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Skills WORKSHOP

Fan performance

Cool chicks

Top fan technology for poultry farmers

Tough lessons

Avoiding common pitfalls

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COOL CHICKS

As our appetite for chicken continues to increase, farmers are using HVAC technology to help produce healthier and happier birds, writes **Sean McGowan**.

A little more than half a century ago, Australians consumed 7kg of chicken per person every year, on average. Fast forward to 2015/16 and that figure had grown to over 46kg – making chicken the country's favourite meat.

According to Australia's representative body for the industry, the Australian Chicken Meat Federation (ACMF), one of the main reasons for the growth in chicken consumption is affordability. While other meats have become more expensive, there has been no increase in the real cost of chicken meat over the past 50 years. But how has this been achieved?

"The chicken industry has been able to deliver a more affordable product because of significant improvements it has made in the efficiency with which chicken meat is produced, and overall improvements in productivity," says the ACMF.

The Federation says substantial research has contributed to advances such as better feeding practices and bird nutrition, improved housing and husbandry, and improved flock health.

Growing periods of up to 60 days can involve both heating and cooling regimes, varying according to the ambient temperature and the season.

Broiler chickens (the chickens farmed for meat) are especially susceptible to heat stress due to their inability to sweat.

This has resulted in chicken growers taking a particularly keen interest in HVAC technologies, including ventilation systems, and temperature and humidity controls.

GREENFIELDS

Forty kilometres north-west of Melbourne, Greenfield Poultry has embraced the latest in fan technology to ensure its birds are kept in the best conditions while growing.

In 2014, owner Bobby Stankovic approached leading fan manufacturer ebm-papst to develop a cooling system for eight new broiler sheds being built on the farm.

These massive sheds – measuring 17.8m wide and 160m long – can house up to 50,000 broiler chickens. They feature the highest level of redundancy to ensure the health and safety of the birds at all times.

"Greenfield Poultry wanted to use the best available technology to future-proof their business," says ebm-papst sales manager for Victoria and Tasmania, Christopher Hauck.

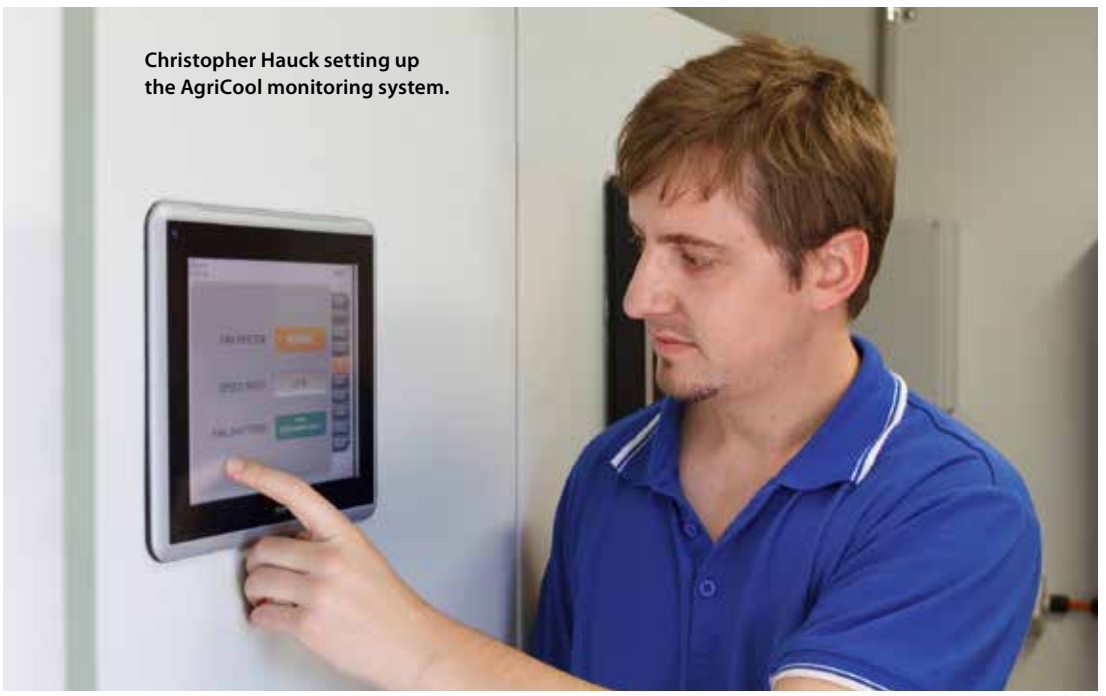
Having worked with the Australian agricultural sector for three decades, the fan manufacturer collaborated with the farm, as well as the shed designer and controls experts, to develop a solution based on traditional EC (electronically commutated) technology – that is, fans with a brushless DC motor.

