

***Appendix 1***

***Biogas equipment suppliers and service providers***

## Biogas equipment suppliers and service providers

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**Note:** The following list of businesses has been compiled as a service to Australian pig producers interested in developing, operating or maintaining on-farm biogas systems. It is not intended to be an exhaustive listing of all businesses that supply equipment or services to the biogas industry. The majority of businesses included in this listing have proactively requested that their details be made available to prospective customers in the pork industry. Consequently, inclusion in this listing does not imply any warranty or recommendation with regard to the quality of the products or services provided by these businesses. Furthermore, in compiling this listing, the businesses are not listed in any particular order and the Pork CRC is not endorsing any individual business or product over any other business providing similar products or services. While this listing provides some initial contacts, it is recommended that producers make their own enquiries before selecting businesses providing particular products or services.

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### Shepelec Instrumentation

Henk Büchner

Technical Manager

Shepelec Instrumentation

Phone: (03) 5831 8181

Fax: (03) 5831 3540

Email: [sales@shepelecinstrumentation.com](mailto:sales@shepelecinstrumentation.com)

Website: [www.shepelecinstrumentation.com](http://www.shepelecinstrumentation.com)

Biogas metering, Sage and other brands

Biogas flare temperature and flowrate monitoring.

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### Thermo Fisher Scientific

Tim Brewer, Sales Specialist

Environmental Assessment Technologies

Thermo Fisher Scientific

Unit 2, 5 Ross Street | Newstead, QLD 4006

Mobile: 0403 222 557 | Customer Service: 1300 735 295

[tim.c.brewer@thermofisher.com](mailto:tim.c.brewer@thermofisher.com)

[www.thermofisher.com.au](http://www.thermofisher.com.au)

Geotech gas analysers, GE flowmeters.

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## **ALS Group Qld**

Scott Miller

Business Development -Australasia

Units 3 & 4, 32 Premier Circuit,

WARANA, QLD. 4575

ALS GROUP QLD

T +61 7 5413 4343

F +61 7 5413 4333

E [info@alsgroupqld.com.au](mailto:info@alsgroupqld.com.au)

<http://alsgroupqld.com.au/>

Storage tanks

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## **Envirofix Erosion Control Pty Limited**

Richard Hurley

Envirofix Erosion Control Pty Limited

PO Box 2177

Carrum Downs Vic 3201

Phone +61 3 9773 2049

[info@envirofix.com.au](mailto:info@envirofix.com.au)

[www.envirofix.com.au](http://www.envirofix.com.au)

Biogas flares, blowers, flow meters.

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## **East Coast Diesel & Gas**

Engineering Consultants & Services - Currumbin Waters, QLD

Alex Pannekoek - Managing Director

8 Boom Ct, Currumbin Waters QLD 4223

Phone: (07) 5521 0304

Mob: 0488 048 662

Email: [alexpannekoek@bigpond.com](mailto:alexpannekoek@bigpond.com)

Biogas engine retrofits and troubleshooting relating to biogas engines.

Bulk iron-oxide pellets (cg5) imported from China for removing H<sub>2</sub>S from biogas .

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## **Evo Industries Australia**

Travis McNeill

General Manager

Phone: 1300 85 99 33

After Hours: 0419 136 772

Address: 18 Hasp Street

Seventeen Mile Rocks QLD 4073

Email: [info@evoheat.com.au](mailto:info@evoheat.com.au)

Website: <http://www.evoet.com.au/contact-us/>

2G Biogas CHP systems, GM/Efficiency & Powergen Specialist at Evo Energy Technologies

Evo Industries supplies a range of heat pump equipment to the market. Evo's product range is designed to lower energy usage and running costs of various areas such as space heating/cooling, water heating and chilling and applications which use hot or cold liquids in any process.

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## **Energy 360 Pty Ltd**

Samantha LAMOND | Energy 360 Pty Ltd

Chief Financial Officer

2/2 Access Way CARRUM DOWNS, VIC.3201

Ph: +613 9770 8545 | Fax: +613 9770 8546 | Mobile: 0428 397 837

web: [www.energy-360.com.au](http://www.energy-360.com.au)

email: [samantha.lamond@energy-360.com.au](mailto:samantha.lamond@energy-360.com.au)

Energy 360 Pty Ltd has been established by the key stakeholders of ABM Combustion, Australia's most experienced and respected biogas handling equipment engineering firm. Energy360 has built upon ABM Combustion's experience in biogas systems to bring our biogas handling expertise into a formal partnership with a leading German biogas company - Oekobit - to offer turn-key biogas systems to the Australian market. Energy360 will take responsibility and Project Manage the system design and implementation to provide sites which have an organic waste stream, a competitively priced biogas solution. Energy 360's turn-key biogas systems aim to maximise the amount of biogas obtainable from the current organic waste stream. We work with our clients to make minimal upstream (plant located) modifications. This reduces the upfront project cost, whilst delivering valuable renewable energy savings.

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## Total Lining Systems

Dax Knight

Total Lining Systems

Address: 14 Waine St Freshwater NSW 2096

T. (02) 9938 3858

F. (02) 8916 6173

M. 04 28 135 139

Email: [enquiries@totalliningsystems.com.au](mailto:enquiries@totalliningsystems.com.au)

[www.totalliningsystems.com.au](http://www.totalliningsystems.com.au)

Total Lining Systems (TLS) specialises in the design, supply and installation of engineered geosynthetic systems.

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## Waterlogic Environmental Systems

Colin Jones

Mob: 0425 326 916

Warehouse: Shed1, 344 Annangrove rd, Rouse Hill, 2155.

[Enquiries@waterlogic.com.au](mailto:Enquiries@waterlogic.com.au)

Postal Address: 141 Hanckel Road, OAKVILLE NSW 2765, Australia

Street Address: NGINA, 344 Annangrove Road, ROUSE HILL NSW 2155, Australia

Phone: (02) 9627 3861

Email: [colin@waterlogic.com.au](mailto:colin@waterlogic.com.au); Website: [www.waterlogic.com.au](http://www.waterlogic.com.au)

Waterlogic is an experienced and well-established company, in the plastic geomembrane industry. With extensive experience in the civil, agricultural and mining sectors, Waterlogic can offer a wide range of products, delivering dynamic and practical solutions to suit all small and large scale projects.

