

# Final report

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## MLA – Romani Pastoral Co Digital Livestock 4.0 2019/2020 Pilot - Farmdeck

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# 1. Background

## 1.1 Deployment Case Study

### 1.1.1 Farmdeck background & deployment case study at Romani Pastoral Company

Farmdeck provides a centralised dashboard for a big variety of use cases that are useful to farmers to help them manage their day to day on farm activities.

Farmdeck is fully self contained, including all the data that is ingested located and stored within farmdeck and within Australia. .

The entire solution is fully self-contained and the data is made available for use by farmers in real time from anywhere in the world that has connectivity to the internet. Farmdeck includes the following:

- Has been built to allow for scale of 500 000 sensors and beyond,
- Centralised cloud-based solution,
- Developed 100% in Australia by Outcomex (Full time resources located in Australia),
- Supported 100% within Australia, 24 x 7 x 365 Break Fix Support nationally across Australia and to be released globally in January 2021.
- Data is stored locally, owned by the end farmers and MLA and not mined by cloud providers
- Multi-User access – Can have different dashboards for the different departments/teams
- Information output to end user is real-time
- Includes a Sandbox environment to allow for the testing of new end user sensors prior to full blown integration (for when introducing new sensors in future)
- Interfaces with multiple internet connectivity options – Wifi, Lora, RFID, Satellite, NBN, 4G/5G
- Includes “local caching capabilities” so that no data is lost even when communication links are down.

The farmdeck solution that has been deployed at Romani utilises the following 4 components to address the requirements:

**1.) Sensors** - The sensors deployed at Romani, were to address the following use cases:

- **Water Tank** level monitoring sensors
- **Water Trough** level monitoring sensors
- **Rain Gauges** for rainfall monitoring
- **Electric Fence** for monitoring of electric fences
- **Quad bike overturn** alerting for when there is an overturn event on a quad bike

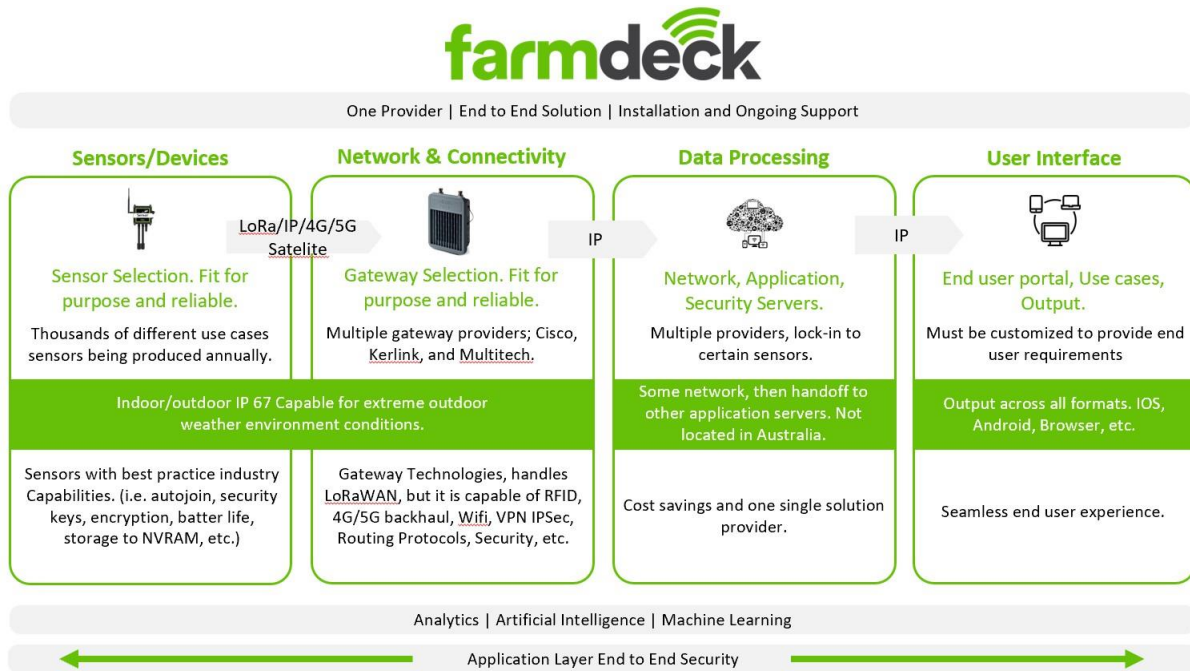
**2.) On Farm Physical Network** - The network deployed at Romani, enables thousands of sensors to be added and connected. Farmdeck has deployed 18 sensors covering the abovementioned use cases and 1 communication tower.

