

SUMMARY OF RECENT ACTIVITIES OF THE ANIMAL WELFARE AND SUSTAINABLE ANIMAL PRODUCTION GROUP AT THE FMVZ-UNAM THAT SUPPORT THIS PROPOSAL

The information that supports this proposal is divided in: 1) Formation of human resources, 2) Research, 3) Extension, liaison and services.

1. HUMAN RESOURCES

1.1 Undergraduate teaching programme at the FMVZ-UNAM

Since 1993 a compulsory course of 88h, theoretical and practical, on Ethology and Animal Welfare (AW) is included in the plan of studies. With the modification of the plan of studies in 2003 and as a response to the increasing demand to include more contents on Animal Welfare in Veterinary Medicine, new courses are included. Currently, AW is taught in a transversal way with two compulsory courses in the first and second years respectively, and an optional course in the fourth or fifth years. Additionally there is another elective course which complements and deepens in the field of Clinical Ethology.

-Animal Behaviour, Handling and Welfare I (64 h theoretical/practical in the first semester with emphasis on Basic principles of AW)

-Animal Behaviour and Welfare II (15 h as part of a course on Physiology of the Productive Process in the fourth semester with emphasis on the assessment of AW)

-Animal Welfare (Elective course of 64 h with emphasis on the applications of AW)

These courses are based on the scientific component of the concept of AW (see section B) so that the students can understand that it is an objective and quantifiable concept, based on studies of behaviour and physiology. These courses have a complement with another compulsory course given also at the first year of studies named.

-Seminars on Bioethics This course covers the ethical component of the conceptual framework of AW.

-Clinical Ethology (Elective course of 64 hours from seventh semester, theoretical and practical part).

1.2 Graduate Programme

The current programme called Graduate programme on the Sciences of Animal Health and Production was approved in 1998. As part of the curricula two separate courses with contents of Animal Welfare were included. These courses are offered every other semester and have 64 h each. These are: 1) **Applied Ethology**, y 2) **Selected topics of Animal Behaviour and Welfare**. The number of graduate students working in our groups has increased since that year and over the last five years more than 30 Masters and PhD students have graduated with research programmes on topics related to Animal Welfare.

1.3 Thesis supervised (concluded and in process)

Since 2000 to date more than 50 undergraduate theses have been supervised (see attached Cv's). In the list below we include the Masters and PhD thesis supervised by members of our group during the last eight years.

Masters

González VM Social behaviour of dairy cows under intensive housing conditions and its relationships with stress. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2000.

Rodarte CF. The effect of environmental enrichment on the welfare of piglets weaned at 14 days of age. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2001.

Tejeda PA. The effect of environmental enrichment on the behaviour, productive parameters and immune response of poultry. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2001.

Ojeda CJ. Behaviour and faecal cortisol measurements as non-invasive indicators of welfare in captive and wild jaguars (*Panthera onca*). México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2002.

Pifarré M. The effect of zoo visitors on the behaviour and faecal cortisol in the Mexican wolf (*Canis lupus baileyi*). México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2004. Honors.

Gutiérrez, M. Measurements of behaviour and faecal cortisol in the black bear (*Ursus americanus*) under different environments. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2004.

Edwards, C. Attachment behaviour analysis on domestic cats (*Felis catus*) towards its owners in an experimental situation. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2004.

Pedernera, C. Regionalization of antibody presence against *Leptospira spp*, cortisol levels and haematological values in eleven groups of sea lions *Zalophus californianus californianus* in California Gulf. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM, 2004.

Miguel, C. Behaviour and salival cortisol measurements in captive dolphins (*Tursiops truncatus*).. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM. 2004.

Miranda, G. Social strategies in dairy goats. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM, 2005

Torres, P. México D.F., Social behaviour dynamics in feral dogs of Mexico City and Cozumel Island. México: Facultad de Medicina Veterinaria y Zootecnia. UNAM, 2007

Mena, H. Trophic behaviour of feral dogs on Cozumel Island and its relationship with epidemiological status of wildlife populations. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM, 2007.

Luna BA. Behavioral and cortisol measurements in dolphins (*Tursiops truncatus*) in two kind of enclosures: open and close installations. (Master Science thesis) México (DF) México: UNAM, 2008.