Liner applications Include:

- Environmental Ground water protection
  - Lining of dams and ornamental Lakes
  - Floating covers
  - Biogas Covers
  - Evaporation ponds and canals
  - Sewage ponds
  - Water storage
  - Reservoir liners
  - Heap leach pads
  - Damp proof membranes
  - Agricultural sheeting and covers
-

## **AMOCO Group Chengdu Company**

Address: B-1403. Huaxi Building, No.5 Linyin Street. Chengdu, China P.C.:610041

TEL:(86-28)85431144 Ext. 120

FAX:(86-28)85436644

Mobile: +86 135 4104 2268

Email: [camila@amoco.com.cn](mailto:camila@amoco.com.cn)

Skype: jincai8881

[Http://www.amoco.com.cn](http://www.amoco.com.cn)

Camila, Marketing Director

The main function and parameter our membrane biogas holder:

1. Capacity: Volume from 10-20000 cubic meter.
2. Stable pressure: We do stable pressure adjustment by auto-control system, in general it is 3000Pa, or you can choose another data.
3. Another additional device can do help: Such as, over-pressure protection, the display of capacity, pressure and temperature, dewatering system, observation window, etc.
4. The other function can be customized according to customer demand.

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## **Bio-Gen Solutions Pty. Ltd.**

Locked Bag 5010

Caloundra DC QLD 4551

07 5413 9240

[info@bio-gensolutions.com.au](mailto:info@bio-gensolutions.com.au)

<http://www.bio-gensolutions.com.au/index.php>

BIO-GEN SOLUTIONS

Bio-Gen Solutions supply and install modular bolted storage tanks, bioenergy digesters, odourless storage covers and mixing agitators.

We offer a variety of services including tank maintenance, repairs, insulation and cleaning. We can design and engineer water management solutions to meet the requirements of a wide range of applications.

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## **Finnbiogas**

Jason Hawley B.E(Mech)

Engineering Director

Phone: +61 407 823 161

Email: [jasonh@finnbiogas.com](mailto:jasonh@finnbiogas.com)

Skype: Jason\_g\_hawley

Web: [www.finnbiogas.com](http://www.finnbiogas.com)

I run a small Brisbane-based engineering consulting company that specialises in the design, construction management, commissioning and rectification of biogas plants throughout Australia and South East Asia. I've worked previously for a Brisbane-based biogas company, but have since gone out on my own on a consulting basis, and am working on projects in Costa Rica, the Philippines and China. We work across a range of different technologies (tanks, lagoons, hybrid systems), and aim to provide smart sustainable solutions that meet the true needs of our clients. I personally am a Chartered Professional Engineer (CPEng), and Registered Professional Engineer of QLD (RPEQ).

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## **Cipatex**

William Rogerio Nicolau

Exports Manager

[rogerio.nicolau@cipatex.com.br](mailto:rogerio.nicolau@cipatex.com.br)

Fone +55 (15) 3288-4330

Cel: +55 (15) 99132-2143

Fax +55 (15) 3284-9056

[www.cipatex.com.br](http://www.cipatex.com.br)

skype: rogeriofacilis

I have developed a partner in Australia who has a deep knowledge about waterproofing systems and also about the materials we commercialize. In fact, one of his associates is located in Brisbane and may help us a lot in developing this relationship with you at UQ and somehow contribute to your project. They are copied in this e-mail. The owner of SGS is Mr. Wayne Alexander and Ms. Zehra Kaya is his team member in Brisbane. As I have introduced before we have a reasonable knowledge in biodigestors and Cipatex is committed to employ all the efforts necessary to have a solid presence in Australia. We look forward to partnering with you and have you consider us as one of your certified suppliers of geomembranes for your projects.

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## **Southern Geosynthetics Supplies Pty Ltd (ABN: 31 766 785 395).**

QLD contact:

Zehra Kaya BSc Engineering (Textiles), Master of International Business

Business Development Manager

Southern Geosynthetics Supplies

Mobile: +61 409 953 136

Email: [zehra@geosynthetics.com.au](mailto:zehra@geosynthetics.com.au)

Internet: [www.geosynthetics.com.au](http://www.geosynthetics.com.au)

VIC and other states contact:

Wayne Alexander

Mobile: 0419 478 238

Email: Wayne Alexander [wayne@geosynthetics.com.au](mailto:wayne@geosynthetics.com.au)

Local geomembrane suppliers with regards to lining and capping of biodigesters.

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## **Quantum Power Limited**

Richard Brimblecombe

Level 1, 9 Gardner Close

Milton Qld 4064

Phone: 07 3721 7500

Email: [info@quantumpower.com.au](mailto:info@quantumpower.com.au)

Internet: <http://www.quantumpower.com.au/>

We're the leaders in anaerobic digestion systems and biogas fuelled power station installations, offering complete, end-to-end service. We've completed many successful installations in the pig, poultry and food processing industries. We offer two different project delivery models, depending on what works best for your business:

Build, own and operate system – We build, fund, own, operate and maintain the biogas to energy system and sell electricity to you at a discount to your grid supplied cost under a long-term power purchase agreement.

Turnkey solution – We build the entire biogas to energy system including the digester and generator/boiler and you purchase and operate the completed system. We also provide maintenance services to our turnkey clients.

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## **RCM Digesters**

P.O. Box 4716

Berkeley, CA 94704

PH: 510-834-4568

[www.rcmdigesters.com](http://www.rcmdigesters.com)

[contact@rcmdigesters.com](mailto:contact@rcmdigesters.com)

Analysis, design, construction and operation of a range of biogas systems.

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## **BioBowser**

Ron Lakin

89 Pinjarra Road

Pinjarra Hills

Brisbane QLD 4069

[info@biobowser.com.au](mailto:info@biobowser.com.au)

+61 422 872 586

An exciting Australian innovation, BioBowser® offers a range of packaged biogas plants and modules designed to be installed quickly and integrate with existing waste handling procedures at minimal cost with minimal disruption. BioBowser® can treat between 50 kgs and 20,000 kgs (feed-in volume at max 8% Total Solids) of organic waste per day. Suitable waste streams include animal manures, effluent, abattoir residues or food waste from processing facilities such as kitchens, canteens, holiday resorts, mining camps and retirement villages.

