AUSTRALIAN PORK LIMITED

Rotational Outdoor Piggeries and the Environment

2015

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Demonstrations of How to Achieve Best Management Practices – Environmental Management

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FSA Consulting

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INTRODUCTION

Rotational outdoor piggeries are systems in which pigs are kept outdoors in small paddocks that are used in rotation with a crop-pasture phase. During the stocked phase, the pigs are supplied with prepared feed, but can also forage (photograph 1). The crop-pasture phase is intended to remove nutrients deposited in manure from the pig phase by cutting and removing plant material from the area.

Rotational outdoor piggeries pose different, and sometimes higher, environmental risks than indoor piggeries, depending on their siting and management. Good nutrient management and erosion prevention, which are imperative to protect land and water resources, are the main issues for most rotational outdoor piggeries. On the other hand, odour, dust and noise are rarely a concern for well-run units with suitable soils, topography and climates. This booklet provides best management practices (BMPs) to help piggery operators protect the environment without compromising economic productivity.

Photograph 1 Rotational outdoor piggery paddock

In most situations, outdoor pig production is considered intensive animal husbandry which triggers the need for a planning permit or development consent from local government.

The Issues

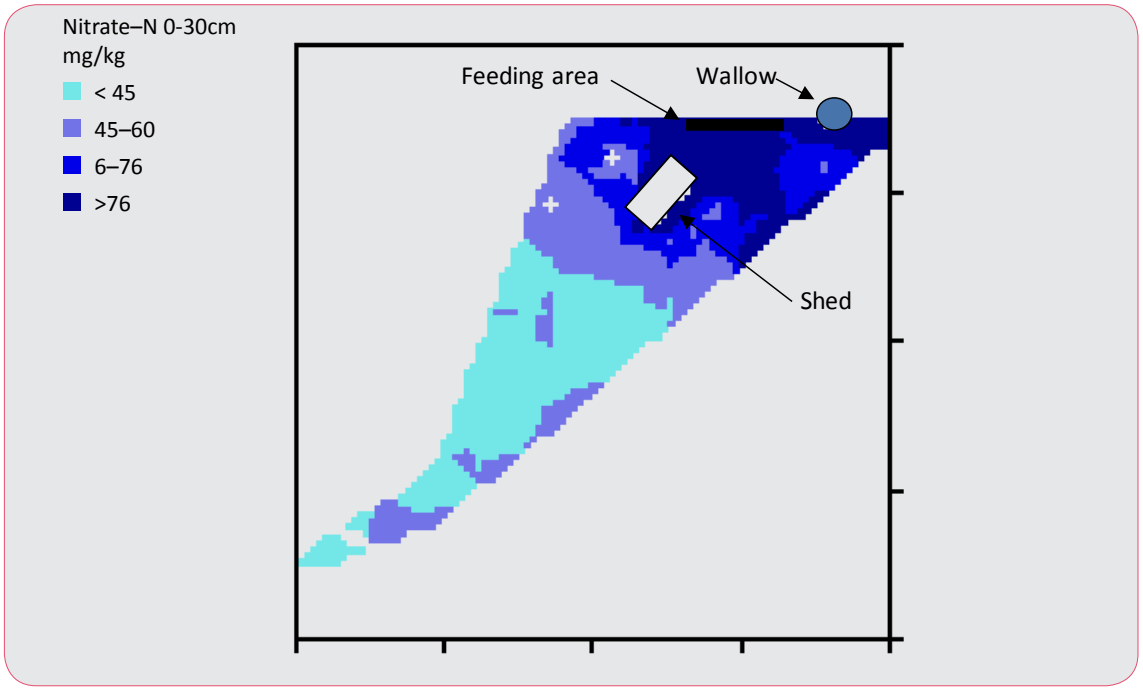
Using land to operate a rotational outdoor piggery affects the soils of the site and may also affect nearby surface waters, groundwater, vegetation and amenity. The level of impact depends on the features of the site and the design and management of the piggery.

Groundcover removal, soil disturbance by pig rooting and soil compaction by trampling may increase soil erosion and compromise soil structure. Groundcover removal exposes the soil to increased erosion risk, with the accompanying threat of nutrient transport to surface water and groundwater. Crusts, hard pans and uneven or excess soil nutrient levels may reduce land capability for the crop-pasture phase.

