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* See Appendices
AGENDA
HICAHS Advisory Committee Meeting
February 29, 2008
Pathology Room 103

9:00 Welcome and Introductions
  Update on NIOSH – Reynolds
  Update on NAS Review – Gunderson
  Advisory Board – Constituents, Function, Chair
  Current HICAHS Projects – Rosecrance, Douphrate, Reynolds, Buchan

11:30 Lunch

12:30 Outreach/Website/Newsletter – Borges
  Pilot Projects – Hanneman
  Regional Meetings – Reynolds, Buchan
  Expanding HICAHS Support – Reynolds
  Future HICAHS Investigators – Reynolds

4:00 Adjourn
INTRODUCTIONS

Dr. Steve Reynolds welcomed the Advisory Committee members and HICAHS personnel in attendance, and circulated the meeting Agenda. He emphasized his hopes to establish how the Advisory Committee could be best organized and utilized in the future.

The following Advisory Committee members were in attendance: Paul Gunderson (former Ag Center Director), Dan Fahrenholtz (Greeley MD), Del Chase (Ag Studies Coordinator at Lamar Community College), Jeffrey Levin (Southwest Ag Center Director), Bob Ellis (CSU Professor), Doug Steele (Director of Montana Extension Services), Eric Esswein (Public Health Officer associated with the Denver and Cincinnati NIOSH offices), Mitch Anderson (Ag Land, Inc.), Nancy Schleining (Director of Member Services for Colorado Livestock Association), and Clyde Serna and Tom Levy (Pinnacol Colorado Workers’ Compensation Carrier).

In addition, the following HICAHS personnel attended the meeting: Darla Borges, Vicky Buchan, Roy Buchan (former HICAHS Director), Bob Seiz, Juhua Liu, Helen Holmqvist-Johnson, Rena Saito, John Mehaffy, Bill Hanneman, Bill Wailes, David Douphrate, Garrett O’Keefe, John Rosecrance and Angi Buchanan. Available for a portion of the meeting were: Peter Chen, Dave Gilkey, and Dennis Lamm.

NIOSH UPDATE

Steve Reynolds reviewed the agenda briefly, and updated the group on the current NIOSH ag program status. The current contact and head of extra-mural ag programs at NIOSH is Allen Robison. NIOSH is struggling with funding, with only $9 million of budgeting allocated to ag being distributed to NIOSH and 17% of the ag support going to the CDC as indirect. Ag Center Directors have questioned where the additional ag funding has been consumed. Due to the reduced monetary allocation, only 10% of grants applied for have been funded, rather than the previous 20%.

This lack of funding has affected the ability to pursue activities outside the Centers. The NIOSH Education Research Centers (ERCs) and Ag Centers are congressionally mandated and therefore somewhat protected from these budget cuts. However, fewer HICAHS proposed projects have been funded, and two project reviews have been contested, but no response has been received from NIOSH about these challenges. NIOSH has expanded its presence in the west with a satellite office in Denver.

Eric Esswein elaborated that NIOSH and the Public Health Department are increasing health hazard evaluations in the west with a new direction being promoted by the latest NIOSH Director. The unique needs regarding worker health and safety in the
west has been recognized, including issues in Washington and Alaska, such as mining and gas concerns. Max Keifer is managing the NIOSH Denver office and internal NIOSH ag programs, and contact with the remainder of NIOSH has been structured through him. At the newly formed Denver office, more hiring is underway. The current team of six senior members is currently in a state of flux, with additional hiring being done to respond to the 450 requests for services received last year.

Advantages

Steve Reynolds sees many possibilities for building partnerships among developing occupation health programs in Colorado, in the areas of industrial hygiene, occupational medicine, occupational health psychology, and health physics. A new ERC (the Mountain and Plains ERC) was established in Colorado a year ago, which offers continuing education, outreach and hopes to intersect with ag center activities. Several of our HICAHS faculty are members of the ERC, Steve Reynolds is the Deputy Director and Lee Newman at CU Denver is the Director. Focus on at-risk populations, including Hispanic and Native American workers, is of particular importance. While there is a large amount of activity in Colorado, expanding outside the state is also a goal.

When HICAHS received new funding, Colorado Senator Ken Salazar expressed an interest in the Center and offered his assistance. Steve Reynolds sees this as an opportunity to work more directly with political representatives and hopefully have more influence in steering the national agenda regarding rural and agricultural issues.

NATIONAL ACADEMY OF SCIENCES EVALUATION OF NIOSH

Paul Gunderson has led the recent National Academy of Sciences (NAS) review of NIOSH ag programs funded by the Center for Disease Control (CDC). The evaluation of mining occupations has been finalized, and the review of agricultural programs, including agriculture, fishing and forestry (AFF) has been essentially completed. Paul offered specific information concerning this evaluation process in a PowerPoint presentation (attached). There are reviews of six other divisions of occupational safety underway. These evaluations are funded directly by the federal government, with NAS as an independent agency. The scope of this review was to evaluate program relevance and impact. The full report is due out next month (March).

This was the first national review of NIOSH. The ag centers were initially funded in 1990, and centers were first contacted for input and historical data in November, 2006. The program review began in January, 2007. While the framework of the review was communicated before the evaluation, the panel looking at the ag programs took a more global approach, rather than concentrating on specific regions of the country. They looked at the types of people which their review affected, especially concentrating on the fact that these are generally outside workers. The evidence package submitted to the
NAS committee has been published on the internet at www.nap.edu. Of particular interest was testimony from producers, as well as energy and trade agreements.

Scoring was based on a five-point scale, with NIOSH scoring only a three. Congressional response noted a need to ascertain impact of the current programs. John Rosecrance asked if NIOSH funding was jeopardized by the low score, but Paul Gunderson did not believe that was an issue, noting that some congressional personnel were involved with the review. Steve Reynolds added that all national organizations supported directly by Congress are in need of funding. He recommended investigating resources outside of NIOSH, such as partners dealing with food safety issues for example.

Priorities

The main objective of the committee was to assess the NIOSH ag programs. Ag center priority was the third goal determined, and the fifth goal noted that center impact is muted without outreach funding. Much concern with the lack of surveillance was expressed. High priority was given to how resources were utilized. In the fishing industry, changes in programs were noted, including contact with Somalian workers. Forestry issues included increased use of contract laborers, and the rapid change in the industry with foreign trade agreements. Differences noted in ag business included industrialization and the preparation of fresh produce moving directly from the fields to market, rather than through processing plants.

In 2006, with the U.S. development of a global view related to the production of food and fiber fuels, all of the ag industry is seen as changing. The divergence of money will shape the future workforce, putting NIOSH on the cusp of an enormous opportunity to develop an agenda based on worker concerns.

