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# Better Wintering – West Coast

## Our Land & Water Rural Professional Fund

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| Client | **Our Land and Water – Rural Professionals Fund** |
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## Project Background

Livestock farming on the West Coast can be challenging given the Coasts unique and diverse climates and landscapes. Perhaps the biggest challenge facing farmers is how to best manage livestock through the winter and early spring periods, particularly during times of prolonged rainfall.

There are limited West Coast specific resources available to assist farmers with their winter decision-making. Farmers have had to make-do with advice based on other region's experiences, or based on general principles, which can often be of limited relevance to West Coast farming systems. This project's goal was to address this through providing West Coast centric information on applicable wintering systems for the Coast.

The recent Intensive Winter Grazing regulations have placed renewed focus on managing risks to water quality from wintering livestock. However, nutrient loss is typically of lesser concern on the Coast due to the high rainfall environment, short residence time of rivers, and lower intensity farm systems interspersed within large areas of indigenous vegetation. Instead, the challenges are sediment loss to drains and smaller tributaries, soil damage from pugging leading to spring pasture production issues and animal welfare considerations, particularly during calving. Nutrients are of concern in some areas where there are sensitive downstream receiving environments, such as pristine lakes, or groundwater drinking zones.

Current West Coast wintering practices typically include traditional standoff pads and/ or sacrifice paddocks. More recently infrastructure solutions such as composting barns and herd shelters have been promoted as the way forward. However, many West Coast farmers are asking questions as to the need and financial viability of these.

## Project Overview

The West Coast wintering project's goal was to provide West Coast farmers with specific information on the range of applicable wintering system options alongside considerations for the application of these. There has been no previous winter grazing research conducted specifically for the benefit of West Coast farmers.

The project outputs provide West Coast farmers with a winter grazing options analysis that is specific to their situation. This will support farmers improve upon their environmental and animal welfare practices, allowing them to make informed decisions and develop more resilient farm systems. It will also support West Coast farmer discussions with their consultants, many of whom are from outside the region and not fully aware of its unique challenges. The project's benefits include improved water quality, improved soil structure leading to reduced impacts on pasture production, and improved consideration of animal welfare.

The project involved an initial literature review followed by a series of interviews with West Coast farmers, alongside two farmer workshops. The interviews included farmers using the standoff pad methods in combination with supplementary feed or winter forage crops, alongside farmers using herd shelters and compost barns. Questions were asked about each farmer's motivation and reasoning behind their current wintering system, the options they considered, and any limitations or additional benefits they have identified since implementing their winter system.

Two West Coast dairy farms, one a system 2 and the other a system 4, were used to model a range of different wintering options through Farmax and Overseer. This allowed the economic and

environmental implications of the different options to be better understood. Both case study farms have a long history of benchmarking data including financial and physical information.

## Literature review

A list of the common winter grazing systems can be found below and a detailed summary of each in Appendix 1. It should be noted many of these are often used in combination:

1. Pasture and baleage
2. Sacrifice paddock
3. Forage crop
4. Stand-off pad/ Wintering pad
5. Feed-pad
6. Herd shelter
7. Herd home
8. Composting barn

## Farmer Interviews and Workshops

Eight farmers were interviewed throughout the West Coast to encompass a variety of farm systems and climatic conditions. The purpose of the interviews was to gain an understanding of the key issues facing farmers on the West Coast around wintering, alongside the key drivers for each farm selecting their current wintering system. The interviews also explored lessons learnt and key messages that each farmer would pass on to others who are looking to change how they winter.

Two workshop was also held at locations on the West Coast which reinforced the farmer interview findings.

From the interviews and workshop, it became apparent that the main environmental concerns for West Coast farms are sediment and pathogen run off into drains and tributaries. Due to the high rainfall environment, short river residence times and relatively low intensity of farms, nitrogen loss is typically of a lesser concern, but there are some areas for which its management needs careful consideration.

The other main divers for improved winter management on the Coast are:

- Managing the impact of soil pugging during prolonged wet periods and the flow-on impact this has on spring grass production. Two farmers and numerous workshop attendees indicated that if you get it wrong it can take a couple of seasons for badly pugged paddocks to recover. This also strongly links with sediment and pathogen run-off.
- Animal welfare is a key consideration, particularly extreme weather conditions during calving. This can also take its toll on owner and staff morale through having to work long days in cold and wet conditions.

Another key challenge highlighted by some farmers was the value of land on the West Coast and managing the risk that infrastructure solutions may result in land over-capitalisation. While farms need to be future proofed and sustainable, they also need to remain a profitable system that can be easily on-sold.

Those that had built wintering infrastructure noted its benefits from an animal health and welfare perspective. Winter feed costs per cow were noted to have decreased due to improved supplement utilisation. Peace of mind and less stressful calving was also noted as a significant benefit. Excellent feed planning was seen as key for the successful use of infrastructure, this included sourcing a supply of quality local feed, noting the expense of transporting feed from Canterbury, particularly at short notice. Comment was also made that there was an initial steep learning curve with infrastructure as it often resulted in new challenges. For example, the increased risk of mastitis from its poor design or poor operation. Infrastructure appeared to better suit the long-term owner who was actively involved in the day-to-day operation of the farm as opposed to farms with transient contract or lower order sharemilkers.

Both interviewee and workshop farmers commented that there was a lack of West Coast centric information available to them, and that because very few consultants were based on the West Coast, their perspectives, challenges, and costs were often related to Canterbury or Southland scenarios, which are very different in nature.

## West Coast Wintering Options

The wintering options chosen for the case study analysis were selected based on the literature review, farmer interviews, workshop feedback, and in discussion with the case study farmers. Figure 1 provides an overview of the range of wintering options available on the West Coast and an explanation of each is provided below this.

