Fact sheet
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ENERGY EFFICIENCY IN POULTRY UNITS

Introduction

High energy efficiency on poultry units means simple efficiency measures can yield significant savings, especially in older buildings. The first step in improving energy efficiency requires knowing how much, where and when energy is used.

This can be done at a basic level by regularly recording utility meter readings or fitting advanced data logging equipment. This information allows energy consumption patterns to be identified and performance benchmarked.

Energy consumption

A standard 73m x 18m 27,000-bird broiler house (without renewable energy installed) on average consumes 240-270 megawatt hours (MWh) of heat energy/year. That's the same as 36,000-40,000 litres of liquefied petroleum gas (LPG) or 23,000-26,000 litres of kerosene heating oil, together with 35,000kWh of electricity.

Pay attention to detail and make energy efficiency part of routine procedure. Birds are finished at 2kg body weight Ireland (ROI), with a typical six and a half week turnaround, which results in seven to seven and a half cycles a year.

The industry is mainly heated through propane gas, with an average cost of 8 cent per bird. This works out to 1.43kWh per bird. There are 7kWh of energy in one litre of LPG and it costs 39 cent a litre. This translates to 5.6 cent per kWh. Typical heat energy input only:

- 71.5kWh per 100kg heat input;
- 2kg for bird in the south;
- 50 birds in 100kg = 50 birds in the south; and,
- 71.5kWh/50 birds = 1.43kWh in ROI.

A 25,000-bird house requires 35,750kWh per batch for this flock size. If we assume 7.5 batches/shed/year, it works out at 35,750 by 7.5 batches = 268,125kWh (268MWh) in heating costs. Modern broiler houses are built to accommodate typically 40,000 birds.

Indirect benefits

Indirect heating systems where the boiler is located in an annex adjacent to the building and transfer heat via a radiator system within the house are more efficient than direct-acting systems. While costly to install, new systems typically offer 93% efficiency, compared to 60% from older box heaters and are likely to retain efficiency better. Biomass boilers are more attractive since the introduction of the Support Scheme for Renewable Heat (SSRH), which gives a relatively short payback.

Control airflow

Insulating buildings and reducing air leakage by sealing gaps in walls, and around windows, doors, louvres or fans are priorities. Poultry buildings are designed to be ventilated but you must have control over airflow, especially in winter. A lot of poultry houses work on negative pressure, so a good way to test for leaks is to close all vents and switch fans on to see what pressure you get. If 20-30 pascal (Pa) cannot be reached in a standard house with four fans, there is likely to be a serious leakage. Improving insulation keeps heat in and reduces "solar gain" in summer, helping to keep the inside cool, and reducing energy requirements for heating and ventilation.

Insulation

Adding 400mm of insulation is recommended. This is double the previous standard. Adding insulation can be difficult in older houses, but it is relatively easy and cheap for new units. Many existing units fall well below 400mm, despite young birds often being kept at a constant 30^0C. Payback from sealing buildings can be in less than a year, while for insulation it is seven to eight years.

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Financing

At present the Rural Development Programme (RDP)-funded Targeted Agricultural Modernisation Scheme (TAMS) is in operation and will cover 40% of the cost of many upgrades and 60% for young trained farmers up to a maximum spend of €80,000, including the following:

TAMS funding is available for many upgrades.

- energy-efficient lighting;
- biomass boiler;
- solar panels/photovoltaic (PV);
- heat pumps;
- heat recovery units;
- insulation;
- ventilation systems; and,
- upgrade/new wet feeding systems.

Poultry energy efficiency tips

Ventilation:

- match duct and fan sizes to ventilation system;
- clean and maintain fans, ducts and louvres to improve airflow;
- replace old fans with energy-efficient models – belt-driven fans use one-third less energy than direct-drive;
- use recirculation fans to improve heat distribution – link to first-stage fans to maintain normal airflow;
- seal gaps around doors, walls, windows and louvres to reduce air leakage; and,
- fit proprietary "bell mouths" to fans or "cones" to outlet fans to increase aerodynamic efficiency by typically 10%.

Heating:

- position thermostats to avoid overheating buildings (avoid draughts/doors);
- insulate roof, floors and walls (insulate concrete mass walls to the ground);
- link heating and ventilation systems;
- use heat recovery to pre-heat incoming air with warm extract air (savings – 10-25%);
- service boilers regularly – clean heat transfer surfaces;
- replace aging boilers with energy-efficient models or renewable energy systems – e.g., biomass boiler, heat pump, solar);
- consider radiant heaters to heat floor area and minimise air temperature rise; and,
- restrict chicks to smaller areas with zonal control/brooding curtains with a tight seal.

Lighting:

- reduce lighting (within regulations) – current min. is 20 lux over 75% of floor;
- replace incandescent and tungsten halogen lights with energy-efficient fluorescent systems inside, and sodium or metal halide lamps outside;
- modern LEDs are dimmable and fit existing sockets – costs are higher than standard bulbs but lifespan is 50 times longer, and they use less energy to produce twice the light; and,
- use photoelectric sensors to control lighting in buildings with windows.

Other:

- use electronic sensors at bird height to improve ventilation and heating accuracy – systems that record temperature/ventilation data aid management;
- use inverters (variable speed drive) to speed or slow fans as required; and,
- commission an energy audit.

Support Scheme for Renewable Heat

The Support Scheme for Renewable Heat (SSRH) is a Government scheme that provides financial support to convert to renewable heat for a 15-year period. The technologies covered are in the non-domestic sector, which include heat pumps and solid biomass (including combined heat and power). For biomass, the SSRH provides a continuous income stream for 15 years in a bid to ensure renewable heat is commercially attractive when compared to fossil fuels. A one-off grant tariff of 30% of the cost of air-, ground- and water-source heat pumps is also available.

Poultry farmers can potentially benefit from the SSRH, depending on circumstances. The SSRH will pay ongoing operational support to business owners, depending on the amount of heat generated. The aim is to bridge the gap between the installation and operating costs of renewable heating systems and conventional fossil fuel alternatives. This Government-funded scheme will pay 5.66c/kWh for the first 300,000kWh of heat produced, 3.02c/kWh for the next 700,000kWh, and so on.

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Further information

For further information please contact Barry Caslin, Teagasc, Rural Economy Development Programme at:

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The following resources are also helpful:

- https://www.seai.ie/business-and-public-sector/business-grants-and-supports/support-scheme-renewable-heat/
- www.agriculture.gov.ie/farmerschemespayments/tams/pigandpoultryinvestmentscheme/

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