**3.) Data ingestion from the sensors** - The data collected from the sensors is stored into farmdeck’s data ingestion data lake and is made available in real-time to farmers when using the farmdeck reporting dashboard.

- The farmdeck data lake is located within Australia and built with Cisco’s leading architecture with end-to-end security.

- The data that is ingested, can only be viewed by farmdeck and the end user farmer and is not made available to any other entity other than farmdeck, the farmer and MLA.

**4.) Dashboard and Visualisation** - The dashboard provides a centralised application that brings together all the use cases into a single dashboard. It can be used or accessed from any location across the world that provides internet connectivity.



Farmdeck has been developed in Australia, and our team of engineers provide installation and support services nationally.

Farmdeck provides a private network solely for farmers and all data is kept within Australia. (Unlike various other offerings, where data is collected by sensors in Australia, but then processed overseas and sent back for visualisation in Australia allowing overseas providers to mine the data.)

We follow a strict quality assurance program for the IoT sensors; analysing factors such as their range, sensitivity, battery life, security, manufacturing quality, dust and waterproofing, and ease of integration. Every sensor used in farmdeck has been selected following this program which ensures they are secure and follow the best practice design principles.

Our organisation has over a decade of experience in networking technologies and security, which form an integral part of the underlying architecture required for IoT networks.

## 2. Objectives

The project objectives were to install a network that would support various use cases as set out by Romani Pastoral company and MLA requirements.

The following has been completed and installed and is currently being monitored by Outcomex managed Operation Centre in real-time.

- On Farm network – An on-farm station mast was installed at Romani Redbank utilising Solar Power and batteries to ensure that the solution is powered by solar technology. The on-farm network currently broadcasts signal across an approximate 10km radius and is capable of registering a few thousand sensors.
  - **Status at 14 June 2021** – The on farm network has been fully installed and is currently being monitored. There have been various failures to aerials mostly from cockatoo bird life that chew on the aerials and due to a lightning strike which occurred earlier in 2020. All the failures have been fixed in a timely manner. The solution is monitored in real-time and in the event of an alert, farmdeck technicians will investigate and remediate accordingly.
- 18 sensors were installed to monitor water tank and trough levels, electric fence monitoring, rain gauge measurements and Quad Bike Rollover events.
  - **Status at 14 June 2021** – All sensors are operational and some have been replaced due to faulty hardware.
- Data ingestion and visualization is provided by farmdeck and been installed in full
- Additional AI/ML features are available for use by the farmers. These are also enabled at Romani installation and can be used when required for predictions, automation and other similar requirements.
- All aspects of the solution have been installed in a secure encrypted manner to ensure that it is safe from cyber attacks. Farmdeck has implemented various data security techniques to ensure that the solution is safe and secure.

## 3. Methodology

- Planning and preparation (Status at 14 June 2021, all milestones completed. Systems were fully installed by 01 November 2020 = Completed 100%)
- On farm installation of farm network and sensors (**Status at 14 June 2021, = Completed 100%**)
- Remote monitoring and alerting and onsite support for any issues that arise – (Various trips have been made to Romani to resolve hardware issues from lightning strikes or antennas pulled off sensors by crows and other wildlife. (**Status at 14 June 2021 = Completed and ongoing until the end of the trial**))

