

Inmaculada (*Inma*) Estévez Biography

1. PERSONAL INFORMATION.

Name: Inmaculada (*Inma*) Estévez.
Professional Address: Department of Animal and Avian Sciences,
University of Maryland,
College Park, MD 20742, USA
Telephone: 301-405-5779, Fax: 301-314-9059
E-mail: iestevez@umd.edu

Current Rank: Professor
Percentage of official time devoted to: Research **70%**, Extension **30%**.
Year of Appointment: 2007

a. Educational Background:

1988: B.Sc. Biology, University of Córdoba, Spain.
1994: Ph.D. Biology, University of Córdoba, Spain.

b. Positions Held:

July 1 2007. Full Professor

July 1 2003-June 2007. Associate Professor with Tenure.

September 2003-Present. Affiliate Associate Professor at the Maryland Campus of the Virginia- Maryland Regional College of Veterinary Medicine, College Park.

April 1997- June 2003: Assistant Professor. Poultry Behavior Extension Specialist, Department of Animal and Avian Sciences, University of Maryland, College Park.

March 2000-September 2003: Affiliate Assistant Professor at the Maryland Campus of the Virginia- Maryland Regional College of Veterinary Medicine, College Park.

1996: Post-doctoral Fellow of the Spanish Ministry of Education and Sciences, Spain. Program for the Interchange of Researches between the Industry and Public Research Centers.

April-Sept 1995: Post-doctoral Fellow of the Institute National de la Recherche Agronomique (INRA), Tours, France. Visiting fellowship.

July 1994-March 1995: Post-doctoral Fellow of the Swedish Institute, Agricultural University, Skara, Sweden. Visiting fellowship.

1993: Research Associate University of Cordoba, Spain. Funded by the Andalusian Government.

1989-1992: Ph.D. Fellow of the Spanish Ministry of Education and Sciences, University of Cordoba, Spain.

1987-1988: Research Assistant within the French-Spanish Integrate Action Program # 32/49 and # 40/208 (Spanish and French Ministries of Foreign Affairs), University Paul Sabatier, France.

2. RESEARCH, SCHOLARLY AND CREATIVE ACTIVITIES.

a. Chapters in Books

Bosch, M., Estévez, I., Recarte, J. M. (1992). Comportamiento del muflón (*Ovis orientalis musimon*) durante la época reproductora. [Behaviour of mouflons during the rut]. In: Gonzalo Nardiz Award of Ethology 1991, Publications of the Agricultural Board of the Basque Government, pp:7-42, ISBN:84-457-0191-6.

Estévez, I. (1993). El sistema de organización social en pollos broiler (*Gallus gallus*): una nueva perspectiva. [The social organization in broiler chickens: A new perspective]. In: Gonzalo Nardiz Award of Ethology 1991, Publications of the Agricultural Board of the Basque Government, pp:13-74, ISBN: 84-457-0400-1.

Estévez, I. (2007). Behavior and environmental enrichment in Broiler Breeders. In: Biology of Breeding Poultry. CAB. In Press.

b. Articles in Refereed Journals

* Research reported in these publications was performed by Dr. Estevez, Graduate students or Postdoctoral personnel under her direct supervision.

1. Bon, R., González, G., Estévez, I. & Recarte, J. M. (1992). Comparison of social patterns during the rut within three European populations of Corsican mouflon (*Ovis ammon musimon*). *Etología*, 2:9-20.

2. Bon, R., Dardaillon, M. & Estévez, I. (1993). Mating and lambing periods as related to age of female mouflons. *Journal of Mammalogy*, 74(3):752-757.

3. Estévez, I. (1993). El IV Symposium Europeo sobre el bienestar de aves domésticas. *Selecciones Avícolas*, Diciembre, 1993: 841-848.

4. **Estévez, I.**, Newberry, R. & Arias de Reyna, L. (1997). Broiler chickens, A tolerant social system? *Etología*, 5:19-29.
5. Newberry, R. & **Estévez, I.** (1997). A dynamic approach to the study of environmental enrichment and animal welfare. *Applied Animal Behaviour Science*, 54:53-57.
6. *Fiscus-LeVan, N. J., **Estévez, I.** & Stricklin, R. W. (2000). Use of horizontal and angled perches by broiler chickens. *Applied Animal Behaviour Science*, 65:349-365.
7. Tablante, N. L., Vaillancourt, J-P., Martin, S. W., Shoukri, M. & **Estévez, I.** (2000). Spatial distribution of cannibalism mortalities in commercial laying hens. *Poultry Science*, 79:705-708.
8. *Cornetto, T. L. & **Estévez, I.** (2001). Influence of vertical panels on use of space by domestic fowl. *Applied Animal Behaviour Science*, 71:141-153.
9. *Pettit-Riley, R. & **Estévez, I.** (2001). Effects of density on perching behavior of broiler chickens. *Applied Animal Behaviour Science*, 71:127-140.
10. Newberry, R. C., **Estévez, I.** & Keeling, L. J. (2001). Group size and perching behaviour in young domestic fowl. *Applied Animal Behaviour Science*, 73:117-129.
11. Gonzalez, G., Bon, R., **Estévez, I.** & Recarte, J. M. (2001). Behaviour of ewes (*Ovis gmelini musimon*) during the rut. *Rev. Ecol. (Terre Vie)*, 56:221-230.
12. *Cornetto, T. L. & **Estévez, I.** (2001). Behavior of the domestic fowl in presence of vertical panels. *Poultry Science*, 80:1455-1462.
13. **Estévez, I.**, Tablante, N. L., Pettit-Riley, R. & Carr, L. (2002). Use of cool perches by broiler chickens. *Poultry Science*, 81:62-69.
14. *McGary, S., **Estévez, I.**, Bakst, M. & Pollock D. (2002). Phenotypic traits as reliable indicators of fertility in male broiler breeders. *Poultry Science*, 81:102-111.
15. *Cornetto, T. L., **Estévez, I.** & Douglass L. (2002). Using artificial cover to reduce aggression and disturbances in domestic fowl. *Applied Animal Behaviour Science*, 75:325-336.
16. **Estévez, I.**, Newberry, R. C. & Keeling, L. J. (2002). Dynamics of aggression in the domestic fowl. *Applied Animal Behaviour Science*, 76:307-325.
17. Heckert, R. A., **Estévez, I.**, Russek-Cohen, E. & Pettit-Riley, R. (2002). Effects of density, heat stress and perch availability on the immune status of broilers. *Poultry Science*, 81:451-457.
18. *Bizeray, D., **Estévez, I.**, Leterrier, C. & Faure, J. M. (2002). Influence of increased environmental complexity on leg condition, performance and level of fearfulness in broilers. *Poultry Science*, 81:767-773.
19. *Bizeray, D., **Estévez, I.**, Leterrier, C. & Faure, J. M. (2002). Effects of increasing environmental complexity on the physical activity of broiler chickens. *Applied Animal Behaviour Science*, 79:27-41.

20. *Pettit-Riley, R., **Estévez, I.** & Russek-Cohen, E. (2002). Effects of crowding and access to perches on aggressive behaviour in broilers. *Applied Animal Behaviour Science*, 79:11-25.
21. Bakst, M. R., McGary, S., **Estévez, I.** & Knapp, T. (2002). Using nonsettable eggs to evaluate turkey hen fertility. *Journal of Applied Poultry Research*, 11:402-405.
22. *McGary, S., **Estévez, I.** & Bakst, M. (2003). Potential relationships between physical traits and male broiler breeder fertility. *Poultry Science*, 82:328-337.
23. Tablante, N., **Estévez, I.**, & Russek-Cohen, E. (2003). Effect of perches and stocking density on tibial dyschondroplasia and bone mineralization as measure by bone ash in broiler chickens. *Journal of Applied Poultry Research*, 12:53-59.
24. *Cornetto, T. L., Angel, R. C. & **Estévez, I.** (2003). Influence of stocking density and dietary energy on ostrich performance. *International Journal of Poultry Science*, 2:102-106.
25. *McGary, S., **Estévez, I.** & Russek-Cohen, E. (2003). Reproductive and aggressive behaviour in male broiler breeders with varying fertility levels. *Applied Animal Behaviour Science*, 82:29-44.
26. Keeling, L. J., **Estévez, I.**, Newberry, R. C. & Correia, M. G. (2003). Production-related traits of layers reared in different sized flocks: The concept of problematic intermediate group sizes. *Poultry Science*, 82:1393-1396.
27. **Estévez, I.**, Keeling, L. J., and Newberry, R. C. (2003). Decreasing aggression with increasing group size in young domestic fowl. *Applied Animal Behaviour Science*, 84:213-218.
28. Dennis, R., Zhang, H. M., Bacon, L. D., **Estévez, I.** & Cheng, H. W. (2004). Behavioral and physiological features of chickens diversely selected for resistance to avian disease. 1. Selected inbred lines differ for behavioural and physical responses to social stress. *Poultry Science*, 83:1489-1496.
29. Kreger, M. D., **Estévez, I.**, Hatfield, J. S., & Gee G. F. (2004). Effects of rearing treatment on the behavior of captive whooping cranes (*Grus americana*). *Applied Animal Behaviour Science*, 89:243-261.
30. *Bilcik, B., & **Estévez, I.** (2005). Impact of male-male competition and morphological traits on mating strategies and reproductive success in broiler breeders. *Applied Animal Behaviour Science*, 92:307-323.
31. Kreger, M. D., Hatfield, J. S., **Estévez, I.**, Gee, G. F., & Clugston, D. A., (2005). The effects of captive rearing on behavior of newly-released whooping cranes (*Grus americana*). *Applied Animal Behaviour Science*, 93:165-178.
32. *Bilcik, B., **Estévez, I.** & Russek-Cohen, E. (2005). Reproductive success of broiler breeders in natural mating systems: The effect of male-male competition, sperm quality and morphological characteristics. *Poultry Science*, 84:1453-1462.
33. *McGary, S., **Estévez, I.** & Ottinger, M. A. (2005). Can testosterone and corticosterone predict the rate of display of male sexual behaviour, development of secondary sexual

- characters and fertility potential in primary broiler breeders? *British Poultry Science*, 46 (5):621-625.
34. Kreger, M. D., Hatfield, J. S., **Estévez, I.**, Gee, G. F. & Clugston, D. A. (2006). Behavioral profiles of the captive juvenile whooping crane as an indicator of post-release survival. *Zoo Biology*, 25:11-24.
 35. **Estévez, I.** & Christman, M. (2006). Analysis of the movement and use of space of animals in confinement: The effect of sampling effort. *Applied Animal Behaviour Science*, 97:221-240.
 36. Dawson, M. D., Benson, E. R., Malone, G. W., Alphin, R. L., **Estevez, I.** and Van Wicklen G. L. (2006). Evaluation of Foam-Based Humane Mass Depopulation Methodology for Floor-Reared Meat-Type Poultry Operations. *Applied Engineering in Agriculture*, 22(5):787-794.
 37. *Leone, E. N. H., **Estévez, I.** & Christman, M. (2007). Environmental complexity and group size: Immediate effects on the use of space by domestic fowl. *Applied Animal Behaviour Science*, 102:39-52.
 38. **Estévez, I.**, Andersen, I. L. & Nævdal E. (2007). Group size, density and social dynamics in farm animals. *Applied Animal Behaviour Science*, 103:185-204. (**Invited paper, ranked #10 in the Top 25 Hottest Articles for the Journal of Applied Animal Behavior Sciences**)
 39. **Estévez, I.**, (2007). Too many, too few: The effects of groups size and density in captive animals. Preface, Special Issue of *Applied Animal Behaviour Science*, 103:183-184. (**Preface**)
 40. Newberry, R. C., Keeling, L. J., **Estévez, I.**, & Bilcik, B. (2007). Behaviour when young as a predictor of severe feather pecking in adult laying hens: the redirected foraging hypothesis revisited. *Applied Animal Behavior Science* (In press).
 41. *Leone, E. N. H. & **Estévez, I.** (2007). Patch Discrimination as a function of handling time. *Poultry Science*, 86:447-452.
 42. **Estévez, I.** (2007). Density allowances for broilers; Where to set the limits? *Poultry Science*, 86:1265-1272. (**Poultry welfare symposium, Invited review paper**).
 43. Leone, E.H. and **Estévez, I.** 2007. Space use according to the distribution of resources and level of competition. *Poultry Science* (In Press). ***Received the Alltech Student Research Manuscript Award.**
 44. Leone, E.H. and **Estévez, I.** 2007. Economic and Welfare Benefits of Environmental Enrichment for Broiler Breeders. *Poultry Science* (In press).

