more often than crop farm employers (Table 3). Overall, the usefulness of the tools was valued higher than their actual current use. This could mean that the farm employers recognize the value of the tools and they would like to increase the use of the tools. The Farm Risk Map is new and not well-known, but there seems to be demand for such tool, especially when farms become larger with more complex risks management challenges. Approximately 70 % of the farm employers who found the Farm Risk Map useful had larger farms (over 50 hectares). The dairy and other livestock farm employers reported the Farm Risk Map to be likely more useful for them in the future. The production complexity and the increased work load have a connection to the usefulness of the Farm Risk Map, but this requires further study.
Germany/Brandenburg
Author: Dr. Martina Jakob

Health and Safety Research
Recent Research:

1. Workload evaluation regarding working heights and weights while attaching the cluster
2. Assessment of muscular-skeletal-pain and disorders on German dairy farms

Ongoing or planned research:

1. Intervention strategies to improve the workplace
2. Measuring the impact of technical interventions

Dairy Industry Status
Milk prices are varying, see graph below. Prices are Euro cent/kg per month.

Health and Safety Issues

- According to Liebers et al. (2011) the standard morbidity ratio for the number of muscular-skeletal-disorders among female dairy parlour operatives in comparison to office workers was between 1.7 and 5.5 depending on the diagnosis. The analysis was based on aggregated data including 8 health insurance companies. The most prevalent reasons for sick leave among dairy parlour operatives were back pain and carpal tunnel syndrome.

- Livestock is causing approximately 18000 accidents per year. Two thirds of them are caused by cattle. The number of fatal and non-fatal accidents on dairy farms is not known.

Regulatory Issues affecting health and safety: According to the law, working environments need to be evaluated following the German legislation. The employer takes care that the working environment is safe and is responsible for risk assessment.
Immigration policies affecting the dairy workforce

I have no precise or statistical information on the nationalities of the dairy workforce. In my opinion it is mainly German. On smaller farms it is family labor.

Dairy Farm Profile

Worker Characteristics: I have found no statistics on that.

Technologies (parlor styles, robotic milking, production practices): Parlor styles depend on farm size. 20 cows or more are usually milked in separate parlors. Robotic milking is increasing, but still marginal as about 4% of all farms own one or more robots.

The milking routine mostly contains cleaning, drying, pre-milking and attaching the cluster. Since cows are more often held inside, udders are dirtier compared to cows on grassland.

Number of Dairy Farms: According to the German livestock census in November 2011 there were 46 cows on an average dairy farm in Germany; the average for East Germany with 161 cows per farm is much higher than the average of 41 cows in West Germany.

Typical Dairy Farm Structure: See Table 1 below. Germany had an average yearly milk yield of 7240 kg per year and cow in 2011.
Table 1: number of German farms and dairy cows per farm by size range in 2011

<table>
<thead>
<tr>
<th>Livestock from ....to..... dairy cows</th>
<th>Number</th>
<th>Proportion of livestock size range in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of farms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - 9</td>
<td>11580</td>
<td>12.9</td>
</tr>
<tr>
<td>10 - 19</td>
<td>16537</td>
<td>18.4</td>
</tr>
<tr>
<td>20 – 49</td>
<td>34982</td>
<td>39.0</td>
</tr>
<tr>
<td>50 – 99</td>
<td>19744</td>
<td>22.0</td>
</tr>
<tr>
<td>100 – 199</td>
<td>5211</td>
<td>5.8</td>
</tr>
<tr>
<td>200 – 499</td>
<td>1319</td>
<td>1.5</td>
</tr>
<tr>
<td>500 and more</td>
<td>390</td>
<td>0.4</td>
</tr>
<tr>
<td>altogether</td>
<td>89763</td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of dairy cows</strong> (in one thousand)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - 9</td>
<td>61.1</td>
<td>1.5</td>
</tr>
<tr>
<td>10 - 19</td>
<td>241.3</td>
<td>5.8</td>
</tr>
<tr>
<td>20 – 49</td>
<td>1122.5</td>
<td>27.0</td>
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<tr>
<td>50 – 99</td>
<td>1348.5</td>
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<td>100 – 199</td>
<td>671.5</td>
<td>16.1</td>
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<td>200 – 499</td>
<td>396.9</td>
<td>9.5</td>
</tr>
<tr>
<td>500 and more</td>
<td>322.9</td>
<td>7.8</td>
</tr>
<tr>
<td>altogether</td>
<td>4164.8</td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of dairy cows per farm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>altogether</td>
<td>46.4</td>
<td></td>
</tr>
</tbody>
</table>
Republic of Ireland
Authors: John McNamara, National Health and Safety Officer, Teagasc – Agriculture and Food Development Authority, Ireland.

Patrick Griffin, Senior Inspector with responsibility for OHS policy in the Agriculture sector, Health and Safety Authority.

Health and Safety Research
Support for Research is provided both by Teagasc and the Health and Safety Authority who operate a joint Prevention Initiative. Research projects are focused on the Agriculture sector including the Dairying sector rather than the Dairying sector on its own. However, specific data for the dairying sector can be isolated within research studies. Dairy farming is the most work intensive enterprise on Irish farms and from the data available generally records the highest level of farm workplace death and injuries and farmer ill health.

Recent Research projects in occupational health and safety (OHS) related to Farming in Ireland including Dairying.

- A National Survey of Farm Injuries in Ireland, 2012. This indicates that the Dairying enterprise has one of the highest injury rates (report attached).
- A National Survey related to Occupational Ill Health among Farmers in Ireland indicates that Musculoskeletal Disorders are the most frequent occurring cause and that the scale of the farming operation is the principal risk factor. Dairy farmer are the largest farms in terms of scale in Ireland (ref. Osborne et al. 2012).
- A National Study had indicated that farmers in Ireland have elevated Mortality rates when compared to other occupation groups (Smyth et al, 2012).

Health and Safety Outreach (Extension)
In Ireland, due to the importance of the Agriculture sector, an extensive Extension service involving integration of Training/ Education, Advisory Services and Research is provided by Teagasc – the state Agriculture and Food Development Authority. About 80% of farmers receive information from the service with about 40% are fee paying clients who obtain an intensive service. Provision of OHS is included in the service provided and a related article related to this can be obtained at: http://www.oceanpublishing.ie/health_safety/images/featuredarticles/issue35/farm%20safety%202.pdf

Over the last 20 year, a network of Discussion Groups has been developed, particularly in the Dairying sector. These have been shown to be a superior approach for leading technology and practice adoption (ref. Heanue and Hennessy, 2012). A recent example of the use of Discussion Groups to gain OHS adoption is the recent presentation of the EU European Good Practice Award to an Irish Dairy Discussion Group which can be seen at: https://osha.europa.eu/en/publications/reports/european-good-practice-awards-2012-2013

A study of Extension approaches (2 year M.Sc study) which most influence farmers is currently being conducted by Teagasc while the Health and Safety Authority have commissioned a study among farmers of behavioural reasons for adoption/ non adoption of health and safety controls. These two
studies will guide approaches to assisting and influencing farmers to adopt health and safety measures from 2014 onwards.

**Dairy Industry Status**
The Irish Dairying Industry exports about 90% of its output. The Irish dairying industry operates under the EU Common Agricultural Policy where a national limit or ‘quota’ on milk production is in operation. This will be abolished on 1st April 2015 and the industry is on course for major planned expansion of the order of 50% thereafter. Dairying is one of the most profitable farm enterprises however milk price fluctuate considerably with world market prices, following the removal of EU price support mechanisms. Currently the farm gate price is about 35cents/ liter but this has dropped to as low as 19 cents per liter in recent years (2009) and a price of 28-30 cents per liter is required to provide a reasonable level of profitability. Farmers also receive an EU Single Farm Payment as an alternative to receiving price supports.

**Health and Safety Issues**
Dairying is one of the most labour intensive enterprises and is associated with the highest levels of fatal and serious injury and ill health.

Regulatory issues affecting health and safety: All workplaces in Ireland including farms where the farmer is self-employed are covered by Irish Safety, Health and Welfare at Work legislation.

Immigration policies affecting the dairy workforce: Ireland is within the EU where there is free movement of Labour. Predominantly Dairy farms are family farm operated (circa 92% plus) where the farm operator predominantly provides labour.

**Dairy Farm Profile**
There are currently 128,200 farm holdings in Ireland with the average farm size being 32.3 Hectares. The average age of farmers is 57 and just 7% are under 35 years old. This demographic arose during the so-called ‘celtic tiger or boom’ years where there was a exit of farm labour particularly farm successors due to alternative employments in other sectors. However, this trend is now in operating in reverse with an inflow of labour and particularly farm successors due to the reversal of relative economic conditions.

There are 18,500 dairy farms with an average dairy cow herd size of 60 and an average milk yield of 4631 liters per cow.

Farms are family owned (97% plus) and family labour predominates with non family labour making up 7% of labour deployed. Labour supplied by spouses who are predominantly female makes up 22% of total labour. The level of non Irish national labour deployed on dairy farms is low (less than 5%).

Parlour style is typically 8-20 unit ‘herring bone’ type. With expansion there is increasing use of rotary milking parlours. The Irish Dairy industry is based on low-cost grazed grass as the predominant feed. Grass growth is seasonal (March to September) which leads to a seasonal cow calving and production patterns.
Swedish Research and Publications Related to Dairy Production

Follow-up studies on dairy farmers' work situation and health in Scania (new research project).

- Advanced technical equipment and automatization – a stress factor in robotic milking? (new research project)

- The Psychosocial Pulse of Entrepreneurs in Rural Areas: Screening of psychosocial working conditions, mental health and social network among farmers and entrepreneurs in rural areas. University report published (in Swedish) and will soon be available at [http://pub.epsilon.slu.se](http://pub.epsilon.slu.se) (recent research and publication)

- Prevention of MSD when working in dairy production – advice and good solutions. University report published (in Swedish) and will soon be available at [http://pub.epsilon.slu.se](http://pub.epsilon.slu.se) (recent research and publication)

- How to attract and motivate people to work as employees in large-scale dairy farming. University report published in Swedish and available at [http://pub.epsilon.slu.se/5671/1/kolstrup_c_110208.pdf](http://pub.epsilon.slu.se/5671/1/kolstrup_c_110208.pdf). Published in English and available at Work 41 (2012) 5311-5316 (What factors attract and motivate dairy farm employees in their daily work?) (recent research and publication)

- Work load in parallel and fish bone milking systems. Recommendations for ergonomic design and correct working postures (recent research and publication)

- Good practices in agriculture: social partners participation in the prevention of musculoskeletal disorders. EU project (Sweden, Belgium, England and Poland) (recent research and publication). Part 2 is on-going and part 1 has been reported at: [http://www.agri-ergonomics.eu/](http://www.agri-ergonomics.eu/)

- Injuries and injury prevention during animal-handling in dairy production – human, animal and environmental factors. PhD-project (C.Lindahl) which will be completed in 2013 (One paper published in J. Agromedicine 2012).


- On-going project about Migrant workers in Swedish agriculture (including milk production) with a focus on communication issues regarding safety & health, food hygiene and work instructions.

- JTI - Swedish Institute of Agricultural and Environmental Engineering has a few research projects on working conditions in the dairy industry. One on-going project deals with low-stress handling of cattle and another project is collecting data on injuries with bulls in milk-production.

**Dairy Industry Status**

Economy, milk prices, etc.: Dairy farmers in Sweden are rather pessimistic about their economic situation. A recent study showed that only 20% of the dairy farmers find themselves coping with the economic situation. There is, however, an expectation that farmgate returns will increase again over the
coming months as envisaged reductions in world dairy output take effect. Sweden is home to around 5,000 milk producers and 300,000 cows. The national herd is split 50/50 Swedish Red and Holstein cows. Output per cow is high, as are high milk constituent levels. The average milk yield on Swedish farms is between 9,000 and 10,000 litres per year with protein and butterfats coming in at around 3.5% and 4.3% respectively. By law dairy farmers in Sweden must put their cows their cows out to pasture during the summer months. However, these grassland areas serve as exercise paddocks only, with all of the performance generated by way of TMR feeding strategies. Cows have access to indoor feed bunkers 24/7.

**Health and Safety Issues**

As a dairy farmer you have to follow the health and safety regulations issued by the Swedish Work Environment Authority. This is also the case for a self-employed farmer. There is also special regulations regarding work with animals in agriculture.

Regulatory Issues affecting health and safety: In Sweden there is animal-welfare regulations which might have effects on the health and safety issues for farmers and farm workers. In most cases it goes hand in hand between animal and human welfare.

Immigration policies affecting the dairy workforce: The number of immigrants in the dairy industry is increasing but statistics are lacking. Immigrants from the EU-countries have few formal problems to seek jobs in Swedish agriculture, but from other countries it involves more paper work.

**Dairy Farm Profile**

- Number of Dairy Farms: 5,260 dairy farms and 346,495 dairy cows in Sweden 2011  
- Typical Dairy Farm Structure: Average herd size 65 dairy cows per farm (862 farms had more than more than 99 dairy cows per farm in 2010). No information available for the dairy sector regarding workers, however estimated figures from 2010 indicate 177 384 people engaged in agriculture (full- and part time)  
- Worker Characteristics: Predominantly male owners/employers, however predominantly female employees. The average age of a dairy farmer is around 55 years. The numbers of migrant workers in the dairy sector is unknown, but is becoming more and more frequent. The nationalities are most frequent from EU-countries, such as the Baltic countries, Poland and Rumania but also from Ukraine, Russia and others in the eastern part of Europe.
- Technologies: Milking rail, herringbone, parallel, rotary and automatic milking systems. Loose-housing barns with cubicles, parlour, rotary or automatic milking systems are more and more often seen in dairy barns and 50-60% of the Swedish dairy cows are housed in these systems. A recent innovation from Sweden is the first robotic milking rotary

**References**

1) Yearbook of agricultural statistics 2012 (including food statistics)

Key figures on Swedish Milk production 2013:  

Milk in Sweden:  
Southern Europe

Authors: Federica Masci, Emanuela Bossi, Massimiliano Mazzi and Claudio Colosio

Department of Health Sciences of the University of Milan and International Centre for Rural Health of the University Hospital San Paolo, Via San Vigilio 43, 20142 Milan (Italy).

