

Leaving Certificate 2017

(School Name)

Agricultural Science Practical Assessment

Name:

Exam Number:

Name of Farmer:

Address:

Livestock: Dairy Cattle

Crop 1: Grassland

Crop 2: Barley

(Picture of you on farm)

Chapter 1 – General Information on the farm

Farm details

Farmer's Name:

Address:

Type of Enterprise: Dairy Cattle/Tillage

Total acreage of farm: 500

Acreage owned: 300

Acreage rented: 200

Arable acreage under tillage: 200

Arable acreage under grass: 300

Wasteland: Less than 1%

Scrub: 5%

Farm layout

The farm is situated just off the R683, regional road, which connects Waterford City to the village of Passage East. It is situated south of Kennel Lane and north of Kill St Nicholas.





This is a hunting bird that is kept on the farm as a tradition.



This is the farmer's dog.

Fencing

- High tensile wire fencing

High tensile wire fencing is used throughout the farm. Four strands of strong wires run horizontally through insulators that are attached to fence posts. This type of fencing was chosen as it is suitable for cattle (the livestock on the farm), it is long lasting and it is easy to install. Regular monitoring of the fence is carried out to ensure that it is kept in good working condition.



High tensile wire fencing on the farm.



Galvanised gates on the farm.

Water supply

- Well
- Mains

The farm's water supply comes from a well and the mains are used as a backup should the well break down.

Drainage systems

- Mole drainage

A mole drainage is the drainage system used on the farm. A mole plow is used to make an underground channel to drain the heavy soils on the farm.



Mole Drainage on the farm.

Topography of the land

- Flat & sloping

The farm's land is a mixture of flat and sloping. The sloping land is used for grazing for cattle and the flat land is used for the growing of crops ie barley. The flat land is used for growing crops as it is easier to use the machinery on the flat land rather the sloping land.

Aspect

- The farm is north facing. This affects the soil temperature. North facing slopes are colder than south facing slopes which results in colder soils.

Natural shelter belts (hedgerows)

- Hedgerows

Hedgerows run around the perimeter of the farm distinguishing the farmer's land and fields from neighbouring properties. These natural shelter belts help to keep the farmer's livestock in and other neighbouring livestock out.



Hedgerow on the farm.

Gates

- Galvanized gates

10-16ft galvanized gates are used.



Galvanised gates on the farm.

Power source

- Mains

The farm's power source is the mains (32 KVA).

Farm Buildings

List of buildings on the farm:

- Slatted units
- Dry area
- Workshop
- Machinery store
- Grain store
- Milking parlour
- Stables

Slatted units

This type of building was chosen as it can accommodate both the cows and their waste. The cows are grouped according to age, body condition and calving date. The slatted units on the farm have a feeding area and lying down area. Although this type of housing was expensive to build the farmer finds it to be less labour intensive than cubicle housing in which the dung passageway needs to be cleared every day. Teagasc recommends that each dairy cow have 2.5-3 metres squared per cow.

The leaflet included shows Teagasc's drawing and plans of various building that comply with the Department of Agriculture and Food specifications and Health and Safety procedures and requirements. The farmer used the plans for BH4 as shown in the drawings.

Machinery store

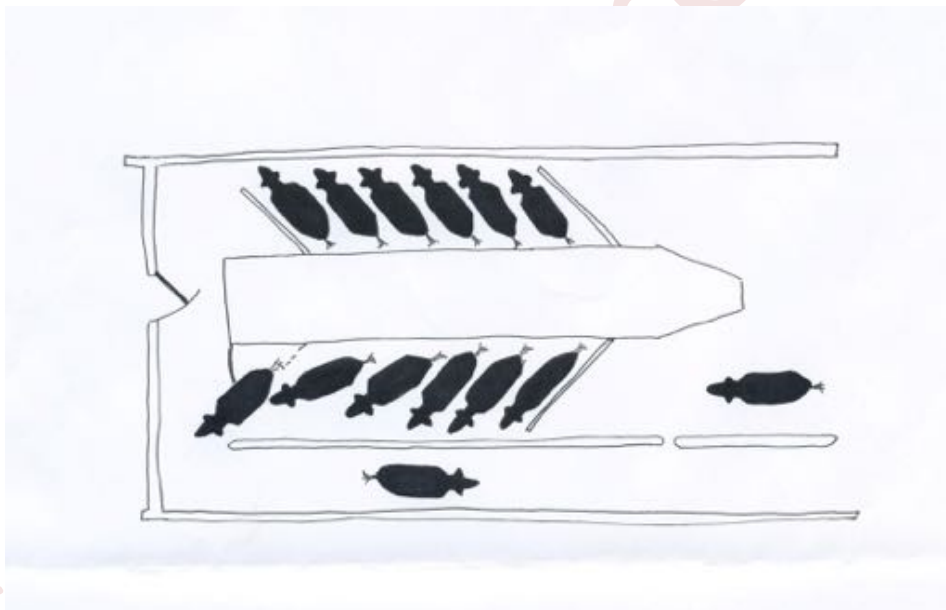
The machinery is stored in a open plan shed.