Effects of supplementation with citrus scraps and of crossbreeding with improved breeds (Suffolk and Rambouillet) on Pelibuey sheep carcass quality and yield. On process. MVZ: Javier Gutiérrez Molotla. Grado: Maestría. Asesor Principal. Fecha de Graduación 26 de octubre del 2001.

Evaluation of the effect on productive behaviour of crossing Belgian white blue breed with commercial cattle. Adolfo Kunio Yabuta Osorio. Comité Tutorial. Graduado 2002. Grado: Maestría.

Utilization of PCR on microorganism detection in bovine carcasses. MVZ Esperanza García López. Grado: Maestría. Asesor Principal. Graduada: Julio 2002.

Pathogen microorganisms detection in Oaxaca cheese with PCR technique. MVZ Claudia Alcázar Montañés. Grado: Maestría. Asesor Principal. Graduada: Julio 2002.

Salmonella sp and Vibrio cholera 01 determination on exportation shrimp from northeast Mexican maritime regions with PCR technique. Asesora del Comité. Lissette Pérez Casas. Graduada 2003. Grado: Maestría.

Chronic stress effects caused by the diminishing of available space and/or group size on productivity, metabolic and endocrine changes of growing and finalization pigs. Miguel Gerardo Hernández Castonera. Miembro del Comité Tutorial. Grado: Maestría

Sensorial quality on national and imported meat on Guadalajara, Chihuahua y Veracruz. MVZ Sandra Civit Gual. Grado Maestría. Iniciando en el semestre 2002-2. Asesor Principal. Graduada 2006.

Characterization of Mexican bovine carcasses. MVZ Cesar Octavio Meza Martínez. Grado Maestría. Inicio semestre 2005-1. Comité Tutorial. Graduado Enero 2007.

Comparison of the effect of ractopamine and zilpaterol chloride in fattening steers. Miguel Angel Reyna Martínez. Grado Maestría. Inicio semestre 2005-1. Asesora en el Comité Tutorial. Doctorado.

Utilization of fibrolytic enzymes in meat cattle confined, fed with concentrate feed and cane. Juan Manuel Vargas Romero. Asesor del comité. Inicia el semestre 2005-1. Graduado noviembre 2006. Grado: Maestría.

Prediction equation for Mexican bovine carcasses. MVZ Marco Antonio Pérez Miranda. Grado Maestría. Inicio semestre 2004-2. Asesora Principal. .

Polymorphism in CAPN1 y TG genes and its association with Mexican bovine meat quality. Tesis de Maestría de Cinthya A. Bonilla Contreras. Asesor Principal. Grado: Maestría. Graduada 4 abril del 2008.

Physical and chemical characterization of bovine forelimb muscles in two breeds (*Bos taurus*, *Bos indicus*). Adrián Chavez Gómez. Tesis en Revisión.

Comparative analysis of carcass quality on terminal crossbreeding of Katahadin sheep with meat Suffolk, Dorper, Texel and Charolais studs. Edith Tatiana Vázquez. Grado Maestría. Inicio 2008-1. Tutor principal: Rubén Danilo Méndez Medina. Miembro del comité: MS Rubio L, Armando Partida

Zilpaterol chloride effect on the determination of the ideal slaughter weight in relation with meat quality in Katahadin x Dorper and Katahadin x Charolais lambs. Tania Alejandra Casaya Rodríguez. Grado Maestría. Inicio 2008-1. Fecha de graduación 2009. Tutor principal: Rubén Danilo Méndez Medina. Miembro del comité: MS Rubio L, Armando Partida.

Javier Gutiérrez Molotla. Effect of crossbreeding Suffolk and Rambouillet on the yield, composition and quality of Pelibuey carcass. Grado Maestría. FMVZ, UNAM. Aprobado, 26 de octubre de 2001.

Eunice Elizabeth Ramírez Acosta. Effect of uric acid, tirón and dipyrindile in spermatic cells during cold shock in Mexican bald pig and improved breed pigs. Grado Maestría, FMVZ, UNAM. Graduada marzo 2005

Santurtun E. Knowledge and attitude of Mexican Society towards animal welfare and sustainable animal production. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM.

Rodríguez C. Cattle - environment interaction in foraging conditions. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM.