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## **UTILITAS**

Fiona Waterhouse, CEO

Suite 12, London Offices, 30 Florence Street

Teneriffe | Queensland 4005 | Australia

Phone: +61 7 3105 2819

Website: [www.utilitas.com.au](http://www.utilitas.com.au)

Brisbane based Utilitas Pty Ltd is a biogas energy developer. We scope, design and deliver process plants for solid organic wastes and wastewater using “European Style” tank based digester systems, ‘tier1’ equipment and experienced local contractors.

We do the process engineering for each of the projects this includes using our internal knowledge to design the biogas plant. We design, specify and integrate both solid and liquid waste biogas treatment equipment into our plants (traditionally most biogas companies specialise in either liquid or solid).

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## **Compressed Air and Gas Systems Specialist**

AJ Stack Solutions P/L

John DEWAR - Compressed Air and Gas Systems Specialist

7 Arnold Street, Cheltenham. VIC Australia 3192

Office: +61 3 8820 3119 Mobile: +61 4 0234 6284 Email: [compressors@ajss.com.au](mailto:compressors@ajss.com.au),

Website: <http://ajss.com.au/>

A J Stack Solutions P/L represent Airpack NL which has recently released a modular package system for treatment of biogas to clean the gas and convert the other waste streams into usable products. This innovative product reduces the service requirements compared with other cleaning processes (such as iron oxide absorption). The packages can be engineered to suit any required size and gas quality.

Refer: <http://www.gazpack.nl/> and <http://www.gazpack.nl/nieuws/>

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## **Livestock Environmental and Planning (LEAP)**

Livestock Environmental and Planning (LEAP)

Robyn Tucker, Principal Consultant

Private Bag 260 (110 Natimuk Road)

Horsham Vic 3400

M: 0419 787 137

P: 03 5381 0709

E: [robyn@leap-consulting.com.au](mailto:robyn@leap-consulting.com.au)

[www.leap-consulting.com.au](http://www.leap-consulting.com.au)

Intensive livestock planning permit applications typically include information about the proposed site, the development, the potential environmental impacts and how the facility will be managed to prevent these. Detailed information about effluent treatment and reuse is needed; this can include a covered anaerobic pond with or without a generator or combined heat and power or a biodigester. A comprehensive Environmental Management Plan (EMP) is also essential. Livestock Environmental and Planning staff have over 20 years' experience in preparing planning permit applications for all types of intensive livestock developments in all mainland states.

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## **Fox Generation**

Brad Fox

Principal Engineer

Mobile: 0409 365 477

Email: [foxgeneration@outlook.com](mailto:foxgeneration@outlook.com)

Design and installation of biogas control and monitoring systems.

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## **Gas Advisory Services**

John Fleming

Mobile: 0431 533 252

Post: PO Box 31, Scarborough Qld 4020

Email: [GAS@johnfleming.com.au](mailto:GAS@johnfleming.com.au)

Projects to date include:

Safety Management Plans, Accident Investigations, Gas Safety Training, Safety and Compliance Audits, Government Submissions, Risk Assessments including unodourisd gas, Gas Advice to Major Projects including SMS, Technical and Safety Reviews, Type B Certification (Small and special devices), Assistance with Standards and Codes of Practice, Advice on gas issues to large and small industries, Expert Witness in legal cases, Review of experimental procedures, University Lectures, Design and undertaking Emergency Exercises.

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## **Advanced Energy Australia**

Peter VanderWeyde

28 Marillana Court, Shailer Park Qld 4128

Mob: 0413 084 098

[advancedenergyaustralia@gmail.com](mailto:advancedenergyaustralia@gmail.com)

Design and installation of biogas generators, control and monitoring systems.

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## **Earthlee Onsite Organic Waste Reduction & Energy Solutions**

Our goal is to deliver innovative services and products in the field of Onsite Waste Management for SMEs by working with global partners in the development and delivery of waste-to-energy technologies, including anaerobic digestion of organic waste and slurry.

Australian distributors of Qube small-scale and modular anaerobic pond covers and CHP systems.

Adam Odeh, Managing Director

E: [adam@earthlee.com](mailto:adam@earthlee.com)

M: +61 400 999 756

T: +61 3 9832 0637

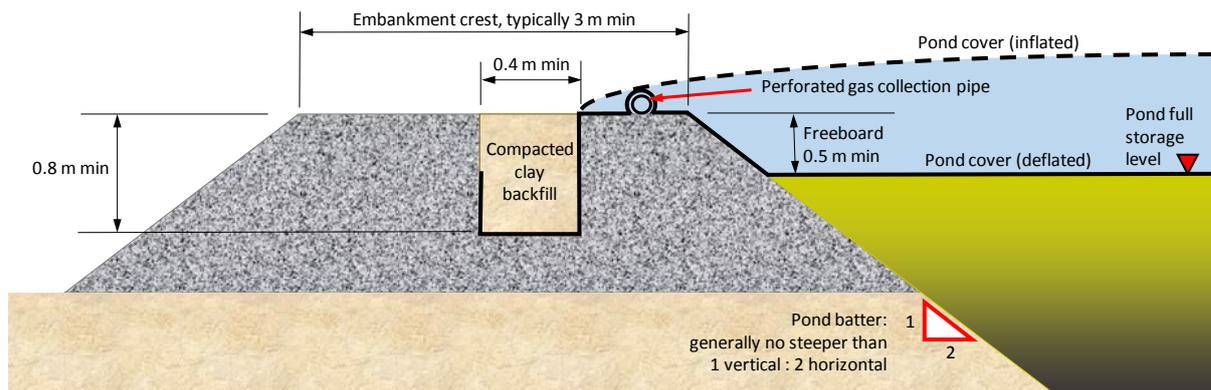
A: Suite 313, 23 Milton Parade, Malvern Vic 3144

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***Appendix 2***  
***Standard drawings***

