**LS11-238 Long-term AgroEcosystems Research and Adoption in the Texas Southern High Plains**

**Impacts and Contributions**

**Graduate students involved in this project**

**Students Completed:**

**M.S.**

Jeffrey D’Wayne Dudensing, Agriculture and Applied Economics

Kelly Jones, Agricultural Education and Communications

Jennifer Collins, Plant and Soil Science

Rebekka Martin, Agriculture and Applied Economics

Pamela Miller, Agricultural Education and Communication

Jurahee Jones, Agricultural Education and Communication

Victoria Nicole Termini, Plant and Soil Science

Katie Leigh, Agricultural Education and Communication

Morgan Newsom, Agricultural Education and Communication

Heather Jones, Agricultural Education and Communication

Lindsay Graber, Agricultural Education and Communication

Jennifer Zavaleta, Agricultural Education and Communication

**Ph.D**

Dirk Philipp, Plant and Soil Science

Mark Marsalis, Plant and Soil Science

Will Cradduck, Plant and Soil Science

Teresa Duch-Carvello, Plant and Soil Science

Nithya Rajan, Plant and Soil Science

Justin Weinheimer, Agriculture and Applied Economics

Yue Li, Plant and Soil Science

Song Cui, Plant and Soil Science

Cody Zilverberg, Plant and Soil Science

**Students in progress**

**M.S.**

Victoria Xiong, Plant and Soil Science

**Ph.D**

Alex Rocateli, Plant and Soil Science

**Post Docs**

Will Cradduck, Plant and Soil Science

Nithya Rajan, Plant and Soil Science

Justin Weinheimer, Agriculture and Applied Economics

**Visiting Scientists**

Fujiang Hou, Lanzhou University, Lanzhou, China

Tal Kipnis, The Volcani Center, Bet-Dagan, Israel

Gilad Ashbell, The Volcani Center, Bet-Dagan, Israel

Wenlong Li, Lanzhou University, Lanzhou, China

**Publications resulting from this program**

**Journal Publications**

Acosta-Martínez, V., T.M. Zobeck, and V. Allen. 2004. Soil microbial, chemical, and physical properties in continuous cotton and integrated crop-livestock systems. Soil Sci. Soc. Am. J. 68:1875-1884.

Allen, V.G, C.P. Brown, R. Kellison, E. Segarra, T. Wheeler, P.A. Dotray, J.C. Conkwright, C.J. Green, and V. Acosta-Martínez. 2005. Integrated cotton and beef production to reduce water withdrawal from the Ogallala aquifer in the Southern High Plains. Agron. J. 97:556-567.

Philipp, D., V.G. Allen, R.B. Mitchell, C.P. Brown, and D.B. Wester. 2005. Forage nutritive value and morphology of three old world bluestems under a range of irrigation levels. Crop Sci. 45:2258-2268.

Philipp, D., C.P. Brown, V.G. Allen, and D.B. Wester. 2006. Influence of irrigation on mineral concentrations in three old world bluestem species. Crop Science. 46:2033-2040.

Allen, V.G., C.P. Brown, E. Segarra, C.J. Green, T.A. Wheeler, V. Acosta-Martínez, and T.M. Zobeck. 2006. In search of sustainable agricultural systems for the Llano Estacado of the U.S. Southern High Plains. Agric. Ecosystems Environ. (Invited paper).

Allen, V.G., M.T. Baker, E. Segarra and C.P. Brown. 2007. Integrated irrigated crop-livestock systems in dry climates. Agron. J. 99:346-360. (Invited paper).

Philipp, D., V.G. Allen, R.J. Lascano, C.P. Brown, and D.B. Wester. 2007. Production and water use efficiency of three Old World bluestems. Crop Sci. 47:787-794.

Marsalis, M.A., V.G. Allen, C.P. Brown, and C.J. Green. 2007. Yield and nutritive value of forage Bermudagrasses grown using subsurface drip irrigation in the Southern High Plains. Crop Sci. 47:1246-1254.

Acosta-Martinez, V., S. Dowd, S. Yung, and V. Allen. 2008. Tag encoded pyrosequencing analysis of bacterial diversity I a single soil type as affected by management and land use. Soil Biology & Biochemistry 40:2762-2770.

