Minimising muck, Maximising money

Stand-off and Feed pads
Design and Management Guidelines

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Section One: Decision Making

Introduction

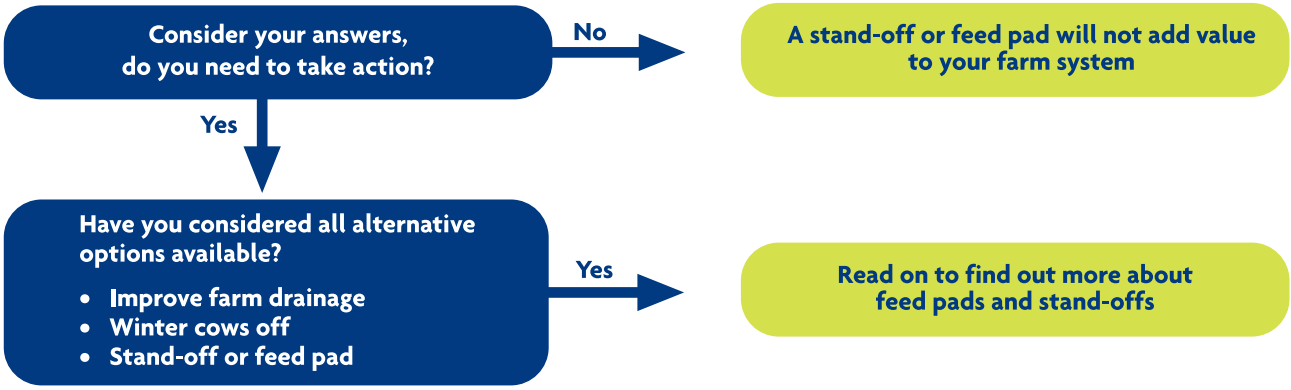
If you are contemplating constructing or upgrading a stand-off or feed pad then this booklet is for you! This booklet provides options and tips for incorporating a pad into your farming operation. It covers planning and decision making, design, construction, maintenance and management to help you reach optimum efficiency.

Profit or fashion... Do you need a stand-off or feed pad?

So you're thinking about investing in a stand-off or feed pad. To make the best decision you'll need to have thought about the limiting factors on your farm and how a pad will enhance your operation. Make sure you have thought through the consequences of any changes to your system. Will you need to spend more money on upgrading other parts of the farm (e.g. effluent system, races)? If a pad is part of a change in farm system, will you need to upgrade the farm dairy or staff accommodation, or learn new management skills? How will the change affect the risks your farm business is exposed to?

Make sure you consider all alternative options, as other simpler solutions could be available. Do you actually need to construct a stand-off or feed pad?

Do you have problems with.....	Yes / No
Soil structure or pugging of paddocks	
Pasture damage due to wet conditions	
Slow pasture re-growth after winter and spring grazings	
Renewing pastures more frequently than you would like to	
Damaging laneways from standing cows on them	
High incidence of lameness and mastitis	
Wasting feed when feeding out	
Managing nutrient loss from your property	
Animal stress from weather extremes	
Incorporating specialised feeds and additives into the diet	



What will I need to consider if I put in a pad?

The size and complexity of your pad depends on you and your operation. A pad does not need to be expensive, but it does need to be efficient, sustainable, appropriate for your herd and your management, and meet regional rules and regulations.

There are considerable benefits to be gained from installing a pad. Remember to look at the bigger picture before making your decision. Consider the following:

- How will you adjust your pasture management to maximise efficiency?
- How will a pad impact on your farm's profitability?
- How will constructing a pad impact on you and your staff's time?
- What will you use the pad for?
- How will you handle animal health and welfare on the pad?
- Can you maintain the proposed system long term, e.g. feed availability, material replacement etc?
- Will a change in system align with your personal and family goals?
- Will you be changing to a higher input feeding system?
- Do you have the skills and staff to run a high input/supplementary feed system?
- How will I manage with increased effluent and stormwater created from the pad?

What pad type do I need?

Stand-off or loafing pad: a specially built area where stock can be withheld from grazing during wet periods to minimise damage to pastures. These pads are constructed of free-draining material such as sawdust, bark, woodchips, lime or soft metal (rock) mix. Because cows may be withheld for extended periods (20 hours/day) they need 8-10m^2 per cow. There is no provision for stock feeding while the animals are on the pad.

Feed pad: a hard surface area. The pads are normally sited adjacent to the farm dairy where stock can be held for some time (1-2 hours), either before or after milking, and provided with supplementary feed. Feed pads are usually included in a farm system to improve feed use compared to paddock feeding.

Wintering pad: a specially built area constructed where animals are withheld from pasture for extended periods and supplementary feeds are brought to them on the wintering pad. As the herd may spend several months on the pad the cows require a similar sized area to lie down on as a stand-off pad, as well as additional space for feeding.

Wintering barn: similar to the wintering pad except that it is covered. The animals are usually withheld from pasture for extended periods and supplementary feeds are brought to them in the wintering barn.

Typical progression toward a pad system

Sacrifice paddock

Laneway

Laneway with bins

Concrete laneway with bins

Constructed stand-off

Constructed feed pad

Wintering pad

Wintering barn

Section Two: Feed Pad Planning

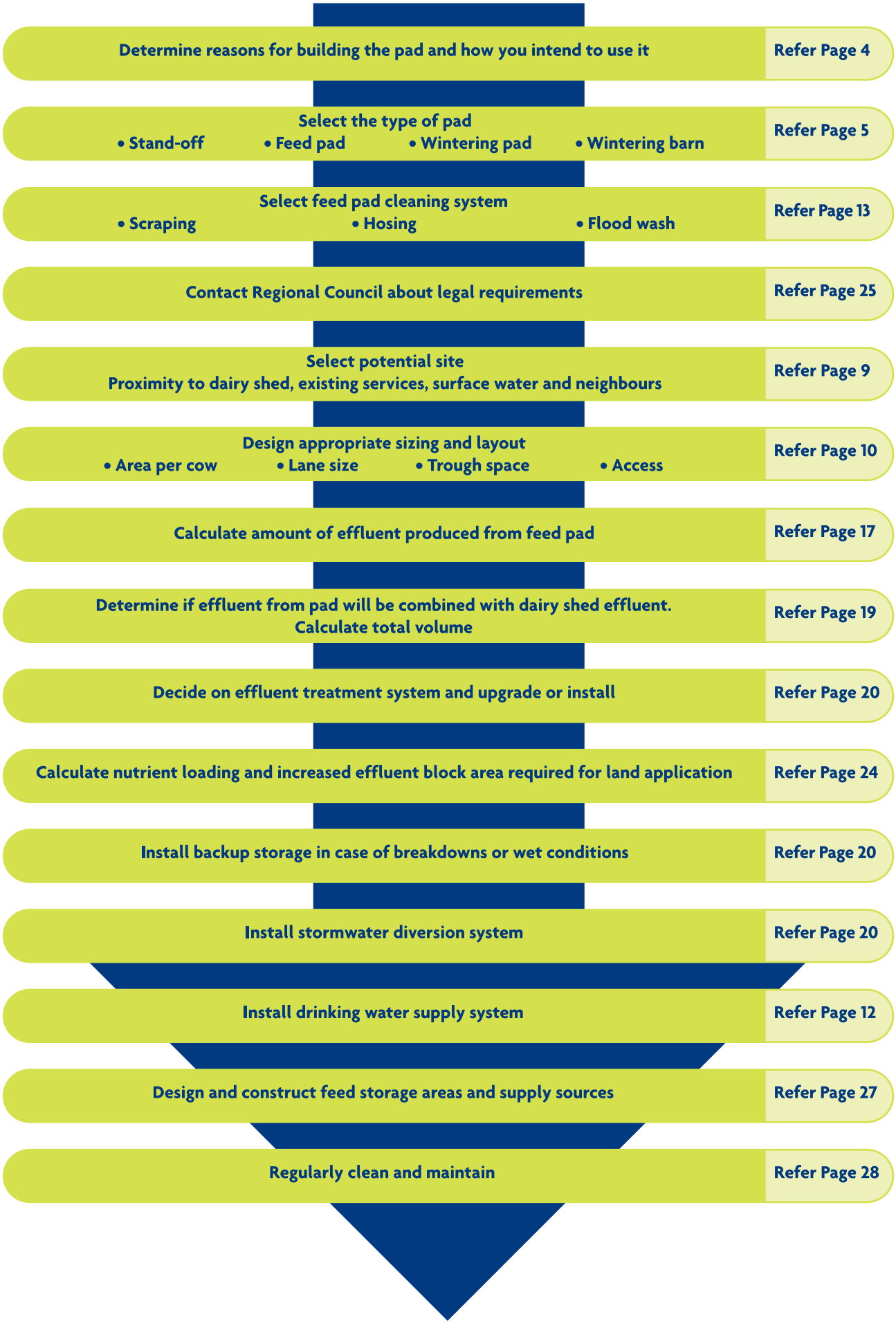
What is involved with a feed pad?