Papers in review as of 10/18/07

- *Dennis, R. L, **Estévez, I.**, Newberry, R. & Cheng H. W. (2006). Appearance Matters: Artificial Marking Alters Aggression and Stress.

c. Monographs, Reports and Extension Publications

1. Invited papers

1. **Estévez, I.** (2000). Normas de bienestar: situación en Estados Unidos. Congreso Internacional de Producción y Sanidad Animal, XXXVI Symposium of the World Poultry Science Association (WPSA), Barcelona, Spain, pp: 81-89.
2. **Estévez, I.** (2001). Euro-welfare and its impact to the poultry Industry; Can we learn from it? Proceedings of the 73rd Northeastern Conference on Avian Diseases. The future of the poultry industry. June 27-29th, 2001, Virginia –Maryland Regional College of Veterinary Medicine. University of Maryland. pp: 1-3.
3. **Estévez, I.** (2002). Dealing with animal welfare issues: proactive strategies and voluntary regulations. Proceedings of the 49th Maryland Nutrition Conference, March 27-28, 2002, Timonium, MD. Edited by the Department of Animal and Avian Sciences, University of Maryland, College Park, MD. pp: 3-19.
4. **Estévez, I.** (2002). Poultry welfare issues; Implications for processing. Proceedings of the 37th National Meeting on Poultry Health and Processing. October 9-11, 2002, Ocean City, MD. Edited by the Delmarva Poultry Industry, Inc. in cooperation with the University of Delaware, University of Maryland and Delaware State University. pp: 70-81.
5. **Estévez, I.** (2003). Poultry welfare: Proactive strategies and voluntary regulations. Roche Tech Symposium, Proceedings of the Multi-State Poultry Conference. May 20-21, Indianapolis, IN. 18 pp.
6. **Estévez, I.** (2003). Animal welfare in modern animal agriculture. Proceedings of the Meeting on “Future Trends in Animal Agriculture: The Science and Ethics Behind Animal Well-Being Assessment”. USDA, Jamie L. Whitten Federal Building, May 28, Washington D.C.
7. **Estévez, I.** (2004). Impact of selective breeding for high productivity on the welfare of parents and offspring. Proceedings of the 15th International Congress on Animal Reproduction, 2004 Porto Seguro, Brasil, August 10. pp: 13-16.
8. **Estévez, I.** (2006). Poultry Behavior; Beyond the welfare aspects. Proceedings of the 55th Annual National Breeders Roundtable. St. Louis, Missouri, May 4-5, pp: 77-85.
9. Newberry, R. C. & **Estévez, I.** (2006). Species Specific Enrichment- Poultry. SCAW/FASS Conference: The Humane Care and Use of Agricultural Animals in Research, St. Louis MO, May 22-23, 2 pp.

2. Bulletins and Technical Reports

1. **Estévez, I.**, Castro, F. & Arias de Reyna, L. (1993). Study of the migratory patterns of thrushes in the regions of Córdoba and Jaén (Part I). Technical Report to the Agriculture and Fisheries Board of the Andalusian Government.
2. Castro, F., **Estévez, I.** & Arias de Reyna, L. (1993). Study of the migratory patterns of thrushes in the regions of Córdoba and Jaén (Part II). Technical Report to the Agriculture and Fisheries Board of the Andalusian Government.
3. **Estévez, I.** (1996). Management and productive aspects of the “*Label Rouge*” chickens in the South of Spain. Technical Report to the Enterprise Hermanos Alameda S.L.
4. **Estévez, I.** (1996). Production of the “*Label Rouge*” chickens in freedom in the South of Spain. Technical Report to the Enterprise Criandal S.L.
5. **Consortium (Estévez)** (2002) A Report for the Animal Agriculture Alliance (AAA): Criteria for the Evaluation of Animal Care Guidelines. 2002, Consortium, Federation of Animal Sciences Societies, Savoy. IL.

3. Extension Publications

1. **Estévez, I.** (1999). Density: How it can affect the behavior and health of your birds. Fact Sheet # 758.
2. **Estévez, I.** (1999). Human animal interactions: Potential effects on performance and well-being. Poultry Perspectives, Volume 1 (1):4-6.

Article Reprinted in:

Timely Topics (1999). Published by the Delmarva Poultry Industry, Inc. Georgetown, Delaware. November, 16 (4):6-7.

3. **Estévez, I.** (1999). Cover panels for chickens: A cheap tool that can help you. Poultry Perspectives, Volume 1 (2):4-6.
4. **Estévez, I.** (1999). New European Union Directive for the protection of laying hens. Poultry Perspectives, Volume 1 (2):6.
5. **Estévez, I.** (2000). Field experiences with ‘Panels’ in poultry houses. In: Proceedings of the Delmarva Breeder Hatchery & Grow-Out Conference, 13 September, Delmar, Maryland.
6. **Estévez, I.** (2002). Ammonia and poultry welfare. Poultry Perspectives, Volume 4 (1):1-3.
7. **Estévez, I.** (2002). Normas de bienestar para ponedoras: Situacion en Estados Unidos. Avicultura Profesional, 20:24-28.
8. **Estévez, I.** (2002). Normas de bienestar para ponedoras: situacion en Estados Unidos. Redvya, Mundo veterinario (Website located in Spain). Retrieved August 26, 2002 <http://www.redvya.com/veterinarios/veterinarios/especialidades/aves/especialista/Etiologias/Bioseguridad/Articulo22.htm>
9. **Estévez, I.** (2003). Poultry welfare issues for processors. Poultry Digest Online. Volume 3, Number 2, 12 pp. <http://www.wattnet.com/library/Download/PD2aw.pdf>.

10. **Estévez, I.** (2005). Stocking density in broilers: How many are too many? *Poultry Perspectives*, Volume 6 (1):10-12
11. **Estévez, I.** (2007). The relevance of the early environment in broiler breeder management *Poultry Perspectives*, Volume 6 (1):10-12

* Newspaper Columns: *Delmarva Farmer- The Mid-Atlantic Poultry Farmer*.

May 16, 2000 - Column- A Chicken's Life; An introduction to poultry behavior.

January 16, 2001. - Column- A closer look at Europe.

October 16, 2001. - Column- Are you ready for an audit?

July 16, 2002. - Column- Voluntary regulations on poultry welfare- Are they truly voluntary?

March, 2004. - Column- Feeding behavior in broilers: potential consequences for the bottom line.

4. Editorial Work

Poultry Newsletter entitled "*Poultry Perspectives*" with one to two issues per year Co-Edited by Dr. Estevez and Angel at the Department of Animal and Avian Sciences. Topics in all aspects of poultry production are included. "*Poultry Perspectives*" is available on line at: <http://www.ansc.umd.edu/pbw/extension.html>

1999: - Spring Volume 1 (1) Editors: I. Estevez & R. Angel.

- Fall Volume 1 (2) Editors: R. Angel & I. Estevez.

2000: - Spring Volume 2 (1) Editors: I. Estevez & R. Angel.

2001: - Spring Volume 3 (1) Editors: R. Angel & I. Estevez

2002: - Spring Volume 4 (1) Editors: I. Estevez & R. Angel.

2003: - Fall Volume 5 (1) Invited Editor: N. Tablante

Editors: I. Estevez & R. Angel.

2005: - Spring Volume 6 (1) Editors: I Estevez & R. Angel

2006: - Spring Volume 7 (1) Editors: I Estevez & R. Angel

d. Book Reviews, Other Articles and Notes

1. Thesis

Estévez, I. (1994). Efecto del tamaño de grupo y de las condiciones de manejo en el comportamiento y uso del espacio del gallo doméstico (*Gallus gallus*). [Effect of group size and rearing conditions on the behaviour and use of space in broiler chickens]. Ph.D. Dissertation, University of Córdoba, Spain.

e. Talks, Abstracts and Other Professional Papers Presented

1. Talks

a) Invited Research Talks

- 1992: *Do broiler chickens share available resources?* Agriculture Canada, Agassiz Research Station, Canada.
- 1994: *The behaviour in captivity: Improving zoos, farms and other centers of captive animals.* Within the Course “Advice and Therapy in Animal Behaviour”. Granada University, Spain. (2hr talk)
- 1994: *Behaviour and use of space in broiler chickens.* Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences, Skara, Sweden.
- 1995: *All you ever wanted to know about chicken behaviour but were afraid to ask.* Station de Recherches Avicoles, Institute National de la Recherche Agronomique, Center de Recherches Tours/Nouzilly, France.
- 1997: “*Dinamica del comportamiento en los animales de granja*” (15 hours) [Dynamics of behavior in the domestic animals]. I Jornadas de Etologia “El comportamiento animal en la profesion veterinaria” [Behavior of animals for Veterinarians]. Centro Universitario San Pablo C.E.U, Valencia, Spain.
- 1998: *Behavioral research: integrating poultry production and welfare.* November 4, United States Department of Agriculture, Beltsville Agricultural Research Center, Maryland.
- 1999: *Poultry behavior and welfare.* October 21, Department of Animal Sciences, Michigan State University, East-Lansing.
- 2000: *Behavioral research in The U. S.* Presentation at the University of Córdoba, Spain. January, 11.
- 2000: *Applied poultry research at the University of Maryland.* Faculty-adjunct/affiliate faculty workshop, Virginia-Maryland Regional College of Veterinary Medicine, April 7. (approx 20 attendants)
- 2000: *Normas de bienestar: situación en Estados Unidos.* Presentation at Congreso Internacional de Produccion y Sanidad Animal, XXXVI Symposium of the World Poultry Science Association (WPSA), Barcelona, Spain November, 8. (approx. 200 attendants)
- 2001: *Euro-welfare and its impact to the poultry industry; Can we learn from it?* 73rd Northeastern Conference on Avian Diseases, June 27-29th, 2001, Virginia–Maryland Regional College of Veterinary Medicine, University of Maryland. (approx. 70 attendants)
- 2002: *Impact of new welfare regulations on animal production.* 49th Maryland Nutrition Conference, March 27, 2002, Timonium, MD. (approx. 150 attendants)
- 2003: *Poultry welfare: Proactive Strategies and Voluntary Regulations.* Roche Vitamins Technical Symposium, Multi-State Poultry Meeting, May 21, 2003, Indianapolis, IN. (approx. 100 attendants)

- 2003: *An introduction to behavior applications*. Future Trends in Animal Agriculture, The Science and Ethics Behind Animal Well-being Assessment. Jamie L. Whitten Federal Building, United States Department of Agriculture, May 28, 2003, Washington D.C. (approx. 50 attendants).
- 2003: *What molecules don't tell us about chickens*. University of Delaware, Graduate Student Seminar, November 3rd, Newark DE (Aprox. 50 attendants).
- 2003: *Comportamiento Social. Efecto de incremento de densidad y tamaño de grupo en pollos de engorda (Social behavior ; Density and Group Size effects)* . 1^{er} Curso Internacional de Etología Aplicada a la Producción Avícola (1st International Course on Applied Ethology for Poultry Production). Facultad de Medicina Veterinaria y Zootecnia de la Universidad Nacional Autónoma de México (UNAM) Mexico City, November 14th, 2003.
- 2003: *Avances sobre el comportamiento reproductivo en gallinas (Reproductive behavior in poultry)*. 1^{er} Curso Internacional de Etología Aplicada a la Producción Avícola (1st International Course on Applied Ethology for Poultry Production). Facultad de Medicina Veterinaria y Zootecnia de la Universidad Nacional Autónoma de México (UNAM), Mexico City, November 14th, 2003.
- 2003: *Problemas de patas, programas de enriquecimiento animal y prácticas de manejo alternativas para resolver ciertos problemas de bienestar en pollos de engorda (Leg problems, enrichment programs and alternative management practices to resolve welfare problems in poultry)*. 1^{er} Curso Internacional de Etología Aplicada a la Producción Avícola (1st International Course on Applied Ethology for Poultry Production). Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México (UNAM), Mexico City, November 14th, 2003.
- 2004: *What molecules don't tell us about chickens*. Oregon State University, Department of Animal Science, Departmental Seminar, March 8th, Corvallis OR.
- 2004: *How to be a woman in Science and ... not to die in the attempt*. Oregon State University, Department of Animal Science, Woman in Science Seminar, March 9th, Corvallis OR.
- 2004: *Addressing poultry health, welfare and production issues through behavioral research*. Avrum Gudelsky Veterinary Center, Departmental seminar, April 14th, College Park, MD.
- 2004: *Impact of selective breeding for high productivity on the welfare of parents and offspring. Animal Welfare Workshop*. 15th International Congress on Animal Reproduction, Porto Seguro, Brasil, August 10.
- 2004: *All you ever wanted to know about chicken behavior and were afraid to ask*. University of Maryland, Department of Animal and Avian Sciences, Graduate seminar, College Park.
- 2005: *Poultry Behavior: The missing link between welfare and performance*. Pennsylvania State University, Departments of Animal Science and Poultry Science. Animal Science Graduate Seminar, October 7th.
- 2006: *Environmental enrichment for poultry*. The Humane Care and Use of Agricultural Animals in Research, Conference sponsored by Scientist Center for Animal Welfare and the Federation for Animal Sciences and USDA, May 22-23, St. Louis, Missouri.