Medium priorities determined by the NAS committee included the enormous implications of biofuels on the ag industry. For example, Paul noted that in 2000, most of the grain produced in North Dakota was exported. However, by 2007 virtually all grain was kept within the state. Specialized ag, currently 13%, is also rising quickly. 80% of the produce is harvested by 17% of farms growing bulk agricultural products. Livestock confinement issues are also an increasing concern. Equipment dangers have lessened in importance, with the use of automatic steering tractors by eight of ten producers. More tractors without ROPS are also being retired.

Low priorities identified are global warming effects on workers, such as violent weather, the effectiveness of personal protective equipment, and land grant institutions’ identification of molds and fungi moving to the north. Transportation of workers to and from the worksite, rather than living in housing on the farm, is increasing. Genetic moderation of respirable dust is also being studied.
Recommendations

Some of the NAS committee recommendations include fusing of regional Centers, and recognizing surveillance as a crucial necessity. Without proper surveillance, Congress cannot be shown evidence of the impact of progress, and this type of testimony is the most compelling influence for funding of future programs. National security is threatened without a healthy workforce. The NAS reviewers also support translation of research to end users (r2p), and saw the need for stakeholder involvement to assist in identifying regional needs.

Centers of Excellence, joining public and private partners are encouraged. A demonstration of knowledge of worksite or “real work” problems must also be exhibited.

Participant Input

Roy Buchan identified himself as a member of the NORA 2 counsel for NIOSH, and noted that while there has been little interaction with NAS, he observed a large amount of overlapping findings. The NORA 2 counsel is developing a strategic plan for NIOSH, identifying goals, objects and specific tasks required to achieve recommended aims. The NORA 2 counsel agrees that surveillance is necessary to target activities needing attention, in addition to documenting the impact of programs. Steve Reynolds added that a NORA meeting is being held in Denver in the end of July, and that the ERC is assisting in the organization of the meeting. HICAHS plans to follow-up with the ag sector meeting, and is encouraging participation by producers and partners as well as researchers. Doug Steele pointed out the need for program as well as philosophical surveillance, and recommended the troubles with surveillance issues be researched. Paul Gunderson added that R01 and R21 proposals should outline the necessity of surveillance, and emphasize this portion of the research. He further sees a need to revamp NIOSH, to limit surveillance of children and encourage a more substantial impact with adults and older workers. Risks for children are dropping with newer technologies and more worker families living in town and going to rural areas only for work. Partnering with the Department of Labor (DOL) to access their National Agricultural Survey System has been recommended. The forestry and fishing industries do not have this advantage, as there is no master roster of such workers, especially in the gulf coast regions, with the possible exception of IRS records. Steve Reynolds pointed out that recent Tractor Safety Initiative (TSI) projects found it extremely difficult to gain access to the DOL information. Paul Gunderson is aware of a NIOSH senior staff briefing, in which membership on the task force was identified as crucial, and USDA involvement essential.

Eric Esswein offered another example of surveillance problems with the Health Hazard Evaluation program, a part of the NAS review as well. This program also had no plan for review or documenting its outcomes. Showing
impact was not designated as part of the assignment, as the program was approached from a risk-based perspective. It has been difficult to determine lasting effects as there was no design to track such information, and it is the employers’ choice whether recommendations are implemented. John Rosecrance was pleased that the NAS recognized the difficulty a lack of surveillance has caused. Eric Esswein added that surveillance divisions have not been working with the Department of Health and Human Services (HHS), but that NIOSH has expressed a desire to combine these operations. With the NAS outcomes, he anticipates a realignment of programs to demonstrate positive outcomes, moving toward performance-based funding.

Doug Steele pointed out that the impact of educational and prevention projects cannot be measured, with the possible exception of behavior changes. Eric Esswein indicated an industry-wide study might reveal what had been accomplished, but agreed that measuring affects on chronic disease is more difficult, since innovations would not be withheld in order to measure effect. He compared this problem with the gas and oil industry, where hazards have been well-known, but improvements in health aspects have been difficult to determine. A long-term review is necessary. John Rosecrance believes that scientists tend to be isolationists, and appreciated the NAS stimulus to offer alternative approaches, including studies of global warming issues. He further suggested dealing with the effects of such things as rodents in farm worker housing. He believes by prioritizing the need for surveillance, bureau chiefs may be convinced of its importance. In addition, he hopes for a determination of how the 17% of agr-related funding going to the CDC is being applied towards pertinent studies. He expressed concern that political agendas may impede progress in these areas. Dave agreed that evaluation without a control group is difficult, and noted that historical appraisals cannot identify what specific factors contributed to any changes. He believes more funding is necessary from NIOSH and must be requested within an R01 proposal.

ADVISORY COMMITTEE STRUCTURE

Steve Reynolds asked for input as to how the Advisory Committee could be most effective. He pointed out that Center proposal reviewers commented negatively on the current Committee organization. One reviewer felt the current group was too large, causing difficulties in scheduling meetings, and saw a problem with the lack of organization and no designated chairperson. Steve Reynolds pointed out that the Texas (Southwest Center) Advisory Committee was much smaller and asked for Jeff Levin’s input on this issue. Jeff has found that regional representatives have been the goal at his Center, as well as determining the most effective and economical method of holding meetings. They have utilized some electronic meetings, conceding that it is not the equivalent to personal meetings, but adding that time issues become less of an obstacle. They have appointed a chairperson, generating a more cohesive and directed response mechanism. This allows Committee members to communicate through a spokesperson, who can also meet with administrators and PIs as needed.
Steve Reynolds offered that working with sub-groups at meetings in the past has provided great feedback. Paul Gunderson noted that the current Committee represents 12 producers or ag client service organizations, which he believes is a strong feature he would encourage maintaining. He suggested exploration of alternative methods to convene, and inclusion of organization counterparts in regional states outside of Colorado (i.e. Livestock Association, Workers’ Comp. carriers, etc.). Jeff sees the reviewers remarks as a “catch 22” situation, in keeping Committees small while achieving a good cross-section of representation. Doug recommended a brief description of expectations of Committee members would offer a better understanding of their role. He also suggested rotating terms and sub-committee gatherings outside of full group meetings. Steve Reynolds agreed that expectations should be clarified, and suggested following-up with more specifics. Garrett O’Keefe recommended that members in similar fields assist in facilitating partnerships.

Committee Expectations

Steve Reynolds would appreciate assistance with accomplishing a needs assessment and having the Committee members identify and prioritize important regional issues. He also asked for help in identifying potential partners, community connections and advice on building these relationships.

