Agricultural Animal Research and Teaching

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What contributions do livestock make to society?
Benefits of Agricultural Animals

- Conversion of feed into food
- Clothing
- Power
- Recreation
- Conservation (soils/fertility)
- By-products: Waxes, soaps, lubricants, glues, inks....
- >100 drugs for humans and animal use
Animal Teaching and Research

- Improve and expand on livestock contributions to benefit both humans AND animals

- Contribute to a vision of future agriculture
  - Sustainable, ecologically sound
  - Responsive to local conditions and to human and animal needs
Critical components of a student’s education in the Department of Animal Science

- Sound animal management techniques
- Solid scientific understanding
- Ethics of animal use
- Prepare to identify and solve tomorrow’s agricultural challenges!
Other than livestock, what other animal species might an Animal Scientist work with?
Animals used in research and teaching

- Mice, rats, guinea pigs, rabbits, hamsters, gerbils, dogs, cats, primates, fish, amphibians, reptiles......
What animal is most commonly used in research?
Animal Models

- Approximately 20 million animals used annually
- > 90% of animals used are rats/mice
# Animal Research Models

- **Immunizations**
- **Antibiotics**
- **Other pharmaceuticals**
  - Insulin
- **Diagnostics (EKG, EEG, Cardiac Catheterization)**
- **Surgery**
  - Coronary artery bypass
  - Organ transplants
  - Prosthetic joints
- **Kidney Dialysis**
- **Rh factor, transfusions**
- **Cataract removal**
- **Microsurgery**
- **AIDS**
- **Cancer**
  - Chemotherapeutics
  - Radiation therapy
  - “Personalized” therapy
What do you need to know before you start working with the animals?
Core Information

- Laws, regulations and policies
- Ethical and scientific Issues
  - Alternatives to animal use
  - Minimizing pain and distress
- Importance of good husbandry and environment
- Responsibility of researchers, IACUC, veterinary and farm personnel
Animal Welfare Act (1966)
- First known as Laboratory Animal Welfare Act
- Amended in 1970 to Animal Welfare Act
  - Authorized USDA to regulate animal treatment in exhibitions or wholesale pet trade
- Amended in 1976 to prohibit most animal fighting ventures
  - 1994 Marine Mammal Protection Act
- Enforced by USDA/APHIS Animal Welfare
Other Laws & Regulations

- Health Research Extension Act of 1985
  - Public Law 99-158

- Public Health Service Policy
  - Nine U.S. Government Principles
  - Govern proper use, husbandry, veterinary care, training of personnel
  - Justification for species, number of animals, search for alternatives
  - Refers to “the Guide” as resource
Laws, Regulations and Policies

- Guide for the Care and Use of Laboratory Animals (revised 2011)
- Guide for the Care and Use of Agricultural Animals in Agricultural Teaching & Research (revised 2010)
- University Policies and SOP’s
  - http://UVM.EDU/IACUC
  - http://www.uvm.edu/~animrsch/
Several entities play a role in monitoring animal welfare:

- Institutional Animal Care & Use Committee (IACUC)
- U. S. Department of Agriculture
- Office of Laboratory Animal Welfare (OLAW)
- Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC)
UVM has its own Institutional Animal Care & Use Committee (IACUC)

- Required to have 3 (USDA) or 5 (OLAW) members
  - UVM has 12 IACUC members
- Review program every 6 months
- Inspect facility every 6 months
- Review proposed animal activities
- Investigate animal use concerns
The Animal Care and Use Protocol Document

- Outlines ALL details involving animals
  - **Justification** for doing the research
  - **Species** and **number** of animals to be used
  - **What will be done** to the animals, what will they experience?
  - Describe housing, restraint, medical care, care following procedures, biohazards
  - Describe **method of euthanasia**
  - Outline **training** for staff
Ethical and Scientific Issues in Using Animals in Teaching and Research

More than the legal requirements surrounding animal use!
“Three R’s” (Russell & Burch, Principles of Humane Experimental Technique, 1959)

- Replacement, Reduction, Refinement
- Literature search required for any protocol which entails more than momentary pain/distress
- Mission of the Center for Alternatives to Animal Testing (John’s Hopkins)
  - http://caat.jhsph.edu/

Replacement:

- Substitute insentient materials or a lower species
Reduction:

- Use minimal number of lives necessary to effectively answer research question
  - Appropriate experimental design
  - Statistical consultation & analysis

- Note that SMALLER groups of animals may not always be BETTER
Refinement:

- Reduce incidence or severity of distress
  - Improved anesthesia and/or analgesia
  - Training of personnel
  - Adoption of improved surgical techniques or noninvasive techniques
We are bound by legal and moral obligations to minimize Pain, Distress and Discomfort!
Pain

What is pain?

“an aversive feeling or sensation associated with actual or potential tissue damage”

Does pain have a function?
How can we minimize pain?