## Securing pond cover in perimeter anchoring trench

Schematic drawing - not to scale



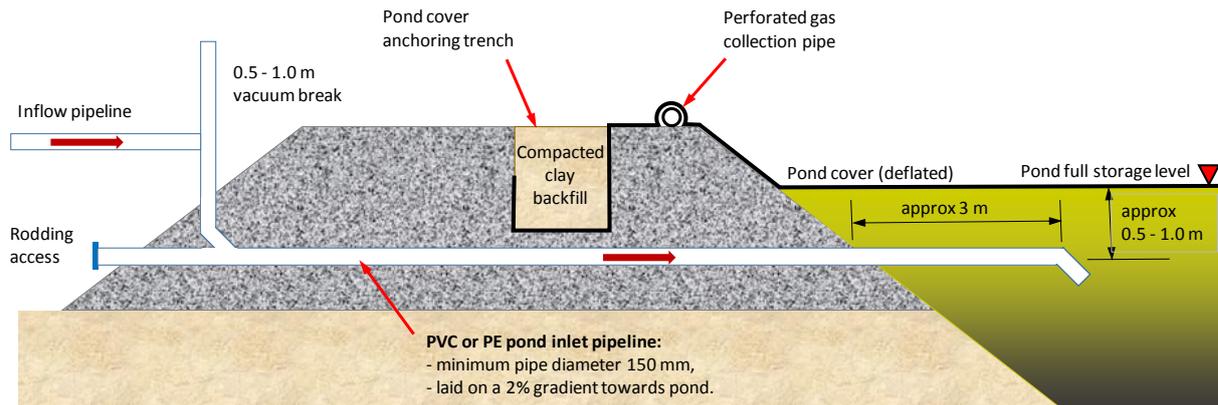
### Notes:

- 1 Pond covers may be secured in an anchor trench excavated around the perimeter of the pond embankment crest.
- 2 The trench should be at least 0.4 m wide x 0.8 m deep. The cover material should extend down the inner trench wall, across the base of the trench and approximately halfway up the outer trench wall.
- 3 The trench should be backfilled with clay, in layers not exceeding 200 mm in thickness. Each layer should be thoroughly compacted to form a gas-tight seal.
- 4 Synthetic pond liners may also be secured in the same trench used to secure the pond cover.

This drawing is based on current best practice adopted within the Australian and New Zealand pork industries and incorporates recommendations previously published by the Pork CRC and NIWA (NZ). It should be noted that these drawings are schematic only and therefore general in nature. Consequently, it is recommended that producers planning the installation of covered anaerobic ponds should seek professional advice to ensure that their proposed systems meet all relevant site-specific limitations and regulatory requirements.

## Pond inlet structure

Schematic drawing - not to scale



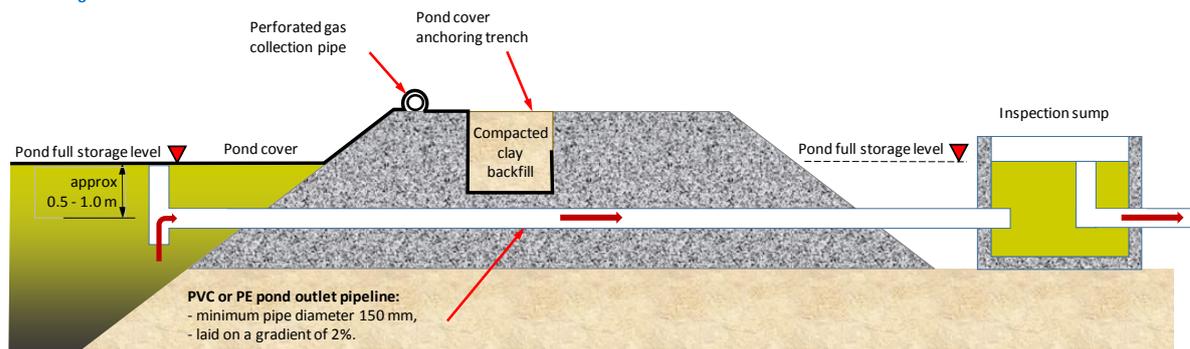
### Notes:

- 1 Inlet pipelines are generally installed through the pond embankment, below the cover anchoring trench.
- 2 Pond inlet pipelines generally use PVC or PE pipes. The pipe diameter will depend on the delivery flowrate, either directly from the sheds or from an effluent collection or solids separation sump; however, a minimum diameter of 150mm is recommended to minimise the risk of blockages.
- 3 The inlet pipeline should discharge effluent approximately 0.5 to 1.0 m below the pond full storage level, with a 45° bend on the discharge end, to minimise the likelihood of the fresh, in-coming effluent flow 'short-circuiting' across the pond surface, to the pond outlet.
- 4 The inlet pipeline should extend approximately 3 m out from the pond batter to provide adequate clearance above any accumulating coarse solids deposited near the pond inlet.
- 5 Inlet pipelines are generally laid on a constant gradient of 2% towards the pond, to minimise the risk of solids settlement impeding the effluent flow.
- 6 For ease of removing any blockages, rodding access should be provided on the upstream end of the inlet pipeline. If practical, the inlet pipeline could be installed on a steeper slope so that the rodding access point, on the the upstream end of the inlet pipeline, is above the pond full storage level. This would avoid the need for partial emptying of the pond during inlet pipeline blockage removal operations.
- 7 A vertical riser (vacuum break) may be required on the upstream end of the inlet pipeline to prevent siphoning of pond effluent back to an effluent collection sump located at a lower elevation.
- 8 A 45° 'Y' piece and 45° bend is recommended where the vertical riser meets the inlet pipeline to provide better rodding access through the vertical riser and to avoid a sharp (90°) tee where solids may accumulate.

This drawing is based on current best practice adopted within the Australian and New Zealand pork industries and incorporates recommendations previously published by the Pork CRC and NIWA (NZ). It should be noted that these drawings are schematic only and therefore general in nature. Consequently, it is recommended that producers planning the installation of covered anaerobic ponds should seek professional advice to ensure that their proposed systems meet all relevant site-specific limitations and regulatory requirements.

