

NCR-131: Applied Animal Behavior and Welfare

(Multistate Research Project)

Duration: October 2006 to September 30, 2011

Administrative Advisor(s): [[Don H. Beermann](#)]

CSREES Reps:

Statement of Issues and Justification

Need: To enhance food production and maintain the competitiveness of American animal agriculture in the global economy, it is imperative that the agricultural industry has access to cutting edge scientific information on animal welfare. Animal welfare is increasingly taking the stage in world trade as evidenced by the recent establishment of global animal welfare standards on transport and slaughter by the World Organisation for Animal Health (OIE). The OIE plans to continue this work by establishing standards for animal welfare on the farm.

Animal welfare is also an important issue for consumer confidence in animal production. Surveys taken during the past 10 years indicate strong public concern that farm animal welfare is compromised as a result of pain and suffering. For example, 93% percent of Americans surveyed agreed that "animal pain and suffering should be reduced as much as possible, even though the animals are going to be slaughtered" (Caravan Opinion Research, 1995). The possibility that animals suffer greatly due to excessive fear during interactions with handlers, social disruptions, and exposure to transport conditions is of particular concern to the public. Management practices associated with fear and pain are also viewed very negatively by animal scientists and veterinarians (Heleski et al., 2004, 2005). As a result, several animal welfare certification programs now include assessment of fear levels in their auditing procedures.

Excessive fear is also of concern to animal producers from a production and management perspective. Fearful animals are likely to grow more slowly and less efficiently than non-fearful animals and to have reduced reproductive output (e.g. Gonyou et al., 1986, Hemsworth and Barnett, 1992). In addition, fearful animals are more difficult to handle and can be dangerous to the caretaker.

Research to assess animal fear objectively and scientifically has involved many different methods of assessment, including the Open Field Test, the Tonic Immobility Test, the Human Approach test, the Elevated Plus Maze Test, the Emergence Test, and others. A great deal of variation in response variables is found when such tests are used and their validity and reliability have been questioned (Pedersen, 1997, Marchant et al., 1997, Miller et al., submitted 2004a,b). Moreover, most of these tests were developed for use in laboratory rodents and have not been validated in food production animals. It is

questionable whether results from these types of tests should be used when evaluating the impact of different housing and management systems on farm animal welfare or when conducting animal welfare audits. This causes confusion for producers who need accurate, conclusive information to improve their management systems.

Through NCR-131, we have established a national scientific committee to generate and disseminate objective scientific information on animal welfare issues. This committee is comprised of over 20 scientists working in multiple disciplines at different locations throughout North America (see list of participants below). The proposed research agenda for the NCR-131 over the next five years is to address the measurement of fear in production animals, including pigs, poultry and sheep. The protocols will be carried out in multiple locations and the outcomes will elucidate the validity of measures across different environments and genotypes of farm animals.

Importance: Our research is critical "to provide the science and technology to keep farmers and ranchers ahead of any barrier that could hinder their success." (quoted from USDA Strategic Goal 1.5). A potential barrier that lies ahead for animal producers is tighter regulation over farm animal welfare, management practices, and potential trade restrictions from countries and trading groups that desire more stringent criteria for how farm animals are raised. Such a group is the European Union. A Gallup poll also indicates that society is becoming more concerned about the welfare of animals (Moore, 2003), specifically about the level of fear and pain to which they are exposed. Currently, industry and independent non-governmental organizations are responding to animal welfare concerns by developing voluntary animal welfare auditing programs. A proliferation of animal welfare standards, guidelines and auditing procedures has occurred, due in part to a dearth of conclusive scientific evidence supporting specific standards and methods of assessment. Commodity groups in the U.S. have, nevertheless, highlighted that their policies and programs must be based on sound animal welfare science (e.g., National Pork Board, 2002). To fill this need, NCR-131 aims to generate and disseminate objective scientific information about the behavioral responses of animals under different housing and management systems and to interpret this information in terms of animal welfare. Specifically, we plan to develop, integrate, and validate behavioral tests and associated physiological measurements related to animal welfare, performance and health. Over the next five years, we propose to focus on the assessment of behavioral tests of fearfulness.

CRIS Search: To ensure that this project does not duplicate previous or ongoing research a CRIS search was conducted using the terms Novel, Startle, Test, Fear, Livestock; and their combinations. In total 20 documents were retrieved. Of these 20 documents, 4 were relevant to the current project. However, none of these four documents had the same objectives or were close to meeting the objectives of the proposed project. In addition, all four were projects of members of NCR-131 (Lay, Pajor, Mench, Friend) and were either expired or researching a tangent but not duplicate area of research as proposed by this document.

