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GREAT PLAINS CENTER FOR AGRICULTURAL HEALTH

I. INTRODUCTION AND EXECUTIVE SUMMARY OF THE PROGRAM

The Great Plains Center for Agricultural Health (GPCAH) at The University of Iowa serves as the NIOSH Agricultural Health and Safety Center for Federal Region VII (Iowa, Missouri, Kansas, and Nebraska), America's most agriculturally intensive region with 1/6 of the U.S. farms and land in farms. GPCAH continues to make significant progress in advancing knowledge about agricultural injuries and illnesses through its research activities and prevent them through its education, outreach, and intervention efforts.

Overall goals of GPCAH are:

1. Conduct a multidisciplinary agricultural health and safety research program targeting national research priorities for agricultural health and safety.
2. Develop and evaluate novel disease and injury prevention models that assess educational, outreach, and intervention programs targeting farm workers and their family members.
3. Develop and implement training of health professionals including industrial hygienists, veterinarians, and physicians for career development in the area of agricultural health and safety with emphasis on their professional training needs.
4. Provide agricultural health and safety technical assistance and consultation in research methods, training, and education to health professionals and community-based organizations.
5. Maintain and strengthen linkages with health professionals in academic institutions, state and federal agencies, and international organizations regarding agricultural health and safety research, training, and prevention programs.

GPCAH members continued to be active leaders and contributors in a wide range of professional venues locally, nationally, and internationally. Their work was prominent in the planning and delivery of agricultural safety and health programming at Saskatoon and Keystone symposia. They contributed widely and abundantly to the NIOSH Agricultural Centers' Tractor Safety Initiative, its public presentation, and the subsequent project proposals. They presented and participated in an array of forums with students, producers, cooperative extension, and healthcare providers. They actively networked, presented, and published.

During the first six months of this fiscal year, Center personnel and others were engaged in arranging and conducting a strategic review of the GPCAH at the midpoint of its current grant. Dr. Paul Gunderson led that review. He met with 32 individuals and 7 small groups over a two day period. He presented his findings and recommendations to all participants, Center leadership, and Center Advisory Committee members at a return visit in February. Subsequently, his report and related action plans were distributed broadly within the Center and among its associated individuals and groups.

Open, group processes were applied to the solicitation, formation, screening, and selection of research and outreach project proposals that fit our Center strategically. Three feasibility projects are continuing, two ended during the fiscal year, and a previous year's feasibility project was spun-off to be a free-standing product. From 60 topics with potential, four new projects were proposed in the competitive supplement due March 2004. From over two dozen outreach pre-proposals from across our region, we have made commitments to seven. These seven represent a full investment of next year's outreach supplement before this fiscal year ended.

The Keokuk County Rural Health Study (KCRHS) is the major research effort of the GPCAH. This population-based, prospective study has followed the health status and environmental exposures of a large, stratified, random sample of residents in one rural Iowa County for the past 14 years. The KCRHS focuses on injury and respiratory disease. It monitors health care delivery, geriatric, reproductive, mental health, and other health outcomes. Analyses of Round 1 data continued throughout the year resulting in six manuscripts published or accepted for publication. Seven other manuscripts are in progress.

Round 2 data collection was completed in May 2004. Data has now been accumulated on a total of 1,588 adults and 575 children representing 1,002 households. Completion of Round 2 was delayed to accommodate several spin-off studies that required staff to collect data. Two additional studies were started after Round 2 ended as investigators continued to meet in small research groups to plan Round 3. The KCRHS continues to be a rich source for collaboration with other investigators (23), for mentoring students (8), and for connecting with the community through a newsletter, website, and a Community Advisory Committee which met twice this year.

The other project in the GPCAH Research Core is an evaluation of new methods for measuring inhalable and respirable dusts, as well as endotoxins and glucans in agricultural settings. Sampler comparisons have been concluded. Swine confinement dust has been aerosolized in test chambers, and similar trials with chicken dust are underway. Endotoxin analyses show no difference between the four samplers in the field or in the laboratory. Comparison between measurements with samplers and photometer output is ongoing. In addition to field sampling completed last year at a swine confinement facility, field sampling has been completed at both a chicken and a turkey site. Results indicate good correlation between samplers for large particles but not between those samplers and the cyclone measuring respirable dust.

The Prevention Intervention Core of the GPCAH has one component project: the dairy farm application of the Certified Safe Farm program, which is being conducted in collaboration with the National Education Center for Agricultural Safety (NECAS), Peosta, IA. Farmers complete an occupational health screening, participate in an on-farm safety review, and receive tailored safety education to become certified. To date 15 have received their health screenings and 24 farms have been reviewed. Local funding enabled NECAS to provide respiratory and hearing protection to every farm, 188 slow-moving

vehicle (SMV) emblems, 18 fire extinguishers, and rollover protective structures (ROPS) for 10 tractors on seven farms.

The Education and Outreach Core continued to provide the formalized agricultural safety and health curriculum put in place in the fall of 2001 as well as provided lectures on agricultural health and safety to students in environmental health, veterinary medicine, occupational medicine and nursing, and industrial hygiene. Forty-eight nurses, physicians or physician assistants attended our 40-hour Agricultural Occupational Health Certificate Course, which has been revised and enhanced for distance learning. Ten students are enrolled in the Agricultural Health and Safety MS/PhD program. Dr. Merchant consulted with officials at the University of Saskatchewan (4/14/04) and the University of California-Davis (9/24/04) regarding possible new schools of public health. These initiatives are being led by the respective directors of their agricultural health centers.

Again this year we sponsored the Midwest Regional Agricultural Safety and Health forum in cooperation with Iowa's Center for Agricultural Safety and Health (I-CASH) and two adjoining NIOSH Ag Centers. New this year was collaboration in hosting this forum from the Iowa Rural Health Association. Over 125 agricultural safety and health professionals and practitioners participated, including strong representation for the AgriSafe Network of clinics.

The process for transforming the AgriSafe Network (AN) clinics into a non-profit organization has been finalized. This will facilitate network development with promising prospects in Eastern Iowa, Texas, Illinois, South Dakota, North Dakota, and Kansas, as well as provide another robust channel for our outreach programming to providers and producers. This complements information now communicated through our website, newsletters, presentations, monthly newspaper articles, and periodic public service announcements.

The GPCAH worked a six-month process to initiate, screen, and select outreach projects to fund in the coming fiscal year. Two of the seven selected projects have their home in the Midwest outside Region VII to further our "centeredness" in the region. These projects will be in addition to ongoing, funded outreach provided through the Education and Outreach Core and are consistent with the essential outreach described to NIOSH in January 2004.

A. CENTER ACCOMPLISHMENTS FOR FY 2004

GPCAH has been a valued research, education, and advisory resource for the region and nation for 14 years. The scope, importance, and management of our work are illustrated only in part by the following selection of highlights for fiscal year 2004:

1. Round 2 of the Keokuk County Rural Health Study was completed in March. KCRHS continued to expand its constellation of related research projects and collaborating investigators.
2. Organic dust aerosol evaluation methods and Certified Safe Farm (Dairy) projects progressed as planned. Local funding made possible the installation of over

- \$11,000 in safety equipment on CSF dairy farms, including 188 SMV emblems and ten agricultural tractor ROPS.
3. Our formalized curriculum in agricultural safety and health continued to draw MS and PhD candidates with ten currently enrolled in the agricultural safety and health emphasis area. In addition, this year's 40-hour certificate course drew 48 nurses, physicians, and physician assistants.
 4. Over 125 agricultural safety and health practitioners attended the annual Midwest forum co-sponsored with the Iowa Center for Agricultural Safety and Health and the Iowa Rural Health Association.
 5. AgriSafe Network clinics continued to mature as another channel for outreach programming to providers and producers, complementing information now communicated through our newsletters, website, presentations, regular newspaper articles, and public service announcements.
 6. GPCAH enhanced its "centeredness" in the region, employing processes that drew from the geographic area and engaged professional resources of our region and Institute to assemble a wide selection of project proposals and outreach investment opportunities.
 7. An independent, external consultant was commissioned to perform and complete a comprehensive, strategic review of GPCAH.
 8. GPCAH members contributed capably and generously to Saskatoon and Keystone symposia as planners, session leaders, moderators, and presenters. They were instrumental in the NIOSH Centers' Tractor Safety Initiative.

B. REGIONAL ACTIVITIES

1) States Served by Center:

Iowa
Kansas
Missouri
Nebraska

2) States with Center Activity for FY2004:

Colorado	Missouri	Texas
Iowa	Nebraska	Wisconsin
Illinois	North Dakota	
Kansas	South Dakota	

II. REPORT ON THE OUTREACH PROGRAM

The GPCAH concluded a six-month outreach decision-making process before fiscal year end by choosing to fund seven new, collaborative outreach projects for next year as a strategic investment of its entire outreach supplement. Details of ongoing, funded outreach for the past fiscal year are recorded under the Education and Outreach Core in this report.

Ranging up to \$12,000, these new projects reach out through project lead professionals with intermediary and direct delivery expertise to address needs important to agricultural communities in our region. They will be providing educational training to trainers, farmers/farm workers, and sometimes children, about agricultural confined spaces, ATV and compact utility hauler safety, and much more. They will contribute to the knowledge base and expertise prerequisite for successful translations that change work practices and behaviors, as well as convey to Center personnel voice from the communities served. Two of the selected projects have their home in the Midwest, outside Region VII. It is expected all projects will have measurable impacts across state boundaries in the Region, Midwest, and beyond. One of the recipients is Farm Safety 4 Just Kids (FS4JK). In his letter to FS4JK Leadership Conference participants in March, Senator Harkin wrote, "Farm Safety 4 Just Kids is a champion and a respected source of information in farm safety outreach, education, prevention and intervention." His letter continued, "Your activities today will help promote prevention and awareness about safety all across the United States and beyond."

The GPCAH outreach solicitation, screening, and selection process was structured to bring forward important projects. The aims were to expand our "centeredness" in the region, and to engender collaboration with project leaders. We especially sought leaders capable of delivering evaluation and impact evidence tightly linked to known regional indicators and most beneficial to future outreach programming. (The concept of "centeredness" was a significant point in the independent evaluation of the GPCAH detailed under the Administrative Core of this report.)

Outreach activities considered essential by the GPCAH, within a flexible framework shaped by specific objectives derived in consultation with external advisors and the agricultural community, were described in communication to NIOSH in January. Needs highlighted in that communication included:

- Improving the expertise of professionals doing research and contributing to research translation into practice, i.e. r2p.
- Networking with, and continuing education for, professionals in communities;
- Choosing the right blend of intermediary/multiplier (e.g., train-the-trainer) and direct outreach efforts. (Note that our branding of products and outreach was specifically mentioned by the external consultant in his review findings.)

In parallel with our specific process for the forthcoming new outreach programming, these needs were inculcated beyond the Center to engage support. Outreach has been integrated in the strategic plans of both the Department of Occupational and Environmental Health and the College of Public Health at The University of Iowa. For example, it is a departmental goal to engage in research intervention/translation activities, specifically research translation projects. In addition, Center staff resumed work with the Agriculture Center Evaluators' project and continue to advise developers of a new outreach database for the college to ensure efficient and comprehensive capture of GPCAH outreach activities.

As the fiscal year ended we were at the beginning of some exciting research-to-practice (r2p) stories. Farm Safety 4 Just Kids made inquiry about replicating the hearing conservation program for middle school students that grew out of research in the Keokuk County Rural Health Study (KCRHS). In a new study of tractor overturns reported in earlier rounds of the KCRHS, participants are rewarded with a fresh slow-moving vehicle (SMV) emblem and reflectors to improve equipment conspicuity and reduce crashes between farm equipment and motor vehicles on the roadway. These illustrate sincere efforts to not only translate our research into practice (an understandable preference) but also translate others' research into changes that are important to community members in our region. The Fewer Accidents with Reflective Materials (F.A.R.M.) kit given to participants grew out of ASAE standards work that flowed from research at The Ohio State University.

The parallel process to specify near term outreach programming ramped-up through the spring and summer. Current strategy was melded together with existing education and outreach core plans, to which we maintain commitment. These plans were previously approved and highly rated by reviewers of the current Center grant application, but only partially funded:

- Communicate to the region and nation current information and trends in agricultural safety and health and the activities, progress, and outcomes of the GPCAH;
- Evaluate the impacts of FS4JK and assist in their effectiveness and in mission of injury and illness prevention among farm youth;
- Enhance opportunity for undergraduate collegians to choose agricultural safety and health as a field of study and practice;
- Prepare rural parish nurses and clergy to deliver agricultural safety and health interventions as a part of their health ministries;
- Create a consensus core curriculum in agricultural safety and health for the health care professions;
- Extend to the region and nation three proven programs developed in Iowa: 1) the AgriSafe Network, 2) Certified Safe Farm, and 3) the agricultural occupational health certification program;
- Facilitate competency of teachers/organizations in the region and nation to deliver agricultural safety and health education to health and safety organizations.

An internal brainstorming session folded together existing and new ideas with knowledge, perspectives, and expertise from across the Institute for Rural and Environmental Health (a.k.a., Ag Core Group) on target needs, potential collaborators, and types of outreach programming. A dozen representatives from Midwest states were gathered together at the Symposium in Keystone, CO, in June to share GPCAH plans for outreach funding, ask for their support, and invite proposals. A formal invitation summarizing discussions at Keystone and detailing collaborative roles for both applicants and GPCAH personnel was subsequently distributed widely to key individuals and organizations throughout the Midwest.

Consultations encouraging applications and helping shape other proposals continued through August and included an open, mid-August conference call for all potential applicants. This was done to clarify, respond to questions, bring together those with common interests in similar work, and foster joint efforts and replications. That work appears to have been successful as those who proposed work with similar focus from four states who have come together in two outreach project areas. From the more than two dozen pre-proposals of early summer, twenty began to take shape. Ultimately, there were thirteen proposals reviewed by the Ag Core Group. Their comments and recommendations were then acted on by the GPCAH Executive Group, which made the final selection of projects and allocation of funding.

Our selection process included awareness of stronger government evaluation as represented by PART, the Program Assessment Rating Tool. Accordingly, we integrated preference for projects that impact practice and bottom line injury or illness outcomes. We chose several projects and encouraged leveraging with other supporters and targeting of communities/audiences/populations to yield results that can be documented in evaluation measures as this funded outreach work unfolds.

III. CENTER PROJECT REPORT BY CORE / TYPE:

A. PROJECT TITLE

Administrative and Planning Core

B. PROJECT OFFICER(S)

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Deputy Director for Education and Outreach
Deputy Director for Intervention and Prevention
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Center Administrator
Center Webmaster
Secretary
Account Specialist

C. PROJECT DESCRIPTION

The mission and tasks undertaken by the Great Plains Center for Agricultural Health are varied. The Administrative Core provides leadership, direction, and oversight of all aspects of the Center. The Administrative Core provides continuity, builds on the strengths of the previous work, and supports ventures advancing into new research areas. The Administrative Core also initiates and integrates new Center responsibilities.

The specific aims of the Administrative Core are to:

1. Provide Center administration and leadership;
2. Provide research coordination within the Center, with other related research programs at The University of Iowa, with other NIOSH Agricultural Health and Safety Centers, and with other U.S. and international investigators concerned with agricultural health and safety research;
3. Perform, in conjunction with the Center leaders and advisors, monthly meetings to evaluate the budget and progress on Center activities and to recommend future directions;
4. Develop, in consultation with the Internal and External Advisory Committees, an updated strategic plan to guide the Center's direction, development, and growth.

D. PROJECT START AND END DATES

09/30/2001-09/29/2006

E. PROJECT ACTIVITIES / ACCOMPLISHMENTS

Plans for a strategic review of the GPCAH were put in motion at the beginning of 2004. Dr. Paul Gunderson, a researcher, scholar, teacher, author, and North Dakota farmer, was commissioned to perform an independent, comprehensive review of the Center, its direction, performance, and function. Dr. Gunderson, former Director, Marshfield Medical Research and Education Foundation, Marshfield National Farm Medicine Center and Co-director of the University of Minnesota's Regional Injury Prevention Research Center, has led numerous scientific review panels including the panel for recent agricultural safety and health grants. This strategic review process was structured to provide open access and information exchanges that enabled meaningful findings, to further enhance personnel and programmatic interactions, and to provide helpful mentoring opportunities. The process culminated in Dr. Gunderson's presentation of findings and recommendations to all participants, Center leadership, and to a combined forum of Center leadership and Regional and External Advisory Committee members.

Information provided in advance presented the Center's history, performance records, grant applications, and strategic plans in hardcopy and electronic form. Additional documents included Dr. Murphy's supplemental writing "Looking Beneath the Surface of Agricultural Safety and Health", results from the Saskatoon Symposium "think tank team", the ASH-NET publication, "Using History and Accomplishments to Plan for the

Future”, and the “National Land Grant Research and Extension Agenda for Agricultural Safety and Health (NCR-197)”.

Dr. Gunderson interviewed individual managers, leaders, and researchers as well as met with small groups representing the AgroMedicine Core Group, Certified Safe Farm/AgriSafe Network, Iowa Injury Prevention Research Center, Heartland Educational Resources Center, Keokuk County Rural Health Study, Outreach Working Group, the GPCAH Executive Council (our Internal Advisory Committee), and the Center’s Regional and External Advisory Committees. Collectively, over 100 direct contact person-hours were invested in these open, unmonitored exchanges with 32 individuals and seven small groups over a two-day period in January 2004.

Embedded in both days were reflection periods with the GPCAH Executive Council to make process adjustments, provide additional information, and maintain focus on these questions of strategic importance:

- What should be the future direction of the Center, particularly with regard to research development?
- How can we increase our Center’s activities in Core areas, especially through involvement of our external partners?
- How can we leverage our current strengths to tap into additional sources of funding?
- How can we utilize Center personnel and resources more effectively and efficiently?
- Should we consider sponsoring more topical or general conferences?
- With the Center grant application cycle not far ahead, what strengths should we highlight and what weaknesses should we remedy?

