Conon Kynoch

549 Black Road

Ashley Clinton

Winter 2020

Management Options

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Date 24th April 2020

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DISCLAIMER

Director,
AgFirst Pastoral Ltd,
24th April 2020.

1.0 EXECUTIVE SUMMARY

Case Study Farm: Conon Kynoch, Ashley Clinton, Hawkes Bay (590ha)
Analysis & Report prepared by: Lochie MacGillivray, AgFirst

- Conon Kynoch farms in the Ashley Clinton district of Central Hawke's Bay. This district has been impacted severely due to low rainfall and the soil moisture are at record lows.

- The 590ha effective property is hill county with 85% of the land being steeper then 21° and most of the property has a slope of greater than 26°. With an altitude of 430-530 m.s.l and close to the Ruahine mountain range the winters are, from a Hawke's Bay perspective, long and cold.

- The topography of the farm means that it is not feasible to supplementary feed all but a few animals during winter months. Generating pasture covers before the onset of winter is therefore critical in the farm management policy.

- Current pasture covers are at 1,000 kgs dm/ha. This is well below desired levels.

- Stock numbers have been reduced but further reductions are difficult due to a stagnant store market and the slow processing at the meat works due to Covid 19 complications.

- In early April Conon approached the MPI drought support service to assist him in developing a feed wedge ahead of the winter. After modelling a number of scenarios, together Conon and AgFirst were able to develop a complex plan that is feasible and enables Conon to carry all his capital stock through until the spring.

- Policy recommendations included the use of nitrogen, delaying the return of grazing animals, delaying mating dates, the use of grain and the sale of all non-capital stock. The impact of these policy decisions is summarised in the table below.

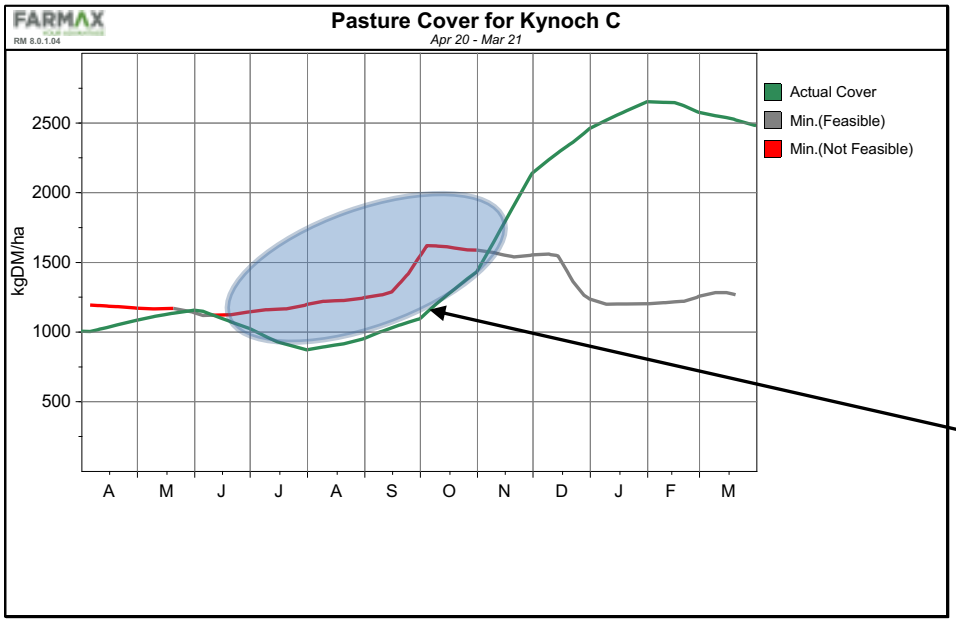
Impact of policy changes April- October 2020

Policy Changes	volume effect (t) (supply - demand)	% effect
Nitrogen applications	105	43%
Feeding barley to start rotation	21	9%
Delay in lambing	77	32%
Extend cow grazing	10	4%
Impact of the combination of all changes	29	12%
Total volume supply less demand effect (t)	**242**	**100%**

- This current drought is unprecedented and even though Conon has been proactive in his decision making, it is the nature of this drought that it along with other complications almost caught one of the region's more experienced farmers.

- The lesson we can all learn from Conon is in his tenacity and energy, keeping on searching for answers rather than being overwhelmed by events. With this positive attitude he will manage the farm through one of the regions toughest droughts.

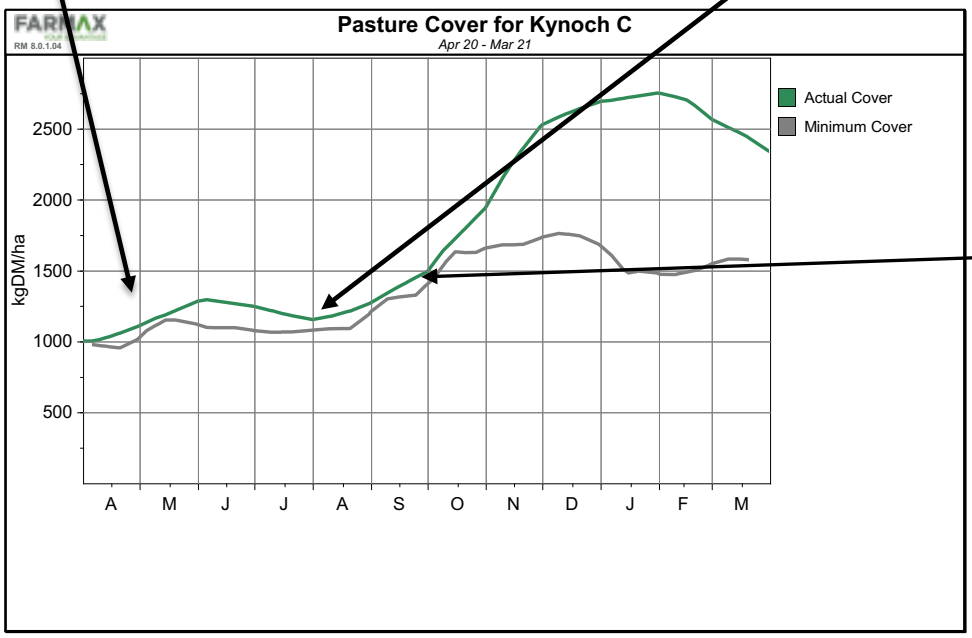
The comparison between the initial position and the revised position after the combined management interventions is shown below.