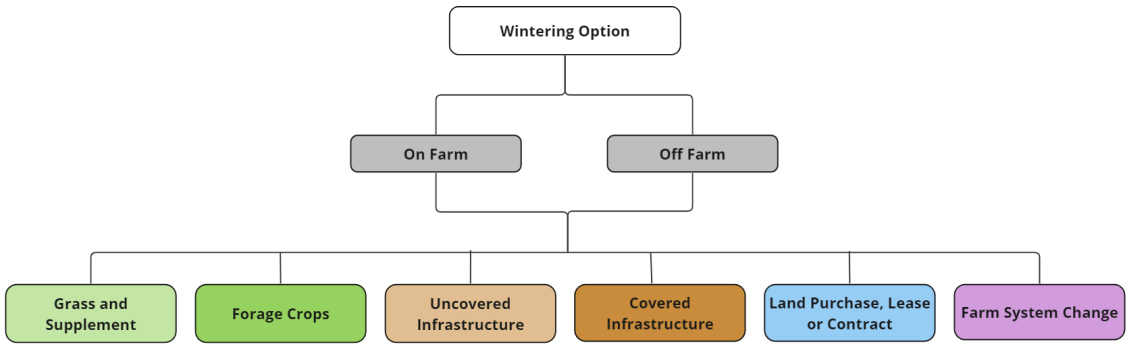


Figure 1 – Range of **w**intering options for Farm Systems on the West Coast

### Grass and Supplement

A self-contained wintering system where stock remain on-farm and are fed grass that has been saved for winter and supplementary feed such as baleage and silage which has been either purchased or made on farm.

### Forage Crops

A self-contained wintering option where stock remain on-farm but are transitioned on and then off a forage crop such as a brassica for the 100-day winter period. Supplementary feed such as straw, hay and baleage are fed to balance the diet,

### Uncovered Stand off and Feed Pads

Lower cost infrastructure that has a permeable base such as gravel or woodchip that is either in a paddock or near a shed that enables stock to be fed more efficiently, often in troughs. Allows stock to be off paddocks in adverse and pro-longed wet weather conditions so pasture can have less damage.

### Covered Stand off and Feed Pads

Intensive infrastructure, often requiring a consent for building and/ or effluent management. Generally, these have a solid base such as a membrane to prevent leaching. They can have rubber mats, concrete slats, or woodchip as a base material for managing effluent and animal welfare to facilitate cows lying down for long periods of time.

### Barn

Much like the covered infrastructure option but allow for longer periods of time off pasture with facilities that can enable cows to be inside 24/7 when weather conditions such as snow and rain occur. Effluent management needs to be considered for either liquid discharges or managing compost to keep conditions clean.

### Additional land purchase, lease block or contract grazing

This involves a shift away from being self-contained through the addition of land as a support block. It can involve purchasing more land, which may enable all youngstock and additional supplements to be harvested, or stock being grazed off on contract to fit in with staff and lifestyle. This allows the milking platform pastures to recover and a focus on peak milk production.

### Diversifying Farm System

Adding additional income streams to the farm system, either with no change to the dairy system or to supplement loss of income through lower cow numbers or lower production.

## Wintering Option Decision-Making

In determining which wintering options should be selected for analysis with each case study, the practicality of each of the above options was carefully considered.

The considerations included the farm's inherent (landscape) risk, animal welfare risks, farm system limitations, management limitations, farm financial constraints, and the goals of the farm owner.

Through this process a series of questions to support decision-making was developed (figure 2). These can be used by West Coast farmers to support them in working through the appropriate wintering option for their farm. An associated list of wintering options, their benefits, and situations for careful consideration, was also developed. These should be used in conjunction with the questions (figure 3). For example, if the farms soils are susceptible to pugging, in an area of very high rainfall, and there was lake downstream, in situ grazing of forage crops would not be advisable due to soil damage and resulting production losses alongside potential environmental risks.