As future proposals are developed, the Committee’s input regarding the relevance of the direction being pursued both from a scientific as well as the distribution of knowledge achieved would be helpful. Vicky Buchan feels that in order to prioritize strategies and project proposals a larger group is needed. Likewise, pilot project proposals can be encouraged through Committee contacts. Jeff agreed that engaging the Advisory Committee in solicitation of proposals, as well as their review and judgment regarding the best use of the funding available would be useful. He further suggested using interns or students placed with organizations outside of Colorado to increase outreach efforts.

John Rosecrance feels the Advisory Committee could be of assistance by identifying how outreach can be most effectively accomplished. Steve Reynolds added that he recently presented at a Colorado Livestock Association meeting and learned that many members were unaware of the existence of HICAHS and what we might offer.

Terms of Committee service have generally coincided with the duration of grant funding, and Steve Reynolds asked if this time commitment was excessive. However, continuity on the Committee is critical. Vicky Buchan noted that many Committee members have served over several funding cycles, but she understands that members’ willingness to participate needs to be confirmed.
Issues

Issues to consider include an increase in outreach activity, especially outside Colorado. Partners in other states within the region are desirable. Committee identification of strategies to encourage pilot projects with PIs outside of Colorado would be appreciated. Bill Wailes believes that industrial cooperation informs HICAHS personnel regarding work being done, industry requirements and engages ag businesses in the process of project planning which could lead to funding within the industry related to a specific workforce. John Rosecrance believes businesses could also realize financial incentives. Committee guidance in approaching businesses and identifying the most effective stimulus would be helpful.

Dave sees the Committee input as vital in establishing priorities from competing areas and integrating plans, which can be a difficult task.

Meetings

Steve Reynolds asked for input regarding the frequency of Advisory Committee meeting, which have generally been conducted twice a year. He suggested using other forms of communication, adding that the Committee has assisted in planning research and providing guidance as to how it could be effectively applied in the workplace. Bob Ellis feels face-to-face discussions are generally the most productive, and Paul Gunderson suggested sub-committees meet electronically.

The Southwest Center has recently purchased the Elluminate system, which cost approximately $45,000, with a $1,600 per year maintenance agreement. Paul Gunderson feels this is a good communication instrument. Steve Reynolds has proposed that the School of Public Health purchase the program to coordinate the CSU, CU (University of Colorado - Denver) and UNC (University of Northern Colorado – Greeley) participation, but has not yet received a response.

Structure

The designation of a chairperson was discussed, but Steve Reynolds feels the current organization works well from the HICAHS perspective. A central contact from which specific information could be collected might be helpful. Paul Gunderson believes a chairperson could attend related meetings throughout the region. Doug Steele suggested a small executive committee which might be more available and most effective in carrying out Committee recommendations. Garrett agreed that an executive committee is more efficient, especially related to specific associations, such as producers. Paul Gunderson recommended instituting cohorts, with one representative from factions like insurance,
producers, extension, etc. Representatives from specific categories could be solicited for interest.

Dan Fahrenholtz recommended developing profiles of the Advisory members outlining their areas of expertise. Paul Gunderson added that a short description of their roles in ag areas would be helpful, and Jeff commented that members’ specific investment in ag health and safety would also be useful.
PROJECT UPDATES

Dairy Parlor Study

David Douphrate presented a PowerPoint (attached) on the Dairy Parlor study he is coordinating on with John Rosecrance. Notable abbreviations include: UE = upper extremity, MSS = muscular skeletal system. Focus groups were conducted with parlor workers. Jeff Levin asked about the survey mentioned, which was a questionnaire. John Rosecrance added that a structured interview was utilized with Spanish-speaking workers. Noa Roman-Muniz, a recent PhD graduate in the Veterinary college has assisted in translation for this study.

Dairy Endotoxin Exposure Study

Following lunch, Steve Reynolds offered a PowerPoint presentation related to his dairy study (attached). It was clarified that pre/post shift testing was performed on the same day and in the same timeframe. Steve Reynolds added that with the growth in the dairy industry, many owners have come to CSU for assistance in dealing with increased injuries in numerous new workers in the field. Nancy Schleining added that substantial employee turnover has caused concerns within the industry as well. Steve Reynolds noted the attempt to reflect the 50% turnover rate in data analysis. Del Chase asked if collaboration with the National Jewish Hospital has been considered. Steve Reynolds explained that he has indeed been working with National Jewish. He added that he has been pooling resources with California (Western Center) researchers and producers to conduct a parallel study of the dairy industry in California.

Translation and Social Marketing Study

John Rosecrance showed a brief PowerPoint presentation regarding his translation project (attached). Work on this interdisciplinary study is being coordinated with Garrett O’Keefe of the Communication and Technical Journalism department and Peter Chen, specializing in Occupational Health Psychology. John Rosecrance is currently searching for partners, and hopes the Advisory Committee can be of assistance in identifying groups to include in this project. He is not seeking any particular types of partners, but hopes to have community needs identified by focus groups. Eric asked about the amount of success there has been with social marketing dissemination of information. John Rosecrance responded that Peter and Garrett have past success with this type of dissemination. Steve Reynolds noted that while this is a new field, the recent TSI social marketing models were successful. Dave Gilkey added that social marketing has been determined the best approached on issues such as supplying information, associated costs, barriers and behavior change. Garrett explained that the social marketing model has been used for 25 years, and cited the HIV/aids campaign as an example. This model offers a clear structure and includes researching the audience prior to dissemination of information. John Rosecrance
added that communication readiness, as well as change agents, are being examined, and this approach appears to be the most effective method of information distribution.

4-H CD Development and Evaluation

Vicky Buchan explained her 4-H CD project, briefly demonstrating the first CD which has been produced. This interactive CD was developed over the last three years, with the five modules being identified as important areas of emphasis. It is currently being tested nationally in Kentucky (Southeast Center), New York (Northeast Center) and Texas (Southwest Center). It concentrates on knowledge gain and translation of knowledge to behavior change, and will be tested on over 350 children. Regional panels are assisting in determining the applicability of topics, from which a second CD will be created. Eventual goals for this project may include making individual modules available on the web and national dissemination through 4-H or other national organizations dealing with rural children. The first CD was tested in Montana and South Dakota, indicating increased knowledge. Behavioral changes will be examined in the current project through parent interviews. Vicky Buchan stated that a rigorous evaluation of educational projects has been called for in the literature. Following completion of testing, control groups were given access to the CD.