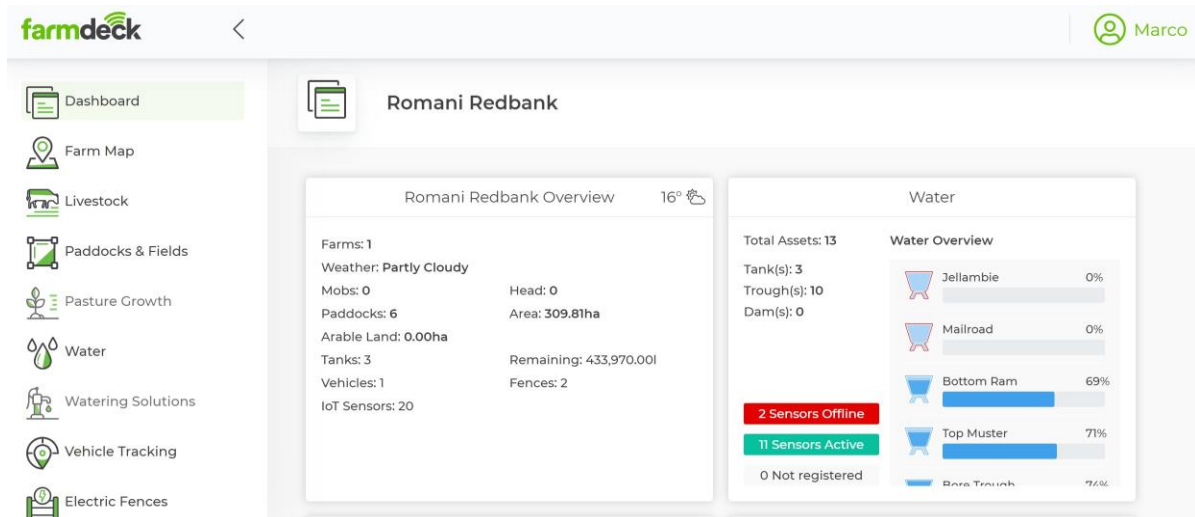
## 4. Results

The results thus far have been overwhelmingly positive.

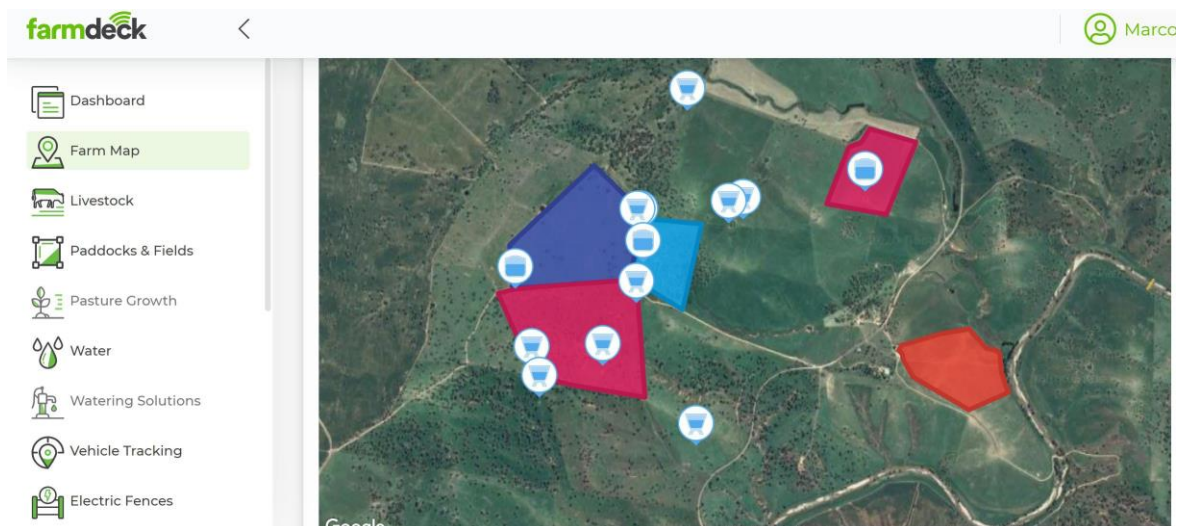
We experienced a few issues with regards to faulty hardware due to a batch of faulty software in the sensors. This was identified remotely and Farmdeck scheduled and conducted an upgrade of the software in order to eliminate the issues that were found. The sensors have been in operation successfully ever since the upgrade. Additionally, Farmdeck has replaced some sensors with ones that have upgraded aerials in order to limit the damage caused by bird life, in particular cockatoos, which chew on the aerials until they break off. The newer model aerials are more robust and have withstood the damage previously caused by birdlife.