Grain store

There is a loose grain store on the farm. There are no grain drying facilities as all grain is bought in.

Milking parlour

The parlour on the farm is a herringbone parlour. The parlour is laid out so that there is a holding area at the end near the farmyard. Cows enter at that end and line up as shown below. There is a centre aisle where the farmer can observe at milking and then the cows are directed out.



A diagram of the herringbone system that is used on the farm.

Stables

There are two stables located in the farmyard. Although there is no need for working horses on the farm, horses are still kept as a part of the farm tradition and also for leisure.



The stables.

Animal housing on the farm

The type of housing used for the cattle is slatted units. Some of the houses are new and some are old with the majority being built in 1998. They are permanent, purpose built animal houses. If new houses were to be built the farmer would like more cubicles and slats and less dry area. The cattle are housed from mid-November until mid-March. The calves are kept separate from the cows and are grouped with other calves of similar age. The houses are well ventilated and draught free in order to prevent pneumonia in calves. An excellent standard of hygiene is maintained in order to prevent scour. This involves feeders and troughs being thoroughly scrubbed, cleaned and disinfected once a month. Weanlings are housed indoors for winters when they are roughly nine months old.



The cattle sheds on the farm

Cattle handling facilities

The cattle handling facilities on the farm are crush areas, two permanent and one mobile and a drafting area. A crush area holds the cow in a stall safely when they are being examined, branded or being given treatment. A closely fitted crush ensures the animal stand still for the safety of the animal and the people around. A well designed drafting area allows the farmer to separate the cows from one another should he need to.



Cattle handling area.



The cattle crush on the farm.



The cattle holding yard at the back of the milking parlour.

Storage

For crop storage there is a loose floor area. Both a silage pit and baled silage are used on the farm but mainly baled. The silage pit is located close to the slatted unit for ease of use, and the run off from the pit goes into the slatted tank. Hay and straw is stored in a loose store. Machinery is stored in a open plan shed.

Grain

There is a grain store but there are no grain drying facilities as all grain is bought in.

Machinery

The machinery used is a reversible plough, a subsoiler, a seed drill, a fertiliser spreader, a combine harvester, a mower, a rake, a baler, and a diet feeder.

Reversible plough

The plough is used to turn over the top layer of soil in the fields. This is done so that the nutrients are brought to the surface which allows for the plant uptake of them. The soil aeration is also improved. The plough on the farm is a reversible plough which means there are two ploughs mounted together and only one is used at a time.

Subsoiler

The farmer subsoils before ploughing. He does this to break up any hard pans or iron pans therefore improving drainage and aeration of the soils.

Seed drill

The farmer uses a seed drill for seed establishment. He uses the seed drill to sow seeds as he can place fertiliser along with the seed.

Fertiliser spreader

The farmer uses a fertiliser spreader to spread fertiliser on the established crop. The fertiliser is spread in granulated form.

Combine harvester

The farmer uses a combine harvester to harvest the barley grown on the farm. The combine harvester is used instead of a regular harvester as it combines the three practices of reaping (cutting the stalks of the grain), Threshing (loosening the grain seeds from the straw and chaff), and winnowing (separating the seeds from the straw and chaff) into one continuous action.

Mower

The mower is used to cut grass for preservation as silage for winter feed.

Rake

The rake is used to create rows of grass ready for baling as silage.

Baler

The baler creates round bales of silage. The baler on the farm bales and wraps in one operation.

Diet feeder

The farmer uses a diet feeder so that he can achieve a uniform mixture of silage and concentrates. The ration is mixed and dispensed evenly.







Chapter 2 – Livestock

Name of Farmer:

Address of Farmer:

Type of enterprise: Dairy

Time of year for calving: Spring

Number of cows on farm: 130

Number of calves produced per year: 125

Breeds

- Jersey x Holstein Friesian

Jersey X Holstein Friesian is the breed of cattle used on the farm. This breed was chosen because it makes use of hybrid vigour/heterosis (A crossbred maintaining the best characteristics of both breeds). Profit is higher than a purebred jersey or holstein friesian as although this crossbred produces a reduced milk yield, milk solids are increased therefore increasing profit per lactation. This crossbreed has an increase in production efficiency due to higher grass intake relative to its size. The average milk yield per cow per year is 5272kg.



