

International Hatchery Practice

Volume 31 Number 4 (2017)

Practical information for better breeding and hatching

UNIFORMITY

The importance of grading for better flock performance

INCUBATION

The management of hatching eggs during hot weather

BIOSECURITY

Effective ventilation and a tight hatch window

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fertilethoughts

Have you ever seriously used the 'what if' scenario when evaluating possible strategies for improvement and setting goals? Let us consider a breeder-hatchery division in a fully integrated broiler company setting two million eggs a week.

What happens if we improve fertility by 0.1, 0.5 or 1.0%? In simple terms we can get 2,000, 10,000 or 20,000 more chicks per week. If we do the same with hatchability of, for example, 90% we can get another 1,800, 9,000 or 18,000 chicks. If we can achieve both improvements this becomes 3,800, 19,000 or 38,000 chicks or almost 2,000,000 more chicks a year!

If we look at breed standards and find that we are more than a few percentage points behind on these yardsticks, perhaps we could reap even greater rewards!

The danger with this is that we start to consider capital projects that should earn these figures for us. So, perhaps now is the time to ask whether this question is realistic?

The answer, in theory, is 'yes' but, in practice, it is 'no'. However, what these numbers do show us is the

type of return we can get on a 1.0% improvement. With big numbers, a small percentage improvement is another big number. This is known as the profits of size, which is the opposite of economies of scale.

In other words, what appears to be relatively minor at one level can soon multiply into something of commercial significance over time and the number of birds or eggs it can be applied to.

Within nature there is always biological variation in our measurements, or the figures derived from them, because so many factors can impinge on the bird and ultimately affect our measurement's value.

We are not manufacturing nuts and bolts – we are helping nature produce eggs, chicks and ultimately meat. This biological variance is something that accountants and managers without a biological or agricultural background find hard to fully appreciate. We need to adopt an approach that errs slightly on the side of overproduction. That then gives us the challenge of covering its costs. Unlike our friends in processing, we can not put extra chicks into cold storage! ■

Cover Picture:

A challenging start!
(photo courtesy of Hybrid Turkeys)



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worldfocus

An executive summary of key international issues

France

Some light at the end of the tunnel?

In Europe over the last 6-12 months France has been the country that has been most affected by HPAI. The main area is in the southwest, but sporadic cases are occurring across the country. French endeavours, including the depopulation of susceptible flocks in the main HPAI high risk areas, now appears to have met with a degree of success. We understand that outdoor production and flocks of commercial ducks are involved, giving the outbreaks in the southwest of France some degree of uniqueness and a possible reason for so many flocks being involved in that part of France. New poultry outbreaks of HPAI H5N8 have recently been reported to OIE in Austria, Germany and Italy.

Australia

Do not always blame chickens for the salmonella!

Just recently Australia had an outbreak of salmonella food poisoning associated with the consumption of lettuce leaves. There were 128 cases, of which 10 were laboratory confirmed. This is not the first time that this issue has been raised. A study in the USA concluded that 'traditionally, most cases of salmonella were thought to originate from red meat and poultry meat products. However, an increasing number of cases are now being caused by consumers eating other contaminated products'. These other products have included lettuce, tomatoes, melons and soft cheeses. In practice, this means that when we receive a customer complaint regarding salmonella, we should not just investigate our own production, but we should also point out that other sources need to be considered.

Biosecurity

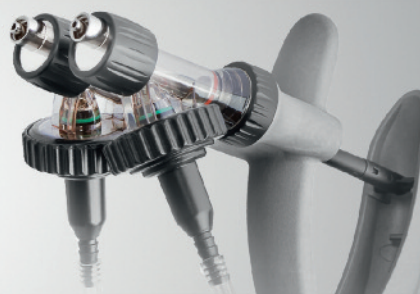
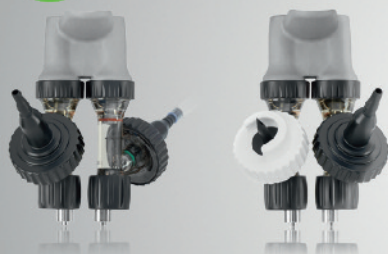
Where next with education?

When it comes to biosecurity training, nearly everyone is a self-appointed expert who thinks their current knowledge/expertise on the subject is more than adequate for their needs. Therefore, management have the challenge of persuading staff that this is not the case and that what independent experts have to say on the subject is very pertinent and relevant for the company. In addition, why do we pay so little attention to the science behind the subject? There is quite a bit of science behind biosecurity. Could we make biosecurity much more appealing to younger managers and staff if we brought more science into our standard operating procedures?

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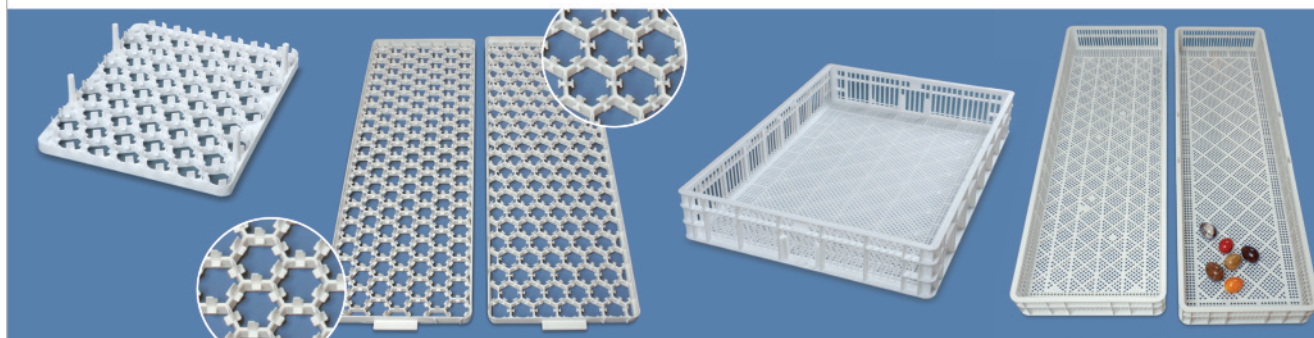


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The importance of grading for better flock performance

Grading, the separation of broiler breeder females into weight dependent sub-populations to improve total flock uniformity, is not a new concept. Many parts of Western Europe have been managing this process regularly since the early 1990s.

by Michael Longley, Aviagen.
www.aviagen.com

As the poultry industry, and in particular the chicken industry, has expanded, managers have looked in increasing detail as to how they can improve hatching egg and chick output and have found that a more uniform flock will have optimal performance and welfare.