The following provides some screenshots in real-time of the deployed use cases:

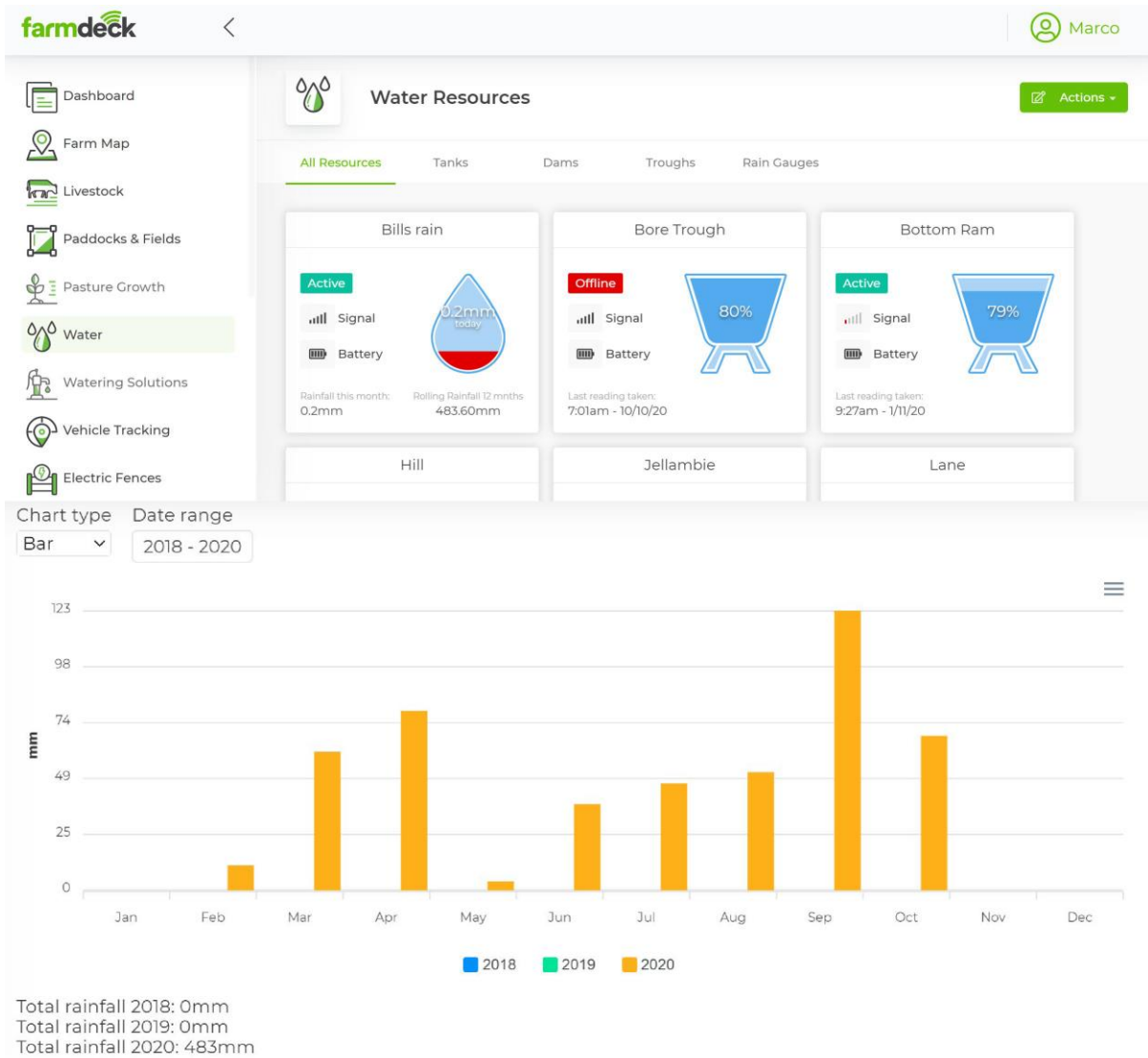
Screenshot of the main dashboard deployed at Romani Redbank:

