



NATIONAL Poultry NEWSPAPER

Vol 4. No. 8 August 2021 National Poultry Newspaper PO Box 162 Wynnum 4178 Phone (07) 3286 1833 Email ben@collins.media

Standards and guidelines for Australian poultry

THE Australian Government is working with states and territories to develop and put in place nationally consistent standards and guidelines for farm animal welfare.

The 'Australian Animal Welfare Standards and Guidelines for Poultry' will replace the 'Model Code of Practice for the Welfare of Animals Domestic Poultry'.

The standards will be put into effect in state and territory legislation.

The guidelines will be voluntary.

They will set out the best practice for caring for and managing poultry.

In March 2021, a draft of the revised standards and guidelines was sent to members of the stakeholder advisory group.

The four-week consultation period proved extremely beneficial as the panel received almost 900 separate specific comments on the proposed standards and guidelines.

Comments ranged from minor drafting improvements to more substantive information including further scientific sources on animal welfare impacts,



The 'Australian Animal Welfare Standards and Guidelines for Poultry' will set out the best practice for caring for and managing poultry.

and information on industry practices and implementation implications.

The panel acknowledge and appreciate the time and effort SAG members invested in providing these detailed comments.

Since the conclusion of the consultation period, the panel have finalised the standards and guidelines and are scheduled to present a final version to the Agriculture senior officials committee in mid-August.

It is intended that senior officials will consider the standards alongside a regulation impact statement and determine next steps, including referral to agriculture ministers.

The terms of reference for the independent panel set out that the standards will:

- Improve animal welfare outcomes within Australia's poultry industries
- Reflect contemporary animal welfare science
- Consider current industry practices, cost and benefits, new technologies and practicalities of implementation
- Align with the values and expectations shared by the Australian community
- Meet the expectations of trading partners
- Consider possible domestic and international trade impacts
- Provide the basis for nationally consistent and effectively enforced regulation.

The Agriculture Ministers' forum agreed to the panel's terms of reference in October 2019.

For further information, contact poultry.panel@agriculture.gov.au or visit agriculture.gov.au/animal/welfare/standards-guidelines/poultry



Water is a key element of natural duck behaviour and a major focus for welfare improvement, hence providing water in a safe and effective manner to commercial ducks will improve their welfare. Photo: Thalia Ruiz

Highlighting applied on-farm research

THIS month we finalised our 2021 research grants and I look forward to sharing these with you next issue.

However, I would like to take the opportunity to share with you a research project that we commissioned last year, 'Assessing behaviour and welfare impacts of water provision via misters in commercial ducks'.

This project, led by Dr Dana Campbell, is a fantastic example of how applied research can happen directly on farm.

The objectives of the research are to measure the environmental, behavioural and welfare impacts of water provision via a misting system for commercial grower ducks.

Dana will achieve this via a combination of on-bird measurements, video recordings, farm production data and environmental sensors.

Ducks are motivated to access water to maintain feather condition – providing water to ducks on commercial farms is challenging as it may reduce litter and air quality.

Water is a key element of natural duck behav-



by TAMSYN CROWLEY
Director



our and a major focus for welfare improvement, hence providing water in a safe and effective manner to commercial ducks will improve their welfare.

Dr Campbell's research has the potential to highlight the Australian duck

industry as world leaders in duck welfare and husbandry, and maintain the duck industry's social license to operate.

Duck research within Australia is currently very limited, particularly in the area of welfare and behaviour.



One of the environmental loggers installed at bird height – the yellow box attached to feeder line – another tool used to capture relevant research data.

For the industry to sustain itself in a time of social licenses, as well as grow and increase duck meat acceptance within Australia, it is imperative that welfare be addressed in an objective manner.

Research projects such as Dana's can inform the industry on husbandry methods, enabling them to improve duck health and welfare.

Dana and her team have successfully set up the sheds and are currently collecting data through video systems and bird assessments.

We look forward to providing an update once Dr Campbell has

completed her project.

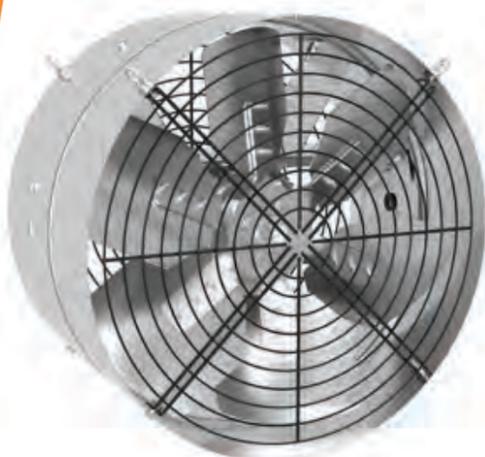
With the recent releasing of the Australian Animal Welfare Standards and Guidelines for Poultry, the PHA team has been busy working to see how our programs and research will help to support the industry through some of the transitions required.

We are always looking for ways to support industry and farmers and welcome any suggestions of how we can be of assistance.

If you have an idea or would like to chat all things poultry, don't hesitate to contact our office at poultryhub@une.edu.au



One of the cameras installed to capture a portion of birds within one of the sheds for Dr Dana Campbell's research project. A total of 16 cameras have been installed across four sheds.



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Poultry Industry Calendar of Events

2021

AUG 8-12 – World Poultry Congress, Paris, France www.wpcparis2020.com

AUG 16-18 – World Poultry Science Association (WPSA) – Cambridge, UK www.wpsa2020.org

SEP 1-2 – Poultry Africa 2021 – Kigali, Rwanda www.viv.net/events/poultry-africa-2021-kigali

NOV 21-22 – AVAMS21, Gold Coast www.avams2020.com.au

2022

MAR 30 - APR 1 – 7th International Conference on Poultry Intestinal Health, Columbia, www.ihsig.com

MAY 15-17 – Poultry Information Exchange and Australasian Milling Conference (PIX/AMC), www.pixamc.com.au

How to supply event details: Send all details to National Poultry Newspaper, PO Box 162, Wynnum Qld 4178, call 07 3286 1833 or email: design@collins.media

poultrynews.com.au
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HAVE YOUR SAY!

All producers are encouraged to send in letters to be published in NPN, outlining any concerns or issues they may have with the industry.

This is an open forum where you can cover any topic, whether for or against an issue.

Please send your letters to: editorial@collins.media or PO Box 162, Wynnum Qld 4178

Egg industry to recognise farmers and workers with new awards

AUSTRALIAN egg farmers provide valuable input into the meals of almost every Aussie household.

Which is why Egg Farmers of Australia, the egg industry's leading voice, is set to recognise their contribution – as well as others who work in egg production – through a new annual awards program.

In November, at our annual general meeting in Hobart, Egg Farmers of Australia will be presenting two key awards:

- The EFA Young Egg Industry Achiever of the Year, and
- The EFA Egg Industry Leader Excellence Award for service to the egg industry.

Our egg commercial farmers and those who work with them – farm



staff, hatchery staff and vets – work very hard to maintain a consistent and clean supply of fresh eggs for Australians to eat every day.

That's 19 million eggs daily, and their contribution should be celebrated and recognised.

The awards are open to any worthy candidates involved in egg production, such as egg farmers, egg

production teams, farm staff, researchers, poultry vets, hen nutritionists and hatchery employees who contribute to the improvement of the nation's egg industry.

Candidates for both awards and the person nominating them must be financial members of Egg Farmers of Australia.

Membership forms are found on the Egg Farm-

ers of Australia website eggfarmersaustralia.org/membership-form/

Nominations close on August 31 and nomination forms can be found at <https://bit.ly/2VusQIR>

Our judges for the awards will be publisher of *Poultry Digest* Peter Bedwell and Australian Eggs managing director Rowan McMonnies.

Egg farmers concerned by ABC using outdated term

Aussie egg farmers are concerned that people may think they mistreat their animals because the ABC continues to use the outdated term 'battery hens'.

The term incorrectly appeared first as a headline online and was further used by ABC Radio *Afternoons* Brisbane to incorrectly describe modern cage egg production.

Battery hens don't exist in Australia after being outlawed in 2008 – 13 years ago.

Occasionally the media get it wrong and we have politely asked the ABC to correct this.

Farms now abide by strict government legislation that controls the care, health and happiness of hens.