In most rotational outdoor piggeries, nutrients accumulate very quickly in the soil which may lead to nutrient imbalances or excesses. Pigs kept in outdoor paddocks also exhibit a distinct dunging pattern, with most manure deposited in the high use area between the shelter and the feeding area (Photograph 2, Figure 1). For this reason, the soils in some areas of the paddocks have much higher nutrient levels than other areas. Nutrient transport from these areas, especially increased leaching to groundwater, is a particular risk.

Photograph 2 The land around feeders is often nutrient-rich and denuded of vegetation

FIGURE 1 NO_3N distribution in dry sow paddock of a commercial Australian rotational outdoor piggery (Galloway 2011)



Stormwater runoff from pig paddocks may transport eroded soil and nutrients attached to the soil or dissolved in the water. Greater soil nutrient concentrations pose an increased risk, particularly if there is inadequate groundcover. The entry of soil and nutrients into streams, dams and lakes may increase turbidity and eutrophication risk.

Pigs may kill trees through root disruption and bark rubbing. Elevated soil nutrient levels may also kill native vegetation.

Well-sited rotational outdoor piggeries rarely disrupt amenity. Banhazi (2013) reported very low odour, dust and noise levels at Australian rotational outdoor piggeries on suitable sites. Amenity concerns should be assessed on a case-by-case basis taking into account site factors (e.g. distance to sensitive land uses, visibility from roads, rainfall, soil type, topography), scale and management.

The underlying causes of most environmental issues at rotational outdoor piggeries stem from:

- poor siting – too close to sensitive land uses, visible from public areas, high rainfall, close to waterways, shallow groundwater, very sandy or clayey soil and/or hilly or steeply sloping land
- elevated soil nutrient levels - the rate at which soil nutrient concentrations increase varies with management. Nutrient hot spots, generally between the shelter and the feeding area pose a particular risk
- prolonged pig access to the same feeding, watering and wallow areas removes vegetation and concentrates nutrients. Depending on soil type and rainfall, repeated trampling of the same areas may also result in soil compaction. Wet, manure-rich areas, like wallows, can also be odorous (Photograph 3)

Photograph 3 Wallows often have high nutrient levels

"Outdoor piggeries need to be managed on a stocking rate and rotation basis."

Producer WA

» soil exposure through groundcover removal – in farming and grazing systems, groundcover retention is the primary defense against soil erosion which can transport nutrients and sediment to waterways. Pigs can quickly remove vegetation (photograph 4) and disrupt the soil (Photograph 5).

Photograph 4 Pig rooting removes groundcover

Photograph 5 Pigs can dig large holes in the ground

Good site selection, awareness and management of soil nutrient levels, erosion prevention, secondary measures to filter runoff and prevent sediment from reaching waterways, and land remediation after the pig phase are all important in preventing environmental impacts.

Selecting a Suitable Site

Suitable property selection and piggery siting greatly reduces the risks to the environment and helps with maintaining comfortable conditions for the pigs.

Sites with temperate climates and annual rainfalls of less than 760 mm are generally preferred for rotational outdoor piggeries. Hotter locations are less suitable since heat waves are linked to summer infertility. Areas with very cold winter temperatures may experience problems with water delivery due to pipes freezing. Wetter climates tend to produce less suitable paddock conditions. Rotational outdoor piggeries can operate in other climates but may have different risks and need better design and/or more intensive management.

To operate rotational outdoor piggeries sustainably, enough land for the pig phase plus the subsequent crop-pasture phase is required. Extra land must be available to enable flexibility in management, and provide for grassed vegetated filter strips (VFS) below pig paddocks (see photograph 6), roads, farm dams, buildings, remnant vegetation and buffers. In most rotational outdoor piggeries, the majority of the land area will be occupied by the crop-pasture phase. The total area required depends largely on the types of pastures and crops that can be grown, and how quickly they can remove the nutrients added during the pig phase.

Photograph 6 Vegetated filter strips below the pig paddocks will filter runoff and reduce the risk of nutrient entry to waterways

At any time, the majority of the land needed to operate a rotational outdoor piggery will be growing crops or pastures that will be harvested to remove the nutrients added during the pig phase.