- A well graded flock with minimal variation in body weight will be:
- More predictable in response.
 - More persistent in production.
 - Easier to manage.
 - More profitable.

This article covers the key points of why grading is important, how grading should be managed, and the challenges that may be experienced.

Why is grading important?

The biological traits of any animal population exhibit natural variation. The normal distribution of that variation is bell shaped. For example,



A well graded population with birds separated into different pens according to body weight, stocking density, feeder and drinker availability.

when looking at the distribution of weight within a population of animals of the same age, there will be a large range of weights within the population, but the majority of individuals will be expected to fall within close proximity to the mean body weight with the number of individuals at the extremes being low (Fig. 1).

During grading the 'average' birds (those that fall within a given range of the mean body weight) are separated from those birds that are

heavy or light compared to the mean (those birds that are at the extremes of the population). The light and heavy birds should be placed into separate pens to allow closer management of their body weights.

The objective is to manage the light and heavy populations by con-

trolling the feed increments and feed levels of each weight category so that they can be brought back to the mean body weight of the flock (the 'average' population) by the end of the rearing period (19-22 weeks of age). It is important to state at this stage that grading is about management of the whole population, to reduce the variability within the flock by point of lay.

- The more variable a flock, the more variable the:
- Reproductive performance.
 - Individual nutrient requirements.
 - Liveability.

How should grading be managed?

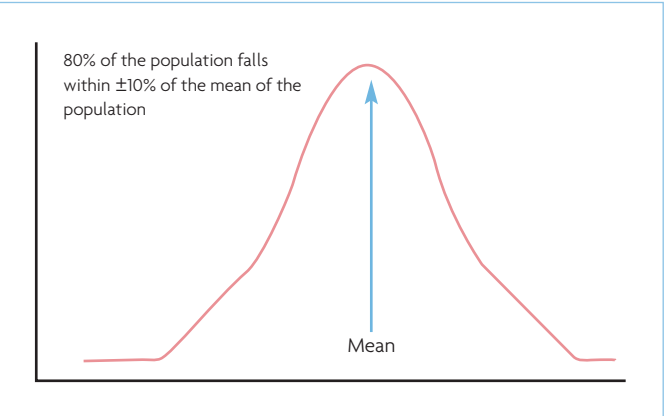
Grading should be done between 28 and 35 days of age. A representative sample of the flock must be weighed using an accurate set of either dial or electronic scales.

A minimum of 5% of the population or 100 birds, whichever is greater, must be weighed – taking birds from at least three different sample points within each pen.

The variability of body weight within the population should then be calculated.

Continued on page 9

Fig. 1. Normal distribution of a population.



CV%	Uniformity (% age birds falling within $\pm 10\%$ of mean)	Grade required
10	80	2-way
12-14	65-75	3-way
>14	<65	3-way

Table 1. Grading methodology based on variability of body weight within a flock.

Table 2. Grading cut-off points based on flock CV%.

Flock uniformity CV%	Grade	Population after grading (%)		
		Light	Average	Heavy
10	2-way	20	80 (78-82)	0
12-14	3-way	22-25	70 (66-73)	5-9
>14	3-way	28-30	58 (55-60)	12-15



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Continued from page 7

There are two ways to calculate how variable in body weight a flock is:

● **Coefficient of variation (CV%).** CV% is the standard deviation divided by the mean body weight expressed as a percentage. It shows how much variation from the mean there is within a flock. A high CV% indicates that there is a lot of variation within the flock and that body weights are spread over a large range. A low CV% indicates that the spread of body weights around the mean within a population is small i.e. the flock is less variable.

● Uniformity

Uniformity shows the percentage of the flock that falls within a given range of the mean body weight of a flock ($\pm 10\%$ of the mean is a good range to use to optimise subsequent flock uniformity).

If a high percentage of the population falls within this range it indicates a more uniform flock. If a low percentage of the flock falls within this range it indicates a less uniform flock with a greater spread of body weights.

After flock CV% and/or uniformity has been calculated the number of populations into which the flock should be graded can be determined.

A less uniform flock (low uniformity or high CV%) will need to be split into three populations (light, average and heavy), while a more uniform flock may only require a 2-way grade (light and average).

Table 1 gives an indication of how many populations a flock should be graded into depending on the variability in body weight within the flock.

The weight categories that the birds are graded into depends upon the method chosen by the producer to measure flock variation. For those using the uniformity calculation, all birds that are more than 10% lighter than the mean should be placed into a separate 'light' pen and all birds more than 10% heavier than the mean should be placed in a 'heavy' separate pen (if using $\pm 10\%$ as your range).

If CV% is to be used, then the cut

	Rearing (0-15 weeks)	Lay (16 weeks – depletion)
Automatic circular or trough drinkers	1.5cm per bird	2.5cm per bird
Nipples	One per every 8-12 birds	One per every 6-10 birds
Cups	One per every 20-30 birds	One per every 15-20 birds

Table 4. Recommended drinking space for females.

off weights for light, average and heavy populations should be as given in Table 2.

When moving birds into their graded populations/pens, it is important to remember that bird stocking densities of 4-7 birds/m² and feeder and drinker space must be adhered to (Tables 3 and 4).

In particular, it is important to make sure feeder and drinker space is correct for the number of birds in the pen. This is more easily managed where adjustable penning is used as pen sizes can be increased or decreased to accommodate bird numbers.

Failure to maintain stocking densities and to appropriately match feeding and drinking space will lead to increased variation within each pen as birds will not be able to exhibit correct feeding and drinking behaviour.