It's wrong to demonise egg farmers by using an outdated term to describe the governed and ethical methods of conventional, pre-enriched or furnished cage egg farming – particularly as the practise is no longer existent in this country.

Australian consumers rely heavily on having the choice of cage eggs, which account for up to 40 percent of egg sales in supermarkets.

Without them, Australian families would face egg shortages and higher prices for what is currently one of the nation's most affordable sources of protein.

Importantly, cage egg production also has the lowest carbon footprint compared to free range or barn laid eggs.

Australian poultry vet and researcher Dr Rod Jenner has backed our organisation saying Australia's cage egg production is far more ethical today, and hens were healthy and thriving.

"As vets, we're extremely sensitive to the welfare and care of farm animals," Dr Jenner said.

"We look for signs of good health and interactive behaviours as key welfare indicators.

"Being flock birds, hens are content to live close together as it mimics part of their natural behaviour.

"What many people who eat eggs may not realise is that Australian caged hens have an incredibly low incidence of infectious disease and mortality rates.

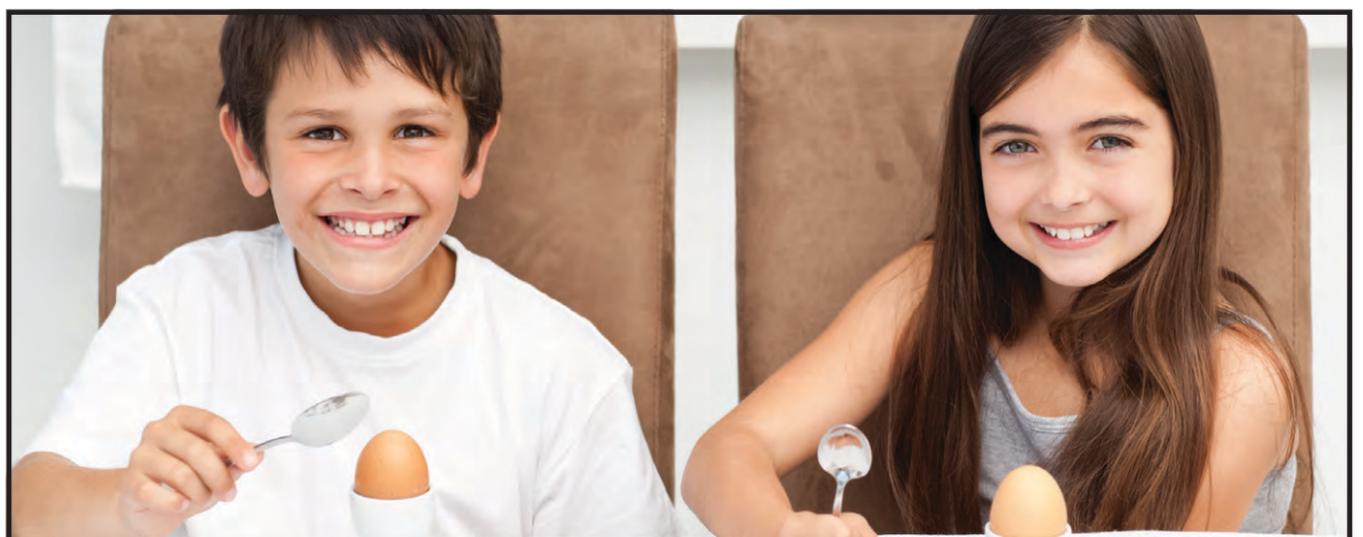
"As a result, they do not require any antibiotics, which is an important consideration for consumers.

"Conventional cages are really social housing for hens, holding small groups with 20 percent more space per bird in comparison to previously outdated methods."

EFA want the industry to adopt an even more comfortable system of 'furnished cages' by July next year and back a phase-out of current conventional cages by 2046.



Young egg farm workers David Howe, Jess Howe and Jacko Stockman. Egg Farmers of Australia members are urged to nominate candidates for two awards.



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For over 50 years, Australia's egg farmers have trusted SBA's quality layers to keep their egg supply moving. We're Australia's largest specialist supplier for a reason: our genetically superior Hy-Line and Lohmann day-old chicks and point-of-lay pullets are bred in the world's most advanced facilities. And we are still investing in superior biosecurity, logistics and genetics to protect the future of our food security – and support your farm at every stage, from chicken to egg.

With SBA as your production partner, you can have confidence in what comes next.

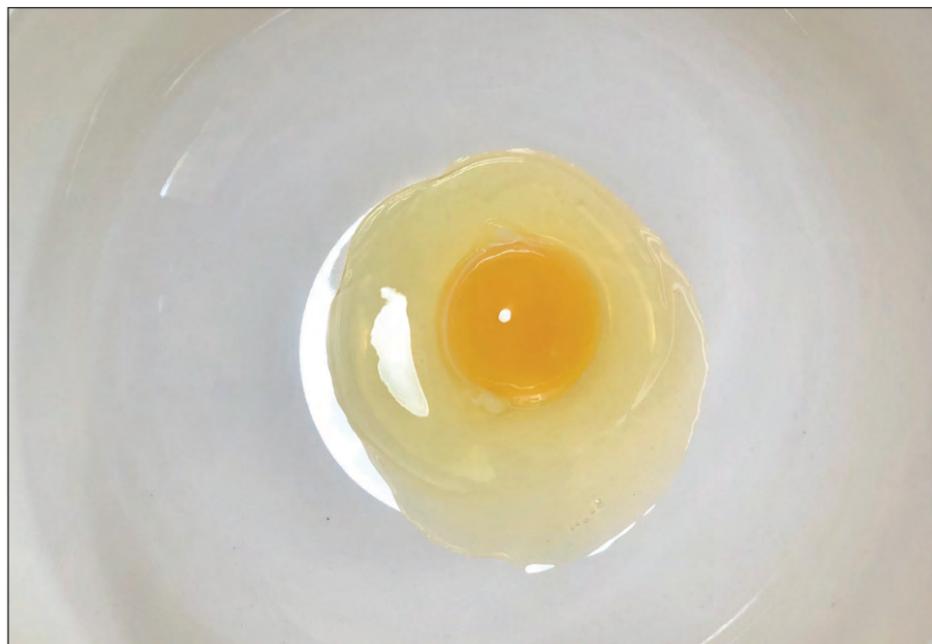
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Cooked up with rice, my paler than usual egg was still a lunchtime treat.



Though a little on the pale side, this yolk probably reflects the tough July my preferred hens have experienced. Nonetheless, still tasty and nutritious eggs.

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Contact Brendon Cant

M 0417 930 536 E brendon@iinet.net.au

Yellow yolk matters

AS for most egg lovers, I love a nice rich yellow coloured yolk.

And I admit to being a little disappointed when I crack one that is a bit off-colour.

Not bad and smelly mind, just not as bright as I've come to expect – no matter the season, the hen's feed or how happy or unhappy the hen may be.

Consequently, my most recently purchased eggs from my usual supplier – admittedly laid and bought during one of Perth's coldest, wettest, stormiest, darkest Julys ever – simply didn't enrich my morning with anything approaching sunshine.

The yolks were a little on the dull side.

When I questioned my supplier – who I respect



Cant Comment by BRENDON CANT

for his honesty, knowledge and lifetime of experience as an egg farmer, both indoor and outdoor – I was not overly surprised to learn he agreed with my suspicion that season can have a colourful impact on eggs.

He said he'd been finding the same thing when cracking his own eggs for his breakfast.

He went onto say (well... text in this case) that he felt his birds had been challenged with the cold weather.

"Because we can't control the temperature in the sheds like the modern systems, this can be a trade-off."

"I have changed their

feed with a higher protein and hope to see some better colour moving forward."

While I'm yet to head back for another two dozen – plus my usual bag of chicken manure for my garden composting efforts and a chat, if my contact is not too busy – I'm yet to be able to report any change in the colour dynamics.

Of course, I must note that my preferred free range jumbo eggs still taste great, indicating that colour prejudice is unacceptable, even when it comes to eggs – however, I still tend to think yellow yolks matter.

Of course, while egg yolk colour may not impact its health value, plenty of chefs, egg farmers and home cooks are adamant that yolk colour affects the flavour of the egg and subsequently the dish it's served up in.

The more vibrant the shade, the more vibrant the taste, they say... and I confess, I'm one of them.

Most authorities will tell you that yolk colour is influenced by the hen's diet, doesn't indicate freshness and has no significant influence on nutrition or flavour.