The Cattle



The cows.



The cows.



The cows.



A cow and her calf.

Stock bulls

- 4 stock bulls
- AI

Four stock bulls are kept on the farm, 2 holstein friesians, 1 jersey and 1 aberdeen angus for mating with replacement heifers. These stock bulls are kept on the farm in an attempt to keep a closed herd so that there is less risk of disease. However some AI is used as it is more cost effective. All AI that is bought in is checked to ensure it is disease free. AI is used for cows that are not successfully mated on the first try.



Stock bulls.

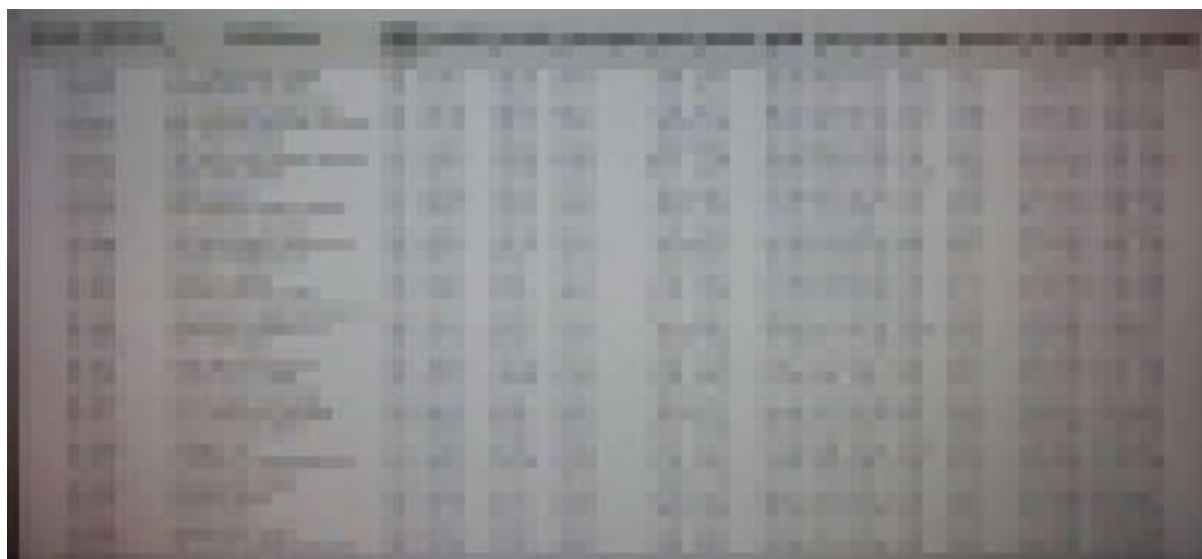


Stock bulls.

Replacement heifers

- 20% a year

Each year 20% of calves are kept for replacement, and these calves are chosen mainly dependent on their EBI. The EBI is the Economic Breeding Index, it is designed to produce profitable genetics through cows that go back in calf quickly; therefore lasting longer and giving greater lifetime production.

A photograph of a printed table, which is a section from the EBI (economic breeding index). The table has multiple columns and rows of text, but the content is too blurry to read accurately. It appears to be a standard data table with several columns.

A section from the EBI (economic breeding index).

Replacement heifers are bred and raised on the farm in order to maintain a closed herd and prevent the entrance of disease. Heifers are mated at 15 months once they reach 60% of their mature body weight. At this stage they should be weighing 295kg and have a BCS of 3.25 to ensure the heifer is cycling (coming into oestrus). AI is used on all replacement heifers and they are mated with high EBI sires. The sires used are Aberdeen Angus to ensure easy calving.

Management

Culling

Animals would be culled from the herd should there be a breakout of TB or any other notifiable disease. Cows are culled if they are repeating (coming into oestrous repeatedly after mating) or should their health not be up to scratch eg mastitis, bad feet, bad teat, lameness etc

Breeding

- AI
- Stock bulls

When AI is used Dovea or Geno Ireland are the companies used. The bull chosen must be disease free. Four stock bulls are also used on the farm and they are put out on good

pasture a month before the mating season. Tail painting is used to tell when the cow has been serviced.

Calving

- Indoor calving

Calving takes place on straw in one of the ten calving pens which are located close to the slatted units. The vet he uses should he need assistance when a cow is calving is CCW (Carrick Crangily). The calving facilities should be kept clean, well-bedded, have good lighting, have a supply of fresh water and be equipped with a self-locking restraining gate. Calving pens should never be used to house sick cattle. Straight after birth the cows naval is sprayed with iodine, its airways are cleared, it is fed colostrum and it is tagged. The cow is also checked for a second calf. The calf is then weaned at 6-8 weeks.

