

The supplement struggle

New Zealand's dairy industry is so reliant on internationally produced supplements that production and profitability would be impacted significantly if this food supply was interrupted. New Zealand-grown supplements could free us from this reliance, but the transition will be slow.

Moving to zero-supplement dairy systems

Why: To determine the productivity, profitability and sustainability impacts of removing all internationally produced supplements (IPS) from New Zealand dairy farming systems.

Where: Two dairy farms in Waikato.

Who: Regan McCorquindale (RECO) and Sean Nixon (Agriconcepts).

What:

- Analysis was performed on two dairy farms to determine how reliant these properties have become on internationally produced supplements (IPS).
- The current system was used as the base and three scenarios were modelled: zero IPS (ZIPS), substitution for New Zealand produced supplement (NZPS), and a lower stocking rate with ZIPS (LSR).
- The outcomes and additional data were scaled up to a national level, and this uncovered that without IPS, efficiency would rapidly decline if dairy cow numbers and farmed area remained the same. Production and profitability would be impacted significantly.
- If the dairy area was reduced and IPS was substituted for NZPS, some of the losses would be mitigated, but there would be product access challenges.

Read more: *Moving to zero-supplement dairy systems:* ourlandandwater.nz/RPF2022

Trucks frequently visit New Zealand dairy farms, but Regan McCorquindale from RECO worries how many of them are loaded with imported feed. He wondered what could happen to New Zealand's dairy industry if it lost access to this food source.

Internationally produced supplements were needed to maintain dietary requirements as stocking rates increased on New Zealand dairy farms. But this has left the sector in a vulnerable position, with fluctuations in production and logistical challenges. There are also mounting pressures to drive efficiencies and produce 'more from less' as cow numbers decrease.

Keen to understand what feed opportunities lie ahead for the New Zealand dairy sector, Regan and Sean Nixon from Agriconcepts teamed up to explore the topic. They wanted to understand what the potential impacts could be if internationally produced supplements were removed from the system and whether the value of New Zealand produced supplements could be increased.

"It is a worry how reliant the New Zealand dairy system has become on internationally produced supplements to sustain production levels and animal welfare," Regan says. "You struggle to go to a farm nowadays that doesn't have truck tyres coming in the gate, but we need to look at other alternatives. What can be controlled within New Zealand's agricultural system and what can't."

He recognises there will always be a place for internationally produced supplements, but wanted to explore how the sector could rely on them less.

The project used data from two Waikato dairy farms (**Table 1**). FARMAX modelling and some system optimisation models allowed them to explore the net effects on production if all internationally produced



Regan McCorquindale with supplement

supplements were removed from the system. They also looked at what system changes would be needed if imported supplements were substituted with New Zealand products, and both scenarios were scaled up to determine the impacts on a national scale.

The results highlighted there would be significant impacts if the sector faced a sudden shift to remove all internationally produced supplements, as it would reduce production and profitability greatly, posing risks to business sustainability.

The good news was that substituting with domestically produced supplements has the potential to maintain production, although the biggest challenge is the availability of land to grow alternative crops.

They concluded the shift will need to be gradual and farmers will need to look at options to mitigate risks and reduce their reliance and control as much as they can to protect their businesses into the future.

Supported by supplement

The levels of internationally produced supplements used in New Zealand constantly change. For the two farms analysed, imported feed made up 28% (System 4) and 19% (System 3) of the herd's diet. The modelling showed if supplement was removed from those systems entirely, milk production would reduce by 14% and 24% and profitability would decline.

“There is too much volume coming in, our sector couldn't handle an abrupt stop to imported supplements. But the current system is too reliant on shipping and transport,” says Regan.

“Farms don't have the storage capacity, so they rely on human input to estimate when they need another delivery, and usually there are a lot of farms wanting it at the same time which affects availability. Not to mention the skyrocketing transport and logistic costs.”

The research didn't suggest farms should move towards lower intensity systems (System 1 or 2) with less supplement, says Regan, but farms do need to have infrastructure to store the product and not be so reliant on the timing of a truck turning up.