Without decisive decision making – an accumulating feed deficit- rectified by compounding destocking of capital stock – The situation was not feasible

Feed Barley to ewes 6 weeks/ lift LW
Sell all surplus stock
Delay ram until 5 May
Effects a fundamental change in minimum cover requirement

Cows off grazing (has a compounding affect)
Monitor live weight profiles and covers
Strategic application of N in May & August (dependant on covers)



Delayed lambing midpoint 1st Oct

2.0 FARM DETAILS

2.1 Location, climate, topography, and soils

The property is located in the Ashley Clinton district, some 30 kilometres west of Waipukurau in Central Hawke's Bay. Nestled under the Ruahine mountains the farm ranges from 430- 530m above sea level with an average rainfall of 1540 mm pa (1972-2013 average).

This farm lies in Hawkes Bay's "green belt" and as such is generally considered "summer safe". Although like all of Hawkes Bay it is prone to dry periods, it generally gets some showers and thunderstorms that drift over from the nearby mountain range to the west, as well as receiving good rain from southerly through to the easterly events.

Being relatively high for pastoral farming in Hawkes Bay as well as its proximity to the Ruahine range it has cool winters. The table below shows the average temperatures at the Ashley Clinton climate data recording station.

Month	Apr	May	Jun	Jul	Aug
Average Temperature (°C)	11.1	10	9.4	9.6	10.6

Source: HBRC

The property has a total land area of 794ha, of which there is an estimated 590 ha effective.

The table below shows the breakdown of the Land Use Capabilities (LUC) of the property:

Land Use Capability classification	2	4	6	7
Land area (ha)	50.23	80.49	238.8	425.24
Percentage of total land area	6%	10%	30%	54%

Source; Landcare Research, LRIS portal LUC shapefile data.

Of the total 794 ha, 7% of the land is classified as a slope category G (very steep) and 71% as slope category F (steep) and 6% moderately steep. This means that nearly 85% of the property has a slope over 21° with most of this land steeper than 26°.

Please note in the appendices there are maps showing:

- a property location map,
- a property boundary map,

2.2 Management

The farm is owned and managed by Conon Kynoch, who runs a breeding ewe flock and beef herd. There are no other permanent staff.

All stock are generally finished on the property with winter numbers established during April. The mixed aged cows are often away grazing during some summer months and during parts of the winter if possible.

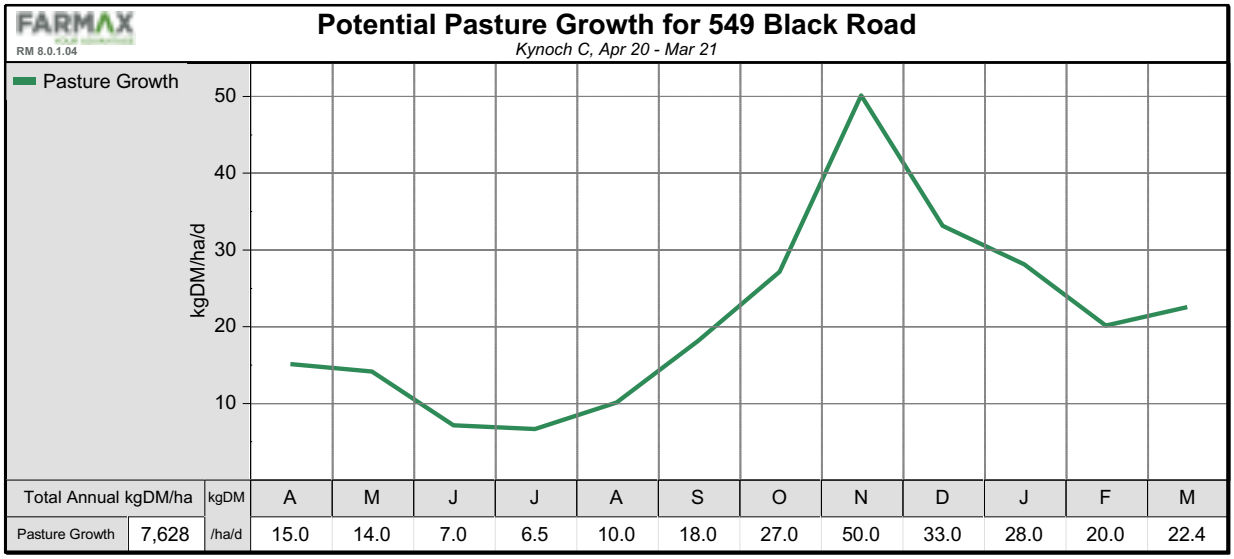
The steep terrain of the farm means that there is limited cropping land available with 7-10 ha sown annually in a forage crop.

There is some water reticulation but in the more remote paddocks stock water is via springs and dams.

Once the winter starts access by heavy machinery is very limited and therefore most stock are on an all grass system.