Feasibility: Successful completion of the outlined project is feasible for this group of researchers and educators. Members of NCR-131 conduct research with a variety of species and approaches, and therefore, the diversity of experience and skills is an asset. This array of expertise will also put the NCR-131 committee in a competitive advantage to compete for extramural funding. Investigation of behavioral tests of fear can be conducted on specific species by scientists at each research station location. Some members of NCR-131 are currently at the forefront of fear research in domestic animals and the introduction of new ideas and approaches from other members should yield the development of standard fear assessment methods. NCR-131 comprises the leading applied animal behavior researchers in the U.S. and their wide-ranging skills are likely to yield significant progress in this area.

Multistate Advantage: The NCR-131 Information Exchange Group has enjoyed a long and productive history. The group was originally created in 1981 and has been actively meeting every year since this time. In 2000, NCR-131 sponsored a symposium on transportation of livestock at the joint meetings of the American Society of Animal Science and the American Society of Dairy Science meetings held in Baltimore, MD. The symposium was highly successful due to the timeliness of the topic and support that animal welfare research receives from the societies.

Applied animal behavior research is a relatively new scientific discipline in the United States. This distinction creates a deficiency in both researchers and funding to support its growth within the animal and veterinary sciences. This characteristic is changing rapidly. However, it still provides a challenge. **The strength of creating a Scientific Committee such as NCR-131 is that it brings scientists together to conduct collaborative research, thus consolidating resources and effort. In addition, contributing members are also involved in teaching and outreach, which will allow our work to directly impact all stakeholders of animal agriculture.**

Future Impacts: The research and publications that are produced by this committee will set the standard for quality research in animal welfare science. With these objective data and the promotion of valid methods to assess subjective states of animals, the scientific base of knowledge will be created to allow American animal agriculture to play a significant role in international negotiations regarding animal welfare issues. In addition, a major outcome of the collaborative efforts derived from these meetings will be that scientific information will be generated that will prove essential in optimizing animal performance, health, and welfare. Each year's meeting of the NCR-131 Scientific Committee will be the major opportunity for researchers to discuss progress on their multi-state research project as well as to develop and establish other collaborative research projects on animal behavior. Our members are the key spokespersons on the topic of animal behavior at the local, state, and global level. NCR-131 members are working with numerous organizations that are developing animal care guidelines, assessment, certification, and third party audit programs for animal welfare. These organizations include National and State species-specific organizations (e.g., National Pork Board, United Egg Producers, National Chicken Council, National Turkey Federation), scientific organizations (e.g., FASS, American Registry of Professional

Animal Scientists) and retail organizations (e.g., McDonald's, Burger King, Food Marketing Institute, National Council of Chain Restaurants). Interaction and exchange of information between committee members is essential for the development of effective, standardized and scientific assurance and third party audit programs.

Our proposed projects and timeline are as follows:

Dates	Project
Oct. 2006 - Sept. 2007	<ul style="list-style-type: none"> • Conduct research at multistate locations to evaluate tests designed to assess fear.
Oct. 2007 - Sept. 2008	<ul style="list-style-type: none"> • Continue to conduct research at multistate locations to evaluate tests designed to assess fear. • Write manuscripts (reviews) for peer reviewed journals. Write manuscripts for trade publications, and provide educational presentations to various commodity groups.
Oct. 2008 - Sept. 2009	<ul style="list-style-type: none"> • Conduct research at multistate locations to evaluate tests of fear. Pending the success of the Pig, Poultry and Sheep/Goats projects attempts will be made to add dairy cattle and beef cattle protocols to assess fear. • Write research manuscripts for peer reviewed journals. Write manuscripts for trade publications, and provide educational presentations to various commodity groups. • Host a workshop with stakeholders in association with a scientific meeting to discuss research results
Oct. 2009 - Sept. 2010	<ul style="list-style-type: none"> • Develop collaborative grant applications to investigate the impact of management practices and housing on the occurrence of fear in domestic animals • Write manuscripts for peer reviewed journals. Write manuscripts for trade publications, and provide educational presentations to various commodity groups.
Oct. 2010 - Sept. 2011	<ul style="list-style-type: none"> • Develop future projects to assess subjective experiences in domestic animal