- 2006: *Poultry behavior: Beyond the welfare aspects*. Departmental seminar. Department of Animal and Avian Sciences, University of Maryland. June 6th
- 2006: *Density allowances for broilers, turkeys and layers; Where to set the limits?* Poultry Welfare Symposium, Poultry Science Association Annual Meeting, July 16, Edmonton, Canada. Poultry Science, Poscal 85 (supplement 1), pp: 17.
- 2007: *Mathematical Modeling and analysis of use of space*. **M.C. Christman (presenter)**, C.P. Miller, & I Estevez. ADSA-PSA-AMPA-ASAS, 2007 Joint annual Meeting San Antonio, Texas July 8th-12th APoultry Sci. Vol., 86, Suppl. 1 pp. 417.
- 2007: *Behavior and environmental enrichment in Broiler Breeders*. Biology of Breeding Poultry, 29th Poultry Science Symposium, WPSA UK Branch. 23rd-25th July 2007, Surgeons Hall, Edinburgh, Scotland.

b) Invited extension talks

- 2000: *The Poultry Behavior Research Program at the University of Maryland*. Board of Directors' meeting, of the Delmarva Poultry Industry, Salisbury, MD. March, 14. (32 registrants)
- 2000: *Field experiences with panels in poultry houses*. 2000 Delmarva Breeder Hatchery and Grow-out. Delmarva Conference Center, Delmar, MD. Organized by University of Delaware and the University of Maryland in cooperation with the Delmarva Poultry Industry, September 13. (318 registrants)
- 2001: *The Poultry Behavior Research Program the University of Maryland*. Growers Committee, Delmarva Poultry Industry, Salisbury, MD, February. (approx. 35 attendants).
- 2001: *The Poultry Behavior Research Program the University of Maryland*. Live Production Committee Delmarva Poultry Industry, Salisbury, MD, March 21. (22 attendants).
- 2001: *Ammonia emissions: Poultry welfare issues*. Delmarva Poultry Industry Workshop on Ammonia emissions for the poultry industry personnel. University of Delaware, Georgetown, DE. (40 Delmarva Poultry Industry attendants).
- 2001: *Euro-welfare and its impact on the Poultry Industry: Can we learn from it?* Presented before the Board of Directors of the Maryland Egg Council, December 5th, Ellicott City, MD. (25 attendants).
- 2002: *The European Perspective on the welfare of laying hens; New alternative cage designs*. 2002 Pennsylvania Poultry Sales and Service Conference, April 9-10, University Park, PA. (approx. 40 attendants).
- 2002: *European Legislation for the welfare of layers; Implications for the poultry industry*. Mid-Atlantic Layer Workshop, August 22, Roanoke VA (approx. 50 attendants from VA, NC and SC).

- 2002: *Poultry welfare issues; Implications for processing*. 37th National Meeting on Poultry Health and Processing. October 9-11, 2002, Ocean City, MD. (approx. 80 attendants National Audience).
- 2003: *Poultry welfare: Proactive strategies and voluntary regulations*. Roche Tech Symposium, Proceedings of the Multi-State Poultry Conference. May 20-21, Indianapolis, IN.
- 2005: *Animal welfare update. NCC Poultry Welfare Guidelines: The reasons behind*. 2005 Delmarva Breeder Hatchery and Grow-out Conference. Wicomico Youth and Civic Center, Sept. 14th 2005. Organized by University of Delaware, University of Maryland and Delaware State University in cooperation with the Delmarva Poultry Industry.
- 2006: *Poultry behavior: Beyond the welfare aspects*. 55th Annual National Breeders Roundtable. May 4-5, St. Louis, Missouri.
- 2007: *Reproductive behavior and environmental enrichment in broiler breeders*. Annual meeting of breeders, Perdue Farms Inc. February 1st, Rocky Mount, NC.

2. Other extension presentations (posters and talks):

1997:

- Presentation of the seminar "*How behavioral research can benefit production*" to:
 Growers Committee, Salisbury Oct. 28, 1997
 Grow-Out Management Committee, Salisbury, Nov. 19, 1997
 Presentation of the poster "*How behavioral research can benefit production*" at:
 Open House Applied Poultry Research Laboratory July 30, 1997
 Dedication Applied Poultry Research Laboratory, Nov. 5, 1997

1998:

- Presentation of the Maryland Poultry Web Site at the Delmarva Corn & Soybean Technology Conference & Delmarva Poultry Industry, Inc. Grower Educational Seminar, Salisbury, February 17-18, 1998.
Flying the Internet. Maryland State 4-H Teen Focus Conference, "Bird's Eye View". June 22nd 1998.
 Presentation of the poster "*Use of cover and aggression in the domestic fowl*". Open House Applied Poultry Research Farm July 29, 1998.

1999:

- Presentation of the Poultry behavior program and the Newsletter "*Poultry Perspectives*" to the Board of Directors of the Egg Council, Inc. May 11, 1999.
 Presentation of the poster "*Improving ostrich productivity through increased behavioral and nutritional knowledge*". Open House Applied Poultry Research Farm July 29, 1999.
 Presentation of the poster "*Benefits of using panels in broiler production systems*". Open House Applied Poultry Research Farm July 29, 1999.

Discussion group in broiler breeder reproductive behavior. Broiler Breeder Department, Townsends Farms, September 8.

Discussion group in broiler breeder reproductive behavior. Broiler Breeder Department, Perdue Farms, September 29.

2000:

Annual Extension Conference, March 28-30, 2000, Ocean City, MD. Presentation of the posters:

Improving ostrich productivity through increased behavioral and nutritional knowledge. R. Angel & I. Estevez.

Benefits of using panels in broiler production systems. I. Estevez & T. L. Cornetto.

Decreasing phosphorous in poultry litter through dietary changes. R. Angel & I. Estevez.

Open House Applied Poultry Research Farm July 26, 2002 Upper Marlboro. Presentation of the posters:

Effect of stocking density on perch use and aggression on broiler chickens. I. Estevez & R. Pettit-Riley.

Broiler breeder reproduction: Do physical traits correlate with male fertility? I. Estevez & S. McGary.

Improving ostrich productivity through increased behavioral and nutritional knowledge. R. Angel & I. Estevez.

2001:

Presentation of the poster "*Improving poultry performance, health and welfare through behavioral techniques*" at:

Poultry Partnership meeting, August 14, Salisbury (MD).

Bioscience Research and Technology Review Day, November, 13. University of Maryland.

Presentation of the poster "*Improving poultry performance, health and welfare through behavioral techniques*". Bioscience Research and Technology Review Day, November, 13. University of Maryland.

2002:

Bioscience Research and Technology Review Day, November. University of Maryland. Presentation of the posters:

Kreger, M. D., Hatfield, J. S., Gee, G. F., Clugston, D. A. & **Estévez, I.** Behavioral profiles of the captive whooping crane as an indicator of reintroduction survival.

McGary, S., **Estévez, I.**, & Ottinger, M. A. Relationships between endocrine endpoints, reproductive behavior, and fertility in two strains of primary broiler breeders.

Freed, M., & **Estévez, I.** Effects of stocking density on the behavior of domestic fowl; physical and social components.

2003:

Presentation for the Delmarva Poultry Industry, entitle “*Poultry welfare Issues Update*” to the Grower Committee Meeting April, 22, 2003 (approx. Attendance 30 people).

Presentation for the Delmarva Poultry Industry, entitle “*Poultry welfare Issues Update*” to the Live Production Committee April, 16, 2003 (approx. Attendance 25 people).

Presentation for the Delmarva Poultry Industry, entitle “*Poultry welfare Issues Update*” to the Board of Directors September, 9, 2003 (approx. Attendance 34 people).

2006:

Benson, E. R., Malone, G. W., Alphin, R. L., Estevez I., and Van Wicklen G. L. (2006). Using Foam as a Mass Depopulation Method for Emergency Disease Control in Commercial Broiler Houses. 1/19/2006. USDA APHIS. Riverdale, MD.

Benson, E. R., Malone, G. W., Alphin, R. L., Estevez I., and Van Wicklen G. L. (2006). Using Foam as a Mass Depopulation Method for Emergency Disease Control in Commercial Broiler Houses. 1/25/2006. American Association of Avian Pathologists, Animal Welfare committee. Atlanta, GA.

3. Abstracts and Other Professional Papers

Bon, R., González, G., **Estévez, I.** & Recarte, J. M. (1988). Variaciones en la estructura de población y en la sociabilidad en tres poblaciones europeas de muflón (*Ovis musimon*), [Variations in the group structure and sociability of three European populations of mouflons]. II Congreso Nacional de Etología, Sevilla, Spain.

Castelló, V., Arias de Reyna, L. & **Estévez, I.** (1988). Influencia de la edad y el sexo de la cría del muflón (*Ovis musimon*), en la frecuencia de vocalizaciones madre-hijo, [Effect of age and sex of mouflon lambs on the mother-young frequency of vocalizations]. II Congreso Nacional de Etología, Sevilla, Spain.

Arias de Reyna, L., Obregón, F., **Estévez, I.** & Recuerda, P. (1989). Mother young relationships prior to weaning in mouflon (*Ovis musimon*). 21st International Ethological Conference, Utrech, The Netherlands.

Castro, F., Arias de Reyna, L., Recarte, J. M. & **Estévez, I.** (1990). Selección del lugar de nidificación en la golondrina común [Nest selection on swallows]. III Congreso Nacional de Etología, León, Spain.

- Estévez, I.,** Newberry, R. & Arias de Reyna, L. (1992). The effect of semi-external rearing on growth and the use of space by broiler chickens. *J. Anim. Sci.* 70 (suppl.1):172. International Society of Applied Ethology, Pittsburgh, USA.
- Estévez, I.,** Arias de Reyna, L. & Recuerda, P. (1992). Evaluación de un nuevo sistema de cría de pollos broiler mediante parámetros comportamentales, [Evaluation of a broiler chicken's rearing system through behavioral parameters]. IV Congreso Nacional y I Iberoamericano de Etología, Cáceres, Spain.
- Estévez, I.,** Fernández, P. & Marín, J. (1992). Puede el comportamiento explicar el rendimiento de pollos broiler a distintas densidades?. [Can behaviour explain the effects of density on broiler chicken's performance?]. IV Congreso Nacional y I Iberoamericano de Etología, Cáceres, Spain.
- Estévez, I.,** Arias de Reyna, L. & Recuerda, P. (1993). An alternative hypothesis to the hierarchical social system in the domestic fowl. XXIII International Ethological Conference, Torremolinos, Spain.
- Estévez, I.,** Newberry, R. & Recuerda, P. (1993). Male broiler chickens, the stressed sex? In: Proceedings of the IV European Symposium on Poultry Welfare, Edinburgh. Ed. C. J. Savory & B. O. Hughes, pp: 282-284.
- Estévez, I.,** Newberry, R., Arias de Reyna, L. & Recuerda, P. (1994). The cost of inter-individual disturbances in broiler chickens. The seventh Nordic International Society of Applied Ethology (ISAE) Winter Meeting, Lillehammer, Norway.
- Estévez, I.,** Newberry, R., Arias de Reyna, L. & Recuerda, P. (1995). Perturbaciones en pollos broiler: causas y efectos. [Causes and effects of disturbances in broiler chickens]. V Congreso Nacional de la Sociedad Española de Experimentación Animal, Cáceres, Spain.
- Estévez, I.,** Newberry, R. & Keeling, L. (1996). Dynamics of aggression in the Domestic fowl. In: Proceedings of the 30th International Congress of the International Society of Applied Ethology (ISAE), pp:48, 14-17 Aug. 1996, Guelph, Canada. Ed. By I. J. H. Duncan, T. M. Widowsky & D. B. Haley. Published by The Colonel Campbell Centre for the Study of Animal Welfare.
- Newberry, R., Keeling, L. & **Estévez, I.** (1996). Group size and anti-predator behaviour in domestic fowl. In: Proceedings of the 30th International Congress of the International Society of Applied Ethology (ISAE), pp:36, 14-17 Aug. 1996, Guelph, Canada. Ed. By I. J. H. Duncan, T. M. Widowsky & D. B. Haley. Published by The Colonel Campbell Centre for the Study of Animal Welfare.
- Newberry, R., **Estévez, I.** & Faure, J. M. (1997). Cover, group size and predator risk in Label Rouge chickens. In: Proceedings of the 31st International Congress of the ISAE, pp:98, 13-16 Aug. 1997, Prague, Czech Republic. Ed. By P. H. Hemsworth, M. Spinka and L. Kostal. Published by Research Institute of Animal Production, Prague, Czech Republic and Institute of Animal Biochemistry and Genetics, Slovak Academy of Sciences, Ivanka pri Dunaji, Slovakia.

