

# CCAC training module on: the ethical use and care of farm animals in science

## Reference and Resource Handout

### Note:

This is a list of all the relevant references and resources cited within this module. Animal users should consult relevant experts and scientific literature for the most recent information on the species and techniques under consideration.

Care has been taken to ensure that any provided web links are up-to-date; however, the dynamic nature of the internet may mean that some links will become out-of-date. Therefore, keyword search suggestions are provided for situations in which links to additional resources may be broken. The keywords can be entered into any standard internet search engine.

### Slide 3 Training Module Outline

Colditz I.G. (2006) The application of Russell and Burch's Three Rs in commercial livestock experimentation. *Animal Welfare* 15:1–5.

### Slide 7 What is Animal Welfare?

Boissy, A., Manteuffel G., Jensen M.B., Moe R.O., Spruijt B., Keeling L.J., Winckler C., Forkman B., Dimitrov I., Langbein J., Bakken M., Veissier I., and Aubert, A. (2007) Assessment of positive emotions in animals to improve their welfare. *Physiology & Behavior* 92:375–397.

DeVries T.J., Vankova M., Veira D.M. and von Keyserlingk, M.A.G. (2007) Short communication: Usage of mechanical brushes by lactating dairy cows. *Journal of Dairy Science* 90:2241–2245.

Fraser D., Weary D.M., Pajor E.A. and Milligan B.N. (1997) A scientific conception of animal welfare that reflects ethical concerns. *Animal Welfare* 6:187–205.

Fraser D. and Duncan I.J.H. (1998) Pleasures, pains and animal welfare: toward a natural history of affect. *Animal Welfare* 7:383–396.

Fraser D. (2008) *Understanding Animal Welfare: The Science in its Cultural Context*. Oxford UK: Wiley-Blackwell.

Jensen, M.B. and Kyhn, R. (2000) Play behaviour in group-housed dairy calves, the effect of space allowance. *Applied Animal Behaviour Science* 67:35–46.

von Keyserlingk M.A.G., Rushen R., de Passillé A.M. and Weary D.M. (2009) Invited review: the welfare of dairy cattle—Key concepts and the role of science. *Journal of Dairy Science* 92:4101–4111.

Yeates J.W. and Main D.C.J. (2008) Assessment of positive welfare: A review. *The Veterinary Journal* 175:293–300.

## Slide 8 Regulations & Guidelines Concerning Farm Animals

### Federal – Transport: *Health of Animals Act (Part XII)*

- The regulations associated with this act outline the conditions necessary for humane transportation of all animals. It prohibits undue suffering caused by transporting sick or injured animals, as well as by continuing to transport animals that become unfit to travel. In addition to designating appropriate types of vehicle design and bedding requirements, the regulations also require that animals not be mixed with incompatible individuals and that they not be overcrowded to the point that injury or suffering will result. Maximum times for transportation and feed and water deprivation are indicated for different species.
- It should be noted that the *Health of Animals Act (Part XII)* only addresses the needs of animals during transport, and does not apply to the care and handling of animals outside of transportation situations.
- Administered and enforced by the CFIA
- [http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:1\\_XII/en#anchorbo-ga:I\\_XII](http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:1_XII/en#anchorbo-ga:I_XII)

### Federal – Humane Handling and Slaughter: *Meat Inspection Act (Sections 61 – 80)*

- This act sets standards for the humane handling and slaughter of food animals in federally registered slaughter facilities. It prohibits handling that causes avoidable animal distress and pain, including the use of goads and electric prods on sensitive (anal, genital or facial) regions of the animal. The act also prohibits mixing of different species and addresses the need for food and water prior to slaughter.
- Administered and enforced by the CFIA
- <http://laws.justice.gc.ca/eng/SOR-90-288/page-4.html>

### Federal – Suffering: *Criminal Code of Canada (Section 444 – 446)*

- This federal code prohibits any person from willfully causing an animal to suffer from neglect, pain or injury. Section 444 refers specifically to cattle, whereas 445 – 446 are applicable to all other animals, including birds.
- Enforced by police forces, societies for the prevention of cruelty to animals (SPCAs) and humane societies.
- <http://laws.justice.gc.ca/eng/C-46/page-7.html>

(Note: if any of the above links are broken, search for: Department of Justice Canada and then use the tabs “Statutes by Title” and “Regulations by Title” to locate the specific act and regulation).