Specifically, the colour derives from plants rich

in xanthophylls, which are natural yellow pigments from the carotenoid group.

Xanthophylls is literally Greek for yellow.

Egg yolks range in colour from pale yellow to deep orange, with the darker colour signalling the presence of carotenoids.

Since carotenoid-rich fodder is more common and available in pasture-raised hens, eggs from these chickens are prone to be deeper orange in colour.

However, any chicken egg can turn out orange, not only the pasture-raised ones.

Provided chicken feed contains the nutrients that trigger 'orangeness', the yolk can turn out this deeper colour.

Free range egg farmers, however, can't depend on pasture alone to deliver a consistent yolk colour and so most add supplements to the feed.

As hens aren't machines, there will always be variations in yolk colour, and what is important is that their diet is regularly monitored to achieve the best nutrition for the hens.

And, if that's done, consumers will continue to lovingly lap up luscious nutritious eggs. 🐔

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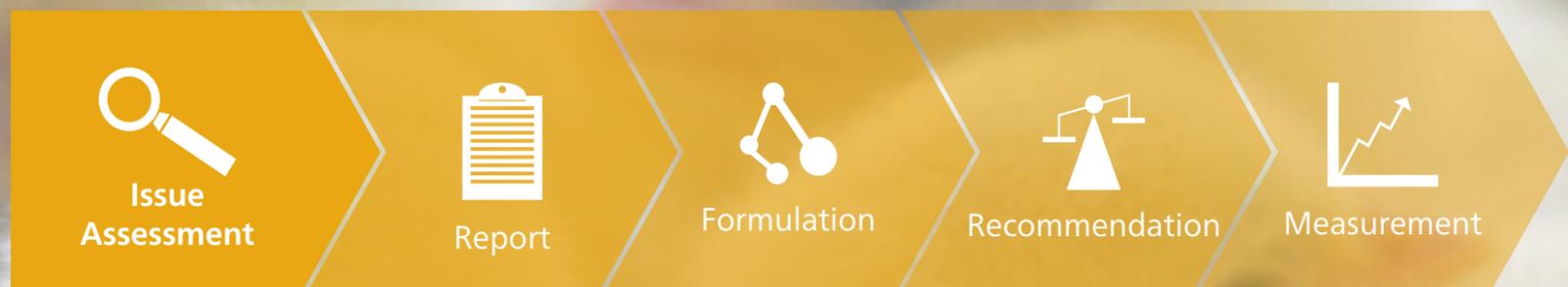
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Back in warmer months, this was how my usual eggs coloured up.

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Technicians Guido Pagotto and Loris Comin with Rob Duns from Dunogan Farm Tech Pty Ltd and John Rohde of Rohde's Free Range Eggs.



The Riva Selegg E20 egg grader installed at the Rohde's farm has four auto packing lanes with closures and denesters, plus three manual pack lanes.

Rohde's farm installs new model Riva Selegg E20 egg grader

ROHDE'S Free Range Eggs at Tarlee in South Australia's Clare Valley has been producing humanly farmed RSPCA approved eggs for more than 15 years and has recently installed the new Riva Selegg E20 egg grader.

The Riva Selegg E20 egg grader has the option of fully automatic egg packing of graded eggs into cartons or trays and the capacity of 20,000 eggs per hour.

The new Riva Selegg E20 can also grade up to seven weight grades of eggs, has touch screen control and features a soft air eject system.

It has an ethernet slot for internet connection capability with the possibility

of remote access management.

The Riva Selegg E20 egg grader installed at the Rohde's farm has four auto packing lanes with closures and denesters, plus three manual pack lanes.

Automatic vacuum loading is provided whereby eggs are mechanically loaded 30 at a time onto the egg grader infeed rollers.

For washing dirt from the eggs, a Kuhl egg washer is connected in-line with the Riva Selegg E20 egg grader.

Rohde's Free Range Eggs is third generation family owned and is one of the largest free range egg farms in South Australia.

Committed to ensuring its hens are free to roam outdoors to scratch and

dust bathe at their leisure from 20 sheds, Rohde's farm currently has 80,000 free range layers at a stocking density of 1500 birds per hectare, with plans to add another 10,000 layers by the end of 2021.

Riva Selegg egg graders have been available and distributed by Dunogan Farm Tech Pty Ltd in Australia and New Zealand for 30 years.

Rob Duns from Dunogan Farm Tech said Riva Selegg egg graders have proven egg grader technology, are compact in design and have the smallest possible layout footprint.

For more information, visit dunoganfarmtech.com.au or email Rob Duns at robduns@dunoganfarmtech.com.au

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The denesters on the Riva Selegg E20 egg grader installed at Rohde's Free Range Eggs.



The round table auto loader on the Riva Selegg E20 egg grader. The Riva Selegg egg graders have proven technology, are compact in design and have the smallest possible layout footprint.



The Riva Selegg E20 has touch screen control and an ethernet slot for internet connection.

Evonik proves ecological advantages of its feeding solutions for poultry

A COMPARATIVE life cycle assessment by Evonik has further demonstrated the ecological advantages of using its feed amino acids and feeding concepts compared with common animal nutrition practices.

The global LCA analysed the environmental impact of feeding broiler chickens, laying hens and swine.

The study was audited and certified by TÜV Rheinland according to ISO 14040 and 14044 in second quarter 2021.

Evonik's animal nutrition business line head Dr Emmanuel Auer said, "Our system solution



– based on a balanced amino acid profile, low crude protein content and our amino acid products – can contribute significantly to reducing the environmental footprint of livestock farming, without compromising animal welfare."

"And we need to use this scope to meet the animal protein needs of a growing world population without overstretching natural resources."

The animal nutrition

business line is part of Evonik's life sciences division 'nutrition and care', which is about developing sustainable solutions for a better life for people and animals.

"It is impossible to meet the challenges of our times with single products," Dr Auer said.

"This is why we concentrate all our knowledge and experience on developing targeted system solutions."

In 2010, Evonik pioneered its first TÜV-certified comparative LCA for feed supplementation with the essential amino acids methionine, lysine, threonine and tryptophan.

In 2015, a second followed, which also included valine.

Both times, feeds without amino acid supplementation served as a comparison.

Evonik efficient nutrition product line head Dr Jan-Olaf Barth said, "Today, amino acid supplementation is common practice in many parts of the world."

"This was taken into account in the current study, as were regional differences in feed composi-

tion, which enables us to provide our customers with even more targeted advice," Dr Barth said.

In the new LCA, the environmental impact of species, and the developmentally appropriate feeding of swine, broiler chickens and laying hens with balanced amino acid profiles and low crude protein content, was evaluated according to specific criteria – global warming, acidification and eutrophication potential, blue water consumption, land occupation and respiratory inorganics.

The analysis included feed raw material production, animal husbandry and manure treatment emissions.

Evonik sustainability development in the animal nutrition business line head Dr Michael Binder said, "We have found that our feeding concepts and amino acids can have significant effects in reducing climate change and nitrogen-based emissions."

"Their application can reduce acidification, eutrophication and the release of respiratory inorganic substances induced by ammonia," Dr Binder said.

The study also demonstrates another advantage of low protein feeding regimes – the option to use regional raw materials with a lower environmental footprint.



The global life cycle assessment by Evonik analysed the environmental impact of feeding broiler chickens and laying hens.



Aussie Pumps' latest pump selection guide has Australia's biggest range of self-priming pumps from 1" all the way to 6".

Aussie's new pump selection guide

AFTER good winter rainfall across much of the country, now is the time farmers are maximising water harvesting, with proactive management of water tanks and dam levels.

Selecting the right pump to achieve this is essential.

Aussie Pumps' new 'Pump Smart' catalogue displays a full range of self-priming centrifugal pumps for a wide range of on-farm applications, including transferring water, spray irrigation, even firefighting pumps.

The catalogue explains how to select the right pump, providing details of pressures and flows.

Aussie's self-priming pumps all come with a five-year warranty.

The catalogue also contains a lot of infor-

mation about specific applications.

The product range starts with a lightweight 1" pump and goes all the way through to big 6" flood lifters that will move loads of water fast.

Engine-powered portable firefighting pumps are a safe solution, providing there is a water source to utilise.

Available in both petrol and diesel-drive versions, it is the diesel drive that the majority of farmers and property owners are turning to.