Sites with gently sloping or undulating topography are preferred to very flat sites because they have better drainage. Moderately to steeply sloping land is unsuitable because of the increased erosion and runoff risk.

Soil type affects paddock conditions for stock, particularly in wet conditions; capacity to grow pastures and crops that can be harvested to remove nutrients, water holding capacity and erosion risk. Heavy clays stay wet and puggy after rainfall, making management challenging. Some clay soils are also prone to compaction. However, these soils generally have a much lower nutrient leaching risk than lighter soils. Avoid very sandy soils that are subject to nutrient leaching which can pose a risk to groundwater.

Rotational outdoor piggeries must be well separated from watercourses and water bodies. They should provide a 100 m wide VFS between the pig paddocks and watercourses and a buffer of at least 800 m to a major water supply storage. Ideally, the VFS should consist of runner-developing, non-clumping grass. Rotational outdoor piggeries also need to be above the 1 in 100 year flood level.

Protect surface waters by providing a vegetated filter strip consisting of runner-developing, non-clumping grass between pig paddocks and watercourses.

Avoid areas overlying shallow groundwater, particularly if the soil is light. Provide a 20 m wide buffer to bores.

Pigs need water for drinking and cooling themselves (wallows or spray/drip). Water may also be used for dust control along roads. Ensure there is a plentiful supply of water that can legally be used in the piggery.

Avoid areas with significant remnant native vegetation. The use of fencing to prevent pig access to trees within paddocks and provide a buffer to native vegetation is recommended.

Provide suitable separation distances to neighbours, choose a site set back from well-used roads and use vegetative and/or topographical screening to reduce the likelihood of complaints. Rotational outdoor piggeries should be at least 250 m from nearby residences, 500 m from rural residential areas and 750 m from towns. State government codes or guidelines and local government planning schemes may specify additional requirements.

Suitable all-weather road access is needed. Access to mains power may also be a consideration.

Provide buffers to neighbouring houses and use screening to reduce the likelihood of nuisance and complaints.

Managing Soil Nutrient Accumulation

During the pig phase, nutrients accumulate in the soils of rotational outdoor piggery paddocks. The nutrients added by manure and bedding are not matched by removals via pig foraging and gaseous losses (of nitrogen). As a result, soil nutrient levels can build up very quickly.

Recent Australian Pork Ltd (APL) funded research on two commercial Australian rotational outdoor piggeries showed that soil nutrient levels had accumulated to very high concentrations within 6-12 months of commencement of the pig phase. Wiedemann (2014) found that the pigs were adding some 300-600 kg N/ha/yr and 100-200 kg P/ha/yr. Elevated nitrate-N and phosphorus levels in the topsoil and the subsoil, and evidence of nitrate-N leaching below the crop root zone, represented environmental risks to both surface water and groundwater.

The research confirmed that nutrient levels vary significantly across the paddock. Concentrations in the hot spots bounded by the shelters, feeding areas and watering areas were up to six times higher than the paddock average. Under best practice management, soil nutrients would not be allowed to accumulate to unsustainable levels during the pig phase.

Very high nutrient concentrations in the soils of rotational outdoor piggeries may pose a serious environmental risk. Paddocks need to be managed to prevent nutrients accumulating to unsustainable levels and being lost in runoff, eroded soil or leachate during the pig phase.

The nutrient accumulation rate (kg/ha) over the pig phase can be reduced by using shorter pig phases (6-12 months) and/or lighter stocking densities. It is also important to try to distribute nutrients over the paddock by regularly and frequently moving shelters and feeders.

Shorter pig phases and/or substantially lighter stocking rates, with frequent and regular movement of shelters and feeders reduces the risk of nutrient export from pig paddocks.

It is also worth exploring ways to reduce nutrient inputs. Installing feeders that minimise feed wastage or using phytase in conjunction with reduced dietary phosphorus can significantly reduce nutrient inputs.