Once graded into separate populations, birds should remain in the same pen until they have reached target body weight for age. Control of body weight in graded populations is done by adjusting feed levels and weekly feed increments.

General management strategies used to do this are:

- Overweight (heavy) birds may need smaller weekly feed increments, feed increases delayed or feed levels held for a maximum of two weeks rather than increased weekly.
- Underweight (light) birds may need larger weekly feed increments, feed increases brought forward and/or more than one increment per week.

If by 63-70 days, the graded populations have still not reached the desired body weight and/or variation within the flock has become worse, it may be necessary to regrade. Birds that are still over or underweight by this age should con-

tinue to be managed back to the target weight by 105 days.

The challenges of grading

Grading can be, and often is, seen as a challenging and difficult task, which seems like a lot of work for little return. There are a number of reasons why many managers do not attempt a thorough and detailed grade of their flocks:

- More labour may be needed to help during the process which increases costs.
- Moving birds between houses and pens is potentially stressful for the birds (but this should be balanced against the long term benefits of grading for flock performance and welfare).
- Configuring feeders and drinkers to pen sizes and bird numbers can be a difficult task.
- Adjusting feed amounts according to the number of birds in smaller and larger pens requires careful management and attention to detail.
- Managing feed times without each pen having its own feeding system, creates many difficulties when trying to give extra feed to a light population of birds housed in the same house as a heavy and/or average population of birds.

● Vaccinating work may be made more complicated with a number of different pens within a house.

● Some facilities may not have the availability of adjustable penning to allow accurate graded numbers of each weight category by making pens larger or smaller depending on the size of the graded population.

This may lead to a higher level of variation than wanted as weight ranges within each pen may need to be wider to accommodate stocking densities.

Each of the challenges noted above can be managed in a logical and practical way. Moving birds from one pen or house to another with minimum stress is overcome by ensuring that anyone who is handling birds is trained appropriately and is using the right equipment.

Adjusting feed amounts for each pen without making a mistake may be done by simple spreadsheet use and recording what was fed, clearly and concisely. Vaccination may actually become easier as smaller pens are easier to manage for manual tasks.

Conclusion

Grading of a flock is increased work for the manager and does require extra effort and input. But, if managed well, the benefits of grading to improve flock uniformity and welfare are greater than any perceived disadvantages (Table 5).

If at the end of the rearing stage, a flock has a CV <8% and a uniformity >85%, then the grading process has been managed well and a flock will have been produced with much greater production potential, that is easier to manage, more predictable, more persistent and more profitable. ■

Table 3. Recommended female feeding space.

Age (days)	Feeding space	
	Track feeder (cm)	Pan feeder (cm)
0-35	5	4
36-70	10	8
71-105	15	10

Table 5. The impact of increasing variability/reducing uniformity of a breeder flock.

CV%	Effect
<8	Predictable onset Higher sustained peak Better persistency Lower mortality Easier to manage
8-10	Becoming less predictable onset after initial stimulation High peak Poorer persistency Higher mortality Harder to manage
10-13	Unpredictable onset – possible eggs before initial stimulation Lower peak Poorer persistency Higher mortality Difficult to manage
>14	Very difficult to manage at every stage

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The management of hatching eggs during hot weather

Summer weather brings a high level of complexity to managing eggs, from production through to hatch, due to increases in temperature and humidity.

by Dr Juan Lopez,
Hatchery Specialist,
Hybrid Turkeys, Canada.
www.hybridturkeys.com

The first successful artificial hatch of eggs dates back hundreds of years and occurred in ancient Egypt, where the climate was that of a desert; hot and dry.

They understood that the egg shell temperature had a direct relation to the quality and survival of an embryo. The hatchery workers would measure the temperature of the egg shells by using their eyelids, as this was considered the most sensitive part of the body for temperature evaluation. They also counted on the fact that the dry desert weather meant low humidity in the air.

Nowadays, in many geographic areas around the world, the summer season presents two complex environmental factors which jeopardise proper development of the embryo: high temperature and high humidity. With some effort, hatcheries experiencing these factors

can keep the shell temperature in a good range (99.4-100°F/37.4-37.8°C) but in many cases, the high humidity in the air is more difficult to control.

Egg quality begins on the farm

The effects of high temperature on an embryo begin before an egg is laid. Hot weather can cause effects to the physiology of laying hens that can also impact the eggs they will lay.

For example, laying hens tend to reduce feed intake during extreme heat, which means a reduction in the amount of calcium they consume. Calcium is an important component of egg shells.

In addition, hens pant as a way to cool themselves. This panting causes a lowering of CO₂ in the blood and produces respiratory alkalosis.

Alkalosis means the pH of the blood becomes alkaline and the availability of calcium for the eggshell is reduced.

This also causes increased calcium carbonate loss through the kidney making the issue that much more complex.

During the hot and humid season the likelihood that eggs will sweat, during transportation or movements inside the hatchery, increases.

It is crucial to avoid sweating as moisture

on the shell surface provides an ideal environment for the growth of pathogens and facilitates the penetration of them through the pores of the shell.

Humidity and moisture loss

Proper moisture loss, or egg weight loss during incubation is important as it creates an adequate air cell inside the egg.

This air cell must be large enough, at internal pipping, for lung ventilation to begin.

During incubation, the amount of moisture loss is controlled by the difference in water vapour pressure over the egg shell and the conductance of the egg shell and its membranes.

It is not important at which moment during incubation the egg loses its weight, as long as the air cell reaches an adequate size before the embryo internally pips.

Several studies have shown that hatchability is optimal when weight loss of a turkey egg is between 10 and 14%.

If the humidity in the air of the hatchery is high, the eggs cannot lose enough water. Embryonic mortality increases when water loss is lower than 9.1%.

The greater the water loss through the shell, the larger the airspace.

Continued on page 12

The greater the water loss through the shell, the larger the airspace. If the air space is too small, the poult's respiration will be affected and the young bird will have difficulty breaking out of the shell (below left). The lack of adequate airspace can also contribute to navel wicks (centre) or the presence of leg damage; such as red hocks (below right).