Outreach Activities

Darla Borges discussed outreach activities, demonstrating the newly updated HICAHS website. She asked that Committee members offer suggestions for other items to include on the website. She plans to publish noteworthy activities and accomplishments as they occur. She also demonstrated the Google analytics she has installed to precisely monitor website hits. Del Chase asked how the website is publicized, which Darla Borges has communicated through e-mails, and Steve Reynolds has announced at presentations he has made. Doug Steele recommended utilization of Extension listings and development of an accurate distribution list. He further suggested that Agents provide a link to the HICAHS website in their weekly columns in rural publications. Steve Reynolds asked about using key word references, a list of which Paul Gunderson understands is available through Google.

Additional outreach activities have included work with children at various youth-based fairs and similar events. She has worked with regional Extension Agents, supplying funding for continuation of educational projects, but no evaluation of this venture has been accomplished. She has experienced inconsistency in dealing with Extension Agents, partially due to decreased Extension funding, and loss of designated Safety Agents.

Past outreach activities performed by the Center included OSHA on-site consultations, attendance at farm safety day camps for children, work with
associations such as Colorado Corn and Onion Growers, and personal protective equipment trainings. Future plans include continuing work with producer organization, depending on financial support. She would like Committee input on where to pursue work with migrant and Native American populations in particular.

A quarterly newsletter was discussed, but Steve Reynolds feels newsletters may receive little attention. He is uncertain if such a publication is worth the time and effort required, based on limited resources. Jeff Levin noted that the Center-wide publication, Ag Connections is now dormant, agreeing that its usefulness is debatable. He agreed with the strategy of posting information on the website, and possibly including stakeholder findings as well. Paul Gunderson proposed promotion of the Center and website availability in key journals, such as Ag Enterprises; to more effectively apply the limited funding available. Nancy Schleining believes that publishing articles though other ag organizations’ newsletters might be more efficient than a Center newsletter. By providing a link to the website in these publications, Darla Borges believes a wider audience could be reached.

Other methods of creating awareness of HICAHS are needed and might be identified via a broader needs assessment. Use of the website to aide in a needs assessment was proposed.

Pilot Project Proposals

Bill Hanneman stated a call for proposal of pilot projects is complete, and asked the Committee’s assistance in encouraging relationships with target sectors and studies pertaining to them as well as promoting pilot project proposal submissions. Steve Reynolds envisions the translation projects as more population directed, with pilot projects aimed at scientists in hopes of their progressing to larger grant submissions. He acknowledged the difficulties in writing larger grant proposals, and having success measured by writing abilities rather than research value. An improved method of identifying people in the region (outside Colorado) is needed. Steve Reynolds hopes to foster partnerships with academics, Extension personnel and producers. He noted that the ERC is experiencing similar problems. Bill Hanneman suggested matching funds from partnering industries might be available. Paul Gunderson noted that acknowledgement of in-kind contributions is also helpful.

Bill Hanneman asked if target areas should be pursued, and John Rosecrance responded that injuries appear to be higher in the Hispanic worker population. Clyde Serna said specific group management is being pursued, as opposed to particular ag types Tom Levy added.
GENERAL DISCUSSION

Dairy Workers

Mitch Anderson inquired into the problem of new hires leaving the industry (i.e. dairy workers) after training, and Vicky Buchan wondered if this type of data was being tracked. Del (?) understands Pinnacol has ascertained that the average new hire leaves a position within 60-days to one year. Clyde Serna noted that Pinnacol is working to determine the affects of education and training on this statistic. Vicky Buchan feels there may be an opportunity for pre/post tracking of these workers. Dan Fahrenholtz asked what benefits there are to employers encouraging safety issues, such as insurance incentives. Steve Reynolds believes that by targeting new workers, employers will reap economic benefits, requiring less repeated training as well as fewer injuries. Dave Douphrate’s dissertation data may offer insight into hot spots to target.

Pilot Projects

Jeff Levin asked about the number and size of awards available. Steve Reynolds responded that three or four projects could be funded in the amount of $10,000 to $20,000 each, with the possibility of these projects being extended for over more than one year. Jeff agreed that one-year awards are difficult, as it often requires a good deal of time to obtain IRB or human subjects approval, leaving little time to accomplish proposed studies. He does feel this is a good opportunity for young investigators, who might be considered as the target audience. Keeping indirect costs minimized is also important. Steve Reynolds suggested the possibility of encouraging a cap on indirect constraints from institutions accepting these grants. He hopes to develop potential links through the Advisory Committee which can assist in connecting current needs and interests with available pilot funding, not necessarily related to current projects. Announcement of funding availability through rural healthcare providers and departments was recommended. Jeff also suggested connecting with graduate students or faculty outside of ag-related disciplines (e.g. college of business). Steve Reynolds advised that some animal science professionals have been granted pilot funding in the past. Paul Gunderson feels one issue of interest could be the loss of enterprise in both animal and grain production. John Rosecrance noted that healthcare issues are becoming more significant in the area of psychology, and associations with counterparts outside of CSU and the region could be encouraged. Eric asked if individuals could apply for pilot funding, and Steve Reynolds responded that any proposals would be considered, as long as a health and safety aspect is included in the research. Dan Fahrenholtz suggested brainstorming on possible pilot topics, and bringing those areas with the most interest to the Advisory Committee for review. Steve Reynolds would like the Advisory Committee input on proposals submitted for funding as well.
Insurance/Incentive Issues

Mitch Anderson asked about wellness programs related to ag insurance, and how underwriters might be engaged in considering such options. He understands that as processes (e.g. dairy parlors) become more mechanized, more sedentary work is performed. He mentioned his understanding that 60% of ag workers are taking medications, a large number of which are anti-depressants. With improved safety records, wellness should increase as well. Paul Gunderson recommended working with HICAHS to generate a research design looking into these issues. Bob Ellis added that the relatively small workforce is an advantage in encouraging safety, as investments are impacted to a larger extent within smaller organizations. Darla Borges pointed out that David Douphrate’s study incorporates similar economic factors as well. Clyde noted Pinnacol’s association with ten or more ag-related organizations, which could supply separate, more detailed information. Paul Gunderson feels these organizations could be a source of opportunistic areas in which insurance rates could be at least partially based on the establishment of safe practices. He wondered if data could be segmented out to illustrate the economics of introducing a safer work environment. Steve Reynolds again recommended applying David Douphrate’s study by providing his findings to producers.