- Proper training
- Sedative or anesthesia
- Post-procedural analgesics
- Close supervision of students and staff by investigator or veterinarian

Unmitigated pain must be avoided!
USDA Categories are used in IACUC review:

- B: Breeding (no induced pain)
- C: Minimal (momentary) pain or distress
- D: More than momentary or slight pain/distress relieved by analgesia
- E: More than momentary or slight pain/distress not relieved by analgesia
Farm Animal Welfare Committee (FAWC)

- Originally developed by Farm Animal Welfare Advisory Committee in UK from “Brambell’s Five Freedoms”
- FAWC formed in 1979 and published these:
  - 1. Freedom from Hunger and Thirst
  - 2. Freedom from Discomfort
  - 3. Freedom from Pain, Injury or Disease
  - 4. Freedom to Express Normal Behavior
  - 5. Freedom from Fear and Distress
Freedom from Hunger & Thirst

◆ Feed and Water
Feed and Water

- Nutritional adequacy
  - Access to appropriate amounts of feed/water
  - Properly formulated rations
- Quality control
  - Vermin control
  - Correct storage
Freedom from Discomfort

- Requirements and recommendations outlined in “Guide“ or “Ag Guide”
- Includes temperature, shelter, bedding, etc.
- Importance of stable environment and controlling research variables
Handling and Care of Animals

- Sick or injured animals require special handling
- Emergency care must be available
- Ability to handle non-ambulatory animals
- Ability to provide humane euthanasia
Disease prevention includes:

- Good herd health programs
  - Appropriate vaccinations
  - Treatment plans for “special needs” animals
  - Good sanitation & hygiene
- Biosecurity
Biosecurity

- Protect animal subjects from exotic and non-exotic diseases
- Principles of biosecurity:
  - Traffic control
  - Isolation
  - Hygiene
Freedom to Express Normal Behavior

- Social Environment and Behavior
  - Most livestock species are “social” animals
  - Should be housed in groups or pairs or at least have visual & auditory contact
  - Animals should be provided with species-specific “enrichment items”
    - Balls or swings for pigs
    - Oral stimulation for calves
Freedom from Fear and Distress

◆ Stressors
  ◆ Painful procedures
  ◆ Overcrowding
  ◆ Mixing with unfamiliar animals
  ◆ Transportation
  ◆ Adverse environments
Good animal welfare is important in commercial agriculture

Why?

- Pain, distress, fear can affect animal products or performance
  - “pale soft exudative” (PSE) pork
  - “dark cutters” in beef
- Animals that are stressed or frightened are a greater risk to themselves and to personnel – ALWAYS handle animals calmly and quietly
Occupational Health & Safety

◆ Hazards in teaching and research
  ◆ Environmental hazards
    ◆ Equipment – tractors, skid steers are significant hazard. Stay out of the way of farm vehicles!
Animals – cattle are large and strong, the cause of most livestock-associated injury.

- Understand cattle behavior & handling before you work with them
- Report injuries to your instructor or supervisor
  - Complete a “First Report of Injury” form
- Seek appropriate medical attention for bites, kicks, scratches
**Occupational Health**

Zoonotic Diseases

- Ringworm
- Tetanus
- Q-Fever
- Cryptosporidiosis
- Listeriosis
- Rabies

- E. coli
- Salmonella
- Allergies
- Brucellosis
- Tuberculosis
- Toxoplasmosis
- Giardia

Cartoon from islandcrisis.net
Clothing

- Wear boots and protective clothing (coveralls, milker’s apron) when handling animals

Personal hygiene

- ALWAYS wash hands after handling animals and before eating or drinking

Food and Drink should not be stored or consumed in the animal housing areas – go to a class-room, office or break room
Teaching and research activities with animals follow established guidelines.

Animal procedures will be outlined by your lab instructor.

Some commonly used procedures may be provided in written form.

Follow Standard Operating Processes!
Your Responsibilities

- Humane care of animals
- Follow Standard Operating Procedures
- Practice good personal safety
- Notify responsible person with any issues or questions
- Get further training as needed (Surgical, drug handling procedures, etc.)
Reporting Animal Welfare Concerns

If you have concerns about the welfare of animals used in UVM’s research or teaching programs:

- Report your concerns using the EthicsPoint online system: [http://www.uvm.edu/~complian/](http://www.uvm.edu/~complian/)

- Contact the University Veterinarian or the Chair of the Institutional Care & Use Committee
  - Dr. Ruth Blauwiekel, [drruth@uvm.edu](mailto:drruth@uvm.edu) or 656-0459
  - Dr. George Wellman, [George.wellman@med.uvm.edu](mailto:George.wellman@med.uvm.edu)

- Contact the Institutional Official
  - Dr. Richard Galbraith, [Richard.Galbraith@uvm.edu](mailto:Richard.Galbraith@uvm.edu)

Disclosure of suspected misconduct is a responsibility of faculty, staff, and students. Retaliation against those who report misconduct is contrary to University policy.
The End