The nutrients added by the pig phase need to be managed by using a well-managed crop phase. This includes careful use of fertiliser *only as/where needed* and regular soil testing to monitor soil fertility. Because soil nutrient levels will be elevated at the end of the pig phase, fertiliser is unlikely to be needed in the first year after the pig phase. However, nutrient distribution may be patchy. Hence, some parts of the paddock may benefit from fertiliser additions in the second year after the pig phase while hot spots are unlikely to need fertiliser for a number of years. If practical, identify the location of expected nutrient-rich areas and avoid fertilising them until needed by the crops being grown.

Because soil nutrient levels will be elevated at the end of the pig phase, fertiliser is unlikely to be needed in the first year after the pig phase. Hot spots may not need fertiliser for a number of years. *This needs to be understood by whoever is responsible for managing the crop-pasture phase.*

Gross Nutrient Loads

To manage the nutrients well, it is necessary to first appreciate how quickly they build up. Models like PIGBAL (Skerman *et al.* 2013) are useful in estimating gross nutrient loads. However, because manure nutrients are likely to be distributed unevenly over the pig paddocks, regular soil testing is also needed to understand nutrient accumulation.

Tables 10.1 and 10.2 of the National Environmental Guidelines for Rotational Outdoor Piggeries (Tucker et al. 2013) provide estimates for the total mass of nitrogen (N), phosphorus (P) and potassium (K) added by pigs (kg/hd/yr) and bedding (%), respectively. Data from these tables are reproduced as Table 1 and Table 2. The APL "Piggery Manure & Effluent Management & Reuse Guidelines 2015" and the associated "Piggery Manure and Effluent Reuse Glovebox Guide 2015" also provide guidance on estimating manure nutrient loads.

TABLE 1 **Manure nutrient output by pig class**

Pig Class	Manure nutrients added (kg/hd/yr)		
	N	P	K
Gilts	12.0	4.6	4.0
Boars	15.0	5.3	3.8
Dry sows	13.9	5.2	3.7
Lactating sows	27.1	8.8	9.8
Suckers	2.3	0.4	0.1
Sow + litter	50.0	13.0	11.0
Weaners	3.9	1.1	1.1
Growers	9.2	3.0	2.4
Finishers	15.8	5.1	4.1

Use the length of the pig phase, the stocking density and the nutrients added by the class of pigs to estimate manure nutrient additions for each paddock. For instance, a paddock stocked for twelve months with 10 dry sows/ha may be adding around 139 kg N/ha (1 year X 10 sows/ha X 13.9 kg/ha/yr) as manure.

TABLE 2 **Nutrients in bedding materials**

Material	Manure nutrients added (% fresh basis)		
	N	P	K
Hardwood sawdust	0.20	0.01	0.05
Softwood sawdust	0.13	0.01	0.03
Rice hulls	0.49	0.07	1.21
Barley straw	0.63	0.06	2.16
Wheat straw	0.52	0.04	1.26

Estimate the nutrients added by bedding from the length of the pig phase, the bedding use rate, the stocking density and the nutrient content of the bedding type. Using the same example as above, and barley straw bedding use of 400 kg/sow/yr, some 25 kg N/ha (i.e. 1 year X 400 kg bedding/sow/yr X 10 sows/ha X 0.63% N) could be added as bedding.

Hence, the average total nitrogen nutrient addition to the soil is 164 kg N/ha (i.e. 139 kg/ha + 25 kg/ha). For nitrogen (only), some gaseous losses would occur. If 20% is lost, about 131 kg N/ha remains in the soil for management. Using the same process, some 54 kg P/ha and 123 kg K/ha are also added.

Total nutrients added to pig paddocks = nutrients added by manure + nutrients added by bedding.

If spent bedding from shelters will stay in the paddock, it should be spread on areas away from the shelters and feeders to disperse nutrients more evenly.

Estimations of gross nutrients provide a guide to the amount of nutrients added to the whole paddock area during the pig phase. However, because these nutrients will not be evenly distributed across the paddock, soil testing is needed to understand nutrient levels across a site. What gross nutrients do provide is a guide to the total mass of nutrients that could potentially be lost from a poorly managed site.