Continued from page 11

If the air space is too small, the poult's respiration will be affected and the young bird will have difficulty breaking out of the shell.

The lack of adequate airspace can also contribute to navel wicks or the presence of leg damage; such as red hocks.

In addition to an increase in pipped, non-hatched embryos and culls, it has been reported that high relative humidity (75-80%) can increase mortality during the first 10 days of incubation.

How to minimise the impact of summer weather

● At the farm

- Check feed composition to ensure the breeder hens receive an appropriate supply of nutrients.
- Help the birds to focus on feed and water consumption by keeping the nests closed for at least 1-2 hours after lights come on and 1-2 hours prior to lights going off.
- Ensure adequate air speed is directed at the birds for an appropriate cooling effect.
 - Whether using tunnel or natural ventilation with circulating fans, it is recommended to have air speed of 600ft/minute or 3m/second.

- Collect the eggs frequently from the nest and store around 60.8°F/16°C.

● During transport

- Confirm that the temperature, in the truck during transport, is a little higher or the same as in the hatchery to avoid egg sweating.
- Minimise any temperature effects from the outside environment by getting the truck as close as possible to the reception door at the hatchery upon delivery.

● At the hatchery

- Pre-warm eggs gradually.
- Check the egg shell temperature often during incubation. Remember that inadequate feed intake of the hens can alter the egg shell conductance.
- Decrease the relative humidity of the air that you bring inside the hatchery.
- If using a single stage incubator, open the dampers early to facilitate more moisture loss.
- Do not increase air speed with the intention of increasing the moisture loss. This will not work and rather could result in other negative effects.
- Monitor the hatch window closely and be aware that small poults have higher surface to body weight ratios, and are therefore more easily dehydrated than larger poults.

– Dehydration has been reported to be associated with the higher mortality of poults from young breeders.

- After hatch, the rectal temperature of the poult should be between 103-104°F/39.4-40.0°C.

● Upon placement on the farm

- Check that the floor and the air of the barn at placement are adequate.
 - Chilled poults huddle together to keep warm and do not eat and drink normally.
 - Blood samples taken on farm show an increased packed-cell volume in chilled birds, compared with birds brooded at warm temperatures.

Summary

As you can see there are external factors, especially during the summer season, that can impact the quality of a hatch. Heat and humidity are difficult to manage and if you let it get away from you, it can negatively impact the results of your hatch.

Measuring egg shell temperature during incubation gives a good indication of embryo development.

It is of utmost importance that if egg shell temperature and humidity are not optimal, that you make the necessary adjustments to ensure you get the best possible results every time. ■

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Effective ventilation and a tight hatch window is the key to success

When planning a new hatchery biosecurity is an important consideration. The prevailing wind direction will dictate the hatchery's orientation, room and ventilation layout, drainage, personnel and product flows.

by Ken Baker,
Managing Director,
EmTech Hatchery Systems, UK.
www.emtech-systems.com

Everything should always travel in a 'clean to dirty' – eggs to chicks – direction. Clean, fresh air will be drawn from the same end of the hatchery as the egg delivery dock. Drainage will always run away from the egg side towards chick despatch. Personnel areas should be situated centrally so that 'clean' and 'dirty' workers can be more easily separated and lower the risk of cross contamination.

Once this 'clean to dirty' concept has been established and strictly adhered to, you have given yourself every chance of maintaining the highest levels of biosecurity in your hatchery.

Fresh air can be filtered and UV treated before entering the main duct and air handling units that are dedicated to specific rooms – setters/hatchers/processing etc. Ventilation pressure cascades should always ensure that air can be moved from room to room in the clean to dirty direction. For the

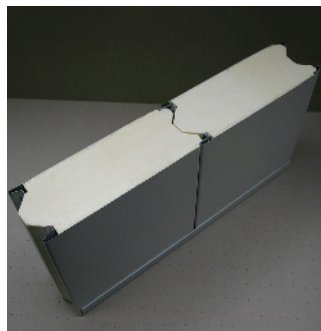
incubation rooms, modern day systems utilise automated pressure control that will not only ensure the correct air exchange for the setters and hatchers, but also that the pressure cascade is always respected. A small amount of air relief directly from the room to the exhaust plenum will also ensure an ongoing air exchange within each room, while always maintaining the correct pressure, temperature and humidity.

For modern (single-stage) hatcheries to operate at their full potential it is essential that the correct temperature, humidity and air pressures are maintained 365 days per year, regardless of climate and ambient conditions. Not only does this guarantee homogeneity of chick quality and maximum hatchability but also ensures that biosecurity is not compromised.

HVAC systems

Heating, Ventilation and Air Conditioning (HVAC) systems are generally recommended for new hatcheries throughout the world.

Hatchery ventilation systems should be designed for 100% fresh air supply and should not recycle room, or exhaust, air from setters and hatchers. While such a practice can (and does) help to maintain the moisture content of the air, it is extremely bad practice when the biosecurity of a hatchery is considered. The costs of HVAC can, to a lesser or greater extent, be offset by



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heat recovery systems especially in the temperate zones where animal heat from developing embryos can be reclaimed from the setters' warmed water return lines.

Sophisticated incubator control systems, such as EmTech's Eclipse, can ensure that the correct temperature and humidity is very accurately maintained avoiding embryonic stress with expensive overshoots and uneven weight loss. Indeed, if good, consistent results and premium quality chicks can be guaranteed the case for HVAC is further advanced.

Often in the past, hatchery ventilation was treated as secondary to the incubator system that was being employed. Some incubator systems were very forgiving and would always produce average chicks using the most rudimentary ventilation.

Some systems required huge amounts of air to be rushed through the setters taking with it all that expensive heat, humidity and CO₂.

Some systems often struggled to get enough air to the extremities of the cabinet resulting in a wide hatch window and temperature band width.

With the advent of single-stage incubation and latterly the discovery that CO₂ is, in fact, beneficial in the early stages of incubation, ventilation became not just an expense but an important tool for achieving the highest quality chicks consistently and in the greatest numbers.