2.3 Pasture Growth

The farm has not been regularly recording pasture production, so an estimate was made on the potential production based off the local AgFirst data base as well as considering typically carried stock numbers. The typical pasture production profile is then as depicted below;



Total Annual kgDM/ha	kgDM	A	M	J	J	A	S	O	N	D	J	F	M
Pasture Growth 7,628	/ha/d	15.0	14.0	7.0	6.5	10.0	18.0	27.0	50.0	33.0	28.0	20.0	22.4

At this 7,600 kg dm /ha/yr potential growth it would equate to a stocking rate potential of 9.5 su / ha and a total of 5,600 stock units for the property.

3.0 SITUATION AS AT 10TH APRIL

Through the MPI drought support service, AgFirst were approached by Conon around the 10th of April. At this time, he had just applied 61 tonnes of DAP over the property (equivalent of 19 kgs N/ha). The average pasture covers were estimated to be 1,000 kgDM/ ha.

Rainfall has been significantly behind normal for several months, only 14% of average monthly rain fall in February, 16% in March and 26% of the monthly average in April. The average soil moisture of 10% is similar to the 2012-13 drought deficit levels and essentially the soils can't get much lower in terms of moisture content. Some rain had happened in early April (4th), only to be followed by snow on the mountains and then warm westerly winds. The effect of this rain was to green up some of the pastures, but growth continues to be limited. Since the 4th of April there has been no significant follow-up rain.

Conon had his cows away grazing and they were due to come back on the 1st of May. He had been feeding the 5-year olds some barley (1.2 tonnes purchased) and they had been fed this grain along with some baleage for a month or so and are now well-conditioned to the concentrate.

All the other sheep are naive to grain and supplements.

The ram had gone out with the 5-year olds on the 10th of the month and they were due to go out on the 20th to the two tooth and mixed aged ewes. The ewes were light with an average live weight of 55kgs for the 5 yr and MA ewes, this is 8- 10 kg lighter than normal. Currently the two tooths are 2-3 kg lighter than MA ewes.

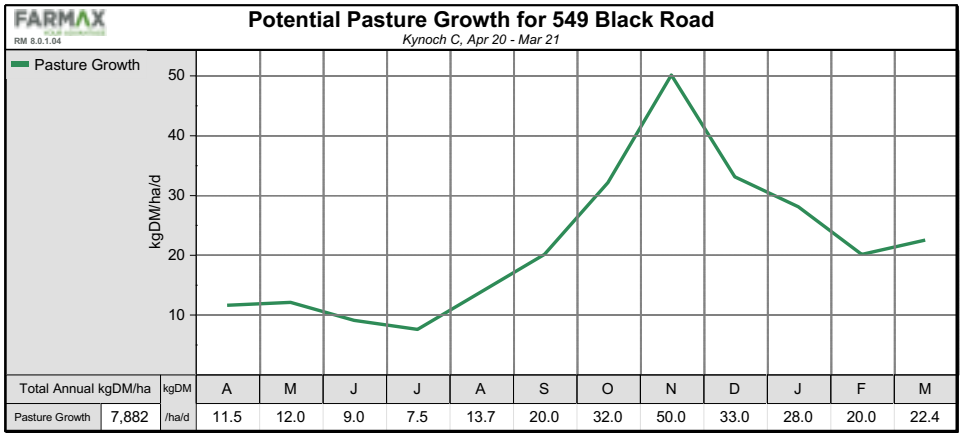
Water had been a major issue with the unusually very low rainfall in the mountains leading to springs and dams running dry. Conon had been carting stock water until the April rain, which gave a little "fresh" to the dams and springs, relieving some of the workload.

3.1 Stock numbers as at the 10th of April

Stock class Sheep	number	Est l.w	Stock class Cattle	number	Est l.w
5 yr ewes	355	55	Cows (away grazing)	136	550
Mixed Aged ewes	1670	55	Dry cows	12	580
2ths	852	52	i/c cull cows	7	550
Ewe Hgts	877	33	i/c 2yr Heifers	46	440
MS Hgts	660	33	Weaner heifers	50	170
Rams	25	72	Weaner bull beef	26	200
			Friesian bulls	46	170
			R2 Bulls	22	470
Totals	**4,439**			**345**	

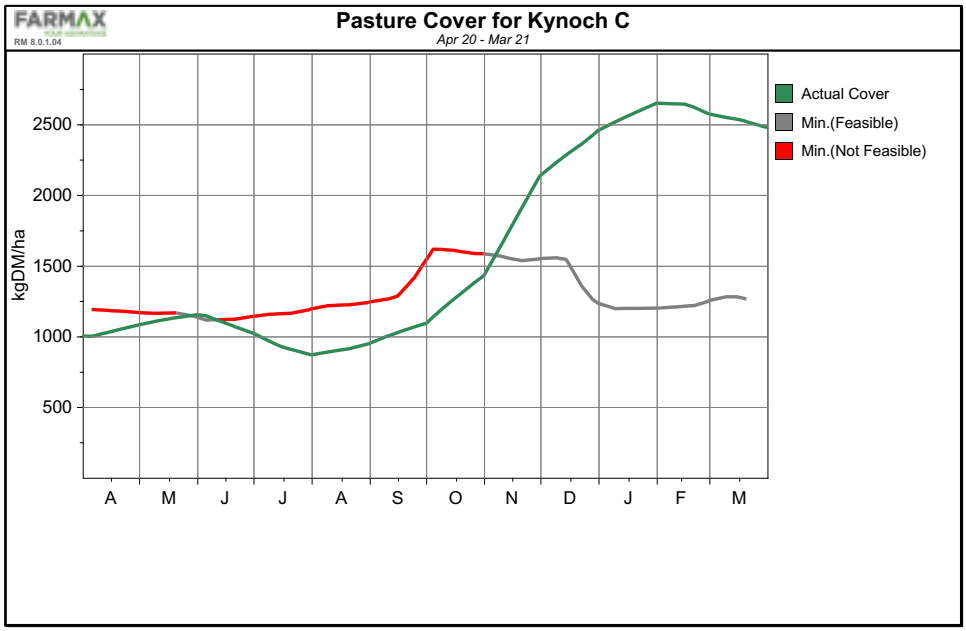
3.2 Pasture cover forecast at current situation.