## Pond outlet structure

Schematic drawing - not to scale



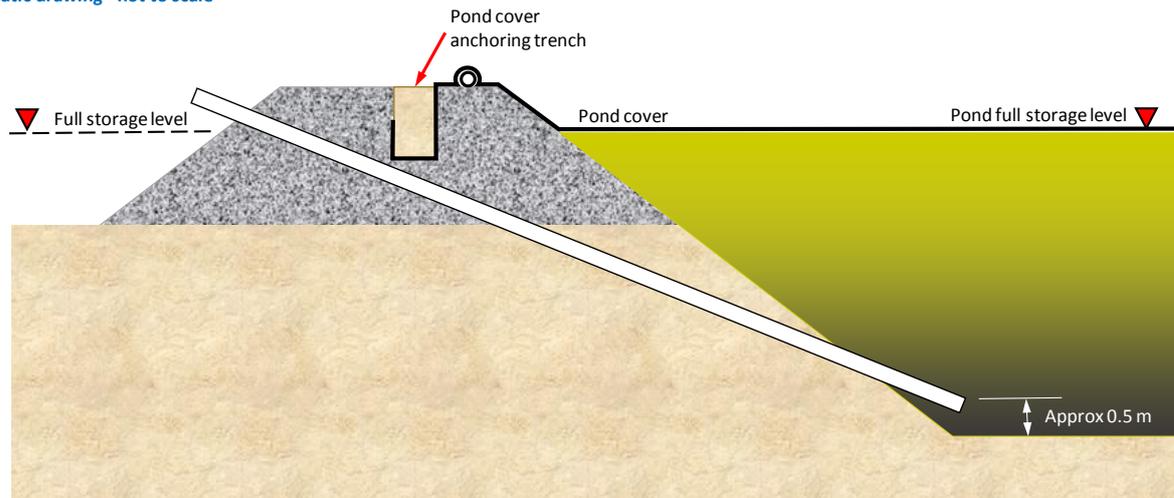
### Notes:

- 1 The pond outlet pipeline should be installed approximately 0.5 to 1.0 m below the pond full storage level, with a tee installed on the inlet, extending up to the pond full storage level, to minimise the likelihood of any floating crust material entering the outlet pipeline.
- 2 An inspection sump may be installed downstream from the pond embankment to provide access for removing any blockages from the outlet pipeline and for regulating the pond full storage level (by adjusting the angle of the elbow on the inspection sump outlet).
- 3 A suitable cover should be installed on the inspection sump to minimise the risk of human or livestock injury or exposure to hazardous gases or liquid effluent.

This drawing is based on current best practice adopted within the Australian and New Zealand pork industries and incorporates recommendations previously published by the Pork CRC and NIWA (NZ). It should be noted that these drawings are schematic only and therefore general in nature. Consequently, it is recommended that producers planning the installation of covered anaerobic ponds should seek professional advice to ensure that their proposed systems meet all relevant site-specific limitations and regulatory requirements.

## Covered anaerobic pond (CAP) desludging pipes

Schematic drawing - not to scale



### Notes:

- 1 Desludging pipes should be installed to draw sludge from a depth of approximately 0.5 m above the base of the pond, extending to above the pond full storage level. These pipes are typically approximately 16 m long, based on a pond effluent depth of 5 m and a batter gradient of 1 vertical : 2 horizontal.
- 2 Desludging pipes may be directly connected to pumps or vacuum tankers. Polyethylene (PE) or PVC pressure pipe, having a minimum diameter of 150 mm, may be suitable in this application; however, the suction pressure limitations of the selected pipe material should be considered. The minimum recommended pressure rating is PN 9 (0.9 MPa maximum working pressure at 20°C).
- 3 Alternatively, flexible pump or vacuum tanker suction pipes may be inserted through the desludging pipes. In this case, larger diameter desludging pipes (minimum 225 - 300 mm) are recommended.
- 4 Desludging pipes are generally spaced at 10 to 15 m intervals along one or both long sides of the the covered anaerobic pond.

This drawing is based on current best practice adopted within the Australian and New Zealand pork industries and incorporates recommendations previously published by the Pork CRC and NIWA (NZ). It should be noted that these drawings are schematic only and therefore general in nature. Consequently, it is recommended that producers planning the installation of covered anaerobic ponds should seek professional advice to ensure that their proposed systems meet all relevant site-specific limitations and regulatory requirements.

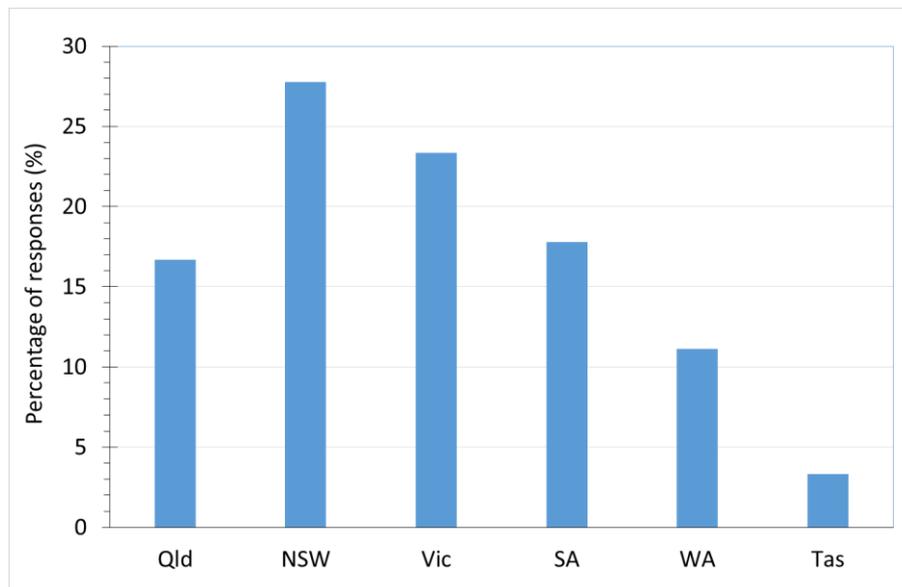
***Appendix 3***  
***Piggery biogas survey***

## Piggery biogas survey

Detailed responses to the survey questions are summarised below:

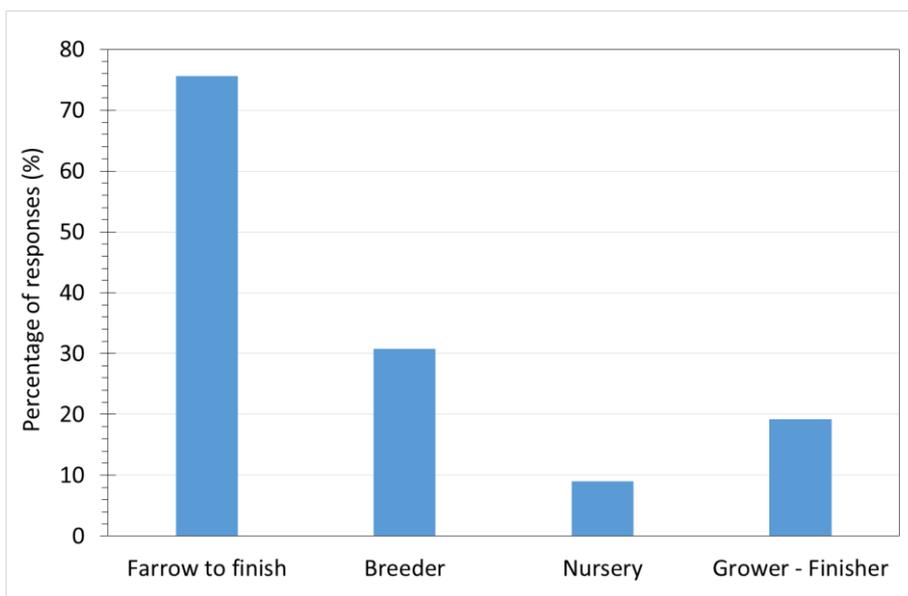
### Australian state where your existing piggery (or piggeries) is located:

Answer Choices	Responses	
Queensland	16.67%	15
New South Wales	27.78%	25
Victoria	23.33%	21
South Australia	17.78%	16
Western Australia	11.11%	10
Tasmania	3.33%	3
Australian Capital Territory	0.00%	0
Northern Territory	0.00%	0
	<b>Answered</b>	<b>90</b>
	<b>Skipped</b>	<b>1</b>



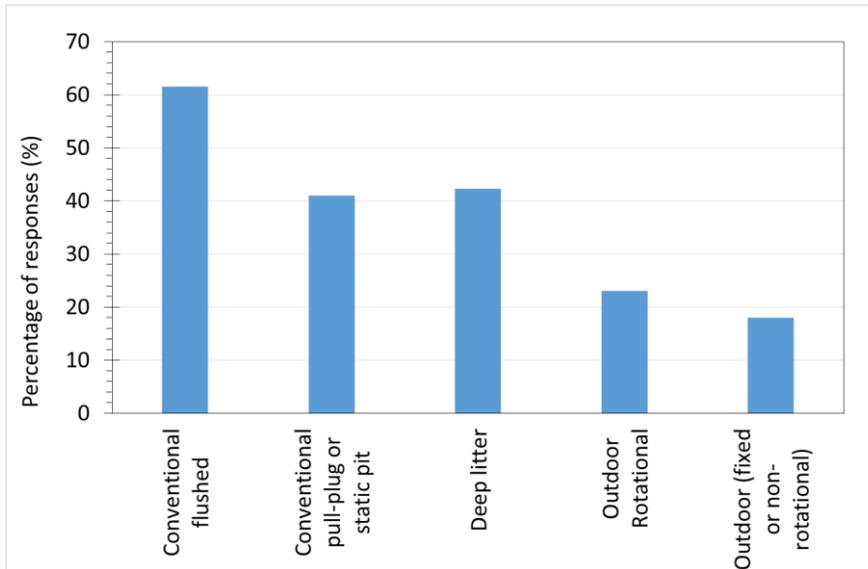
**Types of piggery units that you currently operate (tick all relevant boxes):**

Answer Choices	Responses	
Farrow to finish (accommodating pigs from birth to finishing weight within the same unit)	75.64%	59
Breeder (accommodating pigs from birth to weaning)	30.77%	24
Nursery (accommodating weaner pigs)	8.97%	7
Grower - Finisher (accommodating pigs from weaning to finishing weight)	19.23%	15
	Answered	78
	Skipped	13



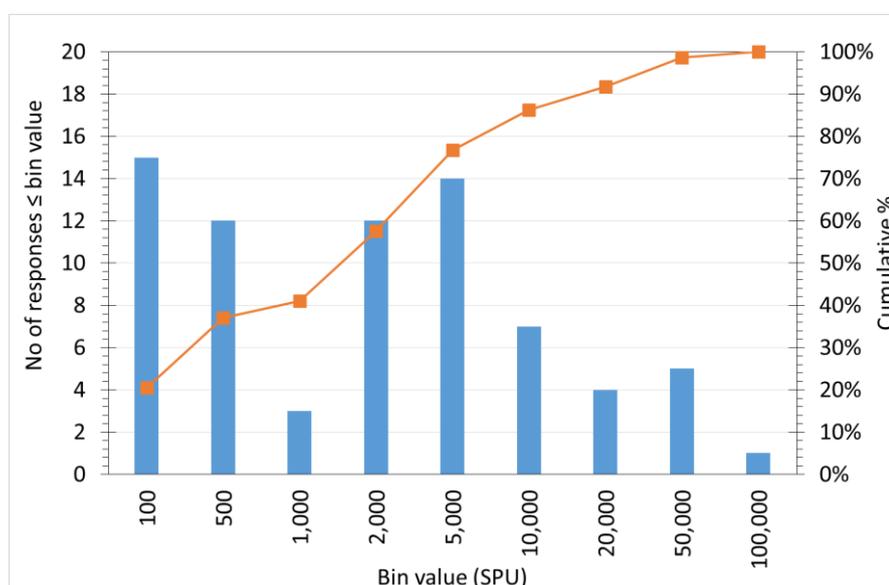
**Production system(s) employed at your current piggery unit(s) (tick all relevant boxes):**