Calf rearing

- Reared until slaughter
- Weaned at 3 months

Calves that are not being used as replacement heifers are reared until slaughter. Calves are started off on colostrum then are fed nuts and then grass with them being weaned off milk fully at 3 months or 100-110 LWG (live weight gain, where for every 100-110kg of food consumed the cow produces 1 litre of milk). They are then moved out to grass, weather dependent. The paddock for the calves is chosen based on shelter and good grass. IBR (Infectious Bovine Rhinotracheitis) is a disease that has been encountered with the calves on the farm. Although it can affect older cows it mainly affected the calves. It is a highly contagious, infectious respiratory disease. Any calves that tested positive were culled and it is now being prevented with an injection programme. It was brought into the farm by a bought in replacement heifer and due to the the farmer now maintains a closed herd by breeding from within his own herd. Calves are all vaccinated 2-3 weeks before weaning.



The calves.





A calf.



A calf.



Calves.

Milking parlour

- Herringbone

The type of milking parlour used is a Herringbone and is located in the centre of the farm for easy access. 20 cows can be milked at once with the whole procedure taking 2 hours including clean up. The parlour is 5 years old and has automatic cluster removers and so only takes 1 person to carry out the milking process which takes place at 6:30am and 5:30pm. The advantage of a almost 12 hour milking interval is that there is an increased milk yield. Frequently milking the cow encourages the milk-secreting cells (alveoli) to work to their full capacity. 12 hours is the optimum milking interval for dairy cows. Drafting and crush facilities are both located beside the parlour and the drafting area is used for AI and hoof care. Glanbia collects the milk every second day and they carry out butterfat, protein, cell count and bacteria tests on the milk. The cows are dried off starting mid-November for 6 weeks to build condition score for calving. In the draft area during the drying off period a dry cow treatment is given to the cows. It contains a long-lasting antibiotic that treats and prevents bacterial infection in the udder. This is done so that mastitis can be prevented



The milking parlour.



The milking parlour.



The milking parlour.



The milking parlour.



Milking equipment.

Teat Dipping

Cows are teat dipped at the end of each milking session. The cow's teats are dipped in a teat disinfectant which helps to prevent mastitis.



Teat dipping.

Housing

Slatted sheds are used. Before housing all cows are vaccinated for flu and worms. While being housed indoors the cows are fed silage and a course ration.



Vaccinations.



Injections.

Rations

The farmer has comprised a diet that includes all of the following nutrients which are essential in the diet of cows

- Carbohydrates (for energy and fibre)
- Protein (for growth and repair of cells, energy)
- Fat (for insulation and energy)
- Vitamins (for control of many metabolic processes)
- Minerals (for bone and teeth building, energy production, milk production)
- Water (aids in temperature regulation, lactation and other metabolic processes)



The rations.

The cows graze out during summer and during winter they are fed indoors on a diet which consists of bulky feeds and concentrates. The farmer feeds silage as it is high in fibre. The fibre helps to develop the rumen in the calves and helps in the functioning of the rumen in older animals.



Silage.

Body Condition Scoring

The farmer checks the BCS of the cattle every 6 weeks. He does this to ensure they have a BCS of 3.5 at calving.



Body condition scoring.

The cows are checked around the tail head for a fat pack. The cow shown above had a fat pack that can be clearly felt. This indicates a BCS of 3.5



Body condition scoring.

The cow above has only a thin layer of fat around the tail head. This indicates a BCS of 2.5



Body condition scoring.

The cows are also visually assessed at the round. A “u” shape as seen above indicates a BCS of 3.5



Body condition scoring.

A shape that is more like a “v” as shown above, indicates a BCS of 2.5



Body condition scoring.



Body condition scoring.



Body condition scoring.



Body condition scoring.



Cow with a BCS of 2.5.



Cow with a BCS of 3.5.

Chapter 3 – Crop 1 – Grassland

Name of Farmer:

Address of Farmer:

No. of acres: 300

Varieties

- PRG
- Clover

PRG was chosen as the grass species for the grassland. It was chosen because the soils on the farm are well-drained and have a pH of greater than 6.0. It was chosen for its high palatability, productivity and digestibility. It was also chosen as it has a long growing season which means there is reduced costs for winter feed. The brand the farmer uses is Aber Magic. He chose this brand as it has a late flowering date and its exceptional quality. It was first sown in 2008 in one field and now due to its success it is sown throughout the whole farm.

Clover is also present in the sward. White clover was sown with the PRG because it fixes nitrogen so the farmer found there was less need for artificial fertiliser which in turn reduced his costs.