> "Each shed's temperature distribution is only 0.2–0.3°C across the length of the shed"

CONTROLLED CONDITIONS

The environmental conditions of Greenfield Poultry's broiler sheds need to be able to change as chickens are grown from day-old pullets (chicks) to 55-day-old, 4kg birds ready for harvest.

Beginning at 32°C and 80 per cent humidity, the temperature may need to fall to as low as 20°C and less than 50 per cent humidity depending on the growth phase and season. Minimum air speeds of 3m/s are typical.



Christopher Hauck setting up the AgriCool monitoring system.

To achieve these conditions as well as provide appropriate redundancy, a ventilation system was developed to meet the needs of the poultry farm and the wider Australian poultry market.

Known as AgriCool, the system features a bank of tunnel fans installed on each shed to achieve specific conditions.

At Greenfield Poultry, each shed features 14 1250mm EC direct-drive tunnel fans. The fan system is controlled by a purpose-built, touch-screen interface that operates in parallel with the main shed controller.

The sheds feature sensors that monitor the internal environment, with the system programmed to adjust the rate of ventilation accordingly, to optimise the climate conditions.

Each tunnel fan has been installed with a shutter system, controlled by a 24V DC actuator. An uninterrupted power supply back-up system provides a high level of system redundancy and reliability.

Should a fan failure occur, the other fans will automatically increase in speed to achieve the required shed conditions.

According to ebm-papst's Alexandra Gray, each fan can be monitored and accessed from the shed's control room, as well as remotely via an internet connection to provide the farmer both onsite and offsite control.

BROODING PHASE

Every broiler shed also features a dozen 200mm EC destratification fans to make the brooding phase – the period during which young chicks are kept warm as they grow rapidly – easier, simpler and cheaper.

These destratification fans reduce the temperature differential between the shed's ceiling and floor without affecting bird comfort. By moving warm air from the ceiling down to litter level, the litter temperature is increased to promote even bird spread, and thereby improved bird comfort.

"This means that each shed's temperature distribution is only 0.2–0.3°C across the length of the shed," says Stankovic, "providing uniform growing conditions."

POWER SAVINGS

As well as being able to closely control the shed conditions, the speed control methodology of the fan system results in dramatic power savings of 70 per cent compared to traditional systems.

This significantly reduces the running costs of broiler sheds on poultry farms, impacting positively on the farm's bottom line.

"Farmers are being driven to supply meat at lower and lower prices," says Hauck. "Increasing electricity costs are dramatically affecting returns on investment and growth margins."

The EC technology used in the fans has also allowed for power factor correction. This is important given the electrical supply contracts typical of poultry farms.

PROJECT AT A GLANCE

THE PERSONNEL

Client: Greenfield Poultry

Controls: HMI Electric

Electrical contractor: HMI Electric

Mechanical services design: ebm-papst

HVAC EQUIPMENT

Controls: ebm-papst

Fans: ebm-papst

Alexandra Gray commissioning the AgriCool system.

REAL-LIFE PERFORMANCE

Hauck says one of the key lessons to be taken from this project was the early involvement of and communication between all parties involved.

"Fans are usually selected towards the end of a project," he says. "Being able to understand what exactly was needed from the start enabled us to provide a more tailored solution to the grower's specific requirements."

Completed in early 2015, the tunnel fan technology used on the broiler sheds at Greenfield Poultry has delivered optimal growing conditions for the farm's chickens to help meet local demand.

So, it seems that just as there would be no beer without refrigeration, there may well be less chicken without HVAC.

Think about that next time you tuck into a chicken parma at the pub! ■