

In 2021, there were 1.8 million head of cattle in Tennessee (USDA NASS, 2021). Every county in Tennessee engages in beef cattle production with an economic value of \$488 million. There are also about 170 registered dairies in the state with an economic value of \$106 million (TN Farm Bureau, 2020). In 2015, almost 4 million cattle and calves in the U.S. were lost due to predator and non-predator causes, with deaths in one-third to one-half of all operations, resulting in \$3.87 billion in economic losses (USDA APHIS, 2017). Unmanned aerial vehicles (UAV), or drones, can be used to help farmers monitor cattle and calves in their operations to help reduce mortality and these economic losses. This fact sheet will discuss some of the current and future options.

General Use

A basic drone that can be useful in cattle operations is one that is easy to learn, fly, and maneuver and is mounted with a camera that can capture images and video. These should be equipped with a gyroscope so they will maintain their position in the air without any adjustments and have a battery life that is at least 20-30 minutes. One example is the DJI Mini 2 (Fig. 1) which is \$400-\$500, however, there are other manufacturers and models that likely fit this category. These drones can be used to check on animals in the field (especially during calving season), check fence rows and water sources, and reach areas that may be difficult to navigate on foot or by vehicle (Fig. 2). Monitoring animals using drones usually saves time. For example, one farmer found that a normal monitoring routine that usually took 2 hours could be done in 20 minutes instead (Daneshku, 2016). This can allow for more frequent monitoring that may help reduce animal mortality.



Fig. 1. The DJI Mini 2 is an example of a drone that can be used to do basic monitoring of cattle in the field.

New Uses

Currently, there is research being performed to enhance the use of drones in animal production. Below are some examples of how they may be used now or in the future. Some of these uses may require different types of drones, sensors, or other accessories.

Herding: Some researchers have simulated how drones can be used for herding purposes (Jung and Ariyur 2017). Farmers in Australia are using drones to help herd cattle (Justice, 2015) and others in New Zealand use a drone that emits a barking noise to herd sheep (AGDAILY, 2019).



Fig. 2. Basic monitoring with drones can allow farmers to check for cows in distress, fencerows, and food and water sources.

Identification: Researchers are also using drones and artificial intelligence to identify specific animals in the field to assist with counting cattle. One study achieved greater than 90% accuracy in identifying the correct number of cattle from drone images (Barbedo et al., 2020). Scientists at the University of Kentucky are working to identify specific cattle by facial recognition so they can be tracked over time (Piercy, 2020).

Health: Facial recognition technology, along with multiple images of a specific cow, can be used to monitor changes in volume and size of the animal (Fig. 3). Other researchers using drones to record temperature data from ear tags found they could collect this information at a 150 foot height and at a rate of 38 acres/hour (Webb et al., 2017). The amount of food consumed by cattle has also been related to feeding frequency estimates derived from drone video which can be helpful in monitoring cattle feeding behavior (Nyamuryekung'e et al., 2016).



Fig. 3. Multiple images taken by drones can be used to estimate changes in cattle size and volume.

Grazing: One group of researchers were able to measure pasture sward height by drone before and after grazing and had the same level of accuracy as manual traditional methods (Michez et al., 2019). Also, crude protein and ADF values have been measured by drone following different harvests and under different forages with similar accuracies to other in-field methods (Wijesingha et al., 2020).

As more research is done, there will be additional consumer options available for using drones to collect data and monitor animals in the field. This will help provide more opportunities to reduce animal mortalities, labor and other input costs to enhance time and financial savings on the farm.

For more information

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