Management

Rotation

- All grass is rotationally strip grazed.
- 10 percent of the grassland is reseeded per year
- 20-30 acres are reseeded at a time
- A blend of seed mixtures is used (Abergain)
- The farmer reseeds in an attempt to keep away weed grasses

Strip Grazing

The farm has 4 paddocks each divided into 7 strips. It is designed like this so that the cattle will return to the first strip they grazed 4 weeks after they first grazed it. The cattle graze each strip for 24 hours. The farmer uses an electric fence to separate the strips and has a

moveable water trough which needs to be moved each day as the cattle move. Although the farmer finds this type of grazing very labour intensive, there is no waste of grass and there is fresh grass available to the cows each day.

Reseeding

10% of the land under grass is reseeded each year which works out to be between 20-30 acres of grassland being reseeded at a time. The farmer has found that this is the optimum amount of land to be reseeded each year as he can add clover to the pasture therefore increasing the level of productivity, palatability and digestibility.

Reasons For Reseeding

- To reduce weed infestation by the addition of clover
- Increased stocking density
- Improves the grass quality
- Extra grass can be cut for silage which brings in extra income

Seed Mixtures For Reseeding

All grass is reseeded with an AberGain seed mixture due to its extremely high digestibility and palatability. This seed mixture uses PRG and white clover.

Cultivation practices

- Stitching in

Stitching in

Seed is sown into old grassland. The farmer reseeds in spring as grass growth is not at its highest rate. Nitrogen fertiliser is sown with the seed to encourage establishment.

Benefits of stitching in

- No need to plough the land
- Land does not have to be taken out of use
- If the new seed fails to establish itself, the old sward will still grow

Seed Establishment

- Fertiliser use
- Weed Control

Fertiliser use

- CAN 10-10-20

300 acres of the farmland is used for grazing. Soil tests are carried out every 5 years. Lime is applied to the land where needed and the farmer uses 5 bags of CAN 10-10-20 where needed. Slurry and farmyard manure are also applied.

Weed control

- Thistles
- Docks

Most common weeds are thistles and dock. These are shown on the page included.

Harvesting

5 Acres is saved as hay and it is harvested in July. All hay harvested is kept for feed, and the average bales per acre is 8









Conservation

The grass is conserved as silage for winter feed for the cattle.

Ther fermentation of carbohydrates in the grass produces acids that lower the pH of the grass and inhibit all microbial activity. Properly fermented and preserved silage can be stored for a few years, although on this farm it is used in the winter as animal feed.

Chapter 4 – Crop 2 - Barley

Farmer Name:

Address of Farmer:

No. of acres: 200

Varieties/End Use

- Spring barley
- Feeding barley

Feeding barley is produced on the farm for animal feed, and the straw is used for animal bedding. Saffron is the variety of barley used on the farm. All barley is spring barley. This variety was chosen because of its' disease resistance and yield.



Why Did The Farmer Choose Barley

The farmer chose barley because he found that it is suited to the cool, wet Irish climate well. He also decided to grow barley as it is higher in protein and fibre and is therefore more valuable to him as an animal feed.

General Management

- Sown in February
- Harvested from August onwards

As the barley is spring barley it is sown in February as it is not frost resistant. There is a lower yield due to a shorter growing season. Spring barley was chosen as the end purpose is feeding barley.

Certified seed is used on the farm as the germination rate is guaranteed and this means there will be a higher yield. Certified seed must pass identity and purity tests to ensure they have a minimum germination rate of 85%, they must have undergone treatment with fungicide/pesticide and they must be completely free from wild oat seed. This all ensures a higher yield can be guaranteed.

Cultivation

- Soils/climate
- Seed bed preparation/sowing
- Fertilisers
- Weed control
- Harvest/storage

The soil on the farm is a brown earth soil and this is suited to the growing of feeding barley. The general pH of the soil is between 6 and 6.5. This is checked every five years and lime is added to raise the pH as needed. As there is a lot of rain in Ireland, spring barley is suited to the climate as the barley needs to be harvested in dry conditions and the farmer harvests the spring barley around August each year. The climate in the south east is suited to barley growing due to the fact that barley needs moisture to grow and this is why the farmer chose to grow barley on the farm over another crop.

The land is ploughed in autumn and then it is harrowed. The land is then rolled (after sowing the seed) to help with seed-soil contact. The barley is sown in February each year. The farmer sows the seed with a combine drill which sows the seed at a rate of 200 kg/ha along with CAN 10-10-20 fertiliser.

Selective herbicides are used to control the weeds on the farm and stubble cleaning is also carried out for weed control.