It was also soon discovered through regular monitoring of hatchery bacterial and fungal levels

that biosecurity was easier to control with a 100% fresh air HVAC system and that outbreaks of disease were less common. Improved environmental conditions in chick processing rooms – especially when chicks required additional processing, such as vaccination and sexing, also contributed, as did the improved conditions for hatchery staff.

With HVAC, incubation systems (especially single-stage) can always run to their full potential by the accurately controlled delivery of optimal air volumes at the correct temperature and humidity levels for every stage of the embryonic development, 24/7/365.

While the ability to provide humidification of the air supply to setter and hatcher rooms is very important for colder climates, conversely, yet equally importantly, dehumidification is essential for optimal performance and optimal chick quality for hatcheries situated in tropical climates such as South East Asia, for example.

EmTech firmly believes that the tighter the hatch window the better the quantity, quality and liveability of the chicks. Forget the gimmicks, a tight hatch window is the best indicator that you have got it right – simple as that.

There is also a benefit to biosecurity if chicks hatch in a tight bandwidth, faecal matter, meconium and other potential contaminants have less time to endanger the hatchery environment.

It surely makes sense that if all of the chicks hatch around the same time they have all been exposed to exactly the same environmental conditions. Conversely, if the hatch window is wide it is a good indicator that the conditions within the setter vary considerably. This can be due to many factors but usually it is the lack of significant air movement in the extremities of the setter cabinet. This causes hot spots resulting in an accelerated development and exhausted, poorly conditioned, chicks. Or, conversely, cooler pockets of air, resulting in delayed embryonic development, insufficient weight loss and a prolonged,

Continued on page 15

Hatchery ventilation systems should be designed for 100% fresh air supply and not recycle room, or exhaust, air from setters and hatchers.





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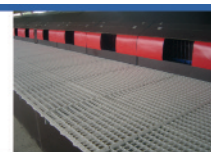
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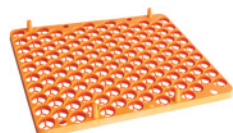


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-First quality products

- **Big Chick Box (4 Comp.)**
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Capacity: 100 chicks



- **Quail and partridge Setter Tray 129**
Dms: 31 x 38 x 2 h



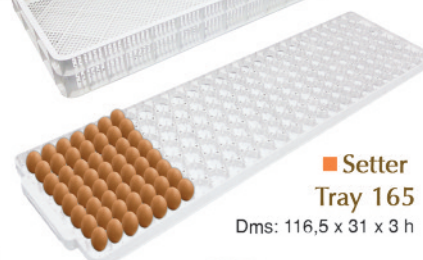
- **Hatcher Basket 82**
Dms: 59,5 x 39,5 x 16,5h



- **Hatcher Basket 165**
Dms: 122 x 42 x 12h



- **Setter Tray 165**
Dms: 116,5 x 31 x 3 h



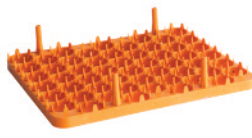
- **Hatcher Basket 150**
Dms: 80 x 56,5 x 11,5 h



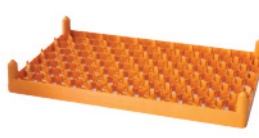
- **Chick Box (2 Comp.)**
Dms: 60 X 40 x 12 h
Capacity: 80 chicks



- **Setter Tray 54**
Dms: 38 x 31 x 7,5 h



- **Setter Tray 82**
Dms: 53 x 34 x 7,5 h



- **Setter Tray 150**
Dms: 73,5 x 50,5 x 4h



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Incubation system	Flock age	Hatchery cull rate (%)	First week mortality (%)	Total mortality at kill (%)	Bird weight week 1	Final weight	Results compared to standard (%)	FCR	Standard FCR
EmTech PrimoTech PT12	34 weeks	0.36	0.45	2.8	0.181	2.437	106	1.54	1.617
Competitor's single-stage system	34 weeks	0.48	0.73	3.5	0.177	2.429	105.6	1.57	1.617

Table 1. Results for a 34 week old flock comparing EmTech with an existing single stage setting system at BroMargo, Margonin Hatchery, Poland.

Continued from page 13

dragged out hatch which will stress these and the earlier hatched chicks.

There are, of course, other reasons why the hatch timing and hatch window can be wider (too early/late setting, long storage of eggs etc) but providing the eggs are correctly prepared, EmTech are confident enough to guarantee that for the PrimoTech single stage setter, the air temperature will be no more than $\pm 0.35^{\circ}\text{C}$ throughout the entire setter cabinet – top, bottom, centre and corners. This is certainly confirmed by recent hatchability and hatch window data gained from hatcheries in the UK and Poland.

As shown in Table 1, there was a 0.9% improvement of hatchability on a prime (34 week) flock. This, coupled with distinctly lower mortality and cull rates and improved bird weight, is testament that a tighter hatch window and improved ventilation can significantly improve performance and profitability.

EmTech has conducted many trials using thermal imaging to try and understand why there are temperature fluctuations within the setter and how to keep them to a minimum. Often it is because the paddle and impeller fans provide air movement in a regular pattern that can create static air pockets that are bypassed. We have also seen that fans are not powerful enough to penetrate several banks of eggs in trolleys especially when turned against the air flow. We also found that setter cabinets, especially those that are constructed with a framework of highly conductive aluminium extrusions can lose heat rapidly via these thermal bridges.

The results of the thermal images convinced us that we needed to rethink the design of our cabinets and now we use an interlocking slip jointed system that does not require aluminium supports.

We are also convinced that having just one double trolley located each side of the central fans provides the best opportunity for the air to consistently reach every single egg, creating a stable, homogenous environment that is required to achieve the best possible chicks.

What about multistage incubation?

It is often stated that a multistage setter environment can never really compare to a single stage environment for performance and chick quality and that a multistage operation is a compromise in respect to subjecting the entire egg mass (of six different ages of eggs) to the same conditions. However, again, just like a single stage setter, optimum performance and chick quality is very dependent on very good internal air flow distribution throughout the entire setter cabinet.