### Federal – Drug and Vaccine Studies

- Studies involving the testing of new drugs and vaccines in food animals may require approval from the CFIA or Health Canada.
- For new vaccines, contact the Veterinary Biologics Section of the CFIA: <http://www.inspection.gc.ca/english/anima/vetbio/vbpbve.shtml> (Note: if link is broken, search: CFIA Veterinary Biologics)
- For new drugs, contact the Veterinary Drugs Directorate of Health Canada:
  - Emergency Drug Release: <http://www.hc-sc.gc.ca/dhp-mps/vet/edr-dmu/index-eng.php> (Note: if link is broken, search: Health Canada Emergency Drug Release)

- Experimental Studies Certificate: [http://www.hc-sc.gc.ca/dhp-mps/vet/applic-demande/form/esc-cee\\_08-2002-eng.php](http://www.hc-sc.gc.ca/dhp-mps/vet/applic-demande/form/esc-cee_08-2002-eng.php) (Note: if link is broken, search: Health Canada Experimental Studies Certificate for Veterinary Drug)

## Provincial and Non-Governmental Organizations

- All provinces and territories have legislation governing the care of animals. Numerous non-government organizations also produce recommendations related to the care and use of animals. A summary of the available regulations and guidelines, including details of the individual provincial and non-government organizations' guidelines can be found at: <http://www.inspection.gc.ca/english/anima/trans/infrae.shtml> (Note: if link is broken, please search: CFIA Animal Welfare in Canada).
- The National Farm Animal Care Council (NFACC) develops voluntary Recommended Codes of Practice for the Care and Handling of Farm Animals. All currently available codes of practice are available from the NFACC website: <http://nfacc.ca/code.aspx> (Note: if link is broken, please search: NFACC codes).

When research must be directly relevant to the agricultural industry, these codes of practice should be used as minimum standards, but require approval by the animal care committee (ACC).

## Slide 9 A Note on Agricultural Industry Standards

CCAC guidelines on: the care and use of farm animals in research, teaching and testing (2009). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this guidelines document.

## Slide 10 Standard Operating Procedures (SOPs)

CALAM Standards of Veterinary Care, 2007: <http://www.calam-acmal.org/wp-content/uploads/2010/01/CALAM-Standards-of-Veterinary-Care.pdf> (Note: if link is broken, please search: CALAM standards of veterinary care)

Food Animal Residue Avoidance Databank, FARAD: <http://www.farad.org> (Note: if link is broken, please search: Food Animal Residue Avoidance Databank)

## Slide 12 Feed and Water

Agriculture and Agri-Food Canada's *Livestock Water Quality - A Field Guide for Cattle, Horses, Poultry, and Swine*: <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1259101276424&lang=eng> (Note: if link is broken, please search: Agriculture Canada Field Guide Cattle, Horses, Poultry, and Swine)

Canadian Council of Ministers of the Environment's *Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses*: <http://ceqg-rcqe.ccme.ca/> (Note: if link is broken, please search: CCME Water Quality Guidelines for the Protection of Agricultural Water Uses)

DeVries T.J., von Keyserlingk M.A.G., and Beauchemin K.A. (2005) Frequency of Feed Delivery Affects the Behavior of Lactating Dairy Cows. *Journal of Dairy Science* 88:3553–3562.

National Research Council (NRC) (1985) *Nutrient Requirements of Sheep*, 6<sup>th</sup> ed. Washington DC: National Academy Press.

