

ABSTRACT:

The Oakley Sustainable Agriculture Center was donated to Tech several years ago. The Farm consists of almost 2,000 ac, and includes 600 brood cows, 150 developing heifers, and an assorted number of calves depending on the time of year. Unfortunately several years ago a large number of cattle were stolen by a former employee. Since then, efforts have been underway to “track” cattle more efficiently and to conduct more frequent inventories using electronic means, and to include “electronic boundaries.” Two additional objectives have arisen and with the aid of RFID ear tags. With RFID technology, a mineral feeder has been constructed to monitor cattle mineral consumption patterns as well as spray an insecticide for horn fly control. The spray system is connected to the US Weather Station to monitor wind speeds and rain conditions. The cows are sprayed with insecticide every 18 – 21 days based on the weather trends reported. Additionally, a creep feeder has been fitted with a “reader” and load cells to allow for easier monitoring of feed consumption in a creep feeder by individual calves. It monitors which calf is in the creep feeder and how much creep feed it is consuming. The economic availability of this inventory is still a problem as it is several generations of technology away. To combat this, the research group, in conjunction with the Biology Department, is adding drones to the arsenal of advanced technology to monitor livestock and wildlife movements and the births of new wildlife and calves on Oakley Farm. Drones seem to offer our best opportunity to develop an inventory system as we await the availability of electronic ear tags with a range of 1 mile or more. This technology is currently only available to military personnel.

The drones are capable of filming with high resolution cameras and infrared sensors to detect warm-blooded animals. The technology is sensitive enough to differentiate size differences between cows and calves, with the planned emphasis on scanning pastures automatically, and alerting when cows have had a calf so animals can be inventoried and routine treatments given to calves immediately after birth.

The Use of Drones to Support “Cattle Tracking” Activities to Monitor Livestock Movements and Wildlife Numbers

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Industry Support: Y-Tex Cattle Company, Wyoming; Tennessee Cattlemen's Association

STATEMENT OF THE PROBLEM:

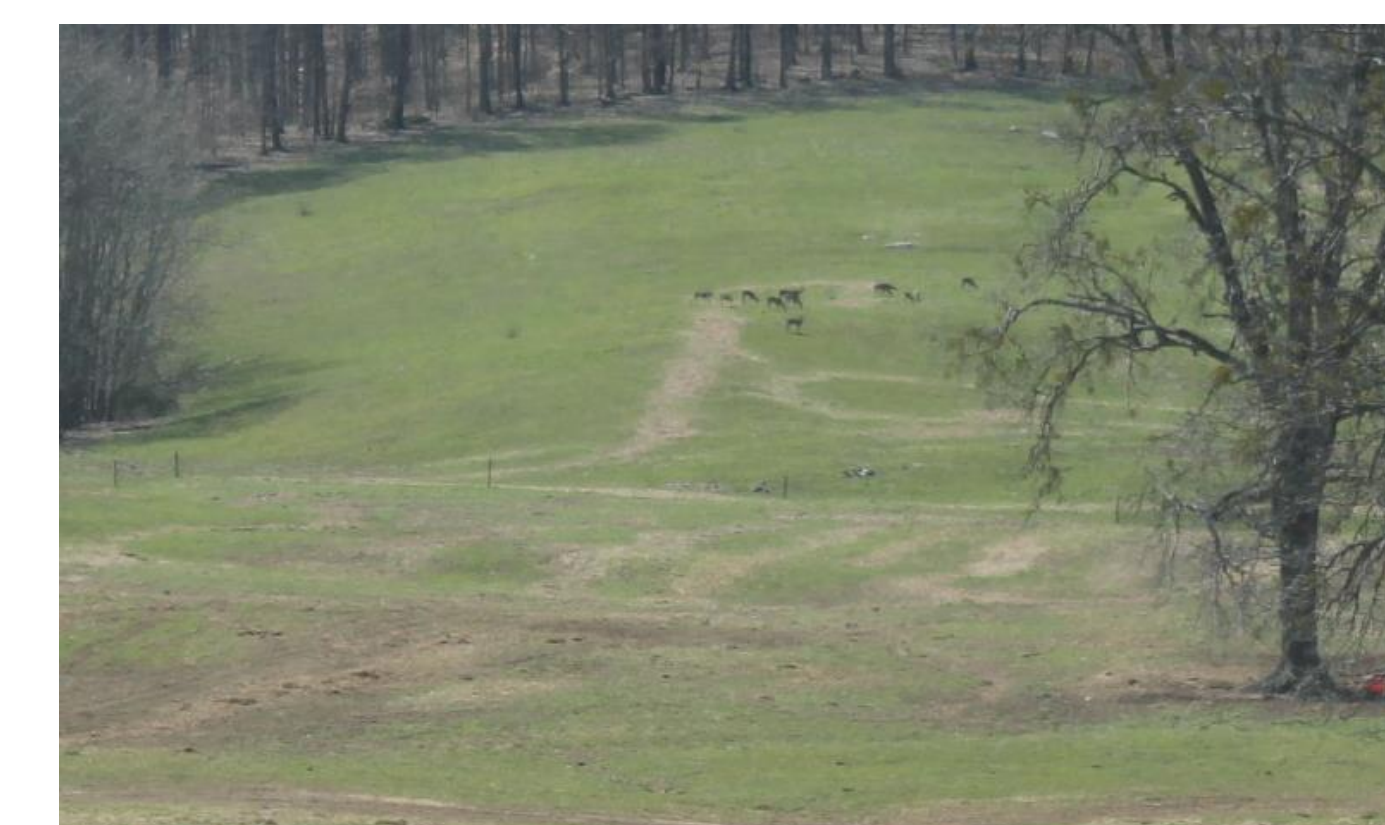
Cattle theft. Two years, 28 head of livestock were stolen from the Oakley Center over a several month period. The thief was apprehended, however, only 6 head of livestock were recovered,