Mancera K. Protocol validation for farm animal welfare assessment. México: Facultad de Medicina Veterinaria y Zootecnia. UNAM.

Muñoz García Claudia Irais. Small wild carnivore ectoparasites and endoparasites and its epidemiological interaction with domestic animals in El Cielo National Park, Tamaulipas, México. Maestría en Ciencias de las Producción y de la Salud Animal, FMVZ-UNAM nivel de Maestría. Agosto de 2006 a la fecha.

José Antonio Navarro Capella. Carcass characterization of the Mexican bald pig and determination of chemical and sensorial characteristics of its iberic mature ham. Grado Maestría. FMVZ, UNAM. En proceso.

Doctorate

Arch TE. The Guinea Pig as a model in welfare studies. México D.F. Universidad Autónoma Metropolitana. 2000.

Brousset HDM Comparative study on environmental enrichment, animal welfare and captive reproduction of endangered mexican felids (ocelot, margay and jaguarundi). México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM, 2003.

Ortiz, MNA Social rank effect on some reproduction and stress indicators in goats. Mérida, Yucatán, Universidad Autónoma de Yucatán, 2004.

Ugaz, C. Behavioural and welfare evaluation on dolphins (*Tursiops truncatus*) in Mexican. dolphinariums. México D.F., México: Facultad de Medicina Veterinaria y Zootecnia. UNAM.

1.4 Training courses

Between 1990 and 1993, Prof. Aline S. de Aluja organized four courses on Applied Ethology and Animal Welfare that were given by Prof. Donald M. Broom (University of Cambridge, UK), Dr. Temple Grandin (University of Colorado, USA), and Dr. Gerrit van Putten ("Schoonoord" Institute of Animal Production, The Netherlands). Each course lasted two weeks and had the aim of training the lecturers that would be teaching the new compulsory course for the second year students, Ethology and Animal Welfare to be included in the new plan of studies (1993). In 1991 and 1994, Dr. Francisco Galindo

and Dr. Anne Sisto, obtained their PhD degrees on Applied Ethology and Animal Welfare at the University of Cambridge and Texas A&M, respectively. This helped to strengthen the AW teaching programme at our institution.

Since 1995 at least one annual course on Animal Behaviour and Welfare has been organized at the Faculty. In addition, more than 10 courses on AW have been given in other Universities of Mexico and support has been given for the design of Ethology and AW course in several Vet Schools of the country. (Cv's attached).

1.5 Training course-workshop for slaughter-house operators.

During 2008 and 2009 members of this working Group have been elaborating together with SENASICA-SAGARPA this course to be given during 2009.

1.6 Diploma course on Animal Welfare for the Federal Government and Central American countries

As a result of an MOU between SAGARPA –SENASICA and the FMVZ-UNAM a 150 h diploma course on Animal Welfare has been elaborated in order to train veterinary officials nation wide. Also, recently the Organismo Internacional Regional en Sanidad Agropecuaria (OIRSA) has sent a petition to the FMVZ-UNAM so that this diploma course could be given to Veterinarians from Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panamá and Dominican Republic. The description of the course is included below.

Name of the course: The science of animal welfare: basic principles, assessment methods, and applications.

Aimed for: Official veterinarians and other professionals that work in areas related to Animal Welfare, and which specific activities include the assessment, inspection and notification, as well as decision making.

General Aim:

To train Veterinarians on the assessment, identification and solutions for animal welfare problems in farm and working animals, allowing legislation enforcement and the promotion of Animal Welfare inside the structure of official veterinary services offered in the country.

Specific aims:

Module 1.

To identify the origins of Applied Ethology and of the science of animal welfare.

To understand the conceptual framework of Animal Welfares and its scientific basis.

To identify and apply the biological indicators of Animal Welfare through study cases.

Module 2.

To understand the applications of Animal Welfare identifying the main animal welfare problems in farm animals, and its effects on animal health, productivity, food safety and product quality.

Module 3.

To recognize the indicators of AW on farm, during transport and at slaughter.

Module 4.

To understand the legal framework on AW, nationally and internationally, in order to facilitate enforcement.

Module 5.

To apply the AW assessment methods on farm, during transport and at slaughter of dairy cattle.

Module 6.