EU milk production sector

Total milk production in Europe-27 is about 156 million tons, with an increase of 18 % between 2001 and 2011(11); the total value of this production, independently from the use (drinking milk or other dairy products), the total value is worth EUR 53.1 thousand million, accounting for 14 % of the total value of EU agricultural output in 2011. (1)

![Diagram of milk production network](image)

*Figure 1: Milk production in the EU-27, 2011 (million tons) - Source: Eurostat (apro_mk_pobta) and (apro_mk_farm)*

In 2011 European Dairies collected a total of 142 million tons, 98 % of which was cows’ milk. The main uses were: cheese production (67 million tons of raw milk), butter and other yellow products (42 million tons) and drinking milk (31 million tons). The other dairy products (cream, yoghurt, concentrated milk, buttermilk, etc.) use the remaining volume of milk. The dairies’ size is very variable, but a small group of big companies hold most of the total production: in this scenario, 1.4% of the enterprises process the half of the total milk collected. Due to an excess of production, in EU the milk production is regulated and each country is forbidden to produce more than a pre-established quantity. The milk produced is mostly (91 %) delivered to a dairy or a collection centre but in some southern European counties such Bulgaria and Romania, most of milk produced is processed in the farms. The vast majority of milk produced on EU farms comes from cows, although in a number of the southern European Countries significant quantities are also produced by sheep, goats and buffaloes.(1) In Greece less than half of the milk collected in 2011 was cows’ milk, whilst in Bulgaria, Spain, Italy and Cyprus it accounted for about 95 %. In terms of production, Greek ewes’ milk was at about the same level (40 %) of cows’ milk, while goats’ milk accounted for the remaining 20 %. (1) Greece, Spain, France, Italy and Romania produce
about 92% of the ewes’ milk of EU, and Italy is the biggest producer of buffaloes’ milk (88%) of the EU production). During the first seven months of year 2012 the exports of cheese, that is the main dairy product exported by the EU27, was 13 percent higher compared to the same period of 2011. (4). In 2012, EU-27 deliveries of fluid milk and manufactured dairy products increased, but at a slower pace because of the economic downturn and the rising production cost. (4) whilst in 2013 the trend of production and delivery become negative. (2)

Structure of dairy farms
The number of agricultural holdings in the EU-27 decreased steadily (20%) between 2003 and 2010, resulting in 12 million enterprises. The number of farms with livestock (56% of all agricultural holdings) reported an even stronger decrease (35%) within the same period, resulting in 6.7 million holdings. (1) In 2010, of the 2.6 million holdings with cattle, 1.7 million had dairy cows, with a fall of around a third (32%) compared to 2007 and a half (47%) compared to 2003. As for the size, the biggest enterprises are located in Northern Europe (Denmark, UK, Netherlands and Belgium), with the exception of Cyprus. In these enterprises there is a combination of specialized work and a quite clear definition of workers’ tasks and jobs. The smallest are located in Bulgaria, Latvia, Lithuania and Romania. In these enterprises labor force is less specialized, smaller in size and with a less clear definition of tasks and jobs. Very often, farms with livestock carry out also agricultural activities addressed at feed production. (1)

Italy
The Italian Dairy sector: some numbers
Dairy sector is the first Italian food sector, with a total sale of 14.2 billion euro. (10) Seventy five per cent of the milk is produced in the North districts of Italy: Lombardia, Emilia Romagna, Veneto and Piedmont. In Italy about 12 millions of tons of milk for manufacturing are produced and converted in 1 millions of tons of cheeses (especially PDO cheeses), 2.5 millions of tons of pasteurized drinking milk and UHT milk and 295 tons of yogurts and fermented milks. (3) In 2012, Italian fluid milk production is forecast to increase slightly compared to previous years. After almost two years of market stagnation, growing domestic and foreign demand brought about an increase of prices and stimulated dairy production. (4) An agreement signed between the Regional Agricultural Organisations and the industry, recently expired, fixed the milk’s price of 0.40 €/liter, in line with the median European price. (2 - 5)

Italian Farms
Over the last decade, the number of specialized farms producing cow’s milk has experienced a significant restructuring from around 75,000 units in 2000 to 40,000 in 2010, while the average production per farm has increased from 140 t/farm to 270 t/farm. At the same time, the farm net income per business entity is almost three times the one reported for agriculture as a whole (respectively, €74,000 and €28,000 per farm per year). (3) The biggest Italian dairy farms have reached a dimension in terms of number of heads similar to other main EU countries, except UK; instead in terms of average milk yield there is still a gap. (3) In fact the average size of the dairies is still not very large: more than 78% of dairies collect 5,000 t milk per year or less, while in Germany and France the figures stand at 34% and 59% respectively. (1) According to data from the Agriculture Census 2010, collected by
the Italian Institute for Statistics (ISTAT) in Italy are bred 5.5 million of bovines. (6) Beside cattle 
breeding, dairy production in Italy also consists of buffalo and small ruminant breeding (sheep and 
goats). 360.000 buffalos are reared in 2.435 farms, mainly in the Centre and the South of the Country for 
the typical production of “mozzarella”. (4) Most of the companies are managed directly by the farmer 
and his associate or family (the workers involved in cattle breeding are about 44.000, of which 89% 
independent farmers and 67% aged more than 40), and only few companies use employed labour force, 
in particular in the biggest (6) Foreign workers, amounting to 233 thousand units, representing a portion 
of 24.8% of the agricultural non familiar workforce and 6.4% of the total. Fifty seven per cent of migrant 
workforce comes from other EU Countries, and 42.3% from non-EU countries. Migrants from India and 
Romania represent a significant component in the agricultural sector; Indians are more frequently 
engaged in milking activities.(7) The presence of foreign workers in Dairy and Agriculture as a whole 
 imposes special attention in the field of occupational health and safety. Since most of dairy farms run 
also “typical” agricultural activities, also dairy suffers problems such as instability and variation of 
working conditions, seasonal and temporary work, and exposure to unfavourable weather conditions. 
There are not systematically collected data on dairy in Italy, but in a sample of 141 milkers extracted 
from a population of agricultural workers employed in companies in South Milan and provided with 
occupational health surveillance by our Centre it was pointed out that the majority of workers are male, 
has an average age of 45 years old, and has Indian origins.

**Dairy industry Technology**

Milking systems for dairy cattle in Italy have now reached a high technological standard of quality, 
 despite the presence of some underdeveloped situations (8). The three systems existing in the Country 
are comb, erring bone, and carousel radial; the most advanced solutions are represented by the robotic 
milking systems (AMS), currently used only in relatively small size enterprises, characterized by the 
presence of 50 to 110 heads (8).

Despite the running mechanization, the work of the milker remains one of the most demanding in the 
agricultural sector for the presence of several risk factors such as noise, long working time, night work, 
microclimate conditions, exposure to biological risk, antibiotic, organic dusts and several kinds of 
biomechanical risk. It is worth saying that very often these risks are neglected by the prevention system.

Certainly, milker is a hardly accepted and very demanding job, but it is also the most delicate and 
 important for milk production and herd’s health. It is necessary to underline that, despite the 
technological innovations introduced, the milking operation involves for about 50% of the labor force 
required into a farm.

**Health & Safety**

Dairy industry is still one of the most dangerous economic sectors involving exposure to injury risk and 
to the several already mentioned health risk factors.

The Italian Workers’ Compensation Authority (INAIL) data of 2011 concerning occupational diseases 
indicates that among farmers and skilled workers of cattle and horses the principal diseases are those 
affecting the muscle skeletal system, with a percentage of 81.3% (52 cases ), followed by respiratory
system diseases, represented by 10.9% (7 cases) and the nervous system and sensory organs diseases with 4.7% (3 cases) (see table 1). More than half of the workers suffering different work-related diseases are aged between 50 and 64 years, and approximately 70% are male.(9). The data are well on line with those collected from the agricultural sector as a whole (table 2).

Table 1. Detail on the occupational diseases reported that among Farmers and skilled workers of cattle and horses in Italy in 2009 – 2011 per disease Source: Italian Workers’ Compensation Authority (INAIL). Statistics 2011.

<table>
<thead>
<tr>
<th>Disease</th>
<th>2009 recognized</th>
<th>% of reported</th>
<th>2010 recognized</th>
<th>% of reported</th>
<th>2011 recognized</th>
<th>% of reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>1</td>
<td>2.7</td>
<td>2</td>
<td>2.9</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Nervous system and sensory organ diseases (total)</td>
<td>1</td>
<td>2.7</td>
<td>5</td>
<td>7.1</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>1</td>
<td>2.7</td>
<td>2</td>
<td>2.9</td>
<td>7</td>
<td>10.9</td>
</tr>
<tr>
<td>Muscle skeletal &amp; tendon diseases</td>
<td>34</td>
<td>91.9</td>
<td>61</td>
<td>87.1</td>
<td>52</td>
<td>81.3</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>100.0</td>
<td>70</td>
<td>100.0</td>
<td>64</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. Detail on the occupational diseases reported in agriculture in Italy in 2007 – 2011 per disease Source: Italian Workers’ Compensation Authority (INAIL). Statistics 2011.

<table>
<thead>
<tr>
<th>Disease</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>10/11</th>
<th>07/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported diseases</td>
<td>1.650</td>
<td>1.832</td>
<td>3.926</td>
<td>6.389</td>
<td>7971</td>
<td>24.8</td>
<td>383.1</td>
</tr>
<tr>
<td>Muscle skeletal &amp; tendon diseases</td>
<td>923</td>
<td>1.109</td>
<td>2.859</td>
<td>5.156</td>
<td>6585</td>
<td>27.7</td>
<td>613.4</td>
</tr>
<tr>
<td>Hearing Loss</td>
<td>277</td>
<td>265</td>
<td>359</td>
<td>565</td>
<td>615</td>
<td>8.8</td>
<td>122</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>154</td>
<td>156</td>
<td>215</td>
<td>240</td>
<td>254</td>
<td>5.8</td>
<td>64.9</td>
</tr>
<tr>
<td>Cancer</td>
<td>32</td>
<td>23</td>
<td>34</td>
<td>58</td>
<td>64</td>
<td>10.3</td>
<td>100</td>
</tr>
<tr>
<td>Skin diseases</td>
<td>25</td>
<td>33</td>
<td>43</td>
<td>43</td>
<td>32</td>
<td>25.6</td>
<td>28</td>
</tr>
</tbody>
</table>

It is important to underline that the apparent significant increase of some occupational diseases is not due to a worsening of working conditions but to a better reporting, consequent to the introduction in the Country of a new list of occupational diseases subject to mandatory report to the authorities when diagnosed. Unfortunately, the way the data are collected does not allow considering separately the specific dairy sector, which is aggregate with horse breeding.
It is important to remind also that the rate of occupational accidents is still high in agriculture in Italy, even though the real burden is hardly evaluable because difficulties of finding sound denominators and possible underreporting. The total number of accidents in the sector in the Country is about 47,000 per year, as registered in 2011, with 115 fatalities. In the dairy sector, a total of 2,300 cases are reported per year, with 3 fatalities. Eighty percent of the injured are male, and most are aged between 35 and 49 years. Contusions (40.1%), dislocations (20.7%), fractures (17.4%) are the main types of injury, very frequently due to direct contact of the worker with the animal (9).

Legislative Provisions
Occupational health care is mandatory in Italy for any employee who is exposed to identified and relevant risk factors at the workplace, according to a risk assessment report (RAR) to be mandatory done in any productive settlement of the country. The related costs must be covered by the employer, also for “regular” migrants, who are not addressed in the Country by specific rules.

Without prejudice to the other provisions of the regulations of hygiene (specific to each local reality of the different cities), the premises for the housing and milking of livestock of new construction must meet specific requirements provided by recent law. These requirements address: safety distances from homes, recommended minimum height, artificial and natural lighting, escaping routes within the stables, characteristics of the flooring and access paths. National law addresses also workers’ safety, identifying appropriate personal protective equipment (gloves, boots with non-slip and iron tip, aprons, etc.) to be mandatorily made available. Moreover, based on Italian and European law, all workers must, before starting their activity, get an insurance coverage against occupational accidents and diseases and must be trained and educated regarding the main risks present in the working activities and their prevention. Unfortunately, these sound legislation provisions address only employed workers and not family and self-employed. This means that the majority of Italian workers are not mandatorily covered by occupational health and safety system.

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8) Region of Lombardy. General Directorate for Agriculture, Unit of programming and research for Agro-industrial
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10) SUMMILK Italian Dairy industry website - Italian Dairy industry an overview

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3. University of Western Sydney, New South Wales

Health and Safety Research

Currently there is limited research concentrating on improving the health and safety of dairy workers in Australia, except for the following:

- **National Centre for Farmer Health**: Sustainable Dairy Farm Families™ - Future Directions 2010-2012. Report has been completed and should be available on the farmer health webpage [www.farmerhealth.org.au](http://www.farmerhealth.org.au) once permission given from funders. To release report.
- **Cholinesterase Outreach Research Program (CROP) is currently working with a few dairy farmers.** [http://www.farmerhealth.org.au/page/research-centre](http://www.farmerhealth.org.au/page/research-centre)
- Shh hearing in a farming environment research study is working with farmers on the social impact of hearing loss and some are dairy farmers.
- **Australian Centre for Agricultural Health and Safety** - Generally, projects involving a range of agricultural industries including fatalities and issues such as noise and quad bike safety.
Dairy Industry Status

- *Economy, milk prices, etc.* – milk prices are currently increasing by a small % mainly due to export pressures. Supermarkets such as Coles and Woolworths continue to put downward pressure on whole milk prices, and this is a major concern for farm viability in most dairy regions of Australia.

- *Southwest of Victoria (where Sue Brumby is from) is experiencing a green drought.* Fodder supplies are very short, expensive and herds are being culled. Recent press link is attached. This is following on from 10 years of drought, although some farmers are managing. http://www.weeklytimesnow.com.au/article/2013/07/10/576193_opinion-news.html.