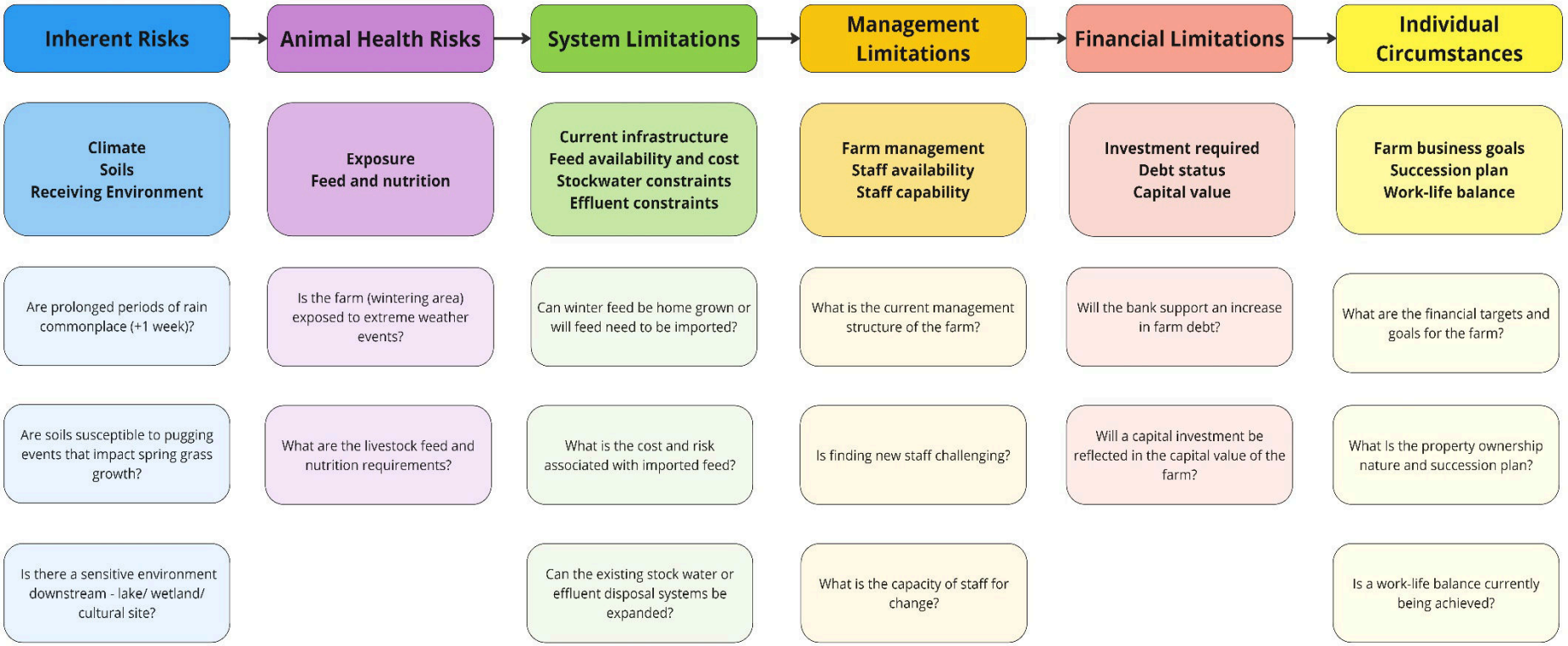


*Figure 2: Wintering Option Decision-Making*

| Options | Considerations |
|---|---|
| **Forage Crop** | **Benefits -** Cost-effective option, particularly when used in conjunction with a Stand-off/ Feed pad<br>**Situations requiring careful consideration** - Soils susceptible to pugging; sensitive downstream environments; exposed sites |
| **Grass & Supplementary Feed** | **Benefits -** Cost-effective option, particularly when used in conjunction with a Stand-off/ Feed pad<br>**Situations requiring careful consideration** - Soils susceptible to pugging; exposed sites |
| **Uncovered Stand-off pad** | **Benefits** - Effective option when used in conjunction with forage crops or grass & supplementary feed systems; milking-season use<br>**Situations requiring careful consideration** - Soils susceptible to pugging; exposed sites; effluent constraints |
| **Uncovered Feed Pad** | **Benefits** - Effective option when used in conjunction with forage crops or grass & supplementary feed systems,; millking-season use.<br>**Situations requiring careful consideration -** Soils susceptible to pugging in prolonged rainfall environments; exposed sites; effluent constraints |
| **Covered Stand-off pad** | **Benefits** - Effective option when used in conjunction with forage crops or grass & supplementary feed systems; milking-season use<br>**Situations requiring careful consideration** - Soils susceptible to pugging; exposed sites. |
| **Covered Feed Pad** | **Benefits** - Effective option when used in conjunction with forage crops or grass & supplementary feed systems; millking-season use.<br>**Situations requiring careful consideration -** Soils susceptible to pugging in high rainfall environments; exposed sites |
| **Herd home (hard floor)** | **Benefits** - Decreases animal health risks; favourable work environment; milking-season use as stand-off; calving use; undercover effluent storage<br>**Situations requiring careful consideration -** Short-term management arrangements; no cost-effective feed supply; high debt; pro-longed within milking-season use. |
| **Composting Barn** | **Benefits** - Minimises animal health risks; favourable work environment; milking-season use for prolonged rainfall events; calving use; no effluent<br>**Situations requiring careful consideration** - Short-term management arrangements; no cost-effective feed supply; high debt. |
| **Wintering-off - Land purchase/ lease** | **Benefits -** Effective infrastructure alternative; removes the risk of land over-capitalisation<br>**Situations requiring careful consideration -** TRansfering the issue to other land where soils susceptible to pugging; sensitive downstream environments; exposed sites, milking-season rainfall protection required |
| **Farm system change (de-intensify)** | Situation specific, typically option favours older owner-operators with no succession plan or those looking to diversify their operation |

*Figure 3: Benefits and Considerations for the different winter options on the West Coast*

## Case Studies

The two farms used for the case studies were the monitor farms for the West Coast Focus Farm Trust. They were selected as they had comprehensive records (both financial and performance data) over multiple seasons. Both farmers had knowledge from wintering in other areas of New Zealand and are known for embracing the changes and challenges within the industry and regulatory environment.

Each farm's current system was modelled in Farmax using 2021-22 season data. The three additional wintering scenarios were also modelled in Farmax.

Farmax is a modelling and decision support tool that uses farm input, production, and financial data to enable the production and financial impacts of different scenarios to be explored. It also provides a simple Nitrogen-Balance. A Nitrogen Balance approach was used for the analysis as it provided a simple indicator that has been shown to strongly correlate with N-loss. Also N-loss modelling for infrastructure mitigations currently has many uncertainties.

Both farms are also part of Westland Milks Farm Excellence (Farm Ex) program. This requires them to submit a report of their inputs and outputs each year and demonstrate they are meeting the supplier agreed standards for people management, animal welfare and the environment.

In undertaking the analysis discussions were held with each farm around the wintering options selected, including the potential drivers and risks for each farm (see table 1 below). It was from this table that the decision-making questions in figures 2 were developed.

*Table 1 – Risks and Drivers for farmers to consider*

| Factor | Key Questions |
|---|---|
| **Inherent Risks** | Climate, soils, surrounding environment, farm size. |
| **System Limitations** | Current farm infrastructure, staff, pasture/supplementary feed production. |
| **Animal Health Risk** | Exposure to weather, nutritional requirements, self-contained or grazing off farm. |
| **Management Limitations** | Staff availability and turnover, current management on farm. |
| **Financial Limitations** | Debt to equity ratio, level of investment in infrastructure, impact on capital value, succession, current debt status. |
| **Individual Circumstances** | Individual goals and drivers, stage of farm investment/ownership. |

The capital and maintenance costs for infrastructure were socialised at the farmer workshops to ensure the costs used were relevant for the West Coast.