National Research Council (NRC) (1994) *Nutrient Requirements of Poultry*, 9<sup>th</sup> ed. Washington DC: National Academy Press.

National Research Council (NRC) (1998) *Nutrient Requirements of Swine*, 10<sup>th</sup> ed. Washington DC: National Academy Press.

National Research Council (NRC) (2000) *Nutrient Requirements of Beef Cattle*, 7<sup>th</sup> ed. Washington DC: National Academy Press.

National Research Council (NRC) (2001) *Nutrient Requirements of Dairy Cattle*, 7<sup>th</sup> ed. Washington DC: National Academy Press.

## Slide 14 Housing Requirements

CCAC training module on: *environmental enrichment* (2003). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this training module.

## Slide 16 Animal Welfare Effects of Facility Maintenance Issues

*Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*, Third Edition (FASS, 2010): <http://www.fass.org/page.asp?pageID=216> (Note: if link is broken, please search: FASS pdf guide for the care and use of agricultural animals in research and teaching)

## Slide 17 Environmental Improvement

Damm B.I., Pedersen L.J., Heiskanen T. and Nielsen N.P. (2005) Long-stemmed straw as an additional nesting material in modified Schmid pens in a commercial breeding unit: effects on sow behaviour, and on piglet mortality and growth. *Applied Animal Behaviour Science* 92:45–60.

Hughes B.O. and Duncan I.J.H. (1988) The notion of ethological 'need', models of motivation and animal welfare. *Animal Behaviour* 36:1696–1707.

Rushen J. and de Passillé A.M. (1995) The motivation of non-nutritive sucking calves *Bos Taurus*. *Animal Behaviour* 49:1503–1510.

## Slide 18 Improving Farm Animal Environments

Arey D.S., Petchey A.M. and Fowler V.R. (1991) The preparturient behaviour of sows in enriched pens and the effect of pre-formed nests. *Applied Animal Behaviour Science* 31:61–68.

Bilcik B. and Keeling L.J. (1999) Changes in feather condition in relation to feather pecking and aggressive behaviour in laying hens. *British Poultry Science* 40: 444–51.

Panivivat R., Kegley E.B., Pennington J.A., Kellogg D.W. and Krumpelman S.L. (2004) Growth performance and health of dairy calves bedded with different types of materials. *Journal of Dairy Science* 87:3736–3745.

## Slide 19 Environmental Enrichment

CCAC training module on: *environmental enrichment* (2003). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this training module.

Wilson S.C., Mitlöhner F.M., Morrow-Tesch J., Dailey J.W. and McGlone J.J. (2002) An assessment of several potential enrichment devices for feedlot cattle. *Applied Animal Behaviour Science* 76:259–265.

Young R.W. (eds.) (2003) *Environmental Enrichment for Captive Animals*. Oxford UK: Wiley-Blackwell.

## Slide 21 Importance of Proper Acquisition

Scientific Committee on Animal Health and Animal Welfare. (2000). *The Welfare of Chickens Kept for Meat Production (Broilers)*. 149 pp. European Commission, Health & Consumer Protection Directorate-General: [http://ec.europa.eu/food/fs/sc/scah/out39\\_en.pdf](http://ec.europa.eu/food/fs/sc/scah/out39_en.pdf) (Note: if link is broken, please search: Europe welfare of chickens kept for meat)

## Slide 22 Transporting Farm Animals for Use in Science

Part XII of the *Federal Health of Animals Regulations*: [http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:l\\_XII/en](http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:l_XII/en) (Note: if links is broken, search for: Department of Justice Canada and then use the “Browse Statutes by Title” to the *Health of Animals Act*)

*Recommended Code of Practice for the Care and Handling of Farm Animals – Transportation*, 2001: <http://www.nfacc.ca/pdf/english/Transportation2001.pdf> (Note: if link is broken, please search: NFACC codes and select “Transportation (2001)”)

## Slide 23 Importance of Proper Identification and Animal Record Keeping

CFIA’s Livestock Traceability Information: <http://www.inspection.gc.ca/english/anima/trac/trace.shtml> (Note: if link is broken, please search: CFIA livestock)

CCIA’s Cattle Identification Information: <http://www.canadaid.com/> (Note: if link is broken, please search: CCIA cattle)

## Slide 25 Quarantine: Essential for Maintaining Good Health and Welfare

*CCAC training module on: occupational health and safety* (2003). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this training module.