There is no better test of a setter's ability to transfer heat than that of egg shell temperature measurement and thermal imaging is a great way to check a setter's thermal characteristics. For optimum performance, egg shell temperatures should ideally be within a range of $37.8\text{--}38.3^{\circ}\text{C}$ but this is very much dependent on the setter's ability to create a good airflow and to efficiently transfer heat from embryos at the later stages of incubation to the

embryos during the early stages of incubation, with the excess heat removed by the cooling system.

The thermal imaging comparisons that EmTech has conducted against a similar design and older multistage setter were extremely conclusive.

With embryos at 18 days of incubation, the older setter shows maximum egg shell temperatures of 39.5°C and 39.3°C . Whereas for our NovaTech Setter, measurements from the same trolley and tray positions show maximum egg shell temperatures of 38.3°C and 38.2°C .

That is 1.2°C cooler and, consequently, produces better chick uniformity and chick quality.

At the opposite end of the scale, with the embryos at only one day of incubation, the older setter shows an average egg shell temperature of 36.3°C and 36.6°C , while for the NovaTech Setter, measurements from the same trolley and tray positions show average egg shell temperatures of 36.7°C and 37.5°C . That is 1.1°C warmer which ultimately compressed the hatch window for improved chick uniformity and quality. The temperature set-point for both the older multistage trolley setter and NovaTech setters was 37.3°C .

Enhanced ventilation technology, coupled with precise control, is the key to ensuring that every single egg receives the correct environmental conditions within the setter cabinet.

For single stage setters, EmTech has developed reverse paddle fan technology and variable fan-speed as a standard feature of their stage programming procedure.

Air within the setter is now significantly disturbed driving it into areas that were previously hard to pene-

trate. Precise control of air exchange post seven days of incubation, in control of CO_2 and humidity is also a major factor in ensuring that chicks hatch consistently after achieving optimum development and weight loss.

In multistage systems, highly efficient impeller fans and a redesigned fan-board now provides over 25% greater average air flow through the egg mass resulting in greater heat transfer and a tighter temperature bandwidth. The improved airflow also creates a greater air pressure at the machine floor giving higher air velocities throughout the lower egg racks.

Conclusion

To conclude, a good ventilation system should be location specific and accurately sized to achieve a tight hatch window and the highest levels of biosecurity.

Intelligent incubator design coupled with sophisticated control systems will produce more and better conditioned chicks that will perform well on farm.

EmTech is a young company but probably has more hatchery industry experience than any incubator supplier operating in the world today.

We have questioned every aspect of incubator and ventilation system design and created new systems that have taken the best from the past coupled with the latest mechanical and digital technology to supply systems that not only work very well but are reliable, easy to operate and based on sound incubation principles. ■

Fig. 1. Day 7. Thermal image from the new NovaTech Setter, Trolley 7, Bottom, showing a minimum temperature of 36.9°C , an average temperature of 37.2°C and a maximum temperature of 37.5°C .

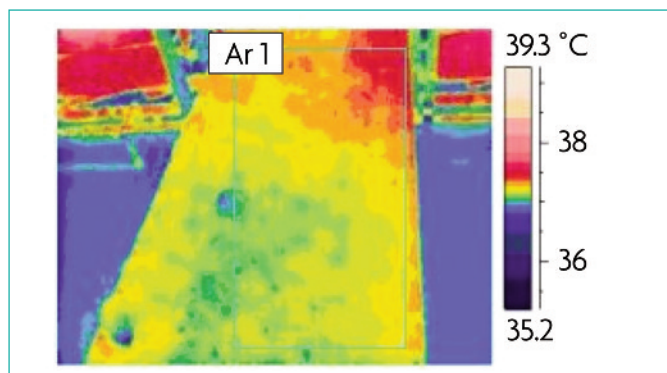
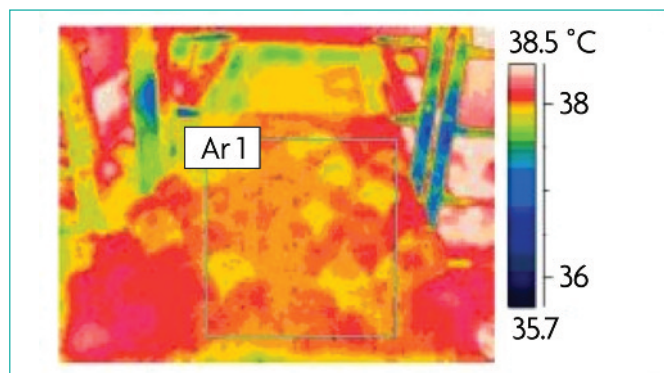


Fig. 2. Day 18. Thermal image from the new NovaTech Setter, Trolley 3, Top. Note that the temperatures are within the ideal range of between 37.8°C and 38.3°C .



Avian influenza forum reflects on vaccination strategies

Boehringer Ingelheim's new poultry vaccines group, which was formed by merging their poultry vaccine interests with those of the former Merial, recently held a two day Avian Influenza Forum in Athens, Greece that was attended by delegates from some 30 countries.

Dr Haitham Malkawi, Head of Avian Emerging Markets for Boehringer Ingelheim Animal Health summarised the current situation. "The presence and threat of avian influenza continues to be commonplace throughout many countries, with devastating financial effects. "New flu outbreaks will continue to occur unless there is a significant shift in control strategy approaches. "Vaccination is a critical tool in the strategic implementation of AI programs, which should also include biosecurity, sanitation, diagnostics and monitoring, through education, collaboration with our customers,

Table 1. Approximate avian influenza H5N1 vaccine usage in the four endemic countries.

Country	Vaccine usage (% of total)
China	91.0
Egypt	4.7
Indonesia	2.3
Vietnam	1.4

and the application of the best available strategies." International Hatchery Practice attended the Forum and this article reflects on some of the key papers on vaccination.

