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FOOD MANUFACTURING
CUSTOMER STORY \ SEPT 2018
BERRYBANK PIGGERY

ACTI-Mag

on an anaerobic cogeneration plant at a piggery farm

ACTI-Mag™

Case Study Snapshot

CHALLENGES

- The piggery farm faced the following challenges:
- To increase profits by reducing chemical consumption and increasing power and biogas generation.
- To improve biogas quality and quantity and reduce odors due to H2S.
- To reduce blockages due to struvite formation.
- To reduce chemical usage and inculcate environment-friendly solutions.

SOLUTION

ACTI-Mag provides the following solutions:

- Improves biogas quality and quantity.
- Reduces H2S, thus reducing odors.
- Reduces soluble phosphate levels and struvite build up.
- Does not add salinity to soil and improves SAR values in the soil.
- Is non-corrosive, environment-friendly and safer to handle.

BENEFITS

Introduction of ACTI-Mag brought about the following benefits:

- The production of biogas was increased by 30%, having improved quality with increase in Methane (CH4) by 19%.
- The average production of energy increased by 15%.
- A significant increase in earnings ($68K) was achieved from increased power generation and reduced chemical
- The average levels of H2S were largely reduced by 70%.
- The average daily effluent soluble phosphate levels decreased by 40%.

Background

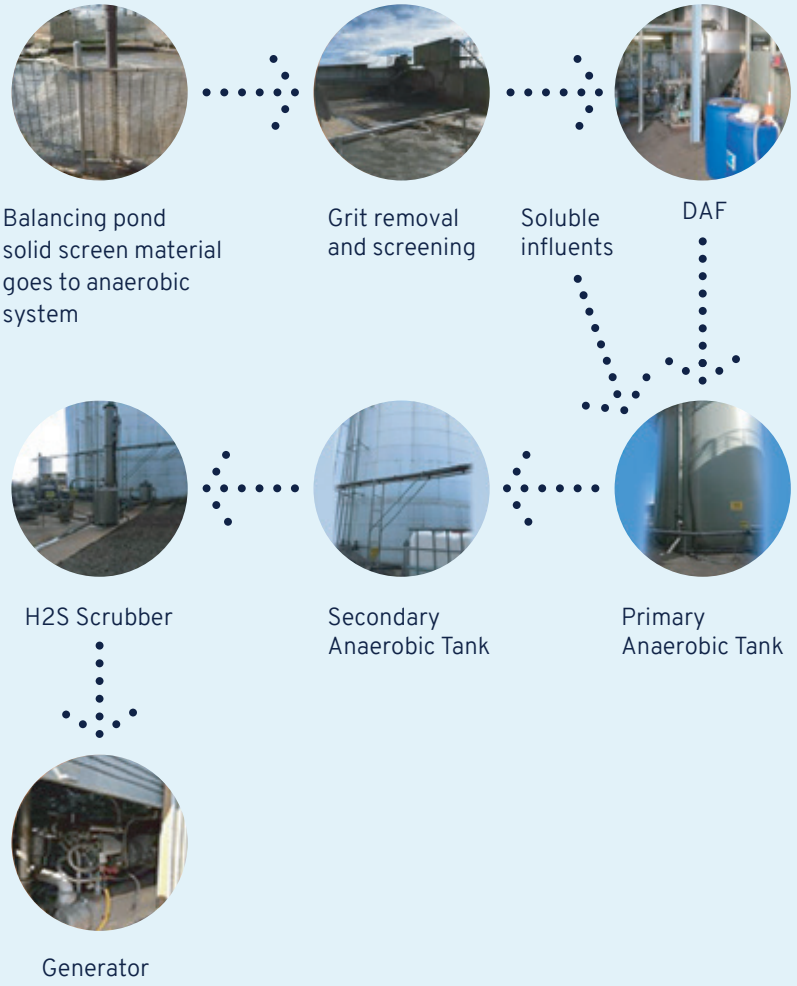
LOCATION

South West Victoria

OBJECTIVES

- Reduce H2S in biogas from existing 700 ppm
- Avoid the use of a chemical scrubber
- Generate more biogas
- Generate more power
- Reduce retention time
- Reduce blockages from struvite
- Safe product to handle
- Reduce Sodium Hydroxide consumption

Wastewater Process



BEFORE TRIAL POWER GENERATION

Generator: 1300MWh Per year
Thermal power: 214KWth Hour
Electricity: 192 kWh

The wastewater stream volume is reduced to 100,000 litre per day which goes though the anaerobic system.