- *Health and Safety Issues* – broad but the main identified issues of farmers in Australia are stress and mental fatigue due to economic pressures and low profitability. Noise, fatigue, safety issues relating to quad bikes and tractors, and manual handling are also issues.

- *Regulatory Issues affecting health and safety* – Major changes in OHS legislation impacting on all but two states of Australia (Victoria and Western Australia).

- *Immigration policies affecting the dairy workforce* – workers on farmer, if not Australian citizens or permanent residents, must have a work visa such as a 457 visa. Likely increase in restrictions on workers as Australian economy slows.

Dairy Farm Profile

Number of Dairy Farms in 2011/12:

- Vic – 4556
- NSW – 778
- Qld – 555
- SA – 275
- Tas – 444
- WA – 162
- Total – 6770

Number of cows:

- Vic – 1 059 000
- NSW – 198 000
- Qld – 96 000
- SA – 77 000
- Tas – 146 000
- WA – 55 000
- Total – 1 630 000

In Australia in 2011/12, the majority of farms (~80%) are owner-operated farms, with 16% being share farmed and only 2% being corporate farms.

Worker Characteristics (gender, age, nationalities of any immigrant labor):
• Limited details available of size of workforce including age and gender.
• Immigrant labour is increasing but numbers difficult to ascertain.

Technologies (parlor styles, robotic milking, production practices): mixture of technologies are used depending on the size, age and type of milk production system.

References
• ARC Linkage Grant - http://www.arc.gov.au/default.htm

New Zealand
Author: Grant Hadfield, FarmSafe, 102 Manchester St, Feilding, New Zealand

New Zealand Economy & Milk Prices
Fonterra, the major New Zealand milk processor has forecast a milk price of $NZ7.00 per kg of milk-solids for the upcoming 2013/14 season, up from a forecast $NZ5.80 per kg for the current 2012/13 season, which ended on May 31. New Zealand milk production in 2012/13 experienced its first year on year decline for six years, as a result of a major drought. The decline was 1.2%.

Major Expansion of the New Zealand Dairy Sector
A recent Government report predicts that the New Zealand Dairy Sector will continue steady growth at a rate of 8 percent, compounding (http://www.mpi.govt.nz/Portals/0/Documents/about-maf/2013-sopi-report-web.pdf). This continues a long term trend. All of the increased dairy production will be exported.

Migrant Workers on New Zealand Dairy Farms
Dairy farming is increasingly reliant on migrant workers, particularly for milking. In 2012/13 there were 2268 work permits issued. Over 11798 herds this is very significant. New Zealand Immigration have just published a new guidance for farmers who are using migrant labour http://www.immigration.govt.nz/NR/rdonlyres/7A01C8B9-0E46-4F84-923F-12EE1D592CC3/0/Dairymigrantsguide_vMay12.pdf.

Automation of Milking Developments in New Zealand
Robotic Systems have been studied since 2001 (http://www.dairynz.co.nz/page/pageid/2145869713/The_Greenfield_Project) and a small number of farmers have installed fully robotic milking plants. In general, the uptake of these is limited by the reliance on pasture being fed in-situ meaning the cows need to walk a long way to get milked. There is much greater interest in “Robotic Cluster Attachment” systems for Rotary Dairies, further reducing the labour required for milking.
Independent Task Force Report on Workplace Health and Safety


1. The present Health and Safety Act will be replaced so that its scope is widened to include acute, chronic and catastrophic harm, and that the basis for control moves from “All Practicable Steps” to a “Reasonably Practicable” test based on risk-based decision making.
2. A new workplace health and safety agency will be established, WorkSafe New Zealand.
3. The legal framework for worker participation will be strengthened.
4. There will be much greater use of Regulations, Approved Codes and Practice and Guidance material developed on a tripartite basis.
6. WorkSafe New Zealand will take a leadership role in forming a “Health and Safety Professionals Alliance”. This includes establishment of reliable competency standards for Health and Safety Consultants and intermediaries.

Safety with Quad Bikes

There are three recent developments in New Zealand:

1. Commercial production has commenced of a new crush protection device, called “Lifeguard” ([www.lifeguard.co.nz](http://www.lifeguard.co.nz)). This is a flexible segmented roll bar that moulds around the rider in the event of a roll-over. Initial testing indicated it does not affect the stability of the quad bike. Further testing is being done in Australia and some results are expected at the end of 2013.
2. The government farm business, Landcorp Farming Ltd, have announced there will be no quad bikes used on their new farms and that their use on their other farms will be restricted [http://www.stuff.co.nz/business/farming/sheep/8676250/Landcorp-limiting-quad-bike-use](http://www.stuff.co.nz/business/farming/sheep/8676250/Landcorp-limiting-quad-bike-use). This followed attempts by the company to reduce quad bike accidents through staff training, compulsory use of helmets and good maintenance. In spite of these measures they reported 20 accidents from December 2012 to April 2013. Note they presently have 400 quad bikes on 120 farms.
3. A Coronial Inquiry into Deaths from Using Quad Bikes has started and is expected to report in the latter part of 2013.

The government campaign for quad bike safety is continuing. There appears to be a significant shift to replacing quad bikes with “Side by Side” Utility vehicles.

FarmSafe Direct Intervention Programmes

FarmSafe have recently introduced new templates for their Advisors to use in preparing Safety Management Plans. Each plan involves either one or two visits by a FarmSafe Advisor. The templates simplify the process in producing the plans. They are produced on a ‘Standardised Costs’ basis. The network of FarmSafe Advisors is being expanded to cope with the expected demand.

FarmSafe “Rural Safety – A Forward Focus” Forum

From this forum in May 2013:

1. FarmSafe are providing a Rural Skills License, as part of its training package
2. The Chief Coroner’s Office indicated that rural suicides numbered 123 from 2007 to 2012 of which 115 were male. These numbers were far higher than tractor or quad bike related deaths that were 32 and 28 respectively over the same period.

3. Mental Health of farmers is receiving a lot of attention. A major project is addressing “Farmer Wellness” with strong support networks, prevention and early diagnosis programmes. This work is supported by Dairy New Zealand.

**Dairy Farmer Wellness and Wellbeing Programme**

This is a Dairy Woman’s Network project. This is a multi-agency approach in supporting dairy farmers. It includes Health ‘Pit Stops’, improved knowledge of their physical and emotional wellbeing, identification of ‘at risk’ dairy farmers, presentation with information to enable farmers to better address their health needs, development of interventions that will manage and mitigate stress related problems, increased engagement of the health sector in the provision of knowledge, support, advice to dairy farmers, further research and identification of the leverage points in dairy activities that could lead to significant systemic changes in work practices, behaviour and the culture of dairy farming.

**Number of Dairy Farms in New Zealand**

New Zealand Dairy Statistics 2011/12 show that there were 11,798 herds comprising 4,634,226 cows on 1,638,546 “effective hectares”. This equates to an average herd size of 393 cows and 2.83 cows per “effective hectare”. The average size herd had increased by 7 on the previous season and is consistent with the trend for the last 30 years.

**Operating Structure of New Zealand Dairy Farms**

The table below indicates the number of managed or owner operators, and the various sharemilking orders that make up the 11,798 dairy herds in New Zealand. These show that 65% are operated by the owners or managers.

<table>
<thead>
<tr>
<th>Operating Structure</th>
<th>No of Herds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner operators</td>
<td>7,764</td>
</tr>
<tr>
<td>Sharemilkers¹</td>
<td></td>
</tr>
<tr>
<td>Less than 20%</td>
<td>234</td>
</tr>
<tr>
<td>20-29%</td>
<td>1,173</td>
</tr>
<tr>
<td>30-49%</td>
<td>193</td>
</tr>
<tr>
<td>50/50</td>
<td>2,218</td>
</tr>
<tr>
<td>Over 50%</td>
<td>216</td>
</tr>
<tr>
<td>All sharemilkers</td>
<td>4,034</td>
</tr>
</tbody>
</table>

¹ Sharemilking is a share farming arrangement; 20% means 20% of the revenue goes to the sharemilker and 80% to the farm owner

**Dairy Farm Profile New Zealand**

Over 90% of the New Zealand dairy industry is based on pasture grown on the farm and most of the herds are managed on a seasonal basis with the cows dry from late autumn to mid winter.

In 2010 40% of New Zealand dairy cattle were milked in Rotary Dairies. The larger the herd, the more likely it is to be milked in a Rotary Dairy. If these trends continue the rotary dairy will become the dominant technology for milking cows.
Canada
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CANADA

Purpose of organization and geographic representation
The Canadian Centre for Health and Safety in Agriculture (CCHSA) was established in 1986 (originally as the Centre for Agricultural Medicine). CCHSA is a leader in agricultural safety and rural health issues and we have evolved into a new national centre of excellence which has an expanded mandate in the field of agricultural safety, rural health, delivery of training programs and knowledge translation. The Canadian Centre has a focus on addressing public health issues related to the agricultural rural ecosystem and bridges gaps that occur between the spectra of basic research, applied research, the community and policy.

CCHSA has faculty with specialty training in industrial hygiene, ergonomics, proteomics, biostatistics, epidemiology, respiratory medicine, inflammation, occupational health, and rural health. A large majority of our research involves Saskatchewan, although we have conducted national projects and our CCHSA National Network encompasses national and international partnerships.

We have brand new (2013) Canadian Foundation for Innovation funded laboratories called the CCHSA National Agricultural Industrial Hygiene lab. The labs include state-of-the-art labs for industrial hygiene, occupational health, knowledge translation, respiratory health, epidemiology, injury, ergonomics, and commercialization. These labs are meant to enhance multidisciplinary opportunities.

Opportunities for collaborative efforts
The new CCHSA National Agricultural Industrial Hygiene laboratory is a natural starting point for new collaborative efforts. These labs will allow us new opportunities in research and knowledge translation.
We are expanding our efforts in better understanding the inflammatory nature of agricultural exposures and would very much value the opportunity to collaborate on such efforts.

**Mechanism for solicitation of involvement or funding, or our contribution to their efforts**

We currently do not have dairy research funded initiative at CCHSA. However, the possibility to look at airborne exposures and control mechanisms has been written into a recently submitted grant to the Government of Canada’s Growing Forward II program. If successful, we would receive just over 1 million dollars to look at airborne exposures and controls in agricultural operations. Part of this focus could be on dairy production. Our limitation is that dairy production is not large in Saskatchewan and we would need to look to partners across Canada to further the dairy agenda.

There are many other smaller funding opportunities in Saskatchewan to forward this type of research including Saskatchewan Agriculture (yearly opportunity), and the dairy producers of Canada. We would require a much targeted approach that clearly had a focus on either herd health or economic impacts to the dairy industry.

Our current work in the dairy industry is looking at protein profiles in dairy dust samples. This is similar work to the profiling we have been doing on other dusts from the swine, poultry and grains industries. Simply put, we are trying to identify specific proteins from these dust samples. When a specific and abundant protein has been identified, we are attempting to get a purified form of the protein. Mice would then be challenged with the protein through respiratory challenges, to determine the inflammatory nature of the specific protein. The future of this work is to determine the inflammatory nature of proteins specific to agricultural dusts. If specific inflammatory proteins can be identified, then control mechanisms would be considered to reduce worker and animal exposures to these proteins.

In other agricultural populations we have been working to better understand the inflammatory nature of respiratory exposures. In the swine industry we have a project to demonstrate that substantial respiratory health outcomes are present in workers new to the swine industry that are different than the health outcomes of workers well established in the swine industry. Furthermore, this project will demonstrate that the reaction to the workplace environment in workers new to the swine industry relates to inflammatory processes unique to these workers, inasmuch as prolonged exposure leads to adaptation responses that dampen subsequent swine barn-induced pulmonary inflammation. We are assessing the progression of respiratory and inflammatory measures of new workers from baseline (before any initial exposures to the swine barn atmosphere) through the apparent adaptation to document differences between acute and adaptive inflammation. This same type of work could be transferable to other agricultural populations including dairy workers. In addition, we would be happy to partner with others working on inflammation in agricultural workers.
United States

Mountain West Region

*Mountain-West US: North and South Dakota, Utah, Colorado, New Mexico and Texas*

Authors:
David Douphratre, University of Texas School of Public Health
Stephen Reynolds, Colorado State University
Robert Hagevoort, New Mexico State University

Demographics and Technology

As the US dairy industry continues to consolidate, increased efficiency and production on each dairy farm is paramount. The southwestern US can be characterized by fewer dairies but with larger milking herds.

**Texas**
- State ranking in production: 6th
- Number of milking herds: 590 (15th nationally)
- Production: 9.5 million pounds annually (+8.5% from 2010)
- Milk cows: 431,000 (7th nationally)
- Milk per cow: 22,232 lbs annually (9th nationally)
- Mean herd size: 731 (9th nationally)
- Percentage of state total farm receipts: 8%
- Most production is in the Texas panhandle region along Texas-New Mexico border.

**New Mexico**
- State ranking in production: 9th
- Number of milking herds: 140 (31st nationally)
- Production: 8.2 million pounds annually (+3.8% from 2010)
- Milk cows: 329,000 (9th nationally)
- Milk per cow: 24,854 lbs annually (1st nationally)
- Mean herd size: 2,350 (1st nationally)
- Percentage of state total farm receipts: 13%
- Most production is in eastern half of the state along New Mexico-Texas border.
- Majority farms employ parlor milking technologies

**Colorado**
- State ranking in production: 15th
- Number of milking herds: 130 (35th nationally)
- Production: 2.9 million pounds annually (+6.5% from 2010)
- Milk cows: 128,000 (16th nationally)
- Milk per cow: 23,430 lbs annually (5th nationally)
- Mean herd size: 985 (6th nationally)
- Percentage of state total farm receipts: 8%
- 85% of production is in Larimer, Morgan, Logan and Weld counties.