To apply the AW assessment methods on farm, during transport and at slaughter of beef cattle.

Module 7.

To apply the AW assessment methods on farm, during transport and at slaughter of pigs.

Module 8.

To apply the AW assessment methods on farm, during transport and at slaughter of laying hens.

Module 9.

To apply the AW assessment methods on farm, during transport and at slaughter of poultry.

Module 10.

To apply the AW assessment methods during maintenance, transport and at slaughter of working equines.

Module 11.

To understand the role that international organisms (i.e. OIE, NGO's) play on AW.

Module 12.

To recognize the importance of AW as one of the factors involved in the conceptual framework of sustainable animal production, identifying its interactions with socioeconomic and environmental factors.

Basic bibliography:

1. Appleby, M. y Hughes, B. Animal Welfare, CAB International, UK, 1997.
2. Benson, J. y Rollin, B. The Well-being of farm animals: Challenges and Solutions Blackwell Publishing, US 2004.
2. Broom y Fraser, A.F. Farm Animal Behaviour and Welfare, Baillière Tindall, 4rd. de., U.K. 2007.
3. Galindo, F. y Orihuela, A. Etología Aplicada. UNAM, México, 2004.
4. Grandin T. Livestock handling and transport, CAB International, 3rd edition, 2007.

Sitios electrónicos:

1. http://www.oie.int/eng/Welfare_2004/proceedings.pdf
2. <http://www.bienestaranimal.org.uy/>
3. <http://www.grandin.com/index.html>
4. <http://www.inac.gub.uy/>
5. <http://www.defra.gov.uk/>
6. <http://www.aphis.usda.gov/>
7. <http://www.nal.usda.gov/awic/>
8. <http://www.ufaw.org.uk/>
9. <http://www.welfarequality.net/>
10. <http://www.bienestar-animal.com/>

1.7 Teaching materials

Database on AW for the National Council for Veterinary Education, Open University System UNAM, Centro Nacional de Evaluación par la Educación Superior, A.C. Animal Behaviour in Zoos. **DVD** (duration 50 min) produced by Africam Safari Zoo and the Department of Ethology and Wildlife , FMVZ-UNAM. 2003.

Elaboration of **Teaching materials** for five courses on Animal Behaviour and Welfare as part of the plan of studies approved in 2003.

Text book: Galindo F., y Orihuela A (eds.) 2004. **Applied Ethology**. Universidad Nacional Autónoma de México. First text book in Spanish on the topic with the collaboration of Prof. Don Broom (University of Cambridge), Prof. Edward Price (University of California, Davis), Dr. Temple Grandin (University of Colorado), Dr. Judith Blackshaw (Australia), Dr. Xavier Manteca and Dr. Jaume Fatjo (Autonomous University of Barcelona) and 6 other colleagues from Mexico.

2. RESEARCH

2.1 Research lines and projects

Six lines of research have been created by members of this working group. Past and present funding sources are mentioned as well as the institutions that we have collaborated with.

a) Applied Ethology, Animal Welfare and Epidemiology.

- Responsible persons: Francisco Galindo and Anne Sisto
- Funding source: National Council of Research and Technology-CONACYT, Research and Technology Innovation Programme (PAPIIT-UNAM), Geraldine Dodge Foundation.
- Collaboration with: University of Cambridge, Texas A&M University, in addition

to other academic institutions in Mexico.

b) Animal Welfare and Sustainable Animal Production.

- Responsible persons: Francisco Galindo y Danilo Méndez Medina
- Funding source: National Council of Research and Technology-CONACYT, International Cooperation programme INCO of the European Union as part of the Welfare Quality project ®, UNAM, International Fund for Animal Welfare (IFAW), The Irish Fund
- Collaboration with: University of Jaboticabal, Brazil, Autonomous University of Barcelona, University of Cambridge, University of Bristol, Texas A&M University, University of Montevideo, Uruguay, University of Chile, and several academic institutions in Mexico.

c) Applied Ethology, Animal Welfare and Conservation.