Planning for system change

When including a feed pad into your farm system, make sure you have thought through the consequences of any changes to your system. How will adding a feed pad impact on:

Production	• Will milk production increase, due to improved utilisation of existing feed supply? • Do you have to buy more shares as a result of increased milk?
Farm management	• Do you need to learn new management skills? • Will you increase or decrease bought-in feed?
Economics	• Will you need to spend more money upgrading other parts of the farm e.g. bigger effluent system, more cows, new side-feeding feed wagon, bigger tractor. • How will the change affect the risks your farm business is exposed to? • How will this impact on your farm profit?
Labour / staff	• Will your staff need new skills? • How will this affect your labour requirement? • Can you provide adequate staff accommodation?

Planning Process



Section Three: Feed Pad Design and Construction

Site Selection

When choosing a site for your pad you must consider the practical and regulatory aspects. These include:

- Proximity to dairy (no closer than 20m)
- Enough room for vehicles to access and turn easily
- Existing site services (water, power, effluent systems)
- Take advantage of any gentle slope (2-4°)
- Use of existing shelter or vegetation
- Accessibility to feed bunkers
- Room for future expansion
- Slope and other drainage features
- Well away from neighbours or property boundaries
- Well away from any waterways or bores (refer to Page 25 for local regulations)
- Ease of cow flow.

Slope

The surface of your pad needs enough slope to assist with drainage. Between 2-4° is common. That is a rise of 35mm per 1m along for a 2° slope or 75mm per 1m for a 4° slope.

Orientation

The orientation of a pad should be considered; can you maximise shade from tree belts and minimise prevailing winds? Orientation is especially important if you intend to cover the pad.

	Benefits	Disadvantages
North – South	• Maximises sun (if pad is on the North side of shelter) • More drying • Reduced bacteria	• Less shade
East – West	• Maximises shade	• Little sun • Less drying of surface • More bacteria present

What surface type is best for my property?

The surface type you choose is determined by a balance of factors: the ability to feed out efficiently, longevity of the surface, ability to clean the surface and capture effluent and the well being of the animal. The longer a cow is on a hard or wet surface the greater the risk of stress and lameness. This is related to the length of time a cow can spend lying down.

If you are using a pad for feeding only, then it is expected that cows will only be there for a few hours each day. In this situation a surface such as concrete is acceptable. However, if you are intending to use the pad for prolonged periods for winter management then you need to provide an additional softer surface for animals to lie down on.

Non-concrete surfaces are not recommended for feed pads due to problems with cleaning and containing effluent.

	Cost	Considerations
Metal rock	• $150-180/cow	• Annual maintenance cost $80/cow • Effluent management more difficult
Concrete	• $130-150/cow	• Maintenance cost is washing only • Effluent management easy

Concrete

Feed pads should be constructed with reinforced concrete.

If you have separate fed and cow lanes:

- Feed lanes should be 25-30 MPa* to allow for heavy machinery and have a smooth finish for easy cleaning
- Cow lanes should be 20 MPa with a rougher textured finish to reduce slipperiness.

If feed bins/troughs are used then cows and machinery are likely to travel over the same area – therefore concrete should be 25-30MPa to allow for heavy machinery and have a rougher textured finish to reduce slipperiness for stock.

* MPa is a unit of measure relating to force per area

Dimensions

Feed pad dimensions will be case specific. However, there are some general rules of thumb:

- Allow 4.5-6.0m wide feed lanes for easy tractor and feed-out wagon access
- Single cow lanes should be 4.0-4.5m wide
- Double cow lanes should be at least 7.0m wide
- Length of the feed face if all cows feeding at once should be 0.7m/cow
- Length of the feed face if cows feeding adlib should be 0.3m/cow.

Entry and exit points as well as turning areas for cleaning and feeding out should be wide enough (at least 8-10m) to allow free flow of stock and vehicles.

Before construction, consider providing sufficient fencing to split herd into smaller mobs, e.g. heifers and older cows.

MANAGEMENT TIP

Stake out the proposed area with standards and tape. Then get a staff member to drive the tractor and feed wagon around; adjust size accordingly.

How much area per cow is required?

The area allowed per cow will affect the animals' comfort levels. When cows stand in a yard before milking, they have about 1.0 square metre each. **Cows need to have 3.5m² per cow on a feed pad when it is being used for short periods of time.**

If the pad is being used for longer periods of time e.g. 12 hrs per day then cows must be provided with a comfortable lying area allowing a minimum of 6m²/cow.

If the pad is being used permanently with no on-off grazing then a minimum of 9m²/cow plus a 1m² feeding area per cow must be provided.

Remember to allow for any likely herd-size increases or changes in breed in the future.

Drainage

Drainage is important for ease of access and animal health. All liquid including effluent and rainwater should be drained or diverted away from the pad to operate a clean and effective system.

- To minimise the amount of liquid entering the pad ensure you install a rainwater diversion system around the exterior of the pad
- Where possible divert clean stormwater off the pad. This is only possible if there is no effluent contamination
- Any liquid contaminated with effluent needs to be collected and treated.

CONSTRUCTION TIP

A raised lip around the edge of the pad keeps drainage water out of the pad and contains effluent in the pad.

Should I cover my pad?

Whether to cover your pad or not, is an individual decision.

You will need to consider the benefits to your farm system against the cost of construction. Benefits include providing shade and shelter for cows and diverting rainfall so there is less effluent to manage.

Entrance to Feed Pad

Lameness can be a major problem in some herds. When cows step from the race onto a concreted area the small stones caught in their hooves are a major cause of lameness. To avoid this there are three main options available:

- using a softer surface leading to the entrance
- installing a footbath system
- constructing a step barrier.

Your entrance is a collection point for effluent; make sure this is well drained and diverted to an effluent treatment system.

Soft material		• Materials such as post peelings, limestone, scoria, rotten rock or sand can be used • Spread for 100m leading up to concrete • Use a depth of 150-200mm of material Pumice is not ideal as it washes away. However if used, spread it at 200-300mm depth and roll to 125-150mm
Foot bath		Removes stones by washing them away with water immediately before cows step onto pad Footbaths can also have treatments such as copper sulphate or zinc sulphate added to improve foot heath
Step barrier		Removes stones caught in hooves as the cow lifts its legs to step over Step barriers also act as part of the nib wall helping to contain feed pad effluent

Water supply

It is essential that there is adequate water supply at the pad.

- Lactating cows require between 70-110L of water per day. Dry cows require 35-80L of water per day
- As cows are fed more concentrated supplements with higher DM their water intake will increase above 70L
- Adequate water must be available for cleaning purposes, if using hoses or flood washing
- Water troughs should be placed well away from feed troughs and bins.

Unlike a dairy shed and yard, you are allowed to use recycled effluent water to clean the surface of a feed pad, providing the feed pad is no closer than 20 metres to the dairy and there is no chance recycled water could be used to wash the dairy shed or yard. This would mean a separate water wash down system is installed. Do not use recycled effluent water to clean feed bins or lanes.

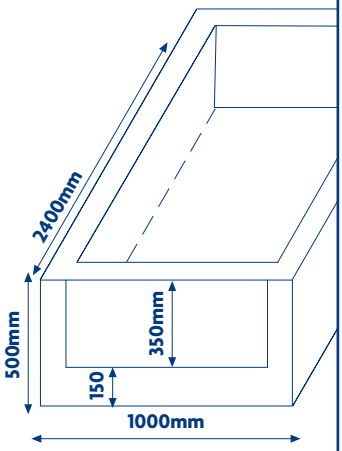
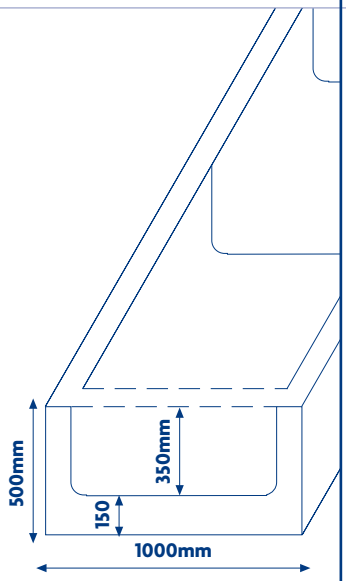
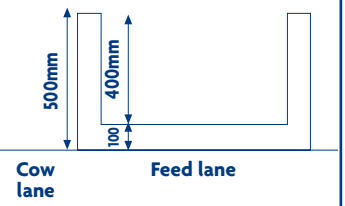
Cleaning the feed pad

Feed lanes should be cleaned daily so food quality is maintained. A couple of dry scraping passes is usually sufficient.