Removing Added Nutrients

The crop-pasture phase is intended to remove the nutrients added to the soil during the pig phase. If the site has been managed to minimise losses through runoff, erosion and leachate there will generally be a substantial mass of nutrients to manage. It can take some years to remove these and an effective cut-and-cart rotation must be planned (photograph 7). This involves careful crop selection, good agronomic practices and a suitable fertiliser strategy. In most cases, fertiliser will not need to be applied to the paddocks (or to the whole area) in the first year of the crop-pasture phase. Thereafter, fertiliser should be strategically spread, with nil applied to expected hot spots until necessary to meet crop nutrient requirements. Seek agronomic advice on fertiliser management.

Grazing pastures removes nutrients very slowly and cannot be the only land use during the crop-pasture phase.

Photograph 7 Growing and harvesting crops after the pig phase will effectively strip nutrients

In some cases soil structural issues (not necessarily related to the operation of the piggery) may need to be addressed to maximise crop yields. This could involve gypsum applications, deep ripping or other remedial measures.

While soil nutrient levels remain elevated there is a risk of nutrient transfer to nearby surface waters and shallow groundwater. To minimise the risk to the environment, plan a crop rotation that will quickly remove nutrients and manage fertiliser additions very carefully.

Table 14.4 of the National Environmental Guidelines for Piggeries provides nutrient removal rates data for a range of pastures, forages and crop. This is reproduced below as Table 3. For any crop, multiply the dry matter yield (t/ha) by the nutrient content (kg/t) to find the nutrient removal rate (kg/ha).

For example, harvesting a 3 t/ha barley crop removes:

» 57 kg N/ha (3 t/ha X 19 kg N/t)

» 9 kg P/ha (3 t/ha X 3 kg P/ha)

» 15 kg K/ha (3 t/ha X 5 kg K/ha).

Assuming the nutrients are evenly spread across the paddock, and there are no losses from the system, the nutrient removal rates can be subtracted from the nutrient surplus to find a balance.

If the barley is harvested in the first year after the pig phase, the nutrient balance is:

» 74 kg N/ha (131 kg N/ha – 57 kg N/ha)

» 45 kg P/ha (54 kg P/ha – 9 kg P/ha)

» 108 kg K/ha (123 kg K/ha – 15 kg K/ha).

The barley removes phosphorus and potassium more slowly than it removes nitrogen. This suggests that enough nitrogen would be available to grow the second crop in the crop phase but not the third. In reality, the nutrients aren't spread evenly. It is likely that nitrogen would need to be added to parts of the paddock in year 2 of the crop phase to optimise crop growth, but other areas could have enough nitrogen for a few years.

An effective crop rotation might use multiple crops, selected for their N, P and K removal rates, local suitability and the nutrient surpluses.

Plan a crop phase that will effectively utilise nutrients:

» choose cut-and-cart pastures or crops that suit the location

» plan fertiliser use carefully – often no fertiliser at all will be needed in the first year of the crop phase. Thereafter apply fertiliser as needed; avoid applying unneeded nutrients to hot spots. Seek agronomic advice on fertiliser strategies

» test the soil to monitor nutrient levels and apply extra nutrients as needed to ensure crop yields (and nutrient removal capability) won't be compromised.

TABLE 3 Approximate nutrient removal rates for various crops and crop yields

Crop	Dry Matter (DM) Content (kg/t)			DM yield rangea	Nutrient Removal Range (kg/ha)		
	Nitrogen	Phosphorus	Potassium	(t/ha)	Nitrogen	Phosphorus	Potassium
Grazed pasture[b]					7-19	1-2	0.1-0.6
Dry land pasture (cut)	20	3	15	1-4	20-80	3-12	15-60
Irrigated pasture (cut)	20	3	15	8-20	160-400	24-60	120-300
Lucerne hay (cut)	31	3	25	5-15	155-465	15-45	125-375
Maize silage	22	3	20	10-25	220-550	30-75	200-500
Forage sorghum (cut)	22	3	24	10-20	220-440	30-60	240-480
Winter cereal hay	20	3	16	10-20	200-400	30-60	160-320
Barley grain	19	3	4	2-5	38-95	6-15	8-20
Wheat grain	19	4	5	2-5	38-95	8-20	10-25
Triticale	19	4	6	1.5-3	29-57	6-12	9-18
Rice	14	3	4	12-24	56-112	12-24	16-32
Oats grain	15	3	4	1-5	15-75	3-15	4-20
Sorghum grain	20	3	3	2-8	40-160	6-24	6-24
Maize grain	20	3	4	2-8	40-160	6-24	8-32
Chickpeas	40	4	4	0.5-2	20-80	2-8	2-8
Cowpeas	30	4	20	0.5-2	15-60	2-8	10-40
Faba beans	40	4	12	1-3	40-120	4-12	12-36
Lupins	45	3	8	0.5-2	22.5-90	1.5-6	4-16
Navy beans	40	6	12	0.5-2	20-80	3-12	6-24
Pigeon peas	26	3	9	0.5-2	13-52	1.5-6	4.5-18
Cotton	20	4	8	2-5	40-100	8-20	16-40