Dr. Gunderson’s initial report of findings and recommendations were shared with Center leadership and its advisors in advance of his return visit in February 2004. He later shared his report to a full house of the Center’s Executive Council and the AgroMedicine Core Group. His initial findings were:

- Continue successful formula to identify priorities and secure funding.
- Maintain research direction built on strengths and success.
- The KCRHS is one-of-a-kind, build on it.
- Seek engineering projects and apply application expertise.
- Work to resolve the research v. outreach mix.
- “Branding” efforts are very good and should be expanded.
- We work well together as colleagues and get the work done.
- Strong faculty and administrative structures are key strengths.
- Reinvigorate external advisory committees and challenge them with useful tasks.
- We have enviable access to students.
- We enjoy a national image and reputation built on success.

Following an interpretive discussion with the Center's Executive Council, Dr. Gunderson reported his findings and recommendations via simultaneous telephone conference call and Elluminate Live internet connection to members of our Regional and External Advisory Committees. These committee members, reflecting on our annual reports and Dr. Gunderson's findings, were then engaged in an agenda of strategic discussion items. This second part of the strategic review again engaged a broad range of personnel from across the Institute for Rural and Environmental Health. In all, an additional 65 direct contact person-hours were invested in part two of our review process.

Dr. Gunderson's final report was again carefully reviewed by members of the GPCAH. The final, unchanged report was distributed by Center Director, Wayne Sanderson, to all who participated in the review process. He thoroughly summarized Dr. Gunderson's report and invited all interested parties to participate in follow-up as Center personnel take ownership of actions relating to Dr. Gunderson's findings and recommendations:

- Keokuk County Rural Health Study (KCRHS) is a jewel...the only viable epidemiological study of its kind in North America...and it is imperative to continue rounds of study and fully utilize this signature program scientifically.
- Research and outreach content of the Ag Core Strategic Plan drew special mention. Identified research directions are appropriate, but fitting them with producer perspectives is challenging. The Iowa Center for Agricultural Health (ICASH) Producers' Committee is a resource and a step in the right direction.
- Agricultural behavioral health and addiction issues persist in rural America. Developing a related research component could be strategically useful.
- Bifurcation in agriculture means high value commodities rely on manual labor and large-scale operations create extended exposures. Ergonomics, respiratory, and toxicological issues persist as viable arenas for work.
- There is too little epidemiological work addressing causation and control of diseases and injuries.
- Consider placing an emphasis on safety and health of "new worker" populations.
- Building our policy analysis capability could broaden our appeal among agricultural populations and funding sources other than NIOSH.
- Amidst the research-outreach dichotomy, persist in important, good work. Consider becoming a more qualified, ready resource for clinicians. Embrace principles of disease prevention and health promotion. Move with velocity in deploying outreach activities that make full use of journalistic expertise.
- Safety engineering interventions crucial to lowering morbidity and mortality have not fared well in their ability to become funded in the past. Better proposals timed with the GPCAH renewal cycle could help.
- The conjunction of strong leadership, university setting, and regional diversity is a great asset. Performance and evidence of collaboration, multi-disciplinary capacity, ability to convene, and other indicators of "Centeredness" deserve continuous attention. In-kind and other support is growing in importance and should be tracked and reported.

The GPCAH is already doing much work that addresses the findings and recommendations in Dr. Gunderson's report. Other work remains in the planning stages, and more will come in the future as action plans are developed and implemented. The KCRHS has, for example, completed its second round of population follow-up and is currently planning round three. No other entity has an active, prospective follow-up of a rural population. Also, the AgroMedicine Core Group continues to assist with research as it did to formulate outreach plans to select collaborators that leverage and maximize impacts regionally. Work in this vein allows us to involve our regional partners to a greater degree than in the past and contributes to our identity and stature as a regional center.

Four new projects were proposed in a competitive supplement application due March 1. The first project proposed was a large prevention-intervention project describing play areas on farms and evaluating promotion of safe play areas to reduce children's exposures to on-farm hazards. Second was a large translation project customizing the Certified Safe Farm (CSF) program to serve farmers age 60 and older. Third was a small translation project to expand use of new technology (i.e. Elluminate Live) for distance learning and move forward on an agricultural safety and health virtual classroom. Finally, we proposed a large exploratory project on the psychosocial and financial consequences of tractor overturn fatalities. The message here is not about the projects. It is about how we do the work, the processes that enable shared focus to yield decisions that fit well with intentional plans.

These projects were chosen to augment current work without changing specific aims, research designs, or methods of the current Center's grant. Collectively, they relate to each of the GPCAH specific aims, all seven NIOSH agricultural center program objectives, and seven of the NORA priority research areas. With and through the Agromedicine Core Group at the Institute for Rural and Environmental Health, we are able to broadly view such work in context with regional needs, priorities, and strategic plans.

Over 60 topics with potential to become projects were initially identified through interaction with the Ag Core Group. GPCAH and Ag Core Group members then reached out to potential collaborators in our broader region to stimulate preliminary proposals and to help structure and shape those proposals. Concurrently, internal researchers were broadening their perspectives, gaining information to improve our processes, identifying collaborative opportunities through regional networking, and creating proposals they may lead. More refined proposals were obtained and screened in consultation with the Ag Core Group resulting in a portfolio of nine projects. The GPCAH Executive Council made the final choice of projects to include in the application. We estimate the in-kind contribution of those not directly affiliated with the Center was over 60 person-hours.

The GPCAH Executive Council is the primary internal advisory and Center decision-making group. Chaired by the Center Director, the GPCAH Executive Council holds monthly management meetings to address programmatic, project, and budgetary issues. Members of GPCAH are part of the Ag Core Group which consists of 16 regular members who meet twice each month to compound the impacts from our work,

coordinate, learn, and share information. Other internal and external national and international professionals are occasional, invited attendees.

The Norwegian Farmers' Association for Occupational Health and Safety (NFAOHS) provides specialized medical screenings on farm checks, educational and rehabilitation services to 7,500 farmers and others working in agriculture. It is the government-supported model for the Certified Safe Farm program (See Prevention –Intervention Core report). In June, GPCAH hosted Anne Marie Heiberg who directs NFAOHS programming. Heiberg studied in our agricultural occupational health and safety short course visited collaborating organizations, (National Education Center for Agricultural Safety (NECAS) in Peosta, FS4JK in Earlham, and AgriSafe in Spencer), experienced Midwest agriculture at a 5000-head cattle operation in western Illinois, consulted with researchers, and led a staff seminar on the NFAOHS program during her visit.

In addition to multiple representatives at Center Directors' meetings, four GPCAH staff participated in the United States Department of Agriculture-Cooperative State Research Education & Extension Service (USDA-CSREES) sponsored symposium in Chicago on May 5-6, 2004. This symposium brought together agricultural safety and health specialists from the Midwest States' Cooperative Extension Service and those from the Great Lakes and Great Plains NIOSH Ag Safety and Health Centers. This meeting was instrumental in developing relationships, very informative, and suggestive of opportunities for collaboration. Some such opportunities are manifest as feasibility projects and outreach in this report. Mr. Madsen also participated in similar symposia in Mississippi (March 23-24, 2004) and the Southern Region (September 20-21, 2004) meeting in Nashville. Again these symposia brought together both Center and Cooperative Extension Service personnel from throughout their respective regions.

Across the fiscal year, from Saskatoon (October) through Keystone (June) and on to the all-Center's proposal submission due date (October), four GPCAH Administrative Core staff maintained active engagement in the NIOSH Agricultural Safety and Health Center Directors' National Agricultural Tractor Safety Initiative. They contributed voluntarily, liberally, and competently in all group meetings, conference calls, and documentation for the initiative.

Dr. Sanderson was instrumental in preparations for the research segment, Dr. Donham in policy and promotion, Dr. Rautiainen in partnering and global model programs, and Mr. Madsen led the development and documentation of the initiative's leadership structure with assistance from Dr. Bean of Ohio and Dr. Purschwitz from Wisconsin. All reviewed and edited drafts, provided numerous updates to individuals and organizations, and prepared for presentations and discussions. The final document for the initiative was unveiled to a very participative audience of approximately 80 agricultural safety and health professionals from across the nation at the Keystone, CO Symposium. Mr. Madsen delivered the opening presentation. Dr. Donham presented the policy and promotion section.

Subsequently, these Center leaders immediately went to work to help identify leadership for the initiative proposal, create its structure, and develop fundable project proposals in

collaboration with other Centers and researchers. An important early step in this work was achieved when models were proposed that combined leadership structure and a distributed project framework in which all Centers could participate. Further discussions among Center representatives from Iowa, Wisconsin, Kentucky, and our University of Illinois host refined and solidified this enduring framework.

Again the AgroMedicine Core Group was brought in to counsel on projects GPCAH should develop or secure collaborative arrangements. Drs. Sanderson and Donham worked with co-leader Dr. Purschwitz of the National Farm Medicine Center on a proposal reaching out to gain additional farmer, farm organization, dealer, and manufacturer perspectives. Dr. Rautiainen worked for collaborative positions on project proposals to address social marketing, injury and intervention estimates, and description of global, model intervention programs. Mr. Madsen developed the proposal for national surveillance of tractor overturn and roadway crash injuries and fatalities, the two focus areas for the next phase of the initiative.

We have continued to work energetically with HICAHS (CO) and the other participating Centers to forward the model framework, shape and select projects, complement and compliment Dr. Reynolds and his Center's leadership in finalizing the initiative's submission. In sum, GPCAH estimates across the year it contributed approximately 1/3 full time equivalent professional to the work of the NIOSH Agricultural Tractor Safety Initiative (TSI).

Prominent in the document for the Centers' TSI are one line summaries of tractor fatalities that occurred in the U.S. during 2003. These summaries were drawn from press clippings collected, culled and capsulized by the Farm and Agricultural Injury Monitoring System (FAIMS).

FAIMS was started as a GPCAH feasibility project in the fall of 2002. At the end of the third quarter this fiscal year, FAIMS was spun-off from the Center to be a standalone, subscription-based, fee-for-service product of the WorkSafe Iowa enterprise. Interestingly, the number of fatal tractor overturns recorded in FAIMS for 2003 (104) is virtually the same as the number from the Bureau of Labor Statistics Census of Fatal Occupational Injuries. Undoubtedly, case-by-case comparison would show differences because the catchment criteria differ.

In addition to facts about incidents happening across the continental U.S., FAIMS information has furthered peer engagement internally and contributed to individual and organizational networking well beyond our Region. It serves as a resource to inform perspectives and priorities, interact with media, enrich contact with legislative representatives and discussion in the classroom. It has added another information source for Fatality Assessment and Control Evaluation (FACE) investigators and others. It adds important reality to research proposals and is a ready resource for newsletter articles and presentations detailed in this report. Some view it as two-way outreach connecting with agricultural communities and reflecting a form of voice back to researchers.

Competing priorities have slowed progress on our new family of websites that will share a fresh new “skin” for a common look, user friendly interface, and a warehouse approach to selected stores of information. Included within the family are the GPCAH, Keokuk County Rural Health Study (KCRHS), AgroMedicine Core Group, Iowa’s Center for Agricultural Safety and Health (ICASH), and the Certified Safe Farm (CSF) program. Website family and member designs and construction are complete. They were done to optimize selection by internet search engines without buying priority upgrades. We are checking, reviewing, and adjusting each site’s features, navigation, function, and interconnections. Major work to replace placeholder content and move the sites from the prototype server to the University’s production server is progressing slowly.

In addition to website work, members of the Center’s Administrative Core manage our contribution to and redistribution of the NIOSH Ag Centers’ *AgConn* newsletter. Our regional mailing for *AgConn* goes to 458 addresses. Similarly, Center personnel contribute feature and standing articles to each quarterly edition of our *Alive & Well* regional newsletter which is jointly supported by ICASH and GPCAH. *Alive & Well* and its companion e-bulletin are distributed electronically to an initial level of 618 email addresses and in hardcopy to 630 postal addresses for individuals and organizations.

Networking, research, outreach, feasibility projects, press clippings, conferencing, and other communications are strategically valuable in building on our “centeredness”. Very important parts of our working network are the AgriSafe Clinics and each state’s Cooperative Extension Service agricultural safety leaders. Consequently, the Administrative Core group was delighted to participate in the USDA-sponsored forums. In addition, this year as in the past two years, GPCAH was a co-sponsoring organization of the Midwest Rural Agricultural Safety and Health Forum, which brought together approximately 125 producers, extension specialists, researchers, healthcare professionals, and the media.

Members of the GPCAH continued to be active leaders and generous contributors in a wide range of professional service venues locally, nationally, and internationally. Drs. Sanderson, Donham, Rautiainen, and Mr. Madsen served variously on planning committees, as session organizers, moderators, and presenters at the Saskatoon and Keystone symposia. Dr. Sanderson, for example, is active in agricultural health and safety committee work with ACGIH. Dr. Donham, for example, is a member of the Board for the Leopold Center for Sustainable Agriculture, the Center for Rural Health and Primary Care, the Johnson County Health Department, and the International Association of Agricultural Medicine and Rural Health. Mr. Madsen is Chair of the Farm Safety 4 Just Kids Board of Directors and serves on the NECAS Executive Committee. All GPCAH members serve on editorial boards or as manuscript reviewers for professional journals such as the *Journal of Agricultural Safety and Health*, *Journal of Agromedicine*, *Journal of Occupational and Environmental Health*, *American Journal of Industrial Medicine*, and the *International Journal of Agricultural and Environmental Medicine*. In addition to this kind of professional service, Dr. Sanderson especially counsels on graduate research and helps the Center support students pursuing grants.

F. PROJECT PRODUCTS

1) Presentations:

Madsen MD. The Press on Midwest Farm and Agricultural Injuries. Fifth International Symposium – Future of Rural People, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Rautiainen R, Zwerling C, Donham K, Burmeister L, Sprince N, Ohsfeldt R, Reynolds S, Eskola E, Saarimaki P, Siitonen T. Using injury information to guide prevention. Case study based on Finnish worker's compensation data. Future of Rural Peoples Conference. Saskatoon, SK, Canada, October 19-23, 2003.

Rautiainen R. Using Injury Information to Guide Prevention. Case Study Based on Finnish Worker's Compensation Data. University of Saskatchewan, Saskatoon, SK, Canada, Oct 19-23, 2003.

Madsen MD. The Press on Midwest Farm and Agricultural Injuries. Midwest Rural and Agricultural Safety and Health Forum, Des Moines, IA, Nov 5-6, 2003.

Madsen MD. GPCAH Update and Summary of Press Clipping Surveillance. Mississippi Health & Safety Summit, Jackson, MS, Mar 2004.

Rautiainen R, Johnson W. Case Study – Fatal Tractor Overturn Where a Self-Made Roll-Bar Failed. National Institute for Farm Safety Meeting, Keystone, CO, June 21-24, 2004.

Nonnenmann MW. "Ph.D. Preliminary Assessment": The University of Iowa, College of Public Health, Department of Occupational and Environmental Health. 2004.

2) Publications:

a) Peer Reviewed Journal:

Curwin B, Hein M, Sanderson W, Buhler W, Nishioka M. Acephate exposure and decontamination on tobacco harvesters' hands. *Journal of Exposure Analysis and Environmental Epidemiology*, 13:203-210, 2003.

Calvert G, Rice F, Boiano J, Sheehy J, Sanderson W. Occupational silica exposure and risk of various diseases: an analysis using death certificates from 27 states of the United States. *Occup Environ Med* 60:122-129, 2003.

Roy CJ, Thorne PS. Exposure to particulates, microorganisms, $\beta(1-3)$ -glucans and endotoxins during soybean harvesting. *Am Ind Hyg Assoc J* 64(4): 487-95, 2003.

Carreón T, Butler M, Ruder A, Waters M, Davis-King K, Calvert G, Shculte P, Connally B, Ward E, Sanderson W, Heineman E, Mandel J, Morton R, Reding D, Rosenman K, Telaska G. The Upper Midwest Health Study: A case-control study of primary intracranial brain gliomas among rural residents. Pesticide exposure in women. *Environmental Health Perspectives*, Submitted 2004.

Ruder A, Waters M, Butler M, Carreón T, Calvert G, Davis-King K, Schulte P, Sanderson W, Ward E, Connally B, Heineman E, Mandel J, Morton R, Reding D, Rosenman K, Telaska G. Upper Midwest Health Study: A case-control study of primary intracranial brain gliomas among rural residents. Gliomas and farm pesticide exposure in men. *Environmental Health Perspectives*, Submitted 2004.

b) Other Publications:

Madsen MD. How we know what we (think we) know. *Alive & Well* Newsletter, Nov 2003.

Madsen MD. It all adds up. *Alive & Well* Newsletter, Nov 2003.

Donham KJ. We were a strong presence. *Alive & Well* Newsletter, Nov 2003.

Madsen MD. End rear rollovers. *Farm Journal on the web*, Nov 2003.

Madsen MD. The press on midwest farm and agricultural injuries. Abstract, Midwest Rural and Agricultural Safety and Health Forum, Des Moines, IA, Nov 2003.

Madsen MD. Press clippings: U.S. farm and agricultural injuries – 2003. Joint NIFS/NAAC/NIOSH Ag Centers' Conference. Abstract, Keystone, CO, Dec 2003.

Ruder AM, Waters MA, Butler MA, Carreón T, Calvert GM, Davis-King KE, Schulte PA, Sanderson WT, Ward EM, Connally LB, Heineman EF, Mandel JS, Morton RF, Reding DJ, Rosenman KD, Telaska G. Brain Cancer Collaborative Study Group. Farm exposure to individual pesticides and glioma in men. *Proceedings, American Association for Cancer Research Annual Meetings*, Vol 44:1466, 2003.