- Bon, R., González, G., **Estévez, I.** & Recarte, J. M. (1998). Behavioural variations in wild ewes (*Ovis gmelini*) according to their age and their social environment during the rut. Euro-American Mammal Congress Challenges in Holartic Mammalogy, July 20-24, Spain.
- Estévez, I.**, Newberry, R. & Faure, J. M. (1998). Complexity and Aggression in *Label Rouge* chickens. IN: Proceedings of the 32nd International Congress of the ISAE pp: 147. 21-25 July, Clermont-Ferrand, France.
- Estévez, I.**, Newberry, R. & Keeling, L. (1998). Domestic fowl become more tolerant of flock mates with increasing group size. 87th Annual Meeting of the Poultry Science Association, 3-7 Aug., 1998, Pennsylvania State University, University Park, PA. Poultry Science, Vol. 77 suppl. 1, pp:35.
- Estévez, I.**, Newberry, R. & Keeling, L. (1998). Further evidence of the tolerant social system in the domestic fowl. North American ISAE Meeting, Michigan State University, 26-26 June, East Lansing, MI.
- Gomez, C., Sugranez, R. & **Estévez, I.** (1998). Comparacion entre reforestacion y aprovechamiento mediante pastoreo rotacional de ovino seguro. I International Congress of Veterinary Science and Environment, 22-24 October, Madrid, Spain.
- Gomez, C., Sugranez, R. & **Estévez, I.** (1998). Factores del cebo que modifican el valor nutritivo de la yacija reciclada para alimentacion de rumiantes. I International Congress of Veterinary Science and Environment, 22-24 October, Madrid, Spain.
- Tablante, N. L., **Estévez, I.** & Cornetto, T.L. (1999). Human error-induced multivitamin deficiency in broiler chicks. Annual meeting of the American Association of Avian Pathologist, July 1999, New Orleans, LA.
- *Fiscus, N. J., **Estévez, I.** & Stricklin, R. W. (1999). Will domestic fowl roost on angled perches? 33rd International Congress of the ISAE, 17-21 August. Lillehammer, Norway, pp:101. Ed. By K.E. Boe, M. Bakken and B.O. Braastad. Published by the Agricultural University of Norway, Ås, Norway.
- *Cornetto, T. L., & **Estévez, I.** (1999). Utilizing artificial cover to improve use of the pen center by domestic fowl. 33rd International Congress of the ISAE pp: 57, 17-21 August, Lillehammer, Norway. Ed. By K.E. Boe, M. Bakken and B.O. Braastad. Published by the Agricultural University of Norway, Ås, Norway.
- *Cornetto, T. L., & **Estévez, I.** (1999). Artificial cover reduces disturbances and aggression in broilers. 88th Annual Meeting of the Poultry Science Association, 8-11 Aug., 1999, Springdale, Arkansas. Poultry Science, Vol. 78 suppl. 1, pp: 42.
- Estévez, I.**, Pettit R., Tablante, N. & Carr, L. (1999). Impact of position and temperature on perch use by broiler chickens. 88th Annual Meeting of the Poultry Science Association, 8-11 Aug., 1999, Springdale, Arkansas. Poultry Science, Vol. 78 suppl. 1, pp: 42.
- Gomez, C. & **Estévez, I.** (1999). Establecimiento de un sistema de autocontrol en granjas para mejorar la sanidad de carnes y huevos. Congreso Nacional de Sanidad Animal, 3-5 November, Granada, Spain.

- *Cornetto, T., Angel, R. & **Estévez, I.** (2000). Effects of stocking density and dietary energy on growth in ostrich chicks. *Poultry Science*, Vol. 79 suppl. 1 pp: 32.
- *Cornetto, T., **Estévez, I.** & Angel, R. (2000). Influence of stocking density on use of space in ostrich chicks. *Poultry Science*, Vol. 79 suppl. 1, pp: 33.
- Estévez, I.** & Pettit, R. (2000). Effects of density on the use of perches in broilers. *Poultry Science*, Vol. 79 suppl. 1, pp: 36.
- *McGary, S., **Estévez, I.**, Bakst, M. R. & Pollock, D. L. (2000). Evaluating male broiler breeder fertility in a natural floor mating system. *Poultry Science*, Vol. 79 suppl. 1, pp: 2.
- Estévez, I.**, Pettit, R. & Russek-Cohen, E (2001). Effects of density and perch availability on aggressive behavior in broilers. *Poultry Science*, Vol. 80 suppl. 1, pp: 41.
- *McGary, S., **Estévez, I.**, Bakst, M. R. & Pollock, D. L. (2001). Physical traits and reproductive success in male primary broiler breeders. *Poultry Science*, Vol. 80 suppl. 1, pp: 129.
- *McGary, S., **Estévez, I.**, & Russek-Cohen, E. (2001). Can differential fertility of male broiler breeders be explained by differences in reproductive and aggressive behavior? Proceedings of the 35th ISAE Meeting, August 4-9, University of California, Davis, CA, USA. Ed. By Garner, J. P. Mench, J. A. and Heekin, S P. Published by the Center For Animal Welfare at UC Davis, pp: 83.
- *Bizeray, D. **Estévez, I.**, & Leterrier, C. (2001). Increasing behavioral activity in broiler chickens through environmental complexity. Proceedings of the 35th ISAE Meeting, August 4-9, University of California, Davis, CA, USA. Ed. By Garner, J. P. Mench, J.A. and Heekin, S P. Published by the Center For Animal Welfare at UC Davis, pp: 77.
- Estévez, I.**, Keeling L. & Newberry, R. (2001). Behavioural plasticity of social strategies in the domestic fowl. Proceedings of the 35th ISAE Meeting, August 4-9, University of California, Davis, CA, USA. Ed. By Garner, J. P. Mench, J.A. and Heekin, S P. Published by the Center For Animal Welfare at UC Davis, pp: 212.
- Kreger, M. D., Hatfield, J. S., Gee, G. F., Clugston, D. A. & **Estévez, I.** (2001). Behavioral profiles of the captive whooping crane as an indicators of reintroduction survival. Society for Conservation Biology, 15th Annual Meeting, 29 July - 1 August 2001, University of Hawaii, Hilo, Hawaii. <http://www.uhh.hawaii.edu/~scb/abstracts/Kreger.htm>.
- *McGary, S., **Estévez, I.**, & Ottinger, M. A. (2002). Relationships between endocrine endpoints, reproductive behavior, and fertility in two strains of primary broiler breeders. *Poultry Science*, Poscal 80 suppl. 1, pp: 97.
- *Bilcik, B., **Estévez, I.**, & Luque, M. R. (2002). Impact of male-male competition and morphological traits on reproductive behavior in broiler breeders. *Poultry Science*, Poscal 80 suppl. 1, pp: 5.
- *Freed, M., & **Estévez, I.**, (2002). Effects of stocking density on the behavior of domestic fowl; physical and social components. *Poultry Science*, Poscal 80 suppl. 1, pp: 99.

- Tablante, N. L., **Estévez, I.**, & Russek-Cohen, E. (2002). The effect of perches and stocking density on tibial dyschondroplasia and bone integrity as measured by bone ash in broiler chickens. *Poultry Science*, *Poscal 80 suppl. 1*, pp: 54.
- Estévez, I.**, & Christman, M. (2003). Analysis of the movement and use of space by animals in confinement. *Proceedings of the 37th International Congress of the International Society of Applied Ethology*, June 24-28, Italy, pp: 107.
- *Bilcik, B., Kostal L. & **Estévez, I.** (2003). Use of a telemetry system for measurement of blood pressure, heart rate and activity in the domestic fowl. *Data Sciences International Telemetry User Group Symposium*. Oct. 8, 2003, Bethesda, Md.
- Košťál, L., Rajman, M., Sedlačková, M., **Estévez, I.**, & Bilčík, B. (2004). Vplyv sociálnej interakcie na tepovú frekvenciu, krvný tlak a telesnú teplotu u kohútov rodičov brojlerov: rádiotelemetrická štúdia. 31. etologická konferencia, Poľana, April 2004, pp: 51 (in Slovak)
- Rajman, M., Sedlačková, M., **Estévez I.**, Bilčík, B., & Košťál, L. (2004). Sexuálne a agresívne správanie samcov rodičov brojlerov. *31. etologická konferencia, Poľana*, April 2004, pp: 34 (in Slovak) .
- Košťál L., Rajman M., Sedlačková M., **Estévez I.**, Bilčík B. (2004). The Effect Of The Social Interaction On Heart Rate, Blood Pressure And Body Temperature In Broiler Breeder Males: A Radiotelemetric Study. *Regional Meeting of the International Society for Applied Ethology, Tihany, Hungary, May 20-23*.
- Rajman, M., Sedlačková, M., **Estévez, I.**, Bilčík, B., Košťál, L. (2004). Sexual and aggressive behaviour in broiler breeder males. *Regional Meeting of the International Society for Applied Ethology, Tihany, Hungary, May 20-23*.
- Christman, M. & **Estévez, I.**, (2004). Methods for the analysis of movement and use of space of animals in confinement. *Conference on Applied Statistics in Agriculture, Manhattan April 25-27, Kansas*.
- *Dennis, R., **Estévez, I.**, Newberry, R., & Douglass, L. (2004). The effects of artificial marking on the aggressive behavior in the domestic fowl. *North American ISAE Meeting*, 18-19 June, Indiana, pp: 11.
- *Dennis, R., **Estévez, I.**, & Cheng, H. W. (2004). Marked for Stress! *North American ISAE Meeting*, 18-19 June, Indiana, pp: 18.
- *Hoerl, E., **Estévez, I.**, & Christman, M. (2004). Influence of Patch Location Mediated by Group Size on Use of Space and Aggression in Domestic Fowl. *North American ISAE Meeting*, 18-19 June, Indiana, pp: 40.
- *Hoerl, E., **Estévez, I.**, & Christman, M. (2004). Evidences of Optimal Foraging Strategies by Domestic Fowl. *North American ISAE Meeting*, 18-19 June, Indiana, pp: 10
- *Bilcik, B, **Estévez, I.**, & Okimoto, R. (2004). Impact of male-male competition and morphological traits on mating strategies and reproductive success in broiler breeders. *North American ISAE Meeting*, 18-19 June, Indiana, pp: 13