Outreach

It was recommended that dissemination of results of an insurance data review, as well as pilot project funding availability be circulated through e-mail communications. Paul Gunderson encouraged the use of the website to increase outreach with minimal expense. Increased partnering opportunities, and expansion with more focused outreach efforts were recommended. John Rosecrance suggested sharing of study findings with dairy and livestock associations to encourage partnerships, both within Colorado and expanding to sister and similar interest organizations within the region. Steve Reynolds noted a meeting planned in March to include John Rosecrance, David Douphrate, himself and Pinnacol’s dairy membership. Paul Gunderson suggested attracting producer organizations by attending their meetings and informing them before or following of HICAHS and its programs. Nancy Schleining added that many such organizations operate both at regional and state levels. Tom Levy also recommended attending livestock shows. Paul Gunderson felt attendance at the Denver Livestock show would be excellent, but believes groundwork should be started a year ahead of time. The Denver Livestock show has become more focused on dairy and hog production, but Nancy Schleining pointed out that hog-raising is decreasing in Colorado. John Rosecrance mentioned other national meetings, such as Cow Comfort meetings. Paul Gunderson recommends staying responsive to future trends in production concepts.
Eric Esswein mentioned the human/animal interaction and emerging genetic disease. Many of these have been present for 20–30 years, but many of these viruses have only been identified as ag-related within the last nine months. As ag commodities change, new diseases have emerged related to crops and livestock. The ag community needs to be aware of this safety issue. Steve Reynolds added this issue presents an opportunity to involve the veterinary college at CSU, regarding immunization of animals, and understands there has been some progress in this area. He mentioned the programs offering a Veterinary and Masters of Business combined degree. Bob Ellis offered that he is the Executive Director of the Conference on Animal Disease, which has been meeting yearly since the 1920s. This group looks at both foodborne and zoonotic diseases. There were 540 attendees at the last meeting, and 310 abstracts submitted. He is also President-Elect of the Biological Safety Association. Paul Gunderson believes this opportunity for collaboration should be acted upon, especially concerning emerging diseases.

Tom Levy noted a related problem with ag workers being infected while vaccinating livestock. Steve Reynolds commented on problems with Micotil, which is currently being utilized in dairy and cattle operations, resulting in several recent deaths. Bob understands this drug has cured a respiratory outbreak which common drugs did not affect. An increase has also been noted of infection by animals to such diseases as pertussis, tuberculosis, and tetnus. Bob added that the USDA has recently conducted surveys of beef, pork and horse producers, with results noting animal disease and its economic impact. Prevention, rather than treatment of the illnesses is recommended. Another medical problem involves the number of suicides being reported.

Jeff Levin believes regional partners should include producers as well as academic organizations, and asked how familiar the Center is with both in the area. Steve Reynolds asked that Darla Borges compile a list including academic institutions, producers and producer organizations to be used in pursuing a needs assessment. Jeff added that academic bodies may have additional local partnerships. Darla Borges noted that Doug Steele has been a productive contact leading to additional producer organizations. She has experienced difficulty in maintaining a similar contact in Utah. Steve Reynolds noted that the ERC is working closely with Utah State University, but they have shown little interest in research. John Rosecrance and David Doupahre are meeting with dairy owners in Utah who could provide further contacts. Additional Wyoming contacts are also needed, in addition to the former Extension Agent, Ron Cunningham, who is currently working on the Wind River Reservation.

Steve Reynolds offered that the ERC is working to build relationships with tribal nations, where ag is of great interest, but some diplomacy is required. ERC pilot grants are being offered soon. Jeff Levin stated that ERC participation in ag Center efforts has been accomplished in the past in Iowa (Great Plains Center) and Washington (Northwest Center). He feels a voice for ag in the ERC.
is important. Eric Esswein noted that ERC and ag participation was not mentioned throughout his education in Utah.

Steve Reynolds advised that NIOSH has funded a specific ag component in Iowa, Chicago and Minnesota, and he believes it is pushing for more integration of ERC and ag research centers.

Regional meetings with the Texas (Southwest) Center have been funded with conferences being planned for 2009 and 2011. The aim is to include more producers and growers, as well as livestock associations and dairies. Another proposed project which was not funded centered on working with AgrAbility, an organization focused on disabled ag workers. Inclusion of this organization as well as migrant stream associations in the regional meeting is intended. Karen Gilmore at the Southwest Center is pursuing collaboration between these groups. Vicky Buchan also provided information regarding the upcoming Western Centers conference, formerly including only the Northwest and Western Centers, which has expanded this year to include HICAHS as well as the Southwest Center. The meeting will take place in Washington state, but is more scientifically focused. The Washington meeting was scheduled for November 11-13, in order to avoid conflicting with the international conference in Saskatoon, Canada in October. The Saskatoon conference is held every five years, and has traditionally been very beneficial and productive.

Funding Sources

Expanding funding sources beyond NIOSH was discussed, as well as attraction of external PIs (outside of Colorado); with Steve Reynolds noting possibilities within the forestry trade in Utah. He mentioned a study of fisheries maintained by prison personnel proposed in collaboration with Bob McKnight of the Southeast Center. This project was not funded. Paul Gunderson recommended seeking additional support with ag cooperatives, such as those in Minneapolis/St. Paul. These organizations would be natural partners, and offer many resources including education and promotion of young people going into ag lines of work. Steve Reynolds added that the TSI project identified specific funding groups given the direction a project may be headed.

Proposal Review Process

Jeff Levin commented on the difficulty in providing an overall Center theme with linkage of projects, and maintaining that cohesive element following funding of diverse projects. Vicky Buchan suggested responding to this issue by make the theme broader, including regional, rather than Center focus. Paul Gunderson agreed that the structure of the review process and the way panels share information with independent project reviewers is complex. He believes NIOSH could improve on this process, employing other assessment models. Vicky Buchan informed the Committee of a recent meeting with Teri Palermo
(NIOSH) and Allen Robison regarding the Cross-Center (ACE) evaluation project. One topic discussed related to ending the discouraging of cross-Center projects, which are needed to perform national project evaluation. Paul Gunderson believes this relates to the surveillance issue noted by the NAS review (see above), resulting in a loss in public health awareness. He sees a need to develop regional intelligence, especially in clinical settings. Eric Esswein added that the CSTE is increasing surveillance in the west, hiring workers with evaluation backgrounds. Eric noted that the CDC and NIOSH or state funding is being used to support this increase in staffing. Steve Reynolds suggested that collaboration between Centers and sharing of resources will assist in obtaining more regional data.

**FUTURE PLANNING**

Bob suggested that the next renewal present a portfolio of science, relating more to struggling populations. He asked what NIOSH has indicated as its top priorities. Steve Reynolds believes NAS and NORA summaries should be used as guidelines, as well as a regional needs assessment including as many stakeholders as possible.

A fall meeting of the Advisory Committee was briefly discussed, with plans to meet prior to the Washington and Saskatoon meetings (beginning in October).