Aussie Pumps chief engineer John Hales said, "In our experience, customers choose diesel fire pumps for many reasons."

"From a safety point of view, refuelling a petrol pump during an ember attack is seriously dangerous."

"Animals and crops are lost in the paddock due to inadequate firefighting protection."

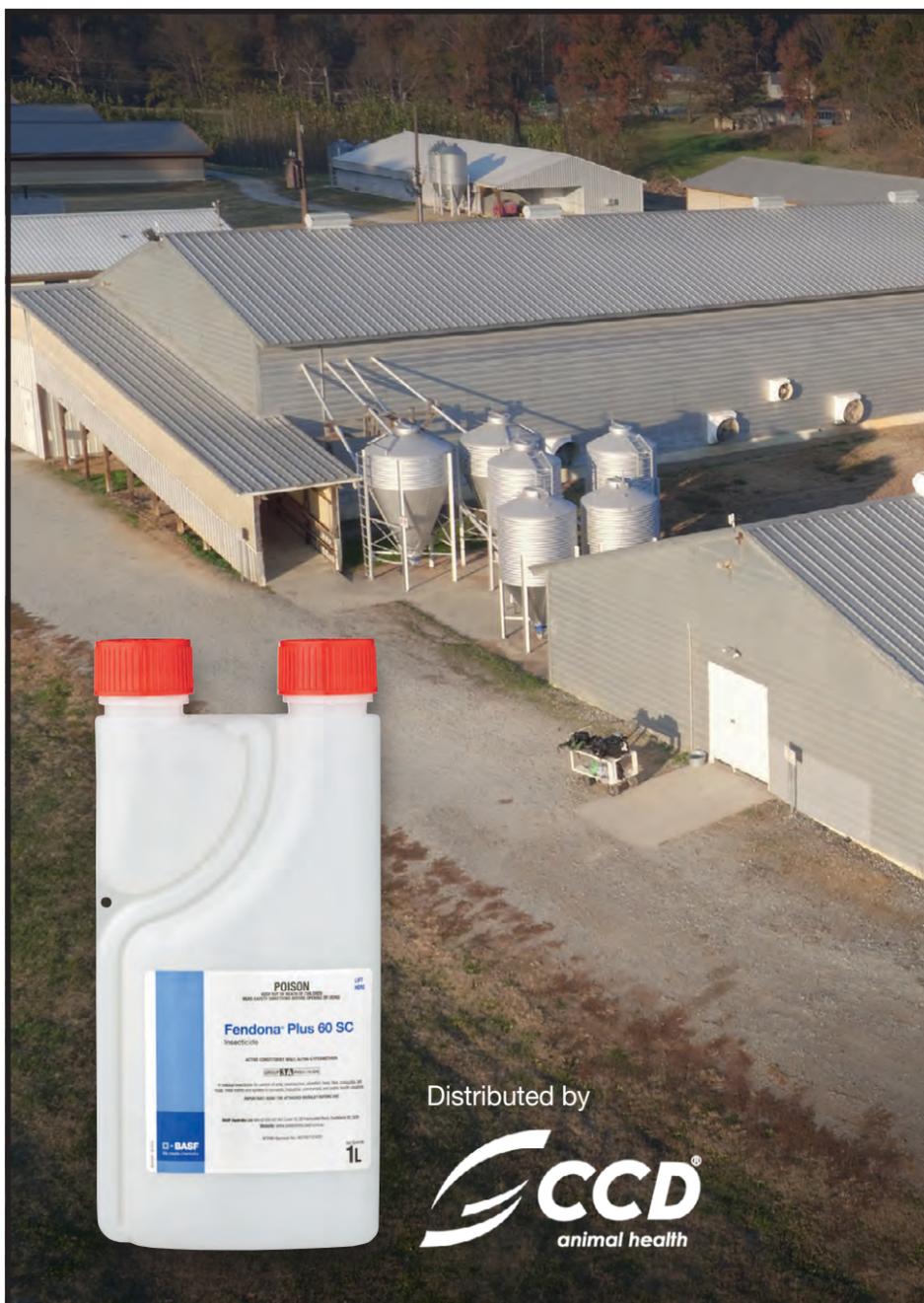
"Farmers are moving to diesel fire pumps for protection."

The Pump Smart catalogue also covers the Aussie GMP range.

These heavy duty cast-iron trash pumps can be used for everything from handling effluent to recycling water and stall washdown.

The Aussie GMP range also includes a full line up of 1" through to 4" heavy duty self-priming stainless steel pumps designed for abrasive applications.

Further information and free copies are available from Aussie Pumps on 02 8865 3500 or aussiepumps.com.au, or through one of the authorised distributors found on the website.



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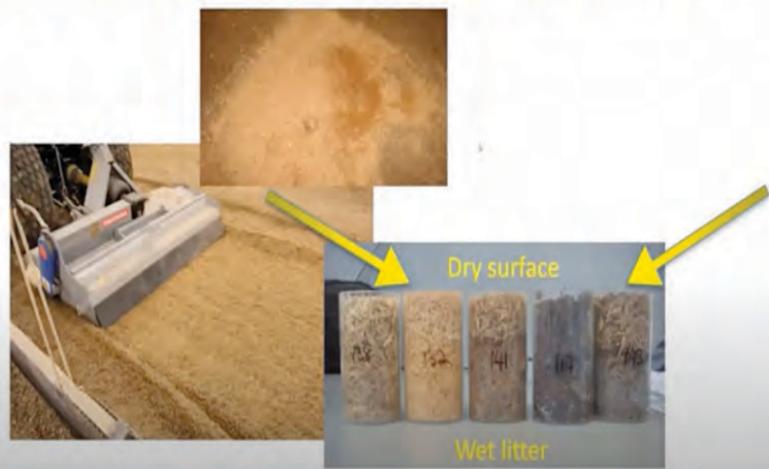
For more information on Fendona Plus 60 SC, visit crop-solutions.basf.com.au or contact your local CCD Representative on 1300 791 009

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Bring the moisture to the surface



Water is evenly distributed when litter is well mixed. When water is removed only from the surface of the litter, the dry surface acts as a blanket and retains the water below the surface.

Adding heat

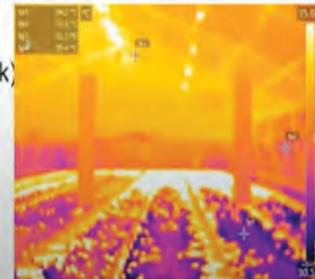
Warming the air reduces relative humidity

- Increasing air temperature by 10°C reduces RH by about half



Warming the air warms the litter

- Heat the litter and floor to 30°C for at least 24 hours before placement (Aviagen broiler handbook)



Warm litter helps water to evaporate

Heating the litter will assist the moisture to evaporate and free the liquid to move into the air easily.

Airspeed at the litter surface

Airspeed ≈ evaporation

- Conserve heat using circulation fans
 - Aim for 0.8-1 m/s
- Circulation brings down heat from the ceiling



Air circulation fan system evaluated by University of Georgia (courtesy of Connie Mou)

Air speed at the litter surface has a strong impact on the evaporation rate.

Drying litter before chick placement

IN May 2021, AgriFutures facilitated a webinar with Queensland Department of Agriculture and Fisheries principal environment engineer Mark Dunlop discussing the benefits and how-to of drying litter before chick placement.

The research was funded by the AgriFutures chicken meat research, development and extension program and the Queensland Department of Agriculture and Fisheries, and supported by

the growers who provided litter samples for experiments, together with information and ideas.

In the webinar, Mark considered the factors of heating, air speed and litter tilling and their effects on drying the litter in meat chicken sheds.

The reasons for drying litter before chick placement include:

- Ensuring the flooring is warm and dry for the day-old chicks
- Removing moisture and ammonia from the flooring
- Increasing water holding capacity of the litter during brooding
- Saving on heating costs – not using as much heat to keep flooring warm.

To evaporate water from the litter, the moisture in the litter needs to be brought to the surface, heating the litter and the air will assist with this, as will air speed and air with low relative humidity, giving the air more capacity to absorb water.

These four components are essential in evaporating moisture from the litter and important for the comfort of the day-old chicks, which is the priority.

Does this mean turning on more fans, using circulation fans, turning up the heat, tilling the litter, and does the weather affect the drying of the litter?

Here are the four components in more detail.