- Responsible persons: Dulce Brousset and Francisco Galindo
- Funding source: National Council of Research and Technology-CONACYT, Research and Technology Innovation Programme (PAPIIT-UNAM), Geraldine Dodge Foundation, International Fund for Animal Welfare, Southwest Fisheries Science Center, NOAA, USA.
- Collaboration with: General Direction of Zoos I Mexico City, Africam safari Zoo, Latin American Association of Zoos and Aquariums, Ministry of the Environment, Centre for Research of Endangered Wildlife, Cincinnati Zoo and Botanical Gardens; Conservation and Research Centre, National Zoological Park, Smithsonian Institute; The Wildlife Centre of Virginia; Southwest Fisheries Science Centre, NOAA, USA, Southwest Fisheries Science Center, NOAA, USA, San Diego Zoo, among others, as well as several academic institutions in Mexico.

d) Clinical Ethology and Companion Animal Welfare

- Responsible persons: Alberto Tejeda and Beatriz Vanda
- Funding source: National Council of Research and Technology-CONACYT, International Fund for Animal Welfare (IFAW), Pedigree Company, among others.
- Collaboration with: IFAW Dominica, Dominica Government, Pedigree, Local NGO's, .

e) Welfare of working equines

- Responsible persons: Aline S. de Aluja, Horacio Chavira
- Funding source and collaboration: National Council of Research and Technology-CONACYT: UNAM, The Donkey Sanctuary, UK; World Horse Welfare, UK.

f) Animal Welfare and Product quality.

- Responsible persons: Danilo Méndez, Maria Rubio and Pilar Castañeda
- Funding source: National Council of Research and Technology-CONACYT, Research and Technology Innovation Programme (PAPIIT-UNAM).
- Collaboration: University of Bristol; Texas A&M University; University of Cordoba, Spain, private sector in Mexico and in the US.

2.2. Current scientific research projects

Since 1998 to date more than 50 funded research projects have been carried out (see attached Cv's). A list of those projects in progress is included below:

- Sustainable beef production in the tropics Subproject 4: Technology for the sustainable use and recovery of the foraging lands, since 2006 to the present. Large Scale Project Programme, UNAM.
- Studies on social dominance, cortisol levels and reproductive status in domestic goat. PAPIIT IN210006, Responsible: Lorenzo Álvarez
- INCO-Welfare Quality ® Project: Integration of animal welfare in Latin American food chain: towards a sustainable animal production system.
Institucional Responsible: Dr. Francisco Galindo Maldonado, in collaboration with Uruguay, Chile, Brasil y España

- The use of shades and its effect on behaviour, productivity and physiology of confined and foraging goats. FMVZ-UNAM. Responsible: Lorenzo Álvarez
- Studies on physiological and behavioral disturbances of goat kid horn removing practice. Development of veterinary protocols (analgesia/anesthesia) to diminish negative impact of those practices in animal welfare. CONACYT.
- Network to monitor the use and trade of wildlife in Latin America, IFAW, Project number: 500071023, Responsible: Francisco Galindo Maldonado
- Population management on feral dogs, IFAW, Project number: 500003023, Responsible: Francisco Galindo Maldonado
- Welfare of captive dolphins (*Tursiops truncatus*). Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica (PAPIIT-Fundación UNAM), Project name: IN223106-2, Responsible: Francisco Galindo Maldonado
- Implementation of health and animal welfare educational kit, International Fund for Animal Welfare IFAW, Project number: 500003023, Responsible: Francisco Galindo Maldonado
- Hepatic function in pigmentation process of broilers fed with micotoxins contaminated diets. Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica (PAPIIT IN212905-3 “
- Effect of functional food on intestinal microbiota composition and broiler productive behaviour. Programa de Fortalecimiento Académico para las Mujeres Universitarias (PFAMU, PI201306).
- Bovine welfare and carcass quality in Mexico. CONACyT. Project responsables: Danilo Méndez y María Rubio
- New product development from the large- scale Project: Sustainable productivity in foraging breeding cattle, UNAM, Project responsables: Danilo Méndez y María Rubio
- Defining meat quality indicators in bovines, suines, poultry, goats and sheeps of Mexico, Sagarpa-Conacyt, Project responsables: Danilo Méndez y María Rubio
- Productive and genetic improvement of beef cattle, CONACYT-Texas A&M University, Project responsables: Danilo Méndez y María Rubio
- Relationship of reproductive function and suppression to social hierarchies in blackhanded spider monkeys (*Ateles geoffroyi vellerosus*) in Catemaco, Mexico and potential of genome resource banking for conservation, Center for Research of Endangered Wildlife, Cincinnati Zoo and Botanical Gardens, Corresponsable: Dulce Brousset
- Evaluation of interaction between fishing sites and california sealion *Zalophus californianus* and structure of the complex *Leptospira interrogans* in reproductive groups of California Gulf. Financiamiento CONACYT-Semarnat, Corresponsable: Dulce Brousset Hernández

