Worker Health and Safety on US Dairy Farms
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David I Doupahrate, PHD, MPT, MBA, CPE
University of Texas
School of Public Health
PRESENTATION

- US dairy industry overview
- Worker demographics
- Dairy farm processes & hazards
- Current research & outreach
OBJECTIVES

At the end of this session, participants will be able to:
1) summarize current production and workforce trends in the US dairy industry;
2) list at least 3 workplace hazards on dairy farms;
3) recall at least 3 current research efforts addressing health and safety among dairy workers;
4) recall 3 resources of information to address workplace health and safety on dairy farms.
US Dairy Industry
Farm Sustainability

Economic

Animal Welfare

Environment
Current Industry Trends

Graph 1. Dairy Operations 500+ Head - United States

Number

3,400
3,300
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500

1999
2001
2003
2005
2007
2009
Graph 3. Dairy Operations <500 Head - United States
U.S. Milk Productivity Quadrupled since 1944

Adapted from Capper et al. 2009
A story of efficiency...

25.6 million Cows  
117 billion lb Milk  
1944  
U.S. Dairy Cows

9.2 million Cows  
186 billion lb Milk  
2007  
U.S. Milk Production

Adapted from Capper et al. 2009
Milk Production vs. Milk Cow Inventory
Average Annual Inventory, US

Livestock Marketing Information Center
Data Source: USDA/NASS
Only 3% of dairies are 1,000 head or larger....
But they produce 50% of the milk!

2011 US Dairy Production by Farm Size

Source: USDA-NASS Farms, Land in Farms, and Livestock Operations 2011 Summary (Feb 2012)
U.S. Top 5 ï 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

Louisiana 12,889
Arkansas 11,833

Source: 2011 Milk Production Report, USDA (Feb 2012)
U.S. Top 5 Average cows per herd

1. New Mexico 2,350
2. Arizona 1,709
3. California 1,056
4. Idaho 1,005
5. Colorado 985

Average herd size in US: 179

Wisconsin 105
New York 112
Pennsylvania 75

Source: 2011 Milk Production Report, USDA (Feb 2012)
However: despite the size, and despite some of the stories; 

95% of the dairies nationwide are family owned and family operated.

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**Figure 7**  
NAICS dairy business organizations, 2002

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>0.5</td>
</tr>
<tr>
<td>Corporation</td>
<td>4.5</td>
</tr>
<tr>
<td>Partnership</td>
<td>13.9</td>
</tr>
<tr>
<td>Individual or family</td>
<td>81.1</td>
</tr>
</tbody>
</table>

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1 North American Industry Classification System (NAICS) is used by U.S. Census Bureau to estimate farm and farm-related employment.

9.0 million cows to produce current domestic and export needs?

- 90,000 dairies with 100 cows
- Or 9,000 dairies with 1,000 cows
- Or 900 dairies with 10,000 cows
So what has changed?

• Larger dairies employ more people – **approx. 1 worker 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...
Example

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

As herds grow in size, owners spend less time on farm work & more time managing employees.

Managers on expanding dairy farms struggle with the transition to human resource management (HRM).

WI producers who expanded farm operations experienced more difficulty and less satisfaction with HRM than other aspects of farm.

Due to lack of HRM training.
Worker Demographics
Hispanic Workforce

Workers from Mexico, Central and South America

Estimates:
- 50% in NY
- 85-90% in CO
- 92% in VT
- 94% in CA
- 97% in 34 dairies in UT, NM, CO, SD
Hispanic Workforce

- Low education (less than 15% graduation from high school)
- Only 39% (WI) having worked in agriculture in home country
Increased Risk for Injury & Fatalities

Davila et al:
Hispanic immigrant men in US with low English skills worked in occupations with significantly higher rates of fatal and non-fatal injuries and illness than US-born Hispanic, non-Hispanic black, and non-Hispanic white men.
Fatal injuries involving foreign-born workers, by country or region of birth, 2012

- Mexico: 39%
- Asia: 20%
- Central America, except Mexico: 13%
- Europe: 10%
- Caribbean: 7%
- South America: 4%
- Africa: 4%
- Canada: 2%
- Australia and Oceania: <1%

Total = 824

Workers born in Mexico accounted for the largest portion (39 percent) of foreign-born workers who died from work-related injuries in the United States in 2012.