Cow lanes collect a lot of effluent and require regular cleaning. There are a number of options available:

	Advantages	Disadvantages	Management tips
Scraping	• Low capital cost • Less effluent to handle	• Higher labour cost • More concentrated effluent to handle	• A 3m wide scraper blade can be quick and effective • Clean 3-4 times a week • A sprinkler system to pre-wet concrete prior to use will assist in cleaning
Hosing	• Low capital cost • Large volume of more dilute effluent to handle • Uses similar amounts of water as flood washing	• Higher labour cost • Splashing of feed area • Large volume of effluent results • May require consent for additional water take	• Have several hydrants around pad
Flood washing	• Lower labour cost • No splashing of feed area • Uses similar amounts of water as hosing	• Higher capital cost • High discharge rates (12-15m^3min) with large diameter pipes (300mm) needed • May require consent for additional water take	• Wide cannels with manure accumulations may lead to meandering of flush water. To prevent, divide wide channel into multiple narrow channels

Feed distribution options

	Recommended dimensions	Considerations
Feed bins 		• The inside floor should be 150mm higher than the feed pad surface to ensure a comfortable eating position for the cows • Requires regular cleaning out to maintain food quality • Cleaning feed bins requires more time than lanes • Drainage holes should be provided for cleaning
Feed troughs 		• These are simply open-ended feed bins. They can be butted together to form long channels • Easier to clean than individual bins
Feed lanes 		• Concrete barrier to separate cows from feed lane • Feed lane should be 75-100mm higher than cow lane, so cows can easily reach food and to prevent effluent contaminating feed

How do you keep cows out of the feed?

There is no one answer to the above question as it depends on your feeding system. Below are a few ideas to consider when designing or managing your feed pad.

- Bullying is the common cause of cows in bins. To reduce this, cows could be separated into smaller mobs for feeding and ensure there is sufficient room at the feed face
- The area per cow at the feed bin/trough/lane should be 0.7m if all cows are feeding at once or 0.3m if they are fed adlib
- Ensure that the inside floor of the bin, trough or feed lane is 100-150mm higher than the feed pad surface where the cow stands. This makes feed easily accessible

Installing wires and piping is useful in preventing stock from getting into the feed. There a large number of options available from low cost hot wire to full head bales.

- A hot wire is commonly placed down the centre of the bin or trough. During construction consider how you will get power safely to feeding area
- A more costly option would be to put in pipe head bales. These not only prevent cows from, climbing into or being pushed into bins, they also prevent them from lifting their heads out of the bins throwing feed around.

Section Four: Feed Pad Effluent System Design and Management

How do I manage effluent?

Effluent from a feed pad needs to be regularly removed to protect animal health and protect the environment from pollution. This section relates to concrete feed pads. Effluent management on other softer more porous surfaces is different. Refer Stand-off Information Page 38.

Effluent produced on feed pads must be contained and treated.

Before designing a system, four important points should be addressed:

1. Effluent from the feed pad must be contained and prevented from entering a waterway.
2. Provision must be made to control rainfall overflow.
3. Effluent must be dealt with through an effluent treatment system.
4. The effluent system must be big enough for the additional nutrient loading and volume.

Check with your Regional Council regarding your local rules at the beginning of the process.

Is feed pad effluent different to normal dairy shed effluent?

Yes. Feed pad effluent is different to normal dairy shed effluent.

1. Feed pad effluent has a higher solid content, due to a number of factors, including feed wastage being combined with effluent during cleaning and a higher fibre diet.
2. Feed pad effluent has a higher nutrient content than dairy shed effluent.
3. Nutrient content is affected by feed type and feed quantity. Different feeds have different nutrient concentrations; effluent will reflect these nutrient variations. The quantity of feed offered or the percentage of the diet supplemented on the pad also reflects in the nutrient content of the effluent.

How much effluent will there be?

The calculations on the following pages will help you determine the total volume of effluent to be handled from your dairy shed and feed pad. **There are a number of assumptions made in these calculations so the total figure will only be an estimate. You should contact an engineer for accurate figures for your system.** Check out www.enviroDIRECT.co.nz for local engineering contacts.

Step One: How much effluent is produced on the feed pad?

An average cow will produce about 11% of her body weight in effluent. So for a 500kg cow that is 55 litres of effluent per day. As cows will spend about 8 hours a day lying down, the amount of effluent produced on a feed pad is based on a 16 hour day. The table below gives an indication of some common herd sizes and durations of pad use and resulting quantity of effluent produced. The figures below do not include wash down water or rainfall.

Herd size	Raw manure produced for length of time on pad (litres)			
	0.5hr	1.0hr	1.5hr	2.0hr
1	1.7	3.4	5.1	6.8
150	255	510	765	1020
250	425	850	1275	1700
500	850	1700	2550	3400
750	1275	2550	3825	5100
1000	1700	3400	5100	6800
2000	3400	6800	10200	13600

	No. of cows	x	1.7 (L/0.5hr)	x	Time on pad/day (hrs)	÷	0.5 hr	=	Amount of effluent (litres/day)	
Example	250	x	1.7	x	2.0	÷	0.5	=	1700	(A)
Your figures		x	1.7	x		÷	0.5	=		(A)

Step Two: How much storm water comes off the feed pad?

The following table shows the volume of storm water (m^3) flowing off different sized feed pads for different rainfalls.

	Annual Rainfall (mm)						
Pad size m^2	600	800	1,000	1200	1400	1600	1800
1	0.6	0.8	1.0	1.2	1.4	1.6	1.8
500	300	400	500	600	700	800	900
750	450	600	750	900	1050	1200	1350
1000	600	800	1000	1200	1400	1600	1800
1500	900	1200	1500	1800	2100	2400	2700
2000	1200	1600	2000	2400	2800	3200	3600

	Pad size (m^2)	x	Annual Rainfall (mm)	÷	1000	=	Stormwater volume (m^3)	
Example	875	x	1800	÷	1000	=	1575	(B)
Your figures		x		÷	1000	=		(B)

*Note: $1m^3$ = 1000 litres

Step Three: How much water will be added from cleaning the feed pad?

The volume of water used for cleaning will depend on the system installed. The table below provides general guidelines on the water quantity you would expect to use and add to the total effluent volume to be treated for hosing and flood washing. If you are scraping effluent prior to hosing or washing then this figure may be reduced.

Volume of washdown water per cleaning event (litres)		
Pad size m²	**Hosing (flow rate = 14m³ /hr)**	**Flood Washing**
1	6.4	6.1
500	3200	3050
750	4800	4575
1000	6400	6100
1500	9600	9150
2000	12800	12200
3500	22400	31850
4000	25600	24400

Select your system...	Pad Area (m²)				Total washdown volume (litres)	
Example	**875**	**x**	**6.4**	**=**	**5600**	**(C)**
Hosing		**x**	**6.4**	**=**		**(C)**
Flood washing		**x**	**6.1**	**=**		**(C)**

Step Four: Add your total effluent volume from the dairy shed

The volume of effluent produced in a dairy is estimated on herd size. As herd size increases the amount of effluent produced per cow reduces.

Volume of washdown water per cleaning event (litres)		
Pad size m²	**Volume L/cow/day**	**Total Effluent Volume (L)**
150	50	7500
250	48	12000
500	43	21500
750	38	28500
1000	34	34000
2000	23	46000

	Herd size		Volume (L)/cow/day		Total effluent volume (L/day)	
Example	**250**	**x**	**48**	**=**	**12000**	**(D)**
Your figures		**x**		**=**		**(D)**

Step Five: Add up your total effluent volume

Once you have completed the calculations for steps one to four for your own system then use the following steps to estimate your total effluent to be treated.

STEP 1

Effluent from pad	A	÷	1000	x	No. of days used	=		m³/year	
Example	1700	÷	1000	x	305	=	519	m³/year	
Your figures		÷	1000	x		=		m³/year	(E)

STEP 2

Stormwater	B	→	m³/year	
Example	1575	→	1575	m³/year
Your figures		→	m³/year	(F)

STEP 3

Washdown water	C	÷	1000	x	No. of days used	÷	Clean every __ day	=		m³/year	
Example	5600	÷	1000	x	305	÷	3	=	569	m³/year	
Your figures		÷	1000	x		÷		=		m³/year	(G)

STEP 4

Dairy shed	D	÷	1000	x	No. of days used	=		m³/year	
Example	12 000	÷	1000	x	305	=	3660	m³/year	
Your figures		÷	1000	x		=		m³/year	(H)

	E	+	F	+	G	+	H	=	Total volume of effluent m³/year	
Example	519	+	1575	+	569	+	3660	=	6323	m³/year
Your figures		+		+		+		=		m³/year

Storage Ponds / Tanks

Effluent storage ponds must be able to hold the combined volume of the effluent – liquid and solid, all water used in the cleaning process, and any rainfall that enters the effluent treatment system. So diverting excess water is crucial.