2.2. List of recent publications of international relevance.

a) Books

Galindo F., y Orihuela A (eds.) 2004. *Applied Ethology*. Universidad Nacional Autónoma de México, México.

b) Chapters in books

Greenough, P.R. Weaver, A.D., Broom, D.M. Esslemont, R.J. y Galindo, F.A. Basic concepts of bovine lameness In: *Lameness in Cattle*, third edition, Ed. Paul R. Greenough, W.B. Saunders Company, USA, pp. 3-13, 1997.

Broom, D.M. Galindo, F.A. Nutrition, behavior and housing In: *Lameness in Cattle*, third edition, Ed. Paul R. Greenough, W.B. Saunders Company, USA, pp. 293-307, 1997.

González-Rebeles, C, Galindo, F. Departamento de Etología, Fauna Silvestre y Animales de laboratorio. En: History of the Faculty of Veterinary Medicine and Zootechniques UNAM, 1853-2003, eds. Quiroz RH, Cervantes, JM, Facultad de

Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, 2003.
Aluja A. Schunemann de: Capítulo 10. La ética en la investigación científica y en la enseñanza con animales vertebrados. En: El Papel de la Ética en la Investigación Científica y la Educación Superior. Eds. Martín Aluja y Andrea Birke, 1ª Ed. Academia Mexicana de Ciencias, pp 175-193, México, D. F., Enero 2004.

Galindo F. Applied Ethology Introduction. En: *Etología Aplicada*. eds. Galindo, F y Orihuela, A. Universidad Nacional Autónoma de México, pp. 17-28. México, D.F., 2004.

Orihuela A, Galindo F. Applied Ethology in Cattle. En: *Etología Aplicada*. eds. Galindo, F y Orihuela, A. Universidad Nacional Autónoma de México, pp.89-131. México, D.F., 2004.

Brousset D, Galindo F. Environmental Enrichment in Zoo Animals. En: *Etología Aplicada*. eds. Galindo, F y Orihuela, A. Universidad Nacional Autónoma de México, pp.279-309. México, D.F., 2004.

Galindo F. Fundamentals of behavioural measurement. En: *Etología Aplicada*. eds. Galindo, F y Orihuela, A. Universidad Nacional Autónoma de México, pp.355-375. México, D.F., 2004.

Galindo F. Applied ethology in sheep. En: Especialización de Producción Animal Ovinos. Impartiendo la plática: Cd. Universitaria, D.F. (En Proceso de edición de un texto y capítulo del libro correspondiente).

Slaughter, Euthanasia and Sacrifice Methods. Manual de Necropsias de patología sistémica veterinaria. Financiado por PAPIIMEEN212504. 2007. Editores: Eugenia Candanosa y Laura Romero. In press.

Notes for the certification course – workshop for slaughter workers. Aline S de Aluja, Ma. Salud Rubio Lozano y R Danilo Méndez Medina. FMVZ UNAM. In press.

c) Scientific publications in peer-reviewed journals (ISI) related to AW since 2000 to date.

Galindo F, Broom DM, Jackson PGG. A note on possible link between behaviour and the occurrence of lameness in dairy cows. *Applied Animal Behaviour Science*, 67: 335-341, 2000.

Galindo F, Broom DM. The relationships between social behaviour of dairy cows and the occurrence of lameness in three herds. *Research in Veterinary Science* 2000, 69, 75-79.

Suzán G, Galindo F, Ceballos G. La importancia del estudio de enfermedades en la conservación de fauna silvestre. *Revista Veterinaria México*, 31(3) 223-230, 2000.

Sisto, A. M. & Friend, T.H. The effect of confinement on motivation to exercise in young dairy calves. *Applied Animal Behaviour Science* 73: 83-91. 2001.