Using the pasture growth as below, the current livestock data, and opening covers were entered into Farmax to generate a predicted feed cover profile. Autumn/winter pasture growth forecasts were derived from local knowledge and then latterly supported by Rezare pasture growth predictions.



Total Annual kgDM/ha	kgDM	A	M	J	J	A	S	O	N	D	J	F	M
Pasture Growth 7,882	/ha/d	11.5	12.0	9.0	7.5	13.7	20.0	32.0	50.0	33.0	28.0	20.0	22.4

The expected covers were then as follows.



In the graph above the green line depicts the predicted pasture profile, whilst the red and grey lines indicate the minimum pasture levels needed to achieve feed requirements. The red line depicts the period where the feed covers are insufficient to meet feed demand, essentially the area between the red line and the green line shows the accumulating feed deficit.

Clearly Conon needed to make more policy decisions to avoid the situation depicted above from eventuating.

4.0 DISCUSSION OF SOME LEVERS TO PULL

In discussions with Conon, AgFirst explored various options.

- Sell all surplus livestock. Conon had intended on selling much of this surplus stock much earlier, however this has proven difficult due to;
    a. A waiting list at the works due to high demand, and then Covid 19 reducing stock killing capacity by up to 50%. Processing supply equalling demand is not expected until sometime in May.
    b. Little to no demand for store stock.
    c. Lower than normal growth rates meaning a high percentage of stock is in store condition only.
- Purchase supplementary feed;
    a. Some baleage had been brought, 12 bales of good quality bales were on hand still, 60 bales were arriving soon, but the energy value of these new bales is low (estimated at an energy of 7 MJME/kgDM).
    b. No other baleage could be found
    c. Some barley is available at $509/tonne bagged & delivered, but the majority of the ewes are naive to this type of feed. Maize bagged & delivered price was $490/tonne
- Extend the grazing of the cows past 1st May. No grazing for other stock could be found. Although this seemed possible initially, at the time of the final report writing the landowner where the cows were grazing informed Conon that the cows must leave by the 1st May.
- Delay the ram going out
- Further application of Nitrogen.
    a. This is getting late now for a further application and there may be difficulties in getting it applied. However even at a lower response it gives a cost of 20 cents/ kg DM, this compares favourably with baleage at 53 cents (not including feeding costs). Note that grain costs are similar to Baleage costs on a cents per kg dm basis, but when the energy content of the feed is considered (MJME/kg dm) baleage is twice as expensive as grain.
    b. A nitrogen application in August is being considered dependant on how the winter progresses.

The ewe rotation had stopped in February due to the low covers and little to no regrowth. Discussions centred around getting the rotation started again and getting this done before the winter. It was recognised that once the winter starts access on the property gets limited and supplementary feeding is not feasible.

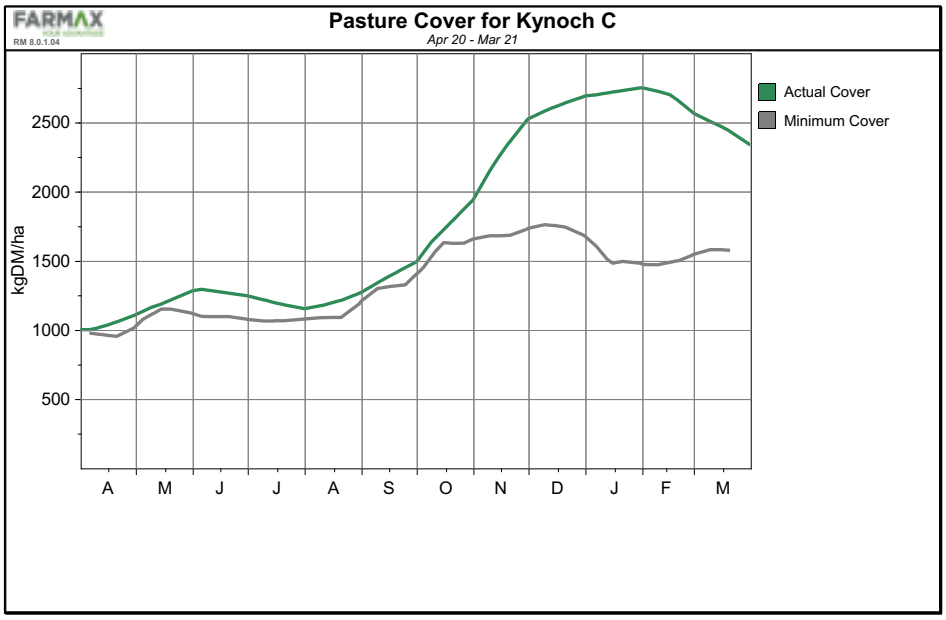
5.0 DECISIONS MADE & FARMAX SCENARIO TESTING

