



The Capacity building teaching grant and the Evans-Allen research grant allowed animal science labs to teach and conduct research in animal biotechnology making them competitive for advanced graduate and professional degree programs.

Training the next generation of animal biotechnologists

Who cares and why?

The Federation of Animal Science Societies (FASS) released a statement saying that by 2020 the global demand for meat will increase by 58 percent, milk consumption will increase from 568 to 700 million tons and egg consumption will increase by 30 percent. This increase in demand for foods is unlikely to be met by traditional technologies, including conventional animal breeding, which takes several years to transfer the desired traits. Recent progress in cell and molecular biology to introduce desired genomic modifications in single somatic cells, which can subsequently be transferred in livestock, has a great potential to enhance meat and milk production, as well as production of human therapeutic proteins in animal milk. This requires training of the next generation of scientists in these newer technologies to meet the increasing global demand for food and medicine in the future. This need prompted us to upgrade our laboratories to teach and conduct research in the area of animal biotechnology to train undergraduate and graduate students, and provide exposure to high school students.

What has the project done so far?

With the USDA teaching capacity building grant and the Evans-Allen research grant, we have upgraded our capacity by acquiring basic equipment including pipette sets, gel tanks, a real-time PCR machine and a fluorescent microscope. The new equipment is being used to teach and conduct research in animal biotechnology. Since the start of the project in September 2011, 61 undergraduate and graduate students have benefitted through hands-on labs, mini-research projects, and structured workshops. Of the 61 students, 13 including eight Master of Science graduates, have completed, or are completing their research projects in the area of animal biotechnology. Three students presented their research last year during the ARD conference, and one graduate student presented research at the 2014 annual meeting of the Society for In Vitro Biology in Savannah, GA. In addition, more than 50 high school students



Fig: Dr. Mahipal Singh along with technician X. Ma and graduate student Charles Okonkwo giving an animal biotechnology workshop to high school students.

attended half or full day animal biotechnology workshops. Laboratory exercises have been written as a part of lab class for ANSC-2813 and ANSC-6303 and are being taught to undergraduates in the fall and to graduates during spring semesters.

Research in our lab includes understanding basic biology of postmortem tissue survival; cryopreservation of animal tissues for future cloning of superior genetics, development of biological reagents and tools for genetic manipulation of small ruminants. We have developed methodologies to procure and preserve viable cells from postmortem animal tissues. These facilities for tissue and cell banking will soon be available to Georgia farmers. We have developed, characterized and successfully cryopreserved several goat and sheep fetal and adult fibroblast cell lines that will be used for genetic manipulation of goats and sheep in future research projects. The hands-on laboratory based education in animal science is important and will make minority students competitive for higher education opportunities in tomorrow's workforce.

Impact Statement

- Updated animal science labs have benefitted more than 60 undergraduate and graduate students in the last 3 years through hands-on labs, student research projects and structured workshops in animal biotechnology.
- A simple method of testing postmortem tissue/cell survival was developed. Using this method demonstrated that individual cells in tissues remain alive for several days than was previously thought.
- Several adult and fetal cell lines were developed from small ruminants and are being studied for genetic manipulation of goats and sheep.

What research is needed?

Embryo manipulation and understanding early developmental events is important to produce healthy babies. However, this area is not properly explored. There is a significant need to understand reprogramming of somatic cells by oocytes to produce viable and healthy embryos to revive superior genetics, to meet the future climatic and other challenges. Research and training of students in these technologies will not only open opportunities in animal agriculture, but also in human advanced reproductive technology clinics.

Want to know more?

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Additional Links: <http://www.umes.edu/ard/Default.aspx?id=46285>

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