Allen, V.G., C.P. Brown, E. Segarra, C.J. Green, T.A. Wheeler, V. Acosta-Martínez, and T.M. Zobeck.. 2008. In search of sustainable agricultural systems for the Llano Estacado of the U.S. Southern High Plains. Agric. Ecosystems Environ. 124:3-12. (Invited paper)

Robertson, G.P., V.G. Allen, G. Boody, E.R. Boose, N.G. Creamer, L.E. Drinkwater, J.R. Gosz, L. Lynch, J.L. Havlin, L.E. Jackson, S.T.A. Pickett, L. Pitelka, A. Randall, A.S. Reed, T.R. Seastedt, R.B. Waide, and D.H. Wall. 2008. Long-term agricultural research: A research, education, and extension imperative. BioScience 58 (7):604-645.

Dudensing, J., J. Johnson, P., and C. Villalobos. 2008. Grazing alternatives in the face of declining groundwater:  A case from the Southern High Plains of Texas. Texas Journal of Agriculture and Natural Resources 21:60-72.

Maas, S.J., and N. Rajan. 2008. Estimating ground cover of field crops using medium-resolution multispectral satellite imagery. Agron. J. 100 (2), 320-327.

Wheeler-Cook, E., E. Segarra, P. Johnson, J. Johnson and D. Willis. 2008. Water conservation policy evaluation:  The case of the southern Ogallala aquifer. Texas Journal of Agriculture and Natural Resources 21:89-102.

Johnson, J., P. Johnson, E. Segarra and D. Willis.  2009.  Water conservation policy alternatives for the Ogallala aquifer in Texas. Water Policy 11:537-552.

Rajan, N., and S.J. Maas. 2009. Mapping crop ground cover using airborne multispectral digital imagery. Precision Agriculture Volume 10, No. 4:304-318. <http://www.springerlink.com/content/1385-2256>

Acosta-Martinez, V., S.E. Dowd, Y. Sun, D. Wester, and V.G. Allen. 2010. Pyrosequencing analysis for characterization of soil bacterial populations as affected by an integrated livestock-cotton production system. Applied Soil Ecology 45:13-25.

Acosta-Martinez, V., G. Burow, T.M. Zobeck, and V. Allen. 2010. Soil microbial communities and function in alternative systems to continuous cotton.  Soil Sci. Soc. Am. J. 74:1181-1192.

Acosta-Martinez, V., C.W. Bell, B.E.L. Morris, J. Zak, and V.G. Allen. 2010. Long-term soil microbial community and enzyme activity responses to an integrated cropping-livestock system in a semi-arid region. Agriculture, Ecosystems and Environment 137:231-240.

Maas, S. J., and N. Rajan. 2010. Normalizing and converting image DC data using scatter plot matching.  Remote Sensing 2 (7):1644-1661.

Rajan, N., S. J. Maas, and J. Kathilankal. 2010. Estimating crop water use of irrigated and dryland cotton in the Southern High Plains. Agron. J. 102:1641-1651.

Zilverberg, C. J., P. Johnson, J. Weinheimer, and V. G. Allen. 2011. Energy and carbon costs of selected cow-calf systems. Rangeland Ecology and Management. Rangeland Ecology & Management 64 (6):573-584.

Davinic, M., L.M. Fultz, V. Acosta-Martinez, F.J. Calderón, S.B. Cox, S.E. Dowd, V.G. Allen, J.C. Zak, J. Moore-Kucera. 2011. Pyrosequencing and mid-infrared spectroscopy reveal distinct aggregate stratification of soil bacterial communities and organic matter composition. Soil Biology and Biochemistry 46:63-72.

Allen, V.G, C.P. Brown, R. Kellison, P. Green, C.J.Zilverberg, P. Johnson, J. Weinheimer, T. Wheeler, E. Segarra, V. Acosta-Martinez, T.M. Zobeck, and J.C. Conkwright. 2012.

Integrating cotton and beef production in the Texas Southern High Plains: I. Water use and measures of productivity. Agron. J. 104:1625-1642.