5.1 Policy decisions

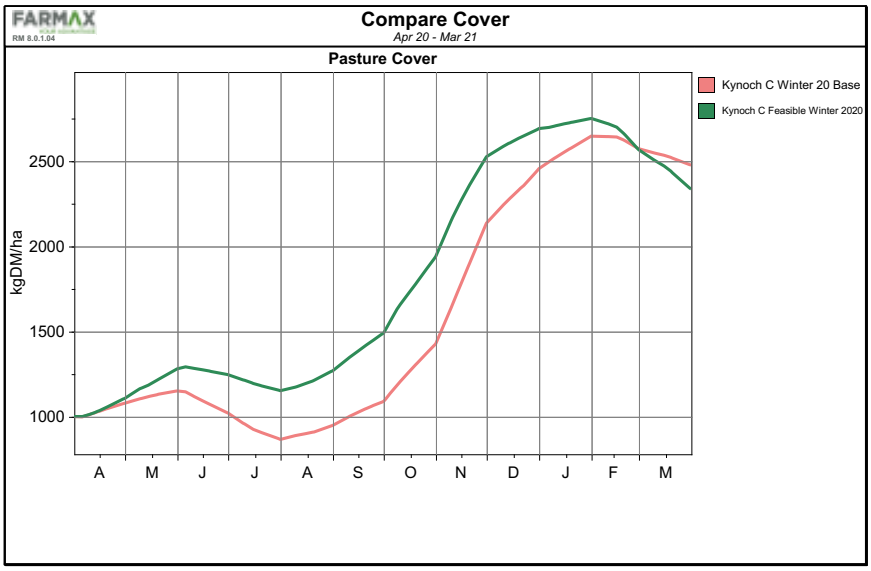
After discussions with Conon the following strategic decisions were made:

1. Sell down surplus stock as soon as the works opens, even if they are short of being prime
2. Delay the ram until the 5th of May and supplement the ewes to see if we can lift the live weight. The Farmax modelling indicated here a difference in the end of winter feed deficit. It is now planned under this later lambing scenario that the ewes would lamb on to covers that would allow them to milk and this later born lambs would have a higher weaning number and higher ewe liveweight than if the ewes had lambed at the earlier scheduled time.
3. Apply 30 kgs N/ha on 150ha of the warmer country of the farm in May (at a predicted response of 8 kgs/ha of pasture growth to 1 kg of N applied per ha) and again another N application depending on winter growth in August.

The overall impact of all the decisions showed a feasible scenario as depicted below.



The difference in between the current situation (without policy changes – in pink) and the feasible scenario (green) after implementing the policy changes is shown in the graph below.



5.2 Impacts of various policy decisions

The table below summarises the impact of these policy changes. There is a combination effect as well, grass grows grass, hence a 12% increase in feed available due to building covers.

1. Impact of policy changes April- October 2020

Policy Changes	volume effect (t) (supply - demand)	% effect
Nitrogen applications	105	43%
Feeding barley to start rotation	21	9%
Delay in lambing	77	32%
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Impact of the combination of all changes	29	12%
Total volume effect (t)	**242**	**100%**

5.3 Other considerations

5.3.1 Build a feed wedge

It is important to try and build some cover to start the rotation. To do this the ewes will be inducted into a grain diet that maximises at about 30% of their intake. This is detailed in section 6.0

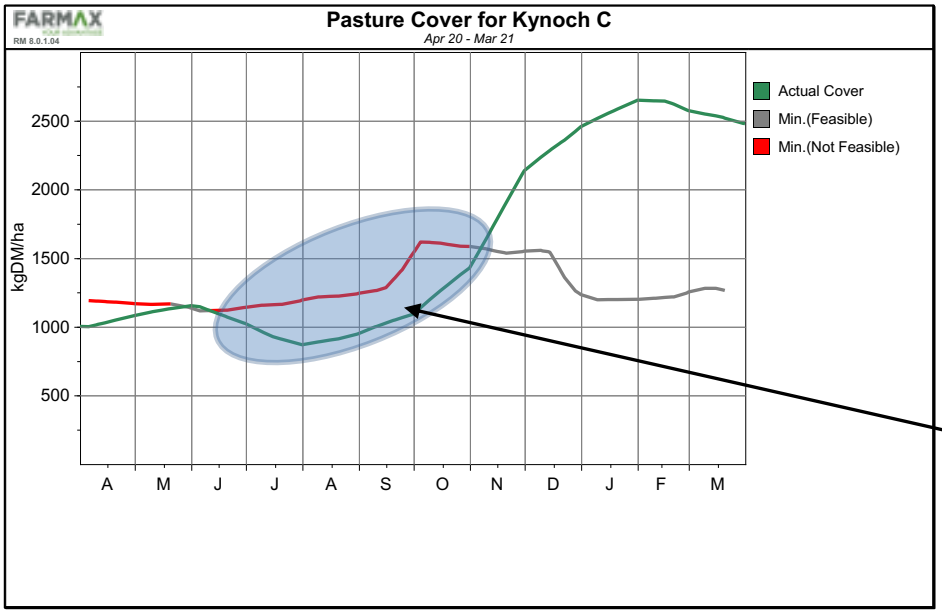
5.3.2 Analyse supplements

Some assumptions are made on the nutritional value of the supplements. This needs to be confirmed.

5.3.3 Monitor pasture growth

It is essential to monitor pasture covers and growth for the entire winter period in order to be proactive and not reactive so as to take hold of the steering wheel again.