The size of storage you need may be governed by your Regional Council rules. Having a large storage capacity will allow you flexibility to irrigate when it suits you so that you can maximise the nutrient value of your effluent and apply when soil moisture levels are low.

DESIGN TIP

Install drainage diversion channels around the pad and a storm water diversion system to reduce effluent storage requirements.

	Total volume of effluent to be managed/year	÷	No. of days pad used	x	Max. possible storage days	=	Storage volume required (m^3)	
Example	6323	÷	305	x	30	=	622	m^3
Your figures		÷		x		=		m^3

Is my current effluent management system adequate to handle the effluent?

In most operations effluent from the feed pad will be combined with dairy shed effluent. If you do this consider:

Storage

Compare your total storage volume required, calculated above, to existing storage ability. You will most likely need to increase the storage capacity.

Land Application

Feed pads generate a great deal of additional effluent that has a higher nutrient concentration than dairy shed effluent. This means that in most cases your existing effluent system will not be adequate. You will need to increase the capacity of your treatment system and the area of land you are applying effluent to (due to higher nutrient content of the effluent) in order to meet regulations and maximise nutrient uptake.

Pond System

If you have a pond system discharging to water, you will definitely need to upgrade your system. You will need to speak to an engineer to get a new system designed based on the new effluent volume. Check out www.enviroDIRECT.co.nz for local engineering contacts. You will also need to update your resource consent. Contact your Regional Council to do this. Some Regional Councils will not accept pond treatment systems for effluent treatment. Check with your Regional Council.

If you are combining your feed pad effluent with your farm dairy effluent it is likely that you will need to upgrade your existing effluent treatment system.

What options are there for dealing with effluent?

The options for dealing with feed pad effluent are the same as for dairy shed effluent. You will need to make adjustments to existing systems due to the higher volume of effluent being treated, the increased nutrient levels and fibre content of the effluent. This may mean increasing the storage and spreading area, and adjusting machinery to suit, e.g. irrigator nozzle size.

Irrigate effluent directly from holding tank

Advantages	Disadvantages
• Inexpensive to install • Simple • No crusting • Effective grit trap • Requires limited area	• Limited storage capacity • Must irrigate even if soils are already saturated • Increased risk of ponding • Blockages from higher fibre content • May foul pasture and cause palatability issues due to wider nozzles used • High labour input

Things to consider when including feed pad effluent to this system	Cost
• A holding tank will probably not be large enough to handle increased effluent volume. Typically tanks hold less than 100m^3 • Need to increase size of storage capacity • Requires wider nozzles (>16mm) on irrigators to avoid blockages. • Need to increase area of the farm that effluent is spread over • Need stirrer to agitate effluent before irrigating	• Possible to install this system for less than $100/cow (2004 figures)

Use holding/storage pond and irrigate effluent to land

Advantages	Disadvantages
• Large storage capacity • Can use existing pond/s (if sealed) • Irrigate when soil conditions suit • Reduced pressure on time and grazing management • Nutrient uptake by plants if applied when soil conditions dry • Lowers the fibre content of effluent	• Must be sealed (can be costly if damaged) • May get crusting • Need to be stirred before pumping • Can take up large land area • Possible problems with odour if stored for long periods

Things to consider when including feed pad effluent to this system	Cost
• Will the pond be large enough to handle increased effluent volume? • May require wider nozzles on irrigators to avoid blockages • Need to increase the area of the farm that effluent is spread over • Would require more frequent removal of sludge (suggest annually) due to higher fibre content	• Possible to install this system for approximately $100/cow (2004 figures)

Treat in anaerobic / aerobic ponds and discharge to water

Advantages

- Large storage capacity
- Can use existing pond/s (if sealed and large enough)
- Reduced pressure on time and grazing management
- Good for tile or mole drained land
- Good for very wet climates

Disadvantages

- Does not capture nutrient value of effluent
- Must be sealed (can be costly if damaged)
- May get crusting
- Can take up large land area
- Requires resource consent
- Needs redesigning for pad effluent

Things to consider when including feed pad effluent to this system

- Because pond size is based on the volume of effluent entering and the levels of nutrients, bacteria, and solids it is most likely that your existing pond system will not be adequate. You need to talk to an agricultural engineer about increasing the treatment capacity of your pond system
- You will need to get a variation to your resource consent
- Would require more frequent removal of sludge (suggest annually) due to higher fibre content

Cost

- Approximately $50/cow

  (2004 figures)

Separate solids before irrigating a more dilute effluent

Ideally solids should be separated out from liquid; this reduces the amount of effluent storage required. The separated, more dilute liquid is usually returned to a second holding pond, then irrigated to pasture. The separated solids can be stored and applied to land as a fertiliser.

Advantages

- A value added solids by-product with high organic matter and nutrients is produced
- The volume of solid material is reduced, saving on storage and transport costs
- Less blockages in equipment
- More dilute effluent with low solids can be pumped and irrigated over a greater distance
- A smaller effluent block required because of the lower nutrient concentration in liquid effluent

Disadvantages

- Expensive to install
- Requires additional equipment to be installed
- Requires higher labour input
- Additional to existing treatment system
- Odour issues from stack

Things to consider when including feed pad effluent to this system

- A feed pad will increase the amount of solids extracted, meaning more storage and spreading of solids will be required
- Liquid effluent storage capacity may still need to increase, as there will be additional liquid contribution from the pad

Cost

- Direct relationship with size from $100/cow for 800 cows to $370/cow for 380 cows

  (2004 figures)

Methane digestion

Effluent is held in a holding pond and is then pumped to a digester. Effluent and water are pumped in equal proportions in the digester. Digestion takes place in "stainless steel rumen" over 40 days.

Advantages	Disadvantages
 • Provides continual energy source, saving on power costs • Uses recyclable energy source • More dilute effluent by-product with low solids and nutrient concentrations can be irrigated over greater distance • A smaller effluent block may be required because of lower nutrient concentration in effluent by-product	• Expensive to install • Requires additional equipment • Requires higher labour input and understanding • More suitable for large farms
Things to consider when including feed pad effluent to this system	**Cost**
• The quantity of effluent will increase so either the storage needs to increase and digestion occurs over a longer period, or if digesters at full capacity then additional digesters may be needed • Effluent characteristics will change so energy output and by-product nutrient values may differ from original	• $135/cow for 1000 cows. High initial cost, suitable for large farms only • It can produce 3-phase power at 22-25kW for 7 hours (where 170kWh = $27) from one days effluent (2004 figures)

Managing Pumps and Stirrers

Effluent should be agitated to prevent crusting so that applications are more even and to prevent blockages. Chopper pumps are useful in situations where highly fibrous feeds are fed.

Stirrers should be on a fixed platform and irrigation pumps should be on floating pontoons.

MANAGEMENT TIP

Stir effluent for 5 mins before irrigation to avoid blockages.

Because of the more fibrous nature of feed pad effluent you may have more blockages and overflows. Ensure you have a backup plan ready to action and make sure all staff are aware of it.

Nutrient Management

The concentration of cows on a pad results in more effluent to manage and nutrients to capture and utilise. Applying the nutrients back to a sufficient area of pasture is essential to obtain maximum benefit from the nutrient value, avoiding overloading, potential leaching, surface runoff and to meet council land application requirements.

By correctly applying effluent to land, not only can we utilise the nutrient value of effluent but also the addition of organic matter will improve the aeration, drainage qualities, water holding capacity and tillage characteristics of the soil.

What is the nutrient value of effluent?

The nutrient value of effluent will vary significantly from farm to farm depending on:

- Feed type and volume fed
- Storage and treatment system
- Volume of dairy effluent
- Wash down practice
- Storm water management
- Herd size and management
- Length of time on the pad
- Frequency of use (number of days used)

Sending a sample of your effluent away for nutrient analysis is critical to establish the NPK and S concentration that will help you calculate the area required for spreading the effluent over. Tests cost approximately $100, a small fraction of what you could save through accurate application and fertiliser savings. Contact your Regional Council or testing lab for information on how to sample. To find a testing lab near you check out **www.enviroDIRECT.co.nz**

What size area should I spread my effluent over?