Carreón T, Butler MA, Ruder AM, Waters MA, Davis-King KE, Calvert GM, Schulte PA, Connally LB, Ward EM, Sanderson WT, Heineman EF, Mandel JS, Morton RF, Reding DJ, Rosenman KD, Telaska G. Farm exposure to pesticides and glioma in women. *Proceedings, American Association for Cancer Research Annual Meetings*, Vol 44:1466-7, 2003.

Madsen MD, Neuendorff L, Bean TL. Sharing rural roads with farm equipment. Joint NIFS/NAAC/NIOSH Ag Centers' Conference. Abstract, Keystone, CO, Dec 2003.

Sanderson, WT. Our sign may not say “over 100 billion burgers sold”. *Alive & Well* Newsletter, Mar 2004.

Madsen MD. It all adds up. *Alive & Well* Newsletter, Mar 2004.

Rautiainen R, Johnson W. Case Study – Fatal tractor overturn where a self-made roll-bar failed. Abstract, Keystone, CO, June 20-24, 2004.

Madsen MD. It all adds up. *Alive & Well* Newsletter, Jun 2004.

Mueller-Anneling L, Thorne PS, Kline JN, Sigurdarson S, Watt J. Research Brief: The whole blood assay as a biomarker of exposure, effect and susceptibility in workers exposed to organic dust. *Farm Families: Alive and Well* 10(3):2, 2004.

Sanderson WT. Machinery is a major cause of agricultural fatalities in the U.S. – tractors in particular. *Alive & Well* Newsletter, Sep 2004.

3) Education / Training / Outreach:

a) Other:

Madsen MD. Poster – Needles in the Hay: U.S. Press Clips on Farm Injuries. Fifth International Symposium – Future of Rural Peoples, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Rautiainen R. NIOSH Construction Center review panel member. Alexandria, VA, July 19-23, 2004.

4) Conferences / Meetings Sponsored:

Future of Rural Peoples. Saskatoon, SK, Canada, Oct 2003.

Keystone Symposium, Keystone, CO, Jun 2004.

G. STATES THE PROJECT WAS ACTIVE IN

Iowa	Missouri	South Dakota
Illinois	Nebraska	Wisconsin
Kansas	North Dakota	

III. CENTER PROJECT REPORT BY CORE / TYPE: (Research Core)

A. PROJECT TITLE

Keokuk County Rural Health Study

B. PROJECT OFFICER(S)

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Wayne Sanderson, PhD, CIH, Co-Investigator
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Kevin M. Kelly, PhD, Programmer Analyst/Co-Investigator
Murray Madsen, MBA, Co-Investigator
Craig Taylor, MS, Senior Research Assistant
Ann Yeoman, BSN, Field Medical Coordinator
Jill Moore, RRT, Field Research Assistant
Diana Sertterh, BA, Field Research Assistant
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Matthew Nonnenmann, MS, Field Research Assistant
Marlene Thompson, Secretary
Wendy Jackson, Center Administrator
Darryl Dodd, Systems Analyst

C. PROJECT DESCRIPTION

The Keokuk County Rural Health Study (KCRHS) is a population-based, prospective study of health status and environmental exposures of a large stratified random sample of residents in one rural Iowa county. The study focuses on injury and respiratory disease. In addition, it monitors health care delivery, geriatric, reproductive, mental health, and other health outcomes. Injury and disease prevalence are investigated in relation to occupational, agricultural, and other environmental exposures.

All consenting members of 1,000+ farm, rural non-farm, and town households are being studied in each of four rounds of examinations over 20 years. Although the sample is stratified by residence type (farm, rural non-farm, and town), the entire county is, by definition, rural, since the largest town, Sigourney, has fewer than 2,500 residents (U.S. Census definition for rural). A large majority of adults have worked or are currently working on farms.

Each participant over the age of eight receives medical screenings in our research facility in Sigourney, the county seat. Those age 18 and over are interviewed at length about their health and behavioral risk factors for injury. In addition, they complete detailed

occupational surveys. Adolescents (ages 12-17) are interviewed about behavioral risk factors for injury and parents are interviewed about the health of their children (newborn - 17). Each household receives an in-depth environmental assessment of their home and/or farm. Specific aims are:

1. Detailed medical surveys of all residents of a random sample of farm, rural-non farm, and rural town households in Keokuk County to document agriculturally-related disease and injury prevalence, and the determinants of such diseases and injuries;
2. Systematic environmental assessment survey of a random sample of farm, rural non-farm, and rural town households in Keokuk County in order to document agricultural and other rural environmental hazards and risk factors;
3. Analytical studies of cross-sectional data utilizing multivariate models and case control methods to identify and document the importance of injury and disease outcome risk factors;
4. Second detailed medical survey, modified based on Round 1 results, of the sample study population in order to document agriculturally-related disease and injury incidence and related risk factors;
5. Second systematic environmental assessment survey, modified based on Round 1 results, of the sample study households in order to document agricultural and other environmental hazards and risk factors;
6. Analytical studies of prospective data to measure the incidence and determinants of agriculturally-related injuries and diseases.

D. PROJECT START AND END DATES

09/30/2001-09/29/2006

E. PROJECT ACTIVITIES / ACCOMPLISHMENTS

Data collection, data analysis, and manuscript preparation

September 29, 2004 marked the end of the study's fourteenth year of funding from CDC/NIOSH. Round 2 data collection, which began in April 1999, continued through May 6, 2004. Twelve to fifteen subjects were examined each week and six to ten home environmental surveys were completed each week. Results of the medical screening and environmental assessments were mailed to study participants on a regular basis. When Round 2 data collection ended in May, we had collected data on a total of 2,163 persons (1,588 adults and 575 children), representing 1,002 households. Of the original households participating in Round 1, 707 (70%) also participated in Round 2. To replace the households that did not participate in Round 2, 295 new households were recruited.

Completion of Round 2 of the KCRHS was delayed one year (from 2003 to 2004) because we accommodated several spin-off studies in Keokuk County which diverted the time and attention of our staff who collected the data. Most of these studies involved collaboration with investigators in other areas and regions and in-kind contributions from KCRHS faculty and staff. These six studies are:

- Farm Family Pesticide Take-Home Study, Brian Curwin and Wayne Sanderson, NIOSH, spring and summer 2001.
- Genetic Studies in Non-atopic, Non-smoking Farmers with Airway Obstruction, NIOSH/Great Plains Center, Susanna Von Essen, Nebraska Medical Center, spring and summer 2002.
- Whole Blood Cytokine Responsiveness in Farmers with Airway Obstruction, NIOSH/ERC, Patrick Lambert, Nebraska Medical Center, spring and summer 2002.
- Childhood Health Outcomes Case-Control Studies, James Merchant, NIOSH, funding ended in 2000 but follow-up has continued to the present.
- Health Tracking of Musculoskeletal Disorders Among Iowa Farmers, Dan Anton, NIOSH/Great Plains Center, ongoing throughout Round 2 (1999 – present).
- Fire Safety Study, Corinne Peek-Asa, NCIPC/Iowa IPRC, spring of 2003 and ongoing.

Although Round 2 has ended, we continue to conduct telephone interviews about injury with an adult in each household every three months in order to obtain more detailed information about injuries of our participants. Questions are asked about any injuries received by any household member “within the past three months.” Using the ICD-9-CM codebooks, we assign E codes and N codes to all adult and child injuries reported by participants both in the in-person interviews and in the telephone follow-up interviews.

Throughout the year, we continued to conduct data analyses on the Round 1 data (medical, interview, and environmental survey) collected from the 2,258 men, women, and children living in the 1,004 households that made up our Round 1 sample. Six manuscripts based on Round 1 data collection have been published or accepted for publication during this grant period, making a total of 22 that have been published from the KCRHS data. Manuscripts on the topics of childhood asthma, pesticide contamination in homes, and characteristics of male batterers are under review. Others on vision, nutrition and obesity, depression, and adolescent risk behaviors are in progress.

In kind contributions

Many of the activities reported in this Annual Report are possible only through generous contributions of time and materials made by faculty and staff, both within our department and outside our department, who are engaged in the study.

Plans for Round 3

We are currently meeting with investigators in groups by research interest to plan the protocol for Round 3. The interest groups are:

- Agricultural/occupational exposures
- Children's agricultural tasks
- Injury, domestic violence
- Risk behaviors for injury
- Health services
- Physical activity, physical limitations, musculoskeletal
- Nutrition
- Respiratory disease
- Dermatology
- Mental health/neurobehavioral
- Vision
- Hearing
- Dental/oral health

We plan to pilot the protocol in February and March and begin data collection in April.

Studies conducted between Round 2 and Round 3

In addition to ongoing sub-studies described below, two studies were begun this summer (2004) to be conducted between Round 2 and Round 3 in order to help inform the development of the protocol for Round 3. They are:

- **Neurobehavioral Study.** Funded as a feasibility project of the GPCAH. Principal-Investigator, Fred Gerr, MD is using neurobehavioral (NB) tests to measure and quantify central nervous system (CNS) function. Although many "batteries" of tests can be proposed, a relatively short battery of tests that cover a wide range of CNS functions includes: 1) Digit symbol substitution (*coding*), 2) Sequences "B" (*concept shifting*), 3) Diamond Naming Test (*word finding*), 4) Hopkins Verbal Learning Test (*short term verbal memory*), 5) Positive and Negative Affect Schedule (PANAS) (*positive and negative affectivity*), 6) Center for Epidemiological Studies Depression scale (depressed mood). The estimated time for computer assisted administration of these tests is 20-25 minutes. After collection of these data, it will be possible to examine for the effects of agricultural and other exposures on test performance. In addition, "norms" of test performance can be calculated for rural populations and used for eventual development of an epidemiological and clinical case definition of cognitive impairment. KCRHS adult participants who have farmed for at least five years and who have farmed within the past year were recruited to participate in this study. In addition to the computer-assisted tests, subjects complete two questionnaires: 1) detailed questions about pesticide exposures; and 2) detailed questions about demographics, general health, and risks for

neurobehavioral/cognitive impairment. They will also be tested with a dynamometer for grip strength. August 2004 – ongoing.

- **Tractor Overturn Project.** Funded within the KCRHS main study. Principal Investigator: Wayne Sanderson, PhD. During Rounds 1 and 2 more than 150 participants in KCRHS reported that they or someone in their household had been involved in a tractor rollover in their lifetime. We also learned that 58% of the tractors being used by study participants were not equipped with seatbelts and rollover protective structures (ROPs). This study was designed to describe the characteristics of tractors that were involved in rollovers. All subjects who reported a tractor rollover are being recruited to participate. Researchers ask detailed questions about the characteristics of the tractors involved in the rollover, the conditions of the ground, weather, etc., and audio tape the “story” of how the rollover happened. In addition, the researchers perform a visual inspection checklist and take multiple digital photographs of each tractor on the property (8 per tractor). August 2004 – ongoing.

Sub-studies within or related to KCRHS

The following are studies which have spun off from the main KCRHS study and have been ongoing throughout the past year. The KCRHS faculty, Coordinator, and other KCRHS staff have been involved in all of these sub-studies, and most of their involvement has been in the form of in-kind contributions.

- **Fire Safety Study** (NCIPC/Iowa IPRC-funded). Principal Investigator: Corinne Peek-Asa, PhD, The University of Iowa. In an effort to better understand how different types of smoke alarms function in rural households, we are testing the two major smoke detection and battery technologies. A total of 691 households were enrolled into the smoke alarm study, and more than 2,000 new smoke alarms were installed. The smoke alarms are free and were installed according to National Fire Protection Association guidelines. The smoke alarms meet the highest performance standards, but they use different methods of detecting smoke and different types of batteries. These different methods may be more or less likely to cause false alarms and certain types may work longer without any maintenance. The study team is now visiting the participating homes to check to see how the smoke alarms are working after 12 months and will check again 36 months after enrollment. This is the first such research study to examine smoke alarm technology in a rural environment. Results will help homeowners and builders decide which types of smoke alarms are best suited for different types of homes and for different locations within homes. Three manuscripts are in process as a result of this study. (Ongoing)
- **Iowa Hearing Loss Prevention (I-HeLP)** (School-based hearing conservation program) (NIOSH-funded). Principal Investigator: Greg Flamme, PhD, The University of Iowa. Due to the high prevalence of hearing impairment in rural areas (KCRHS Round 1 data), Dr. Flamme was funded by NIOSH to develop and estimate the effectiveness of two hearing conservation programs for use with 4th and 7th graders in rural schools. This project is essentially a community-based

clinical trial with a one-year follow up interval, with Keokuk County included in the experimental group. Primary outcomes for the 7th grade population are change in hearing threshold and otoacoustic emissions over the interval. The primary outcome for the 4th grade population is the subject's knowledge about and motivation toward hearing protection. The first round of data collection was completed in January 2004; the second round began in September and will be completed in November. A control group for comparison of the simple and comprehensive hearing loss prevention programs was added, making a total sample of 929 people that are involved in the project in various ways. Analyses of the data from the first round of data collection suggest that there is a low level of knowledge about hearing in this population, but a general awareness of the link between hearing impairment and noise exposure. Risk factors for hearing impairment in Round 1 include endogenous (eye color), exogenous (exposure to farm work, farm animals, and ATVs), and correlated health factors (diagnosed asthma). Analyses of the Round 1 data illustrated some shortcomings in the questionnaire instrument, which necessitated the development of a new instrument to measure exposures to possibly ototoxic agents, knowledge of hearing and hearing loss prevention, components of the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self efficacy), and intent to use hearing protection. Early analyses of I-HeLP effectiveness in the 4th grade cohort indicate that both a simple and a comprehensive hearing loss prevention program improve perceived susceptibility, perceived benefits, perceived barriers, cues to action, and intent to protect hearing over the control condition. The comprehensive program improved perceived susceptibility and intent to protect hearing more than the simple program. Analyses of I-HeLP data are ongoing, and a grant proposal to further refine this work is in preparation. All of Dr. Flamme's work on this project is without GPCAH support. (Ongoing)

- **Prevention Research Center** (CDC-funded). Principal Investigator: John Lowe, PhD, The University of Iowa. The Prevention Research Center – Community Health Action Partnership (CHAP) -- is working with Keokuk County residents on issues the community has identified as being important to their health. The three current projects focus on 1) diet and nutrition (farmers markets, restaurants, school vending machines; 2) physical activity (walking/biking trails); and 3) adolescent alcohol consumption (keg registration). (Ongoing)
- **Hearing Loss in Adults and Adolescents.** Principal Investigator: Greg Flamme, PhD, The University of Iowa. The results of this study showed that the maximum prevalence of notched audiometric configurations reaches its peak between 30 and 50 years of age (peak prevalence approximately 35% in females; 60% in males). After age adjustment, 65-70% of the members of this population have excess hearing loss at 6 kHz, starting in the 20-29 year old age group (both genders). In females, the excess impairment at this frequency falls with age. In males, the excess impairment shifts to lower frequencies, eventually reaching a 60-65% prevalence of excess impairment at 3 kHz among 60-69 year olds. (Ongoing)

- **Health Tracking of Musculoskeletal Disorders Among Iowa Farmers.** (Feasibility project through Great Plains Center for Agricultural Health). Principal Investigators: John C. Rosecrance, PT, Ph.D, Colorado State University, and Daniel Anton, PhD, The University of Iowa. Nerve conduction tests for the detection of carpal tunnel syndrome (CTS) were conducted throughout Round 2 of the KCRHS. As of April 2004, 774 (83%) of potential participants completed nerve conduction tests. The preliminary results show 8.5% of those who completed testing met the case definition for CTS. This prevalence is higher than the 0.5 to 2.7% prevalence reported for the general population (Tanaka, 1994; Atroshi, 1999). There was no significant difference between men and women classified with CTS. However, participants classified with CTS were older (63 years old compared to 57 years of age for those without CTS) and had a higher body mass index (32 kg/m² compared to 29 kg/m²). After statistically adjusting for these two factors, study participants who were current or former farmers were less likely to be classified with CTS than non-farmers. Although nerve conduction slows with aging, there is no population-based data available showing how much decline occurs with aging. The data obtained from these nerve conduction tests will provide normative data for CTS in older populations. Although the funding for this project has ended, Dr. Anton is contributing his time and the data analyses are ongoing.
- **Childhood Asthma Case-Control Study.** Principal Investigator: James A. Merchant, MD, DrPH, The University of Iowa. Although NIOSH funding for this study ended in 2000, we continue to analyze the data collected. We studied a cohort of 610 rural children from Round 1 of the KCRHS to assess four asthma outcomes—doctor diagnosed asthma, doctor diagnosed asthma/medication for wheeze in the last 12 months, current wheeze and cough with exercise. The prevalence of doctor-diagnosed asthma was 12%, but any one of these four asthma outcomes was found in over a third of this population. The high prevalence of asthma outcomes is similar to that found in studies of urban children. Multivariable models of the four asthma outcomes found independent associations between male gender (three outcomes), premature birth (one outcome), early respiratory disease (three outcomes), a personal history of allergy (all four health outcomes), family history of allergic disease (two health outcomes), high risk birth (two outcomes), farm exposure to swine given antibiotics with feed (two outcomes). These findings underscore the need for rural asthma screening programs, for improved asthma diagnosis and treatment and the need for further population-based studies to assess environmental and genetic determinants of asthma among farm children. A manuscript reporting these data is under review and further investigations, including genetic studies, are planned. As the funding for this project ended in 2000, all of the work has been contributed.
- **Prevalence of vision impairment in adults.** The prevalence of bilateral blindness was 0.0044, the prevalence of monocular blindness was 0.035 and the prevalence of visual impairment in one or both eyes was 0.1063. Nearly 19% of the adult population report having visual problems that are not corrected by lenses or contacts. These findings suggest that there is a great need for eye care services

in rural communities. Affordable and accessible ophthalmic care, combined with regular eye checkups and education for eye care, is needed. Future research will assess the relationship between vision impairment and injury. A manuscript reporting these data is being prepared.