[a] Yields may vary from these ranges (refer to historical data for the region for more accurate estimates).
[b] The grazed pasture example assumes a liveweight gain of 75 – 200 kg/ha/yr, with no ammonia volatilisation losses from the grazed animal's manure.

Sources: National Research Council (1984) and Reuter and Robinson (1997)

"I move my sows annually to allow the soil to regenerate and don't come back to a site for 4-5 years."

Producer TAS

Encouraging Pigs to Use the Whole Paddock

Pigs kept outdoors mostly defecate and urinate in the area between the shelter and the feeding area. Using electromagnetic (EM) induction survey technology and soil testing Galloway (2011) and Wiedemann (2014) mapped the spread of nutrients in Australian outdoor piggeries. Figure 1 shows the pattern of nitrate-nitrogen distribution in a Victorian dry sow paddock.

This uneven nutrient distribution has implications for the growth of future crops, but also the environment. Higher levels of nutrient removal in runoff or by leaching could be expected from the areas where nutrients are more concentrated. It is therefore important to promote more even spreading of nutrients over the paddocks, but also to ensure soil nutrient concentrations in all parts of the paddock are restored to sustainable levels before the next pig phase starts.

Moving shelters, feeding points, shade, watering points and wallows helps to spread nutrients more evenly. This also helps to reduce the likelihood of soil compaction through repeated trampling of the same areas. It is particularly important to select shelters and feeders (photograph 8) that can be moved. To effectively disperse nutrients, movable facilities must be relocated *at least* every six months for breeding herds, and every three months for grower paddocks to cover the paddock over the length of the pig phase.

Photograph 8 Regularly shifting movable feeders helps to spread nutrients over the paddock area

Select shelters, feeders and shade structures that can easily be moved to allow the pigs to utilise more of the paddock area. Relocate moveable facilities at least every six months for breeding herds, and every three months for grower paddocks, more frequently if practical.

Spent bedding from the shelters should be spread on areas away from the shelters and feeders to disperse nutrients more evenly.

Erosion Prevention

Groundcover prevents soil erosion and minimises dust releases from the paddocks. Soil erosion reduces land productivity, and can also increase nutrient and sediment deposition in waterways that promotes algal growth and turbidity.

However, pig rooting behaviour quickly destroys groundcover. The groundcover removal rate varies depending on soil type, slope, rainfall, initial land cover, stocking density, rotational practices and other factors. It is important to start each rotation with robust groundcover ideally consisting of runner forming grass. Maintaining a good level of groundcover continuously over the paddock area is challenging, and strategies to achieve this need to be developed. These are likely to involve choosing suitable sites, careful selection of grass type and using light stocking densities and/or more frequent paddock rotation.

If good levels of groundcover cannot be continually maintained, other measures aimed specifically at controlling runoff, erosion and lateral movement of shallow groundwater to streams must be implemented. Vegetated filter strips (VFS) below the pig paddocks should also be used to control nutrients in runoff and eroded soil.

Continuously maintaining groundcover will minimise erosion from the pig paddocks. If good levels of groundcover cannot be maintained, other management measures aimed specifically at controlling runoff, erosion and lateral movement of shallow groundwater to streams must be implemented.

Since nutrient contamination of rainfall runoff and soil erosion from the paddocks pose potential risks to water quality, robust VFS at least 100 m wide should be maintained below pig paddocks particularly if these are close to a waterway.

Managing Mortalities and Spent Bedding

Mortalities and spent bedding need to be managed to minimise the risk of environmental impacts.