Bringing moisture back to the surface

As water is taken off the surface of the litter when drying, the dry surface acts as a blanket over the litter.

When this occurs, it stops the water from moving up through the litter and into the air.

When the litter is well mixed, the water is evenly distributed.

Stirring the litter and bringing wet litter to the surface will help remove more moisture.

Without moving the litter and tilling it, experiments show the water evaporation rate is reduced by 40 percent after 4-6 hours and after 12-15 hours by 70 percent – a drying rate of only 30 percent.

The drying rate reduces to 85 percent after 24 hours, so instead of evaporating

1L of water off the flooring, only about 125ml will be removed after one day if the litter is not stirred and the moisture brought to the surface.

“It’s time to stir things up,” Mark said.

Adding heat

Warming the air reduces the relative humidity in the atmosphere.

The general rule of thumb is that by increasing the air temperature by 10C, the relative humidity is reduced by half.

Warming the air also warms the litter – as per the Aviagen broiler handbook, the recommendation is to pre-heat the litter and floor to 30C for at least 24 hours before placement, ensuring the flooring is warm and dry for the chicks.

Heating the litter will also assist the moisture to evaporate – it frees the liquid to move into the air easily.

Air speed

Air speed at the litter surface has quite a strong effect on the evaporation rate.

One of the challenges with meat chicken sheds in Australia is that the air flow in a shed is generally driven by exhaust fans.

If trying to create air speed in a shed, particularly if running heaters, using fans will exhaust the warm air out.

One way to conserve that heat is to use circulation fans within the shed.

Michael Czarick and the team at the University of Georgia’s Department of Poultry Science have been developing and evaluating a system of circulation fans to generate air speeds of about 0.8-1m per second within a shed – useful for drying the litter.

Circulation fans con-

tribute to cost efficiencies, in that when running heaters and the hot air rises to the roof, circulation fans bring the heat back down, making use of what has already been paid for.

Low relative humidity

Heating the air will reduce the relative humidity.

The target is an RH of less than 50-60 percent, so the air has the capacity to absorb liquid from the litter.

Once the moisture has moved into the air, it is critical to ventilate it out of the shed, otherwise the humidity will only increase.

Essentially, the aim is to warm the air to absorb the liquid from the litter, then ventilate it out of the shed.

Scenario for consideration

You’ve received damp bedding at about 30 percent moisture content as you prepare your sheds for placement of chicks.

The questions arising are how dry do you want the litter to be, how long will it take to get that dry and what can you do to dry it quicker?

Because so many factors are taken into account – air speed, heat and tilling the litter – it is difficult to track which factor or which combination of factors has the greatest effect.

Mark compiled a spreadsheet to assist in change calculations and the impact of each element, and goes into detail using various locations around Australia to answer the above questions.

To view this webinar and find out more on drying litter before chick placement, visit extension.naus.com.au/chickenmeatrde/category/webinars/



Dr Mark Dunlop of the Queensland Department of Agriculture and Fisheries presented the webinar on drying litter before chick placement.

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Temperature and air flow critical to year-round broiler performance

ONE of the most common subjects among broiler producers concerns the determining of how much cooler birds feel with various amounts of air movement.

Though there are charts that provide rough estimates, we really don't know exact degrees of cooling and probably never will.

This is because the way a bird perceives its environment thermally is extremely difficult to determine.

The concept of 'hot' or 'cold' is determined by a bird's perception of its environment.

In reality, hot and cold relate to the rate at which heat is being lost by a bird.

A bird is always losing heat to the environment around it because its deep body temperature of about 41C is greater than house air temperature.

The greater the amount of heat a bird is losing, the colder it will feel.

If a bird is not losing enough of the heat it is producing, its body temperature will start to rise and it will feel hot.

If a bird loses just enough heat to maintain its body temperature with little to no effort on its part, it would be considered comfortable.

Obviously, temperature has a major impact on the rate of bird heat loss.

The lower the air temperature, the greater the amount of heat a bird will lose to the air surround-

ing it – and the cooler it will feel.

Relative humidity is another major factor that affects heat loss.

As much as 60 percent of a bird's heat loss is through the evaporation of moisture from its respiratory system.

Every time a bird breathes it is removing heat from its body.

This is true whether it is a day-old chick or a 50-week-old broiler breeder.

A bird's respiratory system is essentially a miniature evaporative cooling pad.

The lower the relative humidity, the greater the amount of moisture that will evaporate from a bird's respiratory system.

The greater the amount of heat removed from a bird, the cooler it will feel.

So, even though you may be maintaining the recommended house temperature, you could be chilling a day-old chick if the humidity is too low – 20 percent.

Conversely, a house temperature of 18C could be perceived by a market-age broiler as hot if the humidity is too high – 80 percent.

These might be the most obvious issues that affect a bird's perception of hot and cold, but there are other equally important factors.

Growth rate and breed
One consideration is growth rate.

The faster a bird is growing, the greater the amount

of feed it consumes and the greater the amount of heat it will produce.

So, whether 24C for instance is perceived as hot to a 1.8kg bird will depend to an extent on its growth rate.

A fast-growing bird being fed a high-energy diet may not be losing enough of the heat it's producing, which could possibly cause heat stress.

Conversely, a bird not consuming as much feed as a broiler breeder pullet may feel cool at 24C, because it may be losing too much of the relatively small amount of heat it produces.

This holds true for young chicks too.

If a chick is consuming a lot of feed and growing quickly, the house temperature will generally need to be decreased more rapidly over the first week than for a bird that is growing slowly.

This is because the fast-growing chick produces more heat and therefore requires a lower house temperature to help it feel comfortable.

Breed is another factor that can affect a bird's perception of hot and cold.

For instance, certain breeds become fully feathered at a younger age than others.

The lower the level of feather coverage at a given age, the greater the heat loss will be from a bird and the colder it will tend to feel.

Bird density

Density can have a major influence on a bird's perception of its thermal environment, especially towards the end of the flock.

Studies have shown that the higher the density, the lower the rate of heat loss and the warmer it will feel, regardless of house temperature.

For instance, a temperature of 21C would be more appropriate for a five-week-old bird that is soon to be processed, than for one that is being grown to a weight of about 4kg to be processed at eight weeks of age.

The amount of air moving over a bird also contributes to the rate at which heat is lost.

In general, higher wind speeds result in greater heat removal.

However, to complicate matters, the amount of heat removed depends on the difference between the bird's body temperature and the air temperature.

The closer the air temperature gets to the bird's body temperature, the less effective the movement is at removing heat from a bird.

Feather coverage

Bird age will also affect how easily heat is lost.

A young bird's feather coverage has a relatively low 'R-value' and therefore it will lose heat quicker than an older fully feathered bird.

Furthermore, a young bird has a higher surface area per gram of weight

than an older bird, which further increases the rate at which heat is lost from a chick compared to a market-age bird.

A young chick's rapid heat loss is the primary reason we typically start off a flock at around 32C and decrease it to 18C, then to 21C as the birds reach processing age.

We want to help reduce the rate of heat loss of a poorly insulated chick and increase it as it gets older and has difficulty losing the heat it needs to feel comfortable.

Unfortunately, these aren't the only factors that affect rates of heat loss.

Radiant heat gain or loss from poorly insulated ceilings or curtains, level of bird activity, night versus day, bedding type and depth can all have an impact too.

To make matters more complicated, all of these factors interact.

As a result, determining

how a bird 'feels' with any given combination of environmental or management factors would literally require thousands of studies.

Deciding the right course of action

So, what is the most accurate way to determine if a bird is comfortable?

First, start off with your primary breeder's recommended house-temperature guidelines.

Then take time to study the general relationship between the previously mentioned factors and heat loss.

Realise that as humidity increases, a bird feels hotter.

Higher growth rates will generally require lower house temperatures.

As air speed increases, a bird will feel cooler.

Feather coverage as well as density will affect heat loss.

Make small adjustments to the recommended house temperature based on your

specific situation.

Then, most importantly, take the time to sit in your houses and observe your birds.

Don't be in too much of a hurry to pick up mortalities or adjust feed and drinker lines – simply enter the house, take a 20-litre bucket, turn it upside down and spend 10 minutes or so watching your birds.

Are they spread out?

Are they bunching?

How many are lightly panting?

Are they too noisy?

How many are eating?

How many are sleeping?

It may be a cliché, but if you take the time to listen to your birds, they will tell you all you need to know.

