

AGRICULTURAL SCIENCE STUDY GUIDE

Week 12



Farming technology

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Animal physiology and the benefits of modern technology

Throughout the history of farming, advances in technology have resulted in improvements in productivity and efficiency on the farm

In this article, we will focus our attention on how our increased knowledge of animal physiology has resulted in modern technology that can benefit both the farmer and the animal.

Artificial insemination

Artificial insemination (AI) is one of the most significant developments in technology available on the farm. AI has allowed farmers to have more control over the desired characteristics they wish to promote on their farms. The bulls are both performance- and progeny-tested to ensure that they have good genes to pass on to their offspring.

The economic breeding index (EBI) is used to help farmers identify the most profitable animals for breeding in their herd. The EBI focuses on traits such as as:

- ☞ Production:
 - Milk.
 - Fat.
 - Protein.
- ☞ Fertility:
 - Calving interval.
 - Survival.
- ☞ Calving:
 - Direct calving difficulty.
 - Maternal calving difficulty.
 - Gestation length.
 - Calf mortality.
- ☞ Beef:
 - Cull cow weight.
 - Carcase weight.
 - Carcase conformation.
 - Carcase fat.
- ☞ Maintenance:
 - Cull cow weight.
- ☞ Management:
 - Milking time.
 - Milking temperament.
- ☞ Health:
 - Lameness.
 - SCC.
 - Mastitis.

A single ejaculation could be used to service between 50 and 500 cows. Once collected, the sperm is stored in liquid nitrogen in long, thin plastic vials called straws at -190°C . When the female is thought to be in heat, the straws are thawed and guided through the vagina to the cervix where the semen is released. Once the semen is released, the sperm will swim to find the egg and fertilise it.

AI is not just a technology that is used with cattle, it can be used with sheep, pigs, horses, etc.

Scanning of pregnant animals

Ultrasound scanning of animals is used to check if they are pregnant and, if so, with how many offspring. This helps the farmer with the efficient management of his animals and the food which they are fed. Ultrasound scanning can be used on all farm animals but we will focus here on how it benefits the sheep farmer.



Scanning can be used to identify any ewes that are not in lamb.

Sheep reproductive cycle

- ☞ Sheep are seasonally polyoestrous short day breeders.
- ☞ During the breeding season, their oestrous cycle lasts 17 days.
- ☞ The gestation period is five months (147 days) on average.

After the ram has serviced the ewe or AI has been used, the farmer must wait and see if the ewe is "in lamb". This is when the scanner can be of great benefit to the farmer.

- Scanning has a number of benefits:
 - ☞ It can be used to identify any ewes that are not in lamb.
 - ☞ It can help the farmer to determine the number of lambs that are to be expected



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in the coming season.

☞ It can inform the farmer of the animals that are expecting single lambs, twins or triplets. With this information, the farmer can manage the feeding requirements of the ewes more efficiently.

The number of days after removal of the ram will determine what information the scan will tell you, eg scanning for pregnancy status at days 35 to 40 and scanning for singles or multiples from days 75 to 100.

Scanners are also used by some farmers to scan their lambs and predict their:

- ☞ Carcase conformation.
 - ☞ Fat levels.
 - ☞ Kill-out percentage.
 - ☞ The mature weight of an animal if being considered as a replacement.
- The lambs are scanned when they are about five months of age and over 40kg. The scan will collect three main pieces of data about each lamb:
- ☞ Liveweight.
 - ☞ Muscle depth.
 - ☞ Fat depth.

Calving sensors

Calving season can be an exhausting time for a farmer, having to regularly check on the cows and sometimes assist in a birth during the day and throughout the night. In-shed CCTV cameras have made the nighttime monitoring of the cows more convenient and, in recent years, there have been further technological advances that aim to further assist the farmer to monitor the expectant cows. These new devices involve placing sensors either on or in the cow.

The devices monitor the cows and detect the first signs of labour. The device that is inserted into the cow's vagina is expelled when the cow's waters break. When expelled, it sends a message to the

farmer's phone giving the information that labour has begun.

Another type of indicator is placed on the cow's tail. It measures the tail movements and can detect how these tail movements are altered when a cow is experiencing a contraction. As the contractions get more intense and the tail patterns change accordingly, a message is sent to the farmer's phone to indicate that the calf should be born soon.

Robotic milking machines

The dairy farmer's day focuses on the fact that his or her cattle need to be milked twice a day in order to ensure that their udders are comfortable and not straining and painful due to being too full.

With the automatic milking machines, the cows can be milked whenever they want to be. The cows come into the sheds themselves and can enter the milking machine without the help of the farmer.

Not only does the machine milk the cows, but it also has the ability to monitor:

- ☞ The volume of milk.
- ☞ Quality of their milk.
- ☞ Give vital feedback as to the performance of each cow.
- ☞ Monitor the cow's health.

The identification collar the cow wears can monitor the cows chewing rate and lactose measurements. Both of these can indicate if the cow is getting sick. Hormone samples may also be taken which can indicate when the cow may be coming into heat.

In summary, the advancements in modern technology in relation to farming are moving ahead in leaps and bounds. These advancements have greatly aided the farmer in managing the farm and improved the health and welfare of the animals. It will be exciting to see where modern technology will take farming next.

“Calving season can be an exhausting time for a farmer but CCTV cameras in sheds have made monitoring of the cows easier