

LESSON 1 INTRODUCTION – TRENDS AND TECHNOLOGIES IN FARMING

Learn commercial herd management.

Welcome! You've enrolled in this course because you want to be successful in cattle farming and production.

Understanding cattle as an animal which needs cared for and tended to, is only one part being a farmer. Rural land management, livestock health and husbandry, feeding and pasture management are all what make farming livestock a busy and rewarding career.



Small herd

DOMESTICATED CATTLE IN HUMAN HISTORY

Researchers have established that all domesticated cows today can be traced back to a single herd of just 80 head - from this small herd have come over 800 recognised cattle breeds, ranging in characteristics and purpose. Over thousands of years humans has selected and specifically bred cattle for different traits in order to have them perform a variety of roles.

Domestication meant that trade could take place, which helped to lay the foundation of an early economy for some civilisations. Draught animals were vital as a means of pulling sledges, carts and wagons for the transport of large loads. They may have helped in the transport of building materials such as stone and timber. There were also cattle used for ploughing the land for crops, this would have made farming more efficient. These animals would also have had to be strong and possess endurance to work for long periods.

Cattle were and still are considered sacred in many religions and played a sacrificial role in other religions and cultures. Cattle have been used in entertainment and sport in many cultures for many years. Bull fighting, where a man is pit against a bull and is killed in front of spectators, is still a popular sport in Spain, Portugal and Latin America.

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column.

Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.

Live animals could provide milk, transport, be utilised in farming, and post slaughter they provide meat, leather, horn and bone – which could be utilised for a variety purposes. Over the years humans have selectively bred them to bring out a one or more traits, to make certain cattle more efficient at one specific task, i.e., meat or dairy production. Though there are crossovers of uses for cattle and many popular dual or multi-purpose breeds exist.

COMMERCIAL HERDS TODAY

A commercial herd usually consists of two parts:

1. The breeding herd,
2. Stock for sale.

The breeding herd is needed to produce sale stock. Stock may be sold off as either:

- Weaners – Calves at 6-9 months of age.
- Yearlings – cattle 1½ years old or long weaners for growing and finishing off on another property.
- Two-and-a-half-year-olds - for slaughter, or as feeder that are finished off on another property.
- Two-Four-year-olds - for slaughter.

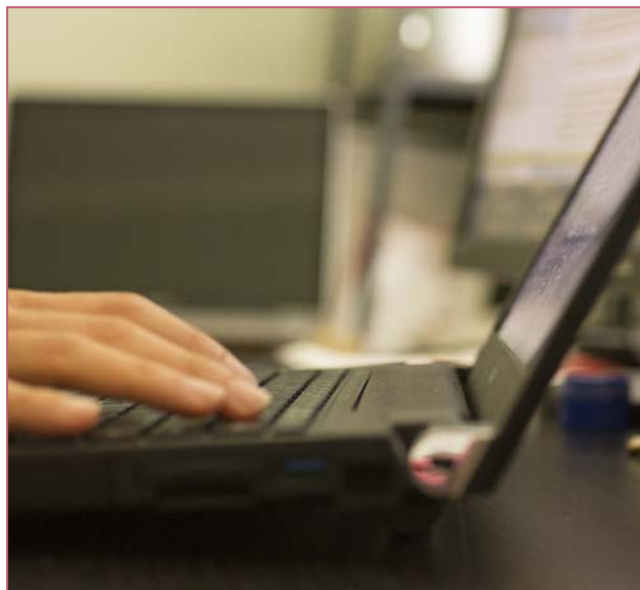
The system followed by an individual farm will depend on the following factors:

- The rainfall on that farm.
- The type of pasture on the property.

- The size of the property.
- The breed of cattle on the property.
- The calving percentage of the breeding herd (i.e., how many calves are born).

TECHNOLOGY IN AGRICULTURE

Technology is commonly used in agribusinesses. This includes the use of drones, sensors, and data analytics platforms. Over the next few decades, such technology will create change in the industry. Agriculture is going to go through a major transformation to become more sustainable and efficient – a necessary shift given increased demand from a population estimated to reach 9 billion by the end of the 21st century. Autonomous robots capable of herding cattle, harvesting fruit, and surveying crops will soon be a common feature in agribusinesses.



Like many other industries, Agriculture is becoming more reliant on Information Technology

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Suggested Task

Research what items can be made from cattle parts other than food items.

You may search online for information. Make a list with a pen and paper.

Consider how many items surprised you.

Spend 10-15 minutes on this task.

Using Drones in Cattle Farming

In the agricultural industry, drones may find application in the following key areas:

- Marketing and sales
- Surveying
- Asset management
- Monitoring Livestock

Drones can be manned or unmanned; UAVs are increasingly common, and their automated nature makes them desirable in terms of decreased labour costs.

Marketing and Sales

Agriculture includes marketing and sales at both a primary industry level and business to business level (selling on to wholesalers and retailers). As interest in the provenance of food grows, particularly in the case of organic food, videography, and photography of produce is a useful marketing tool.

Combined with a camera, drones can capture imagery which in the past was only obtainable through aerial photography. This imagery can be presented to wholesalers as part of brand building and engagement, but also to show effectiveness of farming practices and production, and what the wholesaler can expect in terms of product. Drone footage is also an excellent way to help wholesalers grasp the scale of an operation.

Wholesale purchasers who then go on to sell the produce (e.g., supermarkets) may later use footage from the grower as part of their advertising to help sell product, e.g., using aerial views.