To determine the area required for land application, consider the total volume of effluent produced from the farm dairy and pad entering the effluent treatment system and the nutrient concentration of the effluent. You also need to consider:

- Soil type, as this will influence application rate and depth
- Regional Council rules and regulations
- Animal health implications e.g. high potassium (K) levels and associated metabolic disorders.

The best way to determine the correct area to spread effluent over is to do a nutrient budget. The nutrient budget programme, OVERSEER®, will provide you with a detailed analysis of what nutrients are being removed from your system each year in product and losses and what nutrients you are inputting such as fertiliser and effluent. Understanding this calculation will allow you to optimise the efficiency of your farm by identifying where you may have fertiliser wastage through leaching and runoff.

Ask your Farm Consultant or Fertiliser Field Rep to carry out an OVERSEER® nutrient budget and take you through the results, and put in place a plan to optimise your farm nutrients.

Best practices for nutrient management

To optimise the value and minimise the environmental impacts of effluent

- Carry out regular soil tests
- Carry out a separate nutrient budget (e.g. OVERSEER®) for the effluent block
- Apply supplemental fertiliser based on nutrient budget recommendation
- Grow a crop on the effluent block
- Take a silage crop from the effluent block
- Increase area effluent is applied too
- Maintain effluent system
- Only apply effluent at times of low soil moisture
- Application depth and rate should be appropriate for your soil type

Rules and Regulations

During the planning stage of your pad, it is crucial you understand the rules and regulations set by your Regional Council relating to feed pads. These relate mostly to siting, effluent containment and effluent treatment.

All Regional Councils will have different rules and regulations. For the most up to date and accurate information on your local rules and regulations get in touch with your local council.

Contact your Regional Council before you get started. Retrofitting systems can be a costly mistake!

	Northland Regional Council	**0800 002 004**
	Auckland Regional Council	**09 366 2000**
	Environment Waikato	**0800 800 401**
	Environment Bay of Plenty	**0800 368 267**
	Gisborne District Council	**06 867 2049**
	Hawkes Bay Regional Council	**0800 108 838**
	Taranaki Regional Council	**06 765 7127**
	Horizons Regional Council	**0508 446 749**
	Greater Wellington	**0800 496 734**
	Tasman District Council	**03 544 8176**
	Marlborough District Council	**03 578 5249**
	Environment Canterbury	**03 365 3828**
	West Coast Regional Council	**03 768 0466**
	Otago Regional Council	**03 474 0827**
	Environment Southland	**03 215 6197**

Section Five: Feed Management

What impact will a feed pad have on pasture management?

The use of a stand-off and feed pad will reduce soil and pasture damage. When using a stand-off or feed pad, expect to get faster winter and spring re-growth after grazing. The size of the increase will depend on the extent of soil and pasture damage beforehand; you could grow an extra 450 kg DM/ha. The danger is that the extra pasture re-growth is not eaten, and pasture quality deteriorates at critical times. Pasture is your cheapest source of feed and maintaining high pasture quality is essential. If you lose control of pasture quality and the ME goes down, cows will eat less and production will decrease.

What could you change to ensure pasture quality is maintained?

- Increase stocking rate
- Ensure Comparative Stocking Rate (CSR) is between 80-90 kg LW/tDM
- Calve earlier
- Be more vigilant identifying pasture surpluses and make more silage of higher quality earlier
- Reduce supplement feeding earlier in season
- Watch for substitution rate effect – keep pasture residuals at target 'low' levels.

Feed management

Feed losses can be substantial when feed is fed out in a paddock (15-50%). Many factors contribute to feed being wasted such as cattle trampling, low palatability, too much feed offered, etc. Even under good management some wastage is inevitable when feeding out in the paddock.

A feed pad can significantly reduce wastage and can considerably reduce costs when feeding grass and maize silage, grains and other feed mixes.

There is a large range of supplementary feeds available. If you are going to use a mixed ration it is recommended that you seek advice from a nutrition specialist.

For more information on feeding supplements refer to the Dexcel website **www.dexcel.co.nz**

How should I store imported feed?

The feed supplied should meet the nutritional requirements of your herd and be of a quality to promote consumption and avoid odours.

Your storage area should be:

- well ventilated
- vermin proof
- easily accessible for feed out machinery and cleaning
- well away from waterways
- at least 20m from the dairy.

Some types of feeds are recognised to contribute more to odour generation from a site than others. Ideally feed sources that generate offensive odours should be stored short term with regular delivery.

Rodent control is particularly important as rodents carry leptospirosis. Having contact with feed can infect both cows and workers.

Leachate

It is important to be aware of the acidic effects that some supplementary feeds can have on the concrete of feed bunkers and pads. Some supplementary feeds, like processing wastes, can become very acidic (< pH 4) and the leachate draining from bunkers can be very damaging especially if it enters a waterway.

Leachate from stored feeds such as silage has approximately 40 times the nutrient strength of dairy shed effluent. To reduce leachate, ensure silage is well wilted before ensiling, and that your storage area is lined and watertight. Collect the leachate and either apply to land, diluted 1:1 with water and spread back on pasture at a rate of 25m^3/ha, or feed to stock in an undiluted state (20 litres of silage leachate it is equivalent of 1kg barley).

MANAGEMENT TIP

Ensure you monitor pasture residuals and stop feeding supplement when residuals increase beyond target.

Feed distribution

- Feeding out equipment should be operated to minimise spillage
- If using feed lanes, food is likely to get pushed out of the cow's reach. About 30 minutes after cows start feeding, use a food scraper to push feed back against the base of the lane wall
- Rejected feed should be removed and fed to dry stock or composted at least weekly

What are the maintenance requirements on a feed pad?

The maintenance of your feed pad has a critical bearing on its efficiency and effectiveness. There are costs associated with maintenance but they are necessary to protect your investment.

Weekly	• Feed residues should be removed from bins/troughs at least weekly • If the same scraper blade is used in cleaning both cow and feed lanes, it should be cleaned to keep manure out of the feed lanes • Clean under fences and around feed pad
Monthly	• Water troughs and float valves should be maintained to minimise overflows • Repair potholes in the pad • Maintain drainage channels and effluent containment system

Section Six: Animal Management

How could a feed pad affect animal health?

Design	Most concerns about animal health problems in relation to feed pads are due to cows being in an environment considered to be uncomfortable and unhygienic. On a poorly designed pad this may well be the case. If manure is not removed efficiently there will be a build up of bacterial contamination, which could cause problems. On a well designed and maintained pad exposure to disease-causing organisms can be less than, or no greater than a muddy paddock.
Mastitis and Teat Condition	If the feed pad is cleaned properly and has adequate drainage the build up of mastitis causing organisms will be minimal. The teat condition of your cows can deteriorate during wet, windy weather conditions. If a clean, well kept pad is used to keep cows off muddy paddocks teat condition will improve.
Lameness and behaviour	Two things will impact on lameness: the surface type and the area per cow. The longer the time on a hard surface the greater the risk for your cows. **Feed pads are not recommended for standing cows on for long periods of time.** Harder surfaces like concrete are best used for shorter periods of time otherwise they can cause lameness, stiffness, agitated behaviour and weight loss. If you are planning to use your feed pad to protect pasture and soils then you need to consider constructing an additional soft surface area for cows to lie comfortably. Refer Standoff Section.
Fertility	A well-managed feed pad should improve feed energy intake in late pregnancy and early lactation. This not only helps production but also should improve reproductive performance through improved body condition score. Cows should cycle sooner after calving and consequently have a better opportunity to get in calf.

MANAGEMENT TIP

See the SAMM PLAN booklet for more information on how to protect your herd against mastitis.

Section Seven: Feed pad Design and Management Checklist

Fill in the checklist below to see if you have considered all aspects of incorporating a feed pad into your farm system.

Decision Making Process	✓
What is the function of the feed pad?	
What are the economic, production, management and environmental considerations you have taken into account?	
What feed pad stage development will you have?	
What are the Regional Council requirements?	
What machinery and labour requirements are there?	
Development Process	✓
Have construction requirements been considered?	
How many cows will use the pad?	
What will the peak monthly average duration on the pad be?	
What area will be available per cow on the feed pad?	
How big does the pad have to be to hold the whole herd?	
Has a detailed scaled drawing of the feed pad been prepared?	
Has covering the feed pad been considered?	
How wide will the laneways be?	
Is the feed pad more than 20m from the dairy?	
Is the feed pad site topography suitable?	
What slope will be employed on the pad surface?	
What materials will be used to construct the pad surface?	
Has access for both stock and vehicles been considered?	
How will the feed pad be cleaned?	
How often will the feed pad be cleaned?	
Are water troughs capable of supplying the herd needs?	
Fencing or cabling determined?	
Nib wall heights determined?	
Will rainfall be diverted or collected?	

