AUSTRALIAN Pork

Fact Sheet

Energy Efficiency Information
Fact Sheet Series
December 2014

FACT SHEET

PIGGERY TOTAL ENERGY USAGE

Energy is a significant input cost for pork production. Energy is primarily sourced from limited fossil fuel reserves which contribute greenhouse gas (carbon) emissions to the atmosphere. The costs of these energy resources are rising. For these reasons there is an incentive for piggeries to reduce energy consumption. This can greatly benefit the bottom line for the enterprise and the environment.

Piggery Energy Usage

Energy (in the form of electricity, liquid and gas fuels) is essential for piggery operations. Energy is a significant input cost for piggeries, and energy costs have risen by 25–40% in pig producing areas in recent years.

This fact sheet reports the results of a recent energy monitoring project carried out at Australian piggeries, focusing on electrical energy use. The project objectives included, benchmarking energy usage at piggeries and investigating options to increase energy efficiency. Six conventional piggeries from northern and southern Australia were involved (Table 1). They included three farrow to finish, two breeding, and a finisher production system. Energy was monitored over a two-week period in summer and winter. Total direct energy usage is the combination of shed lighting, heating, ventilation, water supply, feed supply, effluent management, administration and minor activities uses (such as repairs and maintenance and pig management). Energy is also used indirectly through the transport of incoming and outgoing pigs and feed.

Piggery	**A**	**B**	**C**	**D**	**E**	**F**
Capacity (SPU)	4200	11350	14705	48064	2594	4289
Type	F2F	F2F	Breeder	Finisher	F2F	Breeder
Ventilation	Natural	Tunnel	Tunnel	Tunnel	Natural	Natural

Table 1: Characteristics of Selected Piggeries

Figure 1 presents the total direct energy use for the monitored farrow to finish piggeries on a per tonne of live weight produced over a 12 month period. With energy costs continuing to increase, the cost of energy in operating a piggery is a considerable expense. The variability between the monitored energy use cost per tonne of live weight suggests there is potential to achieve major savings.

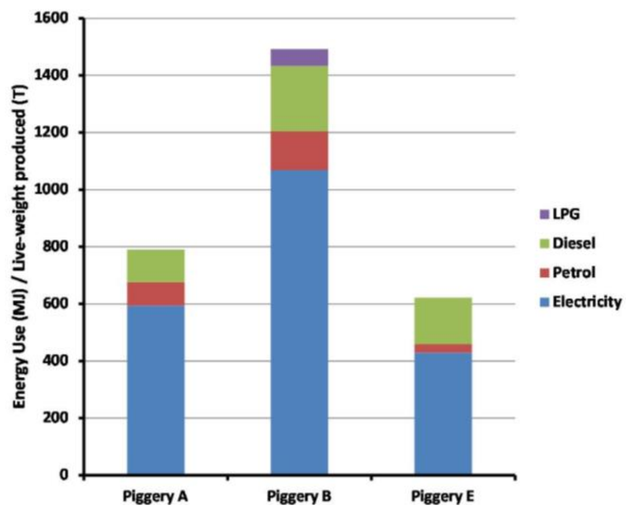

Figure 1: Energy use (MJ) per live – weight (T) for farrow to finish sites

A comparison of the energy used at the breeding sites and the breeding area within a farrow to finish piggery was reported on a per pig weaned basis (Figure 2). Piggery C and F are breeder piggeries, while the other sites are farrow to finish. Piggery B and C are tunnel ventilated and used more energy per weaned pig than the naturally ventilated sites. Amongst the naturally ventilated piggeries Piggery F use substantially more energy on a per pig weaned basis.

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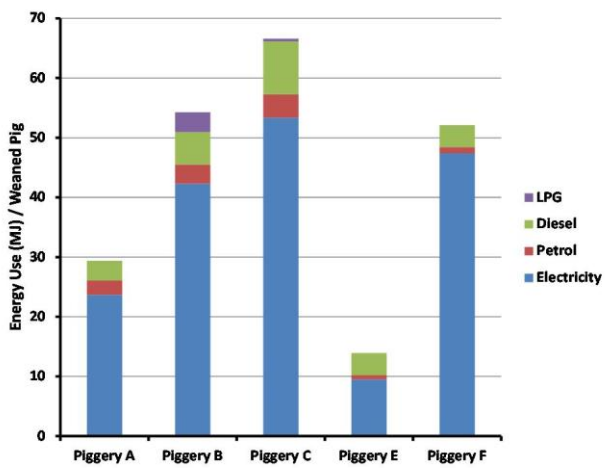

Figure 2: Energy Use (MJ) Per Weaned Pig for Breeding Sites

Energy Types

A comparison between monitored electrical usage and fuel, diesel and gas usage from farm records showed that electricity was the single largest energy type at all sites.

Energy Use Breakdown

The contribution of various components to total energy use were monitored at the four of the six piggeries. Table 2 shows these results as kWh/day for the monitoring period. Results show that farrowing sheds are often the major contributing component to total site energy usage. This is of significance when considering that the farrowing section of a piggery is greatly out-sized by the grower and finishing section.