Surveying

The importance of mapping and surveying the land used in agriculture cannot be overstated. Accurate assessments of land can facilitate better irrigation, maximal use of available land and more efficient livestock management.

The type of drone used will depend on the area to be mapped but often smaller areas will be surveyed with a multi-rotor drone and the larger areas with a fixed wing or hybrid drone. The principal payloads of use are LIDAR and HD cameras. The LIDAR technology facilitates very accurate topographical surveys which are ideal for producing elevation maps and the cameras are excellent for identifying boundaries and areas which may have been damaged, such as in a storm. Using the data gathered can also allow the creation of detailed 3D models which allow the user to visualise areas prone to over/under saturation, or the best areas to graze livestock.

Monitoring Livestock

Livestock can be dispersed over wide areas and are subject to weather, predators, illness, theft, and hunger. The ability to monitor the location of the animals along with their health and surrounding conditions can mean great savings in time and money to a farmer or rancher.

The suitability of particular areas for grazing or drinking can be identified with cameras and multispectral sensors attached to a drone. Damage to fences, predators and trespassers can all be identified with cameras and infrared sensors. Monitoring health in the livestock can also be performed with

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Suggested Task

Research all types cattle farms in your area.

- How many farms are there?
- How far is it from an urban centre?
- How long has it been established?
- What breed is on the farm?
- Is it a beef farm or dairy farm?

The aim of this activity is to familiarise yourself with cattle farming and the production of cattle in your area.

Spend 15-20 minutes on this research.

From any prior knowledge you have, make some notes on what you think are the major differences between beef and dairy food production systems in your region.

Spend 15 minutes thinking about how the production systems differ in cattle farming. If you don't know anything about this, you might do some simple online searches trying to make comparisons between these food production systems.

cameras and multispectral sensors. Perhaps the biggest benefit of drone use is in identifying the location of livestock both day to day and when they are lost without having to investigate large areas from the ground. This would often be carried out by camera feed but when coupled with the use of some kind of locator that is GPS enabled it can save huge amounts of time and resources which can be better deployed elsewhere.



Young cattle and cows

The monitoring of livestock is a big growth area in agricultural drone technology, in particular in tracking cattle. They are large expensive animals left on their own over sometimes quite vast areas so the ability to keep an eye on them remotely is of great benefit. Alongside the technologies listed, researchers at the University of Kentucky are developing a facial recognition algorithm for bovine features. The hope is that eventually a drone will

be able to fly out and tally the location and condition of a herd by recognising the features of each individual animal.

Asset Management

Equipment and other assets are a very expensive part of any agricultural operation. Drones are a useful tool for security and surveillance – they allow for monitoring assets and help growers ensure all equipment is safely secured at the end of the day and run surveillance overnight. Manned drones are particularly useful for this as the operator can respond in real-time if intruders are sighted, which can reduce or prevent theft or damage before it occurs. However, unmanned drones may be more cost effective for agricultural operations, particularly if they are equipped to call emergency services if there is a security breach.

Drones are also useful for ensuring assets such as greenhouse systems, irrigation systems and perimeter fences remain intact, and for regular safety and maintenance inspections of equipment. Some types of equipment, like grain silos, can be difficult to inspect completely due to size and height; drones can make this easier and more cost effective.

For these kinds of applications, a drone with a camera and multispectral sensor would be able to identify areas of variance which require attention. It would be of particular benefit in saving time and money in tracking problems with heating or irrigation systems as the problem areas will be much easier to see in a multispectral image than is likely to be the case tracking a problem on the ground.

Types of Aircraft

The number of aircraft options is steadily growing along with the rising interest in drones. Manufacturers are increasingly focussing on this emerging technology, resulting in a continuous advancement in aircraft systems and a reduction in cost. The main challenges in aircraft development are currently the payload capacity and flying time (battery life).

Fixed Wing Drones

Fixed wing drones are useful if covering a lot of ground, e.g., for surveying quickly or applying pesticides for example. Some UAVs can use gas engines as a power source, giving them a remarkably long airtime.

However, fixed wing drones cannot hover, which can cause problems with photography and image quality, which means these UAVs will produce lower grade images and topographic detail. It can also be harder to launch and land this type of drone. That said, fixed wing UAVs are useful for monitoring general crop health and for irrigation analysis and can still be used to collect significant data.

VTOL Drones

Vertical take-off and landing drones (VTOL drones) are useful for image analysis and crop spraying, but the flight time is shorter than that of fixed wing craft. This means that VTOL drones are better suited to smaller areas or for specialist uses. However, hybrid fixed-wing drones are in development – these will combine the best of both types of drones and be suitable for a wide variety of applications.

Multicopter Drones

This type of drone has low battery life, making them unrealistic for most agricultural applications. However, multicopter drones are a good introduction to working with drones for a low cost and can be useful for learning how to use a drone.

Rotary Drones

These helicopter-style drones are a useful bridge between other types of drones. They are not as stable as multicopter drones but have a longer battery life; they cannot range as far as fixed wing drones but can cover a significant amount of ground. They can carry large payloads and have the ability to hover, which makes them ideal for detailed photography, aerial, and scanning work. That said, this type of drone is on the higher end of the investment scale, which means it may be out of reach for smaller scale operations. As drone technology becomes cheaper, drone procurement as a service (DaaS) may become more common, particularly for agricultural operations who may not need drone technology year-round.



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Suggested Task

Go online to research or talk with someone you know who owns a drone. What can you find out about drones used in agri-enterprise?

Research their value and durability as tools being used on farms. Make some notes on what you find.

Spend 10-20 minutes on this task.