Related, Current and Previous Work

Several behavioral methods have been used in an attempt to quantify and qualify emotional states in animals. For example, open-field tests have been widely used to assess fearfulness or anxiety in many species, having originally been developed for use in rodents (Hall, 1936, Archer, 1973). They have been subsequently applied to various farm animal species, such as chickens (Jones, 1989), sheep (Lachaux et al., 1983), cattle (Kilgour, 1975, Boivin et al., 1992), horses (Mal et al., 1991) and pigs (Beilharz and Cox, 1967, Mormede et al., 1984), with the general interpretation that degree of "fearfulness" negatively related to amount of locomotor behavior carried out. However, this approach appears to involve an oversimplification of the methods developed and validated in rodents, and lessons learned in the use of open field in rodents, such as the importance of repeating the test over multiple days to tease apart the effects of fearfulness, exploration, and habituation of locomotor behavior (Archer 1973; Walsh and Cummins 1976). The approach and investigation of a novel object has also been used to quantify fearfulness in pigs (Lawrence et al., 1991), sheep (Romeyer and Bouissou, 1992), deer (Pollard et al., 1994), and chickens (Rose et al., 1985). Again the inference is that animals that shy away from or are slow to approach the novel object are exhibiting a greater degree of fearfulness than animals which readily approach. However, the results obtained in open-field test and approach tests are very context and species specific. For instance, some animals species specific behavior will lead the test animal to freeze in fearful situations, while that of other species leads the test animal to try to escape. Furthermore, many other factors can affect how an animal behaves in an open-field test, including previous experience, proximity of conspecifics, proximity of the researcher, various objects in the visual field, individual temperament, etc. Many of the methods used appear to have arisen from unspecified sources with little or no apparent validation as to whether tests which have been developed for use with rodents can even be relevant for use with other species of animals, with very different motivational systems (Gray, 1987). Tests are often carried out in unfamiliar surroundings, over relatively short timeframes and involve exposure of the animal to contrived situations or to non-natural stimuli that often have no biological significance for that animal. Thus these tests can lack repeatability, accuracy and reliability; characteristics required for scientific validity. Indeed, much of the apparent reliability of these tests in terms of obtaining consistent scores from the same animal may merely reflect the fact that animals are housed and tested in consistent environments, rather than that these tests are measuring any meaningful or consistent trait of the animal itself (Miller et al., submitted 2004a,b).

Tests currently used by many researchers to measure fear are, in general, adaptations from the rodent literature. However, the NC-131 committee questions their repeatability and validity and thus will aim to recreate these tests as exactly as possible at different locations and then cumulate the data to determine the value of each test.

Objectives

1. Our specific objective is to develop, integrate, and validate behavioral tests and associated physiological measurements related to animal welfare, performance and health. This objective fits well into the objectives of the USDA's Strategic

Plan for 2003-2008 (USDA, 2004). Specifically, our objective assists in the USDA's "Strategic Goal 1: Enhance Economic Opportunities for Agricultural Producers." Although we will assist in Objectives 1.1, 1.2, and 1.3; our most significant contribution will be to Objective 1.5 in which 'The overarching objective is to provide the science and technology to keep farmers and ranchers ahead of any barrier that could hinder their success.' Our efforts will advance research in animal welfare that will assist in designing welfare friendly production systems, adapted to the animals' biological requirements, as well as to meet concerns and criticisms of advocacy groups and society.

Methods

Specific projects will be conducted for pig, poultry and sheep. The experimental methods and participating institutions are listed below.

It is commonly observed that animals vary in flightiness and tendency to show specific behavioral responses (e.g. freeze response in chickens) in fear-inducing situations. However, the extent to which these behavioral responses represent a continuum of fearfulness that can be reliably assessed is unclear. Our working hypothesis is that fearfulness (i.e. responsiveness to fear-inducing stimuli) is a stable underlying personality trait of individual animals that can be measured based on behavioral responses in standardized behavior tests. If so, our prediction is that within populations kept under standard environmental conditions, individual animals will respond to different standardized behavioral tests of fearfulness in a consistent manner, both within and across tests, according to their underlying level of fearfulness.

a) Description of the Pig Team Project The swine group proposes to conduct three experiments at each of five locations, West Lafayette- USDA-ARS LBRU & Purdue University (Marchant and Lay), Iowa State University (Johnson), Alberta Farm Animal Care, Canada (Haley), University of Guelph, Canada (Millman), and Michigan State University (Zanella). The team will conduct research on assessment of three tests: a) the Approach/Avoidance Test, b) the Novel Object Test, and c) the Startle test.