The barley on the farm is harvested with a combine harvester. The farmer knows the crop is ripe when the ear bends over and lies parallel to the stem and also it is identified by the farmer by its golden colour. The grains are stored in large, ventilated sheds. The grain is treated with propionic acid. This prevents the grain from being attacked by pests, fungi and bacteria while in storage.



Rotation

- Sown continuously

As the barley grown on the farm is used for feeding purposes, it is sown continuously. This is because soil-borne pests and diseases do not affect the barley on this farm. However they can be present on other farms.

Yield

The average barley yield on the farm is 6-7 tonnes a half acre which works out roughly to be 2400-2800 tonnes total on the farm per harvest each year.

Diseases Encountered

- Mildew
- Manganese deficiency



Mildew (as shown above)

The farmer has encountered problems with mildew. It is a fungal disease that has affected his grassland in the past. It is identifiable by the white spots on the leaves.

The disease is prevented and controlled by spreading a fungicide called lime-sulflur.



Manganese Deficiency (as shown above)

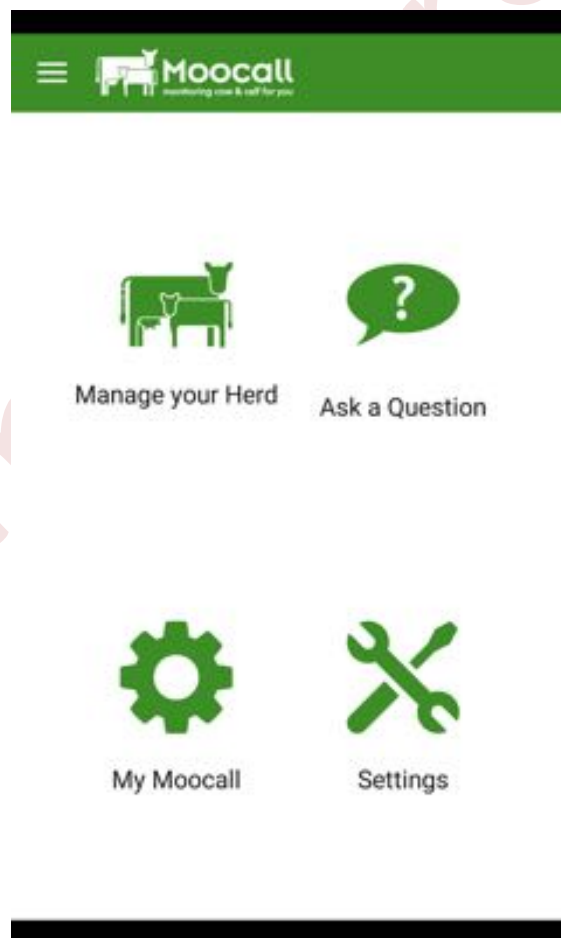
The farmer has also encountered problems with a manganese Deficiency. It was identified by the black/brown spots on the leaves. It was found to be present in a small corner of one field where there was poor drainage due to a downward slope. This was fixed by putting in a mole drainage system.

Technology is used on the farm to enhance the production efficiency, ensure less waste, and overall management on the farm. There are 3 main apps that are used for these functions; Moocall, Grass2Milk and farmGRAZE.

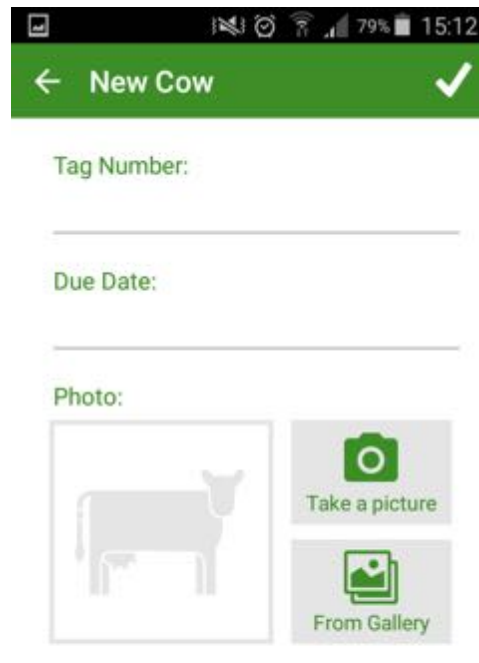
Moocall

This is a mobile app, developed by Moocall, which is designed to work alongside the Moocall device. It's function is to aid the management of the herd at calving season. Each individual cow is entered into the app and data is gathered around due dates, calving events and calving tendencies of the i) the herd and ii) each individual cow.