Michael Czarick
Engineering specialist
at University of Georgia
Department of Poultry
Science

First appeared in Poultry
Health Today



As air speed increases, a bird will feel cooler.



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Cybercrims target Aussie agriculture

RANSOMWARE, a type of malware, is an increasingly popular type of extortionist cyberattack, which encrypts data on infected computers or completely locks you out and holds your data or device hostage, with the attackers offering a decryption or return of access in exchange for a ransom.

According to Avast, the number of ransomware attacks in Australia increased by 10 percent during the height of the pandemic in March and April 2020, compared to January and February 2020.

Ransomware attacks in Australia have continued targeting the country's industry, with \$680,715 reported lost to Australian Competition and Consumer Commission Scamwatch this year, not including companies who haven't disclosed their ransomware payments.

One of the more recent attacks was on the world's largest meat processor JBS, which was attacked by ransomware in late May this year, resulting in 47 of their processing and packing plants ceasing operations.

This had damning consequences to JBS in the US and Australia, where they supply an estimated 25-30 percent of the country's red meat, including to major supermarket chains Coles and Aldi.

The meat processing giant ended up paying a ransom of over \$14 million to regain access to their IT systems.

Another major ransomware attack in February



2020, saw wool brokers across Australia and New Zealand severely disrupted when Talman software's IT system, underpinning auctions and exports, was encrypted by cybercriminals.

This attack resulted in wool sales being halted for eight days and an estimated 70,000 bales being deferred for the sector that has sales of up to \$80 million a week.

Talman refused to pay the ransom, choosing to replace the software.

These ransomware attacks on such important Australian agricultural sectors and supply chains show how vital it is for authorities to defend markets against cyber threats.

In late June, Shadow Minister of Cyber Security Tim Watts tabled a new bill in Federal Parliament called the Ransomware Payments Bill, which proposes the creation of a 'ransomware payment notification scheme' that covers corporations and all federal government entities, as well as state and territory government agencies.

It will require entities that make ransomware payments to notify the Australian Cyber Security Centre and allow the centralised collection of information and other actionable intelligence by our law enforcement and signals intelligence agencies to combat ransomware attacks.

However, this won't necessarily stop all ransomware attacks.

Though you may only ever hear of ransomware attacks on large businesses such as JBL and Talman in the media, small and medium agriculture businesses should still be very aware of ransomware and the potential vulnerabilities in their business infrastructure.

What to do for effective cybersecurity

In the case of a ransomware attack, businesses should definitely not consider paying the ransom or negotiating with the criminals behind the attack, as making the payment doesn't ensure you'll get your files back or that you'll get the right decryption key, and your payment will likely fund the development and launch of new ransomware.

Businesses can of course look for decryption tools that several antivirus companies may have for the malware, and in some cases this works, but you shouldn't rely on it.

It is better to protect yourself against these attacks systematically, specifically by deploying strong security solutions that include the latest malware protection features.

Here are a few ways businesses can prevent ransomware.

Keep your antivirus software up to date

The best way to prevent ransomware attacks is to stop the malware from accessing your computer or device.

The first thing you should do is install an effective top-quality antivirus program with a strong ransomware protection tool and RDP protection to address the growing risks posed by remote desktop use.

Avast Business Antivirus has remote access shield to protect your de-

vices from remote desktop vulnerabilities.

To defend yourself against the relentless creation and assault of new ransomware strains, you should also make sure you keep your antivirus software up to date at all times.

Most programs will automatically do this for you, but for additional peace of mind, set aside a moment once a week to check for updates.

Think twice before clicking on links

Phishing scams are still the most popular way of distributing malware.

Cyber-hijackers also distribute their ransomware through mobile devices using text messaging and social media messenger apps.

Don't click links you receive from unknown contacts via SMS, email or messenger applications such as Skype, WhatsApp or Messenger.

Even if you think you know the sender, take a closer look at both their address and the link itself before proceeding.

If anything looks 'phishy', steer clear.

Though common sense still works very well against phishing attacks, antivirus software can help detect infected sites and block malware, with these features getting better every year.

Update your operating system and your software

As annoying as Windows, Apple and Android system update notices can be, you should never ignore them.

Many of these updates involve security patches that are vital to preventing ransomware and other malware from infiltrating your devices.

If you're still using an older operating system that Microsoft no longer supports, such as Windows XP, you are especially vulnerable to attack.

Do yourself a massive favour and upgrade to a newer operating system.

You should also keep all your software up to date, particularly your web browsers and plug-ins.

Fix your remote desktop access

It is essential to block

the remote desktop access from the internet and leave it accessible only within the internal network.

The default ports – port 3389 for remote desktop – can be secured at the firewall level.

If the company does not need the remote desktop for its daily operations, it is better to turn it off completely.

Back up all important files

The absolute baseline prevention of company data loss due to a ransomware attack is regularly backing up.

Having backups of all your valuable and vital files will help you in terms of damage control.

The best way to prevent data loss is to use a combination of offline and online storage methods.

Save your files to one or more physical devices – external hard drives, USB flash sticks, SD cards are options to consider along with cloud storage services such as Dropbox, Box and Google Drive.

This way, if you do get hit with a ransomware attack, you're ready to restore all your important files as soon as you remove the ransomware from your device.

Ensure employees act securely and trust no one

It is also crucial to manage employees' access rights and to implement the 'zero trust' principle – a security concept that requires all users, even those inside the organisation's enterprise network, to be authenticated, authorised and continuously validating security configurations before being granted or keeping access to applications and data – to reduce the impact of potential security vulnerabilities.

Remove access of administrative privileges for staff that don't require them and educate staff so they know how to browse securely, looking for the URLs padlock symbol and 'https' in the browser address bar, and they're less likely to access malicious hyperlinks, visit unknown websites and are able to recognise slight changes in URLs.

Encourage them to have strong passwords, ideally using different passwords for different website accounts, and add two-factor authentication where possible, especially on administrator accounts.

Also, it is worth regularly getting your staff to check to make sure none of their passwords have been leaked or stolen, which is easily done by using online tools provided by security companies, such as Avast's free Hack Check tool.

Jakub Kroustek
Avast, Malware Research Director

Resilient plants entice hens on free range farms

IN July 2020, Carolyn de Koning of the South Australian Research and Development Institute undertook a research project into the plants hens on free range farms prefer.

The aim of the project was to consolidate available agronomic information and provide an up-to-date resource for free range egg farmers on what and how to plant on the range.

To complete the project, Dr de Koning integrated existing research on the topic, as well as learnings from five 'case study farms' that she had worked with throughout the project.

Plants, both ground cover and trees, grown on free range layer farms provide a vital role by enriching the outdoor range and creating an attractive area for hens to go outdoors and explore.

However, specific information on what to grow and how to go about sowing pastures and planting trees and shrubs is not easy to find for free range egg farmers, with material spread across many and varied sources.

Therefore, the main aim of the project was to consolidate agronomic information on the how and what to plant, while also taking into consideration the main climatic zones of Australia.

The project had three components:

- Case study farms to see what plant species and how farms establish and maintain vegetation on the range
- Development of a guideline package on what and how to plant a range
- The planting of perennials to enhance the outer range areas to increase utilisation by hens.

Information generated from components one and three were incorporated into the guideline package.

Important findings
Perennial pasture plants are very important and in the case study farms both per-

ennial grasses and perennial legumes were utilised.

When annual species had died off for the season, perennials provided some green ground coverage.

This was most evident on the farms in the Australia temperate mediterranean zone during summer.

It is difficult to achieve even usage by hens across the range.

Hens utilise the areas closest to the shed more often.

Temperature and wind strength have a big impact on the hen's willingness to go further out on the range.

Hens are less likely to venture to the outer range if temperatures are above 25C and it is windy.

As a result of hen ranging behaviour, botanical composition of the ground cover species will change according to the distance from the shed, with more activity and hen numbers closest to the shed and less activity and hen numbers furthest from the shed.

Weed species tend to be present closest to the shed.

Drier climates and drought conditions limit the opportunities for free range farms to re-sow ground cover on the range and to plant trees and shrubs.