**South Dakota**
- State ranking in production: 21st
- Number of milking herds: 350 (21st nationally)
- Production: 1.9 million pounds annually (-.7% from 2010)
- Milk cows: 91,000 (23rd nationally)
- Milk per cow: 20,549 lbs annually (18th nationally)
- Mean herd size: 260 (16th nationally)
- Percentage of state total farm receipts: 4%
- Most production is along I-29 corridor in eastern part of state

**Utah**
- State ranking in production: 22nd
- Number of milking herds: 240 (27th nationally)
- Production: 1.8 million pounds annually (+1.9% from 2010)
- Milk cows: 88,000 (24th nationally)
- Milk per cow: 21,068 lbs annually (11th nationally)
- Mean herd size: 367 (12th nationally)
- Percentage of state total farm receipts: 22%

**North Dakota**
- State ranking in production: 35th
- Number of milking herds: 145 (30th nationally)
- Production: 0.3 million pounds annually (-10.4% from 2010)
- Milk cows: 19,000 (34th nationally)
- Milk per cow: 18,105 lbs annually (34th nationally)
- Mean herd size: 131 (27th nationally)
• Percentage of state total farm receipts: .9%

Practices and Technology
As the US dairy industries continues to consolidate, cows are being milked more rapidly and more often. Most dairies milk cows two to three times per day in milking parlors. In 2006, 47% of US large herd parlors were herringbone, 32% parallel, and 5% rotary. A more recent registry of parlor configurations in use could be found for the southwest region. Most dairy cows in the southwest region are Holsteins.

Workforce
The US dairy industry is increasingly dependent on Hispanic immigrant labor. The US National Milk Producers Federation (NMPF) reported an average of 3.2 workers per US farm were of domestic origin, and 2.0 workers were of foreign origin. Fifty percent of surveyed farms (n=1,344) from 47 states reported employing immigrant labor which represented 62% of the US milk supply. Researchers have reported percentages of Hispanic labor on US dairies to be 50% in New York, 85-89% in Colorado, 92% in Vermont and 94% in California. A recently completed study among large-herd dairies in South Dakota, Colorado, Utah, New Mexico and Texas revealed 97% of parlor workers were Hispanic.

Health & Safety Regulations
New Mexico and Utah are two states which have approved State Occupational Safety and Health Plans. Texas, Colorado, North and South Dakota are regulated by the federal Occupational Safety and Health Administration.

Critical Issues
• Immigration and current regulatory proposals at federal level
• Labor management
  o Workforce: low literacy, non-English speaking
• Increasing regulatory challenges (environmental & worker safety)
• Low and fluctuating milk prices
• Limited farm credit lending

Research & Outreach
Research
• Analysis of workers’ compensation claims data among dairy workers (completed)
• Epidemiological study of musculoskeletal symptoms among parlor workers (completed)
• Bioaerosol exposures and models of human responses in dairies and cattle feedlots (current)
• Ergonomic exposure assessment and intervention analysis in large-herd milking parlors (current)
• Enhancing safety training effectiveness in large-herd dairy production (current)
• Exploring shed antimicrobial exposures with high plains livestock operations (Fall 2013)
• Safety leadership and management practices on large-herd dairy farms (completed)

Outreach
• Safety training DVDs (English and Spanish)
• Monthly safety article in Progressive Dairyman E-newsletter (7 articles this year)
• On-the-farm OSHA trainings
• Numerous producer and academic conference presentations
References


Upper Midwest, Specifically the I-29 Region

Author: J.W. Schroeder, Associate Professor and Extension Dairy Specialist, NDSU, Fargo ND

The following is my contribution on behalf of the I-29 Extension Dairy Consortium representing Extension Dairy specialists and area faculty from North Dakota (ND) – South Dakota (SD) – Minnesota (MN) – Iowa (IA) – Nebraska (NE).

Health and Safety Research
The North Dakota Department of Agriculture is in the process of fortifying efforts to attract livestock development in the state by adding two new outreach positions. As part of that move, the North Dakota Dairy Coalition (privately funded) has merged with the Department of Ag to provide leadership and broaden the efforts from dairy to all livestock species. The Coalition will retain its name and 501(c) 3 status.
I-29 Consortia efforts continue. ND-SD-MN combined grant-in-aid efforts to fund a tri-state educational program to train Ag owners/managers in labor retention and management. Workshops included four sessions over four days and were a hands-on training program. This summer T. Renelt and J. Schroeder will conduct on-farm consultations as part of their participation in the Ag Employee Management Workshops. These visits will monitor the progress of the goals they and address emerging issues related to human resource management.

In response to the growing interest in technology application the University of Minnesota is hosting the first U.S. Precision Dairy Conference and Expo, June 26 and 27, 2013 at Rochester, MN.

Unfortunately, the NIOSH Agricultural and Safety and Health Proposal, “Addressing the Human-Animal Welfare Interface on Dairy Farms” submitted to UMASH was not funded. Authors were from HICAHS, UM, SDSU, and NMSU.

**Dairy Industry Status**

While size of herd is increasing it is not occurring at a rate adequate to offset the cows leaving the production stream. We continue to recruit, but despite encouraging responses and interest of other dairy producers from around the world, competition for land has become fierce and as such a barrier to those working in livestock development, especially in ND.

With the extraordinary labor demand in the oil patch, and exceptional salary packages, availability of skilled labor is at an all-time low. With the lowest unemployment rate in the nation, is nearly impossible to find and retain labor with the attitude and ability to work in our environment. As a result, in just the last few years, about 75% of the labor force hired for ag-related occupations, especially dairying is now of Hispanic origin.

Safety remains a concern and the regulations associated with worker safety continue to complicate the lives of already busy dairy owners and operators. Here are some dairy farm accidents that shouldn’t happen, but still do:

- Too many kids drinking acid, soap and sanitizer
- Pinched fingers and hand injuries
- Suspect that carpel tunnel will be an issue with repetitive motion jobs
- Chronic issues (back, shoulder, hip, etc.) injuries from a strenuous work environment

The outcome of a meeting held in Watertown, SD last winter revealed these priorities for future educational needs. These data have not been analyzed and are in unedited form:

1) Emergency contacts

- bi-lingual interpretation
- 911 location Needs to be posted
- ER Services vs. Clinic Service
- increase employee understanding of when and how to report accidents
• challenges: how to pay health cost bills
• need for employee card of employment i.e. Person works for XYD Farm
• need for improved communication

2) Where to get common info
• driver’s license
• health services
• dental services
• Translation services (smart phone application?)

3) Animal handling – high rate of injury

4) Vaccine & proper handling of needles

5) Proper chemical handling – safety procedures

6) Knowledge of EE of chemical when presenting to ER

7) Understanding of warning symbols & chemical exposure

8) Need to use pictures instead of words due to different languages

9) Eye wash stations

10) Safe operating procedures with all mobile devices (learn acceptable cell phone operation procedures)

11) Education on safety (riders on equipment)

12) Hazards – improve awareness
• manure pits
• silos
• silage piles
• large bale handling
• Equipment – SOP’s and general maintenance (keep windows clean, etc.)

13) Concerns / Needs of Workers:

1. Fatigue
2. Physical Fitness         Length of work day – tired / hung over and effect on accident rate
3. Mental Alertness
4. Challenges with shift changes
5. GI issues of workers – heartburn seen with workers
6. Healthy eating habits & cooking, (storing food & food poisoning)
14) Being aware of surroundings & accountable for other workers

Of course the outcome of the new farm bill and forthcoming immigration policy are important to all dairy farm operators. That is being revealed through press releases at this writing. The federal immigration legislation as proposed by the “Gang of 8” could have a major positive impact on our dairies. For example as proposed, a Blue Card guest worker visa for year round employees would be good for 3 years before returning. It is a guest worker visa thus eliminating the need for citizenship.

In a recent SD poll, these findings were also revealed:

- 68% of those polled said they strongly or somewhat support bipartisan immigration reform legislation being debated in Washington;
- 74% of those polled said the strongly or somewhat support a bill that includes a tough but fair path to citizenship;
- 57% of those polled are more likely to vote for an elected official who supports comprehensive immigration reform that includes a path to citizenship.
- 83% of those polled said it was very or somewhat important that the U.S. fix its immigration system this year.
- Of those polled, 52% identified as Republicans, 31% as Democrats, and 17% as Independents.

Similar to most of the rest of the country, high feed prices for dairy and animal production are not being offset by the high milk prices. We were fortunate (Northern Great Plains) to experience minimal effect of 2012 agricultural and environmental droughts, but indirectly we certainly felt the impact with increased competition for forages that not only reduced our supply but increased our prices, thus reducing the advantage we historically have in ND with the lowest feed prices in the nation.

Transportation cost continues as one of the most challenging elements of economic sustainability. Given our remoteness and distance from market, milk processor procurement policies have changed significantly in recent years. And, with the recent purchase of the last dairy processor to be state-owned now a part of AMPI (producer portion) and Kemps (processing portion) our marketing environment is changing even more.

Lastly, more discussion is beginning to enter the board rooms and outreach classrooms on sustainability of the environment, our economy, animal efficiency and feeding a growing world populations.

**Dairy Farm Profile**

As of May 2012 ND has 87 Grade A (fluid) milk producers and 26 Grade B (manufacturing) milk producing farms. Our farm structure is similar to that of most of the Upper Midwest, family farms solely or owned in family partnerships, but the farming landscape is changing. With only a few larger-scale operations in ND, none are over 1100 cows. The average age of the primary operator is approaching retirement age, while larger operators have the younger partners. Generally not the case with MN and SD.
It is noteworthy, that robots have grown in popularity since 2009. While numbers are limited in North and South Dakota, Minnesota has expanded substantially. The manufacturers are tight-lipped about sharing their farm numbers, but we know they are keeping very busy with installations. I believe the states of WI, MN and PA have the greatest number of automated milking systems in the U.S. Minnesota Extension estimates about 50 farms rely on robots in that state. Advantages are primarily the elimination of labor or the reallocation of farm owner/operator time to complete other tasks.

Worker characteristics (gender, age, nationalities of any immigrant labor) information is scarce. ND has 2.2% of its population (699,628) as persons of Hispanic or Latino origin. SD has 2.9% of its population (833,354) as persons of Hispanic or Latino origin. SD has further delineated that 22,000 Latinos, 11,000 are registered to vote. MN has a substantial Hispanic population in the Twin Cities metro area. I can offer for greater detail than you could find browsing the U.S. Census Bureau website.
Southwest Region
Author: Jeffrey L. Levin, M.D., M.S.P.H. Southwest Center for Agricultural Health, Injury Prevention, and Education

This report covers the territory of the Southwest Center for Agricultural Health, Injury Prevention, and Education, which includes Arkansas, Louisiana, New Mexico, Oklahoma, Texas.

Relevant products of/support from the Southwest Center
- Internship support for dairy graduate student in New Mexico
- Volume I of dairy handling safety video
- Right from the Start

Dr. Levin’s and the Southwest Center/staff history and experience with vulnerable worker populations
- Understanding language barriers in occupational health
- Cultural considerations in occupational injury/illness prevention and training
- Fluency in Spanish and work with numerous Hispanic worker groups and migrant/seasonal worker populations
- Has lived for many years in Texas, on the border, and in Central Mexico
- Knowledge of and experience in occupational medicine, injury, and disease and thorough understanding of workers’ compensation systems including Texas, with impact on employers and workers
- Nearly 12 years of experience as the Southwest Ag Center Director in a collaborative stance with and as an External Advisor to other Centers
- Partnership development outside and inside dairy throughout the region (e.g., Ag/Dairy Extension, associations, legislative/regulatory, livestock shows and rodeo)
Recent outreach
I taught a Senior-level Dairy Management class at Utah State University during Spring 2013. As part of the curriculum I required that they view and report on both CD 1 and 2 of “Considering Human and Animal Safety”. After they had made their reports we talked about safety on dairies and things they needed to consider. It was a very good primer for my students and quite revealing in what they didn’t know. As an example, at the beginning I mentioned chemicals kept on dairies and a student, from a dairy, said they didn’t have chemicals. He later changed his opinion.

Dairy Industry Status
Current status is similar to other states; however, we do have a state law that addresses immigration in general, but was written with dairy in mind.

Dairy Farm Profile
We have approximately 225 dairies with an average of about 400 cows/dairy. Works are Latino; primarily male, but many milkers and calf feeders are female. Parlors include herringbone, parallel and rotary parlors. Almost all new construction has been rotary parlors. There are no robotic milkers.
**Health and Safety Research**

Recent Work: Nonnenmann – Aerosol exposure and lung function among dairy parlor workers

Recent Work: National Farm Medicine Center - WI

- Developing a computer application which will assist clinicians and dairy operators to guide safe but efficient return to light duty for common workplace injuries.
- With the help of NASS developing a recurring survey based surveillance mechanism to attempt to identify the effect of changes in dairy production on injury rates in Wisconsin dairies.
- Working with the Migrant Clinicians Network to develop and test the efficacy of a “promotor” safety program in Wisconsin Dairies who employ Hispanic workers.
- Agricultural Safety Consulting provides onsite safety consultations and bilingual worker training to dairies in Wisconsin. We cover such topics as machine guarding, confined space, noise abatement, Hazcom, respirator and electrical safety.
A series of figures is provided to illustrate dairy trends in the Midwest United States.

Figure 1 – Milk Cow Inventory by State (December 2007)

Milk Cow Density: 2002 – 2007 change

Figure 2 – Milk Cow Density Changes (2002-2007)
Figure 3 – Growth of Robotic Milking in Michigan

Figure 4 – Change in U.S. Farmer Operator characteristics (2002-2007)
Figure 5 – U.S. Farm Wage Data, provided by the U.S. Department of Agriculture

Health and Safety Issues

Occupational Health and Safety Training in the Midwest United States

1. National Farm Medicine Center, Marshfield, WI
2. Great Plains Center Agricultural Health and Safety, University of Iowa
   a. MS, PhD, Ag Health and Safety, IH, Ergo, Occ Med
3. Iowa Center for Agricultural Health and Safety University of Iowa/Iowa State
4. Agrisafe Clinic Networks, National
5. Ag Center Nebraska

Agricultural/Rural Health and Safety Issues (Matt Nonnenmann’s opinion):

1. Fatalities and injuries (rates are high, overall numbers are low)
   a. Machinery use
      i. ATV
      ii. Other
   b. Confined space
      i. Grain
      ii. Manure
      iii. Animal handling
      iv. Milk Storage (dairy ONLY)
2. Exploding pig houses (non-dairy)
3. Lung disease
4. Zoonoses
5. Electrical Safety
6. Ergonomics
Dairy Industry Status
California produces 21.3% of the U.S. milk supply. It is the state with the highest milk production and the lowest profits from milk production.

