2012 Selected Research Impacts

Integrating Bibliometrics and Econometrics to Evaluate the Economic Consequences of Research: Application to the Food and Agricultural Sciences

The US has historically been the largest global investor in public agricultural research and development and a leader in terms of intellectual outputs, such as publications and patents related to the agricultural sciences. This dominant position has eroded substantially—mainly due to a reduction in the rate of growth of research funding in the US. Likewise, US agricultural productivity has been slowing in recent decades because of a reduction in the growth of public spending on agricultural research and development.

Contact: Matt Andersen (mander60@uwyo.edu)

Economically Sustainable Cattle Production Practices During Multiple Years of Drought and Differing Price Cycles

Portions of the western US have recently experienced the worst drought in 80 years. The most recent period of drought reduced range productivity, lowered irrigation water supplies, and ultimately forced some ranchers to reduce herd sizes or purchase high cost feedstuffs. Purchasing feed can be a better strategy than partial herd liquidation in the long run, but in the short run it can be more risky. Moreover, retaining yearlings and late calving can be superior management alternatives during drought compared to the traditional strategies of partial liquidation and purchasing feed used by most ranchers. If all cattle producers in Wyoming adopted retained yearlings over partial liquidation, the potential positive impact on income for those producers could total millions of dollars.

Contact: John Ritten (jritten@uwyo.edu)

Measurement and Modeling of Water, Heat, and Carbon Storage and Flux in Forest and Rangeland Ecosystems

Water availability is critical in the semi-arid western US. Snowmelt from forested mountainous regions provides water for irrigated agriculture, urban centers, and industry. The timing and amount of precipitation in rangelands determines plant biomass production for cattle and wildlife grazing. A combined measurement and modeling approach of soil-plant-atmosphere is critical in understanding current water, heat, and carbon fluxes as part of agronomic, hydrological, and climate studies. Development of physics-based computer simulation models also provides a tool for quantifying the impact of management decisions and natural disturbances on the functioning of forest and rangeland ecosystems.

Contact: Thijs Kelleners (tkellene@uwyo.edu)

Reclamation and Restoration of Lands Disturbed and Degraded by Fire

Several very large and pervasive fires occurred throughout Wyoming during the fire season of 2012, including one in the northern Laramie Range that burned nearly 100,000 acres of private, federal, and state lands. The Roger's Research Site, a 320 acre forested component of the Wyoming Agricultural Experiment Station, was burned during this fire. Research to quantify impacts, and to develop strategies for repairing negative aspects of fire in general, are the central aims of this project. Development of these strategies ensures continuation of ecosystem services people have come to expect (clean water, food production, aesthetic appeal, etc.), and allows managers to make informed decisions for post-fire policy. This is especially crucial to property owners, recreational users, producers utilizing forest resources, and those harvesting forest products. Contact: Stephen E. Williams (sewms@uwyo.edu)

2012 Selected Research Impacts

Adherence of *Listeria Monocytogenes* to Fresh Produce

Listeria monocytogenes is a pervasive foodborne pathogen that causes hundreds of cases of the severe disease listeriosis in the US every year. *L. monocytogenes* is the deadliest of the common foodborne bacteria, having a mortality rate of approximately 20%. One source of infections is the consumption of fresh produce that is contaminated with the bacterium. This research aims to provide a better understanding of the factors underlying the adherence and persistence of *L. monocytogenes* on produce. Results will potentially guide efforts to prevent colonization and inhibition of growth of the bacterium on produce leading to a safer food supply. Contact: Kurt W. Miller (kwmiller@uwyo.edu)

Bovine Trichomoniasis in Wyoming Beef Cattle

Bovine trichomoniasis is a worldwide disease caused by the parasitic protozoan *Tritrichomonas foetus*. This sexually-transmitted disease leads to infertility, abortion, and womb infections in female cattle. It has been found in many US states, especially in the Midwest and West, including Wyoming. Identifying risk factors associated with cattle herds infected with *Tritrichomonas foetus* will aid in controlling and eliminating bovine trichomoniasis. Prevention of a 20% lesser calf crop in a 100 cow herd is estimated to save a producer up to $20,000 in annual losses. Contact: Chaoqun Yao (cyao@uwyo.edu)

Early Dietary Intervention in Overfed and Obese Ewes Provides Insight into Improving Human Offspring Health

Maternal obesity is increasing at an alarming rate in the US and throughout the world, and is associated with maternal health concerns, altered fetal growth and organ development, offspring obesity, insulin resistance, type 2 diabetes, and cardiovascular disease. This project has determined that early dietary intervention in pregnant, overfed and obese ewes results in a normalized trajectory of fetal growth and organ development and normalized maternal and fetal hormone patterns, followed by the birth of a normal healthy lamb. Intervention was begun at day 28 of sheep pregnancy which is equivalent to about day 50 in human pregnancy, the time when many women would seek medical confirmation that they are pregnant, and if necessary, could be placed on a dietary regimen by their doctor. These studies may provide the basis for development of clinically relevant dietary interventions in overweight/obese women during early pregnancy to assure the birth of a normal healthy baby. Contact: Stephen P. Ford (spford@uwyo.edu)

Identification and Characterization of Cellular Mechanisms that Impact Human Health

Understanding the underlying mechanisms that control health and disease is a central issue to society. This research has improved our understanding of the cellular functions of an important gene involved in tumor suppression. Part of these studies led to the identification of several genes that may serve as potent drug target candidates in cancer patients. Finding novel targets for cancer therapies could have a huge impact on public health. In particular, inactivation of the identified targets does not appear to cause side effects in our experimental system, unlike many chemotherapeutic targets that when inactivated by drugs lead to deleterious side effects in cancer patients.
Contact: David S. Fay (davidfay@uwyo.edu)