Breakup:
35,000 Litre from the DAF
65,000 litres from the solids screens

TYPICAL ANALYSIS GOING INTO THE ANAEROBIC SYSTEM

Test description	Method	Units	Measurement
BOD	CHW-BOD	mg/L	10,640 ± 500
COD	CHW-BOD	mg/L	33,150 ± 2000
Ammonia (as N)	CHW-NH3	mg/L	800 ± 60
Phosphorus Total	CHW-Tot P	mg/L	760 ± 100
Phosphorous – Total Dissolved	CHW-Tot P	mg/L	90 ± 20
Total Alkalinity ($CaCO_3$)	CHW-Alk T	mg/L	2600 ± 150
Total Solids 103oC		%	4.55 ± 0.5
Volatile Acids		mg/L	1550 ± 200

INITIAL LABORATORY TESTING COMPARING DIFFERENT ALKALIS

Test Method

equal amounts of activated sludge

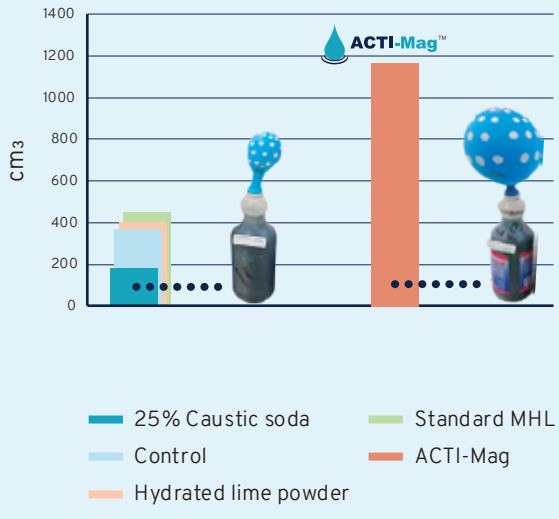
+ equal amounts of wastewater stream

+ equivalent dose rates of tested alkalis

=

average biogas volume generated measured over a 4 day period.

For the same alkalinity dose, ACTI-Mag resulted in **300%** more biogas generation.



Environment friendly

Non-corrosive

ACTI-Mag BENEFITS VERSUS CAUSTIC SODA OR LIME?

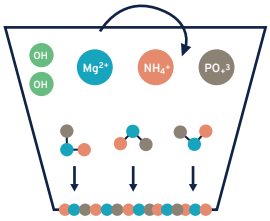
- ACTI-Mag is safe to handle
- Non corrosive
- Safe for the environment
- Does not add to salinity
- Improves SAR value in soils

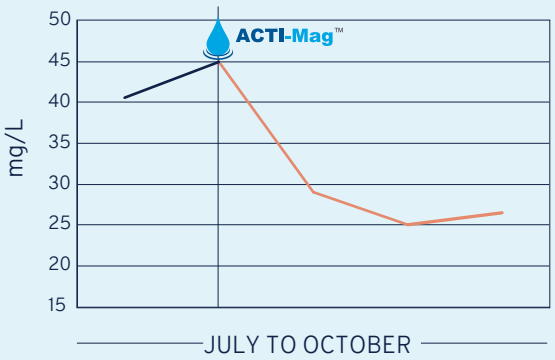
PHOSPHATE REMOVAL & STRUVITE FORMATION

ACTI-Mag helps locking up phosphates and ammonia in the wastewater stream by forming struvite:

$Mg^{2+} + PO_4^{3-} + NH_4^+$

$MgNH_4PO_4*6H_2O$



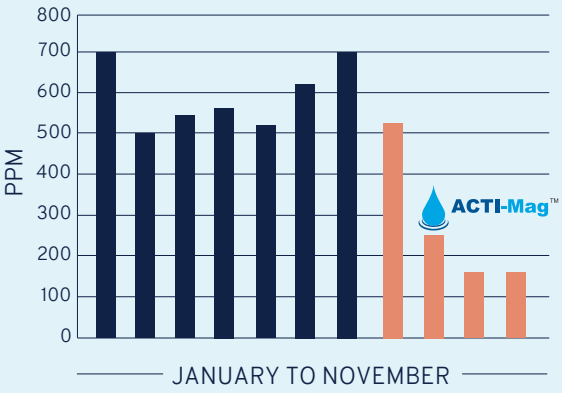


The average daily effluent soluble phosphate levels decreased by **40%** when dosing ACTI-Mag.

HYDROGEN SULPHIDE (H_2) LEVELS

Trial started on the 24/8/2015.