Effluent Management	✓
Will all contaminated runoff be collected?	
Will you use a storm water diversion?	
What is the area of the feed pad from which runoff will be collected?	
What is the average rainfall?	
What effluent treatment system will be used?	
Will the solids be separated?	
What volume of water will be used in flood washing?	
Will flood washing water be recycled?	
What volume of effluent will be produced from rainfall runoff, feed pad and dairy?	
What storage size requirements will you have?	
Is the pump adequate?	
How big will your effluent block be?	
Will Regional Council requirements be met?	

Feed Management	✓
What length of feed trough will be available per cow?	
Has the type of feed been considered?	
Has the type of feed storage been considered?	
Has feed storage area runoff been considered?	
Has feed distribution been considered?	
Has special feed distribution machinery been considered?	
Has odour production and minimisation been considered?	

Animal Management and Maintenance	✓
Has stocking rate been considered?	
Will animals have sufficient shelter?	
Do you have an animal health plan to manage mastitis, lameness and other foot problems?	
Has feed pad maintenance been considered?	
Has feed pad management been considered?	
Has labour requirements and skill level required been considered?	

Section Eight: Stand-off Pad Planning

Why use a stand-off pad?

Pasture protection

The primary purpose of most New Zealand stand-offs is to protect pastures. Cows standing on wet paddocks causes pugging damage. This can reduce pasture production by over 30% for several months after the event and subsequently lower milk production. Even when there is efficient drainage, removing cows from pasture onto specially constructed stand-off pads can be an advantage in wet weather.

Holding cows for long periods of time

The second major reason for constructing a stand-off pad is if you are planning to hold cows off the paddock for long periods of time. If you have a feed pad and are using it for more than just feeding you may need to add a stand-off area made of softer material. Where cows are held on a feed pad with food for short periods of time, e.g. 2hrs, the cows usually remain standing. When held for 5-7 hrs during the day 10% will lie down. However when cows are held for 10hrs per day or longer they will need to lie down; you should provide them with a surface other than concrete to lie on.

FACT

Cows need to lie down for at least 8 hours per day. If lying is restricted they will do this in preference to grazing, resulting in underfeeding.

How will a pad impact on the farm system?

Whilst there are definite benefits to be gained from using a stand-off pad, like any change there are new issues and problems that can result. It is important that you consider the associated downsides and other changes to your farm system that may occur as a result of constructing a stand-off pad.

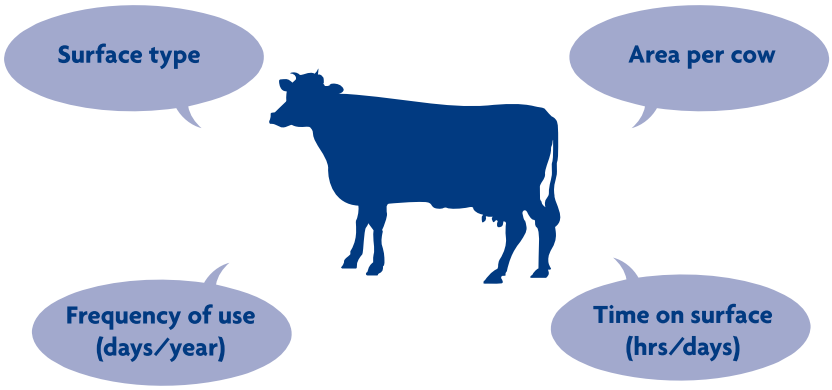
Benefits	Associated Problems
• Less pugging of pasture • More grass in spring • Higher stocking rates can be supported and cow condition maintained • Possible reduction in calf losses when calving on the pad (depending on stock density and the condition of the pad compared with the paddock) • Ability to maintain rotation length • Will help protect farm drainage work (i.e. integrity of subsoiling and moling) • Reduced need for grazing off-farm • Saving in time and worry	• High initial capital cost • Time involved managing the herd is increased • Requirement of regular cleaning, effluent disposal and ongoing maintenance • Fertility transfer from pasture to pad • Unavailability of surface material (e.g. sawdust, wood chip bedding) • Bullying of some animals (in-calf heifers) because of overcrowding • Reduced production unless extra management skills are provided

What is involved in a Stand-off pad?

What do I need to consider before construction?

There are four main factors to think about before construction to ensure your cows are kept healthy and content during standing–off:

- Surface type
- Area per cow
- Frequency of use
- Time on surface.



How often cows are stood off, and for how long, are determined by weather and soil type, while surface type and area per cow are determined by you. If the surface type and area per cow are not appropriate for the frequency of use and time on surface, cows are likely to suffer significant discomfort. By following some simple guidelines you can ensure that your cows are kept healthy and content.

Effluent management must also be considered before construction. You will need to check with your Regional Council (refer Page 25 for contact details) regarding their rules and regulations. For more information about effluent management on stand-off pads see Page 38.

Section Nine: Stand-off Pad Design and Construction

Site Selection

A north-south orientated pad that is sunny and offers good shelter from the prevailing wind is ideal. Other factors to consider in site selection are:

- Proximity to dairy (no closer than 20m)
- Enough room for vehicles to access and turn easily
- Existing site services (water, power, effluent systems)
- Take advantage of any gentle slope (2-4°)
- Use of existing shelter or vegetation
- Room for future expansion
- Slope and other drainage features
- Well away from neighbours or property boundaries
- Well away from any waterways or bores (refer to Page 25 for local regulations)
- Ease of cow flow.

Pad Dimensions

The area allowed per cow during standing-off will affect the animals' comfort levels and their ability to lie down. When cows stand in a yard before milking, they have about 1.0 square metre each. Cows need to have 3.5m² per cow on a pad when it is being used for short periods of time. If the pad is being used for longer periods of time e.g. 12 hrs per day then cows must be provided with a comfortable lying area allowing a minimum of 6m²/cow. If the pad is being used permanently with no on-off grazing then a minimum of 9m²/cow plus a 1m² feeding area per cow must be provided. Remember to allow for any likely herd size increases in the future.

The following table indicates the Minimum area required per cow for different stand-off situations:

Short term + 12 hrs / day (up to 2 days in a row)		**Long term** + 12hrs / day (3 or more days in a row)		**Permanently** No on-off grazing
Surface type	**Area per cow**	**Surface type**	**Area per cow**	**Area per cow**
Woodchip	3.5m²	Woodchip	5.0 m²	8.0m² including a comfortable lying area plus 1m² feeding area
Sand	3.5m²	Sand	5.0 m²	
Concrete	3.5m²	Concrete	Not recommended	
Crop	8.0m²	Crop	8.0 m²	
Paddock	8.0m²	Paddock	8.0 m²	**Length of the feed face** 0.7m feed all at once 0.3m feed ad-lib

*These figures are based on a standard cross-bred size cow. Add an extra 1m² per cow if you have large Friesians.

Entry and exit points and turning areas for cleaning and feeding out should be wide enough (at least 8-10m) to allow free flow of stock and vehicles.

Surface Type

When deciding on a surface type for your pad there are a number of factors to consider.

Ability to lie down
The main factor overriding all others is the cows' ability to lie down on the surface. While they need to lie for 8 hours a day, they prefer to lie down for 11 hours per day.

There are three key features that effect cows' willingness to lie down: the softness, slipperiness and wetness of the surface.

- Cows will lie down sooner on softer surfaces compared to harder surfaces
- If the surface is overly slippery the cows will be less likely to lie down
- Cows are also reluctant to lie down on wet surfaces.

Woodchip surfaces are most favourable to cows of all the surface types for lying on. Harder surfaces can be used, however they have more limitations, for example an increase in lameness can be expected when standing-off on concrete for extended periods.

Time on surface
When deciding on the surface type to use consider the length of time you will be holding the cows. Harder surfaces like concrete are best used for shorter periods of time but if they are used for long periods they can cause lameness, stiffness, agitated-behaviour and weight loss.

Frequency of use
The frequency of use is the number of days per year that cows are stood off. For example, standing cows off for five days a year compared to 20 days a year will influence the facilities your require and the surface type. You must also take into account the number of days in a row it is used, e.g. four days on, two days off scenario.

Effluent collection
No matter what surface type you select you need to collect any effluent that comes from the pad. In this case concrete is obviously the easiest option, however this is very expensive and is not good for animal health. If you choose to use a soft surface such as woodchip or sawdust then you need to put in place a liner or drainage that collects effluent.