Note: Percentages may not add to 100 due to rounding.
The 2012 total for fatal work injuries involving Hispanic or Latino workers was about the same as the total for 2011. Sixty-five percent of fatally-injured Hispanic or Latino workers in 2012 were born outside of the United States.

Note: Data from 2001 exclude fatal work injuries resulting from the September 11 terrorist attacks.
Increased Risk for Injury & Fatalities

Statistics show Latino and foreign-born workers in the US occupy lower-wage, higher-hazard jobs and sustain higher numbers of work-related injuries.

Lower education levels, illiteracy, and limited English proficiency increase the possibility of injury or death associated with higher risk occupations.
Communication

Maloney et al:
Surveyed NY dairy farms
Solving the language barrier is a great challenge since few Hispanic workers speak English
Dairy managers must understand cultural differences to avoid misunderstandings and interpersonal problems
Recommended the establishment of employment policies and carefully communicate them so employees understand employer expectations for worker conduct
Safety Behavior

A survey of dairy producers who employed Latino workers in a Midwest US state

Nearly two thirds rated 5 of 10 safety behaviors as of moderate, high, or extreme concern due to employees’ ability to read, write, or speak or understand English
Human Resource Management

HRM is a potential source of sustained competitive advantage for dairy farms.
Positive relationship found between Return on Equity and use of continued employee training.
HRM & Safety

Case study of MI dairy farms: only 1 farm had OSHA regulatory compliance as a HRM goal

Among 100 Australian dairy farms, only 39% had written farm health and safety plans
Safety Training

Inadequate safety education and instruction are two factors directly related to safety training which is compounded by a language barrier. Cultural, linguistic and attitude barriers should be addressed in safety trainings of foreign-born workers.
Dairy Farm Processes & Hazards
Investigations under way after man, 37, dies in farming accident

Victim in dairy farm accident identified; funeral is Wednesday

Worker Dies After Being Crushed by Cows at Ontario Dairy

Marietta man, 41, who was killed in grain truck accident worked at farm for decades

Man dies in manure pit on Spafford dairy farm

Man killed in accident on Surrey dairy farm

Calif. man fatally crushed by cows at dairy farm

Father of 5 killed in farm accident

Man, 2 Sons Found Dead In Maryland Dairy Farm's Manure Pit
Number and rate of fatal occupational injuries, by industry sector, 2012

Construction had the highest count of fatal injuries in 2012, but the agriculture, forestry, fishing and hunting sector had the highest fatal work injury rate.

Note: All industries shown are private with the exception of government, which includes fatal injuries to workers employed by governmental organizations regardless of industry. Fatal injury rates exclude workers under the age of 16 years, volunteers, and resident military. The number of fatal work injuries represents total published fatal injuries before the exclusions. For additional information on the fatal work injury rate methodology, please see http://www.bls.gov/iif/cshnotic10.htm.

Number and rate of fatal occupational injuries, by major occupation group, 2012

Although transportation and material moving occupations had the highest number of fatal work injuries in 2012, the major occupational group with the highest fatal work injury rate was farming, fishing, and forestry.

Note: Fatal injury rates exclude workers under the age of 16 years, volunteers, and resident military. The number of fatal work injuries represents total published fatal injuries before the exclusions. For additional information on the fatal work injury rate methodology, please see http://www.bls.gov/iif/oshnotice10.htm.
Incidence rates and numbers of nonfatal occupational injuries and illnesses by private industry sector, 2012

Agriculture, forestry, fishing and hunting 5.5 49.4 494 621.1
Transportation and warehousing 4.9 195.8
Health care and social assistance 4.8 502.8
Arts, entertainment, and recreation 4.6 55.4
Manufacturing 4.3 280.5
Retail trade 4.0 438.6
Accommodation and food services 3.8 183.2
Construction 3.7 176.0
Wholesale trade 3.3
Real estate and rental and leasing 2.9 48.5
Administrative and waste services 2.8 128.6
Utilities 2.8
Other services (except public administration) 2.5 72.7
Mining 2.1 17.8
Educational services 1.9 34.3
Information 1.4 34.9
Management of companies and enterprises 1.1 20.0
Professional and technical services 0.9 64.7
Finance and insurance 0.7 37.3