- **Characteristics of male batterers.** Principal Investigator: Corinne Peek-Asa, PhD, The University of Iowa. This study estimates the prevalence of male abusive behavior reported by men and their female partners and identifies characteristics of abusive men. From a population-based cohort study of a rural county, 572 men and their cohabitating female partners responded individually to questions about physical, emotional and sexual abuse. In this cohort, 13.6% of men were identified as moderate to severe physical abusers and 34.9% were emotional abusers. More than 45% of abusive men reported their own behaviors. Alcohol problems, antisocial personality characteristics, depressive symptoms, and financial stress were all positively associated with both physical and emotional abuse, but suicidal thoughts were less likely among abusers. Identification of common characteristics of abusive men may predict proclivity towards partner violence and barriers to behavior modification. A manuscript reporting these data is in press at *Injury Prevention*. Work on this project has been largely contributed.

Education and service

The Current Topics and Issues in Agricultural Health class (taught by Murray Madsen in the Department of Occupational & Environmental Health) visited the KCRHS research facility in Sigourney to learn about the study and participate as “research subjects.” November 2003.

KCRHS staff provided blood pressure checks for visitors to the Keokuk County fair and talked about the study at a Senior Citizens’ luncheon. July 2004.

We hosted a class of medical students enrolled in a Summer Research Program through the Department of Family Medicine and faculty member Jeanette Daly. At our research facility in Sigourney, Iowa, they went through the KCRHS protocol as “research subjects” in order to learn about the components of a complex research study. July 2004.

KCRHS staff regularly attended meetings of the Tobacco Coalition of Keokuk County in order to become informed about their work in the county and to share the goals of the KCRHS with them.

Community Advisory Committee

The Community Advisory Committee met twice for evening dinner meetings on October 14, 2003 and May 4, 2004, to discuss results of the study and plans for the future. Research projects planned for between Round 2 and Round 3 (Tractor Overturn Project and Neurobehavioral Study) were discussed and committee input was sought.

Newsletter

A Summer 2004 KCRHS newsletter was mailed to all of our research participants and Community Advisory Committee members.

Website

We continue to work on our website (www.kcrhs.org) to inform other researchers and the public about the study. We are currently participating in a web upgrading project that will facilitate a coordinated look (Alive and Well) that is consistent with that of the Great Plains Center for Agricultural Health and other agricultural health and safety centers in the department.

Meetings

The KCRHS Executive Committee (investigators, coordinator, and data analyst) meets weekly. KCRHS faculty and staff meet monthly, and KCRHS research staff and coordinator meet as needed. The KCRHS Community Advisory Committee meets biannually in Keokuk County. The KCRHS coordinator meets frequently to consult with and provide resources to faculty and student investigators working on KCRHS data or planning KCRHS-related projects. Dr. Stromquist and Dr. Kelly have consulted throughout the year with faculty and student researchers who are analyzing KCRHS data.

Mentoring students

The following graduate students worked (and continue to work) on projects using KCRHS data:

Florin Oprescu, MD, worked with us last year as a Fogarty International Scholar from Romania and is now enrolled in the PhD program in Public Health. He continues to work with the KCRHS, analyzing our data on vision. He is preparing a manuscript for publication based on these data.

Robin Epp, MD, is a 3rd year resident in Occupational Medicine and is currently working on an MPH. Dr. Epp is working with Dr. Fred Gerr, helping to conduct the Neurobehavioral Study described above.

Leah B. Maxwell, BS, is a 1st year student in the College of Medicine. She is working with Dr. Corinne Peek-Asa and being supported 1/8 time as a GRA by the KCRHS and 1/8 time by the Injury Prevention Research Center. She is analyzing KCRHS data related to partner abuse, depression, and youth risk behaviors. She received an award for outstanding oral presentation, based on KCRHS domestic violence data, at The University of Iowa College of Medicine Research Day competition. She is working on a manuscript based on the data she analyzed for this presentation.

Rebecca Tsai, MS, is in the PhD program in the Department of Epidemiology. She is working on KCRHS data to investigate the relationship between insurance coverage and self-reported physical and mental health status.

Katie Tharp, MPH, is a PhD student in the Department of Epidemiology. She is analyzing KCRHS Round 2 nutrition data in order to describe and predict fruit and vegetable consumption of adults in the KCRHS cohort.

Seong Woo Choi, MD, is a PhD student in the Department of Occupational and Environmental Health who is using KCRHS data for one third of his dissertation work. He is looking at the association of injury and decreased hearing.

Erin Heiden, MPH, is a PhD student in the Department of Community and Behavioral Health. She is an Occupational Injury Epidemiology fellow and an injury prevention and control student with the Injury Prevention Research Center. She conducts injury follow-up phone interviews with KCRHS Round 2 research subjects and will be helping to analyze the injury data.

Hope Thiesman, MSPH, is a PhD student in the Department of Epidemiology and an Occupational Injury Epidemiology fellow in the Heartland Educational Research Center. She is working with Drs. Corinne Peek-Asa, Craig Zwierling, and Nancy Sprince to analyze KCRHS data related to depression and injury.

Collaboration with other investigators

The KCRHS continues to serve as a rich resource for collaboration with researchers throughout the College of Public Health, The University of Iowa, and beyond. See list in Section VI.

Evaluation

As part of the external evaluation of the Great Plains Center, KCRHS faculty and staff met with Dr. Paul Gunderson in January and February 2004. Dr. Gunderson's final report states, in part,

... This effort is truly one of the "jewels" within The University of Iowa. That the GPCAH has funded it as a center project is a real credit to the foresight of those who designed and shepherded the formation of both the epidemiological catchment area and the GPCAH. Because it is such a large project within the overall center initiative, it seems imperative to fully utilize it scientifically, yet avoid respondent burden and weariness. The future of other catchment areas may be tenuous, **thus the Keokuk County Rural Health Study may emerge as the only viable rural epidemiological catchment area in North America.** . . .

... **Continuation of the "wave" of studies currently underway seems imperative.** They are clinically and scientifically rich, and will contribute in a significant way to the national scientific milieu. Additionally, they position the GPCAH to **shape national and international agendas at scientific and clinical venues.**

New grant proposal related to KCRHS

Childhood asthma. Application for funding sent to National Institute of Environmental Health Sciences. Principal Investigator: Elizabeth Chrischilles, PhD, Department of Epidemiology, The University of Iowa. Rural childhood asthma is a serious health problem with high prevalence. We first discovered this in the KCRHS where we reported that 17.5% of rural Iowa children have asthma, equaling the prevalence observed in large cities. While major studies abroad have found that farm life is protective, several recent

studies (and ours) refute this. We recently submitted a grant proposal for a population-based study of the determinants of asthma among children of private pesticide applicator (farmer) participants in the Iowa Agricultural Health Study (AHS) cohort. We will conduct: (1) a cross-sectional analysis of asthma prevalence and morbidity among 6,171 children currently aged 5 to 12 of parents who are AHS participants (aim 1); (2) a case-control study to test hypotheses about parent farming activities and development of childhood asthma among 800 children born after the parent's enrollment in the AHS (aim 2); and (3) a panel study of 180 AHS children with frequent asthma symptoms (aims 3-6) to test hypotheses about the association of asthma symptom severity with concentrations of irritant gases, inflammatory biological agents, particulates, and allergens. This study will be the first in-depth investigation of the determinants of asthma among U.S. farm children. KCRHS staff contributed in-kind.

Visitors

We hosted Dr. Srmena Krstev, Head of the Center for Development in Occupational Health and International Relations in Belgrade, Serbia--Yugoslavia. In Sigourney she visited our research facility and met with our staff to learn about the study. We also took her to visit staff in the Sigourney office of the Prevention Research Center's Community Health Action Partnership (CHAP).

KCRHS staff met with Anne Marie Heiberg, Norwegian Farmers Association for Occupational Health & Safety. She also visited our research facility in Sigourney and met with staff there.

F. PROJECT PRODUCTS

1) Presentations:

Merchant JA. Rural Health in the United States: Lessons from the Keokuk County Rural Health Study. Plenary speech at official opening of the Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Merlino LA, Anton D, Rosecrance JC. Musculoskeletal symptoms in a population-based cohort of farmers and rural residents. Oral presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Madsen MD, Sanderson WT, Rautiainen RH, Stromquist AM, Taylor C, Merchant JA. Keokuk County farm machinery and associated injuries. Oral presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM, Kelly KM, Burmeister LF, Zwerling C, Merchant JA, The relationship between partner abuse and depressive symptoms in a rural cohort: Results from round 1 of the Keokuk County Rural Health Study. Oral presentation at

Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM, Kelly KM, Burmeister LF, Zwerling C, Merchant JA. Adolescent mental health in a rural county: risk behaviors, depression, and suicide. Poster presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM. The relationship between partner abuse and depressive symptoms in a rural cohort: Results from Round 1 of the Keokuk County Rural Health Study. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 5, 2003.

Flamme GA. Hearing impairment and hearing aid use in rural Iowa. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 5, 2003.

Chrischilles E, Kuehl A. Asthma prevalence and morbidity among rural Iowa children. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 6, 2003.

Sanderson. The Design of Prospective Population-Based Longitudinal Studies and Their Role in Establishing Etiology of Human Disease, 21st International Neurotoxicology Conference. Honolulu, HI, 2004.

Peek-Asa C. Characteristics of male batterers and implications for clinical practice. UI Visiting Faculty Program. Iowa Lutheran Hospital. Des Moines, IA, Feb 19, 2004.

Peek-Asa C. The epidemiology of male battering. Epidemiology Seminar. The University of Iowa, Iowa City, IA, Mar 8, 2004.

Merchant JA, Chrischilles E, Burmeister L, Kelly K, Thorne P, Ahrens R, Wright-Naleway A, Svendsen E, Kuehl A, Stromquist A. Rural childhood asthma: the Keokuk County Rural Health Study. Environmental Health Impacts of CAFOs: Anticipating Hazards - Searching for Solutions Scientific Workshop. Iowa City, IA, Mar 30, 2004.

Tsai RJ, Vangilder RS, Kohatsu ND, Merchant JA. The relationship of insurance coverage to self-reported health status. Poster presentation for Epidemiology Department poster session, The University of Iowa. Iowa City, IA, May 2004.

Sanderson. Tractor Safety Concerns and Safe Use of Pesticides, KCRHS Executive Advisory Committee. Sigourney, IA, May 4, 2004.

Anton D, Merlino LA, Rosecrance JC, Gerr F. Carpal tunnel syndrome in a population-based cohort of rural and farm residents. National Symposium on Agricultural Health and Safety. Keystone, CO, June 2004.

Rosecrance JC, Rodgers G, Merlino LA, Anton D. Back pain and musculoskeletal disorders among Kansas farmers. National Symposium on Agricultural Health and Safety. Keystone, CO, June, 2004.

Maxwell LB. Intimate partner violence and depressive symptoms in a cohort of rural couples. Oral Presentation for Medical Student Research Day, The University of Iowa. Iowa City, IA, Sep10, 2004.

2) Publications:

a) Peer Reviewed Journal:

Chrischilles E, Ahrens R, Kuehl A, Kelly K, Thorne P, Burmeister L, Merchant J. Asthma prevalence and morbidity among rural Iowa school children. *Journal of Allergy and Clinical Immunology* 113(1):66-71, 2004.

Ettinger RL, Warren JJ, Levy SM, Hand JS, Merchant JA, Stromquist AM. Oral health: Perceptions of need in a rural Iowa county. *Journal of Special Care in Dentistry* 24(1):13-21, 2004.

LeVan TD, Von Essen S, Lambert GP, Martinez F, Vasquez M, Merchant JA. Polymorphisms in the CD14 gene are associated with pulmonary function in farmers. *American Journal of Respiratory and Critical Care Medicine*. In press.

Reynolds S, Tadevosyan A, Stromquist A, Fuortes L, Whitten P, Jones M, Zwerling C. Association between the use of farm chemicals and neurological and depressive symptoms in a cohort of Iowa farm operators. *American Journal of Industrial Medicine*. Submitted 2004.

Flamme, G, Mudipalli R, Reynolds S, Kelly K, Stromquist A, Zwerling C, Burmeister LF, Peng SC, Merchant J. Prevalence of hearing impairment in a rural Midwestern cohort: Estimates from the Keokuk County Rural Health Study, 1994-1998. *Ear & Hearing*. Submitted 2004.

Lambert GP, Spurzem JR, Romberger DJ, Wyatt TA, Lyden E, Stromquist AM, Merchant JA, Von Essen SG. Tumor necrosis factor- α hyper-responsiveness to endotoxin in whole blood is associated with chronic bronchitis in farmers. *Journal of Agromedicine*. Submitted 2004.

Peek-Asa C, Zwerling C, Young T, Stromquist A, Burmeister L, Merchant JA. A population-based study of reporting patterns and characteristics of men who abuse their female partners. *Injury Prevention*. Submitted 2004.

Merchant JA, Naleway AL, Svendsen ER, Kelly KM, Burmeister LF, Stromquist AM, Taylor CD, Thorne PS, Reynolds SJ, Sanderson WT, Chrischilles EA. Asthma and farm exposures in a cohort of rural Iowa children. *Environmental Health Perspectives*. Submitted 2004.

Curwin B, Hein M, Sanderson W, Barr D, Reynolds S, Ward E, Alvanja M.
Urinary pesticide levels among farmers and non-farmers in Iowa. Environmental
Health Perspectives. Submitted 2004.

Curwin B, Hein M, Sanderson W, Barr D, Reynolds S, Ward E, Alvanja M. Dust
and hand wipe pesticide levels among farmers and non-farmers in Iowa. Journal
of Occupational and Environmental Hygiene. Submitted 2004.

3) Education / Training / Outreach:

a) Training Seminars:

Sponsored Industrial & Occupational Coding Training Workshop by NCHS and
NIOSH, June 2004

b) Hazard Surveys / Consultations:

Eighty-nine environmental surveys were conducted by KCRHS Industrial
Hygienists on research subjects' farms and in their homes.

c) News Letters:

KCRHS Newsletter, Summer 2004. Distributed to all research participants in
KCRHS Round 1 and Round 2, as well as all members of the KCRHS
Community Advisory Committee.

4) Conferences / Meetings Sponsored:

KCRHS Community Advisory Committee Meetings (2)

G. STATES THE PROJECT WAS ACTIVE IN

Iowa

III. CENTER PROJECT REPORT BY CORE / TYPE: (Research Core, continued)

A. PROJECT TITLE

New Methods for Evaluation of Organic Dust Aerosols

B. PROJECT OFFICER(S)

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Peter Thorne, PhD, Co-Investigator
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Matthew Nonnenmann, MS, Field Research Asst
Marsha O'Neill, MS, Research Asst III
Kevin Kelly, PhD, Data Analyst

C. PROJECT DESCRIPTION

The goals of this research are to evaluate new methods for measuring inhalable and respirable dusts as well as endotoxins and glucans in agricultural settings. Because the new "size selective" aerosol sampling devices differ from older methods, there exists a need to correlate the concentrations reported when using the older methods to concentrations measured with the newer samplers. The performances of these samplers are typically evaluated using inorganic test dusts. A secondary component of this study is, therefore, to evaluate their collection characteristics when sampling organic dusts produced in agricultural facilities. This will include the use of several analytical techniques for evaluating the endotoxin and glucan components of the collected organic dusts.

Specific aims are:

1. Evaluate and compare the precision and relative predicted dust concentration for the following gravimetric methods for measuring organic dusts in swine, poultry (chicken and turkey), and dairy environments: Inhalable (IOM) sampler, Inhalable (IOM), button aerosol sampler, total dust (37 mm cassette), respirable dust (cyclone).
2. Evaluate and compare the precision and relative predicted dust concentration of these devices and collection media for measurement of endotoxins and glucans/ergosterols in these same environments using both assay and chemical methods.
3. Determine the relationships between chemical analyses and biological assays for endotoxins and glucans in these dust samples, and identify specific chemical fractions that best correlate with assay measures. Characterize the distributions of endotoxins and ergosterols by specific chemical components and size fraction in these various organic dust environments.
4. Evaluate the precision and relative predicted dust concentration for direct reading aerosol instruments including the DataRam, HAM, and their relationship to the gravimetric methods in these organic dust environments. Calibrate these devices compared to traditional gravimetric methods and derive correction factors if needed for adjustment of data produced by these devices. Characterize aerosol size distributions using Grimm direct-reading particle counter. Evaluate the usability and utility of these direct reading aerosol devices for practical applications in these agricultural environments.

D. PROJECT START AND END DATES

09/30/2001-09/29/2006

E. PROJECT ACTIVITIES / ACCOMPLISHMENTS

Lab-based Data Collection

We have concluded the sampler comparisons using an inorganic test dust as a control dust to demonstrate typical performance of the aerosol samplers in both the 1-m³ “still air” chamber at the The University of Iowa and the wind tunnel at Colorado State University under the direction of Dr. Stephen Reynolds. During these trials we placed duplicates of each sampler in the chamber at the same time and used regression and correlation analysis to determine a conversion factor to relate the mass collected on one sampler relative to that of any other sampler. Results indicate that there are differences when sampling the dust in the still-air chamber and at two different wind speeds (0.2 and 1.0 m/s). Despite the differences, the samplers are well correlated with one another with Pearson Coefficients greater than 0.9 for all comparisons. We have also expanded upon this work by developing a novel method for determining the actual collection efficiency curve for each sampler with the use of a particle counter analyzing particles in a number of size ranges varying from 0.3 to 15 microns. This information will allow us to not only report that there are differences (from our results as described above) but will also enable us to explain why these differences are occurring in terms of demonstrating the actual shifts in collection efficiency. This work is nearly completed.

Swine dust collected from the swine confinement facilities has also been aerosolized in both chambers. Data from the still-air chamber showed discrepancies relative to sampler comparisons taken in the actual confinement. This difference can be explained by the fact that the range of “total” dust sampled in the confinement was only 2 to 6 mg/m³ compared to a range developed in the chamber of 5 to 25 mg/m³. The low range in the confinement, for example, resulted in no association between the IOM and the cyclone because the respirable fraction measured by the cyclone was extremely low and did not increase with the slight increase in total concentration. We are currently conducting lab trials with the chicken dust and plan to complete trials with chicken, turkey, and dairy dust during 2005.