Answer Choices	Responses	
Conventional flushed sheds	61.54%	48
Conventional pull-plug or static pit sheds	41.03%	32
Deep litter	42.31%	33
Outdoor Rotational	23.08%	18
Outdoor (fixed or non-rotational)	17.95%	14
	Answered	78
	Skipped	13



**Total capacities of your current piggery unit(s):**

Range	SPU	Frequency	Cumulative %
1	– 100	15	20.55%
101	– 500	12	36.99%
501	– 1,000	3	41.10%
1,001	– 2,000	12	57.53%
2001	– 5,000	14	76.71%
5,001	– 10,000	7	86.30%
10,001	– 20,000	4	91.78%
20,001	– 50,000	5	98.63%
50,001	– 100,000	1	100.00%
Answered		74	
Skipped		17	

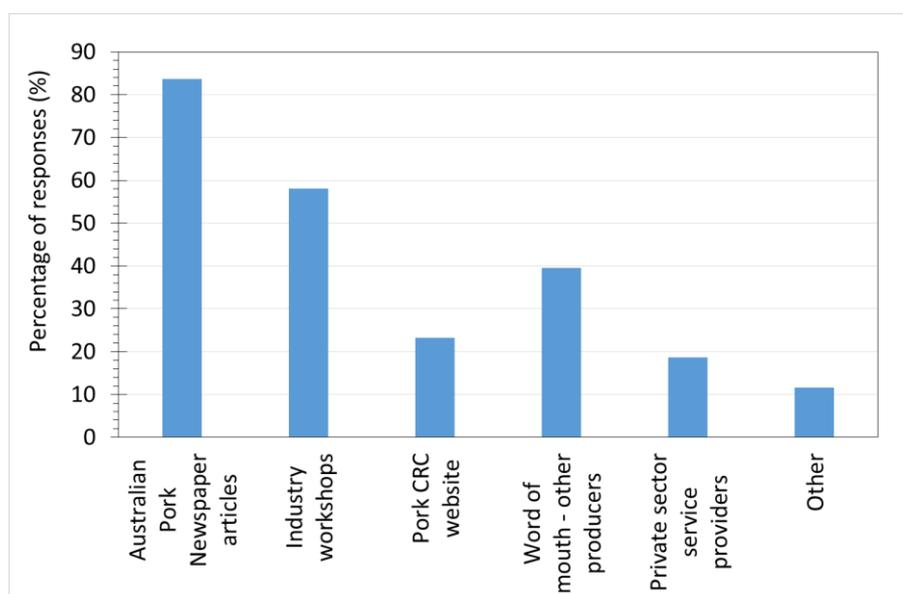


**Are you aware of the Australian pork industries' progressive adoption of on-farm biogas systems over the past decade?**

Answer Choices	Responses	
Yes	58.67%	44
No	41.33%	31
Answered		75
Skipped		16

**How did you hear about the adoption of biogas systems by the pork industry  
(tick all relevant boxes)?**

Answer Choices	Responses	
Australian Pork Newspaper articles	83.72%	36
Industry workshops	58.14%	25
Pork CRC website	23.26%	10
Word of mouth - other producers	39.53%	17
Private sector service providers	18.60%	8
Other	11.63%	5
	Answered	43
	Skipped	48



**Do you have an existing on-farm biogas system?**

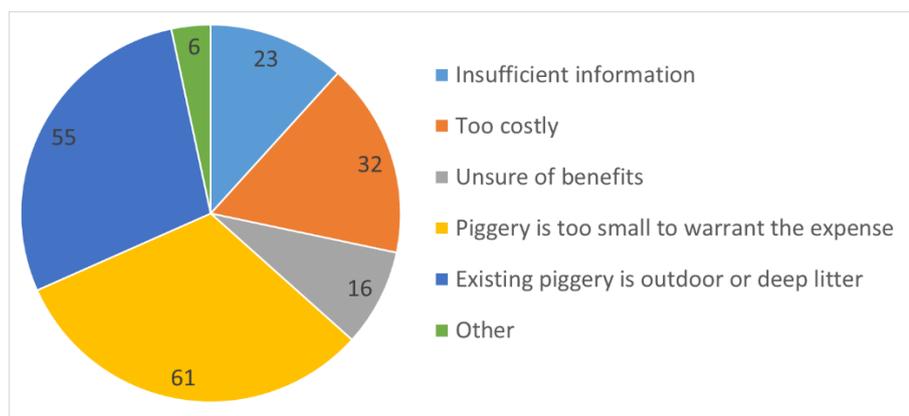
Answer Choices	Responses	
Yes	9.46%	7
No	90.54%	67
	Answered	74
	Skipped	17

**Are you planning to install an on-farm biogas system?**

Answer Choices	Responses	
Yes	7.46%	5
No	46.27%	31
Undecided	46.27%	31
	Answered	67
	Skipped	24

### Reason(s) for not considering biogas system installation:

Answer Choices	Responses	
Insufficient information	22.58%	7
Too costly	32.26%	10
Unsure of benefits	16.13%	5
Piggery is too small to warrant the expense	61.29%	19
Existing piggery is outdoor or deep litter	54.84%	17
Other	6.45%	2
	Answered	31
	Skipped	60



### When are you planning to install an on-farm biogas system?

Answer Choices	Responses	
Within 2 years	40.00%	2
2 to 5 years	40.00%	2
5 to 10 years	0.00%	0
Depends on system costs / returns and industry profitability	20.00%	1
	Answered	5
	Skipped	86

### Type(s) of piggery unit(s) contributing effluent to the existing biogas system (tick all relevant boxes):

Answer Choices	Responses	
Farrow to finish (accommodating pigs from birth to finishing weight within the same unit)	50.00%	3
Breeder (accommodating pigs from birth to weaning)	66.67%	4
Nursery (accommodating weaner pigs)	33.33%	2
Grower - Finisher (accommodating pigs from weaning to finishing weight)	66.67%	4
	Answered	6
	Skipped	85

**Capacity of piggery unit(s) contributing effluent to the existing biogas system:**

Respondent No	Sows	Standard pig units (SPU)	Pigs
1	2,200	(22,000)	24,000
2	200	(2,000)	
3	2,040	(20,400)	24,000
4	9,497	(90,000)	
5	550	5,500	
6	2,000	(20,000)	23,000