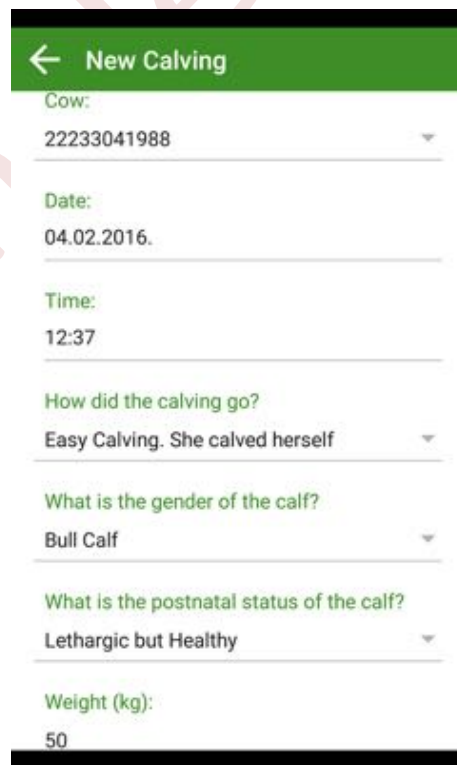
A Moocall Calving Sensor is attached to near the tail head of each cow during the calving season. A ring tone is set which alerts us to a calving event. The app uses wifi and phone signal to sent an alert about an imminent calving, this is an advantage as the phone signal is weak on the farm.



Each cow has their own individual profile, including their tag number, due date and a photo section for identification.



Each calving is inserted into the app, including the tag number, date, time, gender, calving details and the calf's weight.



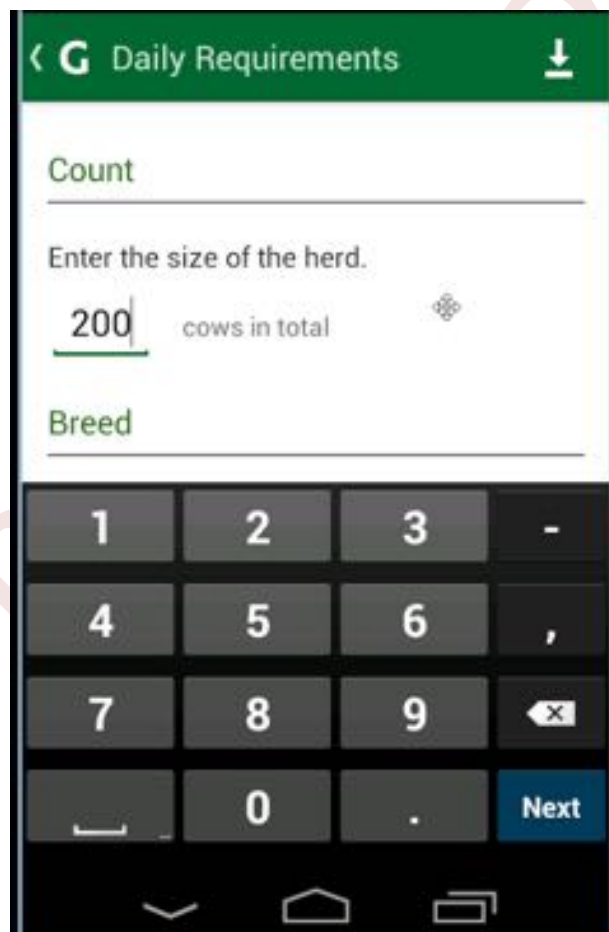
The app stores information on all cows and calving. There is a section for managing the herd, where historic herd calving difficulties can be seen and this helps to ensure a vet is on standby or equipment such as a calving jack is ready to be used if needed.

By sending an alert to the phone of the person closest to the herd at the time of calving, it ensures there is proper management at the time of calving. It helps to reduce calf and cow mortality and the app and Moocall Calving Sensor together are a useful aid used on the farm for the calving season.