In addition to gravimetric measurements of concentration, we are also conducting the endotoxin analysis for all samples collected from the lab and field. Results show that there is no significant difference in endotoxin (EU/mg of dust) measured by the four samplers ($p = 0.67$) in the field or in the lab ($p = 0.11$). The overall average was 3500 EU/mg. Comparisons between photometer output and concentration measured with the samplers is ongoing. As expected, we are seeing much closer associations when comparing the lab samples than those taken in the field where the dust is more heterogeneous and varied from day to day.

Field-based Data Collection

During the winter of 02-03, field sampling was conducted and completed at the swine confinement. During the winter of 03-04, field sampling was completed at both the chicken and turkey sites. Field sampling will be completed in the final dairy CAFO (concentrated animal feeding operation) this winter. Results indicate good correlation between the samplers designed to sample large particles (“inhalable” and “total” dust) but not between those samplers and the cyclone measuring respirable dust for reasons indicated above. However, initial results from the turkey CAFO shows a large difference between the values obtained from the IOM versus that of the Button sampler. We speculate that this difference is primarily related to the abundance of feathers in the air of these facilities. These feathers tend to inhibit sampling of the Button sampler, which has a screened inlet. This inlet can become completely covered by feathers by the end of the sampling period. For example, the correction factor for the Button versus the IOM (Button/IOM) determined from lab trials (still air) was 0.48 whereas it was near one for the test dust.

Data Analysis

All information collected during this study has been noted in a bound lab book and entered into a spreadsheet for analysis and graphing. A binder has been used to collect information obtained during each trial run. The specific steps associated with carrying out these trials have also been recorded. Although some initial statistical analysis has been conducted using the spreadsheet, SAS will be used to make final statistical comparisons relevant to this study. This analysis has involved paired T-tests and a correlation analysis to compare between two different sampler types.

F. PROJECT PRODUCTS

1) Presentations:

O’Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Differences in Aerosol Sampler Collection Characteristics When Sampling Three Dust Types. 22nd Annual Conference of the American Association of Aerosol Research. Anaheim, CA, Oct 2003.

Donham KJ. Dose-Response Relationships in Mixed Agricultural Aerosol: Implications for Exposure Limit Setting for Endotoxin, Particulate Matter, and Ammonia in Confined Animal Feeding Operations. Fifth International Symposium, Future of Rural Peoples: Rural Economy, Health People, Environment, Rural Communities, Saskatoon, Saskatchewan, Canada. Oct 19-23, 2003.

O’Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Aerosol Sampler Collection Characteristics When Sampling Organic And Inorganic Dusts. Midwest Agricultural Health and Safety Forum. Des Moines, IA, Nov 5-6, 2003.

O’Shaughnessy PT. Characterization of a Hooded Human Exposure Apparatus. NIOSH Pilot Project Research Symposium, University of Illinois-Chicago and The University of Iowa. April 2004.

Golla V, O'Shaughnessy P. A Comparison of the Collection Characteristics of Four Size-Selective Samplers during Laboratory and Field Trials. American Industrial Hygiene Conference & Exposition. Atlanta, GA, May 8-13, 2004.

2) Publications:

a) Peer Reviewed Journal:

O'Shaughnessy PT, Mehaffy JM, Watt J, Sigurdarson S, Kline JN. Characterization of a hooded exposure apparatus for inhalation of gases and aerosols. Journal of Occupational and Environmental Hygiene 1:161-166, 2004.

b) Other Publications:

O'Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Differences in Aerosol Sampler Collection Characteristics When Sampling Three Dust Types. (Abstract No. 9PE9) 22nd Annual Conference of the American Association of Aerosol Research, Anaheim, CA, Oct 2003.

Sigurdarson ST, O'Shaughnessy PT, Watt JA, Kline JN. Experimental Human Exposure to Grain Dust and Ammonia: A Model of Concentrated Animal Feeding Operations. Abstract: American Journal of Respiratory and Critical Care Medicine, 167(7) A504, 2003.

O'Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Differences In Aerosol Sampler Collection Characteristics When Sampling Three Dust Types. (Abstract No. 9PE9) 22nd Annual Conference of the American Association of Aerosol Research, Anaheim, CA, Oct 2003.

O'Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Aerosol Sampler Collection Characteristics When Sampling Organic And Inorganic Dusts. Midwest Agricultural Health and Safety Forum, Des Moines, IA, Nov 5-6, 2003.

Golla V, O'Shaughnessy P. A Comparison of the Collection Characteristics of Four Size-Selective Samplers during Laboratory and Field Trials. American Industrial Hygiene Conference & Exposition, Atlanta, GA, May 8-13, 2004.

G. STATES THE PROJECT WAS ACTIVE IN

Colorado
Iowa

III. CENTER PROJECT REPORT BY CORE / TYPE: (Education and Outreach Core)

A. PROJECT TITLE

Education and Outreach Core

B. PROJECT OFFICER(S)

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Lisa Irving, Training Specialist
Meggan Harrington, Project Assistant
Pat Francisco, Account Specialist

C. PROJECT DESCRIPTION

The Education and Outreach Core provides support for the development and presentation of a comprehensive agricultural safety and health (ASH) educational program. The core subject matter has been developed by working with regional agricultural health and safety professionals and rural practitioners. A formalized, didactic curriculum, the only such program of its kind in the nation, provides specialty training in ASH through prescribed courses for MS and PhD candidates. The courses, classes, and the Agricultural Occupational Health Certificate Course (now being considered in other states) enrich the learning experience for students in Nursing, Medicine, Veterinary Medicine, Physician Assistant programs, Industrial Hygiene, and Ergonomics. External expertise has been engaged in evaluating this certificate course. Regional conferences provide opportunity for continuing education and are augmented with important, focused initiatives. These initiatives include development of an educational program in ASH for parish nurses and expansion of the AgriSafe Network of clinics, the first and only comprehensive agricultural occupational health service delivery program in the U.S. Outreach through the internet and newsletter as well as other media channels, presentations, and exhibits

extends the ASH information reach to the general public, rural residents, farm families and workers.

The specific aims of the Education and Outreach Core are to:

1. Develop Post-Doctorate training and a specialty track in Agricultural Safety and Health (ASH).
2. Provide enrichment training in agricultural health to veterinary students, medical students, public health students, and other health science students.
3. Expand the certificate program in Agricultural Occupational Safety and Health to include distance learning.
4. Develop a web page and newsletter on current agricultural health and safety issues.
5. Hold biennial regional conferences.
6. Teach agricultural health and safety to rural parish nurses and clergy.
7. Develop core curriculum in ASH for use in training health care professionals.
8. Assist the state of Illinois in developing a course in ASH for health care and safety professionals.
9. Expand the network of agricultural occupational health clinics (AgriSafe).

We have been successful in obtaining additional resources at The University of Iowa to support agricultural education and outreach. These resources include:

- Iowa's Center for Agricultural Safety and Health
- The Education and Outreach Core of the Great Plains Center for Agricultural Health
- The Agricultural Safety and Health Training Core of the Heartland Center for Occupational Health and Safety.
- Physician Assistants training support from Health and Human Services.

These resources are utilized such that the activities are coordinated but do not overlap.

The following points highlight the focus and collaboration between these Centers. Iowa's Center for Agricultural Safety and Health (I-CASH) has a primary function for communication, coordination, and planning of state and non-governmental organization (NGO) resources in agricultural safety and health. I-CASH is a consortium of ISU Extension, the Iowa Department of Public Health, the UI College of Public Health, the Department of Agriculture and Land Stewardship, safety NGOs (such as FS4JK), farm organizations and affiliated farmers. ICASH facilitates communication between these groups and the Great Plains Center for Agricultural Health. The Education and Outreach Core of the Great Plains Center for Agricultural Health develops core curriculum in Agricultural Safety and Health based on input from health care practitioners, farm safety experts, and the farm community; conducts continuing education courses for a network of ten family medicine residency programs in Iowa; supports Farm Safety 4 Just Kids in their chapter development and programming; develops an agricultural health website and newsletter; helps to plan regional conferences; and develops a training program in agricultural safety and health for parish nurses. The primary objectives of the Agricultural Safety and Health Training Program of the Heartland Center for Occupational Health and Safety are to develop agricultural safety and health training

materials for classroom and distance learning, and development of the Agricultural Occupational Health Nurse Certificate Program.

D. PROJECT START AND END DATES

09/30/2001-09/29/2006

E. PROJECT ACTIVITIES / ACCOMPLISHMENTS

During the past year the Education and Outreach Core supported a number of outreach activities including five radio interviews, public service announcements in the Cedar Rapids Gazette, and agricultural health and safety courses at The University of Iowa, College of Public Health. We also hosted a rural and agricultural health program on the nationally syndicated radio program, "Science Friday", hosted by Ira Flatow on National Public Radio. The agricultural safety and health group meets twice monthly to coordinate activities and resources within GPCAH and in conjunction with other Centers' interests and aims.

Lectures in agricultural health were provided to 27 students in environmental health, 77 second year veterinary medicine students, 4 occupational medicine residents, 5 occupational health nursing students, and 4 industrial hygiene students. We have been working with Dr. Steve Kirkhorn, MD, Lana Skarske, RN, Carolyn Sheridan, RN, and Dr. Susanna Von Essen, MD, to review the curriculum for our training program. For the current year, 48 nurses, physician assistants, and physicians completed our 40-hour Agricultural Occupational Health Certificate Course. We have revised the curriculum, developed new teaching materials, developed a website for the certificate exam, and are pursuing a web-based, real-time, audio-visual distance learning program. Work has begun on revising and updating the website family member for the Great Plains Center for Agricultural Health.

A formalized agricultural health and safety didactic curriculum for the MS and PhD students was put into place fall of 2001. All courses are required for the PhD. All courses except Infectious Diseases Epidemiology and Advanced Agricultural Safety and Health are required for the MS. The required agricultural health and safety courses include the following:

- Rural Health and Agricultural Medicine: 175:209 – 3 sh.
- Agricultural Safety: Theories and Practice: 175:167 – 2 sh.
- Current Topics in Agricultural Health: 175:210 (required every semester) - 1 sh.
- Research and Thesis in Agricultural Safety and Health: 175:201 4-6 sh.
- Preceptorship in (Agricultural) Occupational Health: 175:203
- Infectious Diseases Contracted from Animals and the Environment, Zoonoses (Infectious Diseases Epidemiology): 173:255 3 sh.
- Advanced Agricultural Health and Safety (course not numbered at present)

Ten students are enrolled in the Agricultural Health and Safety MS/PhD program. (Table 1 lists these students and their affiliated program.) One graduated from the M.S.

curriculum this past year and entered into a nursing PhD curriculum emphasizing the health of the aging farmer.

Table 1

Occupational Health Nursing	Industrial Hygiene	Occupational Medicine	Ergonomics / Industrial Hygiene	Injury Epidemiology
Jayne Nirschel	Jeff Miller	Ann Li	Matt Nonnenmann	Rebecca Heick
Mary Brooks	Matt Murphy			
Mary Nissen				
Sharon Columbus				
Michelle Umbarger				

To date, 288 students have completed our 40-hour Agricultural Occupational Health certificate course. We have offered the option for students to take this course for three hours of graduate studies credit for the third time this past summer. We have revised the curriculum and have developed new teaching materials. We have developed a web-based distance learning format for the first half of this course, and it was implemented for the first time this past spring. For the current year we will have certified in agricultural occupational health, by examination, the following: 2 nurses, 14 physician assistants, 3 physicians, 5 veterinarians, and 1 respiratory therapist.

The newsletter developed last year together with our partner program, Iowa’s Center for Agricultural Safety and Health (I-CASH), has continued to grow and develop in its content.

On November 5-6, 2003, the Great Plains Center for Agricultural Safety and Health co-sponsored the Midwest Agricultural Safety and Health Forum, in collaboration with Iowa’s Center for Agricultural Safety and Health, the Colorado and Wisconsin NIOSH Ag Centers, and the Iowa Rural Health Association. The program included research and intervention presentations, with special sessions on communication and agricultural health and safety policy.

We continued to work with the University of Illinois at Urbana, the ERC at Chicago, and Carle Medical Center to put on an ASH course for health professionals. We also continued to work with Dr. Robert Petrea to put on his new distance-learning course in ASH for students in Illinois. Developing collaborations are occurring with South Dakota State University for a train-the-trainer program and a new AgriSafe program. Furthermore, a new initiative began this past summer to develop a regional AgriSafe program in Eastern Iowa.

The work with our external collaborators, Dr. Steve Kirkhorn, MD, Lana Skarsky, RN, Carolyn Sheridan, RN, and Susanna Von Essen, MD, to review and evaluate the

curriculum in our training program has progressed. Although the report from our external evaluators was very positive, we have instituted several changes in our course based on the evaluation. Some of these changes are to include more case-based learning and to make more distance learning available. Our core curriculum project has been incorporated into the planning of a new text book. Dr. Donham completed about 98% of the first draft of the new textbook entitled, "Agricultural Medicine: Occupational and Environmental Health for Rural Health Professionals," to be completed early in 2005.

As stated above, we are in the process of adding new AgriSafe Network clinics in Iowa and the region. There are two new possible clinics in Eastern Iowa, and one each in Texas, Illinois, South Dakota, North Dakota, and Kansas. This would bring the potential total to 29 clinics. We have finalized the process of transforming the AgriSafe clinics into a nonprofit organization, to facilitate network development on a regional and national scale. The AgriSafe Network not only draws on the Great Plains Center for Agricultural Safety and Health for personnel development, but also serves as a channel for outreach. The AgriSafe network is our Extension Service to the health care, public health, and farming community in the region.

We are still working with the National Institute for Farm Safety to provide a certificate course in agricultural health and safety. We plan to employ our current certificate course for that purpose, combining distance learning with a workshop format at the summer meeting held every June.

Internationally we have nurtured our connection with The Gambia. During his visit Dr. Kelley Donham gathered data on agricultural production practices and technical resources in Gambian agriculture, as well as pesticide use and practices. He assisted in development of a research project on prevention of health hazards to Gambian farm workers and strengthened relations between The University of Iowa and the Gambian government. Mr. Rex Kuye (from the Gambia), our international PhD student in agricultural safety and health, has completed collecting data for his dissertation research. He has conducted an overall assessment of occupational hazards of farmers in the Gambia in addition to a study of pesticide exposures in cotton farmers. One of our new PhD agricultural health students, Matt Murphy, spent the summer of 2004 in the Gambia to establish his preceptorship in international agricultural health. Based on his summer experience, he developed a prospectus for his research. He will be conducting his research on pesticide exposure to pesticide applicators and farming communities in the Gambia.

F. PROJECT PRODUCTS

1) Presentations:

Grafft L. Agricultural Trauma, West Union, IA, Oct 13, 2003.

Donham K. Respiratory Symptoms, Pulmonary Function, and Respirator Use Among Certified Safe Farm Participants. 5th International Symposium, Future of Rural

Peoples: Rural Economy, Healthy People, Environment, Rural Communities,
Saskatoon, Saskatchewan, Canada, Oct. 19-23, 2003.

Donham K. Occupational Health Concerns of Concentrated Livestock Production: So
What is New? Midwest Rural and Agricultural Safety and Health Forum, Des
Moines, IA , Nov 5-6, 2003.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, Nov 17,
2003.

Heick R, Rautiainen R, Peek-Asa C, Lundell J, Johnson W. Iowa agricultural
fatalities. NOIRS Conference, Pittsburgh, PA. November, 2003.

Grafft L. Respiratory Issues for Turkey Growers, Des Moines, IA, Dec 4, 2003.

Donham K. Agricultural Skin Diseases. Iowa Lutheran Hospital, Des Moines, IA,
Dec 12, 2003.

Donham K. Skin Diseases of Farmers. Iowa Lutheran Hospital, Des Moines, IA, Dec.
18, 2003.

Grafft L. Farm Safety Issues. Farm Credit Managers, Ames, IA, Feb 6, 2004.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, Mar 1,
2004.

Grafft L. Safety Concerns for Farmers. North Iowa Farm Exposition, Mason City, IA,
Mar 4, 2004.

Grafft L. Agricultural Trauma for Emergency Physicians. Emergency Room
Conference, Omaha, NE, Mar 19, 2004.

Donham K. Skin Diseases of Farmers. Broadlawns Medical Center, Des Moines, IA,
May 5, 2004.

Donham K. Community Health Concerns in Agriculture: From Hog Lots to Water
Pollution. Broadlawns Medical Center, Des Moines, IA, May 5, 2004.

Sanderson W. Continuing Education Course: Implications for Industrial Hygiene in
Occupational Health Nursing. American Association of Occupational Health Nurses,
Kansas City, MO, May, 2004.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, May 24,
2004.

Agricultural Occupational Health Certification Course (a 3-day intensive workshop),
Oakdale, IA, Part 1 of 2 (May 19-21, 2004):

- Donham K. Course Overview, Certified Safe Farm Program
- Donham K. Biological Hazards.
- Fuortes L. Agricultural Toxicology - Symptoms, Exposure History, Pathophysiology, Nursing Assessment, and Prevention of Illnesses.
- Donham K. Zoonoses - Agents, Exposure History, Pathophysiology and Prevention of Illnesses.
- Donham K. Agricultural Skin Diseases.
- Donham K. Rural Environmental Health Problems.
- Grafft L. Acute Trauma Among Farmers.
- Donham K. Agricultural Respiratory Issues: Assessment and Prevention.