Increasing product value

New Zealand-produced supplements, such as maize silage, or barley and wheat grain, could be used to mitigate the production losses. The challenge would be access to product and how much land would need to be removed from the dairy platform, which also means a reduction in cow numbers.

“It would be great to see New Zealand supplements feeding our own dairy systems and create a premium on that product. But our biggest challenge is the availability of land to grow the alternative crops.”

Table 1: Two Waikato dairy farms modelled through FARMAX and the three different scenarios without the use of IPS

Parameter	Farm A				Farm B			
	Base	ZIPS	NZPS	LSR	Base	ZIPS	NZPS	LSR
Number of cows (peak lactation)	530	530	530	495	191	191	191	170
Stocking rate (SR: cows/ha)	2.9	2.9	2.9	2.7	3.4	3.4	3.4	3
Comparative stocking rate (CSR)	84.5	91.5	86	86.8	84.1	95	84.3	90.8
Net pasture growth (t DM/ha)	15.3	15.3	15.3	15.3	16.6	15.7	16.8	14.8
Pasture consumed (t DM/ha)	13	13	13	12.8	15.5	14.7	15.6	13.7
Total feed consumed (t DM/ha)	18.3	16.8	18.3	16.8	22.8	19.7	22.7	18.3
IPS consumed (kg DM/cow)	441	0	426	0	740	0	700	0
Total imported feed/total feed (%)	28	21.7	27.9	22.9	18.8	9.3	18.2	8.9
Annual MS (kg/cow)	429	375	427	408	421	320	422	347
Annual MS (kg/ha)	1,250	1,093	1,244	1,111	1,436	1,092	1,438	1,055
Annual MS (as a % of liveweight LW)	83.6	73.8	81.9	78.8	83.8	66.3	83.7	72.1
LW (kg/ha)	1,496	1,481	1,518	1,409	1,717	1,647	1,718	1,464
Feed conversion efficiency (kg DM: kg MS)	14.2	14.8	14.2	14.6	14.2	15.9	14.2	15.3
Days in milk	286	286	286	286	266	267	266	265
Body condition score	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Greenhouse gas (kg/farm ha)	526	492	524	486	623	550	622	523
Operating profit (NZ\$/ha)	3,330	2,417	2,901	2,524	1,584	780	1,187	818

Note: Fonterra's Final Farmgate milk price for the 2018/19 season which was \$6.35 kg MS has been applied to both the farms, however the cost structure used was different. Farm A cost structure was reflective of the same season, whereas Farm B has been compiled from the 2020/21 season. Therefore, comparisons between both properties' operating profit/ha is not recommended, within-farm comparison is acceptable. The values in red are NZPS/cow in substitution for the IPS.

For production to remain the same as the 2020/21 season, they predicted 183,000 ha would need to be retired from the dairy platform to yield the required tonnage of New Zealand produced supplements (New Zealand Dairy Statistics, 2021). This equates to 10.8% of the area currently under dairying and cow numbers would also need to be reduced by 500,000, meaning per cow performance would need to lift roughly 11% to 442 kg MS/cow to maintain the current level of milk production nationwide.

Even by maintaining production, profitability would reduce. They saw a reduction of almost 13% and 25% for the farms modelled in this project, largely because local supplements cost more.

Getting ready

The process to reduce reliance on internationally produced supplements is going to be gradual, but there are steps farmers can take now to help prepare

them. Regan is a big advocate for matching supply and demand, and he recommends farmers monitor pasture production and move calving spreads to match the 'new' climate.

"Pasture is the cheapest form of feed, but not if cows aren't calving to match the curve. It pays to look back at patterns and move calving if needed."

He also talks about farms doing more from less, considering lower stocking rates and creating greater surpluses through spring to redistribute in summer, depending on climatic conditions.

"For farmers it's about controlling as much as they can. They shouldn't let themselves get too exposed to the seasonal variations and keep an open mind about how they can do things better from less."

—
Samantha Tennent for the Our Land and Water National Science Challenge