Zilverberg, C.J., V.G. Allen, C.P. Brown, P. Green, P. Johnson, and J. Weinheimer. 2012. Integrating cotton and beef production in the Texas Southern High Plains: II. Fossil fuel use. Agron. J. 104:1643-1651.

Song C., V.G. Allen, C.P. Brown, and D.B. Wester. 2013. Growth and nutritive value of three old world bluestems and three legumes in the semiarid Texas High Plains. Crop Sci. 53:1-12.

Johnson, P., J. Zilverberg, V.G. Allen, J. Weinheimer, C.P. Brown, R. Kellison, and E. Segarra. 2013.  Integrating cotton and beef production in the Texas Southern High Plains: III. An economic evaluation.  Agron. J. (In press).

Zilverberg, C. J., C.P. Brown, P. Green, M.L. Galyean, and V.G. Allen. 2013. Three integrated crop-livestock systems in the Texas High Plains: Productivity and Water Use. Agron. J. (accepted).

Li, Y., F. Hou, J. Chen, C.P. Brown, and V.G. Allen. 2013. Long-term grazing of a rye cover crop by steers influences growth of rye and no-till cotton. Agron. J. (accepted).

Li, Y., J. Chen, F. Hou, C.P. Brown, P. Green and V.G. Allen. 2013. Allelopathic influence of a wheat or rye cover crop on growth and yield of no-till cotton. Agron. J. (accepted ).

Fultz, L.M., Moore-Kucera, J., Zobek, T.M., Acosta-Martínez, V. and Allen, V.G. 2013. Soil aggregate-carbon pools after 13 years under a semi-arid integrated crop-livestock agroecosystem. Soil Sci. Soc. Am. J. (accepted).

**Conference Proceedings**

Allen, V.G. 2001. Improving livestock production through integrated soil-crop-livestock systems. P. 11-19. In: Prospects of Grassland Science and Industry for the 21st century. International Conference on Grassland Science and Industry. Jul. 17-20, 2001. China Association Agricultural Science Society and the Chinese Grassland Society Hailar, Inner Mongolia.

Jones, K., Kistler, M., Baker, M., and Doerfert, D. 2004. Attitudinal variability of southern high plains cotton producers toward integrated crop/livestock systems. Proceedings of the 2004 Western Agricultural Education Research Conference, Honolulu, HI.

Kistler, M., Jones, K., Baker, M.T., & Doerfert, D.L. (2004). Attitudinal variability among

Southern High Plains cotton producers toward integrated crop/livestock systems. Proceedings

of the 2004 High Plains Groundwater Resources: Challenges and Opportunities Conference, Lubbock, TX.

Kistler, M., Jones, K. Baker, M., and Doerfert. D. 2005. Attitudinal variability of Southern High Plains cotton producers toward integrated crop/livestock systems. Proceedings of the 2005 Association for International Agriculture and Extension Education Conference, San Antonio, TX.

**Popular Articles**

Allen et al. 1999, 2000, 2001, 2002, 2003, 2004, 2006. Sustainable crop/livestock systems in the Texas High Plains: Project summaries and other forage research studies. Field Day Report, New Deal, TX.

Calloway, Sarah. 2002. The alternative way of farming. The Agriculturist. Texas Tech Univ. Vol. 33, No. 1, p 4-5.

Wolfshohl, Karl. 2003. A change for the Plains. Progressive Farmer. Vol. 118; No. 8. Cotton -2.

Wolfshohl, Karl. 2005. Can they save the Ogallala (and the farmer?) Vistas. Vol. 13, No. 2, p. 16-18.

**M.S. Thesis**

Collins, J. 2003. Agricultural phosphorus in an integrated crop/livestock system in the Texas High Plains. M.S. Thesis. Texas Tech University, Lubbock.

Jones, Kelly. 2003. Attitudinal variability among Southern High Plains cotton producers toward integrated crop/livestock systems. M.S. Thesis. Texas Tech University, Lubbock.

Dudensing, Jeffrey D’Wayne. 2005. An economic analysis of cattle weight gain response to nitrogen fertilization and irrigation on WW-B. Dahl bluestem. M.S. Thesis, Texas Tech University, Lubbock.

Martin, Rebekka. 2005. Economic evaluation of an integrated cropping system with cotton. M.S. Thesis, Texas Tech University, Lubbock.