Approach/Avoidance Test: This test will be conducted using growing pigs (80-100 Kg live weight) and tests will last for ten minutes each session. The pigs will be driven out of the home pen using a solid hurdle and down a 1-1.5 m x 35-40 m alley way to a pen measuring 2 x 3 meters. The pen will be isolated from other pigs such that the test pig can not see or hear its conspecifics. Prior to moving the pig, a person will standing in the pen, standing still in the center and back of the enclosure. The clothing of this person will be standardized between sites by having each person wear yellow coveralls with black boots. The latency (time it takes for the pig to approach) to approach the person within 1 meter, the number of contacts when the snout touches any part of the person, and the latency to contact the person will be recorded for each pig. At each location this test will be standardized by ensuring the dimensions of the pen and the location of the observer are the same and the dimensions of the alley are similar. In addition, time of day to

conduct the test, diet fed to the pigs, housing environment, genetics, equal gender numbers, and age of pig will be standardized.

Novel Object Test: This test will be conducted in the same pen as the Approach Test described above. A novel object, standardized to a traffic cone at all locations, will be slowly lowered via a rope hung from the ceiling into the pen after the pig has entered and had five minutes to acclimatize. The same measures as used in the Approach Test above will be recorded to determine the pig's aversion to this novel object as compared with pigs' aversion to humans.

Startle Test: This test will be conducted while the swine are in their home pens. Cameras will be set above each pen one day prior to the test. Observers will be stationed equal distance along the corridor with each observer immediately between a pair of pens. Each pen will house 10 pigs of the same age and size as described above. A total of five observers will be used, thus 10 pens will be studied in this test. At a precise moment each observer will sound an Air Horn. Observations from the startle response of the pigs will be recorded by each observer, in addition to observations collected at a later date from the video analysis. Measures will include: duration of freezing, jumping, and resumption to previous behavior (latency).

b) Description of the Poultry Team Project

The poultry group proposes to conduct experiments at each of six locations, University of Georgia (Webster), Mississippi State University (Bailey), University of Maryland (Estevez), Purdue University (Garner), Washington State University (Newberry), and University of California at Davis (Mench). Extension of results from the poultry project will be coordinated by Estevez (University of Maryland), Webster (University of Georgia), Cronney (Oregon State University), and Reynnells (USDA). Garner will coordinate statistical analysis. All team members will participate in project planning, preparation of grant proposals, inter-observer concordance evaluation, interpretation of results, and preparation of manuscripts.

The team will conduct research on a variety of tests including a Human Avoidance test, a Novel Object test, a Simulated Aerial Predator (startle) test, a Catching test, a Tonic Immobility test, an Aerial Predator Alarm test, and a Ground Predator Alarm test. Of these, the most commonly used test of fear-related behavior in poultry is the Tonic Immobility test. However, this is a time-consuming test and results are known to be somewhat context specific. Therefore, the team proposes to compare this test with other tests that are relevant from ethological and poultry husbandry perspectives.

Each location will conduct a series of tests using standardized methods developed by the team, controlling for test order. All tests will be replicated across locations but there will be variation in the precise set of tests conducted at each location due to variation in the types of birds housed (e.g. adult laying hens in cages, broilers and broiler breeders in floor pens). At each location, each test conducted will be performed on at least two independent replicate groups of chickens of the same strain and age, kept under the same

environmental conditions. Each test will be repeated at least twice at each location at standardized intervals. For each response variable to be assessed, a minimum of five chickens will be tested per replicate group per location. The observed chickens will be individually marked using Swiftag identification tags. A standardized set of fear-inducing stimuli will be developed for use at the different locations, taking care to avoid pseudo-replication (e.g., different groups of chickens will be exposed to different samples of aerial and ground predator alarm calls).

The team will develop a standardized ethogram for assessing behavioral responses that will include response variables such as flight distance, horizontal distance moved, vertical distance moved, speed of movement, duration immobile, latency to contact novel object, duration vigilant, distance to flock mates (clumping) and distance from cover (e.g. walls and corners). Care will be taken in methods development to minimize the potential for ceiling effects on responses (e.g. insufficient pen space to observe a range of flight distances). Video recordings will be made for assessment of intra- and inter-observer concordance in behavioral assessment. Responses of each bird to the different tests will be explored by factor analysis. Depending on data distributions, parametric and non-parametric techniques will be used to assess the within and between location repeatability of test outcomes and the contribution of each variable in predicting fear-related behavior.