The recent economy has pushed increased efficiency in animal production. In their efforts to lower per-unit production costs, small-scale operations are becoming fewer in number. More cost-effective large-scale operations are increasing so that there are fewer, but larger, dairies. The increased concentration of animals, elevated concerns about the risk of injury and illness among workers. Injuries and illnesses on the job are costly and damaging – both for the individual employee who gets hurt and for the dairy.

Health and Safety Issues
Recent research studies show that the two main causes of workers’ injuries (fatal and non-fatal) are incidents with machinery and animals (Mitloehner and Calvo 2008). Machine-related accidents include tractor rollovers, being run over by tractors and being entangled in rotating shafts. Animal-related injuries include kicks, and workers being pinned between animals and fixed objects. Other causes of injuries include chemical hazards, confined spaces, manure lagoons, use of power tools, and improper use or lack of personal protective equipment.

Studies find dairy farms rely heavily on undocumented workers. It is estimated that over 50% of California dairy workers are undocumented foreign workers, by far most are Hispanic, Spanish-only speakers, and without large animal experience.
**Dairy Farm Profile**
- Approximately 1600 California Dairy Farms; Milking cows: 1.75 Mil
- Average dairy size now over 1,100 lactating cows
- Well over 95% of California dairy farms are family owned
- Sustainability is the number 1 family-owned dairy farmers concern
- Dairy workers are predominately men, 90% plus are from Mexico
- Educational level of workers is low; combined with language difficulties, communication of health and safety risks may be problematic
- Primary milking technologies include pipeline milking systems, milking parlor systems, and robotic milking systems

**Health and Safety and Regulations**
- All California employers are required to provide health and safety training to all of their employees, under Cal/OSHA’s Injury and Illness Prevention Program (IIPP)
- Cal/OSHA requires their Hazard Communication standard, requiring training on all chemicals to which employees may be exposed.
- Cal/OSHA also requires training for other specific standards, such as fall protection, forklifts, heat illness and hearing protection.

**Health and Safety Research**

WCAHS 2006-10 Research Project: *Respiratory Health & Exposures on Large Calif. Dairies*

The primary aims of this study were to determine whether working in a modern, large Californian dairy has any effects on the breathing health of worker; and to perform exposure assessments at a sample of these dairies to better understand the exposure to air pollutants of the workers, and the possible environmental impacts.

Modern management keeps the milking cows in concrete-floored and open-sided freestall barns. Each cow produces approximately 120 lbs of manure daily, which is flushed with water from the freestalls into large manure ponds ("lagoons") located on the dairy. Non-lactating cows and heifers are generally housed in dirt-floored drylot corrals, the manure is scraped several times per year to be applied on cropland as fertilizer. The accumulating manure dries out. Dust (aerosols) can be created in the air from this dried manure due to animal locomotion (i.e. kicking hooves, running, etc). Dust on dairies are generally highest in the summer and during the rainy season, dust levels decrease but gases like ammonia increase. The current study examined the exposure and health effects of the conditions for dairy workers.

In addition to a sampling of publications listed below, the Dairy Safety Training Program (sturdy Dairy Safety Training Guides printed in Spanish and English, include respective “How Pablo Learned to Work” fotonovelas) were developed by WCAHS at UC Davis as part of the Worker Occupational Safety and Health Training and Education Program (WOSHTEP), administered by the Commission on Health and Safety and Occupational Health Program at UC Berkeley.
Publications:


Garcia J, Bennett DH Tancredi DJ, Schenker MB, Mitchel DC and Mitloehner FM.


Schenker MB, Gunderson P. Occupational health in the dairy industry needs to focus on immigrant workers, the new normal”. *Journal of Agromedicine*. (In press).
Appendix G

Presentations (in chronological order)

1. *IDRC Progress by Steve Reynolds* ................................................................. 73
2. *Australia/New Zealand Update by Sue Reed* .............................................. 76
3. *Northern Europe Update by Christina Lunner Kolstrup and Peter Lundqvist* ........................................................................................................... 78
4. *Southern Europe Update by Claudio Colosio* ................................................ 81
5. *West Coast United States Update by Marc Schenker* .................................. 85
6. *Midwest United States Update by Matthew Nonnenmann* ......................... 88
7. *Mountain West United States Update by David Doupgrate* ......................... 93
8. *IDRC Voting Results from Discussion Groups by Vicky Buchan and Annie Keeney* ................................................................. 99
HICAHS International Dairy Research Consortium (IDRC)

Review and Progress July 25, 2013

Stephen J. Reynolds, PhD, CIH
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Colorado State University
Dept. Environmental and Radiological Health Sciences

IDRC Background

This group has collaborated on broader agricultural safety and health research since the early 1990s
- High Plains and Mountain Region Health and Safety Dairy Workshop – Denver, CO 2009. Sponsored by HICAHS and the Southwest Ag Center
- DeLaval Meeting 2010 (United States)
- Planning meeting at Swedish University of Agricultural Sciences, Alnarp and DeLaval 2010.
- Joint symposium on our recent dairy health and safety dairy research at Seventh International Conference on Prevention of Work-Related Musculoskeletal Disorders in Angers, France 2010.

HICAHS Center Grant 2011 – 2016

- IDRC Formally Proposed – Base funding (travel, meetings)
- Goals:
  - Increase research capacity, share best practices, and optimizing resources. Collaborate on research and outreach projects that will ultimately result in the reduction of injuries and illnesses among dairy workers internationally.
  - Reynolds (PI), Douphrate (Co-I), Rosecrance (Co-I)
  - Partners – Lundqvist, Lunner-Kolstrup, Pinzke, Colosio, Rautiainen, Levin, Nonnenmann, Kelfer, Gordon, Kirychuck, Hagevoort, Ariano, Bruno, Brumby, Reed, Mulley, Eifman, Jakob, Lind, Smith, Marras, Murgia, Reuvekamp, Slutsky, Veloz

IDRC Initial Meeting Colorado July 2011

Meeting Accomplishments
- Share information on industry and programs in country
- Identify global issues and priorities
- Opportunities for collaboration
- Objectives and schedule
- Resources

Short Term - Objectives

- Compile Resources available:
  - HICAHS website restricted
  - ILO: Government, union, and employers
  - Sweden
  - WHO
  - ATV Materials?, OHS Management?
- Evaluate and Provide Feedback: HICAHS: Allison, Steve, Matt K, Italy
- Use of LinkedIn and E learning System
  - Calendar of Events for meetings
  - Blog: Structure, Vicky and John G.
  - First Blush: Does this work, will it work
  - Pilot: Add demographics
  - Apply and Evaluate
  - Industry contribution: producers and workers
- Producers and workers Feedback (Douphrate, Quijano, Buchan)
  - Design Tool specifically for Producers
- Contribute Documents: Everyone
- Organize thoughts about adaptability of different tools

Short Term - Objectives

- Aerosol Project: short to long, Marcos, Sue, John G., Matt K, Maggie, John V, Steve, Shelley
  - Bioaerosol Exposures and Models of Human Response (ongoing – SR, JV, MD, JS, GD MN, SK, LE)
- Ergonomics Project: Dave, John R, Theresa, Martina, Kristina, Lelia
  - Rosecrance, Murgia, Colosio, Baldassarri. Joint scientific and industry-related dairy publications, presentations at international meetings, funded research proposals, visiting professorships and opportunities for graduate students.
Dairy Ergonomics and Dairy Safety Training

Collaborations by John Rosecrance
- Visiting professorship in Dpt Agricultural Engineering, University of Sassari in 2012 and 2013.
- Visits to University of Milan to build dairy research opportunities with Colosio’s research team at the International Centre for Rural Health and the S. Paolo Hospital.
- Three CSU graduate students participating in dairy site visits in Italy and presenting their research at the University of Sassari.
- Doctoral student from the University of Milan visiting scholar at CSU in the fall of 2013 focusing on ergonomic exposures of the upper limb among dairy workers.
- Professor Murgia grant in 2013 to study energy usage and ergonomic issues in cow and ewe dairy operations (Rosecrance is co-investigator).

Collaborative Scientific Presentations:
- Two presentations at International Conference of Agricultural Engineering (CIGR-AgEng2012), Valencia, Spain, 2012.

Medium Term - Objectives

Journal Article publication
Steve, Christina, Matt K, David, Matt N
Journal of Agromedicine (Volume 18, Issue 3).
Editors: Reynolds, Lundqvist, Colosio
Planning Team: Reynolds, Colosio, De Vries, Douphrate, Gilkey, Keller, Lunner-Kolstrup, Lundqvist, Rosecrance, Nonnenmann, Scott Heiberger

Medium Term Objectives - Conferences – Workshops - Dissemination
- Colorado July 2011
- Ireland Nordic Conference August 2011
- Spain International Conference of Agricultural Engineering (CIGR-AgEng2012 July 2012
- Sweden Nordic Conference August 2012
- Italy International Conference on Safety, Health and Welfare in Agriculture and Agro-food Systems September 2012
- New Zealand World Safety Conference September 2012
- ISASH June 2013
- Colorado July 2013
- Dr. Douphrate - new monthly column on Dairy Worker Safety and Health for Progressive Dairyman

Long Term - Objectives
- Explore opportunities nationally of partnership with WHO center: Sue, Claudio
  WHO orgs: ICHO, WONCA, OHTA, IDF
- Develop partnerships with Veterinarians
  One health: John G, Matt K, Claudio C, Steve R, Theresa, Rob, Susan B
  Initial meetings re. microbiome approaches – Reynolds group and Morley group CSU

IDRC Membership
- Australia: National Centre for Farmer Health, University of Western Sydney
- Brazil: FundaCentro
- Canada: Canadian Centre for Health and Safety in Agriculture, University of Saskatchewan
- Denmark: Aarhus University
- Finland: TTS: MTT Agrifood Research Finland
- Germany: Leibniz Institute for Agricultural Engineering Potsdam-Bornim
- Ireland: Teagasc – the Irish Agriculture and Food Development Authority
- Italy: University Hospital San Paolo, Milan; Occupational Health Service of Sassari (Sardinia, Italy), National Health Service; Department of Territorial Engineering, University of Sassari
- The Netherlands: The Netherlands Center for Occupational Diseases
- New Zealand: Employers and Manufacturers Association
- Sweden: DeLaval, University of Upsala, Swedish University of Agricultural Sciences
- U.S. HICAHS, SW Center, NFMC-UMASH, Central States, GPAH, Western Center, NMU, Penn State, etc.
Discussion

1. Which objectives remain priorities?
2. Do we need to formalize our structure?
3. How should we vet/accept new members?
4. What has been working – not working?
International Dairy Research Consortium:
What is happening down under

July 25 & 26, Fort Collins, Colorado, USA

Combined Summation of Australian and New Zealand Activities
Australia: A/Prof Sue Reed; A/Prof Sue Brumby & Prof Rob Mulley
New Zealand: Grant Hadfield

Australian Milk Prices and Farm Profiles

• Economy, milk prices, etc. – milk prices are currently increasing by a small % mainly due to export pressures.
• Number of Dairy Farms in 2011/12 – 6770 farms with the majority in Victoria (67%)
• Typical Dairy Farm Structure (number of cows, workers, managers, % family-owned) in 2011/12 –
  – Number of cows: 1 630 000 cows (65% in Victoria)
  – Majority of farms (~80%) are owner-operated farms, with 16 % being share farmed and only 2% being corporate farms
• Worker Characteristics –
  – Limited details available of size of workforce including age and gender.
  – Immigrant labour is increasing but numbers is unreported.
• Technologies - mixture of technologies are used depending on the size, age and type of milk production.

New Zealand Dairy Milk Prices and Farm Profiles

• Milk Price is predicted to increase in 2013/14 by 20%
• Milk Production is down by 1.2% mainly due to drought.
• NZ government predicts the dairy industry will increase by 8% but mainly in the export market.
• Number of Dairy Farms in New Zealand in 2011/12 was 11,798 herds with the average size increased by 7 to 393 cows and 2.83 cows per “effective hectare”.
• Over 90% of the NZ dairy industry is based on pasture and most of the herds are managed on a seasonal basis with the cows dry from late autumn to mid winter.
• 40% of NZ dairy cattle were milked in Rotary Dairies in 2010 due to an increase in the herd size.

Current Projects in Australia

• National Centre for Farmer Health: Sustainable Dairy Farm Families™ - Future Directions 2010-2012. Report is currently being finalized.
• Australian Centre for Agricultural Health and Safety - Generally, projects involving a range of agricultural industries including fatalities and issues such as noise and quad bike safety.
Current Projects in New Zealand

- Safety with Quad Bikes
- FarmSafe Direct Intervention Programmes
- FarmSafe “Rural Safety – A Forward Focus” Forum
- Dairy Farmer Wellness and Wellbeing Programme

OHS Issues in Australian Dairies

- Health and Safety Issues – broad but the main identified issues of farmers in Australia are stress and mental fatigue, noise, fatigue, safety issues relating to quad bikes and tractors and manual handling issues.
- Regulatory Issues affecting health and safety - Major changes in OHS legislation impacting on all but two states of Australia
- Immigration policies affecting the dairy workforce – workers on farmers if not Australia citizen or permanent resident must have a work visa such as a 457 visa.

OHS Issues in New Zealand Dairies

- Besides the issues relating to quad bikes, suicides & fatalities
- Changing legislation: to reduce the rate of workplace fatalities and serious injuries by 2020
  - Health and Safety Act be replaced and widened to include acute, chronic and catastrophic harm;
  - basis for control moves from “All Practicable Steps” to a “Reasonably Practicable” based on risk-based decision making.
  - WorkSafe New Zealand (new workplace health and safety agency) to take a leadership role in forming a “Health and Safety Professionals Alliance”.
  - standards for Health and Safety Consultants and intermediaries.
  - legal framework for worker participation will be strengthened.
  - development of a robust workplace injury, disease data-collection, monitoring and reporting system.
- Use of migrant workers on temporary visas.