Composting (often with spent bedding) or rendering are usually considered best management practice for managing mortalities. If composting is not feasible, mortalities may be buried in a pit dug into low permeability soils with 2 m clearance to groundwater. Each body must be well covered with soil or other suitable material.

Check regulatory requirements; some councils or state environment agencies may prohibit carcass burial or burning unless mandated for disease control.

Areas used to store or compost mortalities or spent bedding, should be bunded to exclude stormwater runoff and confine contaminated water, and have a low permeability base to prevent its seepage into groundwater.

Spent bedding may be dispersed over parts of the paddock expected to have lower nutrient levels, or removed for aging or composting, or spreading elsewhere.

Compost and/or aged bedding should be spread on land at sustainable rates.

To operate at best practice, mortalities will be composted or rendered. Where compost is produced, the product needs to be spread at sustainable rates on farming land.

Site Rehabilitation

At the end of the pig phase some work is usually needed to prepare the land for growing pastures or crops and to remediate wallows and any structural concerns (which may be unrelated to the operation of the piggery).

Removal of fencing, shelters, shades, feeders, drinkers, wallows and pipework will usually be necessary.

Wallows become compacted with use and may need to be disked or deep ripped to break up the base. Gypsum may also help. They should then be filled with soil and levelled so the slope matches the surrounding area.

Broader soil structural issues can be addressed by deep ripping, applying gypsum or other measures.

A forage crop or pasture should be given time to establish before pigs return to an area.

Environmental Monitoring

Environmental monitoring can demonstrate that a rotational outdoor piggery is operating sustainably. It can also identify emerging concerns, enabling them to be addressed.

Regular soil monitoring is important for most piggeries. The "National Environmental Guidelines for Rotational Outdoor Piggeries 2013" recommend soil monitoring locations, depths and parameters, and provide guidance on results interpretation.

Surface water and groundwater monitoring may be warranted in high risk situations.

Record, investigate and respond to amenity complaints from neighbours.

Environmental and Nutrient Management Plans

An Environmental Management Plan (EMP) is a system for:

» documenting the environmental risks of a piggery

» identifying how these risks will be minimised

» specifying how the effectiveness of risk mitigation strategies will be measured (by monitoring)

» detailing how monitoring results will be reported

» identifying actions that will be taken to ensure good environmental management and reduced risk.

The National Environmental Guidelines for Piggeries provide further guidance on EMPs. APL has also developed an electronic EMP template, designed for use with rotational outdoor piggeries. To obtain a copy, phone 1800 789 099.

A Nutrient Management Plan (NMP), which should be part of an EMP, can help those operating a rotational outdoor piggery to:

» document the existing operation

» develop a nutrient budget

» evaluate how evenly manure nutrients are spread

» identify potential nutrient loss pathways

» develop and implement an action plan to address risks

» demonstrate to decision makers, community and regulators that risks have been identified and will be managed.

Further guidance is available in the "National Environmental Guidelines for Rotational Outdoor Piggeries" and the APL Fact Sheet "Developing a Nutrient Management Plan for a Rotational Outdoor Piggery".

APIQ✓® Free Range and Outdoor Bred Certification

The Australian Pork Industry Quality Assurance Program (APIQ✓®) is the industry sponsored on-farm quality assurance program. APIQ✓® provides the framework and standards by which Australian pig producers can demonstrate they are responsible farmers who care for their animals, the environment and their customers by following safe and sustainable practices. Operators of rotational outdoor piggeries who meet the needs of the program can gain APIQ✓® Free Range (FR) or Outdoor Bred and Eco-Barn Raised (OB) Certification. This may provide a marketing edge. APIQ✓® Standards and Performance Indicators (Version 4.0 7/2015) Module 1: Management; ensures producers comply with the definition of a FR or OB piggery. Module 6: Environmental Standards; includes specific Standards and Performance Indicators pertaining to *Environmental Regulatory Compliance and Management of Environmental Impact for Pigs Outdoors*, including:

» soil monitoring

» nutrient management

» promoting even nutrient distribution

» land and water protection.

For more information, see www.apiq.com.au.

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"In some cases two years on one site may be too long, especially for growers. Its very site specific. Maybe a smaller footprint if moved more frequently is the way to go."

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