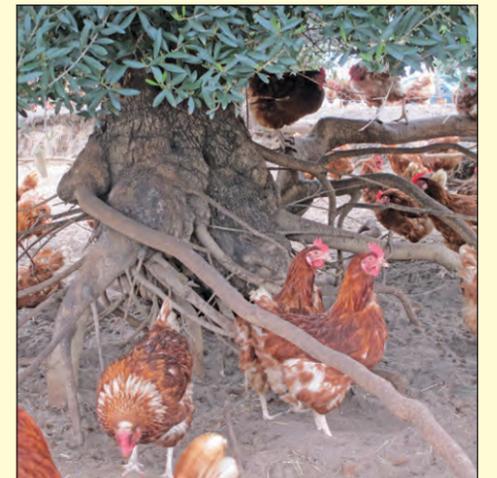
However, free range farms in drier climatic zones can benefit from growing shrubs such as oldman saltbush.

In the case study farms, tree and shrubs played a vital role on the range providing shade, shelter and dustbathing sites.

All farms were actively planting trees and shrubs with hardy local species used.

Furthermore, trees needed protection around the root zone from hen activity, especially ranges stocked at 10,000 hens/ha.

For the full report, visit australianeggs.org.au/assets/research/documents/Resilient-plants-to-entice-hens-outdoors.pdf



Plants on free range layer farms enrich the outdoor range and creating an attractive area for hens to go outdoors and explore.



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Litter manual for Aussie chook farms

IN April 2021, a manual was compiled for AgriFutures Chicken Meat by Mark Dunlop from the Queensland Department of Agriculture and Fisheries and Eugene McGahan and Nic Gould of Integrity Ag and Environment, previously FSA Consulting, into litter management for meat chicken farms in Australia.

Litter is possibly one of the largest operational investments on meat chicken farms.

Litter management can affect meat chicken health, human health, odour and dust. Despite the litter issue being important for all industry participants, there hasn't been a single point where information has been brought together and maintained in an up-to-date format.

While the industry has done a large amount of work in this area, the results are documented in a variety of reports, scientific papers and guides, without there being one document that synthesises this information and makes it applicable and relevant to the various industry participants.

The best practice litter management manual for Australian meat chicken farms collects this knowledge in one place.

The manual covers litter selection, management of litter in sheds including reuse, and options and use of spent litter following removal from sheds.

It has been structured so that users can access concise information and guidance on the best management practice for each process involving litter.

The manual can be downloaded from agrifutures.com.au/product/final-report-best-practice-litter-management-manual-for-australian-meat-chicken-farms/

Best practice litter management manual for Australian meat chicken farms

By Eugene McGahan, Nic Gould and Mark Dunlop
April 2021



The manual has been structured for users to access concise information and guidance on the best management practice for each process involving litter.

Shape-changing bacteria evade fowl cholera vaccines

THE access to open air and an outdoor lifestyle, which is a feature of free range chicken farming, may well be putting birds at a higher risk of an untimely death.

Researchers have long understood that despite their more socially acceptable existence, free range chickens are exposed to more disease agents when compared to caged chickens.

Recently, new research established that *Pasteurella multocida* – the bacterium that causes fowl cholera – is intuitive enough to switch on and off certain genes to outsmart vaccines, leaving free range chicken flocks exposed to the often devastating effects of the disease.

The finding from Dr Lida Omaleki, a research officer based at the University of Queensland, also points to the need for whole-genome sequencing to help chicken producers identify changes in bacterial strains and better protect their flocks.

The death of chickens is often the first sign that a flock is infected.

Chronic symptoms can include fever, loss of appetite, respiratory difficulties and a bluish discoloration of a bird's skin, wattle and comb.

Stresses such as fox or dingo attacks can also lower immunity levels, exposing the chicken to greater chance of infection.

The responsible bacteria *Pasteurella multocida* can also be carried and transferred to chickens from foxes, rodents and migrating birds.

Production levels in flocks for both meat and eggs are impacted after an infection of fowl cholera, which is less prevalent in chicken flocks held inside sheds because of the closely controlled environments and closer monitoring of animal health.

Dr Lida Omaleki's research at UQ is part of a Queensland Alliance for Agriculture and Food Innovation project co-funded by Australian Eggs and AgriFutures chicken meat program.

Using genomic analysis, she has discovered why some vaccines were not

proving effective against fowl cholera.

The most widely used form of vaccine to combat fowl cholera is a 'killed vaccine'.

Live bacteria are taken from the carcasses of an infected flock, grown in the laboratory and then killed, providing the basis for a vaccine to protect subsequent flocks on the same property.

Dr Omaleki said the killed bacteria used in the vaccines for each farm should have the exact outer structure as the strain that produced the disease on that farm.

However, genomic analysis has illustrated the ability of the bacterium to evade vaccine induced immunity by changing the outer sur-

face structure, including by switching genes on and off.

The research shows that traditional bacterial analysis techniques are not specific enough to identify genetic variations in bacteria strains.

Future analysis must use whole-genome sequencing to understand how *Pasteurella multocida* responds to vaccine pressure.

"If we can understand the specific strains in certain flocks, we will be able to better guide vaccination programs as well as identifying where the strains are coming from, and perhaps introduce improved biosecurity practices to protect the chicken flocks," Dr Omaleki said.

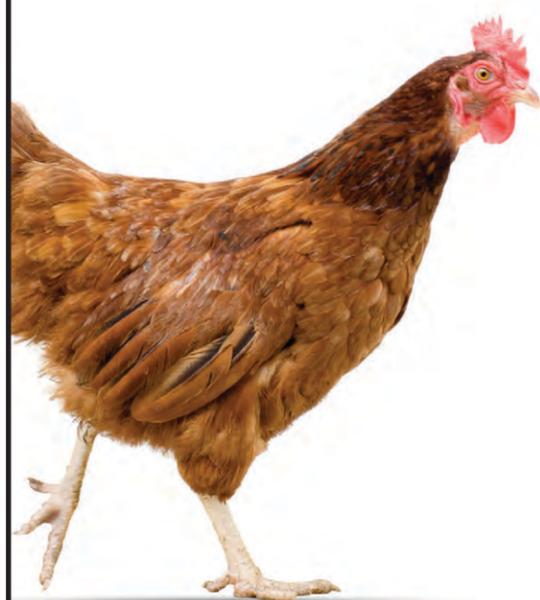
The findings from this three-year national project will allow Dr Omaleki and the research team at QAAFI to investigate ways to overcome this adaptive ability of *Pasteurella multocida* – a mechanism that the bacterium uses to undermine the effectiveness of vaccines.

A related pathogen, which causes middle ear infections in humans, has also been identified as having the ability to switch genes on and off, resulting in a change in bacterial outer structure.

Dr Omaleki's research findings have demonstrated the potential of a similar mechanism in *Pasteurella multocida* for the first time.



Dr Lida Omaleki is a research officer at Queensland Alliance for Agriculture and Food Innovation's Centre for Animal Science at the University of Queensland.



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NUTRITION SOLUTIONS TO ENHANCE PERFORMANCE

AJ Bush upgrades for safer improved operating efficiencies and reduced odours

AJ Bush & Sons (Manufactures) are one of Australia's largest east coast protein recovery provider operating rendering and manufacturing plants in NSW and Queensland.

The plants specialise in processing animal by-products for the meat butchery industry.

The NSW Riverstone plant's collection area, in addition to Sydney metro, ranges from Nowra in the south to Canberra, Dubbo and Bathurst inland, and up to Newcastle and Tamworth in the north.

The material collected is recycled into products used for livestock, pet food, aquaculture, fertiliser and biofuels.

AJ Bush's Riverstone plant has undergone numerous upgrades over the years, aligning with company goals of minimising waste, reducing the risk of pollution and odour, and continuous improvement in providing a safe work environment for employees.

As part of this program, plant engineer Nick Lawrence contacted Hydro Innovations for advice and assistance in replacing aging surface-floating aerators on their wastewater treatment system.

Nick wanted an aeration system that could be monitored and maintained from the lagoon banks – providing a safe environment that opera-

tors can attend to maintenance from – and keep the aeration system at peak operational efficiency.

Hydro Innovations proposed an Echo-Storm aeration system as an alternative to traditional surface-floating aerators, which have always been considered difficult and potentially hazardous to service or maintain.

These surface aerators are usually connected to lagoon bank by cables and generally require operators to 'paddle out' in a small boat to carry out any work.

It was emphasised that by using Echo-Storm aerators, asset owners could minimise workplace health and safety risks

and reduce maintenance and operating costs when compared with surface-floating aerators.