Potential Research Funding Sources

- ARC Linkage Grant – Joint projects are supported if money is also provided by industry.
- Dairy Australia.
- Chemical Suppliers to the Dairy Industry eg Pfizer
- Rotary or Lions – will need to make contacts
The dairy sector is of great importance to EU agriculture and has a diverse structure across EU’s main producers – Germany, France, UK, Netherlands, Italy and Poland (70% of total EU-27 production).

139 million tonnes of milk collected (91% produced milk delivered to dairies). 96.8% comes from cows milk. Milk produced in the EU-worth EUR 53.1 thousand million and accounted for 14% of the value of EU agricultural output in 2011.

Main products made from milk in 2011: 9 million tonnes of cheese, 31 million tonnes of drinking milk, 2.6 million tonnes of milk powder and butter.

During 2001 to 2011:
• 16% decline of dairy cows, however 18.4% increase in milk production.
• 22.8 million dairy cows at 1.7 million dairy farms.
• 20% increase in average milk yield (6,692 kg per dairy cow). Wide range from >8,000 kg per cow in Denmark, Spain, Finland and Sweden to <4,000 kg per cow in Romania and Bulgaria.
• Specialist dairy farms (SDF) defined as 2/3 of output from dairy activity – reared 76% of the dairy cows, accounted for 37% of farms with dairy cows, dairy herd size five times larger (EU 28; DK 141; UK 122; Cyprus 111; Romania 3; Bulgaria 5; Lithuania 6; Latvia 7).
• SDF – needs more labour, SDF (1.63 AWU) twice as high compared to non-SDF (0.81 AWU).

Dairy Technology

Finland:
• 70-80% stanchion barns, typically 30–40 milking cows, pipeline milking system and 4 milking unit.
• New dairy barns loose housing systems for 60–70 dairy cows, with or without a milking robot.
• Milking parlors – autostandems (2x3–4) or herringbones (2x6–8).
• Recent trend – curtain wall loose housing barn with two milking robots, 120–140 dairy cows, AMS and farming couple with one hired worker. Largest dairy farms app. 300–400 dairy cows.

Denmark:
• A combination, mostly robotic milking. Mostly open or semi open stables

Sweden:
• 55% housed in loose-housing barns with cubicles, parlour (herringbone, parallel), rotary or automatic milking systems.
• 45% housed in tied stalls with pipeline milking.
• A recent innovation from Sweden is the first robotic milking rotary.

Dairy Technology

Germany:
• Parlor styles depend on farm size.
• 20 cows or more usually separate parlors.
• Robotic milking is increasing, but still marginal (4%).
• Since cows are more often held inside, udders are drier compared to cows on grassland.

Ireland:
• Parlour style typically 8–20 unit herring bone.
• With expansion there is increasing use of rotary milking parlours.
• The Irish Dairy industry is based on low-cost grazed grass as the predominant feed. Grass growth is seasonal (March to September) which leads to a seasonal cow calving and production patterns.
## Workforce characteristics

### Finland:
- Mostly family owned farms, typically a married couple.
- No current information on the number of farms with hired workers.
- Younger foreign workers without a family from e.g. Estonia and Ukraine.
- Younger and more educated farmers have no problem in hiring foreign workforce as long as they speak satisfactory English.

### Denmark:
- 80% male farmers, 80% native Danes and 20% primarily eastern Europeans.
- Illegal immigrants not regarded as a substantial problem.

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## Workforce characteristics

### Sweden:
- Predominantly family owned dairy farms.
- Predominantly male farmers, predominantly female employees.
- Average age of a dairy farmer 55 years.
- No information available regarding workers, however estimated figures from 2010 indicate 177,000 people engaged in agriculture (full- and part time).
- The numbers of migrant workers in the dairy sector unknown, but becoming more frequent.
- The nationalities most frequent from the Baltics, Poland and Rumania but also from Ukraine, Russia and others in the eastern part of Europe.
- Immigrants from the EU-countries have few formal problems to seek jobs in Swedish agriculture, but from other countries it involves more paper work.

### Germany:
- No precise or statistical information available, however on smaller farms it is family labor.

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## Health and Safety

### Finland:
- Farmers’ Social Insurance Institution (Finnish acronym: Mela) mandatory for all farms with at least 5 hectares of farmland.
- Insurance smaller farms voluntarily.
- Self-employed farmers, their spouses, and salaried family members are covered (salaried non-family workers insured by other workers’ compensation insurance carriers).

### Denmark:
- All employees included in an insurance system covering occupational accidents and diseases.
- This insurance is paid by the employer (mandatory).
- Access to a tax paid free health care system. Health and safety issues on the farms controlled by the Danish Working Environment Authority, but they seldom visit.
- The farming society has their own organization (“Videnscenter for Landbrug”) with some expertise in health and safety issues.

### Sweden:
- Health and safety regulations issued by the Swedish Work Environment Authority (also for self-employed farmers).
- Special regulations regarding work with animals in agriculture.
- Animal-welfare regulations might have effects on the health and safety issues for farmers and farm workers.

### Germany:
- Morbidity ratio MSD female dairy workers 1.7 compared to office workers 5.5.
- Most prevalent reasons for sick leave back pain and carpal tunnel syndrome.
- Livestock causing app. 18,000 accidents per year (2/3 caused by cattle).
- Number of fatal and non-fatal accidents on dairy farms not known.
- The employer responsible for a safe working environment and for risk assessment (German legislation).

### Ireland:
- Dairying one of the most labour intensive enterprises and associated with highest levels of fatal and serious injury and ill health.
- All farms where the farmer is self-employed are covered by Irish Safety, Health and Welfare at Work legislation.

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## Critical health and safety issues: prioritize top 3 concerns for the region.

- Human aspects of structural changes and new technology in the dairy industry (large-scale, advanced technology, stress, injuries, work organization, management, ergonomic issues)
- Migrant workers in dairy production – a new challenge (communication, management, culture)
- Attracting the new generation and taking care of senior experience and competence. Gender issues at all levels from ownership, management to milkers
### Applicable recent research, outreach, and other projects for improving dairy health and safety

**Finland:**
- **Ongoing:**
  - Joint research project to improve dairy production in large dairy farms through better management, methods, and barn design based on research knowledge from actual farms.

**Denmark:**
- **Recent:**
  - Investigation of dust, endotoxin and allergen exposure levels in Danish cattle farms based on results from the Danish SUS Study. Levels of dust and endotoxin are not negligible, and allergen levels are high.
- **Ongoing:**
  - Associations between exposure levels and health outcome (lung function, symptoms, and sensitization) are in progress.

### Applicable recent research, outreach, and other projects for improving dairy health and safety

**Sweden:**
- **Recent:**
  - The Psychosocial Pulse of Entrepreneurs in Rural Areas
  - Prevention of MSD when working in dairy production – advice and good solutions
  - How to attract and motivate people to work in large-scale dairy farming
  - Work load in parallel and fish bone milking systems
- **Ongoing:**
  - Follow-up studies on dairy farmers work situation and health in Scania
  - Advanced technical equipment and automatization – a stress factor in robotic milking?
  - Good practices in agriculture: social partners participation in the prevention of MSD
  - Injuries and injury prevention during animal-handling in dairy production – human, animal and environmental factors
  - Migrant workers in Swedish agriculture (including milk production) with a focus on communication issues regarding safety & health, food hygiene and work instructions
  - Low-stress handling of cattle and another project is collecting data on injuries with bulls in milk production (JTI).

**Germany:**
- **Recent:**
  - Workload evaluation regarding working heights and weights while attaching the cluster and Assessment of muscular-skeletal-pain and disorders on German dairy farms
- **Ongoing or planned research:**
  - Intervention strategies to improve the workplace and Measuring the impact of technical interventions

**Ireland:**
- **Recent:**
  - Research - National Survey of Farm Injuries and Occupational Ill Health among Farmers
  - National Study of farmers and Mortality rates.
  - Outreach - extensive Extension service involving integration of Training/ Education, network of Discussion Groups and farmers behavioural reasons for adoption/non adoption of health and safety controls.
Southern Europe Update
Presented by Claudio Colosio

DAIRY DEMOGRAPHICS IN THE REGION

Total milk production in Europe-27 is about 156 million tons

DAIRY DEMOGRAPHICS IN THE REGION

In 2013 the trend of production and delivery becomes negative

DAIRY TECHNOLOGY

Systems of milking parlor

In Italy: about 5.5 million cows breed
Most of the farms located in northern Italy, specifically in Lombardy, Emilia Romagna and Veneto (Po Valley)
In the Region of Lombardy about 40 million hectoliters of cow milk per year are produced (37% of the national production).

Distribution of milking equipments in the provinces of the Region of Lombardy, 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Bucket</th>
<th>Pipe-milk</th>
<th>Dairy parlor</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>642</td>
<td>558</td>
<td>3159</td>
<td>4559</td>
</tr>
<tr>
<td>2008</td>
<td>782</td>
<td>587</td>
<td>3088</td>
<td>4457</td>
</tr>
<tr>
<td>Differences</td>
<td>-60</td>
<td>-29</td>
<td>-71</td>
<td>-102</td>
</tr>
</tbody>
</table>
Southern Europe Update
Presented by Claudio Colosio

**WORK FORCE CHARACTERISTICS**

**EU STATES**

Labour force and dairy cow population per specialist dairying holding, 2010 (average number per holding). Source: European Commission: Eurostat

**WORK FORCE CHARACTERISTICS: ITALY**

Sample of 141 milkers of the Region of Lombardy (ICRH):
- 99% Males
- 45 yrs old
- 49% Indian origin

figures stand at 34% and 59% respectively.

- Most of the companies are managed directly by the farmer and his associate or family (the workers involved in cattle breeding are about 44,000, of which 89% independent farmers and 67% aged more than 40);
- Only few companies use employed labour force, in particular in the biggest
- Foreign workers, amounting to 233 thousand units, represent 24.8% of the agricultural non familiar workforce and 6.4% of the total

**HEALTH AND SAFETY**

"Unhealthy working conditions contribute to at least 1.6% of the burden of disease in the WHO European Region. Statistics shows that the major occupational risks associated with this burden are:
- injuries (40% of the occupational burden of disease);
- noise (22%);
- carcinogens (18%);
- airborne particulate matter (17%);
- ergonomic hazards (3%)."(WHO)

**ODs in agriculture and in the dairy sector**

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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>12</td>
<td>22</td>
<td>24</td>
<td>31</td>
<td>64</td>
<td>55</td>
<td>21</td>
</tr>
<tr>
<td>Nervous system and sensory organ diseases (total)</td>
<td>12</td>
<td>57</td>
<td>57</td>
<td>74</td>
<td>87</td>
<td>47</td>
<td>20</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>12</td>
<td>22</td>
<td>21</td>
<td>24</td>
<td>25</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Muscle-skeletal and tendon diseases</td>
<td>34</td>
<td>91</td>
<td>76</td>
<td>56</td>
<td>52</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>100</td>
<td>78</td>
<td>100</td>
<td>100</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

**HEALTH AND SAFETY**

**Legislative Provisions: Italy**

- Occupational health care is mandatory in Italy for any employee who is exposed to identified and relevant risk factors at the workplace, according to a risk assessment report (RAR) to be mandatorily done in any productive settlement of the country.
- Specific requirements for the housing and milking of livestock of new construction
- Appropriate PPDs (gloves, boots with non-slip and iron tip, aprons, etc..)
- Insurance coverage against occupational accidents and diseases
- Educational training regarding the main risks present in the working activities and their prevention

**CRITICAL HEALTH AND SAFETY ISSUES**

Mandatorily covered only employed workers (~10% in dairy)

Family, self employed and business partners: health surveillance only on a voluntary basis

No coverage or very poor coverage for seasonal (very often migrants) and «irregular» workers

Lack of Occupational Health Coverage
Lack of denominators for indices calculations

- Instability of workforce
- Number of workers not known
- Seasonal variability
- Turnover

CRITICAL HEALTH AND SAFETY ISSUES

OH and safety legislation hardly applicable in the sector

Legislation mainly addressed at industry workers

Difficulties in identifying the main tasks and jobs

Difficulties in performing risk assessment (apart for some specific jobs such as milker)

CRITICAL HEALTH AND SAFETY ISSUES

Projects running at ICRH

- Upper limbs overload in cow milkers
- Noise risk in agriculture
- Pesticides risks assessment: exposure and risk profiles
- Hepatitis E and other biological risks in agriculture and animal breeding
- Immune system and animal breeding
- Migrants’ access to occupational health care

OHS RESEARCH, OUTREACH AND OTHER PROJECTS IN THE REGION

- Pesticides and other agrochemicals (several projects running in EU: early effects; exposure; biological monitoring; modeling of exposure and risk…)
- Organic gases (ammonia; VOC)
- Organic Dusts: allergic alveolitis; toxic respiratory syndrome (Germany)
- Biological risk (the example of TB) – EFSA projects
- The “One Health Approach”
- Muscle - skeletal diseases (Germany – Italy)

Several projects addressed at food safety and nutrition

THANK YOU FOR YOUR ATTENTION!

ICRH STAFF

- Gabri Brambilla Director, MD U.O.C. Occupational Health San Paolo Hospital, Milan
- Claudio Colosio, MD, PhD. Department of Health Sciences of the University of Milan and Scientific coordinator of the International Centre for Rural Health
- Maryam Sokooti, MD – Chemical and biological risk assessment
- Ramin Tabibi, PhD – Biological risk assessment
- Massimiliano Mazzi, Occupational Nurse
- Stefan Mandic-Rajcevic, MD, PhD student – Chemical risk assessment
- Gaia Varischi, MD - Physical risk assessment, Health Surveillance of workers
- Federico Rubino, Chemist - Chemical risk assessment
- Giorgio Vianello, Laboratory technician - Chemical risk assessment
- Emanuela Bossi, Student of Medicine and Surgery - Ergonomic risk
- Federica Masci, Prevention Technical, PhD student - Ergonomic risk
REFERENCES

4) Global Agricultural Information Network (GAIN) REPORT NUMBER: PL1218 DAIRY AND PRODUCTS-ANNUAL
6) News Coldiretti n. 237 – 03/05/2013 Provincial Federation Coldiretti Brescia (http://www.brescia.coldiretti.it/lattesito-Istinen.pdf)
8) Masci F., Somaruga C., Colosio - “Foreign workers in the agriculture sector in Italy” PAPERS OF SECURITY AIFOS N. 3 – Year 3rd September 2012 (in Italian)
Health & Safety in California Dairies
IDRC Meeting, Fort Collins, CO July, 2013

Marc Schenker MD, MPH
Western Center for Ag Health & Safety
UC Davis

California produces 21.3% of U.S. milk supply.