Three sectors alone—health care and social assistance, manufacturing, and retail trade—combined to account for more than half of all cases reported among private industry establishments in 2012. Health care and social assistance reported more cases than any other private industry sector in 2012.
As in 2011, more injury cases were reported in 2012 in health care and social assistance than in any other private industry sector—585,000 cases—and accounted for 20.7 percent of all injury cases reported among private industry workplaces.
Incidence rates and numbers of nonfatal occupational illnesses by private industry sector, 2012

Employers in manufacturing and health care and social assistance together reported more than half—52.8 percent—of all private industry illness cases in 2012. The number of illness cases in manufacturing was highest among all private industry sectors.
* Agriculture, forestry, fishing and hunting was one of only two private industry sectors to experience an increase in the rate of injuries and illnesses in 2011 compared to 2010, driven by increases in cases in both the crop production and animal production (primarily dairy cattle and milk production) industries. The rate of injuries and illnesses for the accommodation and food services sector also rose in 2011, driven largely by an increase in other recordable cases in both limited-service restaurants and full-service restaurants.
Purpose. The purpose of this Notice is to establish a Local Emphasis Program (LEP) for programmed inspections of establishments within the dairy farming industry having operations classified as dairy cattle and milk production under the North American Industry Classification System (NAICS) code 112120, in accordance with the provisions of OSHA Instruction Number CPL 04-00-001, Procedures for Approval of Local Emphasis Programs (LEPs).

Scope. The Notice applies to the jurisdictional area of all Federal Area Offices of the Occupational Safety and Health Administration in the State of Wisconsin. Inspections will focus on the common hazardous dairy farm activities (discussed in this LEP) which are conducted by farm employees. Inspections conducted under this LEP will normally be classified as comprehensive safety inspections.
First inspections took place in January 2012
Goal to complete 30 inspections
Of the 15 inspections that actually took place, only two dairies were found in compliance.
WI Dairy Dozen

- Manure storage (confined space)
- Dairy bull & cow behavior/worker positioning
- Electrical systems
- Skid steer loader operation
- Tractor operation
- Guard power take-offs (PTOs)
**WI Dairy Dozen**

- Guarding of other power transmission and functional components (grain storage facilities)
- Hazardous energy control while performing service and maintenance on equipment (lockout/tagout)
- Hazard communication (60% of farms had violation in this area)
- Confined space (need placards for confined space)
- Horizontal bunker silos (Silo Association)
- Noise (currently national emphasis program)
WI LEP Renewed for 2nd Year
I. Purpose

The purpose of this Notice is to establish a Local Emphasis Program (LEP) for programmed inspections of establishments within the dairy farming industry having operations classified as dairy cattle and milk production under the North American Industry classification System (NAICS) code 11212, in accordance with the provisions of OSHA Instruction Number CPL 04-00-001, Procedures for Approval of Local Emphasis Programs (LEPs).

II. Scope

The Notice applies to the jurisdictional area of the Buffalo, Syracuse and Albany Area Offices of the Occupational Safety and Health Administration in the State of New York. Inspections will focus on the common hazardous dairy farm activities (discussed in this LEP) which are conducted by farm employees. Inspections conducted under this LEP will normally be classified as comprehensive safety inspections.
Silage Safety
Manure Storage
Animal Handling
Current Research & Outreach
High Plain and Intermountain Center for Agricultural Health and Safety (HICAHS), Colorado St University

- Parlor ergonomics
- Worker performance
- Dairy equipment
- Respiratory exposures
- Safety management and leadership
- Human resource management
- Worker training
Prevalence of Work-Related Musculoskeletal Symptoms Among US Large-Herd Dairy Parlor Workers

David I. Douprrate, PhD, MPT, MBA, 1* David Gimeno, PhD, 1 Matthew W. Nonnenmann, PhD, CIH, 2 Robert Hagevoort, PhD, 3 Cecilia Rosas-Goulart, MVZ, 4 and John C. Rosecrance, PhD 5

Methods

• 4-year project
• Nordic Musculoskeletal Symptom Survey
• Bilingual researcher
• Administered on-site
• n=452
• 89.4% male
• 97.1% Latino
• 40.7% >8 hrs per day
Results

85% kicked by cow (30% in wrist/hand)