Williams, J.L., Friend, T.H., Toscano, M.J., Collins, M.N., Sisto, A.M. & Nevill, C.H. The effect of early training sessions on the reactions of foals at 1, 2, and 3 months of age. *Applied Animal Behaviour Science* 77: 105-114. 2002.

Tejeda A, Galindo F, Quintana J. Efecto del enriquecimiento ambiental sobre la conducta, parámetros de producción y respuesta inmune en pollos de engorda. *Revista Veterinaria México*, 33 (2), 89-100, 2002.

Delgado GL, Gómez CS^a, Rubio LMS^b, Capella VS^a, Méndez MD^b. 2002. Fatty acid and triacylglycerols profile, on intramuscular and subcutaneous fat from fresh and cured Hairless Mexican Pigs hams. *Meat Science* 61, 1, 61-65.

Delgado GL, Gómez CS, Rubio LMS, Iturbe CHF y Méndez MD. 2002. Evolution in the shoulder composition of Hairless Mexican Pigs throughout the curing and drying processes. *Meat Science* 61 4, 341-346.

Méndez MD, Becerril HM, Rubio LMS, Delgado SEJ

Características de la canal del Cerdo Pelón Mexicano, procedente de Mizantla, Veracruz, México. *Veterinaria-México.*, 33(1). Pág. 27-37. 2002.

Galindo F, Broom DM. The effects of lameness on social and individual behavior of dairy cows. *Journal of Applied Animal Welfare Science*, 5(3), 193-201, 2001.

Smith SB, Hively TS, Cortese GM, Han JJ, Chung KY, Castañeda SMP, et al.

Conjugated linoleic acid depresses the $\Delta 9$ desaturase index and stearoyl coenzyme A desaturase activity in porcine subcutaneous adipose tissue. *J Animal Sci.* 2002;80: 2110-2115.

González, M., Yabuta, A.K., Galindo, F. Behaviour and adrenal activity of first parturition and multiparous cows under a competitive situation. *Applied Animal Behaviour Science*, 83, 259-266, 2003.

Swanson WF, Johnson WE, Cambre RC, Citino SB, Quigley KB, Brousset DM, Morais RN, Moreira N, O'Brien SJ and Wildt DE: Reproductive status of endemic felid species in Latin American zoos and implications for ex situ conservation. *Zoo Biology*, 22:421-441, 2003.

Vanda B: La experimentación biomédica en animales en los códigos bioéticos. *Labacta* 2003;15 (2):69-73.

Vanda B: Tanatología en animales de compañía. *Imagen Vet* 2003; 3 (3): 4-9.

Alvarez, L., Martin, G.B., Galindo F., Zarco, L.A. Social dominance of female goats affects their response to the male effect. *Applied Animal Behaviour Science*, 84, 119-126, 2003.

Copado F., Mayagoitia, L., Aluja de. S.A., Galindo F. The behaviour of free ranging pigs in the Mexican tropics and its relationships with human faeces consumption. *Applied Animal Behaviour Science*, 88, 243-252, 2004.

Rodarte CL, Valdez PR, Ducoing, A., Romano PM, Galindo F The effect of environmental manipulation on behaviour, salivary cortisol, and growth of piglets weaned at 14 days of age. *Journal of Applied Animal Welfare Science*, 7, 171-179, 2004.

Rubio MS, Torres N, Gutiérrez J, Méndez RD. 2004. Composition and sensory evaluation of lamb carcasses used for the traditional Mexican lamb dish, barbacoa. *Meat Science* 67(2): 359-364.

Delgado SE, Rubio LMS, Iturbe CF, Méndez MD, Cassis L, Rosiles R. 2005. Composition and quality of Mexican Retail beef in México. *Meat Science* 69(3): 465-471.

Gutiérrez MJ, Rubio LMS, Méndez MD. 2005. Effects of crossbreeding Mexican Pelibuey sheep with Rambouillet and Suffolk on carcass traits. *Meat Science* 70(1): 1-5.

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d) Publications in proceedings and non-scientific publications.