5.4 Farmax Scenario Comparisons



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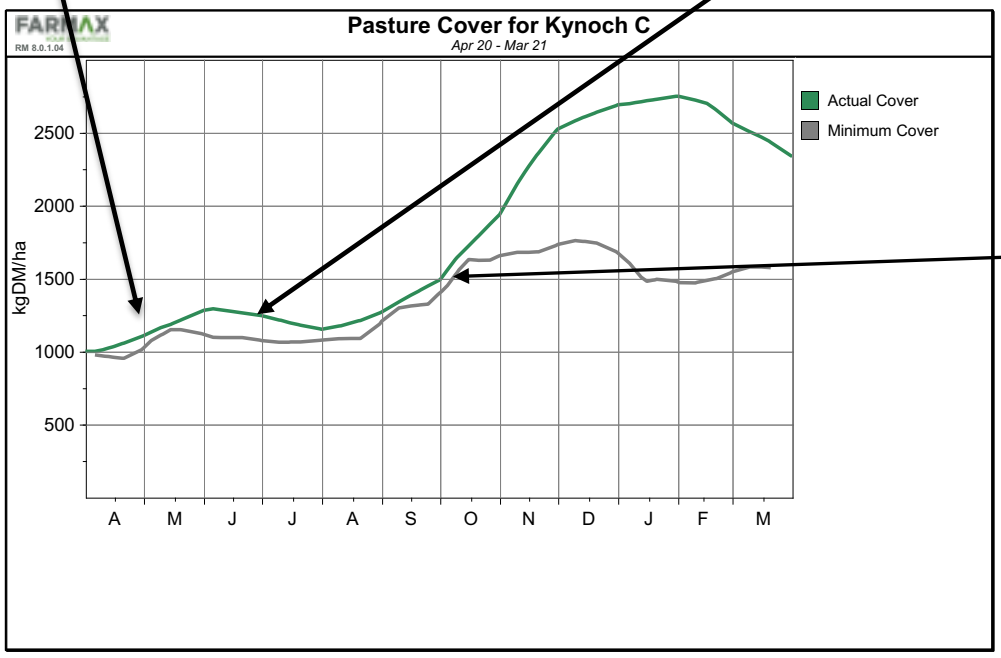


Delayed lambing midpoint 1st

6.0 BUILDING COVERS BY GRAIN FEEDING EWES

	(in puts - yellow cells)			
Grain price/t (bagged/ bulk and delivered)	$ 490		Price per kg for grain (intake)	$ 0.54
DM % of grain	88%		Grain price (kg) / ME (intake)	$ 0.05
Utilisation	90%			
ME content of grain/ kg dm	13.0		Price per kg for Baleage (intake)	$ 0.53
			Baleage price (kg) / ME (intake)	$ 0.08
Days fed grain	42		**By comparison - Applied Nitrogen Costs**	
Amount of grain fed/day (gms)	300		Fertiliser (with N) Cost/ tonne (carted & applied)	$ 745
Total grain intake (t)	21.0		Percentage N in tonne product	46%
Total grain offered (t)	23.4		Response (kgs dm grown/ kg N applied)	8
ME content of pasture/kg dm	11.0		Cost per kg dm for N grown pasture	$ 0.20
			N cost grown /ME **(Cents/me)**	1.84
Weight of bales (kgs)	625			
DM % of bale	40%			
DM content of a bale (kgs)	250		ME for Growth to get to target/hd/period	94
Cost of bale (delivered)	$ 100		at end target live weight kgs/hd of 56.7	(breakeven weight)
ME content of baleage /kg dm	7.0		ME maintenance requirements/hd/day	9
Percentage NDF (average of pasture & baleage)	58.0%		ME needed/day for period for lwg	2
Utilisation of baleage	75%		**Total ME needed/ head/day**	**11**
Bales fed/ day	1.0			
Total bales fed over grain feeding period	42			
Ewes in mob	1670		ME supplied as grain/ ewe/day	3
av animal live weight at start (kgs)	55		Percentage of diet as grain	30%
Target end live weight over ride (0 if no override)*	**0**		Grass/ baleage ME requirement/day	8
*(if **0** above is used then the break even weight below is used for feed calculations)				
ewe starting $ value/hd	$ 100		**Grass intake /day (kgDM/hd/day)**	**0.6**
scan index (number of lambs scanned/ ewe lw)	2.6		Amount fed as Baleage (intake/hd/day)	0.11
Lamb losses between scanning at weaning	25%		**Total feed intake (pasture, baleage & grain) hd/day**	**1.06**
Weaned Lamb value	$ 113.10			
			Max pasture and baleage intake due to	
Grain Cost/mob	$ 11,556		NDF (quality limitations)	1.1
Grain Cost/ewe/day	**$ 0.16**			
Baleage cost/ mob	$ 4,200		**Area of pasture/day/mob**	at breakeven
Total Cost/ewe (including baleage)	**$ 6.92**			ewe weight
			pregraze height (kgs dm/ha)	1200
number of lambs/ 1000 ewes required	139		post graze height (kgs dm/ha)	1050
Percentage weaning increase required	8.3%		Utilised feed (kgs dm/ha)	150
increase in lw (gms/hd/day) required at mating to breakeve	40		Daily pasture requirement (kgs day/ mob)	1077
Ewe weight to breakeven based on weaned lambs	**56.7**		**Area required /day (ha)**	**7.2**
(includes costs of baleage and grain)			**Pasture growth (kgs/ha/day)**	15.0
			Minimum Rotation length (Days)	**10**
			Rotation Area at minimum rotation length (ha)	**72**

The above is a snap shot of a spreadsheet for Conon allows us to calculate the volume of grain (maize) required, the cost of this, and what of supplement and pasture combinations are required to slow the start of the winter pasture rotation.

Once the winter starts there is little opportunity for Conon to supplement the ewes, so the policy is to "go hard and conservative early"

Once the six-week period of feeding has finished there is predicted to be a build of covers to about 1400 kgdm/ha. This then creates enough of a feed wedge to negotiate us through the winter

7.0 MANAGING THE WINTER

As in all models there are a number of assumptions made. This the Farmax scenarios modelled for Conon a key one revolves around the pasture growth over the next few months.

It is critical that regular pasture production growth rates are recorded. This, along with some livestock weighing will allow more accurate information to be fed into the Farmax model.