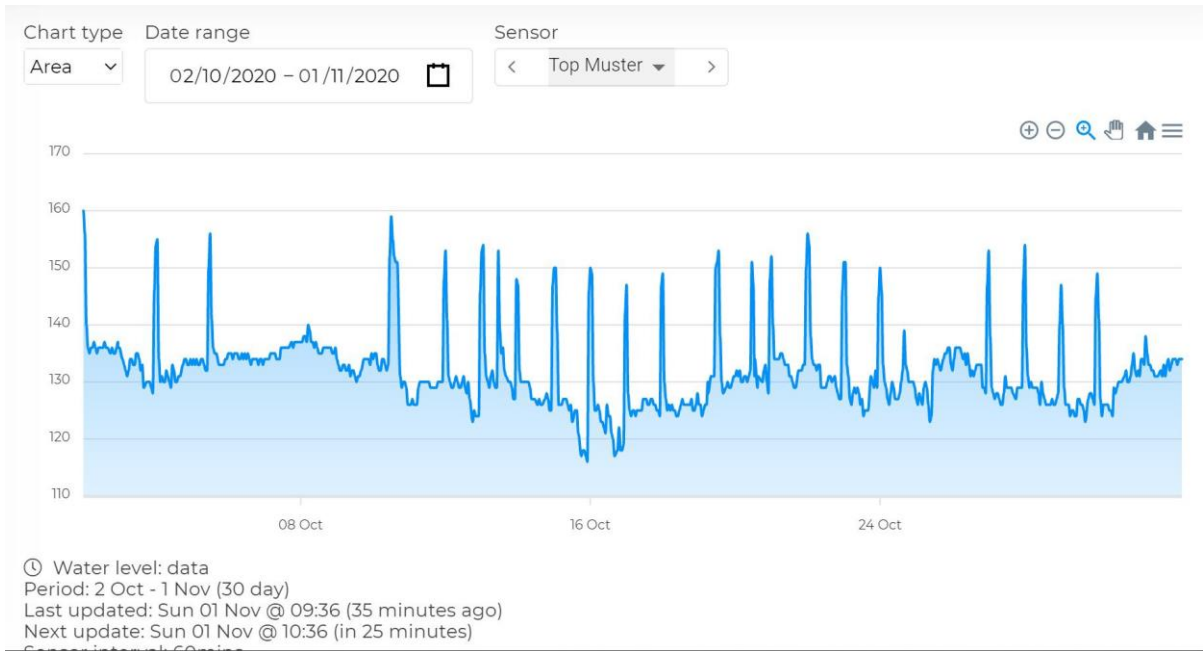


Screenshot below of the main sensor locations on a map:



The screenshot below shows some of the water management page that is used to monitor Tanks, troughs and rain gauges. The information is real-time and historical:





Screenshot below of the electric fences. Both are located in a river bed, so whenever it rains, they alert and show broken fence as can be seen below:

farmdeck

Marco

Dashboard  
Farm Map  
Livestock  
Paddocks & Fields  
Pasture Growth  
Water  
Watering Solutions  
Vehicle Tracking  
Electric Fences

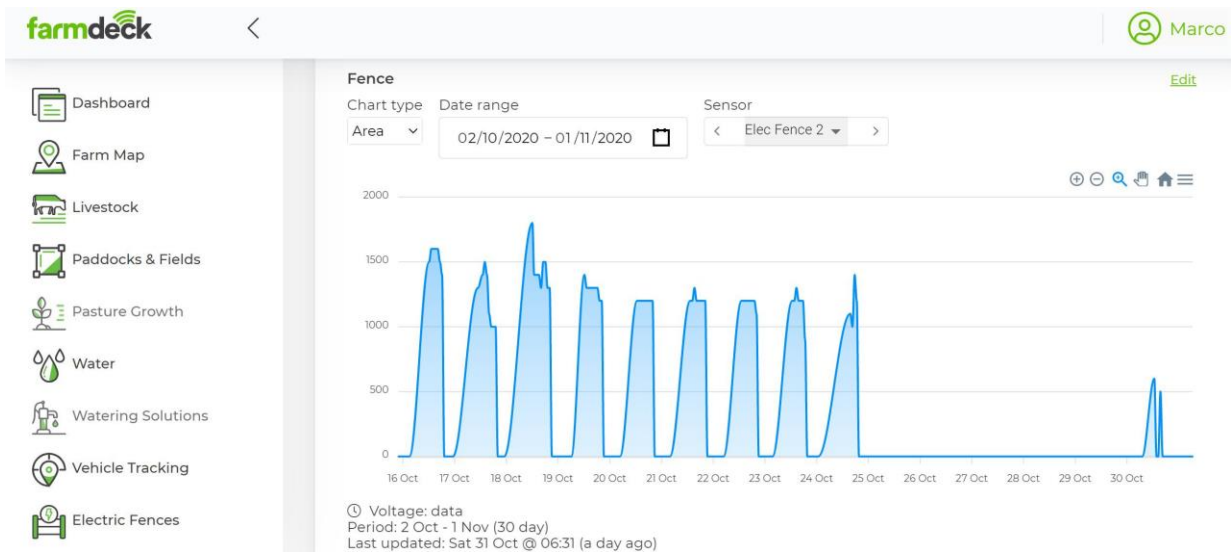
Elec fence 1  
Broken Fence  
Active  
Voltage: 0  
Length: 51M  
Signal  
Battery