Agricultural Occupational Health Certification Course (a 3-day intensive workshop),
Oakdale, IA, Part 2 of 2 (Jun 9-11, 2004):

- Donham K. Course Overview.
- Anton D. Ergonomic Issues Facing the Farming Community/Evaluation and Management of Agricultural Related Back Injuries
- Flamme G. Physiology of Noise-Induced Hearing Loss.
- Sanderson W. Industrial Hygiene Prevention Scheme
- Sanderson W. Recommendations for PPE (noise and chemical).
- Arpey C. Skin Cancer: Pathophysiology and prevention.
- Rosmann M. Behavioral Health Issues in the Farming Community.
- Keninger T. Easter Seals Rural Solutions Program-Resource for Disabled Farmers.
- Grafft L, Rautiainen R. Tour Local Farm and Implement Dealership : Identify Selected Hazards and Types of Agricultural-Related Injuries.
- Donham K, Grafft L. Case Presentations/Scenarios/Problem Solving.
- Sheridan C. Next Steps in the Development of an Agricultural Health Clinic.

Grafft L. Preparing and Effective Presentation. Environmental Health Sciences
Institute, Iowa City, IA, June 24, 2004.

2) Publications:

a) Peer Reviewed Journal:

Nonnenmann MW, Donham KJ, Rautiainen RH, O'Shaughnessy PT, Burmeister LF, Reynolds SJ. Vegetable Oil Sprinkling as a Dust Reduction Method in Swine Confinement. *J Ag Safety Health*, 10(1) :7-16, 2004.

Anderson CI, Von Essen SG, Smith LM, Spencer J, Jolie R, Donham KJ. Respiratory symptoms and airway obstruction in swine veterinarians : a persistent problem. *Am J Ind Med* 46(4) :386-92, 2004.

Sigurdarson ST, Donham KJ, Kline JN. Acute toxic pneumonitis complicating chronic obstructive pulmonary disease (COPD) in a farmer. *Am J Ind Med* 46(4) :393-5, 2004.

Humann M, Donham K, Jones M, Achutan C, Smith B. Occupational Noise Exposure Assessment in Intensive Swine Farrowing Systems: Dosimetry, Octave Band, and Specific Task Analysis. J Agromedicine. Accepted 2004.

Lee JA, Donham KJ, Reynolds SJ, Thu K. Assessment of air quality in the vicinity of swine confinement facilities in Iowa. J Agromedicine. In press 2004.

Donham K, Wheat J, Simpson B, James P, Kirkhorn S. Agricultural medicine: what's in a name – revisited. J Agromedicine. In press, 2004.

b) Fact Sheets / Brochures / Technical Publications:

Grafft L, Donham K. The Agricultural Health and Safety Training Program at The University of Iowa.

Fisher E, Sheridan C, Roy. The AgriSafe Program.

Grafft L, Schneider S, Donham K. Use of PPE for the Certified Safe Farm.

c) Other Publications:

Fisher E. Monthly electronic bulletin to partners in agriculture safety and health.

Donham K. Revised bibliography for veterinary students at Iowa State University

Donham K. Revised course manual for Rural Health and Agricultural Medicine

Donham K. Revised course manual for Agricultural Occupational Health Certificate Course

3) Education / Training / Outreach:

a) Training Seminars:

Sanderson W. Use of PPE in the agricultural environment, Nov 2003.

b) Short Courses:

Agricultural Occupational Health Certification Course (Two 3-day intensive workshops), Oakdale, IA, Part 1 of 2 (May 19-21, 2004), and Part 2 of 2 (Jun 9-11, 2004).

c) Hazard Surveys / Consultations:

Donham K, Miller J. Noise assessment and control for a large swine production firm. Summer 2004.

Miller J, Sanderson W, Donham K. Evaluation of an electrostatic dust control method for swine production. Winter 2004.

d) News Letters:

Farm Families: Alive & Well

e) CD-ROMs or other Computer-Based Training Programs:

Worked with Dr. Robert Petrea to put on a new distance-learning course in ASH for students in Illinois

Developed computer-based training module for Agricultural Occupational Certificate Course

f) Other:

Regular public service announcements in the press (Cedar Rapids Gazette):

Grafft, L. Zoonotic diseases, October 12, 2003

Grafft, L. Keeping guests safe on the farm, November 9, 2003

Grafft, L. Slips, trips and falls, December 14, 2003

Grafft, L. Avoiding hypothermia, January 18, 2004

Grafft, L. Be prepared for medical emergencies, February 8, 2004

Grafft, L. Safety with chemicals, March 14, 2004

Grafft, L. Staying safe on the farm, April 11, 2004

Grafft, L. Safety around livestock, May 9, 2004

Grafft, L. Protect skin from the sun, June 13, 2004

4) Conferences / Meetings Sponsored:

On November 5-6, 2003, the Great Plains Center for Agricultural Safety and Health co-sponsored the Midwest Agricultural Safety and Health Forum, in collaboration with Iowa's Center for Agricultural Safety and Health, and the Colorado and Wisconsin NIOSH Ag Centers. The program included research and intervention presentations, with special sessions on communication and agricultural policy.

G. STATES THE PROJECT WAS ACTIVE IN

Colorado	Kansas	Texas
Iowa	North Dakota	Wisconsin
Illinois	South Dakota	

III. CENTER PROJECT REPORT BY CORE / TYPE: (Prevention Intervention Core)

A. PROJECT TITLE

Certified Safe Farms for Iowa Dairy Farmers

B. PROJECT OFFICER(S)

Risto Rautiainen, PhD, Principal Investigator
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Telephone: 319-335-4887
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Sam Steel, EdD, Co-Principal Investigator
Kelley Donham, DVM, MS, Co-Investigator
LaMar Grafft, MS, Agricultural Safety Specialist
Sara Schneiders, MS, Coordinator
Dan Neenan, Safety Auditor
Charlotte Halverson, Health Assessor
Gloria Reiter, Office Assistant

C. PROJECT DESCRIPTION

The Certified Safe Dairy Farm project functions under the Prevention Intervention Core, which provides leadership in the development of strategies aimed to reduce injuries and illnesses in agriculture such as through the Certified Safe Farm program modified for dairy farmers.

The Certified Safe Farm (CSF) program concept includes reducing farm-related injuries and illnesses and passing along associated cost savings to farmers, insurers, and agribusiness. To become certified, farmers complete an occupational health clinical screening, specific safety education tailored to their own health and farming situation, and an on-farm safety review. They must meet or exceed a minimum passing score on the on-farm safety review to become certified. Maintaining the certification status requires participation in periodic health screenings, education, and safety reviews. It is anticipated certified farms will be eligible for insurance discounts and other benefits in the future. This project focuses on method development to make the CSF program applicable to dairy farms and set an example for further expansion to other commodities.

The Specific aims of the project are to:

1. Evaluate the CSF on-farm safety review checklist and develop modules to address the specific hazards of dairy farming.
2. Evaluate the occupational history and clinic forms and develop questions that address exposures and health effects in dairy farming.
3. Select and/or develop educational materials for dairy farms.
4. Pilot test the CSF dairy health screening, education and on-farm safety review procedures on at least three farms and make modifications as needed.
5. Recruit at least 25 dairy farmers into the study.
6. Provide health screenings and on-farm safety reviews for participating farms.
7. Collect data on exposures and health outcomes using the existing CSF phone interview and other methods, and
8. Develop guidelines for further program expansion into other commodities and types of farming.

D. PROJECT START AND END DATES

09/30/2001-09/29/2006

E. PROJECT ACTIVITIES / ACCOMPLISHMENTS

The Certified Safe Dairy Farm project conducted in collaboration with the National Education Center for Agricultural Safety (NECAS) has continued to progress as planned. The third year of the project has just been completed, during which the revised CSF dairy checklist and clinical screening forms were used with the farms participating in the project. To date, 24 farms have been reviewed and 15 farms have received their health screenings. We used experience from the dairy checklist sections and revised other sections as well. The entire checklist has a new look and scoring system. It is based on Microsoft Excel (rather than EPI info) which enables scoring and reporting locally. During year 3, we used both the old and new checklist versions, and we will compare results in terms of passing rate and safety problems identified.

With funding raised locally (\$11,000), the project staff were able to provide respiratory and hearing protection to every farm, 188 slow moving vehicle (SMV) emblems, and 18 ten-pound fire extinguishers. In addition, ten tractors from seven farms were retrofitted with Rollover Protective Structures (ROPS) and seatbelts. Collectively, the safety equipment reduced the on-farm review scores of the 24 farms by 1,470 points.

This CSF dairy project also helped secure funding for a new CSF study, which is conducted in collaboration with Iowa Farm Bureau and Wellmark Blue Cross Blue Shield. The project will compare health insurance claims on CSF farms versus control farms. The experiences from the CSF dairy have been used to modify CSF forms and review protocols. Recruitment for this project has begun at two sites (Spencer and Dubuque, IA). To date, 21 farms have indicated their interest in participating in the Dubuque area. The CSF dairy project has been well received among participating farmers, and this has helped recruitment efforts for the new expanded CSF study.

NECAS will send a quarterly safety and health update to the 25 farms in FY05. The safety and health update will include topics and resources relevant to dairy farms like choosing appropriate personal protective equipment (PPE), safely storing chemicals and cleaners, and other topics as selected by the project team.

F. PROJECT PRODUCTS

1) Presentations:

Donham K, Schneiders S, Rautiainen R, Madsen M. Helping Farmers Stay Alive and Well in Agriculture. Certified Safe Farm presentation for Iowa Farm Bureau. Des Moines, IA. October 6, 2003.

Rautiainen R, Grafft L, Schneiders S, Donham K. Evaluation of the Certified Safe Farm On-farm Safety Review Process. Future of Rural Peoples Conference. Saskatoon SK, Canada, October 19-23, 2003.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. University of Saskatchewan, Saskatoon, SK, Canada, Oct 19-23-2003.

Rautiainen R, Grafft L, Schneiders S, Donham K. Evaluation of the Certified Safe Farm On-farm Safety Review Process. Midwest Forum for Agricultural Safety and Health. Des Moines, IA, November 5-6, 2003.

Rautiainen R. Injuries in the Iowa Certified Safe Farm Study. Midwest Forum for Agricultural Safety and Health, Des Moines, IA, Nov 5-6, 2003.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. Midwest Forum for Agricultural Safety and Health, Des Moines, IA, Nov 5-6, 2003.

Rautiainen R. Injuries in the Iowa Certified Safe Farm Study. Governor's Safety Conference, IA, Nov 6, 2003.

Grafft L. Certified Safe Farm, Spencer, IA, Jan 22-23, 2004.

Rautiainen R. Evaluation of the Certified Safe Farm Program. Improving Agricultural Safety and Health Programs through Evaluation Conference, Ohio State University, Columbus, OH, Mar 14-16, 2004.

Schneiders S, Madsen M, Fisher K, Donham KJ. Qualitative Evaluation of the Iowa Certified Safe Farm Program. National Institute for Farm Safety (NIFS) Conference, Keystone, CO, Jun 20-24, 2004.

Rautiainen R, Grafft L, Lange J, Madsen M, Schneiders S, Donham KJ. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. National Institute for Farm Safety (NIFS) Conference, Keystone, CO, Jun 20-24, 2004.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. National Institute for Farm Safety Meeting, Keystone, CO, Jun 21-24, 2004.

2) Publications:

a) Peer Reviewed Journal:

Rautiainen R, Lange J, Hodne C, Schneiders S, Donham K. Injuries in the Iowa Certified Safe Farm Study. *Journal of Agricultural Safety and Health* 10(1):51-63, Jan 2004.

Rautiainen RH, Ohsfeldt R, Sprince NL, Donham KJ, Burmeister LF, Reynolds SJ, Saarimaki P, Zwerling C. Cost of injuries and occupational diseases in agriculture in Finland. *Journal of Agromedicine*. Submitted 2004.

b) Trade Journals:

Make Your Farm Certified Safe. *Pioneer Growing Point Magazine*. Jan 2004.

c) Fact Sheets / Brochures / Technical Publications:

Rautiainen R, Grafft L, Steel S, Madsen M, Neenan D, Donham K. Certified Safe Farm Checklist, 2004 Edition. December 2003.

d) Other Publications:

Rautiainen R, Grafft L, Lange J, Madsen M, Schneiders S, Donham K. Evaluation of the Certified Safe Farm On-Farm Safety review process. Abstract, Keystone, CO, Jun 20-24, 2004.

Neenan, D. NECAS: Working to make farms and ranches a safer workplace. *Julien's Journal*, Dubuque, IA, June, 2004.

Article in *Growing Point Magazine*

3) Education / Training / Outreach:

a) Hazard Surveys / Consultations:

Neenan D. Certified Safe Farm reviews (24)

Halverson C. Certified Safe Farm clinical screenings (15)

b) Other:

Great Plains Center for Agricultural Health. <http://www.public-health.uiowa.edu/gpcah/>

Certified Safe Farm. <http://www.public-health.uiowa.edu/icash/csf/>

Rautiainen R, Steel S, Madsen M, Neenan D, Donham K. Certified Safe Farm Checklist, 2004 edition.

G. STATES THE PROJECT WAS ACTIVE IN

Iowa

IV. PROGRESS REPORT ON FEASIBILITY PROJECTS

Evaluation of Ammonia Adsorption to Particles

Airborne contaminants within CAFOs (concentrated animal feeding operations), including bioaerosols and gases, can contribute to a decrease in pulmonary function among exposed workers. This pilot study was initiated to determine the relationship between environmental factors (temperature and relative humidity) and the relative amount of ammonia gas adhered to a corn dust particle. The premise was that ammonia is easily dissolved in water and if a layer of water forms on particles under high humidity conditions then one would expect more ammonia per mass of particles than those in low humidity air. Of particular concern was swine confinements where high animal densities coupled with very low ventilation rates can contribute to high indoor humidities in the winter. The study was conducted in a room-sized chamber with environmental control of the ventilated air to achieve humidities ranging from 5% to 95%. The corn dust particles were generated within the chamber at the same time that ammonia gas was entrained in the air. The particles were then analyzed for ammonia concentration. No significant correlation between humidity level and the mass of ammonia on the dust was found.

Pilot Study of Neurological and Neurobehavioral Outcomes Among Farm Workers

Funded as a feasibility project of the GPCAH. Principal-Investigator, Fred Gerr, MD is using neurobehavioral (NB) tests to measure and quantify central nervous system (CNS) function. Although many “batteries” of tests can be proposed, a relatively short battery of tests that cover a wide range of CNS functions includes: 1) Digit symbol substitution (*coding*), 2) Sequences “B” (*concept shifting*), 3) Diamond Naming Test (*word finding*), 4) Hopkins Verbal Learning Test (*short term verbal memory*), 5) Positive and Negative Affect Schedule (PANAS) (*positive and negative affectivity*), 6) Center for Epidemiological Studies Depression scale (depressed mood). The estimated time for computer assisted administration of these tests is 20-25 minutes. After collection of these data, it will be possible to examine for the effects of agricultural and other exposures on test performance. In addition, “norms” of test performance can be calculated for rural populations and used for eventual development of an epidemiological and clinical case definition of cognitive impairment. KCRHS adult participants who have farmed for at least five years and who have farmed within the past year were recruited to participate in this study. In addition to the computer-assisted tests, subjects complete two questionnaires: 1) detailed questions about pesticide exposures; and 2) detailed questions about demographics, general health, and risks for neurobehavioral/cognitive impairment. They will also be tested with a dynamometer for grip strength.

Prevalence of Musculoskeletal Symptoms and Disability Among Iowa Dairy Farmers

This project was originally designed to start in May, 2003. After further review, the time table for data collection was changed to start in January 2004 in an attempt to achieve a

better response from dairy producers. On 1/15/04, standardized questionnaires (Nordic, DASH, OSWESTRY and WOMAC) were mailed to 813 dairy producers in north east Iowa. Subsequent reminder cards and questionnaires were sent out to dairy producers who had not responded to the initial mailing. Currently, out of 813 dairy producers, 458 have responded, 344 have not responded and 11 had incorrect addresses. Of the 458 respondents, 343 chose to participate, 84 didn't want to participate, and 31 are not farming, resulting in a 44% response rate. We believe that our study achieved an acceptable response with the current budget. A higher response may be achieved with more funds allocated to participant compensation, educating the public about the study, telephoning non-responders, and appearing at functions such as local pesticide application certification meetings. The data entry was completed in August, 2004, and the data analysis should be complete by March, 2005, and the final report by May, 2005. The results of this cross-sectional study are critical, as it is the first study to report on the musculoskeletal symptoms (MSS) of farmers for multiple anatomical sites and how these MSS affect activities of daily living.

Safety and Health Needs of Hispanic Population Involved in Agriculturally-related Occupations in Nebraska and Western Iowa

Clarkson College (Omaha, NE) brought attention to the health needs of Hispanic workers in agricultural occupations through a GPCAH feasibility project. Clarkson College provides education to Hispanic residents who are trained as health care providers in their native country, the majority of whom are dedicated to becoming practitioners in Nebraska and Iowa. This study confirms the barriers that keep Hispanic farm workers from seeking health care services and that providing health care education to Hispanic community members is key to eliminating disparities.

Over 90% of the study participants would seek health careers if offered the opportunity. This study, now completed, recruited members (N=40) of the eastern Nebraska, western Iowa Hispanic population to participate in small focus groups responding to structured questions.

The majority do not have health insurance, are unaware of Medicaid for children, do not seek preventive health care services, and have neither a primary care provider nor do they seek dental or mental health care. Communication, expense, and how to access health care remain barriers. Health fairs are a common source of preventive care, and either the emergency room or health clinics are prime sources for necessary care.

Findings from this study underpin the start-up annual health fair in Omaha's Hispanic community. In this first year it drew over 200 to health screenings, wellness services, and enrollment in Kids Connection, a new state children's health insurance program being developed as an extension of Medicaid in Nebraska, to provide health care to low income uninsured children.

This project helped draw additional funding (\$36K) to promote health care education within the Hispanic communities along our states' common border. Additional funding

requests are in progress. Existing partnerships with organizations like the Chicano Awareness Center, Agri Wellness, Open Door Mission, One World Community Health Center, and Nebraska Medical Center were strengthened. New partnering opportunities are being opened with Proteus, high-minority schools, service agencies and many others. This work also prompted involvement in the Midwest Rural Agricultural Safety and Health Forum, Migrant Health Research listserv, and publications in the Migrant Health Newsline.