Maintenance and availability of material
You need to consider the availability of the surface material. Whilst woodchip and sawdust are excellent for animals and cheaper to construct compared to concrete you need consider the ongoing replacement of material and its availability.

Cost
Cost is always a factor to consider, obviously there are a wide range of cost options available. Do not select surface type primarily on this factor, you are better off to spend a little more and construct an effective and animal-friendly pad rather than suffer the longer-term cost of animal health issues and production loss due to uncomfortable cows.

What surface type options are there?

Surface Type	Benefits	Factors to consider	Management Tips
Concrete (e.g dairy yard, feed pad)	• Often already available • Easy to clean • Durable • Easy effluent management • Location-often near/including dairy	• Risk of injury to cows due to slipping • Cold surface causing joint/ muscle problems • Cows tend not to lie down on concrete • Often not sufficient area of concrete available, need to construct more area • Risk of hoof damage due to stone bruising	• Some farmers have softened their concrete pad surface by using a rubber mat overlay
Woodchip	• Warm • Free-draining • Reduced stress and lameness • Cows lie down sooner • Low chance of animals slipping	• Availability of woodchips in region • May need to change material frequently • Capital outlay for pad • Failed drainage can result in odour, mastitis, lameness and less lying • Need system for effluent collection	• Soiled woodchips can be composted, or can be incorporated into ploughed soils
Sand	• Cheap if available locally • Soft on hooves • Easy to clean	• Cold, and does not encourage lying when wet • Prolonged periods on sand can cause wear on hooves • Necessary to skim off top layer of sand twice a season • Problems when drainage is insufficient (becomes soupy) • Need system for effluent collection	• Planting shelter trees or building an artificial windbreak around the site will improve cow comfort
Sacrifice paddock	• No capital outlay • OK for short periods of time but not recommended long term	• Loss of grazing area • Reduced subsequent pasture growth • Turns to mud quickly (= mastitis, lameness and lying deprivation) • Unable to capture effluent • Visibility from road can result in public concern	• Choose a paddock that you are planning to re-contour, improve drainage or cultivate for cropping /re-grassing. If possible choose a paddock that is not by a roadside or waterway
Compact gravel (eg. laneway)	• Cost effective • Low capital outlay • Cows can be kept near dairy • OK for short periods of time but not recommended long term	• Turns to mud easily, degrades laneway for future use • Difficult to capture effluent • Stress due to hard surface (lameness, muscle/joint problems, mastitis) • Cows deprived of lying	• Construct drains alongside the laneway to capture and divert effluent to a treatment system
Crop	• Uses ground that is already "bare soil" • Less moving of animals • No capital outlay • Retained soil fertility	• Gets muddy quickly • Can result in soil compaction • Need to back-fence to preserve soil condition and prevent mud • Unable to capture effluent • Feed a longer break to allow cows to lie on crop face rather than mud • Be prepared to offer a second break each day during bad weather to prevent them walking about	• Use moveable water trough and baleage feeder to prevent cows walking up and down paddock

Shelter

Shelter from the wind to reduce wind–chill may be provided by artificial shelter such as windbreaks, corrugated iron or natural shelter such as toetoe or trees. Siting close to trees may lessen the impact of wind and rain but care should be taken that tree roots do not interfere with the pad base or drainage system. However, some wind is useful as a surface-drying agent for bedding material.

MANAGEMENT TIP

Walls higher than 2m will cause eddy effects and direct wind down onto the cow's backs.

Water Supply

An adequate supply of fresh water is essential. Animal requirements vary depending on the feed they are eating and their physiological state. For more information refer to Page 12. It is recommended that the water trough should be on a hard standing area such as concrete. This will avoid pugging in the trough access area and subsequent breakdown of the drainage system.

Drainage

Subsurface pipe drains and moling are the most common drainage system. However, hump and hollow drainage works well combined with subsurface drains particularly on sites with little or no fall.

When constructing the pad a compacted clay base is ideal, then lay 100mm PVC slotted sub surface drainage pipes 1.5–3.0m apart with about a 1% or more fall. Drainage pipes should be covered by 20mm of gravel, then cover with 80mm of coarse sand and then 600mm of your selected surface material.

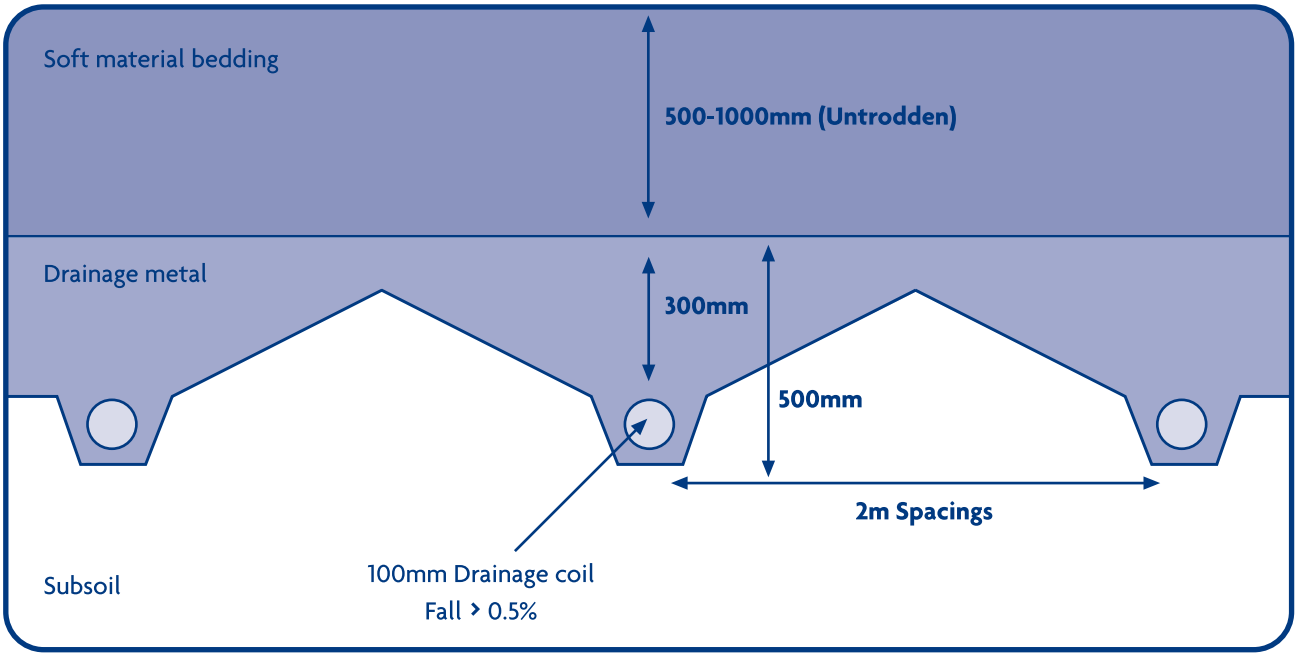
Drain outlets

Rats can make their way up stand-off pad drainage systems and block them. Cover subsurface drainage outlets with wire netting and use rodent traps for control. Pipe drain outlets need to be directed into an effluent treatment system, as drainage water will be contaminated by animal dung and urine.

MANAGEMENT TIP

The movement of heavy vehicles on a stand-off pads should be avoided to minimise soil compaction.

Drainage design profile



Section Ten: Stand-off Pad Effluent Management

Effluent management needs to be considered when designing a stand-off pad. Unlike feed pads where effluent management is normally considered a part of the overall management of the pad, effluent management on stand-off pads is often overlooked. It is important that this effluent is captured and treated. Untreated effluent cannot enter waterways.

Like any other area where cows congregate, there will be a large volume of effluent produced on a stand-off pad.

Rules and Regulations

During the planning stage of your pad, it is crucial you understand the rules and regulations set by your Regional Council relating to stand-off pads. These are mostly regarding siting, effluent containment and effluent treatment.

All Regional Councils will have different rules and regulations. For the most up to date and accurate information on your local rules and regulations get in touch with your local council. See Pg.25 for contact details.

Effluent Capture

There are three ways for effluent to be captured on a stand-off pad:

- Absorbed into material
- Collected in subsurface drainage
- Collected by an impervious layer under the softer material

For options of how to treat captured effluent refer to Page 21.