Steve Reynolds noted that the minutes, as well as a summary would be circulated for input from meeting attendees. He welcomed comments on specific issues. Angi Buchanan would also like contact information updates (see attached Advisory Committee listing, as well as HICAHS Staff).

Steve Reynolds asked for input regarding the next proposal, due in 2010.
Agriculture, Forestry, and Fishing Research at NIOSH

Public Briefing
December 19, 2007

Study Scope

• Evaluate the program’s relevance and impact to health and safety issues in the workplace and make recommendations for improvement.
  – an assessment of the relevance of the program’s activities to the improvement of occupational safety and health.
  – an evaluation of the impact that the program’s research has had in reducing work-related hazardous exposures, illnesses, and injuries.
• Assess the program’s effectiveness in targeting new research areas and identifying emerging issues in occupational safety and health most relevant to future improvements in workplace protection.
  – suggestions on emerging issues that the program should be prepared to address.

Committee Membership

Paul D. Gunderson, Chair, National Farm Medicine Center (Emeritus), Marshfield, Wisconsin
Maria T. Correa, North Carolina State University, Raleigh
R. Alan Davis, American Seafoods Company, Seattle, Washington
James A. Dosman, University of Saskatchewan, Saskatoon, Canada
William A. Groves, Pennsylvania State University, University Park
Ronald L. McAllister, CNH America LLC, New Holland, Pennsylvania
James D. McGlothlin, Purdue University, West Lafayette, Indiana
Susan H. Pollack, University of Kentucky, Lexington
Lorann Stallones, Colorado State University, Fort Collins
Don Villarejo, California Institute for Rural Studies (Emeritus), Davis
Susanna G. Von Essen, University of Nebraska Medical Center, Omaha
James J. Zuiches, North Carolina State University, Raleigh
Committee’s Evaluation Approach

- Framework Document used as guidance
- Period Evaluated: 1990-2006
- Information sources used for evaluation
  - NIOSH evidence package and supplemental materials
  - Comments submitted by the public
  - Presentation to committee by experts
  - Publicly available information and literature

NIOSH AFF Program Goals

- **Goal 1: Surveillance**—Reduce injuries and illnesses in the agriculture, forestry, and fishing workforce by understanding the characteristics of those injuries and illnesses so as to target research and interventions that reduce hazardous exposures.
- **Goal 2: Priority Populations at Risk**—Reduce injuries and illnesses of special populations of workers in these sectors by determining their significant risk factors and identifying and recommending interventions.
- **Goal 3: Health Effects of Agricultural Agent Exposures**—Reduce injuries and illnesses by understanding the long-term, chronic effects of exposures from agriculture-related chemical or physical agents to farmers, their families, and applicators so as to implement controls that prevent harmful exposures.
- **Goal 4: Hazard-Control Systems**—Reduce injuries and illnesses resulting from work-related exposures by developing, demonstrating, and making available control systems that eliminate, guard against, or warn of the hazard.
- **Goal 5: Outreach**—Reduce injuries and illnesses by informing and educating employers and employees in AFF about occupational safety and health hazards and control systems.

Characteristics of Ideal Program

- Identify and engage stakeholders,
- Identify populations at risk,
- Conduct surveillance,
- Conduct health effects research,
- Conduct intervention research,
- Conduct health services research and training,
- Conduct research on knowledge diffusion and technology transfer,
- Inform public policy and provide regulatory assistance,
- Conduct program evaluation initiatives.
Evaluation of AFF Program

Assessment of Relevance

Scale for Rating Program Relevance

5 = Research is in highest-priority subject areas and highly relevant to improvements in workplace protection; research results in, and NIOSH is engaged in, transfer activities at a significant level (highest rating).

4 = Research is in high-priority subject area and adequately connected to improvements in workplace protection; research results in, and NIOSH is engaged in, transfer activities.

3 = Research focuses on lesser priorities and is loosely or only indirectly connected to workplace protection; NIOSH is not significantly involved in transfer activities.

2 = Research program is not well integrated or well focused on priorities and is not clearly connected to workplace protection and inadequately connected to transfer activities.

1 = Research in the research program is an ad hoc collection of projects, is not integrated into a program, and is not likely to improve workplace safety or health.

Rationale for Relevance Score

- Priority of Research
  - Some, but not all, research in the AFF Program has been in high-priority subject areas.

- Applicability of Transfer Activities
  - The program has somewhat been engaged in transfer activities, but not always the most appropriate.
Assessment of Impact

Scale for Rating Program Impact

5 = Research program has made a major contribution to worker health and safety on the basis of end outcomes or well-accepted intermediate outcomes.
4 = Research program has made a moderate contribution on the basis of end outcomes or well-accepted intermediate outcomes; research program generated important new knowledge and is engaged in transfer activities, but well-accepted intermediate outcomes or end outcomes have not been documented.
3 = Research program activities or outputs are going on and are likely to produce improvements in worker health and safety (with explanation of why not rated higher).
2 = Research program activities or outputs are going on and may result in new knowledge or technology, but only limited application is expected.
1 = Research activities and outputs are NOT likely to have any application.
NA = Impact cannot be assessed; program not mature enough.

Rationale for Impact Score

• Some contributions to worker safety and health
  – success of projects affecting children, commercial fishermen, and tractor operators.
• Research has informed public policy and regulatory initiatives at the federal level and in several states.
• Program outputs include a wealth of information that is still considered current and important by the scientific community.

Why it was not rated higher

• Committee had difficulty establishing a clear record of positive impacts
  – the AFF Program itself has not given much priority to documenting the impact of its efforts.
• Contributions of the program have not been accepted by stakeholders nor has the research program engaged sufficiently in transfer activities.
• Information has not been organized in a manner that is helpful to others and has not been accessible to its own researchers.

Key Program Limitations

• Lack of consistent leadership and strategic planning
• Need for comprehensive surveillance
• Not fully engaged with AFF stakeholders
• Ill-defined populations at risk
Identification of New and Emerging Issues by AFF Program

Assessment of Program’s Targeting of New Research

• The program has not developed a consistent process for identifying new research issues and developing a way to address emerging issues.
  – The success of a public health research program is marked by its ability to recognize and address the needs of a targeted population.
    • the AFF Program on the whole has struggled to conduct surveillance to understand the current needs of its worker populations;
    • it is unable to forecast future needs.
• The program has not kept up with emerging issues and has lost the capability to gain useful knowledge and to respond with appropriate new technologies.

Emerging Research and Issues Identified by the Committee
High-Priority Research

- changes in demographic workforce characteristics,
- changes in the fishing industry,
- emerging forestry issues,
- blurring boundaries for food harvesting and food processing,
- food safety and food security,
- transformation and industrialization of agriculture.