Results are helping expand and develop Hispanic nursing education to serve the Hispanic community, reducing their occupational and other health risks. English-as-a-second-language program is now implemented for those interested in health careers. Also implementing exposure to health care careers program for middle school, high school and adult learners.

The Whole Blood Assay as a Biomarker of Exposure, Effect and Susceptibility in Workers Exposed to Organic Dust

Inhalation exposure to organic dusts containing endotoxin in agricultural operations has been shown to cause respiratory disease. Invasive procedures such as nasal or bronchial lavage or induced sputum are often used to evaluate lung inflammation from such exposures. The whole blood assay (WBA) is a less invasive approach that may serve as a biomarker for assessing susceptibility and responsiveness to inhaled inflammatory agents in organic dust. This assay measures cytokine production of circulating leukocytes after *ex vivo* stimulation of whole blood with endotoxin. The present study utilized pulmonary function testing (PFT) symptom questionnaires and the WBA to evaluate inflammatory responses to inhaled endotoxin (lipopolysaccharide – LPS) in swine concentrated animal feeding operations (CAFO) workers and in previously unexposed adults. Both groups were exposed acutely to a nebulized solution of purified LPS in the Clinical Exposure Facility at The University of Iowa. The goal of this study was to validate the WBA as a measure of exposure, inflammation, and susceptibility in humans.

Subject enrollment for the WBA has ended and final analysis of the data is underway. In total, 27 subjects completed the informed consent process; however, 5 subjects did not complete the entire study. Therefore, the final study group consisted of 22 individuals. Of these, 13 were male and 9 were female with a mean age of 33 years. The majority of the subjects (86%) described themselves as Caucasian/non-Hispanic. The exposure was effective in eliciting both a pulmonary and systemic response as measured by pulmonary function testing (PFT) and total white blood cell counts. CAFO workers had significantly higher baseline exhaled nitric oxide (NO) levels and a decreased decline in PFT post-exposure measures compared to controls. This is likely a marker of prior occupational exposures to organic dust and thus a “tolerance” to the LPS exposure. Cytokine production in the WBA did not show a clear group-related effect but further analysis using more advanced statistical models is in progress.

V. REPORT ON SPECIFIC IMPROVEMENTS IN AGRICULTURAL SAFETY AND HEALTH THAT RESULTED FROM CENTER ACTIVITIES (RESEARCH TO PRACTICE)

Accurate indicators of improved health and fewer injuries within each state and the Region need to be developed. GPCAH has collected data on fatal agricultural occupational injuries. (See next page.) We cannot distill the GPCAH contribution to trends. However, we are encouraged and do suggest that all we do in relation to agricultural health and safety has likely contributed to prevent deaths, injuries, and illness in Iowa and beyond.

Considering intermediate indicators, GPCAH is expanding the pool of agricultural safety and health professionals and their expertise through class work, certificate courses, and other continuing education. Forty-eight health professionals took the agricultural occupational certificate course. The possibilities for new AgriSafe Clinics are promising and preliminary work itself has impact.

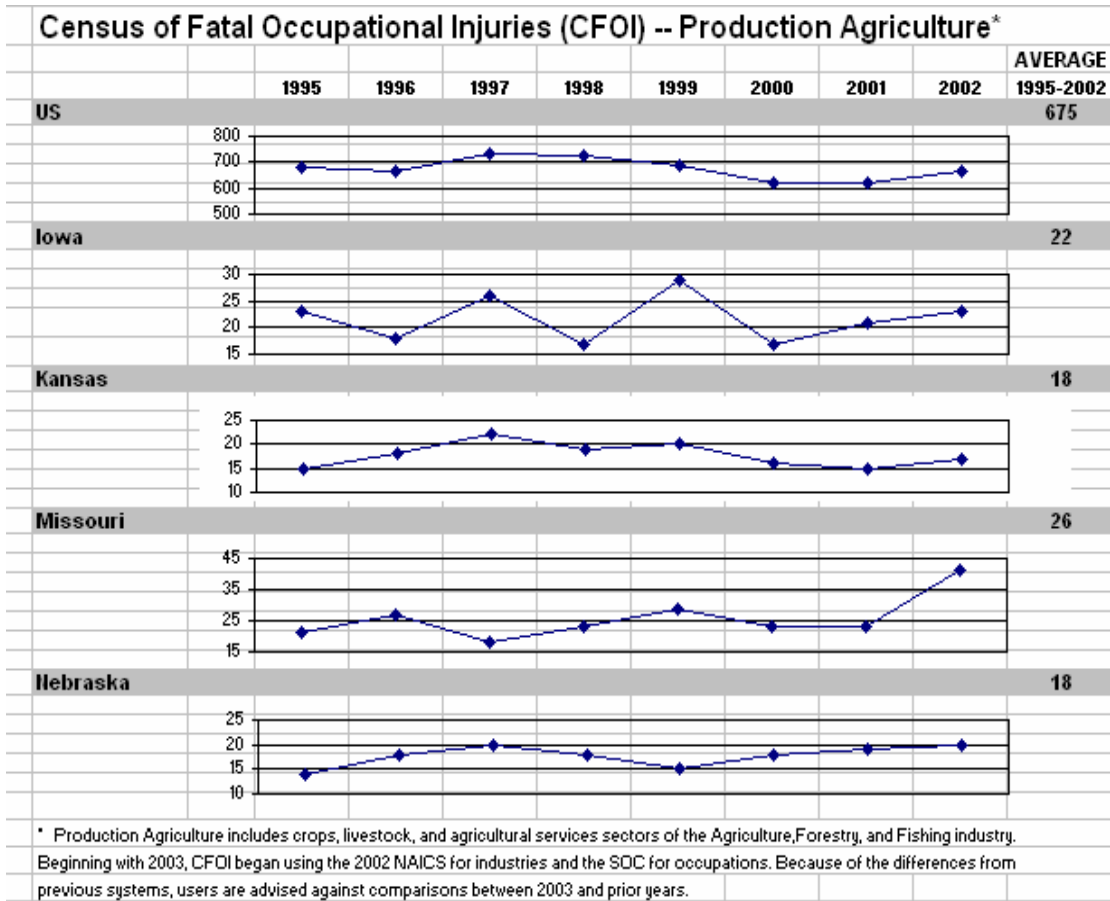
GPCAH is confident important changes are being made in the physical environment of the Iowa farmers participating in the CSF dairy project. Every farm received respiratory and hearing protection (PPE). Slow-moving vehicle emblems were provided for 188 machines. Ten tractors were retrofit with ROPS. It seems reasonable that some neighbors who are not CSF dairy project participants would notice, or be convinced in other ways, and make similar improvements.

Based on data generated by the Keokuk County Rural Health Study, CDC's Prevention Research Center has helped improve the diet and exercise habits of Keokuk County residents through Farmers' Markets and a hiking/biking trail. In addition, it led county residents to pass a keg registration law in order to better control teenage drinking and the injuries and death that are often related to it.

Children participating in the Iowa Hearing Loss Prevention (I-HeLP) project have learned to decrease the amount of noise they are exposed to every day in order to preserve their hearing.

The Fire Safety Study has installed more than 2,000 smoke alarms in 691 Keokuk County homes. Given that a small percentage of homes in this county had good, working smoke alarms and that fires are not uncommon, it can be assumed that this project has prevented at least a few fires and the concomitant injury or loss of life.

Finally, GPCAH provides various forms of agricultural safety and health information received by farmers, farm workers, and their families through a variety of channels. We do not know the injury and illness such communications have prevented or to what degree they have contributed to improved health, led to changes in the physical environment, or modified work practices. We are, however, confident that improvements are being made and unsafe behaviors are being avoided.



VI. COLLABORATION

The KCRHS continues to serve as a rich resource for collaboration with researchers throughout the College of Public Health, The University of Iowa, and beyond. Following is a list of those with whom we collaborated this year.

Michael Abramoff, PhD (ophthalmology)
Dan Anton, PhD (musculoskeletal problems)
Elizabeth Chrischilles, PhD (child asthma)
Jeanette Daly, PhD (elder abuse)
Ronald Ettinger, DDS (dental, oral health)
Greg Flamme, PhD (noise-induced hearing loss)
Fred Gerr, MD (neurobehavioral, musculoskeletal)
Gerald Jogerst, MD (elder abuse)
Neal Kohatsu, PhD (nutrition, physical activity)
Tricia LeVan, PdD, U of Arizona (respiratory disease)
Steven Levy, DDS (dental, oral health)
Allison Wright Naleway, PhD, Kaiser Permanente Ctr for Hlth Res, Portland, OR (epi.)
Florin Oprescu, MD, Fogarty Scholar from Romania (vision)
Corinne Peek-Asa, PhD, (injury, domestic violence)
Audrey Saftlas, PhD (reproductive health)
Linda Snetselaar, PhD (diet and nutrition)
Erik Svendsen, PhD, EPA (environmental health)
Peter Thorne, PhD (environmental toxicology)
Susanna Von Essen, MD, Nebraska Medical Center (respiratory disease)
Marcia Ward, PhD (health services)
Thomas Weingeist, MD (ophthalmology)
Fred Wolinsky, PhD (health services, physical functioning)
Ginger Yang, PhD (injury, physical activity)

Other Collaborations

High Plains Intermountain Center for Agricultural Health and Safety
Midwest Center for Agricultural Disease and Injury Research, Education, and Prevention
Iowa's Center for Agricultural Safety and Health (I-CASH), Eileen Fisher
Immanuel St. Joseph's-Mayo Health System, Dr. Steve Kirkhorn, MD
West Texas A&M University, Lana Skarske, RN
AgriSafe, Carolyn Sheridan, RN
Nebraska Medical Center, Dr. Susanna Von Essen, MD
University of Illinois at Urbana, Dr. Robert Petrea
ERC at Chicago
Carle Medical Center, Urbana, IL
St. Cloud State University, Edward Addo, PhD
Center for Health Effects of Environmental Contamination (CHEEC), Peter Weyer
Iowa State University Extension, Joyce Hornstein
Iowa State University, Radford Davis, DVM
Ecumenical Ministries of Iowa, Rev. Sari Beck, Director

NECAS, Charlotte Halverson, RN
Occupational Therapy Program, University of South Dakota
Paul Gunderson, PhD, North Dakota Development of an AgriSafe Program

APPENDIX

I. TOTAL CENTER BUDGET FOR FY2004 (As reported for last year in Sec I.C)

- 1. Total NIOSH Expenditures:** \$1,196,825 (including \$99,206 carryover from FY 2003)
- 2. In-Kind Contributions:** \$11,500 (115 HRS)
- 3. Other Outside Funding:** \$11,000 (NECAS)

II. CENTER PROJECTS / ACTIVITIES FOR FY 2004

- 1. Ongoing Projects:** 8 (including 3 feasibility projects)
- 2. Projects Completed:** 2

Feasibility Project: Safety and Health Need of Hispanic Population
Feasibility Project: Ammonia Adsorption to Particles

- 3. New Projects:**

Tractor Overturn Project (TOP)

- 4. Feasibility Projects:**

Evaluation of Ammonia Adsorption to Particles
Pilot Study of Neurological and Neurobehavioral Outcomes Among Farm Workers
Prevalence of Musculoskeletal Symptoms and Disability Among Iowa Dairy Farmers
Safety and Health Needs of Hispanic Population Involved in Agriculturally-related Occupations in Nebraska and Western Iowa
The Whole Blood Assay as a Biomarker of Exposure, Effect and Susceptibility in Workers Exposed to Organic Dust

III. CENTER INVESTIGATORS

- 1. Scientific Investigators:** 16
- 2. Program Staff:** 20

IV. CENTER PRODUCTS

- 1. Presentations:** 88

Donham KJ. A review of “Fast Food Nation”: Implications for Improved Health for Iowans. Midwest Rural and Agricultural Safety and Health Forum, Des Moines, IA, Nov 5-6, 2003.

Donham K. Certified Safe Farms, 5th International Symposium, Future of Rural Peoples: Rural Economy, healthy People, Environment, Rural Communities, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Donham K. The Certified Safe Farm: A Novel Incentive-Based Farm Health Intervention. 5th International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Rautiainen R. Using Injury Information to Guide Prevention. Case Study Based on Finnish Worker’s Compensation Data, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Sanderson W. Occupational Noise Standards and Their Place in Agriculture. Midwest Agricultural Health and Safety Forum, Des Moines, IA, Nov 5-6, 2003.

Curwin B, Hein M, Sanderson W, Reynolds S, Nishioka M, Ward E, Alavanja M. Farm Family Take-Home Pesticide Exposure Study. American Industrial Hygiene Conference & Exposition, Dallas, TX, 2003.

Thorne PS. Occupational Lung Disease in Response to Mixed Exposures: the Role of Bacterial and Fungal Contaminants in Agricultural Respiratory Diseases. 42nd Annual Meeting of the Society of Toxicology, Salt Lake City, UT, 2003.

Kostle P, Pentella M, Sanderson W. Sample processing recovery evaluation of *bacillus anthracis* from environmental sampling devices. American Industrial Hygiene Conference & Exposition, Atlanta, GA, May 2004.

Sanderson W. Pre-Symposium Course: Proper Selection and use of Respiratory Protection. Sixth Annual Occupational Health Symposium – “Taking Health and Safety to a New Dimension”, Iowa City, IA, 2004.

Rautiainen R. Psychosocial behavior of children – Implications for childhood agricultural injury prevention. [Keynote address] Proceedings of the International Social Security Association. Colloquium of the Agricultural Section. Helsinki, Finland, Aug 31-Sep 2, 2004.

Rautiainen R. Psychosocial Behavior of Children – Implications for Childhood Agricultural Injury Prevention. International Social Security

Association. Colloquium of the Agricultural Section, Helsinki, Finland, Sep 2004.

Madsen MD. The Press on Midwest Farm and Agricultural Injuries. Fifth International Symposium – Future of Rural People, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Rautiainen R, Zwerling C, Donham K, Burmeister L, Sprince N, Ohsfeldt R, Reynolds S, Eskola E, Saarimaki P, Siitonen T. Using injury information to guide prevention. Case study based on Finnish worker's compensation data. Future of Rural Peoples Conference. Saskatoon, SK, Can, Oct 19-23, 2003.

Rautiainen R. Using Injury Information to Guide Prevention. Case Study Based on Finnish Worker's Compensation Data. University of Saskatchewan, Saskatoon, SK, Canada, Oct 19-23, 2003.

Madsen MD. The Press on Midwest Farm and Agricultural Injuries. Midwest Rural and Agricultural Safety and Health Forum, Des Moines, IA, Nov 5-6, 2003.

Madsen MD. GPCAH Update and Summary of Press Clipping Surveillance. Mississippi Health & Safety Summit, Jackson, MS, Mar 2004.

Rautiainen R, Johnson W. Case Study – Fatal Tractor Overturn Where a Self-Made Roll-Bar Failed. National Institute for Farm Safety Meeting, Keystone, CO, June 21-24, 2004.

Nonnenmann MW. “Ph.D. Preliminary Assessment”: The University of Iowa, College of Public Health, Department of Occupational and Environmental Health. Iowa City, IA, 2004.

Merchant JA. Rural Health in the United States: Lessons from the Keokuk County Rural Health Study. Plenary speech at official opening of the Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Merlino LA, Anton D, Rosecrance JC. Musculoskeletal symptoms in a population-based cohort of farmers and rural residents. Oral presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Madsen MD, Sanderson WT, Rautiainen RH, Stromquist AM, Taylor C, Merchant JA. Keokuk County farm machinery and associated injuries. Oral presentation at Fifth International Symposium, Future of Rural Peoples: Rural

Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM, Kelly KM, Burmeister LF, Zwerling C, Merchant JA, The relationship between partner abuse and depressive symptoms in a rural cohort: Results from round 1 of the Keokuk County Rural Health Study. Oral presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM, Kelly KM, Burmeister LF, Zwerling C, Merchant JA. Adolescent mental health in a rural county: risk behaviors, depression, and suicide. Poster presentation at Fifth International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities. Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Stromquist AM. The relationship between partner abuse and depressive symptoms in a rural cohort: Results from Round 1 of the Keokuk County Rural Health Study. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 5, 2003.

Flamme GA. Hearing impairment and hearing aid use in rural Iowa. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 5, 2003.

Chrischilles E, Kuehl A. Asthma prevalence and morbidity among rural Iowa children. Midwest Rural Agricultural Safety and Health Forum. Des Moines, IA, Nov 6, 2003.

Sanderson. The Design of Prospective Population-Based Longitudinal Studies and Their Role in Establishing Etiology of Human Disease, 21st International Neurotoxicology Conference. Honolulu, HI, 2004.

Peek-Asa C. Characteristics of male batterers and implications for clinical practice. UI Visiting Faculty Program. Iowa Lutheran Hospital. Des Moines, IA, Feb 19, 2004.

Peek-Asa C. The epidemiology of male battering. Epidemiology Seminar. The University of Iowa, Iowa City, IA, Mar 8, 2004.

Merchant JA, Chrischilles E, Burmeister L, Kelly K, Thorne P, Ahrens R, Wright-Naleway A, Svendsen E, Kuehl A, Stromquist A. Rural childhood asthma: the Keokuk County Rural Health Study. Environmental Health Impacts of CAFOs: Anticipating Hazards - Searching for Solutions Scientific Workshop. Iowa City, IA, Mar 30, 2004.

Tsai RJ, Vangilder RS, Kohatsu ND, Merchant JA. The relationship of insurance coverage to self-reported health status. Poster presentation for Epidemiology Department poster session, The University of Iowa. Iowa City, IA, May 2004.

Sanderson. Tractor Safety Concerns and Safe Use of Pesticides, KCRHS Executive Advisory Committee. Sigourney, IA, May 4, 2004.