	Description	Considerations
Absorbed	Due to the absorptive nature of soft materials like sawdust and bark chip a percentage of the total effluent produced will be absorbed into the material	Will become saturated quickly and unless you are changing material as soon as it reaches saturation point which is not highly feasible due to cost and practical constraints. This means you will need an additional effluent capture method
Subsurface drainage	Drainage pipes are often laid beneath the surface during construction to collect liquid effluent. The pipes are then directed into an effluent treatment system. The effluent captured then needs to be treated	If you are adding the effluent from the pad to your existing effluent system you will probably need to upgrade your effluent treatment system to take account of the additional effluent volume
Impervious layer	During construction either a plastic liner, compacted clay or in some cases concrete can been laid beneath a softer material surface	The effluent will be prevented from entering groundwater and needs to be directed to an outlet point, collected and then treated

Section Eleven: Stand-off Pad Management and Maintenance

Animal Management

The concerns about animal health problems in relation to stand-off pads are very similar to those for feed pads. However, due to the longer periods of time cows spend on stand-off pads the risks are magnified. The three main problems are lameness, mastitis and tiredness.

Mastitis

Mastitis can be a problem during standing-off. Mastitis-causing bacteria grow best in wet, dirty and warm environments, so you need to minimise these during standing-off. Reducing the amount of mud is something you do have control over through stand-off pad design and management.

To avoid mastitis causing organisms, ensure your pad has adequate bedding and drainage. Keep your pad as clean as possible to avoid wet dirty conditions

MANAGEMENT TIP

Introducing cows to a new stand-off surface in short stints will decrease stress on the cows. Monitor animal behaviour to detect discomfort.

Lameness

The longer the time on a hard or wet surface the greater the risk of your cows suffering stress. Lameness can be minimised by initially designing your pad to allow animals adequate space. You must provide a soft, clean, non slippery surface for cows to lie down.

Tiredness

Cows need to lie down for at least 8 hours every day. Not being able to lie down will result in tiredness and eventually exhaustion. Ensure your pad has the right area and surface type for your usage requirements. Bullying can also be a factor influencing tiredness and the willingness to lie down. If this is a problem segregate your herd, keeping heifers and rising 3 year olds separate from older cows.

Feed pads are not recommended for standing cows on for long periods of time.

Ensure that you monitor cow behaviour on the pad. Look for signs of stress and animals that are suffering. Remove stressed or unwell animals from the environment and provide treatment promptly.

Cows are stressed when...

- **They hang their heads and appear "tired" during standing-off**
- **Mastitis levels increase**
- **They show excessive stiffness or lameness**
- **They do not lie down on returning to the stand-off area after grazing**
- **Cows choose to lie down instead of graze when back at the paddock after being stood-off.**

What are the maintenance requirements on a stand-off?

Many stand-off pads do not work well because they have not been well maintained. There are costs associated with maintenance but they are necessary to protect your investment.

Before	Before the onset on the wet winter months, the pad should be topped up with bedding material (sawdust, woodchip). Replacement of 1m^3 of sawdust or 0.5m^3 of bark or post-peeling per animal is recommended
During use	It may be necessary to scrape the top off the pad at some stage during the winter Removing cow pats off the pad after use will lengthen its life. Dung will speed up the break-down of the woodchip or sawdust bedding surface and may contribute to failure of the drainage system. However some dung is inevitable, and so problems are best avoided with an excellent subsurface drainage system
After use	At the end of winter the stand-off pad should be scraped down to a firm surface – usually 100 to 200mm below the pad surface. A firm surface will indicate that the under-pad drainage is functioning correctly. Scrapings can be incorporated into cropping land. The remaining bedding should be windrowed to allow drying over the summer months When the pad is not in use for some time, weeds should be sprayed

Section Twelve: Stand-off Pad Design and Management Checklist

Fill in the checklist below to see if you have considered all aspects of incorporating a stand-off pad into your farm system.

Decision Making Process	✓
What are the economic, production, management and environmental considerations you have taken into account?	
What stand-off stage development will you have?	
What construction requirements need to be considered?	
What are the Regional Council requirements?	
Development Process	✓
How many cows will use the stand-off pad?	
What will the peak average duration/day on the stand-off pad be?	
What will the frequency of use on the stand-off pad be?	
How big will the stand-off pad be?	
What area will be available per cow on the stand-off pad?	
What will the stand-off pad surface material be?	
Is the bedding material available long-term in sufficient quantities?	
Has access for both stock and vehicles been considered?	
How much stock drinking water will be supplied per cow?	
Will rainfall be diverted or collected?	
Effluent Management	✓
What is the average rainfall?	
Will liquid effluent need to be stored over winter?	
How much solids will be produced per year?	
How will solid waste be stored?	
How will liquid effluent be drained and contained?	
What volume will the proposed storage be?	
What area will the effluent be spread over?	
Will Regional Council requirements be met?	
Maintenance and Management	✓
Has stand-off pad maintenance been considered?	
How often will surface material be replaced?	
Has stand-off pad management been considered?	
Has labour requirement and skill level required been considered?	
Has animal management been considered?	

Section Thirteen: Taking the Next Step – Wintering Pads and Wintering Barns

Wintering pads and barns are a step up from stand-off and feed pads. They are described as:

Wintering pad: a specially built area constructed where animals are withheld from pasture for extended periods and supplementary feeds are brought to them on the wintering pad. As the herd may spend several months on the pad the cows require a similar sized area to lie down on as a stand-off pad, as well as additional space for feeding.

Wintering barn: similar to the wintering pad except that it is covered. The animals are usually withheld from pasture for extended periods and supplementary feeds are brought to them in the wintering barn.

The important difference from other pads is that a wintering pad will cater for both feeding and lying down, and a wintering barn will have a covered roof. Information in both the stand-off and feed pad sections of this booklet will provide you with most of the information you will need to consider when constructing a wintering pad or barn. However, covering pads has not been discussed in detail in this booklet. For more information on covering your pad you are best to talk to an engineer or builder.

Area per cow

Because cows will be on wintering pads and barns for very long periods of time it is crucial that they are comfortable. One of the main factors for cow comfort is the area allowed per cow. If the pad is being used for long periods of time, e.g. 12 hrs per day, then cows must be provided with a comfortable lying area allowing at least $6m^2$/cow. If you are providing feed on the pad they need an additional $1m^2$/cow for the feed area. If the pad is being used permanently, with no on-off grazing, then a minimum of $9m^2$/cow plus a $1m^2$/cow feeding area must be provided. Remember to allow for any likely herd-size increases or changes in breed in the future.

Things to consider when constructing and managing a wintering pad or barn

- Effluent must be collected and treated
- Providing enough area per cow is critical for animal health
- Keeping the pad or barn clean and dry will reduce mastitis
- Keep old cows separated from heifers to reduce bullying
- Provide a soft surface for cows to lie on to avoid lameness
- Ensure there is sufficient clean drinking water for stock
- Remember good pasture management is crucial to the overall success of your business
- Ensure your barn is well ventilated.

Herd Homes

Herd Homes are an example of a wintering barn with a difference. A Herd Home is for feeding and holding cows for prolonged periods of time and has a sturdy plastic covering, however, it does not have a solid floor surface. The floor of a Herd Home is made up of slatted concrete panels that allow effluent to fall and be collected in an underground bunker. The roof of a Herd Home is made of plastic or clear polythene that allows light onto the pad, which assists in killing bacteria. The design of the roof also allows plenty of ventilation, which reduces odour and moderates temperatures.

How is effluent managed?

The floor is a series of segmented concrete slats that allows urine and solid effluent to drop through into the bunker. The bunker has a base layer of topsoil (150 – 200mm) to absorb the effluent. The manure then goes through a dehydration process which is aided by the warmer temperature created by the plastic covering. Manure will need to be removed from the bunker regularly. The frequency of removal is case specific and ranges from once every two years to every six months in extreme use. To remove the manure from the bunker remove the concrete slats and the solid waste can then be scraped out and spread over the farm. This consolidated manure is a valuable resource when applied back to land.

Cow comfort

A dung matting forms on the slatted floor of a Herd Home. In summer it forms a smooth carpet cushioning the cow's hoof from the concrete. When a cow lies down this dung matting insulates the cow and udder from the cold hard surface. The dung matting is more absorbent than cowhide so new deposits of dung stick to the floor and leave the cow's coat moderately clean. Surplus dung, dry or fresh, falls through the slats into the underground bunker. In the heat of summer a shade cloth ceiling and vented roof will considerably reduce heat stress in cows. Herd Homes allow cows to retain their winter coats to protect them when grazing outside.

Cost

Establishing a Herd Home is a significant investment (approximately $1000/cow) and the whole process needs to be done correctly. Seek specialist advice when making the decision to construct a Herd Home.

For further information on this topic contact:

Dexcel
Corner Ruakura and Morrinsville Roads
Private Bag 3221, Hamilton, New Zealand
Ph 07 858 3776
Fax 07 858 3751
www.dexcel.co.nz

www.envirodirect.co.nz
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