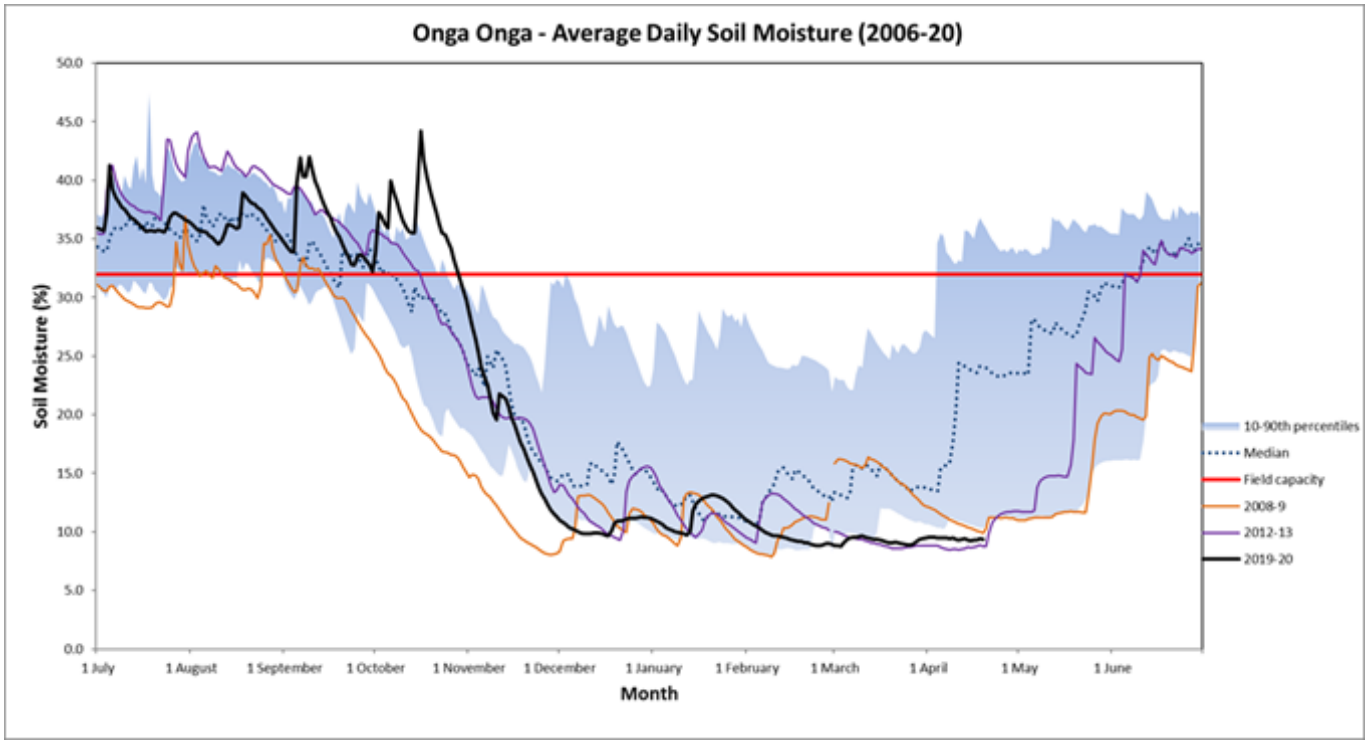
The initial feed growth predictions (and used in the modelling) were slightly less than that predicted by Rezare and this gives us some confidence. However, the number of levers open to Conon gets limited once the winter sets in. These are down to selling capital stock, or if good records are kept, further modelling with a view on more nitrogen to be applied in August.

This current drought is unprecedented in that it is North Island wide and feed supply and stock movements are limited. On top of this Covid 19 has impacted on Conon's ability to sell down livestock.

Conon has been proactive in managing the drought, feeding the 5 yr olds early, cows away grazing, applying N based fertiliser and not the least in seeking outside for help and ideas, but it is the nature of this drought that it along with other complications almost caught one of the regions more experienced farmers.

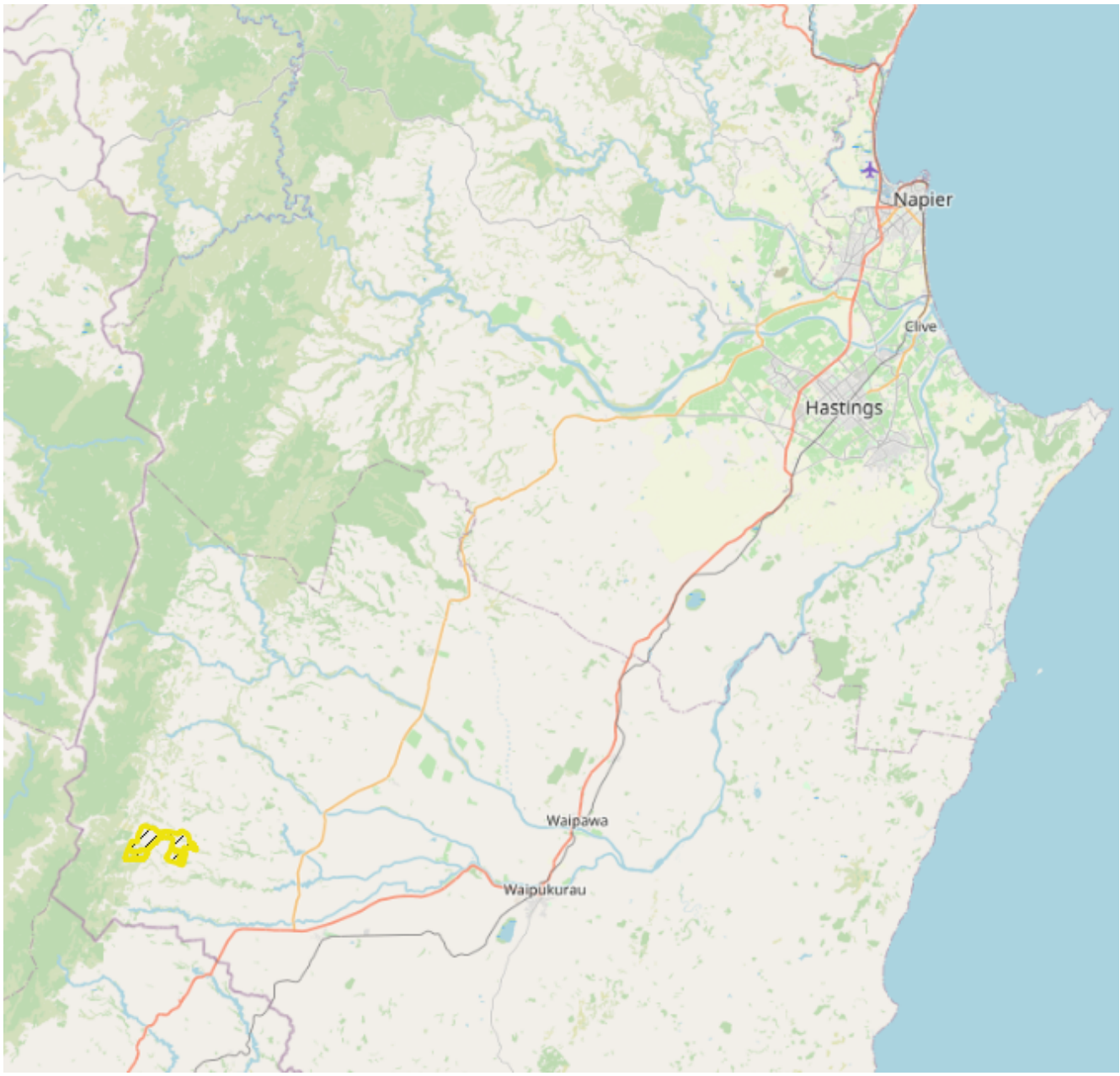
The lesson we can all learn from Conon is in his tenacity and energy, keeping on searching for answers rather than being overwhelmed by events. With this positive attitude we will manage the farm through the toughest of droughts.