Table 2 shows the range of costs used for the Farmax modelling. The lower and upper end of each range is influenced by the level of infrastructure to be added. For example, some farms have existing infrastructure such as effluent storage and ponds that can handle additional effluent while others may require investment in further storage.

*Table 2 – Capital and on-going maintenance costs of infrastructure for wintering on the West Coast*

| Infrastructure | Capital Cost | Maintenance Cost |
|---|---|---|
| Stand Off Pad | $800 – $1,000 per cow | $8,000 - $10,000 per annum |
| Covered Stand Off Pad | $1,300 - $1,600 per cow | $10,000 – $13,000 per annum, |
| Covered Barn | $2,500 – $4,000 per cow | $10,000 – +$20,000 per annum |
| Land Purchase | $7,000 - $20,000 per ha | Variable depending on investment |

## Current Farm System

***Farm A***

Farm A is a System 2, self-contained unit with a lease block that supports wintering and youngstock operations. Forage crops are currently grown alongside maize silage to supplement the system. PKE is fed in the shed, and there is a small standoff pad that allows for feeding of supplementary feed throughout the season as required. Investment has been made in some on-farm technology to automate some systems. Contractors are used to allow for lower staff numbers on-farm. The baseline performance data is provided in table 3 alongside the wintering options analysed. The wintering options were selected in conversation with the owners to ensure they were applicable. The N-balance (69 kg/N/ha) when compared to the Dairy Tomorrow Purchased Nitrogen Surplus upper quartile target of 141 kg/N/ha is much lower reflecting the lower intensity and efficiency of the farm system.

***Farm B***

Farm B is a System 4, partly self-contained unit but with youngstock grazed off farm. The miking herd is wintered on an adjacent lease block where supplementary feed is also provided. Maize silage is grown on farm and fed out alongside PKE on a loafing pad near the dairy shed. It is predominantly an owner-operator system with contractors used for some of the cultivation and crop work as required. The farms baseline performance data is provided in table 3 alongside the wintering options analysed. The wintering options were selected in conversation with the owners to ensure they were applicable. The N-balance (99 kg/N/ha) when compared to the Dairy Tomorrow Purchased Nitrogen Surplus upper quartile target of 141 kg/N/ha is lower reflecting the lower intensity and efficiency of this farm system. However, it is comparatively higher than Farm A noting it is a system 4 as opposed to system 2.

## Wintering Option Analysis

Wintering options on West Coast are not a one size fits all approach. The diversity of climate and farming landscapes gives rise to a set of challenges that are unique to each farm. These then shape the decisions that farmers make alongside their personal goals.

The unique climate on the Coast typically leads to a longer winter period than that of other regions. Higher rainfall and exposure to the elements mean animal welfare is a key consideration in the decision-making process. Pugging and the limited window for resowing paddocks in some areas are also key considerations given the impact these have on spring grass growth and cost of production.

Table 4 shows the change in farm operating profit per hectare and for each of the wintering system options analysed. An explanation of each is also provided below.

*Table 3 – Baseline data for case study farms*

| Farm Baseline | A | B |
|---|---|---|
| **Stocking Rate** | 2.2 cows/ ha | 2.4 cows/ ha |
| **MS/Cow** | 461kg MS | 424kg MS |
| **MS/ha** | 1,100kg MS | 951kg MS |
| **System** | 2 | 4 |
| **Current Infrastructure** | Stand-off pad | Loafing pad |
| **Nitrogen Balance kg/N/ha** | 69 | 98 |
| **Staffing levels** | 2 FTE | 2.7 FTE |
| **Operating Profit** | $3,131/ ha | $3,026/ ha |
| **Wintering Scenario 1** | All Grass (self-contained) | Covered Feed Pad |
| **Wintering Scenario 2** | Winter Brassica Crop | Composting Barn |
| **Wintering Scenario 3** | Land Purchase | Diversification (smaller dairy herd and beef finishing) |

The analysis assumed that farms were at a steady state for each of the wintering options analysed, i.e., transitional changes and costs were not accounted for. The production gains and costs used in the analysis were also conservative.

Capital costs in the Farmax modelling were amortised over a 10-year period using current market interest rates (see Appendix 2). Operating costs were also included for the infrastructure investments based on the conservative end of the range shown in Table 2.

Given the adopted methodology is conservative, it is likely greater production and/or profit gains can be made in the long term for all the options analysed, particularly as they continue to be optimised for each farm.

*Table 4 – Change in Profit compared and Nitrogen Balance from current state for each farm*

| | Farm A | Farm B |
|---|---|---|
| **Wintering Scenario 1** | All Grass Self Contained | Covered Feed Pad |
| **Change in Operating Profit/ha** | -13% | +12% |
| **Nitrogen Balance kg/N/ha** | 63 | 95 |
| **Wintering Scenario 2** | Winter Brassica Crop | Composting Barn |
| **Change in Operating Profit/ha** | +15% | +7% |
| **Nitrogen Balance kg/N/ha** | 64 | 90 |
| **Wintering Scenario 3** | Land Purchase | Diversified System |
| **Change in Operating Profit/ha** | -0% | -11% |
| **Nitrogen Balance kg/N/ha** | 66 | 94 |

***All Grass Self Contained***

Given the costs of imported feed and the benefits of being self-contained, i.e., reduced labour costs and ability to easily manage biosecurity risks, a system 1 dairy system dairy farm was modelled. For this production was lowered by 5% (to reflect the decreased milking herd size), and operating costs were also reduced by grazing all stock on the platform. While at the farm level the environmental footprint of such farm types may increase, at a catchment level the overall impact on nutrient leaching and greenhouse gases is unlikely to change (Chikazhe et al. 2019). The Nitrogen Balance has decreased slightly from the baseline, this is due to becoming a self-contained system 1 dairy farm.