- Newberry, R. C., Keeling, L. J., **Estévez, I.**, & Bilcik, B. (2004). Behaviour when young as a predictor of feather pecking in adult laying hens: the redirected foraging hypothesis revisited. North American ISAE Meeting, 18-19 June, Indiana, pp 9.
- Košťál, L., Rajman, M., Sedláčková, M., Bilčík, B., & **Estévez, I.**, (2004). Sexual and aggressive behaviour in broiler breeder males: Relation to morphological and physiological traits. International Society for Applied Ethology, Helsinki, Finland, August 7-10.
- Väisänen, J. **Estévez I.**, & Jensen, P. (2005). Behavioral effects of long term social stress in two lines of white leghorn roosters. International Society for Applied Ethology, Japan, August 7-10.
- Estévez, I.**, Bilcik B. & Luque, M. R. (2005). Male-male competition for matings in broiler breeders. Poultry Science, Poscal 84 (supplement 1), pp: 23.
- Estévez, I.**, Freed, M. & Christman, M.C. (2005). Effects of density on movement and use of space in broilers. Poultry Science, Poscal 84 (supplement 1), pp: 63.
- *Leone, E. H., **Estévez, I.**, & Christman, M. C. (2005). Behavioral response of broilers to competition with different feeder sizes and locations. Poultry Science, Poscal 84 (supplement 1), pp 47.
- *Leone, E. H., & **Estévez, I.** (2005). Maximizing Efficiency: Feeding Strategies of Broilers. Poultry Science, Poscal 84 (supplement 1), pp: 64.
- *Han, T. Leone, E. H., **Estévez, I.** & Humphrey, B. D. (2005). Effect of group size and housing density on behavior and stress responses in broilers. Poultry Science, Poscal 84 (supplement 1), pp: 49.
- Benson, E. R., Alphin, R., Malone, G. W., Dawson, M. D. Van Wicklen G. L. & **Estévez, I.** (2005). Fire Fighting Foam as an Alternative Method of Mass Euthanasia for Meat-Type Poultry Flocks. Poultry Science, Poscal 84 (supplement 1), pp: 60.
- Dawson, M. D, Reyes, P. L., Benson, E. R., Malone, G. W., Alphin, R., **Estévez, I.** & Van Wicklen G. L. & (2005). Evaluating the use of fire fighting foam in mass poultry euthanasia ASAE (American Society of Agricultural Engineers) Annual meeting.
- *Leone, E. H., **Estévez, I.**, & Christman, M.C . (2005). Measuring use of space in captive animals. XXIX International Ethological Conference, Budapest, Hungary, August 20-27, 2005, pp: 132.
- *Bilcik B., **Estévez, I.**, & Russek-Cohen, E. (2005). Reproductive success of broiler breeders: The effect of male-male competition, sperm quality and morphological characteristics. XXIX International Ethological Conference, Budapest, Hungary, August 20-27, 2005, pp: 29.
- Rajman, M., Kubikova, L., Sedlacková, M., Vyboh, P., Bilčík, B., & **Estévez, I.**, Kostal, L., (2005). The role of dopamine receptors in control of the sexual and aggressive behavior in broiler breeder males. XXIX International Ethological Conference, Budapest, Hungary, August 20-27, 2005, pp: 180.

- Dawson, M. D., Reyes, P. L., Benson, E. R., Alphin, R. L., Malone, G. W., Van Wicklen G. L. & **I. Estevez** (2005). Evaluating the use of fire fighting foam in mass poultry euthanasia. ASAE Paper No. 054001. St. Joseph, MI: ASAE.
- Benson, E. R., Dawson, M. D., Malone, G. W., Aplphin, R. L., **Estevez, I.** & Van Wicklen, G. L. (2006). Fire fighting foam as an emergency mass euthanasia methodology for floor-Reared Meat-Type Poultry. AVMA/AAAP Annual Meeting.
- Benson, E. R. Alphin, R. L., Malone, G. W., Dawson, M. D., VanWicklen G. L. & **Estevez, I.** (2005). Fire fighting foam as an alternative method of mass euthanasia for meat-type poultry flocks. Poultry Science, Poscal 84 (supplement 1), pp: 60.
- *Leone, E. H., & **Estévez, I.** & Spahn, K. (2006). Benefits of environmental complexity for broiler breeders. Poultry Science, Poscal 85 (supplement 1), pp: 17.
- Dawson, M. D. Benson, E. R., Aplphin, R. L. Malone, G. W., Van Wicklen, G. L., & **Estevez, I.** (2006). Evaluation of the use of fire fighting foam for large scale emergency euthanasia of floor reared meat type birds. Poultry Science, Poscal 85 (supplement 1), pp: 176.
- Kasube, H., Leone, E. H., Estevez, I., Xin, H. & Noll, S. (2006). Turkey beak trim and feed form. 2. Effect on turkey behavior. Poultry Science, Poscal 85 (supplement 1), pp: 17.
- *Leone, E. H., & **Estévez, I.** (2007). Separating the effects of group size, stocking density and pen size in broilers. Poultry Science, Poscal 86 (supplement 1), pp: 126.
- *Leone, E. H., & **Estévez, I.** (2007). Environmental enrichment improves broiler breeder welfare and reproductive performance. Proceedings of the 41st International Congress of the ISAE, Merida, July 30-August 3rd, 2007. pp 31
- Mallapur, A., **Estévez, I.**, Miller C. & Christman, M.C. (2007). Movement and use of the space in confinement; The effects of group size and pen size in broilers (*Gallus gallus domesticus*). Proceedings of the 41st International Congress of the ISAE, Merida, July 30-August 3rd, 2007. pp 152

f. Films, Tapes, Photographs and Software

Sanchez, C. & **Estévez, I.** 1998. The Chickitaizer©, University of Maryland, College Park, MD 20742. Software created to digitalize spatial location of animals while keeping track of their behavior and identification codes. New 2006 version allows data entry from a Tablet PC

g. Exhibits, Performances, Demonstrations and Other Creative Activities

1. International/ National/Regional Boards and Committees.

1992-1997: Member of the European Poultry Science Network, and Coordinator of the Poultry Welfare Research Activities in Spain.

1993-1997: Spanish representative within the IX Working Group (Poultry Welfare) of the World Poultry Science Association.

1995-1998: Elected member of the Council of the International Society for Applied Ethology.

September 1995-1997: Spanish representative to the Expert Working Group for the force-feeding of geese and ducks Scientific Veterinary Committee (Animal Welfare Section). European Union, D.G. Agriculture, Brussels.

March 1996-1997: Expert on animal welfare of the Expert Working Group for the remodelation of the Córdoba Zoo.

1999: Representative of Poultry Sciences Society at the Annual Board of Trustees of the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC).

1998-2002: Member of the Committee of the Poultry Science Association for the Poultry Welfare Research Award.

2001- 2003: Member of the Animal Care Committee of the Poultry Science Association.

May 2002-December 2003: Member of the Broiler Species Committee of the Federation of Animal Science Societies (FASS), the American Registry of Professional Animal Scientist (ARPAS), and Animal Agriculture Alliance (AAA) established with the purpose of developing the scientific criteria that will be used to evaluate welfare programs nationally.

2003-2004: Chair of the Animal Care Committee of the Poultry Science Association.

2005-Present: Regional Secretary for the U.S.A. of the International Society of Applied Ethology.

2005: Member of the subcommittee for Poultry for the FASS Animal Care, Use, and Standards Committee (to develop the Poultry Training Module, Level 1 as a part of the Farm Animal Worker Training Series).

June 2006-present: Assigned PSA contact person for issues pertaining Poultry Welfare.

April 2006-Present: American Market Institute. Member of the Avian Influenza Squad to address animal welfare issues.

2007-2008: Chair of the HyLine International Award committee.

2007-2008: Member of the Poultry sub-committee for the revision of the GUIDE for the Care and Use of Agricultural Animals in Agricultural Research and Teaching. Federation of Animal Science Societies (formerly Federation of American Societies of Food Animal Science, or FASFAS).

2007: Scientific advisor for the laying and broiler American Humane Certified Program of the American Humane Association.

2. Special Recognition and Achievements, Conferences Organized and Chaired.

- 1992: Chairman of the Round Table on Applied Ethology, IV National and I Iberoamerican Meeting of Ethology, Cáceres, Spain.
- June 1997: Member of the Local Host Committee for the 34th Annual Meeting of the Animal Behavior Society, June 21-26, University of Maryland, College Park, MD.
- March 1998: Maryland Nutrition Conference for Feed Manufacturers. Presiding the Symposium: Phytase for Broilers. Baltimore, MD, March 12-13, 1998.
- 1999: Member of the Organizing Committee of the Symposium on the Well-being of Agricultural Animals During Transport and Handling. Baltimore, MD, July 2000.
- 2002: Program Chairperson for the Environment and Management Section of the 2002 Poultry Science Association Meeting, DE.
- 2003- 2004: Member of the Animal Behavior and Well-being Committee for the 2004 Combined Meeting of the PSA, ASAS and ADSA at St. Louis, Missouri.
- 2006: Section Chair for Animal Behavior and Well-being section for the 2007 Joint meeting of FASS, July 8th -12th San Antonio, Texas.
- 2007: Chairwomen for Animal Behavior and Well-being – Livestock and Poultry II Session, 2007 Joint meeting of FASS, July 8th -12th San Antonio, Texas.
- 2007: Chairwomen for the Poultry Welfare session, 41st International Congress of the International Society for Applied Ethology, Merida Mexico, July 30-August 3rd, 2007.
- May 2007-present: Member of the committee to organize the symposium “Landmark contributions from the first 100 years of Poultry Science”.

h. Original Designs, Plans, Inventions and Patents.

- 1998: Designed by: Fiscus-Le Van, N. J., **Estévez I.** & Stricklin W. R.; Office of Technology Liaison (OTL) the Invention Disclosure # LS-98-049: *Angled Perches*.
- 2001: U.S. **Patent # US 6,289,848, B1** September 18. **Estévez I. &** Newberry R. *Method and device for distributing fowl within an enclosure*.
- 2004: Invention Disclosure # *UD05-01*, Office of the Vice Provost for Research, University of Delaware. “*Equipment and procedure for euthanasia of poultry and livestock in confinement facilities*” by Benson E. (Univ. DE), Malone B. (Univ. DE), Alphin R. (Univ. DE), **Estévez I.** (Univ. MD) & Van Wicklen G. (Univ. DE).

i. Contracts and Grants

1. Research Contracts and Grants

1999-2000: Strategies to reduce leg problems in broiler chickens. Maryland Agricultural Research Station Grant No. AASC-99-13. PI: I. Estévez, Co-I: L. Carr & N. Tablante. **Award \$50,000** for year 2000. (84 proposals submitted to this program).

1999-2001: Feed changes to reduce phosphorous excretion by broilers. Maryland Department of the Environment. University of Maryland identification # 980930-8525. PI: R. Angel, Co-I: R. Kohn, I. Estévez & N. Zimmermann. **Award \$201,668.** (16 proposals submitted, ranked as 2nd).

1999-2001: Decreasing phosphorous excretion in broilers. Delmarva Poultry Industry, Incorporated. University of Maryland identification number 980625-7938. PI: R. Angel, Co-I: R. Kohn & I. Estévez. **Award \$127,655.** (8 proposals submitted, ranked as 1st).

Notice: These two projects will be integrated and funded as one by DPI and MDE with the total amount of **\$269,488.**

January 1999-June 2000: Effect of management and early feeding of ostrich chick on survival and maximizing income through diet manipulations. American Ostrich Research Foundation. University of Maryland identification number 980630-8526. PI: R. Angel Co-I: I. Estévez. **Award \$90,279.**

July 1999: Effect of management and early feeding of ostrich chick on survival and maximizing income through diet manipulations. Maryland Agricultural Research Station Grant No. AASC-00-31. Competitive Grant Program. PI: I. Estévez, Co-I: R. Angel. **Award \$20,000.**

October 1999: Symposium on the Well-being of Agricultural Animals During Transport and Handling. Innovative Research Funds, USDA. PI: R. Stricklin & I. Estévez. **Award \$10,000.**

October 1999-October 2001: Behavioral and phenotypic traits as reliable indicators of male quality and fertility in broiler breeders. U.S. Poultry and Egg Association. Competitive Grant. PI: I. Estévez, Co-I: M.A. Ottinger & S. McGary. **Award \$50,000.**

July 2001-July 2003: Reproductive strategies in male broiler breeders, Do dominant males have higher fertility and reproductive success? Maryland Agricultural Research Station, Competitive Grant Program. PI: I. Estévez, Collaborators: D. Pollock (Perdue Farms), A. Donoghue (USDA). **Award \$39,000.**

October 2001- September 2004: Behavioral and morphological traits associated with fertility in broiler breeders. National Research Initiative, Animal Reproduction Program. PI: I. Estévez, Collaborators: M. Bakst (USDA), D. Pollock (Perdue Farms), A. Donoghue (USDA), W. Roush (Penn State), M. A. Ottinger & E. Russek-Cohen **Award \$245,000.** (Ranked 8th out of 72 proposals).