Echo-Storm aerators can produce the desired level of mixing and dissolved oxygen with all the equipment located on the banks of lagoons – not in or on them.

The rendering plant had been operating five floating units and when one of these failed it was decided to install an Echo-Storm aeration system to trial the effectiveness and operation of the system.

After only a month of operation, significant results were achieved, especially in reducing surface scum, maintaining required dissolved oxygen levels, improving operating efficiencies and contributing to lower odour levels.

The other obvious benefit of the newly installed 'bank-mounted' Echo-Storm aeration system is the ability to quickly, safely and easily inspect the system or make any adjustments to the opera-

tion of the equipment if required, ensuring a completely safe working environment for operators.

Nick was pleased with the results and is considering replacing the balance of the old system to bank-mounted aerators.

What is an Echo-Storm? An Echo-Storm is a device used to mix and aerate tanks, ponds and lagoons.

It uses Bernoulli's principle, whereby a low-pressure area is created by an accelerated fluid.

The Echo-Storm aerator is used in conjunction with a self-priming pump.

The pump draws water from the source and pumps it into the aerator.

Within the Echo-Storm aerator, there is an 'acceleration zone' where the pumped fluid is accelerated, creating a low-pressure area in the 'aspirating zone'.

Here it draws in atmospheric air at the rate of 2.2 times the rate of the fluid being pumped.

The air and water then passes into the 'mix-

ing and oxidation zone' where the wastewater and air are mixed under pressure.

The turbulent mixing facilitates the removal of substances with weak Henry's law solubility constants, such as carbon dioxide and volatile organic compounds.

It also oxidises sulphur containing molecules such as hydrogen sulphide and mercaptans for effective odour and corrosion control, as well as reducing the size of organic molecules.

The fluid – saturated

with dissolved oxygen – is then pumped back into the source.

Because of the nature of the system – using a self-priming pump – mixing and destratification is controlled by the positioning of the suction and discharge of the pump.

Water can therefore be drawn from anywhere and at any depth of the tank or lagoon and can be discharged anywhere at any depth.

For more information, visit hydroinnovations.com.au or call 02 9898 1800.



Echo-Storm aerators at AJ Bush & Sons (Manufactures) improved operating efficiencies and reduced odours.

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Overhead sprinkler systems in conjunction with evaporative cooling systems

MARK Dunlop has recently published a paper with his Queensland Department of Agriculture and Fisheries colleague Jim McAuley looking at the potential for overhead sprinkler systems to be used in conjunction with evaporative cooling systems.

An overhead sprinkler system that directly applies water onto meat chickens in tunnel ventilated houses was evaluated and compared with a conventional evaporative cooling pad system at two commercial farms in southeast Queensland.

The sprinkler system was used to reduce the use of evaporative cooling pads as the primary cooling system

but not replace evaporative cooling pads completely.

The sprinkler system used low water pressure and comprised evenly spaced sprinklers and a programmable controller.

Water was applied intermittently based on house temperature and a temperature program that was related to bird age.

The study was conducted over six sequential grow-outs during a one-year period.

Air temperature, relative humidity, litter moisture content, cooling water usage, live market weight and mortality were assessed during the study.

The effect of sprinklers on these measured parameters was complicated by

interactions with farm, batch, bird age and time of day.

In general, it was found that houses with combined sprinkler and evaporative cooling pad systems used less water, while having similar litter moisture content, live market weight, and mortality compared with control houses that were fitted with conventional evaporative cooling pads.

When evaporative cooling was required, sprinkler houses had warmer air temperature but lower relative humidity than the control houses.

Bird comfort due to the direct cooling effect of water evaporating off the birds was not directly as-

sessed during this study but was inferred from thermal camera images and from live weight and mortality data.

This was the first study in Australia involving this sprinkler system, and the researchers suggest that the sprinkler system design and operation may require some adaptation to better suit Australian poultry house design and climatic conditions, including the need for additional sprinklers to improve coverage, lower set-point temperatures and altering sprinkler spacing to suit ceiling baffle curtains, if fitted.

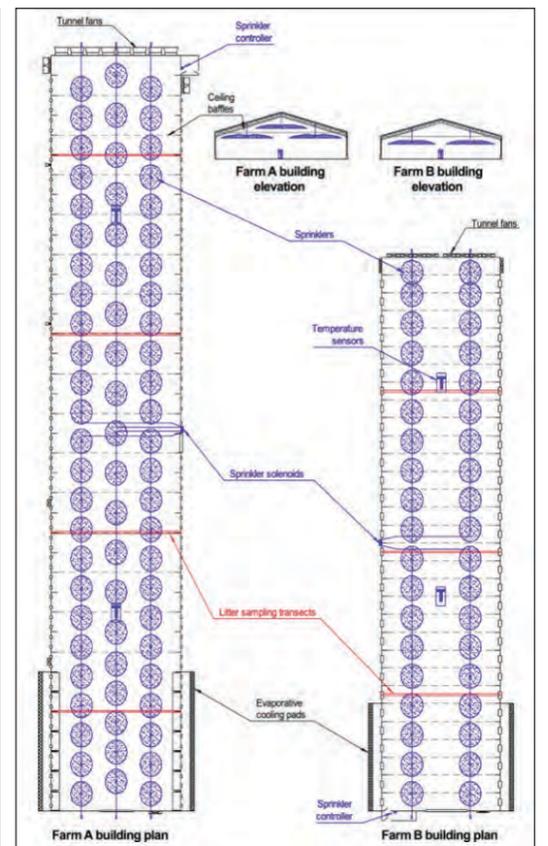
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Schematic of poultry houses, sprinkler system layouts and litter sampling positions used in this study – circles surrounding the sprinklers are not intended to show spray patterns, coverage or overlap, and building length:width ratio is drawn at 1:2.

Using natural fungi to control lesser mealworm in Australian chicken sheds

NEW research supported by AgriFutures Australia is optimising the use of an alternative control measure for the lesser mealworm based on live fungi.

The lesser mealworm, also known as darkling beetle, is a common insect-pest to the chicken meat industry, due to the damage it can cause to the structure of chicken sheds through tunnelling and its ability to carry pathogens.

Lesser mealworms are often found in poultry production systems where deep litter and open floor housing provide optimal survival and reproductive conditions.

Following on from preliminary research that developed a proof-of-concept for non-toxic fungus-based pesticides – called mycopesticides – to control lesser mealworm populations, new research is underway to optimise the use of mycopesticides for this purpose.

Leading the current research project is Queensland's Department of Agriculture and Fisheries technical officer Steven Rice.

"What we're doing now is testing the mycopesticide under various conditions, including different litter use practices and different floor types in meat chicken sheds," Mr Rice said.

"We're conducting field trials, currently at two farms in the Caboolture area, to compare the mycopesticide in full litter replacement and partial litter reuse systems.

"We're running the trials through the seasons so we can compare the fungi's impact on the lesser mealworm populations in winter to what happens in warmer months.

"The initial results look promising.

"The mycopesticide appears to reduce lesser mealworm populations under both litter systems, but there's more research to be done."

Approved insecticides are currently used to control the lesser mealworm pest.

However, insecticides potentially leave residues

in the litter and the lesser mealworm builds up resistance to them over time.

An additional objective of this latest research project is to test the potential of using the mycopesticide in conjunction with insecticides to reduce overall chemical usage and maximise control of lesser mealworm populations.

"We're doing preliminary laboratory trials to see whether the mycopesticide can work together with the insecticides currently approved for use to provide a better overall control effect," Mr Rice said.

"We hope that the combined results of the field and laboratory work will attract a commercial partner interested in producing a mycopesticide that will be effective for use against lesser mealworm and have a low environmental impact."

AgriFutures chicken meat program research manager Annie Lane said the development of an effective fungal-based control for the lesser mealworm has the potential to significantly benefit the Australian chicken meat industry.

"With this research we have the chance to not only

optimise a new natural control method for lesser mealworm but also increase sustainable practices in chicken meat production," Ms Lane said.

"As consumers want more information about the provenance of their food, it's more important than ever to explore natural options for pest control and maintain the consumer confidence that makes chicken the number one consumed meat in Australia."

Read more about this project at agrifutures.com.au/rural-industries/chicken-meat/



Queensland's Department of Agriculture and Fisheries technical officer Steven Rice is leading the research into optimising the use of an alternative control measure for the lesser mealworm based on live fungi.



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