**Existing biogas system type:**

Answer Choices	Responses	
Covered anaerobic pond (not heated or stirred)	100.00%	6
Hybrid in-ground heated, stirred covered pond / digester	0.00%	0
Above-ground mixed tank digester	0.00%	0
	Answered	6
	Skipped	85

**Volumetric capacity of existing covered anaerobic pond / digester (megalitres - ML):**

Respondent No	Responses (ML)
1	20
2	4
3	48
4	48
5	6
6	20

**Biogas treatment method(s) (tick all relevant boxes):**

Answer Choices	Responses	
Iron-oxide pellets	50.00%	2
Biological scrubber	100.00%	4
Chiller to remove condensed moisture	100.00%	4
	Answered	4
	Skipped	87

**Biogas is currently used to operate (tick all relevant boxes):**

Answer Choices	Responses	
A flare	100.00%	6
A boiler producing hot water	16.67%	1
A biogas engine (or engines) driving an electrical generator(s)	33.33%	2
One or more combined heat and power (CHP) systems generating electricity and hot water	50.00%	3
	Answered	6
	Skipped	85

**Average annual biogas production (cubic metres / year):**

Respondent No	Responses (m <sup>3</sup> /y)
1	1,286,228
2	?
3	1,900,000
4	1,410,000
5	175,000

**Rated electrical output of biogas-fuelled generator(s) (kilowatts - kW):**

Respondent No	Responses (kWe)
1	280
2	0
3	50
4	500

**Average annual electricity exported to the grid (kilowatt hours / year - kWh/y)**

Respondent No	Responses (kWh/y)
1	788,568
2	0
3	0 (so far)
4	0

**What have been the greatest benefits from having a biogas system?**

Respondent No	Responses
1	Eliminated power bill
2	Reduced odour
3	So far, carbon credits. Near future, power cost reduction.
4	Carbon Credits. Recovered energy. Reduced Odour
5	Only half way through project
6	Power costs saved, Carbon credits earned, Odour reduction, Saving the world!

**Please list any major issues or concerns regarding your biogas system.**

Respondent No	Responses
1	none
2	minimal gas produced
3	Red F*%#ing tape
4	Sludge removal is the major issue with covered lagoons. Difficult to measure and remove.
5	Lack of support personnel in industry
6	Technical expertise for generator maintenance can be expensive.

**What further information or support would assist you in deciding whether to install a biogas system?**

Respondent No	Responses
1	Costs, Viability for our site, Benefits
2	investigating feasibility for install in 2 years
3	Money
4	size of piggery needed to be cost effective
5	more information and plans on how they can and are built
6	Whether a biogas system works in conjunction with composting
7	pig numbers for viability and long term gains from the system
8	?
9	If biogas units were available for smaller units
10	Is there a system that accommodates deep litter and conventional slurry effluent?
11	Full investigation of same
12	Costs, Returns, analysis on risks and rewards
13	Cost and efficiencies gained.
14	Knowing what the biogas system is?
15	Time poor, waiting for viable scaled down versions
16	We love the concept. We just need to find a way to make it viable for a small piggery such as ours. If this can be achieved, please contact me
17	Design cost effective?
18	It is a time factor for us
19	Any information
20	More details on what is involved...cost, process, benefit, etc.?
21	We looked into biogas and was going to cost \$450,000.00. Not viable for our business at present
22	More information
Answered	22
Skipped	69

## Comments:

Respondent No	Responses
1	installed to reduce odour, we have produced more energy with solar panels
2	<p>This piggery is on a flood prone site which doesn't lend itself for setting up Biogas Collection.</p> <p>Have heard varying stories about the amount of maintenance that is required to run biogas generating plant. Not encouraging.</p> <p>We use all our piggery waste across our grain farming operation of the business. Covered ponds make it harder to access the effluent for spreading purposes.</p> <p>The amount of red tape required in order to get a biogas system up &amp; running (local govt approval, gas compliance regulations, contracts with energy suppliers to feed back into the grid, govt rebates, Carbon credit system, etc) seems to be too much effort for a small operation.</p> <p>Solar energy becoming more attractive.</p>
3	you people seem to push the political correctness wheelbarrow, not understanding that people who have pigs are trying to scratch a living from selling their pigs, and are not interested in the stupidity of government and ridiculous biogas.
4	Perhaps there should be some form of rebate eg. solar gov rebate for farmers. The pig industry in Australia is struggling so there would be no funds to adopt such a major expense.
5	Do not have enough information to make an informed decision
6	need to research low cost systems applicable for inclusion with straw based pig systems also
7	Never price a on-farm bio gas system. Happy to be informed
8	Utilising waste and disposal of it and reducing odours are really more of concern to us
9	Not suitable to my setup
10	how many pigs are required to make the system economically viable and total cost of a unit and who are the end users of the gas produced ...
11	We had feasibility study done for our farm but because we are multi-sited the concentration of pigs in the biggest grower area ( to collect gas) is too far away from the breeder site where the gas could be utilised (kms away !)
12	it is very expensive to install
13	no comment
14	In general a productive plan
15	I would like more info on deep litter models and what the minimum amount of liquid effluent is needed to make it worthwhile
16	We investigated this a few years ago & were advised that because we couldn't feed back into the grid it wouldn't warrant the expense.
17	Covering anaerobic lagoons is good value if the energy recovered can be profitably used onsite.
18	dissemination of information is inadequate/not effective
19	Great for heating sheds floors, where straw is not an option
20	important for neighbour relations and obviously needs to be financially viable
21	Great idea. Please develop an economical SMALL system.
22	We are interested in using biogas for domestic supply if possible and maybe rotating boar and sows through concrete yard.
23	We can all improve our farming operations
24	For intensive indoor piggeries I believe this would be very practical and valuable!

25	We are of the opinion that 400 sow is no big enough for such system
26	Difficulty in managing and up keeping such a system, outweigh the benefits for our farm at this point in time.
27	I am continually surprised uptake has not been faster. Pig farmers have the ability to save on their cost of production, do not out the work in & then complain when prices are high.
Answered	27
Skipped	64