***Winter Brassica Crop***

A forage crop is grazed over the winter months in place of growing a maize silage crop. This allows for the same number of cows to be on-farm, but for pasture to be in better grazing condition for spring and peak milking. Production remains the same as the current system but the costs to grow a brassica crop and re-grass are significantly lower than that of a maize crop. However, it relies on the farm having access to good feed for the remainder of the season, or the use of PKE or meal as needed and that there is a suitable window for re-grassing. The Nitrogen Balance has decreased slightly from the baseline, due to the change in crop used for wintering.

***Land Purchase***

Capital investment to purchase an additional grazing block so the farm is completely self-contained. This gives flexibility to control all the system costs, and additional scope to grow other crops or silage pasture as the season allows. Production is slightly increased due to the additional feed that is expected to be available which in turn offsets the interest costs for the land purchase. The Nitrogen Balance is consistent with the baseline, as production on the land purchase aligns the current system to ensure farm profitability.

***Covered Feed Pad***

An area near the milking shed currently acts as a standoff pad. It was proposed that this area be covered, and a trough feed system put in place. The additional effluent management requirements fitted within the current system capacity so minimal capital investment was required for effluent management. All supplementary feed would be fed on the covered feed pad including PKE and silage. Cow numbers were modelled to increase by 8% and milk production by 5% per cow. This is conservative given the infrastructure benefits and the likely increase in feed utilisation. The Nitrogen Balance has only decreased slightly from the baseline as while there have been efficiency gains cow number and production increases have countered these.

***Composting Barn***

The inclusion of a composting barn would enable the farm to better manage its inherent and animal welfare risks by housing livestock during adverse weather. The barn would also be utilised throughout the season on an as and when basis, which would improve the feed efficiency of supplements. The production increases used were relatively conservative based on an 8% increase in cow numbers resulting in an 5% increase in production. This used a similar level of supplement to that currently grown and purchased. Greater gains in profit could likely be expected, noting previous compost barn modelling has shown gains up to 140% per cow (Woodford et al., 2018). However, the starting production point in such cases was significantly lower than that of the case study farm, so in reality much smaller production gains per cow would be anticipated. The Nitrogen Balance has decreased the most from the baseline, as while cow numbers and production have increased, maintenance requirements have decreased and feed utilisation has also increased.

***Diversified System (smaller dairy herd and dairy beef unit)***

The diversification of the farm system involved de-intensification of the dairy herd alongside the introduction of beef finishing. Reducing the milking herd size by 20% also reduced the number of replacement animals that needed to be kept on farm. This allowed a dairy beef unit to be added, rearing all the calves on farm through to 12-14 months of age. There is potential to have the dairy beef animals on-farm longer, or to bring on other beef animals, however, the modelled scenario (a lower level of production and inputs including staffing costs) appeared to be the best approach. The Nitrogen Balance has only decreased slightly from the baseline, as despite the change in farm system the addition beef unit and becoming self-contained results in similar inputs and outputs.

## Conclusion

The case study analysis demonstrates that traditional approaches such as low-cost stand-off pads in combination with forage crops can work well for most farms; that infrastructure can be cost effective option in the right circumstances; and that becoming a self-contained unit, land purchase and land use diversification may be difficult to justify as an option in some cases.

The main take home from this project is there is no one size fits all to selecting the best wintering system for West Coast farms. In some circumstances stand-off pads or sacrifice paddock will continue to be the best option, in others (particularly in higher rainfall areas, where soils are vulnerable to pugging, where there is a sensitive downstream environment and animal welfare issues are greatest) covered infrastructure options will need to be strongly considered.

To determine the best wintering option for their scenario, West Coast farmers need to logically work their way through the questions outlined in figure 2 (farm inherent risks, animal welfare, farm system limitations, farm management constraints, financial limitations, and individual circumstances), in combination with the benefits and considerations outlined in figure 3. This will help them narrow down the initial range of applicable options. Post this the farms financials and personal circumstances will ultimately drive the option selected.

When working through the best wintering option for their farm, West Coast farmers need to be confident in understanding their system and its associated risks. Seeking independent advice from experienced consultants or financial service providers is recommended to assist with this process, if only as a check and balance. Importantly farmers need to avoid being sold a specific infrastructure solution until such time they have determined it is the best solution for their situation.

# References

Askin, D and Askin, V (eds). (2016). Financial budget manual. Faculty of Agribusiness and Commerce, Lincoln University, New Zealand.

Chikahze, T., Neal. M.B and Bird, P. (2019). Modelling the economic and environmental implications of reducing biodiversity risk by changing to a self-contained dairy grazing system in New Zealand. Journal of New Zealand Grasslands 81: 159-162.

Dairy NZ 2023. The 5 production systems. Dairy NZ. https://www.dairynz.co.nz/business/the-5-production-systems/ Accessed 8/5/2023.

Rowarth, J.S. (2013). Dairy cows: economic production and environmental protection. Ecosystem services in New Zealand - conditions and trends, 85-93.

Woodford, K., Roberts, A., and Manning, M. (2018). Dairy composting barns can improve productivity, enhance cow welfare, and reduce environmental footprint: A Synthesis of current knowledge and research needs. Farm environmental planning - Science, Policy, and practice

# Appendix 1 – Literature Review of Wintering Options

## Permanent Feedpad

**Description**

An area where stock are confined in order to avoid pasture damage and for feeding out during periods when soils are saturated.

A feedpad is a confined yarded area with a hard surface that provides adequate water, space and has the facilities to allow for regular feeding of the whole herd. The feedpad has an effective waste removal system. It should be constructed to withstand heavy traffic and be easily cleaned.