HPAI outbreaks

David Swayne, from the National Poultry Research Centre in the USA, highlighted that since 1959 there have been 42 epizootics of highly pathogenic avian influenza or HPAI. Of these, 35 were geographically limited, usually in one country, and they were eliminated by using a stamping out policy (see inset far right). The epizootic which emerged in 1996 in Guangdong, China caused deaths in wild birds, poultry and humans and spread to more than 70 countries in four continents. This changed our whole perspective on HPAI. In fact, it merits being called a panzootic. Avian influenza viruses are a diverse group divided into 144 subtypes based on different combinations of 16 haemagglutinin (H) and nine neuraminidase (N) subtypes and two pathotypes – HPAI and LPAI. David highlighted how most HPAI were eradicated using the traditional approach of stamping out, but for five epizootics vaccination had been added as an additional interim control (mainly in China).

Lesson learnt	Comments
Rapid diagnosis	Specific 2.3.4.4 RRT-PCR accelerated speed and accuracy of diagnosis
Indemnification	Payment based on live bird numbers encouraged early reporting
Rapid depopulation	Whole flock kills
Safe disposal	By methods that contain the virus
Public veterinary infrastructure	Needs to be reinvigorated
Partnerships	These are important egg government-academia-industry
Surveillance methods (poultry and wild birds)	Emphasis on polling and statistical methods
Emergency response	Planning and exercise to go across state borders
Poultry trade	Better regionalisation

Table 2. Lessons learnt from the 2014-2015 USA outbreak.

However, the vast majority of vaccines have been used in all poultry in four H5N1 HPAI enzootic countries (see Table 1). In these four countries vaccine was used after H5N1 HPAI became endemic and did not create endemic situations. The remaining vaccine (<1.0%) was used in 11 countries in a risk based approach. Some 95.5% of all vaccines used were inactivated and

4.5% were live recombinant vaccines. The lessons learnt during 2014-2015 in the USA are summarised in Table 2.

Cross-protection vaccination studies

Stéphane Lemiére from Boehringer Ingelheim then discussed some

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recent cross-protection vaccination studies.

He highlighted how avian influenza outbreaks are originated by different haemagglutinin (H) serotype viruses, including the H5 and H7 that are involved in HPAI.

All others, including the commonly spread H9N2, are classified as LPAI. H5 and H7 may also be LPAI and with the risk of increased pathogenicity by genome recombination or reassortment are likely to evolve towards HPAI.

In this context, and in countries in which vaccination is a control measure for avian influenza, programmes have to be adjusted according to need, in terms of protection against mortality, clinical signs associated with the disease outbreaks, as well as field virus shedding in infected birds.

Recent examples have shown that designing vaccination programmes helps to control AI outbreaks in different countries facing either HPAI or LPAI outbreaks.

Existing developed AI vaccines, H5, H7 or H9 may be used in vaccination programmes customised to the ever evolving situation worldwide, as long as laboratory cross-protection studies are performed to help demonstrate efficacy.

Heterologous prime-boost vaccination strategies

Michel Bublot, also from Boehringer Ingelheim, then considered heterologous prime-boost vaccination strategies.

He started with a little history. Inactivated AI vaccines came on to the scene in the late 1970s and the first fowl pox vector vaccine for AI was licensed in 1998. Newcastle disease virus and turkey herpes vector vaccines then followed and they gained their first licenses in 2006 and 2012 respectively.

Influenza virus reverse genetics has allowed the genetic attenuation of HPAI to produce reverse genetics H5N1 inactivated vaccines, the first of which was developed in China 13 years ago. More recently (2014), the

baculovirus expression system technology often referred to as BEST has been used to develop a subunit H5 vaccine.

The two key issues for most existing AI vaccines are their broadness of protection and maternal antibody interference.

So what does this mean for particular vaccine types?

● Inactivated AI vaccines

If antigenic drift occurs in the field the vaccine usually needs to be updated. To get optimal immunogenicity vaccines ideally should not be given until the birds have a mature immune system. Inactivated vaccine induced immunity is strongly impaired by maternal antibodies.

● Fowl pox vectored AI vaccines

A major advantage is that this kind of vaccine can be administered in the hatchery by subcutaneous injection. On its own this vaccine gave good protection against challenge from many of the HPAI and LPAI viruses that were isolated up to 2005.

However, protection dramatically declined when vaccinated birds were challenged by H5N1 antigenic variants that then emerged, such as in Indonesia in 2005 and Egypt in 2008.

Priming with a fowl pox vectored AI vaccine in the hatchery followed by boosting from an inactivated vaccine gives a better immunity than single or double vaccination with an inactivated AI vaccine.

More importantly, the cross reactivity of HI antibodies against heterologous antigen is much broader than with traditional prime boost vaccination.

This was shown in a trial with an Indonesian antigenic variant strain (see Table 3). This shows a clear synergistic effect on protection.

The combination of vectored vaccine and classical inactivated vaccine in a heterologous prime-boost programme induced a stronger and broader protection compared to either on its own. It also overcame maternal antibodies. ■

Table 3. Immunogenicity and protection against a 2007 HPAI H5N1 Indonesian antigenic variant induced by FP-AI (vFP89) or H5N9 inactivated vaccine alone or in prime boost scheme in birds with or without maternal antibodies.

MDA	Vaccination		Immunogenicity (H5N8 HI titres on day 28)	Protection as % (Challenged at 28 days)
	At 1 day	At 14 days		
-	-	-	-	0
-	vFP89	-	5.5	10
FP	-	H5N9	5.1	56
FP	vFP89	H5N9	8.1	100