## Slide 29 Avoiding Fear Response

Hemsworth P.H., and Barnett J.L. (1991) The effects of aversively handling pigs either individually or in groups on their behaviour, growth and corticosteroids. *Applied Animal Behaviour Science* 30:61–72.

Rushen J., de Passillé A.M., and Munksgaard L. (1999) Fear of people by cows and effects on milk yield, behavior, and heart rate at milking. *Journal of Dairy Science* 82:720–727.

## Slide 30 On-Farm Human Safety

Canadian Agricultural Injury Reporting (<http://cair-sbac.ca/tecrep.html>) (Note: if link is broken, please search: CAIR-SBAC)

*Handling Farm Animals Safely*. (Farm Safety Association, 2002): <http://nasdonline.org/document/44/d001612/handling-farm-animals-safely.html> (Note: if link is broken, please search: NASD handling farm animals safely)

On-Farm Safety Manuals: *Protect Yourself from Livestock Injuries* (Nova Scotia Department of Agriculture, 2004): <http://www.gov.ns.ca/agri/farmsafety/livestock/index.shtml> (Note: if link is broken, please search: farm safety protect yourself from livestock injuries)

### Slide 33 Consequences of Restraint Devices

CCAC guidelines on: *choosing an appropriate endpoint in experiments using animals for research, teaching and testing* (1998). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this guidelines document.

*Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*, Third Edition (FASS, 2010): <http://www.fass.org/page.asp?pageID=216> (Note: if link is broken, please search: FASS pdf Guide for the Care and Use of Agricultural Animals in Research and Teaching)

### Slide 34 Routine Invasive Procedures and their Effect on Welfare

Molony V., Kent J.E. and Robertson I.S. (1995) Assessment of acute and chronic pain after different methods of castration of calves. *Applied Animal Behaviour Science* 46:33–48.

Thuer S., Mellema S., Doherr M.G., Wechsler B., Nuss K. and Steiner A. (2007) Effect of local anaesthesia on short- and long-term pain induced by two bloodless castration methods in calves. *The Veterinary Journal* 173:333–342.

### Slide 35 Pain Management

Flecknell P.A. and Waterman-Pearson A. (eds.) (2000) *Pain Management in Animals*. WB. London UK: Saunders/Elsevier Inc.

### Slide 36 Specialized Procedures

CCAC training module on: *farm animals used in biomedical research* (2010)

CCAC training module on: *genetically-engineered farm animals* (2010)

### Slide 40 Blood Sampling Guidelines

Morton D.B., Abbot D., Barclay R., Close B.S., Ewbank R., Gask D., Heath M., Mattic S., Poole T., Seamer J., Southee J., Thompson A., Trussell B., West C. and Jennings M. (1993) Removal of blood from laboratory mammals and birds. First Report of the BVA/Frame/RSPCA/UFAW Joint Working Group on Refinement. *Laboratory Animals* 27:1–22.

### Slide 41 Blood Volumes: Single Sample

Sampling methodology adapted from: Hawk C.T., Leary S.L. and Morris T.H. (2005) *Formulary for Laboratory Animals*, 3<sup>rd</sup> ed. Ames IA: Blackwell Publishing.

Mitruka B.M. and Rawnsley H.M. (1977) *Clinical, Biochemical and Haematological Reference Values in Normal Experimental Animals*. Tunbridge Wells UK: Abacus Press.