Miller, Pamela. 2006. West Texas high school agriscience teachers knowledge, confidence and attitudes towards teaching water quantity-related topics. M.S. Thesis. Agricultural Education. Texas Tech University, Lubbock.

Leigh, Katie. 2008. A qualitative investigation of the factors that influence crop planting and water management in West Texas. M.S. Thesis, Agricultural Education. Texas Tech University, Lubbock.

**Ph.D. Dissertation**

Philipp, Dirk. 2004. Influence of varying replacement of potential evapotranspriation on water use efficiency and nutritive value of three Old World bluestems (*Bothriochloa* spp.). Texas Tech University, Lubbock.

Marsalis, Mark A. 2004. Adaption of forage bermudagrasses [Cynodon  *dactylon* (L.) Pers.] to the Texas High Plains grown under saline and limited irrigation conditions. Department of Plant and Soil Science. Texas Tech University.

Cradduck, Will. 2005. Persistence, nutritive value, and effect of grazing selected cool and warm season grasses for the Southern Great Plains. Plant and Soil Science. Texas Tech University.

Duch, Teresa C. 2005. Ecological and management implications of ww-b. dahl Old World bluestem in integrated crop/livestock systems. Department of Plant and Soil Science. Texas Tech University.

Rajan, Nithya B. 2007. Estimation of crop water use for different cropping systems in the Texas High Plains using remote sensing. Department of Plant and Soil Science. Texas Tech University.

Deycard, Victoria Nicole. 2008. Comparison of soil sustainability measured by carbon sequestration using carbon isotopes from cotton (*gossypium hirsutum*) – forage- integrated management systems. Department of Plant and Soil Science. Texas Tech University.

Weinheimer, Justin A. 2008. Farm level financial impacts of water policy on the Southern Ogallala. Department of Agricultural and Applied Economics, Texas Tech University.

Yue Li. 2011.  Allelopathy in an integrated rye-cotton-beef cattle system (unpublished). Department of Plant and Soil Science. Texas Tech University.

Song Cui. 2011. Finding forage legumes adapted to West Texas for reduction of water and energy use and improvement of nutritive value for livestock. Department of Plant and Soil Science. Texas Tech University.

Cody Zilverberg 2012. Agroecology of three integrated crop-livestock systems in the Texas High Plains. Department of Plant and Soil Science. Texas Tech University.

**Abstracts/Proceedings**

Philip, D., V.G. Allen, and C.P. Brown. 2003. Water use efficiency and forage nutritive value of three Old World bluestem species grown in the Southern High Plains. *In:* Annual Meeting Abstracts ASA, CSSA, SSSA, Madison, WI.

Marsalis, M.A., V.G. Allen, C.J. Green, and C.P. Brown. 2003. Water stress and salinity effects on yield and quality of irrigated bermudagrasses. *In:* Annual Meeting Abstracts. ASA, CSSA, SSSA, Madison, WI.

Duch-Carvallo, T., E. Segarra, V.G. Allen, and C.P. Brown. 2003. Economic sustainability of an integrated cotton-forage-livestock production system. *In:* Annual Meeting Abstracts. ASA, CSSA, SSSA, Madison, WI.

Collins, J.L., V.G. Allen, C.J. Green, and C.P. Brown. 2003. Agricultural phosphorus in an integrated sustainable crop/livestock system in the Texas High Plains. *In:* Annual Meeting Abstracts. ASA, CSSA, SSSA, Madison, WI.

Duch-Carvallo, T., E. Segarra, and V.G. Allen. 2006. Economic comparison of conventional cotton and integrated crop-livestock systems in the Texas High Plains. 2007. Beltwide Cotton Conference. January 9-12, 2007. New Orleans, LA.

Allen, V.G., P. Brown, and E. Segarra. 2006. Agriculture and land-use changes in the Texas High Plains. National American Society of Agronomy Meeting. November 12-16, 2006. Indianapolis, ID.

Allen, V.G., and C.P. Brown. 2006. Using grazing beef cattle to restore resilience in our agricultural systems. Proceeding of the Airy Symposium, Iowa State University Department of Animal Science, Visions for Animal Agriculture and the Environment. Kansas City, MO (Jan. 4-6, 2006)

Allen, V.G. and C.P. Brown. Integrating grazing beef cattle and crop production in the Southern High Plains. 28th Annual Southern Conservation Systems Conference, Bushland, TX.

