



FACT SHEET

IDENTIFYING ENERGY USE ACTIVITIES

Energy Efficiency Information
Fact Sheet Series
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Energy audits of Australian farrow to finish piggeries show a large variation in energy use per pig produced. The high variation between piggeries suggests that greater emphasis needs to be placed on energy efficiency.

Areas of direct energy consumption at piggeries include; heating the farrowing and first stage weaner sheds, ventilation system and fans, shed lighting, water and feed supply, and effluent management systems (cleaning, washing, agitation and pumping). In-direct energy consumption occurs through the transportation of pigs and feed.

Why Identify Your Energy Using Activities

To improve energy efficiency, it may help to breakdown the activities involved. This approach will provide context in relation to:

- The complexity of the site
- Main energy use components and where to target efficiency opportunities
- What the inputs and output of the systems are
- How inputs and outputs are monitored.

Which Areas are Important to You?

Knowing where energy is used in the piggery and having an understanding of approximate proportions of total energy use will let you target areas that are of greatest interest to you.

For tunnel ventilated sheds the major contributor to energy use will be the ventilation system and its components. In a naturally ventilated piggery the major contributor will be the heating required for farrowing sheds. Energy use will differ depending on the systems and equipment installed at the piggery, it is important for piggery operators to identify the major energy use contributor.

Heat Lamps

Heat lamps are used to warm sucker pigs in a farrowing shed (Figure 1). The temperature in farrowing pens is critical to the well-being of newly born piglets. Heat is produced from an infra-red bulb.

Due to the requirement of the bulb to produce heat they consume more energy than conventional lights. For example, each heat lamp installed at a conventional piggery was rated 250 W. With numerous heat lamps running throughout the day, energy consumption becomes the major contributing component within the piggery, 30–70%. Energy use from heat lamps increases during winter for piggeries in cooler climates due to the need for longer heating times.



Figure 1: Heat Lamp Installation in a Farrowing Pen

Lighting

Lighting in piggeries is a small contributor (10–20%) to overall energy consumption. They provide suitable lighting conditions inside the pig sheds. Light is also used by the staff when inspecting the pigs. A standard incandescent bulb (60 watts) only converts 5% energy into light and has to be replaced at a higher rate than other bulbs. Compact fluorescents generally have a smaller power draw (13 watts) and longer life. They provide an in-expensive alternative as they are easily fitted into an existing incandescent holder. The latest lighting technology is an LED (light emitting diodes). They are more expensive to install but last much longer and are more energy efficient as they don't produce heat.



LED is the recommended option for new sheds due to their low energy requirements.

Ventilation Systems and Fans

Piggeries use ventilation systems to control the climate, and reduce gas levels and airborne pathogens (Figure 2). This helps improve growth rates and feed conversion efficiency. The ventilation system can either be natural or mechanical. In a natural system, energy may be used to control the sheds inlet and outlet vents. This requires very little energy consumption, 1–5% of the piggery. It can be difficult to control the shed climate with a natural system in harsh weather or exposed sites.

A mechanical system (tunnel ventilated) uses fans, air inlets and controllers to regulate the air flow volume through the shed. This system requires more energy, 60–80% of the piggery total, to operate the ventilation fans which draw a significant amount of electricity each, up to 11 kW. An easy way to reduce fan energy use by up to 30% is to ensure the fans are well maintained and cleaned regularly.



Figure 2: Tunnel Ventilation System – Exhaust Fans

Feed Supply

Feed supply is often only a minor contributor to energy usage, 1–5% for piggeries without a feedmill. Small capacity feedline and auger motors are the only energy requirement at piggeries without a feed-mill. Feed supply can be a significant energy consumer at piggeries that mill their own feed (20–30%). Monitoring took place at a piggery with a 30 kW hammer mill and several smaller auger motors. When milling, the whole piggery recorded a major spike in energy use. Energy use is highly dependent on the feed mills total operation time. For the monitoring period at this piggery's feedmill, energy usage accounted for 24% of the total site (Figure 3).



Figure 3: Feedmill and Feed Silos at a Conventional Piggery

Cleaning

Conventional piggery shed floors are routinely cleaned, often with a high pressure hose. Water is supplied from storage via a hosing pump, these pumps range in sizes and types, from petrol and diesel to electrical powered (Figure 4). The water demand and pipeline specifications will determine what type of pump is selected. A water pump for cleaning is usually a minor component of energy use at a piggery (1–10%).



Figure 4: Water Pump Used for Hosing and Cleaning



Effluent Management

Energy use from a piggeries effluent management section is highly variable, based upon the type of system implemented. The piggeries where energy monitoring was performed used a flushing system into an anaerobic effluent pond. These systems involve effluent pumps and reticulation pumps (Figure 5) which consume energy. Manure management is only a minor component of energy use at piggeries (1–10%).



Figure 5: Recirculation Pump Used to Recycle Piggery Effluent

Administration Uses

Piggeries also use energy for administration purposes, these include, workshops, staff amenities and offices. Energy use is primarily driven by the need for heating and cooling office facilities. In general this is a minor energy use component (1–10%).

Site Layout Plan

Tools to assist you in identifying energy use activities are site maps (an indication of Energy use distribution) and resource flow diagrams.

A site layout plan is a visual representation of key site activities. Most sites will have a map of some description. This may be as simple as a sketch or as complex as a professionally drafted diagram.

A resource flow diagram provides a visual indication of where energy is used around the piggery and is helpful in developing a framework for monitoring energy usage.

The diagram should include a layout of the piggery with individual activities labelled. It should include where energy is used and the source (i.e. electricity, gas, diesel).

Key Points

- **Areas of energy consumption at piggeries include, heat lamps, lighting, tunnel ventilation systems, feed systems, effluent management (including shed cleaning) and administration uses.**
- **A site layout plan help assist farmers identify energy use components at the piggery and develop a plan for monitoring energy usage.**

References and Further Reading

Clarke, S. 2006. Economising on electricity usage on the pig farm. Teagasc Pig Farmers Conference 2006.

S.I. 311 of 2010 - European Communities Welfare of Farmed Animals Regulations.

Other Fact Sheets in this Series

- Energy Measurement Equipment
- Reading and Collecting Energy Data
- Piggery Total Energy Usage
- Improvements to Energy Efficiency.

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