July 2003-July 2005: The effect of confinement on animal movement and use of space. Maryland Agricultural Research Station, Competitive Grant Program. PIs: M. Christman & I. Estévez, Collaborator: J. Harter-Dennis, **Award \$35,000**.

July 2004-July 2006: The impact of artificial marking of the domestic fowl on behavior, stress, and performance. Maryland Agricultural Research Station, Competitive Grant Program. PIs: I. Estévez Collaborator: J. Harter-Dennis, H-W Cheng (USDA), **Award \$35,000**.

May 2004-May 2005. Compressed air foam as an alternative method of mass euthanasia for poultry flock disease control. Seed grant proposal, University of Delaware. PI: E. Benson, Co- PI: R. Alphin (University of Delaware, Bioresources Engineering), I. Estevez, G. Malone & G.L. van Wicklen. **Award \$8,004**.

June 2005-May 2006. Evaluation of foam based humane mass euthanasia methodology for floor-reared meat-type poultry operations. U.S. Poultry and Egg Association, Competitive grant Program. PI: E. Benson, Co- PI: R. Alphin (University of Delaware, Bioresources Engineering), I. Estevez, G. Malone & G.L. van Wicklen. **Award \$25,994**.

July 2005-June 2006: Male mating efficiency and sperm competition mechanisms in broiler breeders. Maryland Agricultural Research Station, Competitive Grant Program. PIs: I. Estévez, Co-I: T. Pizzari (University of Oxford, UK), **Award \$19,925**.

October 2005-Sept. 2008. Movement of farm animals: Techniques for accurately assessing effects of experimental factors. National Research Initiative, Animal Protection. PI: I. Estevez, Co-PI M. Christman (University of Florida). **Award \$304,000** (Ranked 4th out of 40 proposals).

**International Competitive Programs*

1989-1994: The effect of the rearing conditions on the broiler chickens production. Project funded by the Spanish Ministry of Education and Science (Competitive program **\$28,800**) and the industry INDEGASA (**\$13,200** matching funds). PI: I. Estévez.

1994-1996: Feather pecking and cannibalism in laying hens in alternative housing systems: The importance of group size, group structure and social dynamics. Funding: Swedish Branch of Agriculture and the Swedish Institute. Swedish Institute. Competitive grant (based on CV of the candidate and the quality of the research project) **\$10,000**.

Collaboration project with Dr. L. Keeling (PI, Swedish University of Agricultural Sciences) and Dr. R. Newberry (Co-I, Agriculture Canada).

1995-1996: Use of free-range by Label Rouge chickens. Funding: French Government and the company enterprise Union Nationale des Cooperatives Agricoles D'Aprovisionnement

(GROUPE UNCAA) Chateau-Thierry, France. Institute National de la Recherche Agronomique, competitive grant (based on CV of the candidate and the quality of the research project) **\$10,000**.

Collaboration project with Dr. J. M. Faure (PI, INRA, Station de Recherches Avicoles, France) and Dr. R. Newberry (Co-I, Agriculture Canada).

*1996: Adaptation of the Label Rouge production system to the South of Spain. Funding: Spanish Ministry of Education and Science (Competitive grant **\$17,000**), & Hermanos Alameda S.L. (broiler chicken production company) (matching funds **\$15,000**). PI: I. Estévez.*

*June 2002-June 2005. Behavior and its underlying physiological mechanisms related to reproduction and welfare problems in parent stock of meat type chickens. U.S. Science and Technology Cooperation program. PI: Ľubor Košťál, Slovak Academy of Sciences, Institute of Animal Biochemistry and Genetics, Slovakia **Co-I: I. Estevez. Award to the Slovak team \$11,925; to the U.S. team \$7,240**. (Ranked 7th).*

*Other International Contracts/Grants

*1986-1988: Comparative study of the behaviour of ungulates in Mediterranean Ecosystems. Research Assistant contract. Project funded by the Education and Science Board of the Andalusian Government (Award **\$40,000**). PI: Dr. L. Arias de Reyna.*

*1987-1988: Reproductive strategies of three wild ungulate species of Mediterranean ecosystems. Research Assistant contract. Project funded by the Integrate Action Program of the Spanish and French Ministries of Foreign affairs (Award **\$50,000**). PI: Dr. L. Arias de Reyna (Spain) & R. Campan (France).*

*1993: Study of the migration of thrushes in the regions of Córdoba and Jaén for the establishment of the hunting period. Research Associate contract. Project funded by the Agriculture and Fisheries Board of the Andalusian Government (Award **\$50,000**).*

*1996: Production of Label Rouge chicken in freedom in the South of Spain. Funded by the Poultry Industry Criandal S.L. (Gift **\$5,000**).*

2. Extension Contracts and Grants

*1998: Maryland Poultry Web: Development of a training program for Poultry Industry professionals and unique Maryland based World Wide Web resources. Grant PDG 98-25, Maryland Cooperative Extension Service. PI: I. Estévez, Co-I: R. Kohn, S.G. Schoenian, M. Varner, N. Zimmermann. **Award \$5,000**. (10 proposals selected from 37 submissions).*

1998: Enhancing poultry management education of poultry growers in the Eastern Shore of Maryland. Grant SEEGF98-55, Fall 1998 Maryland Cooperative Extension Program. I. Estévez & R. Angel. **Award \$1,000**. (25 proposals selected from 45 submissions).

2001: A biosecurity training program for Hispanic poultry workers (live haul crews and live bird market workers). Maryland Cooperative Extension Program. PI: N. Tablante; Collaborators Y. J. Johnson & I. Estevez, (**Award \$5,000**).

Sept. 2006- Sept. 2007. A Community of Practice in “Profitable and Sustainable Poultry; Welfare, nutrition and the environment” Maryland Cooperative Extension Program. Competitive grant. IP: R. Angel y I. Estevez (**Award \$12,800**)

j. Fellowships, Prizes and Awards

* See positions held for further information of Fellowships from the Swedish Institute, the Institute de Recherche Agronomique and the Spanish Ministry of Education and Science.

1991: National award in Ethology, Gonzálo Nardiz, Agriculture and Fisheries Branch of the Basque Government, for the work entitled: Comportamiento del muflón (*Ovis orientalis musimon*) durante la época reproductora. [The behavior of mouflon (*Ovis orientalis musimon*) during the rut].

1993: National award in Ethology, Gonzálo Nardiz, Agriculture and Fisheries Branch of the Basque Government, for the work entitled: El sistema de organización social en pollos broilers: Una nueva perspectiva. [The social system in broiler chickens (*Gallus gallus*): A new perspective].

2002: College of Agriculture and Natural Resources Junior Faculty Award, University of Maryland, College Park, MD.

2003: Hy-Line International Research Award, Poultry Science Association.

2006: Poultry Welfare Research Award, Poultry Science Association.

k. Editorships, Editorial Boards, and Reviewing Activities for Journals and Other Learned Publications.

- 2002- present, Associate Editor of the Journal of Applied Animal Behaviour Science (Elsevier).
- 2002- present, Associate Editor of the Poultry Science Journal.
- 2005-2006. Invited Editor for the Special Issue of the Journal of Applied Animal Behavior Science “Too many, too few: The effects of group size and density in captive animals”

- Competitive Grant Programs:
 - Panel Member; USDA-NRI, Strengthening Program (1999)
 - Ad Hoc Reviewer; USDA-NRI, Health and Well-being Program (years 2000, 2003)
 - Ad Hoc Reviewer; USDA-NRI, Reproduction Program (2003, 2004)
 - Panel Member; USDA-NRI, Animal Health and Well-being (years 2001 and 2002; invited on 2003 but declined invitation due to conflict)
 - Panel Member; National Academy of Sciences, U.S. Agency for International Development, MERC/CDR Programs (2002)

- Peer-reviewer of papers for the following Journals:
 - Applied Animal Behavior Science (AABS).
 - American Society of Agricultural Engineers (ASAE)
 - Animal Welfare (AW)
 - Behaviour
 - Behavioural Processes
 - Brain, Behavior and Evolution
 - Ethology
 - Etologia (Journal of the Spanish Society of Ethology)
 - Hormones and Behavior
 - Journal of Animal Science (JAS)
 - Journal of Applied Animal Welfare Science (JAAWS)
 - Journal of Applied Poultry Research (JAPR)
 - Poultry Science (PS)

- Reviewer National and International Meetings:
 - 33rd International Congress of the International Society of Applied Ethology, Lillehammer, Norway 1999.
 - 34rd International Congress of the International Society of Applied Ethology, Florianopolis, Brazil 2000.
 - 2004 combined meeting of the PSA, ASAS and ADSA at St. Louis, Missouri.
 - 40th International Congress of the International Society of Applied Ethology, Bristol, England 2006.

- Other Documents:

- Reviewer for the International Fund for Animal Welfare of the documents “Creating Business Opportunity through Improved Animal Welfare” by IFC of World Bank.

I. Other

a. Hatch and Regional Projects

March 1999-March 2001: Effects of density and social factors on level of disturbances and performance in broiler chickens. CSRS Hatch Project. PI: I. Estévez.

1998-2005: NE-127 Regional Project: Biophysical models for poultry production system.

1998- 2005: NCR-131 Animal Behavior and Welfare

2003-2005: S-285 Reproductive performance of Turkeys (to be changed to Reproduction of Poultry in 2004).

2006- present: S-1020 Enhancing Reproductive Efficiency of Poultry.

2006- present: NC-1029 Applied Animal Behavior and Welfare.

2006-present: NE-1022 Poultry Production Systems: Optimization of Production and Welfare Using Physiological, Behavioral and Physical Assessments.

2007: NE-1022 Poultry Production Systems: Optimization of Production and Welfare Using Physiological, Behavioral and Physical Assessments. Organized the 2007 meeting, Oct. 16-17, Annapolis, MD.

b. Gifts

1999: Southern States Coop, Richmond, Virginia. Gift \$5,000.

c. Travel Grants

1989: Grant of the VIII Summer Courses and I European Courses of the University of the Basque Country (transportation and registration).

1991: Travel grant of the Spanish Ministry of Education and Science for a 2 month visit to the Agriculture Canada, Agassiz Research Station. (\$ 3,400).

1992: Travel grant of the Spanish Ministry of Education and Science for a 10 week visit to the Agriculture Canada, Agassiz Research Station. (\$ 3,400).

1992: Travel grant of the University of Cordoba to assist at the Annual Meeting of the American Society of Animal Science, Pittsburgh, PA (USA). (\$ 1,000).

1993: Collaboration grant of the XXIII International Ethological Conference, Torremolinos, Spain (transportation, registration, lodging & meals).

1993: Travel grant of the British Poultry Science Society to assist at the 4th European Symposium on Poultry Welfare, Edinburgh, UK. (450 UK pounds).

1996: Travel grant of the British Poultry Science Society to assist at the 30th International Congress of the International Society of Applied Ethology (ISAE), 14-17 Aug. **(600 UK pounds)**.

2002: Travel Grant of “The International Travel Fund of the University of Maryland”. Round trip **ticket plus \$300.00** for a 30 days visit to the Slovak Academy of Sciences.

d. International activities

1987: Two month visit to the Institut National de la Recherche Agronomique (L'Institut de Recherche sur les Grands Mammiferes). Supervisor Dr. Raymond Campan.

1988: Three month visit to the Institut National de la Recherche Agronomique (L'Institut de Recherche sur les Grands Mammiferes). Supervisor Dr. Raymond Campan.

1991: Ten week visit to the Agriculture Canada, Agassiz Research Station. Supervisor Dr. R.C. Newberry.

1992: Three month visit to the Agriculture Canada, Agassiz Research Station. Supervisor Dr. R.C. Newberry.

1994-1995: Nine month visit to the Department of Animal Hygiene, Faculty of Veterinary Medicine, Swedish University of Agricultural Science, Skara (Sweden). Supervisor Dr. L. Keeling.

1995: Six month visit to the Station de Recherches Avicoles (Poultry Research Station), Institute National de la Recherche Agronomique, Centre de Recherches Tours/Nouzilly (France). Supervisor Dr. J. M. Faure.