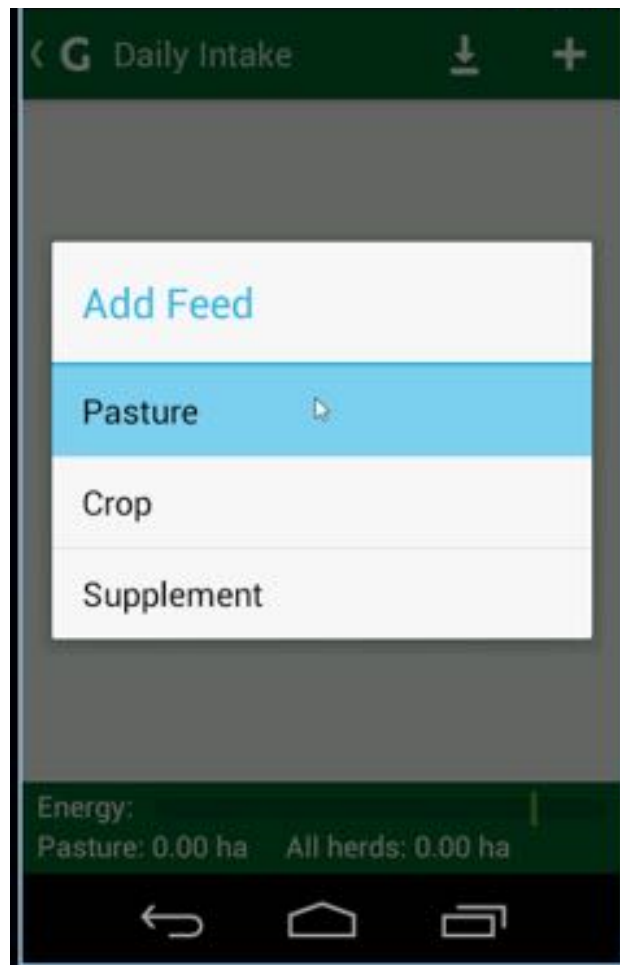
Grass2Milk

This mobile app helps the farmer make informed decisions about the feeding of the herd. It helps to plan the feed allocation for the day, and the farmer can see how much feed is required to reach daily milk targets and body condition score targets.

Information is entered about the herd; the number of cows, the breed, the age and the body condition score.



The daily feed is entered - what pasture, crops and supplements the herd is being fed.



Once the herd and feed details are entered, the app calculates the total ME intake and compares it to the ME requirements.

Each parameter is customised which ensures the results are specific to the herd and the farm. Once these are entered it is used to find out how much to feed on a daily basis. As energy is the most limiting component, the app assists us in identifying the actual daily energy requirement of the herd. The app runs without wifi and phone signal so it can be used anywhere on the farm.

farmGRAZE

This app is used to save money on feed and fertiliser. Grazing is measured and recorded and the app can be accessed quickly from anywhere on the farm.

The sward height/kilos of dry matter per hectare are recorded as well as the breed, type of grazing and supplementary feeding. As the farm has a rising plate meter the value of this is entered as well.



upper

Sward Height

Enter 30 measurements, 24 remaining

6 of 6

5.5
6.0
6.5 cm
7.0
7.5

Remove Finish

An instant calculation on the level of grazing and advice on how to manage it is sent.



upper

summer

Amber high no supp feeding:

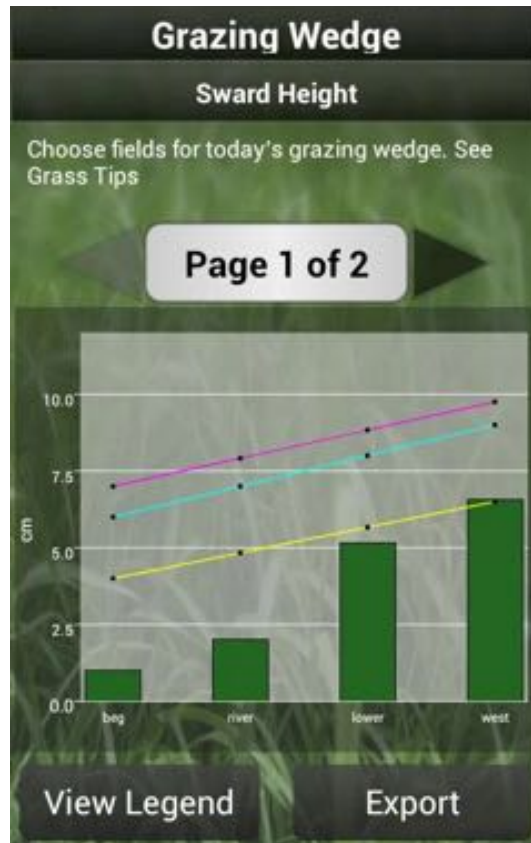
Too much grass, quality will drop and grass will be wasted.

Options:

- add more stock or reduce area -but check stock performance,

Choose next grazing field

Reports



The app sends reminders and tips of grassland management straight to the farmer's phone. Grass measurement is recorded and is recalled when needed by field name and date, these records are exported through email and are then printed and documented with the farm's files and HACCAP records.

References & Acknowledgements

References used

- ReviseWise Agricultural Science by Edco
- BreakingGround Agricultural Science by Edco

Many thanks to ----- for his time in informing me about how he runs his farm and showing me all there is to know and see on the farm, and to my teacher for her guidance.

Sample Project