1. About 20 years ago, USDA contemplated ordering all cattle to have “GPS-like” cattle tracking devices to be implanted likely in the form of a cattle ear tag, similar to the one seen below. However, the issue of costs and effectiveness has arisen. The typical beef producer may make a profit of \$100 per head annually on a beef calf; a GPS-like device would cost \$300 and upwards, making it impossible economically. Y-Tex Cattle Company surveyed the marketplace, and found prices would need to be held in the \$20 per head range for producers to find this technology feasible. USDA backed off their plans to mandate cattle tracking until better technology was available.
2. Y-Tex Cattle Company is the largest seller of cattle ear tags in the world, with a RFID ear tag and reader already commercially available. However, it can only “read” to a distance of about 100 cm.
3. Emerging technology exists to “read” an active tag to 5 km, where direct line-of-sight is possible by using a tower or a drone.
4. Currently in the US, there are about 350 million head of animals to keep track of. With tracking up to 5 km away, it is highly likely USDA will revisit their position on mandating cattle tracking, particularly with certain diseases, such as “Hoof and Mouth Disease,” and “Mad Cow Disease.”
5. Integrating drones into the existing “cattle tracking” efforts will allow for current technology to inventory cattle as desired, and to routinely check herds for cattle numbers and new calf numbers and to estimate types, numbers, and location of wildlife that are on the farm. Wildlife of interest that have currently been seen on the farm deer, turkey, wild hogs and bear.
6. As battery life of drones improves and new software products developed, the automatic checking of desired animals may become incorporated into the management program.



DEVELOPMENT PHASE:

Above, students ready drones to fly patterns over pastures where cattle reside. Below, a herd of 24 deer in that same pasture earlier in the day when cows were resting. Other pastures are monitored for problems caused by feral hogs, particularly in hay fields where these wild animals “root” up pastures, making hay equipment operation much more difficult.



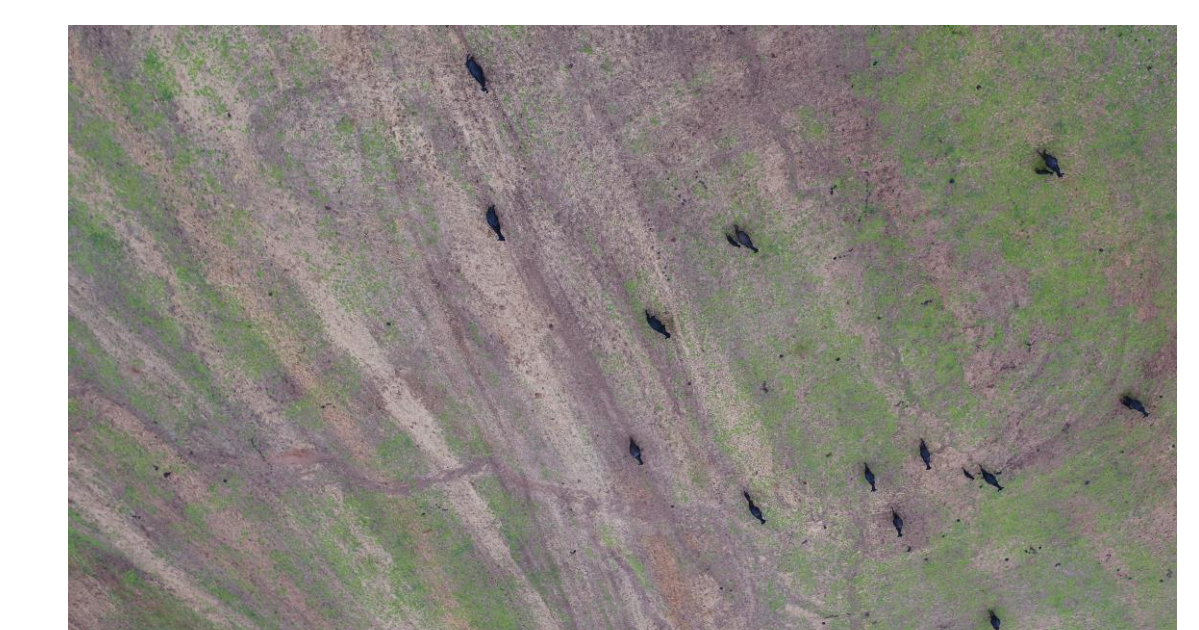
WHY TRACK CATTLE?

Our research effort will focus on “tracking cattle.” The issues include maintaining a simple inventory on a monthly basis, tracking when cattle access mineral feeders, tracking when calves access creep feeders and estimating individual intakes and applying management to cattle as identified by drone technology.



IMPLEMENTATION PHASE

The primary limitation is drone battery life. With a 2,000 ac farm to oversee, battery life must be dramatically improved for drones to fly their patterns.



PROJECT OUTLOOK:

Spring semester 2019 marked the 6th group of Tech students working on this project. There have been > 30 students work on this project. Newer technology is available that can “track” cattle up to 300 m, which allows improved management, particularly in estrus synchronization. Using Google Maps, we have established electronic borders, to identify when cattle are now on the property. The new range of 300 m is helpful in expanding this newer technology. This technology will help detect sick animals from a lack of movement, it can also detect insect/ predator issues with excessive and fast movement, and the night vision camera can be accessed anywhere the owner has internet service.