Because the genetic background, gender, age of birds when tested, and environmental conditions will differ between locations, integration of the results from the different locations will provide information about the external validity of the different tests. From our research, we shall be able to determine which tests and response variables give the most robust outcomes within and between locations and to eliminate redundant response variables. From these findings, we shall be able to make recommendations about practical methods for assessing fear-related behavior of poultry which will be timely given the pressing need for scientifically-validated poultry welfare auditing procedures.

c) Description of the Sheep/Goats Team Project

The sheep/goats group proposes to conduct three experiments at each of two locations, Rutgers University (Katz and Imwalle) and Michigan State University (Zanella). The team will conduct research on assessment of three tests: a) the Approach/Avoidance Test, b) the Novel Object Test, and c) the Startle test.

a) Novel object test and human approach test: This test will be conducted for a ten minute duration. Goats will be individually taken from a home pen and placed in an unfamiliar pen. The unfamiliar pen will be isolated from other goats such that the test goat cannot see or hear its conspecifics. A novel (traffic cone) or an unfamiliar person will be already in place in the center and rear of the pen. Pen dimensions and location of the observer/object will be standardized at each participating location. In addition, time of day to conduct the test, diet, housing environment, genetics, equal gender numbers, and age of goat will be standardized. Last, exposure of the animal to the cone or the person will be randomly varied to prevent bias. The following measurements will be recorded:

latency to approach the object or person, time spent investigating the object or person and the total number of interactions will be recorded.

b) Startle test: This test will be conducted while the goats are in their home pens. Observers will be stationed equal distance along the corridor with each observer immediately between a pair of pens. At a precise moment a single observer will sound an air horn. Observations of the startle response of the goat will be recorded by each observer, in addition to observations collected at a later date from the video analysis. Measures will include: duration of freezing, jumping, frequency of vocalizing, proportion of animals running away from stimulus, and latency to resume previous behavior.

Measurement of Progress and Results

Outputs:

- The outputs from this project will be published in peer-reviewed manuscripts that will provide researchers and educators tools and information on how to assess animal welfare in terms of fear.

Outcomes or projected Impacts:

- The U.S. is challenged with assuring that animal welfare is adequate in its production systems. This committee will provide the information gained through evaluation of tests as a means to answer this question. Thus, the findings of this committee have the potential to impact the welfare of billions of production animals as well as to increase the productivity and competitiveness of millions of U.S. producers.

Milestones:

(2006): Conduct a two-day meeting to design and plan experiments on Fear Test validation for each species.

(2007): Conduct a two-day meeting to present results, re-evaluate methods and address any concerns prior to continuing research.

(2008): Conduct a three-day meeting to merge manuscript portions from each participant into one manuscript authored by each species subcommittee. Discuss and commence planning of the next round of research on fear.

(2009): Conduct a two-day meeting to present results, re-evaluate methods and address any concerns prior to continuing research. Begin to address renewal of NCR-131.

(2010): Conduct a three-day meeting to merge manuscript portions from each participant into one manuscript authored by each species subcommittee. Address renewal of NCR-131.

Projected Participation

Include a completed [Appendix E](#)

Outreach Plan

Extension efforts for the current project will focus on at least three key target groups: livestock behavior researchers, livestock producers, and specialized groups who are using this kind of practical information to assess the well-being of farm animals on a day-to-day basis.

Livestock and poultry behavior researchers are an important target group for extension efforts for several reasons. Firstly as scientists studying the well-being of farm animals, researchers incorporate these kinds of behavior tests into their on-going research programs. It is important for them to know the degree of validation supporting the use of these methods and also for them to be aware of their limitations. Additionally, due to the somewhat limited number of scientists that specialize in farm animal welfare, they also tend to undertake their own extension programs and so they will be an important component of the secondary redistribution of our research findings. Research scientists will be targeted through the International Society for Applied Ethology (ISAE), which is the international professional organization of scientists studying farm animal behavior. The ISAE has a regular newsletter and an e-mail network that can be used to inform others about the research project. Most participants in NCR-131 are members of the ISAE, including the current Senior Vice-President (Newberry), Junior Vice-President (Swanson), US Regional Secretary (Estevez) and Canadian Regional Secretary (Haley). The final research results will be presented at the annual congress before an international audience and it is likely that Applied Animal Behavior Science, the official journal of the ISAE, would be a key peer-review journal where results would be published. Participants are also active in the American Society of Animal Science, the American Dairy Science Association and the Poultry Science Society, and will present research at the meetings and in the official journals of these societies.