## Slide 42 Blood Volumes: Multiple Samples

Altman P.L. and Dittmer D.S. (1974) *The Biology Data Book*, 2<sup>nd</sup> ed. Bethesda MD: Federation of American Societies for Experimental Biology.

Diehl K.H., Hull R., Morton D., Pfister R., Rabemampianina Y., Smith D., Vidal J.M. and van de Vorstenbosch C. (2001) A good practice guide to the administration of substances and removal of blood, including routes and volumes. *Journal of Applied Toxicology* 21:15–23.

Sampling methodology adapted from: Hawk C.T., Leary S.L. and Morris T.H. (2005) *Formulary for Laboratory Animals*, 3<sup>rd</sup> ed. Ames IA: Blackwell Publishing.

Morton D.B., Abbot D., Barclay R., Close B.S., Ewbank R., Gask D., Heath M., Mattic S., Poole T., Seamer J., Southee J., Thompson A., Trussell B., West C. and Jennings M. (1993) Removal of blood from laboratory mammals and birds. First Report of the BVA/Frame/RSPCA/UFAW Joint Working Group on Refinement. *Laboratory Animals* 27:1–22.

## Slide 43 Surgery

Fubini S.L. and Ducharme N. (eds.) (2007) *Farm Animal Surgery*. New York NY: Mosby/Elsevier Inc.

Canadian Council on Animal Care (1993) *CCAC Guide to the Care and Use of Experimental Animals*, vol. 1, 2<sup>nd</sup> ed. Ottawa ON: CCAC.

## Slide 46 Fistulation / Catheterization

Harmon D.L. and Richards C.J. (1997) Considerations for gastrointestinal cannulations in ruminants. *Journal of Animal Science* 75:2248–2255.

Hirayamaa T. and Katoh K. (2005) Effects of fistula size on rumen internal pressure and passage rate of feed in goats. *Small Ruminant Research* 56:277–280.

## Slide 48 Endpoints

CCAC guidelines on: choosing an appropriate endpoint in experiments using animals for research, teaching and testing (1998). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this guidelines document.

CCAC guidelines on: the care and use of farm animals in research, teaching and testing (2009). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this guidelines document.

## Slide 50 Emergency Euthanasia

CCAC guidelines on: the care and use of farm animals in research, teaching and testing (2009). Visit the CCAC website at [www.ccac.ca](http://www.ccac.ca) to access and consult this guidelines document.

## Slide 51 Disposal of Farm Animals Used in Science

Agriculture Canada's *Meat Inspection Act* R.S., 1985 c.25 [1<sup>st</sup> Supp.]: <http://laws.justice.gc.ca/eng/SOR-90-288/page-4.html>

Federal *Health of Animals Act*, 1990 c.21: [http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:l\\_XII/en](http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.296/bo-ga:l_XII/en)

- (Note: if any of the above links are broken, search for: Department of Justice Canada and then use the “Browse Statutes by Title” to locate specific act and regulation.)

*Recommended Codes of Practice for the Care and Handling of Farm Animals* (<http://www.nfacc.ca/code.aspx>)  
(Note: if link is broken, please search: NFACC codes)

Veterinary Biologics Section of the CFIA: <http://www.inspection.gc.ca/english/anima/vetbio/vbpbve.shtml>  
(Note: if link is broken, search: CFIA veterinary biologics)

Veterinary Drugs Directorate of Health Canada:

- Emergency Drug Release: <http://www.hc-sc.gc.ca/dhp-mps/vet/edr-dmu/index-eng.php> (Note: if link is broken, search: Health Canada emergency drug release)
- Experimental Studies Certificate: [http://www.hc-sc.gc.ca/dhp-mps/vet/applic-demande/form/esc-cee\\_08-2002-eng.php](http://www.hc-sc.gc.ca/dhp-mps/vet/applic-demande/form/esc-cee_08-2002-eng.php) (Note: if link is broken, search: Health Canada experimental studies certificate for veterinary drugs)