**Benefits**

- Permanent facility providing flexibility in managing the herds dietary intake, allowing for a greater range of supplements to be fed
- Significant reduction in feed ration wastage and better feed utilisation
- Opportunity to minimise lameness when laneways are problematic
- Reduces cost associated with paddock renovations
- Potential to increase pasture production if pugging can be avoided
- Opportunity to establish an effluent system that captures and store effluent and manure which can be reapplied when soil conditions suit

**Limitations**

- Potential for significant earth works to establish adequate slope
- Permanent facility which is difficult to retrofit to accommodate expanding herds
- Large water supply to enable cleaning
- An effluent management system is required
- Significant labour input

**Local/Site specific factors**

Rainfall will have a big influence on the amount of effluent produced. Is there enough space for a feedlot and the appropriate storage of effluent. Low elevation and coastal aeras typically recording between 2000 mm and 3000 mm of rain annually.

Length of time the herd will be confined to the pad? If used for long periods of time the feedpad requires significant resourcing, including staff availability and knowledge of farm equipment.

What feed supplements will be utilised

**Further information**

https://www.dairynz.co.nz/business/infrastructure-investment/off-paddock-facilities/

https://www.dairynz.co.nz/feed/crops/wintering/

https://side.org.nz/wp-content/uploads/2014/05/3.1-Wintering-Systems.pdf

J Brennan, Horizons Regional Council, Feedlots and intensive winter grazing – Review of literature and regional plans 2017

## Standoff pad/ Wintering pad

A standoff pad is a purpose built, drained loafing aera where stock can be held for long periods when it is not suitable to have them on pasture. Unlike a feedpad, a standoff pad is not a place to fed animals but instead a large area for stock to lie down.

**Benefits**

- Less pugging of paddocks and better production as a result
- Better management of nutrients
- Better pasture management by extending rotation
- Prevents cows lying down in paddocks instead of feeding

**Limitations**

- Cost, high initial capital cost
- More time involved moving herd between pasture and the facility
- Needs time and money to clean and maintain
- Another effluent stream to manage
- Increased risk of mastitis
- Increased risk of lameness

**Local/Site specific factors**

Rainfall will have a big influence on the amount of effluent produced. Is there enough space for a standoff pad and the appropriate storage of effluent.

Standoff pad maintenance affects cow lying times. With a well topped up dry surface cows will spend most of their time lying down on the pad, this is ideal as cows spend their time in the paddock eating and not lying on feed.

Research shows the advantage of on off grazing over 24-hour block grazing. Block grazing reduced pasture production by 15% over the next 2 grazings compared to on-off grazing.

Knowing that cows are safe and securely held on a suitable pad provides peace of mind and can greatly reduce stress levels for the staff working on farm in times of bad weather.

Potential to provide a suitable clean area for calving with a possible reduction in calf losses. Supervision of stock is easier.

**Further Reading**

https://www.dairynz.co.nz/media/5794563/stand-off_pads_booklet_august_2021_dnz40_050_webpdf.pdf

https://www.agritechimports.co.nz/comfy-cow

https://www.massey.ac.nz/~flrc/workshops/16/Manuscripts/Paper_Chrystal_1_2016.pdf

https://www.dairynz.co.nz/media/2213076/investing-in-off-paddock-facilities.pdf

## Winter Forage Crop

Forage crops (typically kale, fodder beet or swedes) are typically sown in the spring to provide adequate feed during the winter months when a feed deficit develops. These crops provide bulk and quality feed at low cost in comparison to feeding supplement. However, to ensure a balanced diet baleage and supplements may be needed.

Annual feed budget prepared to determine crop planted relative to stock units. Yield calculations required to ensure enough fed on hand, and further supplementary feed bought to correct a deficit.

It is important to accurately assess paddock yield and break widths to achieve target DM intake.

**Benefits**

- Cheaper than supplements.
- Produced on farm.
- Nutrient resources can be retained in the paddock if best practice is followed

**Limitations**

- Soil structure can be damaged due to compaction leading to impaired drainage
- Potential for sediment and effluent run-off to enter waterways from disturbed soil.
- Muddy and wet conditions can increase mastitis and lameness if animals not well managed
- There is a chance that cows may not get their daily feed requirements.
- Cost to resow paddock when finished.
- Potential reduced lying time in wet muddy conditions

**Local/Site specific factors**

Knowledge of current regulations regarding intensive winter grazing.

Paddock selection needs to consider slope, soil type and ease of management.

Strategic grazing – slopes top to bottom and long narrow breaks to minimise trampling of crop.

Plant crop in rows parallel to the fence line, so rows can be easily allocated.

Consider back fencing to help minimise pugging.

Reduced lying times of stock in wet muddy conditions.

Place baleage in paddocks prior to winter in line with daily breaks to avoid tractor damage.

Transition onto winter crop allows the bacteria in the gut to adjust from the usual grass-based diet.

**Further reading**

P62421-Winter-Grazing-Guide_FA-WEB.pdf (catalystag.co.nz)

https://www.dairynz.co.nz/environment/freshwater/freshwater-regulation/intensive-winter-grazing-rules/

https://www.mpi.govt.nz/animals/animal-welfare/safeguarding-our-animals-safeguarding-our-reputation/animal-management-winter-grazing-mud/

https://www.mpi.govt.nz/dmsdocument/44866-20212022-Intensive-Winter-Grazing-Module

## Sacrifice paddock

A sacrifice paddock is a method of managing cows and pasture when there are no purpose-built stand-off facilities, or where off farm grazing is not an option. A sacrifice paddock can take the pressure off the rest of the farm by allowing grass cover to build up while vulnerable soils are wet.

Supplementary feed is provided in the paddock to meet the animal's requirements.