**Books and Book Chapters**

Allen, V.G. and J.H. Fike. 2009.  H. A. Wallace, J. J. Ingalls, O. S. Aamodt and Other Voices of the 19th and 20th Centuries. *In:* Wedin, W. F. and S. L. Fales (Ed.) Grassland: Quietness and strength for a new American agriculture.  ASA, CSSA, SSSA, Madison, WI.

Allen, V.G., T. Sell, R.L. Kellison, P.N. Johnson, and P. Brown. 2009. Grassland environments:  Factors driving change.  In: Alan J. Franzluebbers (ed.) Farming with Grass: Achieving Sustainable Mixed Agricultural Landscapes. Soil Water Conserv. Soc. e-book. <http://www.swcs.org/en/publications/farming_with_grass/>

**Video news releases**

Allen, V. 2003. USDA-SARE Update. Video News Release. RaiderNet News.

2012 – The Ogallala Aquifer of the Texas High Plains: A Race Against Time, a video commissioned by the National SARE Program:

<http://www.sare.org/Learning-Center/Multimedia/Videos-from-the-Field/The-Ogallala-Aquifer-of-the-Texas-High-Plains-A-Race-Against-Time?utm_source=CC&utm_medium=Email&utm_content=See%2Bthe%2Bvideo%2Bhere.&utm_campaign=CC-Ogallala%2BVideo>

**Special presentations**

2002 - This project was selected to represent research sponsored by the Southern Region SARE program at the National Farm Bureau Meeting in Reno, Nevada - Feb. 2002.

2003 – March 4 Represented Texas Tech University at the 6th Annual National Association of State Universities and Land-Grant Colleges (NASULGC), Washington, D.C.

**Talks and seminars**

Allen, V.G. 1999. Developing sustainable forage livestock systems for the Southern High Plains. Floyd County Ag Tour Field Day. Lockney, TX. Sep.

Allen, V.G. 2000. ‘WW-B. Dahl’ Old World bluestem in sustainable crop/livestock systems in the Texas High Plains. Texas and Southwestern Cattle Raisers Association. Lubbock, TX. Oct.

Allen, V.G. 2001. Sustainable crop/livestock systems in the Texas High Plains. South Plains Ag Conference and Trade Show. Brownfield, TX. Jan.

Allen, V.G. 2001. Forages for designing sustainable systems. Texas Seed Trade Association. Dallas, TX. Jan.

Allen, V.G. 2001. New agricultural opportunities in this region. Texas Chapter of the American Society of Agronomy Board of Directors. Lubbock, TX. Feb.

Allen, V.G. 2001. Crisis in the Texas High Plains. Texas Pasture and Forage Workers. Stephenville, TX. May.

Allen, V.G. 2001. Sustainable crop/livestock in the Southern High Plains. Dryland Agriculture Institute and West Texas A & M University. Visiting scientists from many different countries. Lubbock, TX. Jun.

Allen, V.G. 2001. Sustainable crop/livestock systems for the Texas High Plains. West Texas Ag. Chem. Meeting. Lubbock, TX. Sep.

Allen, V.G. 2001. Overview of sustainable crop/livestock system program. Texas Farm Bureau Ag. Lead Program. TTU, Lubbock. Nov.

Allen, V.G. 2001. Natural resource management and agricultural security - an initiative for West Texas regional economic development. Stakeholders meeting. Lubbock Chamber of Commerce. Lubbock, TX. Dec.

Allen, V.G. 2002. Natural resource management and agricultural security - an initiative for West Texas regional economic development. Talk given to the Lubbock County Agricultural Advisory Committee, Lubbock, TX. Feb.

Allen, V.G. 2002. Crisis on the Texas High Plains. Farm and Ranch Real Estate Agents Luncheon. Lubbock, TX. Mar.

Allen, V.G. 2002. Crisis on the Texas High Plains. Farm and Ranch Real Estate Agents Luncheon. Lubbock, TX. Mar.