Graph 5. Percent of United States Milk Production - Top 10 States: 2009

Trend in Dairy Number and Average Herd Size in California 2008-2012

Main Pooled Milk Products in CA

The mean annual income per dairy farm in California was $151,000 in 2013
Work Force Characteristics
17,000 dairy workers in California (2010). Avg wage $10.16/hour

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (%)</th>
<th>Range / Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>95+%</td>
<td></td>
</tr>
<tr>
<td>Latino (%)</td>
<td>88 - 94</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>33 - 36</td>
<td>18 - 70</td>
</tr>
<tr>
<td>Length of employment at current dairy</td>
<td>6.6 yr</td>
<td>2 weeks – 40 yr</td>
</tr>
<tr>
<td>Years working on any Dairy</td>
<td>9.0 (median = 6)</td>
<td>1 week - 49 yr</td>
</tr>
<tr>
<td>Education (% ≤ 6th grade)</td>
<td>54.1 %</td>
<td>4 % had no formal education</td>
</tr>
<tr>
<td>Immigrant (% immigrated)</td>
<td>98%</td>
<td>Mean yr USA 11.6yr</td>
</tr>
</tbody>
</table>

Health and Safety Laws Pertaining to Dairies in the California Code of Regulations

- All California employers are required to provide health and safety training to all of their employees. The broadest training requirements fall under Cal/OSHA’s Injury and Illness Prevention Program (IIPP) standard (required under California Labor Code -Section 6401.7. http://www.dir.ca.gov/Title8/3203.html
- Also the Cal/OSHA’s Hazard Communication standard, which requires training on any chemicals to which employees may be exposed.
- Cal/OSHA requires training for other specific standards, such as fall protection, forklifts, heat illness and hearing protection. www.dir.ca.gov/dosh/dosh_publications/TrainingReq.htm

Fatal livestock accident at Southern CA dairy June 15, 2013
Cal/OSHA is investigating the death of an Ontario dairy worker who was crushed to death on June 15, 2013 while moving cows into a feeding area. The employee was crushed between a gate and fence by the cows in the early morning hours, and died from severe internal injuries. Cal/OSHA officials have reported that the dairy is cooperating, and has a clean safety record. The dairy continues to operate as the investigation continues.
By Anthony P. Raimondo
http://www.westernuniteddairymen.com

Health and Safety
Most Common Cal-OSHA violations (2012) in decreasing order of frequency:
1] No written and active IIPP (Injury Illness Prevention Program, workers should be trained on it and know where to find it).
2] No written and active HIPP (Heat Illness Prevention Program)
3] Inadequate employee washing and toilet facilities.
4] Electrical fixtures as electrical boxes and circuit breakers missing insulation or not properly labeled.
5] Inadequate sanitary and accessible first aid supplies.
6] Not reporting (within 8 hr) serious injury or death to OSHA.
7] Not training @ hazardous materials and protective devices, or not maintaining safety data sheet binders with up to date information.
Outreach and Research of Western Center for Ag Health & Safety

• Ongoing outreach programs, focusing on immigrant farmworkers.
  – Telenovela
  – Promotoras
• Respiratory health research studies (see pubs)
  – Exposure assessment
  – Toxicology
  – Epidemiology
• Heat illness prevention
  – Research
  – Outreach

Heat Illness Prevention and other resources

California employers are required to take these four steps to prevent heat illness:

1. Training
   Train all employees and supervisors about heat illness prevention.

2. Water
   Provide enough fresh water so that each employee can drink at least 1 quart per hour, and encourage them to do so.

3. Shade
   Provide access to shade and encourage employees to take a cool-down rest in the shade for at least 5 minutes. They should not cool down until they feel cool to the bone.

4. Planning
   Develop and implement written procedures for complying with the Cal/OSHA Heat Illness Prevention Standard.

Recursos de Seguridad y Salud Ocupacional Western Center for Agricultural Health & Safety (WCAHS):

Manual de Seguridad y Salud Ocupacional (Spanish)

http://www.dir.ca.gov/dosh/heatillnessinfo.html

Thank You!
Dairy in the Midwest

Midwest Farm Demographics

- Dairy Herd Size - typical size (head of cattle)
- Midwest Farm Operator Characteristics

Milk Cow Density

Milk Cow Density - >200 head
Milk Cow Density: 2002 – 2007 change

Dairy – Midwest Farms

Milking Robots

Growth of Robotic Milking in Michigan

Farm Operator Demographics
US Farm Operator Characteristics

- Operators
- Sex of operator male
- Sex of operator female
- Race of operator
- Primary occupation farming
- Place of residence on farm operated
- Some days worked off farm
- 2 years or less on present operation
- 5 years or more on present operation
- Age under 45 years
- Age 45-64
- Age 65 years and over
- Average age

Average Age Farmers

Latino Farmers

White Operators

U.S. Farm Wage Rate Quarterly Data

Hired Labor >150 days
Occupational Health and Safety Training - Midwest

- National Farm Medicine Center, Marshfield, WI
- Great Plains Center Agricultural Health and Safety, University of Iowa
  - MS, PhD, Ag Health and Safety, IH, Ergo, Occ Med
- Iowa Center for Agricultural Health and Safety
- Agrisafe Clinic Networks, National
- Ag Center Nebraska

Ag/Rural Health and Safety Issues - Midwest

- **Matt N’s Opinion - Midwest**
  - Fatalities and injuries (rates are high, overall numbers are low)
    - Machinery use
      - ATV
      - Other
    - Confined space
      - Grain
      - Manure
      - Animal handling
      - Exploding pig houses
      - Lung disease
      - Zoonoses

Top Dairy Health and Safety Issues

- **Matt N’s Opinion**
  - Fatalities and injuries due to safety
    - Machinery use
      - ATV
      - Other
    - Confined space
      - Animal handling
      - Grain Storage
      - Manure Storage
      - Milk Storage
    - Electrical safety
    - Ergonomics
    - Lung disease

Recent Work: Nonnenmann – Aerosol exposure and lung function among dairy parlor workers
Recent Work: National Farm Medicine Center - WI

- Developing a computer application which will assist clinicians and dairy operators to guide safe but efficient return to light duty for common workplace injuries.
- With the help of NASS developing a recurring survey based surveillance mechanism to attempt to identify the effect of changes in dairy production on injury rates in Wisconsin dairies.
- Working with the Migrant Clinicians Network to develop and test the efficacy of a “promotor” safety program in Wisconsin Dairies who employ Hispanic workers.
- Agricultural Safety Consulting provides onsite safety consultations and bilingual worker training to dairies in Wisconsin. We cover such topics as machine guarding, confined space, noise abatement, Hazcom, respirator and electrical safety.

References

- 2007 Ag Census
- NASS 2013
- Matt Kiefer

Thanks!

Questions?
Milk Production

Milk Cows

“Small” Farms

“Medium” Farms
Milk Production County Level

- 1,742 US counties sold milk
  - 11 of these counties produced 25% of US milk
    - AZ, CA, NM WA & PA
  - 80% of US milk comes from 10,000 largest farms
  - 50% comes from 2,500 largest farms
Cow Production by Farm Size

Top 5 States Milk per Cow

1. New Mexico 24,854
2. Washington 23,727
3. Arizona 23,468
4. California 23,438
5. Colorado 23,430

Average US milk per Cow: 21,345

Source: 2011 Milk Production Report, USDA (Feb 2012)

Robert Hagevoort, PhD
New Mexico State University
Dairy Extension Specialist

Texas

- State ranking in production: 6th
- Number of milking herds: 590 (15th nationally)
- Production: 9.5 million pounds annually (+8.5% from 2010)
- Milk cows: 431,000 (7th nationally)
- Milk per cow: 22,232 lbs annually (9th nationally)
- Mean herd size: 731 (9th nationally)
- Percentage of state total farm receipts: 8%

New Mexico

- State ranking in production: 9th
- Number of milking herds: 140 (31st nationally)
- Production: 8.2 million pounds annually (+3.8% from 2010)
- Milk cows: 329,000 (9th nationally)
- Milk per cow: 24,854 lbs annually (1st nationally)
- Mean herd size: 2,350 (1st nationally)
- Percentage of state total farm receipts: 13%
- Most production is in eastern half of the state along New Mexico-Texas border.

Colorado

- State ranking in production: 15th
- Number of milking herds: 130 (35th nationally)
- Production: 2.9 million pounds annually (+6.5% from 2010)
- Milk cows: 128,000 (18th nationally)
- Milk per cow: 23,430 lbs annually (5th nationally)
- Mean herd size: 985 (6th nationally)
- Percentage of state total farm receipts: 8%
- 85% of production is in Larimer, Morgan, and Weld counties

South Dakota

- State ranking in production: 21st
- Number of milking herds: 350 (21st nationally)
- Production: 1.9 million pounds annually (-.7% from 2010)
- Milk cows: 91,000 (23rd nationally)
- Milk per cow: 20,549 lbs annually (18th nationally)
- Mean herd size: 260 (16th nationally)
- Percentage of state total farm receipts: 4%
- Most production is along I-29 corridor in eastern part of state
Mountain West United State Update
Presented by David Douphrate

Utah
- State ranking in production: 22nd
- Number of milking herds: 240 (27th nationally)
- Production: 1.8 million pounds annually (+1.9% from 2010)
- Milk cows: 88,000 (24th nationally)
- Milk per cow: 21,068 lbs annually (11th nationally)
- Mean herd size: 367 (12th nationally)
- Percentage of state total farm receipts: 22%
- Almost all new construction has been rotary parlors
- No robotic milkers

North Dakota
- State ranking in production: 35th
- Number of milking herds: 145 (30th nationally)
- Production: 0.3 million pounds annually (-10.4% from 2010)
- Milk cows: 19,000 (34th nationally)
- Milk per cow: 18,105 lbs annually (34th nationally)
- Mean herd size: 131 (27th nationally)
- Percentage of state total farm receipts: .9%
- No farms over 1100 cows
- Average age of operator is approaching retirement age
- Robotic milking has grown in popularity

Dairy Industry Impact
Impact of a NM dairy farm
- 2,000 Cows
- 42 M lbs milk/year
- 36.4 M direct impact
- 116.6 M total impact
- 26.6 direct jobs
- 100 total jobs

Farm Ownership
93.4% of the dairies nation wide are family owned and family operated

Worker Characteristics
- Workers from Mexico, Central and South America
- Estimates:
  - 45% in WI
  - 50% in NY
  - 85-90% in CO
  - 94% in CA
  - 97% in TX, UT, NM, CO, SD

Distribution of Workers on Farm
- Milkers - 26
- Cow Feeders – 4
- Calf Feeders – 4
- Herdsmen – 5
- Mechanics – 3
- Office Staff – 2
- Truck Drivers – 2
- Farm Workers - 20

Source: ERS using data from USDA NASS, 2007 Census of Agriculture

Courtesy Gonzalez Dairy, Mesquite NM
Worker Characteristics

- Low education
  - (less than 15% graduation from high school)
- Only 39% (WI) having worked in agriculture in home country
- Limited English language proficiency
- High likelihood of limited health literacy

Current Situation

- Larger dairies employ more people – app. 1 per 80-100 cows
- No longer just family labor
- Employees are from different cultural/linguistic backgrounds
- Limited/unknown education/training pertaining to position
- May not be familiar working with/around animals
- Employment not based on skills but on willingness to perform
- Owners/managers are no longer managing cows...

Issues & Challenges

- Immigration
- Labor management
  - Workforce: low literacy, non-English speaking
- Increasing regulatory challenges (environmental & worker safety)
- Low and fluctuating milk prices
- High feed costs
- Limited farm credit

Research & Outreach

- Research
  - Analysis of workers’ compensation claims data among dairy workers (completed)
  - Epidemiological study of musculoskeletal symptoms among parlor workers (completed)
  - Bioaerosol exposures and models of human responses in dairies and cattle feedlots (current)
  - Ergonomic exposure assessment and intervention analysis in large herd milking parlors (current)
  - Enhancing safety training effectiveness in large herd dairy production (current)
  - Exploring shed antimicrobial exposures with high plains livestock operations (Fall 2013)
  - Safety leadership and management practices on large herd dairy farms (completed)
- Outreach
  - Safety training DVDs (English and Spanish)
  - Monthly safety article in Progressive Dairyman E-newsletter (7 articles this year)
  - On-the-farm OSHA trainings
  - Numerous producer and academic conference presentations
International Dairy Research Consortium

FEEDBACK ON VOTING FROM 4 GAP TOPICS:
- IMMIGRANT WORKFORCE
- STANDARDIZED METHODS & APPROACHES
- INTERVENTIONS
- GLOBAL AREAS

Topic 1: IMMIGRANT WORKFORCE
- Management commitment & training to safety culture (24 votes)
  - Develop protocols, include middle management
- Develop protocols for safe work practice (21 votes)
  - A model OHIMS & show to be profitable
- Require culturally sensitive training (20 votes)
  - Refer to other industries for model safety culture
- Develop a worker safety or a “healthy worker” certification (16 votes)
  - To go along with animal welfare certification

Topic 2: STANDARDIZED METHODS & APPROACHES
- Prioritize environmental/physiological surveillance measures (32 votes)
  - Accurate measurement of denominator
  - Environmental monitoring
- Put together stakeholder group within IDRC to compare international protocols (21 votes)
  - Standardization of terminology/definitions that are worldwide
- Work process risk analysis (18 votes)
  - Track “near misses” and deviations from protocol
- Utilize an uniform survey tool (17 votes)
  - Draw on internationally recognized instruments
  - Include EU

Topic 3: INTERVENTIONS
- Develop interventions which focus on changing culture in the workplace (35 votes)
  - Address difference between “thinking” and “doing”
  - Involve workers and owners in developing solutions
  - Involve management
  - Empower natural leaders
- Create trans-disciplinary teams to identify risks/plan interventions (31 votes)
  - Develop model risk maps for dairies
  - Utilize experience of other industries
- Relate interventions to business profitability (20 votes)
  - E.g. National Milk Producers Federation
  - Address responsible management
  - Examine customer values

Topic 4: GLOBAL AREAS
- IDRC needs to identify partners to collaborate with (44 votes)
  - Dairy organizations, producers
  - International organizations
  - Funding sources (lending/banking, agencies, OIE, WHO/ WONGA/ICOH/USAID/IFG, insurance, rotary club)
- Document Best Practices & Innovations (18 votes)
  - “One Health”
  - Basic occupational health services
- Awareness of international differences (14 votes)
  - Need to feed 9 billion by 2050
  - Hand milking vs. robotic milking
  - Lack of surveillance
  - Increasing immigrant workforce
  - Safety and quality of milk supply
The discussion group topics were selected because they were identified in the special dairy issue of the *Journal of Agromedicine* (July 2013) as areas of need for health and safety in the dairy industry. The four topics were 1) immigrant workforce, 2) standardizing methods/approaches and definitions 3) interventions 4) global trends. The attendees were randomly divided into 3-4 tables to discuss the selected topic. At each table there was a note-taker who summarized the discussion and shared it with the larger group. These notes are below.