**Benefits**

- Low cost as no significant investment is required. There will be a cost associated with renovating the sacrificed paddock after use

**Limitations**

- Soil structure can be damaged due to compaction leading to impaired drainage
- Potential for sediment and effluent run-off to enter waterways from disturbed soil.
- Muddy and wet conditions in sacrifice paddocks can increase the risk of mastitis and lameness if animals are nor well managed
- There is a chance that cows may not get their daily feed requirements
- Potential reduced lying time in wet muddy conditions effecting productivity of stock

**Local/Site specific factors**

Chose the flattest paddock, with free draining soils that is away from waterways. If the best site is next to a water way, ensure a wide fenced vegetation buffer to trap sediment run off.

Ensure that no mole or tile drains are running through the paddock as sediment and effluent can enter these drains.

Sloping paddocks have a higher risk of sediment runoff.

Consider using paddocks that are more prone to pugging when conditions are dry and leaving the paddocks that are less prone to damage for use in wetter conditions. Aiming to minimise the time spent on the sacrifice paddock.

Size of paddock must be big enough to allow for feeding out and movement of feeders to spread the impacts as evenly as possible.

Consider placement of supplementary feed into paddock before conditions get very muddy and other means to reduce mechanical damage.

Reduced lying times of stock due to wet muddy conditions. There is a direct link between lying times and production.

**Further Reading**

https://www.dairynz.co.nz/media/532751/sacrifice_paddock_fact_sheet.pdf

Sacrifice Paddocks - Smart Shelters NZ

https://www.mpi.govt.nz/animals/animal-welfare/safeguarding-our-animals-safeguarding-our-reputation/animal-management-winter-grazing-mud/

## Pasture and Baleage

Baleage is a stored feed that can be used to address a time of supplemental nutrient demand in the herd. The stage of maturity at harvest is the single largest factor affecting the feed value of baleage.

A forage test is needed to accurately determine the nutritional value of the baleage and if additional supplementation is required.

Careful selection is needed when considering which paddocks to over winter stock in. Those prone to wet conditions and show evidence of damage due to treading and pugging should be used early in the season, when conditions are drier, leaving the better drained paddocks for wetter periods. The cost of treading and pugging is twofold; immediate DM utilisation can drop by up to 40%, and future growth can be significantly compromised. In severe cases pugging can kill a pasture

**Benefits**

- Cost, no investment in on farm infrastructure
- Use of supplementary feed grown on farm
- High quality forage  research has shown that annual ryegrass baleage harvested at the boot stage ranges from 60 – 65 % total digestible nutrients and 10 – 16% crude protein.

**Limitations**

- Soil structure can be damaged due to compaction leading to impaired drainage
- Potential for sediment and effluent run-off to enter waterways from disturbed soil.
- Muddy and wet conditions in paddocks can increase the risk of mastitis and lameness if animals are nor well managed
- There is a chance that cows may not get their daily feed requirements
- Potential reduced lying time in wet muddy conditions

**Local/Site specific factors**

When stock are on wet pasture decrease stocking levels to a lighter rate to help minimise soil damage.

Use poor performing paddocks destined for crop or pasture renovation as winter paddocks.

Create laneways within paddocks which are being break fed to help limit treading to smaller areas.

Feeding losses can be minimised using a cone or ring type feeder, trailer or cradle.

Provide an amount that allows the animals to consume bales in 1 to 2 days to minimise spoilage.

**Further Reading**

https://www.dairynz.co.nz/feed/feed-management/winter-management/

https://pasture.io/grazing-management/pasture-in-winter

https://thisnzlife.co.nz/a-pasture-friendly-way-to-feed-stock-in-winter/

https://www.mpi.govt.nz/animals/animal-welfare/safeguarding-our-animals-safeguarding-our-reputation/animal-management-winter-grazing-mud/

## Herd Home

A herd home is a covered area in which animals can be fed, lie down in comfort and relax. It can increase animal welfare, reduce environmental impacts, increase milk production and reduce fertiliser inputs. The herd home system combines concepts from traditional stand-off areas, feed pads and loafing areas. Water and feed management is critical

The herd home requires an effluent system.

**Benefits**

- Limit damage to pasture
- Harvest nutrients, best practice is to apply effluent to pasture or crops when conditions are right
- Potential improved herd health and increased production
- Ease of calving as indoors protected from the weather
- Provide a quality supply of feed and reduce feed wastage

**Limitations**

- Capital cost
- Daily maintenance of bedding or washing of matting
- Waste management, a new effluent stream to be managed
- Permanent facility which is difficult to retrofit to accommodate expanding herds

**Local/Site specific factor**

Design and management will be strongly influenced by how long the cows will use it e.g., all winter or 12 hours a day. The longer the building is expected to house cows the greater the consideration for key factors such as structural robustness and effluent management. The level of design required for housing cows for a long period of time should not be underestimated.

Housed cows need to lie down for 10-13 hrs per day to optimise health and efficiency. This is aided by providing a good quality clean dry surface. Cows housed on hard surfaces have increased lameness, decreased lying times and dry matter intake is reduced as is body condition scores.

It is essential to get stocking rates correct to ensure stock health.

Staff will need to be trained to understand the risks and skills associated with running an off-paddock system.

Ask farmers who have built barns and used them for 3-5 years what they would do differently. Seek expert advice to get the system right.

**Further Reading**

https://herdhomes.co.nz/wp-content/uploads/2022/08/2016-Dairy-Farm-Case-Study-Butterworth.pdf

https://herdhomes.co.nz/wp-content/uploads/2022/08/2016-Dairy-Farm-Case-Study-Glenmoa.pdf

https://www.dairynz.co.nz/media/5792720/dairy-cow-housing-guide-oct-2019.pdf

https://www.dairynz.co.nz/media/2213076/investing-in-off-paddock-facilities.pdf

## Herd Shelter

A herd shelter is a stand-off pad with a cover or roof over it. It is a purpose built, drained loafing area where stock can be held for long periods when it is not suitable to have them on pasture. Unlike a feedpad, a herd shelter is not a place to fed animals but a large area for stock to lie down. There is a direct link to lying times and production

**Benefits**

- Less pugging of paddocks and better production as a result
- Better management of nutrients
- Better pasture management by extending rotation
- Prevents cows lying down in paddocks instead of feeding

**Limitations**

- High initial capital cost
- More time involved moving herd between pasture and the facility
- Needs time and money to clean and maintain
- Another effluent stream to manage
- Increased risk of mastitis
- Increased risk of lameness

**Local/Site specific factors**

Rainfall will have a big influence on the amount of effluent produced a roof will significantly reduce the volume of effluent.