Medium-Priority Research

- biofuels,
- farm labor housing conditions,
- specialty agriculture,
- integration of human and animal health,
- equipment safety issues.

Low-Priority Research

- nutrient enriched food and genetically modified organisms (GMOs),
- transportation injuries,
- global warming.
Recommendations for Program Improvement

Recommendation 1

- Establish strategic goals for the overall program and for separate subpopulations to provide a basis for improving program leadership, administrative oversight, and program evaluation.
  - 1.a: Focus administrative efforts on improving program leadership, administrative oversight, and program documentation.
  - 1.b: Develop a comprehensive program evaluation mechanism to assess and set priorities among research and transfer activities.

Recommendation 2

- Provide national leadership and coordination of research and transfer activities in agricultural, forestry, and fishing safety and health.
Recommendation 3

- **Implement a comprehensive surveillance system.**
  - Use of both on-going and non-routine surveillance systems to identify priority topics for future research or intervention.
  - Focus on hazard surveillance, sentinel health and injury events, and occupational illness outbreak investigations similar to the FACE investigations.
  - Convene a panel of surveillance experts to develop new approaches to AFF surveillance.
  - Implement pilot surveillance systems based on the new approaches proposed by the convened experts.
  - Develop an evaluation plan to assess the quality of the pilot surveillance systems.

Recommendation 4

- **Clearly identify and track AFF target populations.**
  - 4.a: Develop clear definitions of worker populations “at risk”.
  - 4.b: Conduct comparative studies across agriculture, forestry, and fishing to set priorities better and respond to dynamic workforce and workplace conditions.

Recommendation 5

- **NIOSH should conduct research on the science of knowledge diffusion to identify effective methods for AFF research-to-practice programs.**
  - 5.a: Incorporate broader social science expertise into the research diffusion process.
  - 5.b: Explore communication tools capable of reaching the AFF workforce.
Recommendation 6

- Establish a new model to involve stakeholders throughout the research process, and establish an effective multipartite stakeholder mechanism that includes at-risk workers and other organizations to focus on occupational safety and health.
  - 6.a: Develop a new model for targeting all key stakeholders as full participants in research program design and execution.
  - 6.b: Establish a coordinating council that would serve as a public advisory committee and would assume lead responsibility for informing public discourse on occupational safety and health issues.
  - 6.c: Continue to partner with appropriate federal and state agencies and establish additional interagency partnerships to increase the capacity for carrying out research and transfer activities.
  - 6.d: Establish public-private partnerships to work more closely with equipment, facility, and pesticide manufacturers in design and development processes.

Recommendation 7

- Implement integrative and interdisciplinary approaches in its research practices.
  - 7.a: Regular worksites visits by researchers to acquire an understanding of the workplace environment and thus develop and integrate culturally appropriate and sensitive approaches.
  - 7.b: Increase the use of interdisciplinary teams to address the environmental, social, cultural, and psychological complexities of issues that face AFF workers.

Recommendation 8

- Develop greater awareness of national policy activities because they can have a substantial impact on AFF worker populations and risk factors.
  - Farm Bill
  - Immigration Policies
  - Trade Policies
Thank you.

Report available at www.nap.edu
Advisory Board Responsibilities

The HICAHS Advisory Board is committed to assisting HICAHS staff in advancing the mission of “reducing or eliminating accidents and injuries, disease and death resulting from agricultural operations.” This mission is addressed by: undertaking applied research; providing prevention services such as hazard evaluation and control; and developing educational programs for those who work in agricultural production. The Advisory Board is representative of the geographic region including Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming and constituents actively involved in agricultural health and safety.

I. GENERAL DUTIES

1. Attend scheduled meetings to provide advise and support to HICAHS staff, research projects and educational/outreach efforts.
   A. Generally there is one face-to-face meeting utilizing a one day format.
   B. Conference calls or web conferencing may be requested to assist with specific research or educational efforts.
   C. An advisory board term runs congruent with the term of the current granting cycle.

2. Support, encourage, and advise the HICAHS staff and research, education and outreach efforts in the region.

3. Serve in an advisory role for HICAHS staff in determining research, education and outreach needs for the region.

II. SPECIFIC DUTIES

1. Program Planning and Evaluation
   A. Advise the HICAHS staff as to priorities and goals for achieving the mission of the Center.
   B. Review and assist in evaluating current research, education and outreach projects.
   C. Monitor progress on annual program goals and research objectives as identified by HICAHS staff and collaborators.

2. Resource Development
   A. Review annual budget and provide feedback to HICAHS staff and collaborators.
B. Use your influence and provide assistance in identifying opportunities for partnerships and serving as advocates for continued federal funding.
C. Assist and advise in the process of proposal development and grant renewals.

3. Advocacy and Outreach

A. Promote HICAHS and its impact with the broader public.
B. Assist in promoting and building positive relations with HICAHS and stakeholders, constituents and collaborators.
C. Identify prospective advisory board members and promote HICAHS to these individuals.
D. Assist in the public dissemination of research findings and education/outreach efforts.

III. Board Composition

A. Advisory board membership will be limited to a minimum of (?) members and maximum of (?) members.
B. Advisory members will be selected based on interest/knowledge areas, a willingness to be actively engaged with Center activities and ability to help expand influence and research in agricultural health and safety.
C. There will be an Executive Committee not to exceed five persons selected to represent the major sectors that comprise the Advisory board membership. Executive Committee members will be selected by HICAHS staff and serve for the duration of the granting period. The Executive Committee will serve as a rapid response team to requests from the HICAHS staff and provide timely advise as requested from the Center.
Injury Risk Analysis in Large-Herd Dairy Parlors

US Dairy Operation Trends

- Small herd (<500 head)
- Large herd (>500 head)

Pilot Data

- Dairy Farms (307 injury claims):
  - 48% of injury claims in parlor performing milking task
  - 21% kicked while milking
  - 10% kicked while attaching milk cluster
  - 14% injured while pushing cows in parlor line
Study Objectives

- 1) Identify UE workplace risk factors associated with MSS
- 2) Assess the risk for traumatic injury
- 3) Determine prevalence of MSS
- 4) Determine association between parlor exposures or personal factors with MSS
- 5) Identify safety interventions
Study Overview

- 4 year study
- 50 dairies (CO, SD, UT, TX)
- ~500 parlor workers
- Worker survey
- Video analysis
- Focus groups
High Plains Intermountain Center for Agricultural Health and Safety

Endotoxin Exposure and Genetic Factors in Organic Dust Lung Disease
2003-2007

CDC NIOSH U50 OH008085

Research Team

Colorado State University
Stephen Reynolds, PhD, CIH
James Burch, Ph.D.
Thomas Keefe, Ph.D.
John Tessari, Ph.D.
Angelica Serrano Martinez, M.D.
Rena Saito, B.S.
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Niels Koehncke, M.D.
University of Nebraska
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NIHES
David Schwartz, M.D.
Neil Burch, Ph.D.
NIOSH
Paul Siegel, Ph.D.