Allen, V.G. 2002. Reflections on the Future. USDA Plant Stress Laboratory. Lubbock, TX. May.

Allen, V.G. 2002. Reflections on the Future. Lubbock Round Table. Lubbock, Texas. Jul.

Allen, V.G. 2002. Designing Systems for a More Sustainable Agriculture in the Texas High Plains. USDA-ARS Livestock-Forage Research Station, El Reno, OK. Aug.

Allen, V.G. 2002. Grassland Ecosystems: Pieces of the Puzzle. The 2002 Leu Distinguished Lecturer, University of Nebraska, Lincoln, Nebraska. Oct.

Allen, V.G. 2002. How Interdisciplinary Research is Initiated and Designed. AGSC 4300 Undergraduate Research Class, Texas Tech University. Oct.

Allen, V.G. 2002. Annual Forage Programs and Alternatives for the Area. Texas Ag Industries Association, Dumas, TX. Nov.

Baker, M., & Jones, K. 2003. Integrated Systems in the Texas High Plains. Texas Agricultural Science Teachers’ Conference, Wichita Falls, TX. July.

Jones, K. 2003. Integrated Systems in the Southern High Plains. New Mexico Agricultural Science Teachers’ Conference, Ruidoso, NM. Aug.

Allen, V.G. 2003. In search of sustainable agricultural systems for the Texas High Plains. Metropolitan Lubbock Rotary Club. Lubbock. TX. Feb. 28.

Allen, V.G. 2003. In search of sustainable agricultural systems for the Texas High Plains. Board of Directors for the High Plains Underground Water Conservation District No. 1. Lubbock, TX. Apr. 8.

Allen, V.G. 2003. In search of sustainable agriculture for the Texas High Plains. Texas Society of Professional Engineers. Lubbock, TX. Dec. 16.

Allen, V.G. 2004. Future sustainable options for Southern High Plains Agriculture” NRCS Pest Management Training Program. Plainview, TX. Mar. 24.

Allen, V.G. 2004. In search of sustainable water use in the Texas High Plains” 4th Annual Research/Extension Symposium on Cotton Issues, Lubbock, TX. Mar. 31.

Allen, V.G. 2004. Integrating Crops and Livestock for Water Conservation and Improved Economics. Olton Farmers Coop., Olton, TX. Dec. 13.

Allen, V.G. 2005. Integrated crop and livestock systems. Houston Livestock and Rodeo group. New Deal, TX. Oct.

Allen, V.G. 2005. Integrated crop-livestock systems in irrigated semiarid and arid environments. ASA Skpecial Symposium on Integrated Crop and Livestock Systems., ASA Annual Meetings, Salt Lake City, UT. (Invited talk).

Allen, V.G. 2006. Using grazing beef cattle to restore resilience in our agricultural systems Airy Symposium, Iowa State University Department of Animal Science, Visions for Animal Agriculture and the Environment. Kansas City, MO. Jan. (Invited talk)

Allen, V.G. 2006. Forages for building 12-month grazing systems in West Texas and factors that affect their quality. Forage Workshop, Plainview, TX. Mar.

Allen, V.G. 2006. Talk at research site as a part of the Pasture to Plate 2006 Alabama Beef Study Tour, New Deal, TX. Producers. Apr.

Allen, V.G. 2006. Using grazing beef cattle to restore resilience in our agricultural systems. Graduate and undergraduate class in forage management, Angelo State University, San Angelo, TX. Apr. (invited talk)

Allen, V.G. 2006. Talk at research site to group of undergraduate students from University of Wyoming, New Deal, TX. May.

Allen, V.G. 2006. Talk at research site to Staff from College of Agricultural Science and Natural Resources, TTU, New Deal, TX. May.

Allen, V.G. 2006. Talk at research site to group of Ag Teachers and Extension Specialists, New Deal, TX. Jun.

Allen, V.G. 7th Annual Field Day at New Deal. Over 100 producers and others attended this event, New Deal, TX. Jun.

Allen, V.G. 2006. Integrating grazing beef cattle and crop production in the Southern High Plains. 28th Annual Southern Conservation Systems Conference, Bushland, TX. To scientists from across US. Jun.