The lifespan of the surface material is increased, and there is a reduction in the labour associated with its management

Standoff pad maintenance affects cow lying times. With a well topped up dry surface cows will spend most of their time lying down in the pad, this is ideal as cows spend their time in the paddock eating and not lying on feed.

Research shows the advantage of on off grazing over 24 hour block grazing. Block grazing reduced pasture production by 15% over the next 2 grazing compared to on off grazing.

Knowing that cows are safe and securely held on a suitable pad provides peace of mind and can greatly reduce stress levels for the staff working on farm in times of bad weather

Potential to provide a suitable clean area for calving with a possible reduction in calf losses. Supervision of stock is easier

**Further Reading**

https://www.dairynz.co.nz/media/5794563/stand-off_pads_booklet_august_2021_dnz40_050_webpdf.pdf

https://www.dairynz.co.nz/media/2213076/investing-in-off-paddock-facilities.pdf

## Composting Barn

Composting barns are a purpose-built covered area in which animals can be fed and lie down in comfort and relax. The system combines concepts from traditional stand-off areas, feed pads and loafing areas. Cows are free to move around, and the barn has dedicated feeding troughs/alleys.

The key feature of the system is that composting of dung and urine occurs *in situ* within the barn. The cows live on bedding which is organic material initially high in C:N ratio, is porous and is high in lignin. The composting material remains relatively dry, driven by composting warmth and moisture evaporation. If managed correctly there is no liquid effluent and the compost is removed annually.

Correct design and management is essential to ensure ventilation parameters are met and that aeration of the compost can occur twice daily with tractor tilling.

**Benefits**

- Less pugging of paddocks and better production as a result
- Better management of nutrients and potential to decrease artificial fertilizer use
- No liquid effluent stream to manage
- Better pasture management by extending rotation
- Compost can be applied to the paddocks when conditions are suitable
- Prevents cows lying down in paddocks instead of feeding

**Limitations**

- High initial capital cost
- Daily management of the compost bed
- Ongoing training of staff to ensure understanding of the compost system
- Access to suitable bedding material

**Local/Site specific factors**

The tilling system is very important, how the compost layer is turned over daily to provide oxygen to the deeper layers down to 60 - 80 cm.

Compost should be at 50-60°C, an indicator of appropriate activity. The composting process can be disturbed with inappropriate management, e.g., over tilling.

Compost barns should be oriented to take account of predominant wind patterns and heating from the sun to ensure an even distribution of stock. Overcrowded areas will impact the composting ability of the bedding substrate. Ventilation is important to allow moisture to evaporate.

Barns should provide a minimum of $5m^2$ per cow when cows stay in all winter

**Further Reading**

https://www.massey.ac.nz/~flrc/workshops/18/Manuscripts/Paper_Woodford_2018.pdf

https://www.dairybarnsystems.co.nz/knowledge-centre/compost-barns-some-things-to-consider/

https://www.aztechbuildings.co.nz/case-studies/case-1-world-class

https://www.smartshelters.co.nz/how-composting-barns-can-reduce-the-need-for-artificial-fertiliser

# Appendix 2: Infrastructure Amortisation Schedule

***Covered Feed pad***

**Amortisation Schedule**

Yearly Amortisation | Monthly Amortisation

| Year | Principal | Interest | Total Paid | Balance |
|---|---|---|---|---|
| 2023 | $9,268 | $7,385 | $16,653 | $240,732 |
| 2024 | $19,390 | $13,916 | $33,306 | $221,342 |
| 2025 | $20,586 | $12,721 | $33,306 | $200,756 |
| 2026 | $21,855 | $11,451 | $33,306 | $178,901 |
| 2027 | $23,203 | $10,103 | $33,306 | $155,698 |
| 2028 | $24,634 | $8,672 | $33,306 | $131,063 |
| 2029 | $26,154 | $7,152 | $33,306 | $104,910 |
| 2030 | $27,767 | $5,539 | $33,306 | $77,143 |
| 2031 | $29,480 | $3,827 | $33,306 | $47,663 |
| 2032 | $31,298 | $2,008 | $33,306 | $16,365 |
| 2033 | $16,365 | $288 | $16,653 | $0 |
| **Totals** | **$250,000** | **$83,062** | **$333,062** | |

***Compost Barn***

Yearly Amortisation | Monthly Amortisation

| Year | Principal | Interest | Total Paid | Balance |
|---|---|---|---|---|
| 2023 | $39,044 | $24,595 | $63,639 | $960,956 |
| 2024 | $81,072 | $46,207 | $127,279 | $879,884 |
| 2025 | $85,220 | $42,059 | $127,279 | $794,664 |
| 2026 | $89,580 | $37,699 | $127,279 | $705,084 |
| 2027 | $94,163 | $33,116 | $127,279 | $610,922 |
| 2028 | $98,980 | $28,298 | $127,279 | $511,941 |
| 2029 | $104,044 | $23,234 | $127,279 | $407,897 |
| 2030 | $109,368 | $17,911 | $127,279 | $298,529 |
| 2031 | $114,963 | $12,316 | $127,279 | $183,566 |
| 2032 | $120,845 | $6,434 | $127,279 | $62,721 |
| 2033 | $62,721 | $918 | $63,639 | $0 |
| **Totals** | **$1,000,000** | **$272,786** | **$1,272,786** | |