Elec fence 2  
Broken Fence  
Active  
Voltage: 0  
Length: 85M  
Signal  
Battery

All Fences  
Fences Show  
Paddocks Show  
Satellite



Screenshot below shows a detailed current view of one of the electric fences:



## 5. Key findings

The overall implementation was deemed successful, however the following key findings were observed:

- Some hardware such as aerials need to be more robust. A more robust aerial was installed in the later stages of the pilot and have held up well against damage caused by bird life, since being replaced
- Battery life on certain sensors can be improved by means of better placement of core gateway location. The original gateway location was chosen based on available location on the farm. In the long term, farmdeck recommends that the gateway be moved into a more centralised location.
- Additional gateways could be installed to help maintain optimal battery on the sensors

## 6. Conclusion and recommendations

The overall project was implemented successfully as per the original scope of the project and the following applies:

- Outcomex/farmdeck continue to monitor the deployment in real-time and Outcomex will continue to provide support both onsite and remotely, as required and ongoing until the end of the project.
- Since deploying the use cases at Romani in January 2020, Outcomex/farmdeck has continued to add additional features to the platform.
- The following features are now available within farmdeck that can be used across the red meat industry:

### Features

All our features are presented centrally on a user-friendly dashboard and can be accessed remotely via a web browser. Farmdeck gives you the possibility to configure alerts and notifications, as well as reports for each feature.



#### Livestock Tracking and Identification

livestock is identified and then tracked (weight, births, sheep/cattle drafters)



#### Water Level

monitors water levels in real-time, including water tanks, dams, troughs, and turkey nests



#### Rainfall Monitoring

monitors how much rain has fallen across various locations of a farmer's property



#### Water Quality

monitors water quality (drinking and livestock) - salinity, turbidity, blue/green algae



#### Farm Management Application

day-to-day management of livestock and cropping, with Maps, Livestock and Asset Tracking and Identification, Calendar, and Planning features



#### Paddock and Grazing Management and Recommendations

alert once grazing days have been reached, based on the quality of livestock in paddock



#### Asset Tracking (GPS location)

can track location, distance and speed of farm machinery such as tractors, utes, quads, etc.



#### Automated Drafting Integration with Compatible Sheep/Cattle Drafting Systems

integrates with well-known sheep/cattle drafters for automated livestock processing



#### Electric Fence Monitoring

monitors electric fences and alerts if power drops below a certain threshold



#### Soil Temperature, Humidity and Moisture

monitors and reports on soil temperature, salinity, and moisture at various depths



#### Quad Bike Overturn Alerting

alert if quad bike overturns or a motorbike goes down on its side



#### Livestock Down Alerting

monitors livestock and alerts if cattle/sheep have been down or non-mobile for a period of time



#### Outdoor/Indoor Fire and Smoke Detection

indoor and outdoor fire and smoke detectors



#### Electronic Report

integration with MLA/NLIS for simplified NVDs (National Vendor Declaration forms)



#### Stem Trunk and Fruit Diameter

monitors fruit trunk, diameter and leaf wetness



#### Video Surveillance

surveillance monitoring of troughs and other farm assets