PI (Exposure/Epi)
Epidemiology
Biostatistics
Analytical Chemistry
Industrial Hygiene
Occ Medicine/Epi
IH/Chemistry
Occ. Medicine
Pulmonary Medicine
Genetics
Biomarkers

Objectives

1) Characterize worker exposure to endotoxin-containing corn dust aerosols;
2) Evaluate respiratory outcomes including symptoms, cross shift changes in pulmonary function, (PFT) and cellular/immune markers (cytokines);
3) Survey genetic markers related to lung disease and endotoxin etiology (TLR4 gene mutations, and polymorphisms of IL1RN and TNF-alpha);
4) Explore whether endotoxin assay or GC/MS is best predictor of biomarkers, PFTs, Sx;
5) Explore whether cellular/immune responses and PFT differ among those with different genetic status.
Demographics

- N = 174
- Mean age = 37 yrs
- 98.8% Male
- 28% Hispanic/Latino

Exposures –
Geometric means (geometric standard deviation)

Variability in 3-OHFA by Dust Type
Baseline PFT below Criteria for Obstructive Lung Disease

Mean Cross Shift Change in PFT

Proportion with Cross Shift Decrease in PFT Exceeding 5% and 10%
Symptoms with Increase Over Workshift

- Eye Irritation (31%)
- Nose Irritation (99%)

Predictors of Baseline PFT

- FVC
- FEV1
- FEV1/FCV
- Log Endotoxin or Log Dust concentration
- Type of facility, smoking.
- Correlations and regressions weak in all cases

Predictors of Cross Shift Decline in PFT

- FVC
- FEV1
- FEV1/FCV
- Log Endotoxin or Log Dust concentration
- Smoking.
- Correlations and regressions weak in all cases
Immune Markers

- PMN, albumin, ECP, MPO – elevated among those reporting headaches, cough, mucus or blurred vision.
- Endotoxin exposure (EU/mg) correlated with increases in IL-8 and albumin.
- Effects were more pronounced among new workers.
- Suggested adaptation or “healthy worker effect.”

Genetic

- TLR4 299 and endotoxin associated with shortness of breath. $R^2 = 0.269$
  - Subset of 55, complete genetic analyses pending (TLR4, CD14)

Current Dairy Worker Studies

- Naïve Dairy Workers Study
- CA Dairy Worker Study
Naïve Dairy Workers Study

Specific Aim 1: Characterize worker (n=184) exposure to endotoxin-containing aerosols and evaluate respiratory outcomes including symptoms, pulmonary function and cellular/immune markers (cytokines) of inflammation using both peripheral blood and nasal lavage.

- Hypothesis 1-1: Workers with higher exposures to endotoxin-containing aerosols during the work shift will exhibit larger cross-shift decrements in pulmonary function, and higher rates of respiratory symptoms.
- Hypothesis 1-2: Workers without previous exposure (naïve) (n = 92) will exhibit more dramatic respiratory health outcomes than those who have been working in the industry for more than 2 years.
- Hypothesis 1-3: Workers with greater cytokine responses, including hyper-responsiveness to a peripheral-blood endotoxin-cytokine assay, will exhibit greater changes in respiratory health outcomes compared to those that are hypo-responsive.

Specific Aim 2: Compare the exposures and health outcomes among Colorado dairy workers to the results of a comparable study of California dairy workers (conducted by the Western Center for Agricultural Health and Safety) (n = 200).

- Hypothesis 2-1: Different conditions, technology, and practices between California and Colorado dairies will contribute to differences in occupational exposures and respiratory health outcomes.

Specific Aim 3: Evaluate a subset of new (naïve) workers at 0 (n = 92) and 1 month (n = 92) and 1 year (n = 46).

- Hypothesis 3-1: Workers with larger acute cross-shift changes in respiratory health outcomes and with higher inflammatory responses (as measured by bronchial hyper-responsiveness, inflammatory markers, and cytokine production by peripheral-blood leukocytes) will exhibit greater chronic changes in respiratory health outcomes compared to those with lower acute responses over time.
- Hypothesis 3-2: Workers will demonstrate higher inflammatory responses at initial assessment and diminished inflammatory responses after 1 month and 1 year indicating adaptation to the environmental exposures.

Specific Aim 4: Evaluate whether endotoxin assay or GC/MS (specific 3 hydroxy fatty acids) is the best predictor of biomarkers and changes in pulmonary function.

- Hypothesis 4-1: There is a relationship between chemical analyses and biological assays for endotoxins in these dust samples, and respiratory outcomes (Symptoms, biomarkers, lung function).
Specific Aim 5: Survey genetic markers related to lung disease and the endotoxin pathway by performing association testing for polymorphisms in the candidate innate immunity genes TLR4, TLR9, MD2, CD14, IL1-RN, IFN-gamma and TNF-alpha.

Hypothesis 5-1: There will be demonstrable differences in symptoms, biomarker and pulmonary function tests between study subjects with and without some polymorphisms in these candidate genes. Our sample size will be approaching 200 individuals by the end of the study, and an ethnically matched control population is available at NIEHS for this aim. Association testing of marker vs. phenotype will be performed with our study subject and the ethnically matched control subjects.

Specific Aim 6: To identify job factors associated with highest exposures and greatest risk of respiratory disease, and work with ILM and the dairy industry throughout the region to develop cost-effective, culturally acceptable interventions to reduce exposures; and to disseminate information on interventions via the dairy industry associations, and Cooperative Extension and by incorporation into ILM worker training programs. The HiCAMS Outreach program and the Enhancing Translation/Dissemination Project will be instrumental in this effort.

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Naïve Dairy Workers Study 2007 - 2010

### Subject recruitment

### Sampling

- Pre-shift
- Consent
- Questionnaire
- PFT
- Blood draw
  - Dust
  - Ammonia
  - Blood draw
  - Nasal lavage

### Work-shift

- Consent
- Questionnaire
- PFT
- Dust
- Ammonia
- Blood draw
- Nasal lavage

### Post-shift

- Consent
- Questionnaire
- PFT
- Blood draw
- Nasal lavage

### Analyses

- CSU Quest
- NIOSH
- Nebraska
- Gravimetric
- Endotoxin
- Storage
- CBS
- ESR
- CRP
- Cytokines
- CD14
- Data review

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Questions?