Job related pain:
- 76% any body part
- 47% feet
- 42% upper back
- 40% shoulder
- 36% wrist
- 29% low back
- 25% neck
- 24% knee
- 19% elbow
- 19% hip
Parlor Configuration
Differences in Parlor Configuration

**Rotary**: higher MSS prevalences in neck, upper back, shoulders, hips, thighs, and knees

**Parallel**: higher MSS prevalences in elbows

**Herringbone**: higher MSS prevalence in wrist/hand; higher prevalence of being kicked in upper extremity
Results

(0 = no problem, 10 = major problem)

ÅContinuing to work when injured or hurt 7.5
ÅHot, cold, wet, humid conditions 7.1
ÅWorking at or near your physical limits 5.8
ÅBending or twisting back in awkward way 5.7
ÅWorking in same position for long periods 5.6
ÅReaching or working overhead or away from body 5.2
ÅCarrying, lifting, or moving heavy materials or equipment 5.2
Current Study: Milking Parlor Ergonomics

- Physical exposure characterization
  - Muscle forces
  - Posture
  - Motion
  - Rest
  - Physiological workload

- Intervention analysis
  - Milking equipment (milking cluster, teat prep)
  - Parlor design (configuration, pit height)
  - Work organization (task rotation, cross-training)
Intervention:
Ergonomically Designed Milking Cluster

Southwest Regional Dairy Center
Tarleton St University (Texas)
Muscle force exposure comparison
Milker utility assessment
Intervention: Optimum Pit Height

Southwest Regional Dairy Center, Tarleton St University

Muscle force exposure comparison at varying pit heights
Intervention:
Cow Prep Tool

- Replaces 3 cow prep tasks: (dip, strip, wipe)
- Evaluation of muscle force exposure upper extremity
- Planned evaluation of tool redesign
Safety Training Considerations

- Traditional vs. modern training (fam. vs. external)
- Consistency & protocol development
- Assumptions about knowledge level
- Personality traits of the manager owner
- Train the Trainer – personality traits
- Level of Understanding (What vs. Why)
- Language and cultural barriers (I understand)
- Task specific and cross training (consistency)
- Training effectiveness evaluation
- Documentation
First step: Dairy Safety DVD

• Every employee (old & new) should be trained with this DVD!
• Well trained employees have high regard for:
  • Safety and well being of self
  • Safety and well being of others
  • Safety and well being of animals
• Program allows for dairy specific protocols
• Essential part of overall quality assurance program
• Raises awareness and presents guidelines
• Based on understanding animal behavior
• Menu option: English or Spanish
Training DVD – Part I – Going Viral!!

DVD I was distributed to producers in NM, TX, AZ and OK, and attendees of Western Dairy Management Conference in Reno (March 2011).

Have received app. 100 requests nationally and internationally from producers, veterinarians, allied industry and universities for DVD to be used for training.

IRC (International Refugee Committee) has requested permission to use and translate in additional languages including Burmese.
Step II
Dairy Employee Safety Training DVD – Part II
Release: 7-20-2012

Three specific areas:
• General & Outside Worker Safety
• Milker & Calf Caretaker Safety
• Feeder Safety
• English & Spanish
Step III
Development of a total training & safety resource:

On line dairy HRM:
- Training, certification & evaluation resources (videos),
- Technical videos (dehorning, treatment, calving, etc.),
- Instructions for safety interventions,
- On-line training and (re)-certification process,
- Cow-side hands-on instruction apps (I-pad),
- Documentation of training and cross-training (OSHA),
- Documentation of immigration status
- HR management including scheduling, payroll, etc.
- Opportunities for job performance evaluation
Safety Training Using Mobile Learning Technologies

• OSHA Susan Harwood Training Grant
• Delivery of safety content via mobile devices (iPads)
• Levels I, II, and III training effectiveness evaluation
Other Activities

- International Dairy Research Consortium
  - Researchers from 10+ countries dedicated to dairy worker health and safety research

- Safety articles in *Progressive Dairyman* (18 articles to date)
Contact Information

David Doupbrate, PhD, MPT, MBA, CPE
Assistant Professor
University of Texas
School of Public Health
San Antonio Regional Campus
7411 John Smith Drive, Suite 1100
San Antonio, TX 78229
David.I.Doupbrate@uth.tmc.edu
210-276-5505
Cell 970-980-8132
Questions