3. TEACHING AND ADVISING

a. Courses taught during the last five years

	<u>Credits</u>	<u>Enrollment</u>
1998: ANSC 399, Special Problems in Animal Science	1	1
2000: ANSC 399, Special Problems in Animal Science	1	1
ANSC 399, Special Problems in Animal Science	2	1
2001: ANSC 386, Special Problems in Animal Science	3	1
2002: ANSC 399, Special Problems in Animal Science	2	1
2004: ANSC 386 (section 4601), Special Problems in Animal Science	3	1
2005: ANSC 386 (Section 4601), Special Problems in Animal Science	3	1

1994-1997: Welfare and environmental enrichment in captive animals (20 hours course), Graduate Program within the Ph.D. Teaching Program on Ethology of the Animal Biology Department, University of Cordoba, Spain.

1997:

- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior Oct. 29.
- Guest lecture ANSC 455, 50 minutes Class. Introduction to Behavioral Ecology, November.

1998:

- Guest lecture ANSC 489D, 3 hrs. Class. Practical class, How to Measure Behavior. March 9.
- Guest lecture ANSC 262 Animal Behavior, 110 minutes class, April 21.
- Guest lecture ANSC 262 Animal Welfare, 110 minutes class, April 30.
- Guest lecture ANSC 698 A/C Seminar, 50 minutes, Sept 1.
- Guest lecture ANSC 455, 50 minutes Class. Introduction to Behavioral Ecology, Sep 25.
- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior Oct. 12.

1999:

- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior Oct. 12.
- Guest lecture ANSC 455, 50 minutes Class. Poultry Behavior, October 11.

2000:

- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior October, 30.
- Guest lecture ANSC 102, 50 minutes Class. Management practices affecting final quality in poultry, May 8.
- Guest lecture ANSC 453, 50 minutes Class. Poultry Welfare, March 27.

2001:

- Guest lecture ANSC 262, 50 minutes Class. Poultry Behavior, February 26.
- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior, November, 5th.
- Guest lecture ANSC 455, 50 minutes Class. All you ever wanted to know about chicken behavior, November 14th.

2002:

- Guest lecture ANSC 455, 50 minutes Class. Poultry Behavior, September 25th.

2003:

- Guest lecture ANSC 262, 90 minutes Class. Poultry Behavior and Welfare, February 21.
- Guest lecture UNIV 100, 40 minutes. Meet a Faculty class, October 1st.
- Guest lecture VMSC 699, 90 minutes. October 14.
- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior.

2004:

- Guest seminar ANSC 699, 50 minute. Poultry Behavior and Welfare, Oct 5th.
- Guest lecture ANSC 101, 110 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior (Nov. 2004).

2005:

- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior (Nov. 2005).

2006:

- Guest lecture ANSC 340 (Health Management of Animal Populations), 75 minutes Class. Poultry welfare (April 2006).
- Guest lecture ANSC 101, 50 minutes Class. From Cheetahs to chickens; An introduction to Animal Behavior (Nov. 2006).

2007:

- Guest lecture ANSC 340 (Health Management of Animal Populations), 75 minutes Class. Poultry welfare (April 2007).

b. Courses or Curriculum Development N/A

c. Manuals, Notes, Software, Webpages, and Other Contributions to Teaching N/A

d. Teaching awards and other special recognition N/A

e. Advising

1. Undergraduate advising

- 1998: Advisor of 18 undergraduates
- 1999: Advisor of 18 undergraduates
- 2000: Advisor of 15 undergraduates
- 2001: Advisor of 13 undergraduates
- 2002: Advisor of 7 undergraduate
- 2004: Advisor of 5 Undergraduates

- 2005: Advisor of 21 Undergraduates
- 2006: Advisor of 21 Undergraduates
- 2007: Advisor of 13 Undergraduates

2. Supervision of Research Direction

1994: Research Project Supervisor of one (Georgina Correia) Erasmus Fellow (European Union Program) from the University of Lisbon. Actually she works for the Portuguese Government as Animal Welfare representative in the Veterinary Commissions of the European Union.

<u>Post Doctoral Trainees</u>	<u>Degree/Date</u>	<u>Employment</u>
Dr. Boris Bilcik	Post-Doc (Sept. 2001-Sept 2004)	Researcher: Academy of Sciences-Slovakia-
Dr. Avanti Mallapur	Post-Doc (May 2006-September 2007)	

<u>Graduate Students</u>	<u>Degree/Date</u>	<u>Employment</u>
Nancy J. Fiscus	Resch. Supervisor, M.S. 1998	National Zoo
TeriLynn Cornetto	M.S. (May 98- Spring 00)	Technician Smithsonian National Zoo
Rosemary Pettit	M.S. (Sept. 98- Spring 00)	Veterinary Medicine
Sabrina M. Brougher (Formerly S. McGary)	Ph.D. (Sept. 99- Dec 2002)	Assistant Professor, Delaware State University
Mason Seth Freed	M.S. (Sept 2000-April 2003)	Veterinary Medicine
Erin N. Hoerl	M.S. (August 2002- May 2004)	
Rachel L. Dennis	M.S. (August 2002- May 2004)	Ph.D. Student Perdue University
Erin N. H. Leone	Ph.D. (August 2004- current student)	
Taylor L. Callicrate	M.S. (August 2006- current student)	
Kathleen Baczynski	M.S. (August 2006- current student)	

Undergraduate research:

Elisabeth Welch (2000)

Tara M. Klimovitz (2001)

Emily Steinberg (2002)

Kimberly Szawan (2003)

Kimberly Brokaw (2004-2005), Lillian Rummel Scholarship recipient

Carrie Hovland (2005-2006), Lillian Rummel Scholarship recipient

Monica Fernandez (2006-2007), Lillian Rummel Scholarship recipient

Holli Lui (2007)

Linda Huang (2007)

Visiting students:

- Dorothee Bizeray, Institute National de la Recherche Agronomique (INRA), Nouzilly, France. Spring 2000- three month stay
- Johanna Väisänen, Department of Biology, University of Linköping, SE-581 83 Linköping Sweden. Spring 2004- three month stay
- Stephan Luepold, Department of Animal & Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. Spring 2007- three weeks stay.
- Maria Teresa Prieto, Instituto Nacional de Investigacion Agraria, Madrid, Spain. Fall 2007- three month stay

Awards given to supervised students:

2000:

- S. McGary, recipient of the 2000-2001 Richard F. Davis Memorial Scholarship.
- T. L. Cornetto, received the Jacob K. Goldhaber Travel Grant.
- S. McGary, Ph.D., certificate of Excellence for Graduate Student Research Paper, Environment and Management section, Poultry Science Association Annual Meeting.
- T.L. Cornetto, M.S. certificate of Excellence for Graduate Student Research Paper, Environment and Management section, Poultry Science Association Annual Meeting.

2001:

- D. Bizeray, Ph.D. second place Best Oral Presentation Award, 35th Meeting of the International Society for Applied Ethology.

2002:

- S. McGary, recipient of the Certificate of Excellence for Graduate Student Research Paper, Environment and Management section, Poultry Science Association Annual Meeting.

2004:

- R. L. Dennis recipient of the Master Student of the Year Award, Department of Animal and Avian Sciences.
- R. L. Dennis recipient of the first place Shaffner Award to the best presentation in poultry science. Annual symposium, Department of Animal and Avian Sciences.
- E. N. Hoerl, recipient of the second place Shaffner Award to the best presentation in poultry. Annual Symposium of the Department of Animal and Avian Sciences.

2005:

- E. N. H. Leone (formerly Hoerl), recipient of the second place Shaffner Award to the best presentation in poultry. Annual symposium of the Department of Animal and Avian Sciences.

- E. N. H. Leone (E. N. Hoerl), Certificate of Excellence for Graduate Student Research Paper, Environment and Management section, Poultry Science Association Annual Meeting.

- E. N. H. Leone (E. N. Hoerl), Outstanding M.S. Graduate Student of the year, Department of Animal and Avian Sciences, University of Maryland.

2006:

- E. N. H. Leone , recipient of the Mabel Spencer Award- for outstanding student at the University of Maryland.

- E. N. H. Leone, Certificate of Excellence for Graduate Student Research Paper, Environment and Management section, Poultry Science Association Annual Meeting.

- E. N. H. Leone, Poster winner of the Biosciences Day, University of Maryland.

- E. N. H. Leone, received the Jacob K. Goldhaber Travel Grant.

- E. N. H. Leone, received ‘Richard F. Davis Memorial Scholarship’.

2007:

- E. N. H. Leone, Alumni of the College of Agriculture and Natural Resources Graduate Student of the year Award at the University of Maryland.

- E. N. H. Leone, H. Palmer Hopkins Scholarship for excellence in teaching.

- E. N. H. Leone, Alltech Student Research Manuscript Award, Poultry Science Association Annual Meeting.

As member of advisory committee

<u>Name</u>	<u>Degree/Date</u>
X. S. Zhou	M.S. 1997
Nancy J. Fiscus	M.S. 1998
Sabrina McGary	M.S. 1998
Kristina Adams	M.S. 2001
Raymond M. Brooks	M.S. 2002
Mike Potthoff	M.S. 2003
Michael Kreger	Ph.D. April 2003
Debbie Charles	M.S. Dec. 2003
Raymond Brooks	Ph.D.

j. Extension Activities:

1. Major programs established

1a. Management strategies in broiler production to maximize health, performance and welfare (Current)

Background and justification:

Animal agriculture has progressively changed from the traditional ‘family’ owned and operated production system to become part of one of the most powerful industries in the United States. This change has perhaps been most remarkable within the broiler industry. Although nowadays each chicken house is still owned by family farmers they operate as an integrated industry, such that chicks, feed, management programs and veterinary care are provided by corporations that process millions of birds per week. Therefore broiler production is no longer perceived by consumers as a family farm business. At the same time this change was occurring, animal welfare concerns from consumers began to emerge as a result of the actions of activist groups which claimed that companies made multi-million dollar business from crowding and mistreating animals. As a result welfare issues have become more prevalent, to the point that currently is not longer sufficient for the broiler industry to produce high quality birds in an efficient manner, but they must to do so while ensuring that each animal in the system receives proper care and attention.

Program objectives:

- To develop and improve broiler management techniques to maximize health, performance and welfare through behavioral research.
- To provide industry with scientific guidance in the development of animal welfare guidelines.

Scope and duration: National, 1997-present

Program description and results:

The first short-term objective within this program was to establish a clear distinction between research in behavior and issues on well-being/welfare and animal rights. This objective was accomplished through extension seminars (see extension invited talks and other presentations/seminars and education programs) and one-on-one meetings with producers and members of the poultry industry. At the present time there are substantial evidences that the Delmarva Poultry Industry recognize that research in behavior can benefit their economic returns. Improving efficiency of the birds by understanding their behavioral requirements and by increasing their “welfare” have added benefits in terms of public image, particularly when there is increasing public concern on the welfare of animals kept for meat production.

Once this first objective was accomplished, I focused on addressing very specific management issues, such as density, spatial distribution and social dynamics. High densities and uneven bird distribution has important negative effects on health, performance and welfare of broilers. High densities are usually associated with higher levels of disturbances, aggression and damage to the skin, which causes welfare and production problems. High densities have also been linked to increase incidence of leg and foot problems and with a reduction in the use of space. My extension efforts have centered on demonstrating the effects of density in animal welfare and performance, providing information to farmers through extension publications on how to minimize these effects. The research and industry community were also addressed through an invited paper at the 2006 Poultry Welfare Symposium of the Poultry Sciences Association. In addition, we have demonstrated that by using panels (Patented) in poultry environments we can

produce a more even bird distribution which results in almost a 50% reduction in the incidence of disturbances and aggressive interactions.

As a consequence of my efforts in disseminating information on poultry behavior and welfare and the constant interaction with the Poultry Industry in the Delmarva Peninsula and Nation wide, I have been invited to be a member of the advisory council for the:

- National Chicken Council (NCC) Animal Welfare Program (May 2001-Present).
- Perdue Farms Animal Welfare Council. (October 2001- Present)
- Official Auditor for the National Chicken Council Animal Welfare Program. (May 2001-Present).