Livestock producers are an important target group for extension efforts because we need to help them improve their understanding of livestock welfare issues generally and help them to understand the basis of those concerns. With regards to the present topic of fear specifically, livestock producers may be asked to review and comment on on-farm audit programs targeting food safety and livestock welfare aspects of their particular commodity. Producers need to have some fundamental knowledge of the latest research results in these areas. They often do not have access to scientific literature or, if they do, find it difficult to interpret. In the United States, outreach efforts will be led by the dissemination of information via the land-grant extension system as well as the USDA Animal Welfare Information Centre. Data generated from the current project will be disseminated at producer meetings, posting on web pages, and by developing educational courses and materials for farmers, producers and other stakeholders such as fact sheets and columns in relevant newspapers and trade magazines. For example, the main findings of the poultry project will be reported in a series of non-scientific articles published in the

Newsletter Poultry Perspectives , edited by I. Estevez and R. Angel at the University of Maryland. This newsletter is mailed on a regular basis to regional broiler growers and is available via internet at

<http://www.wam.umd.edu/%7Eiestevez/extension/extension.html>. The Livestock Behavior Research Unit Update newsletter at

<http://www.ars.usda.gov/sp2UserFiles/Place/36022000/LBRUUpdateFall2005.pdf> will also provide a vehicle for wide dissemination of results. In Canada, the agricultural colleges across the country will be targeted with the assistance of farm animal care groups in provinces that straddle the country. Groups such as Alberta Farm Animal Care put together regular news releases and put on training courses for livestock producers to teach them about such issues and our NCR-131 participants in Canada have made the contacts to make use of that extension system.

The third main target for extension efforts stemming from this project are those groups that are considering, or that are already conducting, on-farm assessments of farm animal welfare. For those groups that incorporate these practical tests of on farms they need to know the validity and reliability of those tests. This is particularly important since many of the tests in the scientific literature have not been carefully adequately evaluated (an important point of this present project). Again the ISAE will be a primary resource for reaching this target group as many subscribe as members of the Society for the express purpose of accessing this kind of latest, most up-to-date information about behavior measures of livestock welfare.

In general, this project is expected to result in collaborative, peer-reviewed scientific publications and reviews, as well as abstracts presented at national and international meetings, and extension publications. This project also provides unique opportunities for interdisciplinary training of graduate students and other research personnel.

Organization/Governance

The Executive Committee of NCR-131 shall consist of the Chair and Secretary.

Chair: The chair of the committee is responsible for organizing the meeting agenda, conducting the meeting, and assuring that tasks and assignments are completed.

The Chair is elected for a one-year term. Chairs and Secretaries are eligible for re-election.

Secretary: The secretary is responsible for the distribution of documents prior to the meeting. The secretary is also responsible for keeping records on decisions made at meetings (a.k.a. keeping the minutes) and assisting in the preparation of the accomplishments report.

The term of Office of the Chair will end at the adjournment of the regular annual meeting. The previous Secretary will become the Chair for one year. The new Chair (previous Secretary) will prepare a report of the annual meeting and send it to the

Administrative Advisor for distribution to the rest of the Committee. A new secretary will be elected each year by those attending the Committee meeting.

Members: Committee membership requires active participation and information exchange at the annual meetings. In addition to carrying out the agreed information exchange, project members are responsible for contributing to the ongoing progress of any committee activity, and communicating their accomplishments to the committee's members and their respective employing institutions. Regular attendance is vital for a committee to be successful. Therefore, members that do not attend the annual meeting or send a substitute, two years in a row will be removed from the committee. This policy will be initiated at the 2005 meeting.

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Attachments

[\[Appendix 1.doc\]](#)

Internal Linkages

CA-D, GA, IN, IA, KS, MD, MI, MN, MS, NE, NJ, OR, TX, WA

External Linkages

ARS, Alberta Agriculture, Food & Rural Development, Illinois State University, Kemptville College - University of Guelph, USDA/ARS, 216 Poultry Bldg, Purdue University, West Lafayette, IN 47907