Since 2000 the members of this working group have published more than 350 works, including national and international conferences, *in extenso* papers in proceedings and abstracts (see attached Cv's). Among those events that are attended periodically by the members of this group we highlight those that are most relevant to the proposal:

National events:

Annual Congress of the Mexican Society for Applied Ethology (SOMEV)
Annual symposium on Wildlife Medicine and Management , FMVZ-UNAM
Annual Congress on Animal Production Research, INIFAP-SAGARPA
Annual meeting of the National Consultation Council on Animal Health, CONASA

International events:

Annual congress of the International Society for Applied Ethology, (ISAE)
Annual congress of the International Food and Technology Congress, (IFT)
American Society of Animal Science and Poultry Science Association
International Congress of Meat Science and Technology
Pan-American Congress of Veterinary Sciences, PANVET
Congress of the World Small Animal Veterinary Association, WSAVA

3. EXTENSION, LIAISON AND SERVICES PROVIDED

3.1 Oral presentations

Coinciding with publications in scientific meetings proceedings and other events, since 2000 the members of this working group have given more than 250 oral works, including national and international conferences (see attached Cv's). Among those events that are attended periodically by the members of this group we highlight those that are most relevant to the proposal:

National events:

Annual Congress of the Mexican Society for Applied Ethology (SOMEV)
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International events:

Annual congress of the International Society for Applied Ethology, (ISAE)
Annual congress of the International Food and Technology Congress, (IFT)
American Society of Animal Science and Poultry Science Association
International Congress of Meat Science and Technology
Pan-American Congress of Veterinary Sciences, PANVET
Congress of the World Small Animal Veterinary Association, WSAVA

3.2 Scientific meetings and events on Animal Welfare of international relevance organized recently by the working group:

Animal Welfare Session at the Pan-American Congress of Veterinary Sciences, PANVET in Campo Grande, Brazil 1997.

Animal Welfare Session at the Pan-American Congress of Veterinary Sciences, PANVET La Havana, Cuba, 1998.

Animal Welfare Session at the Pan-American Congress of Veterinary Sciences, PANVET in Guadalajara, México 2008.

41 Congress of the International Society for Applied Ethology, ISAE. July 2007, Merida Mexico. Chair of the Organising and Scientific committee: Dr. Francisco Galindo Maldonado.

Members of the Organising and Scientific committees of the First Latin American meeting of the International Society for Applied Ethology, ISAE, Montevideo, Uruguay, 2008.

Biannual meetings of the Mexican Society for Applied Ethology SOMEV, since 1995 to date.

Annual meeting of the Animal Welfare Committee of the National Consultation Council on Animal Health CONASA, since 1998.

3.3. Services provided and legislation drafting.

Coordination and participation in the Animal Welfare Committee of the National

Consulation Council on Animal Health, CONASA. Consultation body for the Ministry of Agriculture, SAGARPA.

Commission for the Reestructuración del Mercado de Animales de Trabajo en San Bernabé, Estado de México, de SENASICA. Comisión Evaluadora de la Salud y Bienestar de los Animales del Zoológico de Aragón, por solicitud de la secretaria del medio ambiente del gobierno del Distrito Federal, Mayo del 2001.

Commission for the assessment of animal welfare and bioethics of the Direction of zoos in Mexico.

Participation in drafting the Official Norm (Norma Oficial Mexicana NOM-051-ZOO-1995) Humane treatment during transport of animals. SARH, 1997.

Participation in drafting the Official Norm (Norma Oficial Mexicana NOM-065-ZOO-1995) Humane slaughter of animals. SARH, 1997.

Participation in drafting the Official Norm (Norma Oficial Mexicana NOM-062-ZOO-2001) for the Production, Care and Use of Laboratory Animals.

Elaboration of the Ruling of the *Federal Animal Health Law on its Chapter III Animal Welfare*.

Elaboration of the initiative *General Animal Welfare Law* presented in congress in December 2008 by Senator Antonio Mejía Haro.

Elaboration of the initiative *Responsible Dog Ownership* by petition of the Mexico City Government.

In other countries:

MOU with the Latin American of International Fund for Animal Welfare, IFAW, for the technical and scientific support.

MOU in progress with the Organismo Internacional Regional en Sanidad Agropecuaria (OIRSA) to support Veterinarian services in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panamá and Dominican Republic on Animal Welfare issues.

Dr. Francisco Galindo was Regional Secretary for Latin America of the International Society for Applied Ethology, ISAE, from 2001 – 2007.