

Reproductive Biology Center Research Station Profile



Report to Stakeholders

May 2010

About the LSU AgCenter

The LSU AgCenter is dedicated to providing innovative research, information and education to improve people's lives. Working in a unique statewide network of parish extension offices, research stations and academic departments, the LSU AgCenter helps Louisiana citizens make the best use of natural resources, protect the environment, enhance agricultural enterprises and develop human and community resources.



Research Highlights

Assisted Reproductive Technologies (ART)

Through studies conducted at the LSU AgCenter's Reproductive Biology Center (RBC) we have shown that beef bull semen processed and frozen from the 1960s is still as viable and produces similar pregnancy rates in beef females as semen processed in 2003. We also found that differences in animal temperament prior to artificial insemination (AI) is not associated with AI pregnancy rates.

We are evaluating a procedure where lasers are used on lower quality cattle embryos that have been frozen, then thawed. This procedure helps the embryos "hatch" from their thick outer membrane so further development can take place in hopes of improving pregnancy rates after embryo transfer.

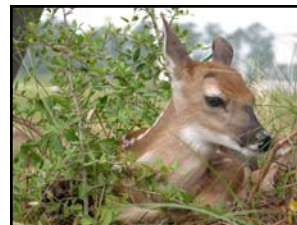
Studies on White-tail deer have shown that pregnancy rates following synchronization of estrus and AI average 55%. Also, this laboratory has shown that semen can be harvested from the testicles of hunter-killed bucks, frozen, stored and thawed at a later date to produce viable offspring. Using this approach will allow us to preserve superior genetics for future use.

Biotechnology

Somatic Cell Nuclear Transfer or Cloning is an important technique which has the potential of significantly impacting many aspects of animal production. Cloning can be used to enhance the propagation of superior animals and is the method of choice for the introduction of new genetic components into the genome of domestic animals. Scientists at the RBC are engaged in a number of experiments to improve the efficiency of this procedure in order to enhance its application in animal production and biomedical science. Pig and cattle somatic stem cells derived from fat have been isolated and culture conditions defined as an efficient source of cells from adult animals to be used as donor cells in the cloning procedure.

Basic Research

We are engaged in a number of studies to understand at a molecular level what determines the developmental competency of an oocyte and what factors determine how an embryo's genetic program is expressed during development. By understanding how fertilization and normal development is regulated we can develop procedures and management practices to reduce reproductive failure. Epigenetics is a process by which the expression of genes are controlled. Epigenetic modifications are passed on from one cell generation to the next. We are studying how these modifications can be altered in cells and embryos during development. The goal of this research is to determine methods to control these modifications such that embryos produced by Assisted Reproductive Techniques develop to term at a higher rate and yield healthier animals.



Reproductive Biology Center Research Station

Address: 5995 LSU Ag Road
St. Gabriel, LA 70776

Location: The Reproductive
Biology Center is located about
12 miles south of the LSU Baton
Rouge campus on Hwy 30.

Phone: 225-642-5474

Fax: 225-642-0048

Email:
ggentry@agcenter.lsu.edu

Web site:
LSUAgCenter.com/RBC

Office Hours:
7 a.m.-3:30 p.m.
Monday-Friday

Glen T. Gentry, Jr.
Research Station
Coordinator/Asst. Professor
ggentry@agcenter.lsu.edu

Size: 1,200 acres, including
1,000 acres of pasture and 200
acres of woodlands.

Research focus:
**Assisted Reproductive
Technologies (ART)**
—Develop and enhance ART for
use in exotic and farmed
animals
—Increase the efficiency of
cryopreservation of gametes
in exotic and farmed animals

Biotechnology
—Increase overall efficiency of
somatic cell nuclear transfer
—Production of transgenic
animals for use as models
for human disease
—Plasmid delivery systems are
utilized to increase
reproductive efficiency of
farmed animals

Basic Research
—Determine factors related to
oocyte competence in beef
cattle

Significance of Reproductive Research

- Produced calves from the oldest reported frozen bovine semen.
- Produced first quarter-embryo calves using embryo bisection.
- Produced first cloned pigs using embryo bisection.
- Produced first foals from live donor mares using intracytoplasmic sperm injection.
- Produced first cloned transgenic goats from nuclear transfer.
- Produced first calves from reconstruction of *in vitro* fertilized and parthenogenetic embryos.
- Produced first calf from a pregnant donor animal using *in vitro* fertilization.
- Produced first domestic cat from non-surgical embryo transfer.
- Produced first White-tail fawn from frozen-thawed White-tail buck epididymal sperm.

2009 Livestock Industry Facts

- Louisiana has more than 602,000 beef cattle and 203,000 horses.
- There are more than 11,500 beef producers and 49,000 horse owners in Louisiana.
- Total gross farm sales of beef cattle was \$329 million, and value added to beef cattle production was \$36 million in 2009, for a total economic contribution of \$365 million.
- The 4,438 race horse and competition horse industry breeders generate \$43 million in stud fees from 2,571 stallions.
- The overall economic impact of the horse industry in Louisiana is estimated at \$2.4 billion.

Data from the Louisiana Ag Summary
 Web: www.LSUAgCenter.com/agsummary

Louisiana Agricultural Experiment Station

Louisiana's unique combination of crops — ranging from corn, cotton, rice and sugarcane to extensive forestry, poultry, cattle and fisheries industries — presents challenges for providing research-based information to ensure sustainable agricultural production systems.

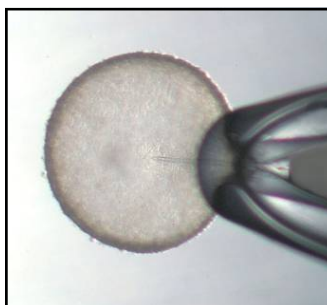
To address the needs of these industries, the Louisiana Agricultural Experiment Station operates 11 departments shared by the LSU AgCenter and the LSU College of Agriculture, as well as 20 research locations across the state. To fund the basic and applied research, scientists compete for federal and state grants and checkoff dollars provided by some farmers' groups, along with state and federal dollars. Many of the facilities also sustain their research operations through the sale of agricultural commodities produced on the stations.

The LSU AgCenter has the most successful record of commercialization of intellectual property in the LSU System. Since 2000, nine new companies have been started based on licensed technology from LSU AgCenter. The income is distributed among the LSU System, the inventors and more research.

The Reproductive Biology Center will continue to investigate techniques and methods to increase overall reproductive efficiency in domestic farmed livestock. Likewise, new experiments will be initiated to increase the efficiency of cloning for the production of transgenic animals to produce both medicinal proteins for use in human medicine and to identify genes in farmed livestock species to increase production.



The Reproductive Biology Center has instituted investigations into the use of plasmid-mediated delivery of endogenous animal protein hormones in an attempt increase production in farmed livestock species. Investigations into assisted reproductive technologies — such as synchronization, artificial insemination, *in vitro* fertilization, oocyte aspiration, multiple ovulations, embryo transfer, gamete cryopreservation and embryo cryopreservation — in farmed livestock and exotic animals will continue.



Artificial insemination trials using white-tail deer as animal models for more endangered species and collaborations with the Audubon Center for Research on Endangered Species will continue in our conservation efforts.

The Reproductive Biology Center has a very diverse research program that supports investigations from on-farm reproductive practices to basic research experiments into the mechanisms of reproduction and follow up with studies that bring the results from the basic research into applied production practices for the stakeholders of Louisiana.



For the latest research-based information on just about anything, visit our Web site: LSUAgCenter.com