Allen, V.G. 2006. Forages for Cow-Calf Systems. Floyd County Ag Tour, TCE and TAWC, Lockney, TX. Sept.

Allen, V.G. 2006. Agriculture and Land Use Change in the Texas High Plains. Symposium - Land Use. ASA Annual Meeting, Indianapolis, ID. Nov. (Invited talk)

Allen, V.G. 2006. Water Conservation in the Texas High Plains. Charting the Course, Sponsored by River Systems Institute, Texas State University, San Marcos, Austin, TX. Nov. 16-17.

Allen, V.G. 2006. Fitting forages into an annual cropping system. The 2006 Alfalfa and Forages Clinic, Sterling, Colorado. Dec. 12.

Allen, V.G. 2006. Designing livestock and cropping systems for water conservation. The 2006 Alfalfa and Forages Clinic, Sterling, Colorado. Dec. 12

Allen, V.G. 2008. Integrated Systems for the West Texas High Plains. Presented at SARE 20th Anniversary Conference, 2008. Kansas City, MO.

Brown, P. 2011. Integrating Forages and Grazing Animals to Reduce Agricultural Water Use. 2011 Universities Council on Water Resources/National Institutes for Water Resources (UCOWR/NIWR) Conference, Boulder, Colorado. Jul. 11-14.

**International talks**

Allen, V.G. 2000. Pastorco con ruminantes para una agricultura sustenable. *In*: III Seminario Internacional Tecnologias Para la Explotacion Sustenable del Recurso Forrajero. C. S. del Real and P. A. Martinez (eds.) p. 103-127. Universidad Autonoma Chapingo. Chapingo, Mexico. Oct. 5-6.

Allen, V.G. 2001. Improving livestock production through integrated soil-crop-livestock systems. International conference on grassland science and industry. Scientists. Hailar, Inner Mongolia. Jul. 17-20.

Allen, V.G. 2002. Forage/Livestock Systems Research. 6th Conference of the Chinese Grassland Society, Beijing, China. May 22.

Allen, V.G. 2004. Integrate Crop and Livestock Systems. Students and faculty of the College of Pastoral Agricultural Science and Technology, Lanzhou University, Lanzhou, China.

Baker, M. 2005. Sustainability in the Southern High Plains: Implications for Extension. Presentation to the Faculty of the Automous University of Chihuahua, Chihuahua City, Mexico. Jan 5.

Allen, V.G., F. Hou, P. Brown, C. Green, E. Segarra. 2006. Integrated Crop and Livestock Systems in the Texas High Plains. Second China Japan - South Korea Joint Symposium on Grassland Agriculture and Livestock Production, Lanzhou University, Lanzhou city, Gansu Province, China. 31 Jul – 6 Aug.

**Educational materials**

Jones, K., Compton, K., Heinemann, K., & Baker, M. 2005. Sustainable agriculture in the Southern High Plains. Available Internet:

<http://www.depts.ttu.edu/aged/SARE%20curriculum.htm>

**Websites**

<http://www.orgs.ttu.edu/forageresearch>

<http://www.depts.ttu.edu/tawc>

<http://www.tawcsolutions.org/>

**Radio**

Status and results of this project have been reported by several members of this team on local radio talk shows more than 50 times during the years of this project. These include the agricultural show on Station KRFE and Ag Talk on Fox Talk Radio.

**Field days**

Seven annual field days have been held at the research site with attendance ranging from 100 to 300 individuals. Participants are provided with an annual ‘Field Day Report’, tours of the project, opportunities for questions and discussion and are provided with dinner at the ‘chuck wagon’. Field day reports have been published for years 1999, 2000, 2001, 2002, 2003, 2004, and 2006.

Additionally through our sister program, the Texas Alliance for Water Conservation (TAWC), various field days, tours, talks, presentations, journal publications and training sessions have been held each year from 2005-2013. Our Texas Coalition for Sustainable Integrated Systems Research Program (TeCSIS) combined with TAWC comprise TeCSIS-TAWC a one of a kind research and demonstration program designed to address issues of sustainability and conservation in semi-arid agricultural production areas of the Texas High Plains and beyond. Complete information from this program and its participants and activities has not been presented here but more information may be obtained from visiting the websites listed previously.