My role in these councils is to provide independent advice and guidance in the development of the poultry welfare guidelines and auditor protocols developed by industry. Only seven Poultry Scientists Nation-wide were invited to participate in the NCC committee and only two at the Perdue Farms committee. In this role I have reviewed several versions of the NCC and Perdue Farms Welfare Guidelines, provided them with comments and relevant scientific information. During the preparation of the guidelines, I attended several committee meetings in Atlanta (GE) and Salisbury (MD) and had numerous conference calls. These meetings have given me the opportunity of discussing welfare issues and behavior with CEO's of the main U.S. Poultry companies such as: Tysons, Pilgrim's Farm Corporation, Fieldale Farms Corporation, Foster Farms, Perdue Farms, etc. **Currently the National Chicken Council Broiler Welfare Guidelines are used Nation-wide by all broiler companies. Perdue Farms follow both the NCC and their own welfare guidelines that includes some provisions not included in the NCC.**

Since May 2006 I am also assisting the **American Meat Institute (AMI) with their Avian Influenza Fact Squad**. This is a group of 27 poultry experts across the Nation that will be assisting the AMI by responding to local media inquiries. I will specifically assist AMI by addressing any poultry welfare issues that may arise in cases of an avian flu epidemic.

Impact of the program:

- The National Chicken Council Welfare Guidelines for broiler production, developed under guidance of the scientific committee are at the present time applied Nation-wide by all the poultry companies with few exceptions.
- The Perdue Farms Welfare Guidelines are applied by all sectors of Perdue Farms (from the hatchery to the slaughter house).

1b. Broiler breeder management and reproductive performance (Current):

Background and justification:

Fertility in modern broiler breeders is in decline. Each 1.3% reduction in fertility costs the U.S. poultry industry \$18.75 million annually. If fertility continues to decrease at the same rate as in the last few years, the industry runs the risk of an imperative change towards artificial insemination. There is a large need for behavioral research in broiler breeders, not only to prevent further reductions in fertility, but also it is necessary to develop new management practices/strategies that will permit industry to increase reproductive performance of broiler breeders.

Program objectives:

- To establish methods to control aggression and mortality in broiler breeders.
- To develop management techniques to improve reproductive performance

Scope and duration:

State and multi-state (WV, KY, NC), 1999-present

Program description and results:

Problems that have been or are currently being addressed include: Aggression and mortality in broiler breeders, reduced reproductive efficiency and design of facilities. Through this program, I have been able to demonstrate that reduced reproductive performance in modern broiler breeders lines is not related to changes in their reproductive behavior as it was initially speculated. We are now in the process of continuing our investigations to demonstrate that the fertility decline in broiler breeders is a consequence of reduced efficiency in sperm transfer probably a side effect consequence of the morphological changes that broilers have experienced due to the intense genetic selection for high yield. Industry is regularly updated regarding the progress achieved with this extension activity by formal and informal meetings, and presentations are scheduled on a regular basis.

I also demonstrated that with a very simple management change that involves providing broiler breeders with access to panels in the chicken house it is possible to achieve higher profits as both fertility, and hatchability, increased by 1.98% and 0.76%, respectively and egg production is increased by 0.1 eggs per female per week. This technique, if applied to all the broiler breeder facilities would increment Perdue Farms profits by \$2 million/year. This demonstration was conducted with the support of Perdue Farms in five commercial broiler breeder facilities located in West Virginia. Two new demonstration trials are scheduled for the fall 2006, in West Virginia and in the Kentucky division of Perdue Farms. In addition, in a prior demonstration trial I also showed that this management method of providing panels to broiler breeder farms can help to reduce male aggression and female mortality.

1c. Humane mass disposal of poultry flocks (Completed)

Background and justification:

Current control strategies for Avian Influenza (AI) and other highly pathogenic poultry diseases often include quarantine, depopulation, and disposal of infected birds. For biosecurity reasons, on-farm depopulation and disposal methods are preferred. The options for mass depopulation are limited, as reported by the 2000 Report of the AVMA Panel on Euthanasia (AVMA, 2001).

Current depopulation techniques required extreme labor, are not appropriate for all house types and may not be suitable for large scale emergency implementation.

Program Objectives:

- To develop a humane method mass disposal of broilers when on farm depopulation is required.

Scope and Duration:

State, possibly National, 2003-2006 (Completed)

Program description and results:

This was a collaboration project with faculty at the University of Delaware (Dr. E. Benson, R. Alphin, B. Malone, and Dr G. Van Wicklen) in the development of a procedure that uses foam to rapidly form a blanket over the birds producing rapid death within approximately five minutes. My role in this project was to investigate the welfare aspects of the procedure to determine if it could be considered a humane procedure. Advantages of the foam method as compared to currently available methods for broiler mass disposal includes: 1) requires significant lower number of people to complete the procedure per farm, therefore reducing possibilities of transmission of highly pathogenic diseases, such as AI to humans. The foam process requires one to two people inside the house distributing foam and similar number outside the house operating equipment. In contrast, the CO₂ polyethylene tent process (currently used by the broiler industry) requires between 10 to 14 people. 2) It is relatively inexpensive as compared with other available methods. 3) The procedure can be applied to a variety of house types for broiler production and is compatible with in-house bird composting (which is the recommended method for broiler disposal during disease outbreaks). 4) The method is comparable to the CO₂ polyethylene tent regarding time of death in small groups, but as the number of birds to be disposed increases the foam method out-competes the CO₂ method. In addition, corticosterone studies have revealed that the foam method is not more stressful than the CO₂ depopulation method. In both foam and CO₂ euthanized broilers, lesions observed during post-mortem analysis are consistent with anoxia/hypoxia. This suggests that foam acts by physical induced hypoxia while CO₂ causes chemically induced hypoxia.

Currently the project has moved from research to implementation. Based on the results of this program several poultry companies have shown interest in this method. At least two states including Delaware and North Carolina are purchasing foam depopulation equipment to provide emergency response capability, and it is likely that the broiler industry in Maryland will be using this new technology as well. States that are considering purchasing the equipment would have the ability to effectively, and rapidly, respond in the event of a serious disease outbreak such as H5N1. A single house outbreak of H5N1 will require depopulation of all poultry houses in a two mile radius. In high production areas such as the Maryland Eastern-shore, this would mean to depopulate 1.5 million broilers within 48 hours. Rapid disposal is critical for outbreak control and spread prevention. At this point we suspect that only the foam method can be performed fast enough to insure meeting this 48hr deadline for disease control.

At the present time, the American Association of Avian Pathologists (AAAP) Animal Welfare Committee, and the National Institute for Animal Agriculture (NIAA), have endorsed the procedure. Final decisions from the AVMA and USDA are pending.

Impact of the program:

- It is likely that in the event of an H5N1 outbreak many (if not all) broiler companies in the Delmarva Peninsula as well as Nation-wide will use the foam method DPI and Perdue Farms, in particular, have already conducted demonstration trials using this technology.

2. Educational programs developed

An educational program was developed to achieve the objectives of the above indicated extension programs through promotion of information pertinent to poultry behavior and welfare. Information is disseminated through the poultry behavior and welfare web site, extension newsletters, newspaper columns, demonstration projects and other.

University of Maryland Poultry Behavior and Welfare Web Site. This site <http://www.ansc.umd.edu/pbw> contains information in poultry behavior, management and welfare topics. The information is divided in two areas, Research and Extension.

- a) *Research:* This section contains summaries on ongoing research projects within my lab, and graduate students participating in each project. As research projects are being finalized abstracts of published scientific article are made available.
- b) *Extension:* This site contains on-line poultry industry oriented articles such as published Fact Sheets and all the issues of the Newsletter "*Poultry Perspectives*" (see details below) published and co-edited by Drs. Estevez and Angel. Relevant articles such as those published in proceedings of invited extension conferences are also available in pdf format at this site.

Extension Publications. Extension information is published in a variety of formats and included timely issues affecting the broiler industry. One of the biggest efforts is the publication of the Newsletter "*Poultry Perspectives*". This newsletter started in 1999, co-edited by Dr. R. Angel and myself, both at the Department of Animal and Avian Sciences. *Poultry Perspectives* is sent to all Maryland DPI members (2,400 farmers and industry personnel) and continues to be well received by industry. The newsletter is currently sent to members as an insert to the DPI mailings. We have followed two different strategies regarding the contents of the newsletter. Mostly it contains a variety of articles on diverse topics that are of interest to the broiler industry. However, most recent issues have been dedicated to specific issues that we knew were a 'hot topic' for industry. These topics included: ammonia, density and poultry welfare, avian influenza, biosecurity, alternative poultry production, nutrient management and environmental issues. We

will continue to focus on specific issues as the need arises. For the list of issues published see "extension publications".

On farm Demonstrations. This is an effective educational approach to encourage the adoption of new management strategies. One of the biggest successes of my program has been the application of the use of panels in broiler production. Below appears the list of the conditions in which the demonstration panels were conducted as well as the results obtained.

- 1999: System implemented in approximately 10 broiler breeder farms from Townsends Farms (each farm has a population of over 8,000 birds; total number of birds impacted was over **80,000**). Feed back indicated that the system worked nicely and was easy to implement.
- 1999: One "On farm demonstration" was conducted in meat type broiler chickens from **Townsends Farms**. Each facility housed about 25,000 birds. Results indicated that the percentage of condemnations was **reduced from 1.27 % to 0.78 % when chickens were reared with cover panels.**
- 2000: On farm demonstrations in broiler breeder farms continued to happen in 2000. **Perdue Farms** (MD) and **Case Farms** (NC) although we did not see obvious advantages in these cases.
- 2001: A European broiler company, **SADA**, from the group **Nutreco**, (which produces 30% of the broilers in Europe) tested the panels in some of their European facilities. Results are unknown.
- 2005: Demonstration project conducted at five broiler breeder farms of **Perdue Farms** in the West Virginia Division. Results indicated that the provision of panels to broiler breeders did benefit industry by increasing egg production, fertility as well as egg hatchability. Data indicates that this practice may result in **\$2 Million additional benefit to Perdue Farms** if they would implement this system in all their broiler breeder facilities. In addition the provision of panels is considered an environmental enrichment technique that benefits the welfare of poultry.
- Fall 2006: New demonstration trials are scheduled for the Fall 2006 in five broiler breeder farms at the West Virginia division of Perdue Farms. A new demonstration trial will be initiated in their Kentucky division simultaneously.

2. SERVICE:

Service to Professional, Public Associations

- a. Organization and membership.

Memberships:

Animal Behaviour Society
International Society of Applied Ethology
Full Member of the *Sigma Xi* (University of Maryland Chapter)
Poultry Science Association
Spanish Society of Ethology
World Poultry Science Association

Other activities within Scientific Organization:

- Evaluator of the Students' presentations of the 2001 and 2002 Poultry Science Association Annual Meeting (Environment and Management Section)

2005-present: Selection Committee member of the Hy-Line International Research Award 2005.

Consulted by:

The Washington Post, September 19, 2005
The New York Times, February 21, 2007

Service to the University and Department

College:

2003: Faculty and Staff Excellence Awards Committee, College of Agriculture and Natural Resources.

2003-2005: Serve on the Search Committee for AGNR Dean.

Department:

1997: Search Committee Poultry Nutrition Position.

1997- 2004: Adjunct Faculty Appointments Committee.

1998: Ad hoc Committee; Review National Agricultural Library Cooperative Agreement Review.

1998-2000: Committee to develop the plan for the new barn to replace the existing "swine barn".

1999: Co-chair Annual Symposium Committee.

2000: Chair of the Annual Symposium Committee.

2000-Sept 2004: Committee of the Departmental Web Page.

2001: Supervised renovation of farm building #119.

2003: Participated in the "Committee of the Graduate Seminar Policy"

2001-Present: Chair for the "Lillian Hildebrandt Rummel Scholarship in Avian Ethology".

2002-2004: Faculty advisor for the "Poultry Club"

2002- 2005: Graduate Program Committee

2003- present: Committee of advisors to the Department Chair

2003- 2004: Search Committee Provost Support Position
April 2004 Present: Faculty supervisor for Manju Mason (Printing Services)
October 2003-Present: Faculty Advisory Committee to the Chair
Oct. 2004- Present: Committee of the Departmental Web Page (Chair).
2006-2007: Search Committee of the Applied Animal Behavior Position (Chair)
2006-2007: Member of the Search committee for the position of Departmental Chair
2006: Member of the Search committee Coordinator (Laboratory Animal Care)
2006-present: Member of the IACUC
February 2006- present: Periodic Review Committee Assignment