**Topic 1-Immigrant Workforce**

**Green Team**

- How to improve health and safety of the immigrant workforce
  - More appropriate question: “how do you ‘engage’ immigrant workforce?” (1 vote)
  - Safety is a concern for all workers
    - Health issues need to be addressed with immigrants
  - Improve safety culture starting with management
  - Supervisors need to remind workers of safety practices and protocols
    - Implement video protocols to remove language barrier
  - Need for system that ties safety into other things happening on the farm
    - Improve profitability
    - Streamline processes
  - Use OHSMS as a tool to help improve safety culture (8 votes)
  - Develop a model OHSMS and show it to be profitable (13 votes)

- Core info for risk management systems
  - Create protocols for how to do the job (3 votes)
  - Place emphasis on hygiene
    - Animal & personal hygiene
  - Address mental health & familiar issues
    - Communicate that they should be safe for their families to encourage safe practices (4 votes)
      - Some dairies wear their family’s pictures on their ID badge as a reminder to be safe for family
    - Encourage safe practices for colleagues
    - Provide support for substance abuse (1 vote)
    - Create a sense of “family” among employees
  - Instill a commitment for safety and “lead by demonstration” mentality from the management team

- Partner with organizations on immigrant health issues
  - Salud
- World Health Organization
  - Help monitor zoonotic diseases, specifically for animals being brought into the U.S. (1 vote)
- Health screening methods for both animal and humans (4 votes)
- How to engage the highly educated fraction
  - Position people coming in as an authority
    - There is a hierarchy among immigrant cultures, especially Latino
    - Workers want a resource directly above them
- Stress and psychological issues (9 votes)
  - Address from farm culture aspect
  - Set an example from the top down
  - All workers must be regarded as equal regardless of gender/culture/ethnicity/race/etc.
    - Women are becoming more and more prevalent dairy workers
- Provide support for mental health
  - Mental health affects work practices
    - Many are worried about families they left behind
    - Fear of getting injured and losing income
  - Safety is affected by stress
  - Many employees may be in a new environment and away from their families

**Team Pink**
- Characterize the workforce
  - Population
  - Culture
  - Gender
  - Education level
- Develop metrics for “improvement” (2 votes)
- Use other industries with experience working with immigrant workforce to create a model of developing a safety culture (10 votes)
- Tie workforce safety to profitability
- Study model of animal welfare certification (FARM) to develop worker safety or “healthy worker” certification (16 votes)
  - If DFA promotes, the dairy industry will buy into it

**Team Red**
- How to improve health and safety of immigrant workforce
  - Understand what we are working with
    - Relatively low education levels
    - Low experience levels with dominant culture and education in general
- Communication barriers
  - Work permits need to be implemented (identified persons) (5 votes)
  - Make sure the cultural language is appropriate for health and safety training material
  - Emphasize communication and understanding
- How can we partner with immigrant health organizations
  - Identify the relevant groups
- What core info is needed to develop culturally appropriate risk management systems for dairy industry
  - Instill safe work practices through protocols (13 votes)
- Can we encourage the highly educated fraction among immigrant workers in dairy health and safety programs
  - Yes, through leadership and supervision positions (1 vote)
  - Credentials are different from countries-can disempower workers
    - Ex: Someone may be a registered veterinarian in their culture, but come into the United States at the “bottom of the food chain”
  - Particular sensitivity at managerial level

Team Yellow
- How can we improve the health and safety of the immigrant workforce in the dairy industry?
  - Effective leadership
    - Top management commitment needs to be committed to a safety culture (3 votes)
    - Training of middle management and support (18 votes)
    - Provide a constant and consistent message throughout all levels of dairy
  - Scare tactics
    - Discuss incidents—“it could happen to you”
  - Require culturally sensitive training for all workers (10 votes)
    - Provide at arrival
  - Mandatory health and safety training
    - Mandatory in California, but not all states; would be a good goal to work toward
  - Training grants
    - Ex: OSHA grants
- Partnerships with: (2 votes)
  - Vendors
  - Producer/industry associations
  - Universities
  - Community organizations (ex: local church)
    - Important to engage the community, many of these organizations are well trusted at the community level
- Core information needed to develop culturally appropriate risk management
  - Risk identification (2 votes)
- Can we engage highly educated fraction?
Instead of focusing on the highly educated fraction, we should focus on individuals on the dairy with leadership skills, and nurture and develop those skills (2 votes)

**Topic 2—Standardized methods and approaches, similar definitions**

**Team Yellow**
- How to standardize methods and approaches
  - Collaborate on case definitions for injuries/diseases; Incidence density (denominators are difficult to determine)
    - Counting people vs. people time
      - Difficult to count both, especially people-time because many farmers are self-employed, and it is nearly impossible to determine hours worked
    - “Recordability” requirements (OSHA style) (1 vote)
    - Track “near misses” or deviations from protocols (9 votes)
    - Difficulty: including self-employed farmer
    - Random sampling strategy
    - Active search of cases via hospital discharge or E.R. records (1 vote)
    - Target insurance company databases including WCP insurance (4 votes)
    - Get “enough” data to identify risks for prevention/intervention
    - Collect primary data through uniform survey tool specific to dairy (2 votes)
    - Include E.U. in survey (4 votes)
      - Employ ICD-10 or E.U. codification system
    - Environmental monitoring or surveillance (9 votes)
      - Ex: aerosols/particles/IOM samplers
      - Focus on inhalable fraction if possible
  - Ergonomics changing
  - Must prioritize other environmental/physiological surveillance measures (12 votes)
    - Ex: heat indices, noise/audiometry/spirometry/pesticides/lighting

**Team Pink**
- How to standardize methods and approaches
  - Standardization of terminology/definitions that would be relevant worldwide (6 votes)
    - Output instruments for use in IDRC project
  - Put together stakeholder group within IDRC to compare internationally (15 votes)
    - Develop protocols for:
      - Compensation data
      - Health data
      - Farm demographics
• Exposure data collection
• “reinterpretation” of national docs in IDRC language
  o Draw on “internationally” recognized instruments (11 votes)
    ▪ Examples: WHO, JLO, JSO, DEN, CEN

**Team Green**

• How to standardize methods and approaches
  o Accurate measurement of denominator (demographics) (11 votes)
  o Have the dairy industry itself conduct surveillance (7 votes)
    ▪ Third party audits have become a big driver to make the dairies participate
    ▪ Co-op with customers as an incentive to engage producers
    ▪ Instill a sense of social responsibilities in producers
      ▪ Ex: Safeway, Walmart
  o Process risk analysis (9 votes)
  o Incorporate in OHS management systems and quality management systems (2 votes)
  o Metrics
    ▪ Leading indicators, behaviors
    ▪ Identify hazards and formulate responses
  o Facilities-used as accepted indicators of animal health/welfare (3 votes)
    ▪ Align animal welfare third party audit program with worker health and safety
    ▪ Need to evaluate value and predictive ability through surveillance
    ▪ Use somatic cell counts as a metric
      ▪ Correlate with OHS
      ▪ Build on this by measuring behaviors of workers and supervisors (1 vote)
      ▪ Document middle managers; provide positive AND negative reinforcement
      ▪ Evaluate job performance over time

**Topic 3—Interventions**

**Team Green**

• Interventions
  o Training
  o Engineering-ventilation, machinery, ROPs
  o Legislative
  o PPE
  o Management systems (5 votes)
  o Addressing the difference between “thinking and doing” (8 votes)
    ▪ Combining the ideas between academia and practice with evaluation and disseminating information
  o Relate interventions to business profitability (6 votes)
- Look at customer values
  - Industry ownership (2 votes)
  - Evaluate intervention on all aspects and widely disseminate
    - ATV
    - Respiratory health
    - Management systems
  - Develop model risk maps for dairies (15 votes)

**Team Pink**

- Interventions currently being used
  - Insurance rates (2 votes)
  - Company safety checklists (ex: safety world)
  - Employee well-being (2 votes)
  - Health screenings (ex: Salud)
  - Training
    - Employee based safety committee
      - Disseminate to employee’s monthly
      - May not be present on many farms
  - The “3 E’s”
    - Enforcement
    - Engineering
    - Education
  - National Milk Producer’s Federation (Farmers Assuring Responsible Management) (9 votes)
    - Used in 60-70% of U.S. farms
  - Tools to assess hazards on farms that are Customizable (1 vote)

**Team Yellow**

- Interventions
  - Important to focus on mid-level leadership
  - Interventions should focus on empowerment of leadership (2 votes)
  - Workers have to come up with the solutions (6 votes)
  - Get inspiration from other industries (1 vote)
    - Ex: motor cross, construction
  - Interventions should focus on changing the culture (19 votes)
    - Use the power of role models
  - Make interventions in the whole group, but with a time delay in one group to be able to measure effect of intervention
    - Potential ethical obstacles against intervention studies
  - “Lean” dairy farms-a possibility to increase safety and productivity (3 votes)
Team Red

- Current/evidence based interventions
  - Dust suppression
  - Farmer education (3 votes)
    - Swedish Common Sense
    - DVDs (NM Extension)
  - Engineering solutions
    - Lock out/tag out
  - Ergonomic designs (1 vote)
    - Combine production with safety education
  - Employee education
  - Trans-disciplinary teams
- How can we share and create evidence-based interventions?
  - Trans-disciplinary teams to identify risks and plan interventions (16 votes)
  - Use traditional strategy
    - Admin
    - Engineering
    - PPE controls
    - Best practice management
  - “Culture of safety” (3 votes)
    - Top down tailgate meetings
- How to develop/evaluate interventions that cut across multiple aspects of dairy H&S
  - Econometric measures
  - Regulatory compliance measures/inspection (1 vote)
  - Insurance actuaries
  - Data collection which benefits producers
    - Measuring trusting relationships (extension model)
  - Define elements of safety and health management system (2 votes)

Topic 4—Global Areas

Team Red

- Global Trends
  - Increasing herd size
  - Increasing large farm model
    - Industrialization
- Needs in South America
  - Large farm management
  - Increased protein demands in developing nations
- Needs in Africa
• Small farm model persists (3 votes)

• Needs in Asia
  o Some large farms
  o Increase in India needed

• Identifying partners
  o Heifer International-DVM
  o Doctors without Borders-MD
  o IH without Borders-Eng (1 vote)
  o ICOH-MD
  o Peace Corps
  o United Nations
  o OIE-French WHO
  o Lending/banking partners (14 votes)
    ▪ Rabobank
    ▪ DeLaval
    ▪ Westfalia
  o Insurance
    ▪ Pinnacle
  o Funding agencies
    ▪ SIDA
    ▪ DANIDA
  o Rotary club
  o WHO health communities

Team Green

• Global Trends
  o Migrant work force (1 vote)
  o Organic agriculture products
  o Robotics for milking
    ▪ Automation of agriculture
    ▪ Changing needs for workforce skills
  o Needs in SA, India, Africa, Pacific Rim
    ▪ More demand for dairy protein
    ▪ Safety and quality of milk supply (13 votes)
      • Raw milk
      • Chemicals
      • Zoonotic disease
      • Foodborne disease
    ▪ Worker health and safety
  o Identifying partners
    ▪ International/regional occupational health organizations
    ▪ International dairy organizations
- Dairy cooperatives
  - Outreach
- International graduate programs (12 votes)

**Team Yellow**

- Emerging Markets
  - China, India, Brazil
- Global Trends
  - Bioenergy vs. feed
  - Food security/food safety
  - Mixing of people/cultures (quick)
  - Price fixing (corporate vs. private farms)
  - Animal well-being/welfare
  - Expanding global dairy market
    - No health and safety programs
    - We can provide examples/templates
  - Child/elderly labor exploitation
  - Use of obsolete pesticides in diary industry
- Foreign needs
  - Zero percent surveillance/no data (2 votes)
  - Limited training programs
  - Global coverage of occupational health
  - Enable medical professionals to incorporate occupational health in primary care
    - “One health” approach (10 votes)
  - Basic occupational health services
- Identifying partners (24 votes)
  - Country dairy organizations
  - Dairy centers
  - OIE, WHO, WONCA, ICOH, USAID, ILO
  - International collaborating partners
  - IDRC needs to identify potential partners
    - Small working groups?

**Team Pink**

- Global Trends
  - Robotic milking (3 votes)
  - Precision agriculture (3 votes)
  - Change in job duties/characteristics
  - Feeding 9 billion by 2050 (2 votes)
    - Changing producer and consumer markets
  - Increased herd size
  - Increased environmental/worker health regulations
• Emerging Markets
  o Increased demand for animal protein
  o Commonalities
    ▪ Technology needs knowledge and infrastructure
• Identifying partners
  o Follow up on new opportunities (4 votes)
  o Producers
  o Producer organizations/associations (7 votes)
  o Document best practices and innovations (8 votes)
  o Identify early adopters/key leaders (1 vote)