Anton D, Merlino LA, Rosecrance JC, Gerr F. Carpal tunnel syndrome in a population-based cohort of rural and farm residents. National Symposium on Agricultural Health and Safety. Keystone, CO, June 2004.

Rosecrance JC, Rodgers G, Merlino LA, Anton D. Back pain and musculoskeletal disorders among Kansas farmers. National Symposium on Agricultural Health and Safety. Keystone, CO, June, 2004.

Maxwell LB. Intimate partner violence and depressive symptoms in a cohort of rural couples. Oral Presentation for Medical Student Research Day, The University of Iowa. Iowa City, IA, Sep10, 2004.

O'Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Differences in Aerosol Sampler Collection Characteristics When Sampling Three Dust Types. 22nd Annual Conference of the American Association of Aerosol Research. Anaheim, CA, Oct 2003.

Donham KJ. Dose-Response Relationships in Mixed Agricultural Aerosol: Implications for Exposure Limit Setting for Endotoxin, Particulate Matter, and Ammonia in Confined Animal Feeding Operations. Fifth International Symposium, Future of Rural Peoples: Rural Economy, Health People, Environment, Rural Communities, Saskatoon, Saskatchewan, Canada. Oct 19-23, 2003.

O'Shaughnessy PT, Lo W-Y, Nonnenmann M, Reynolds S. Aerosol Sampler Collection Characteristics When Sampling Organic And Inorganic Dusts. Midwest Agricultural Health and Safety Forum. Des Moines, IA, Nov 5-6, 2003.

O'Shaughnessy PT. Characterization of a Hooded Human Exposure Apparatus. NIOSH Pilot Project Research Symposium, University of Illinois-Chicago and The University of Iowa. April 2004.

Golla V, O'Shaughnessy P. A Comparison of the Collection Characteristics of Four Size-Selective Samplers during Laboratory and Field Trials. American Industrial Hygiene Conference & Exposition. Atlanta, GA, May 8-13, 2004.

Grafft L. Agricultural Trauma, West Union, IA, Oct 13, 2003.

Donham K. Respiratory Symptoms, Pulmonary Function, and Respirator Use Among Certified Safe Farm Participants. 5th International Symposium, Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities, Saskatoon, Saskatchewan, Canada, Oct. 19-23, 2003.

Donham K. Occupational Health Concerns of Concentrated Livestock Production: So What is New? Midwest Rural and Agricultural Safety and Health Forum, Des Moines, IA , Nov 5-6, 2003.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, Nov 17, 2003.

Heick R, Rautiainen R, Peek-Asa C, Lundell J, Johnson W. Iowa agricultural fatalities. NOIRS Conference, Pittsburgh, PA. November, 2003.

Grafft L. Respiratory Issues for Turkey Growers, Des Moines, IA, Dec 4, 2003.

Donham K. Agricultural Skin Diseases. Iowa Lutheran Hospital, Des Moines, IA, Dec 12, 2003.

Donham K. Skin Diseases of Farmers. Iowa Lutheran Hospital, Des Moines, IA, Dec. 18, 2003.

Grafft L. Farm Safety Issues. Farm Credit Managers, Ames, IA, Feb 6, 2004.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, Mar 1, 2004.

Grafft L. Safety Concerns for Farmers. North Iowa Farm Exposition, Mason City, IA, Mar 4, 2004.

Grafft L. Agricultural Trauma for Emergency Physicians. Emergency Room Conference, Omaha, NE, Mar 19, 2004.

Donham K. Skin Diseases of Farmers. Broadlawns Medical Center, Des Moines, IA, May 5, 2004.

Donham K. Community Health Concerns in Agriculture: From Hog Lots to Water Pollution. Broadlawns Medical Center, Des Moines, IA, May 5, 2004.

Sanderson W. Continuing Education Course: Implications for Industrial Hygiene in Occupational Health Nursing. American Association of Occupational Health Nurses, Kansas City, MO, May, 2004.

Grafft L. Farm Safety and Health. 3rd year medical students, Iowa City, IA, May 24, 2004.

Agricultural Occupational Health Certification Course (a 3-day intensive workshop), Oakdale, IA, Part 1 of 2 (May 19-21, 2004):

- Donham K. Course Overview, Certified Safe Farm Program
- Donham K. Biological Hazards.
- Fuortes L. Agricultural Toxicology - Symptoms, Exposure History, Pathophysiology, Nursing Assessment, and Prevention of Illnesses.
- Donham K. Zoonoses - Agents, Exposure History, Pathophysiology and Prevention of Illnesses.
- Donham K. Agricultural Skin Diseases.
- Donham K. Rural Environmental Health Problems.
- Grafft L. Acute Trauma Among Farmers.
- Donham K. Agricultural Respiratory Issues: Assessment and Prevention.

Agricultural Occupational Health Certification Course (a 3-day intensive workshop), Oakdale, IA, Part 2 of 2 (Jun 9-11, 2004):

- Donham K. Course Overview.
- Anton D. Ergonomic Issues Facing the Farming Community/Evaluation and Management of Agricultural Related Back Injuries
- Flamme G. Physiology of Noise-Induced Hearing Loss.
- Sanderson W. Industrial Hygiene Prevention Scheme
- Sanderson W. Recommendations for PPE (noise and chemical).
- Arpey C. Skin Cancer: Pathophysiology and prevention.
- Rosmann M. Behavioral Health Issues in the Farming Community.
- Keninger T. Easter Seals Rural Solutions Program-Resource for Disabled Farmers.
- Grafft L, Rautiainen R. Tour Local Farm and Implement Dealership : Identify Selected Hazards and Types of Agricultural-Related Injuries.
- Donham K, Grafft L. Case Presentations/Scenarios/Problem Solving.
- Sheridan C. Next Steps in the Development of an Agricultural Health Clinic.

Grafft L. Preparing and Effective Presentation. Environmental Health Sciences Institute, Iowa City, IA, June 24, 2004.

Donham K, Schneiders S, Rautiainen R, Madsen M. Helping Farmers Stay Alive and Well in Agriculture. Certified Safe Farm presentation for Iowa Farm Bureau. Des Moines, IA. October 6, 2003.

Rautiainen R, Grafft L, Schneiders S, Donham K. Evaluation of the Certified Safe Farm On-farm Safety Review Process. Future of Rural Peoples Conference. Saskatoon SK, Canada, October 19-23, 2003.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. University of Saskatchewan, Saskatoon, SK, Canada, Oct 19-23-2003.

Rautiainen R, Grafft L, Schneiders S, Donham K. Evaluation of the Certified Safe Farm On-farm Safety Review Process. Midwest Forum for Agricultural Safety and Health. Des Moines, IA, November 5-6, 2003.

Rautiainen R. Injuries in the Iowa Certified Safe Farm Study. Midwest Forum for Agricultural Safety and Health, Des Moines, IA, Nov 5-6, 2003.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. Midwest Forum for Agricultural Safety and Health, Des Moines, IA, Nov 5-6, 2003.

Rautiainen R. Injuries in the Iowa Certified Safe Farm Study. Governor's Safety Conference, IA, Nov 6, 2003.

Grafft L. Certified Safe Farm, Spencer, IA, Jan 22-23, 2004.

Rautiainen R. Evaluation of the Certified Safe Farm Program. Improving Agricultural Safety and Health Programs through Evaluation Conference, Ohio State University, Columbus, OH, Mar 14-16, 2004.

Schneiders S, Madsen M, Fisher K, Donham KJ. Qualitative Evaluation of the Iowa Certified Safe Farm Program. National Institute for Farm Safety (NIFS) Conference, Keystone, CO, Jun 20-24, 2004.

Rautiainen R, Grafft L, Lange J, Madsen M, Schneiders S, Donham KJ. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. National Institute for Farm Safety (NIFS) Conference, Keystone, CO, Jun 20-24, 2004.

Rautiainen R. Evaluation of the Certified Safe Farm On-Farm Safety Review Process. National Institute for Farm Safety Meeting, Keystone, CO, Jun 21-24, 2004.

2. Publications:

a. Peer Reviewed Journal: 26

Peek-Asa C, Zwerling C, Stallons L. Acute traumatic injuries in rural population. *American Journal of Public Health*, 94(10):1689-1693, 2004.

Chrischilles E, Ahrens R, Kuehl A, Kelly KM, Thorne P, Burmeister L, Merchant J. Asthma prevalence and morbidity among rural Iowa school

children. *Journal of Allergy and Clinical Immunology*, 113(1):66-71, 2004.

Curwin B, Hein M, Sanderson W, Buhler W, Nishioka M. Acephate exposure and decontamination on tobacco harvesters' hands. *Journal of Exposure Analysis and Environmental Epidemiology*, 13:203-210, 2003.

Calvert G, Rice F, Boiano J, Sheehy J, Sanderson W. Occupational silica exposure and risk of various diseases: an analysis using death certificates from 27 states of the United States. *Occup Environ Med* 60:122-129, 2003.

Roy CJ, Thorne PS. Exposure to particulates, microorganisms, $\beta(1-3)$ -glucans and endotoxins during soybean harvesting. *Am Ind Hyg Assoc J* 64(4): 487-95, 2003.

Carreón T, Butler M, Ruder A, Waters M, Davis-King K, Calvert G, Shulte P, Connally B, Ward E, Sanderson W, Heineman E, Mandel J, Morton R, Reding D, Rosenman K, Telaska G. The Upper Midwest Health Study: A case-control study of primary intracranial brain gliomas among rural residents. Pesticide exposure in women. *Environmental Health Perspectives*, Submitted 2004.

Ruder A, Waters M, Butler M, Carreón T, Calvert G, Davis-King K, Schulte P, Sanderson W, Ward E, Connally B, Heineman E, Mandel J, Morton R, Reding D, Rosenman K, Telaska G. Upper Midwest Health Study: A case-control study of primary intracranial brain gliomas among rural residents. Gliomas and farm pesticide exposure in men. *Environmental Health Perspectives*, Submitted 2004.

Chrischilles E, Ahrens R, Kuehl A, Kelly K, Thorne P, Burmeister L, Merchant J. Asthma prevalence and morbidity among rural Iowa school children. *Journal of Allergy and Clinical Immunology* 113(1):66-71, 2004.

Ettinger RL, Warren JJ, Levy SM, Hand JS, Merchant JA, Stromquist AM. Oral health: Perceptions of need in a rural Iowa county. *Journal of Special Care in Dentistry* 24(1):13-21, 2004.

LeVan TD, Von Essen S, Lambert GP, Martinez F, Vasquez M, Merchant JA. Polymorphisms in the CD14 gene are associated with pulmonary function in farmers. *American Journal of Respiratory and Critical Care Medicine*. In press.

Reynolds S, Tadevosyan A, Stromquist A, Fuortes L, Whitten P, Jones M, Zwerling C. Association between the use of farm chemicals and

neurological and depressive symptoms in a cohort of Iowa farm operators. *American Journal of Industrial Medicine*. Submitted 2004.

Flamme, G, Mudipalli R, Reynolds S, Kelly K, Stromquist A, Zwerling C, Burmeister LF, Peng SC, Merchant J. Prevalence of hearing impairment in a rural Midwestern cohort: Estimates from the Keokuk County Rural Health Study, 1994-1998. *Ear & Hearing*. Submitted 2004.

Lambert GP, Spurzem JR, Romberger DJ, Wyatt TA, Lyden E, Stromquist AM, Merchant JA, Von Essen SG. Tumor necrosis factor- α hyper-responsiveness to endotoxin in whole blood is associated with chronic bronchitis in farmers. *Journal of Agromedicine*. Submitted 2004.

Peek-Asa C, Zwerling C, Young T, Stromquist A, Burmeister L, Merchant JA. A population-based study of reporting patterns and characteristics of men who abuse their female partners. *Injury Prevention*. Submitted 2004.

Merchant JA, Naleway AL, Svendsen ER, Kelly KM, Burmeister LF, Stromquist AM, Taylor CD, Thorne PS, Reynolds SJ, Sanderson WT, Chrischilles EA. Asthma and farm exposures in a cohort of rural Iowa children. *Environmental Health Perspectives*. Submitted 2004.

Curwin B, Hein M, Sanderson W, Barr D, Reynolds S, Ward E, Alvanja M. Urinary pesticide levels among farmers and non-farmers in Iowa. *Environmental Health Perspectives*. Submitted 2004.

Curwin B, Hein M, Sanderson W, Barr D, Reynolds S, Ward E, Alvanja M. Dust and hand wipe pesticide levels among farmers and non-farmers in Iowa. *Journal of Occupational and Environmental Hygiene*. Submitted 2004.

O'Shaughnessy PT, Mehaffy JM, Watt J, Sigurdarson S, Kline JN. Characterization of a hooded exposure apparatus for inhalation of gases and aerosols. *Journal of Occupational and Environmental Hygiene* 1:161-166, 2004.

Nonnenmann MW, Donham KJ, Rautiainen RH, O'Shaughnessy PT, Burmeister LF, Reynolds SJ. Vegetable Oil Sprinkling as a Dust Reduction Method in Swine Confinement. *J Ag Safety Health*, 10(1) :7-16, 2004.

Anderson CI, Von Essen SG, Smith LM, Spencer J, Jolie R, Donham KJ. Respiratory symptoms and airway obstruction in swine veterinarians : a persistent problem. *Am J Ind Med* 46(4) :386-92, 2004.

Sigurdarson ST, Donham KJ, Kline JN. Acute toxic pneumonitis complicating chronic obstructive pulmonary disease (COPD) in a farmer. *Am J Ind Med* 46(4) :393-5, 2004.

Humann M, Donham K, Jones M, Achutan C, Smith B. Occupational Noise Exposure Assessment in Intensive Swine Farrowing Systems: Dosimetry, Octave Band, and Specific Task Analysis. *J Agromedicine*. Accepted 2004.

Lee JA, Donham KJ, Reynolds SJ, Thu K. Assessment of air quality in the vicinity of swine confinement facilities in Iowa. *J Agromedicine*. In press 2004.

Donham K, Wheat J, Simpson B, James P, Kirkhorn S. Agricultural medicine: what's in a name – revisited. *J Agromedicine*. In press, 2004.

Rautiainen R, Lange J, Hodne C, Schneiders S, Donham K. Injuries in the Iowa Certified Safe Farm Study. *Journal of Agricultural Safety and Health* 10(1):51-63, Jan 2004.

Rautiainen RH, Ohsfeldt R, Sprince NL, Donham KJ, Burmeister LF, Reynolds SJ, Saarimaki P, Zwerling C. Cost of injuries and occupational diseases in agriculture in Finland. *Journal of Agromedicine*. Submitted 2004.

b. Trade Journals: 1

c. Fact Sheets / Brochures / Technical Publications: 4

d. Other Publications: 27

3. Education / Training / Outreach

a. Training Seminars: 2

b. Short Courses: 1

c. Hazard Surveys / Consultations: 130

d. Academic Training: 11

Graduate Students Sponsored – 10
Students Graduated – 1

e. News Letters: 2

f. CD-ROMs or other Computer Based Training Programs: 2

g. Other: 14

Madsen MD. Poster – Needles in the Hay: U.S. Press Clips on Farm Injuries. Fifth International Symposium – Future of Rural Peoples, Saskatoon, Saskatchewan, Canada, Oct 19-23, 2003.

Rautiainen R. NIOSH Construction Center review panel member. Alexandria, VA, July 19-23, 2004.

Regular public service announcements in the press (Cedar Rapids Gazette):

- Grafft, L. Zoonotic diseases, October 12, 2003
- Grafft, L. Keeping guests safe on the farm, November 9, 2003
- Grafft, L. Slips, trips and falls, December 14, 2003
- Grafft, L. Avoiding hypothermia, January 18, 2004
- Grafft, L. Be prepared for medical emergencies, February 8, 2004
- Grafft, L. Safety with chemicals, March 14, 2004
- Grafft, L. Staying safe on the farm, April 11, 2004
- Grafft, L. Safety around livestock, May 9, 2004
- Grafft, L. Protect skin from the sun, June 13, 2004

Great Plains Center for Agricultural Health. <http://www.public-health.uiowa.edu/gpcah/>

Certified Safe Farm. <http://www.public-health.uiowa.edu/icash/csf/>

Rautiainen R, Steel S, Madsen M, Neenan D, Donham K. Certified Safe Farm Checklist, 2004 edition.

4. Conferences / Meetings Sponsored: 4

Future of Rural Peoples. Saskatoon, SK, Canada, Oct 2003.

Keystone Symposium, Keystone, CO, Jun 2004.

KCRHS Community Advisory Committee Meetings (2)

On November 5-6, 2003, the Great Plains Center for Agricultural Safety and Health co-sponsored the Midwest Agricultural Safety and Health Forum, in collaboration with Iowa's Center for Agricultural Safety and Health, and the Colorado and Wisconsin NIOSH Ag Centers. The program included research and intervention presentations, with special sessions on communication and agricultural policy.

V. ADMINISTRATIVE REPORT

During the past year there were no changes in personnel within the GPCAH. However, several members of the GPCAH staff accepted additional duties beyond tasks to which they were already assigned. In particular, GPCAH staff was heavily involved in developing the National Agricultural Tractor Safety Initiative. Much personnel time was devoted to writing, editing, and collaborating with the other Centers to prepare this document. Subsequently, GPCAH provided leadership in developing plans for future work on tractor safety which was submitted to NIOSH for funding. GPCAH staff developed the overall concept of the proposal and provided input on every section of the proposal. We are eager to continue work on tractor safety and look forward to working with the other Centers to implement plans to help reduce tractor overturn injuries and fatalities and roadway crashes involving agricultural machinery.

Center staff also frequently contributed to the AgConnections newsletter and provided instruction in the workshop on agroterrorism which was conducted by the Southwest Center for Agricultural Health, Injury Prevention, and Education.

The Center also sponsored four supplemental grants, two of which were funded. GPCAH staff supported work on all of those grants, even if they were not named for future salary support from the grant.