Units: kWh/day	Piggery A	Piggery B	Piggery E	Piggery F
Production System	F2F	F2F	F2F	Breeder
Farrowing	150	1325	123	753
Bore Pump	39			
Finishing	36	1483	10	
Feed mill			45	
Stall Sheds				27
Workshop	145		9	121
Total Site	371	2809	187	900

Table 2: Energy Use Components at Four Conventional Piggeries

Piggery A had a higher than average energy use contribution at the workshop, this is due to a house on-site which is supplied from the workshop switchboard. Piggery B had fairly even energy use contribution from the finisher and farrowing sheds. This is due to all of the sheds on-site being tunnel ventilated and using similar amounts of energy. Piggery E contained a feed mill which contributed 45 kWh/day or 24% total energy use. Piggery F contained no other major sources of energy use outside the farrowing sheds.

These results highlight the heavy contribution of farrowing sheds to the piggeries overall energy use. Other major energy use sources are tunnel ventilation systems, feedmills and electric motors.

Reducing energy use in the farrowing unit provides a great opportunity to reduce total piggery energy use.

Farrowing Shed Breakdown

To gain a better understanding of the energy use within a farrowing shed each energy use component within the shed was broken down at Piggery A. The farrowing shed sub-main supplied the following equipment, 96 heat lamps (250 watt bulb), a hosing pump (2.4 kW), an effluent agitator motor (2.2 kW) and effluent pump (4kW), a reticulation pump (7.5 kW) and a feed-line motor (1.2 kW). Figure 3 shows the breakdown of energy use from each component.

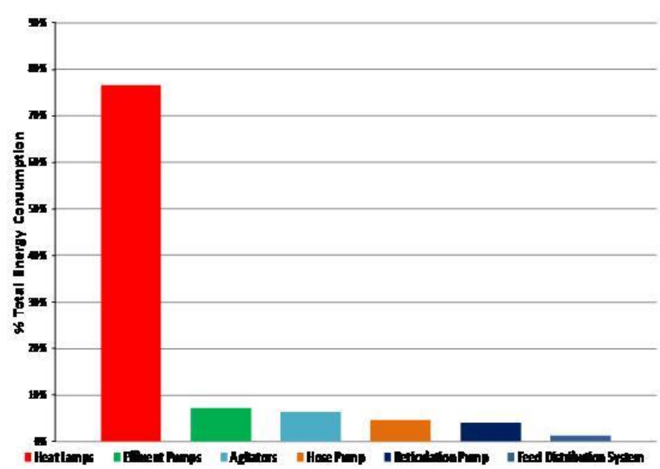

Figure 3: Power Breakdown from an Individual Farrowing Shed

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Heating lamps were the major contributor to farrowing shed energy use, totalling 77% of total energy. The three pump motor types (effluent, hosing and reticulation) and agitator contributed 22% of the total shed. Feed distribution motors accounted for the remaining energy use. The contribution of the heat lamps to the total farrow to finish piggery was estimated at 38%. These results show that making improvements to the heating system in the farrowing unit can drastically reduce energy use. Energy use can be further reduced by ensuring pumps are operating efficiently and are well maintained.

Summer and Winter Comparison

Energy usage can vary significantly between seasons because of activities such as shed heating and cooling. For a tunnel ventilated farrow to finish piggery in QLD, average daily electrical energy use increased from 1150 kWh/day in winter to 1500 kWh/day in summer. This is due to the increased fan activity to control the shed temperature under maximum ventilation. For a naturally ventilated breeder piggery in VIC, the energy use reduced from 920 kWh/day in winter to 830 kWh/day in summer due to reduced heating requirements. Figure 4 compares summer and winter electrical energy use throughout the day for a tunnel ventilated farrow to finish piggery.

The change in seasonal energy consumption is heavily dependent on the location and type of piggery. Tunnel ventilated piggeries in warm climates will experience a dramatic increase in overall energy use due to the fans. Naturally ventilated piggeries will likely see a small increase of energy use in winter due to greater heating requirements in farrowing sheds, however this is dependent on the climate.

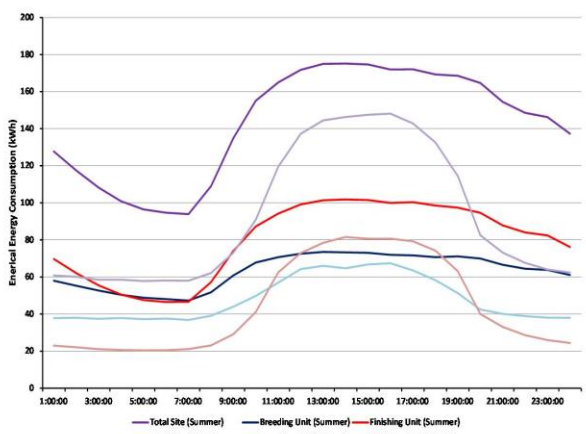

Figure 4: Summer/Winter Energy Use Comparison for Tunnel Ventilated Farrow to Finish Piggery in QLD

Key Points

- **Energy use as a function of pork production varies greatly between piggeries.**
- **The area of highest energy use at the monitored natural ventilated piggeries are the farrowing shed heat lamps. The main energy use at tunnel ventilation piggeries is the ventilation system and its components (fans, water pumps, etc).**
- **Significant amounts of energy may also be required for shed cleaning, effluent management and administration.**
- **Comparison between summer and winter energy use showed higher energy use in winter for naturally ventilated piggeries due to greater use of heat lamps while tunnel ventilated piggeries energy use increased in summer due to greater cooling requirements on the ventilation system.**
- **Both the type of shed ventilation and climatic location of the piggery greatly influence periods of high energy use.**

Other Fact Sheets in this Series

- Identifying Energy Use Activities
- Energy Measurement Equipment
- Reading and Collecting Energy Data
- Improvements to Energy Efficiency.