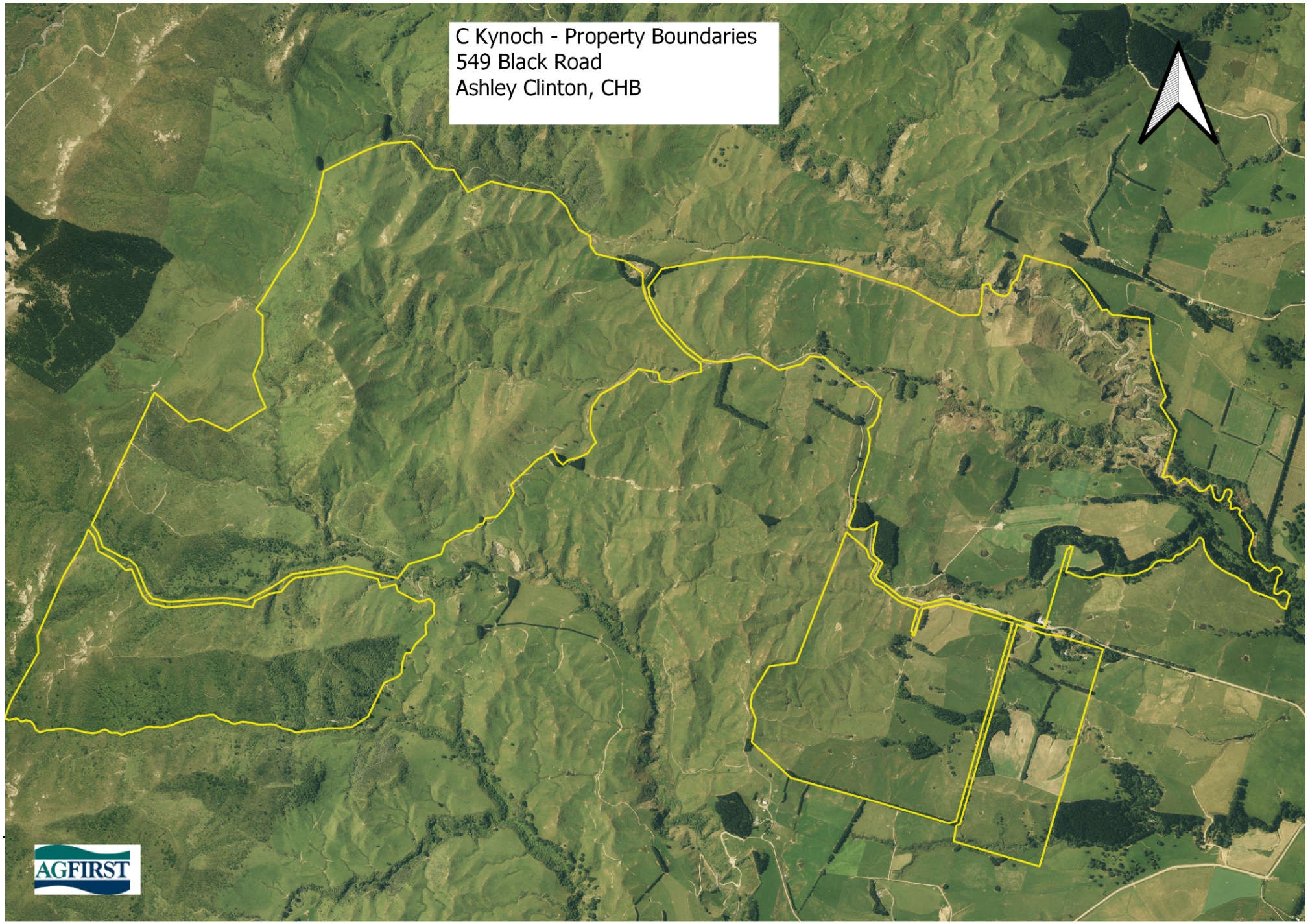
8.0 APPENDICES



Source HBRC

A map showing the relative location of the property, approx. 30 kms west of Waipukurau.

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