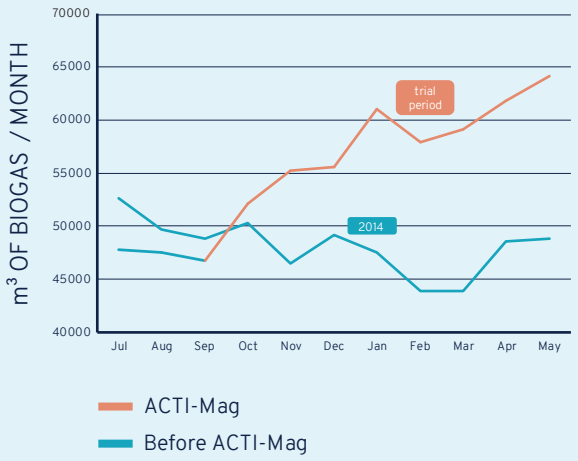
The piggery used ferric chloride and had a normal raw biogas H2S levels around 700-500ppm.



Since introduction of ACTI-Mag, the average levels of H_2S were reduced by **70%.**

AVERAGE MONTHLY BIOGAS PRODUCTION

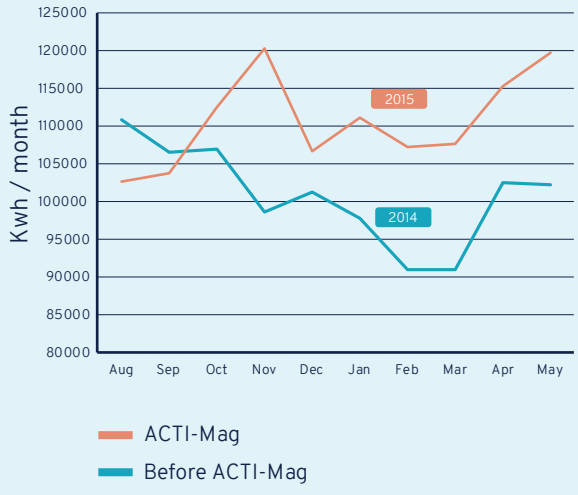
Same effluent production
- (7,620 sows equivalent)



ACTI-Mag increased biogas production by **30%** on average.

MONTHLY ENERGY PRODUCTION (KWH)

Same effluent production
- (7,620 sows equivalent)



ACTI-Mag increased power production by **15%** on average.

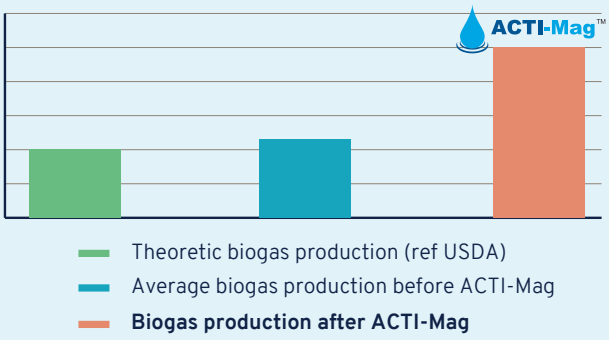
Gas quality

	12th July	5th August	ACTI-Mag™ 28th August	ACTI-Mag™ 15th September	ACTI-Mag™ 10th October	ACTI-Mag™ 10th November
Carbon dioxide CO_2	35%	36%	32%	28%	30%	29%
Methane CH_4	65%	64%	68%	72%	70%	**71%**

Higher bio-treater efficiency

ACTI-Mag increased CH4 by 9%

TYPICAL VERSUS ACTUAL IOGAS PRODUCTION



Data	Animal numbers	Average weight	Animal units	Conversion factor biogas/ animal units/ day (in m^3)	Biogas production per day (in m^3)
Sows	3000	73 kg	1	0.2	600
Piglets	22,000	15 kg	0.21	0.2	924
Typical reference biogas production (ref USDA)				**Total**	**1524**

Ref: Analysis of energy production costs from anaerobic digestion systems on US livestock production facilities. Oct. 2007.

ACTI-Mag™

INCREASE REVENUE FROM YOUR WASTEWATER REDUCE COSTS AND INCREASE PROFITS

	Gas volume per day	Power production per day	Value (0.35 per kWh rate)	Annual
Power production before	3,300	73 kg	$542.50	$ 301k
With ACTI-Mag	4,060	15 kg	$635.95	$ 370k
			Increased earning from power generation	**$ 69k**

Case Study increased earning per year from power generation using ACTI-Mag

− Cost of the ACTI-Mag per year = $11 k

\+ Savings from removing chemicals from the scrubber (due to reduced H2S) = $10 k

Total increase in earnings using ACTI-Mag

= $68k / year

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