HIGHLY PATHOGENIC AVIAN INFLUENZA DISEASE EVENTS			
	Year	Country	Disease
1	1959	Scotland	H5N1
2	1961	South Africa	H5N3
3	1963	England	H7N3
4	1966	Canada	H5N9
5	1975	Australia	H7N7
6	1979	Germany	H7N7
7	1979	England	H7N7
8	1983-84	USA	H5N2
9	1983	Ireland	H5N8
10	1985	Australia	H7N7
11	1991	England	H5N1
12	1992	Australia	H7N3
13	1994	Australia	H7N3
14	1994-95	Mexico	H5N2*
15	1995 & 2004	Pakistan	H7N3*
16	1997	Australia	H7N4
17	1997	Italy	H5N2
18	1996-present	Europe, Asia, Africa and North America	H5Nx (including N1, N2, N3, N5, N6, N8 reassortants)*
19	1999-2000	Italy	H7N1
20	2002	Chile	H7N3
21	2003	Netherlands (BLGM, GRM)	H7N7
22	2004	USA	H5N2
23	2004	Canada	H7N3
24	2004	South Africa	H5N2 (ostriches)
25	2006	South Africa	H5N2 (ostriches)
26	2005	North Korea	H7N7*
27	2007	Canada	H7N3
28	2008	England	H7N7
29	2009	Spain	H7N7
30	2011-13	South Africa	H5N2 (ostriches)
31	2012	Chinese Taipei	H5N2
32	2012-present	Mexico	H7N3*
33	2012	Australia	H7N7
34	2013	Italy	H7N7
35	2013	Australia	H7N2
36	2015	England	H7N7
37	2015	Germany	H7N7
38	2015	France	H5Nx
39	2016	USA	H7N8
40	2016	Italy	H7N7
41	2017	China	H7N9
42	2017	USA	H7N?

* vaccine used in the control strategy

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Ceva Animal Health makes available the C.H.I.C.K Program Quality Code of Practice to their affiliates for the control of good hatchery vaccination practices in poultry.



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For further information please contact Ms Diána Tóth:
diana.toth@vnuexhibitions.com or visit www.poultryafrica2017.com

How much does it cost to hatch a chick?

The issue for hatcheries all over the world is how much does it cost to hatch a chick. If you know your cost and your sales price you know if you are profitable or not.

emka-incubators.com

It boils down to how many eggs you can incubate in a machine and what surface or footprint is needed.

The premise is to decrease the number of machines needed to incubate a greater number of eggs and thus increase profitability.

There are two different types of trays available in the market – matrix and honeycomb structures. Both have been shown to be effective at holding the eggs in place and incubating properly.

Most European manufacturers have chosen to go with a European standard of 150 eggs in a matrix set-up. The trays mostly measure 510 wide by 735mm and are loaded side by side lengthways, either from the side or front of the trolley depending on the trolley construction.

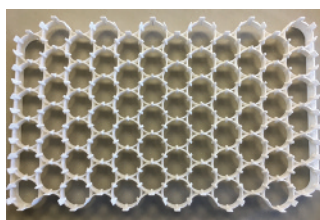
All chicken egg tray/trolley combinations are 16 trays high giving a total of 4,800 eggs per trolley. Thus a 12 trolley incubator is 57,600 eggs.

However, in recent times, due to the increased demand of decreasing the footprint and incubating more eggs per square meter, hatchery companies have developed ever larger machines that still operate in single stage.

At first the increase in egg capacity went to 162 eggs and then 168 eggs (2 x 84) per standard tray – an increase of 8% and 12% respectively.

Emka Incubators have found a way to increase the capacity even more without compromising on chick quality or hatchability. It is a brand new tray; the new compact tray increases the capacity of the incubator by 20% and can be stacked.

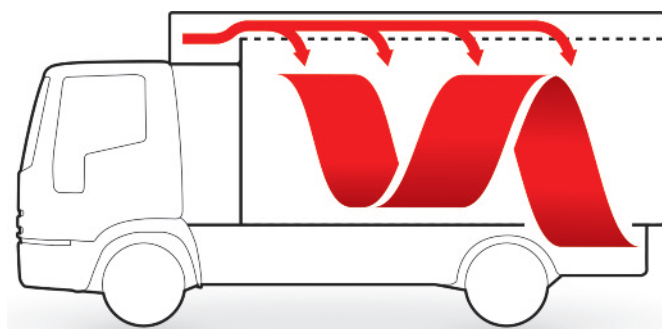
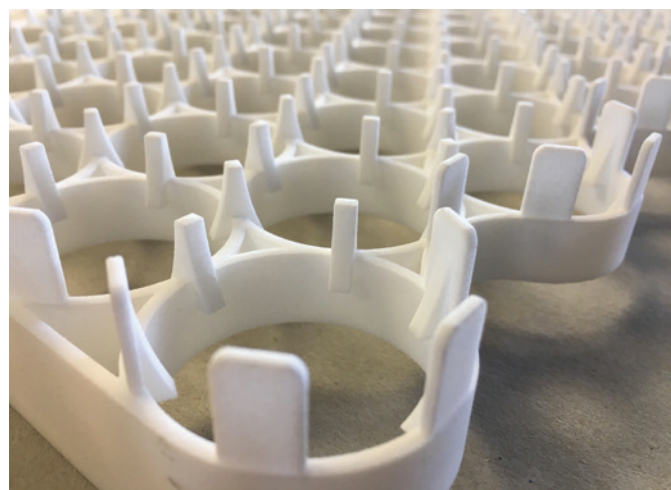
It combines the trays' curved structure, which fits a honeycomb structure perfectly, with the same trolley size as the usual European standard. Each trolley can now be loaded with five stackable trays per level, each tray with a capacity of 72 eggs.



To accommodate the increased weight the trolleys have been reinforced both in construction and wheel assembly. For example, the 24 trolley VH-1152-S, with a capacity of 115,200 eggs, increases to 138,240 eggs – a first for incubation.

The cooling of the setter remains stable and easy through the use of the unique Teggnologic27 cooling tubes, which have more than 30% extra cooling capacity to ensure that even large broiler eggs are kept within set-point ranges.

Teggnologic27 was developed for the 'dry hatch' and has proven its effectiveness in cooling large masses of eggs.



Second generation ventilation system introduced

Eurotier last year was a great opportunity for Veit to introduce a brand new second generation ventilation system. This major innovation in recent years also attracted exceptional attention at the IPPE exhibition in Atlanta this year.

veit.cz

A highly optimised ventilation system has always been the core of Veit vehicles. Every single chick gets the right amount of filtered, conditioned and CO₂ monitored air. What is more, a unique concept of air moving from the top down brings many advantages that go far beyond the ventilation itself.

The new ventilation system inherits all the unique features of its successful predecessor, refines them and extends them to employ natural physical phenomena such as convection. The result is a 3D air-flow with air effectively mixing in the whole body with chicks.

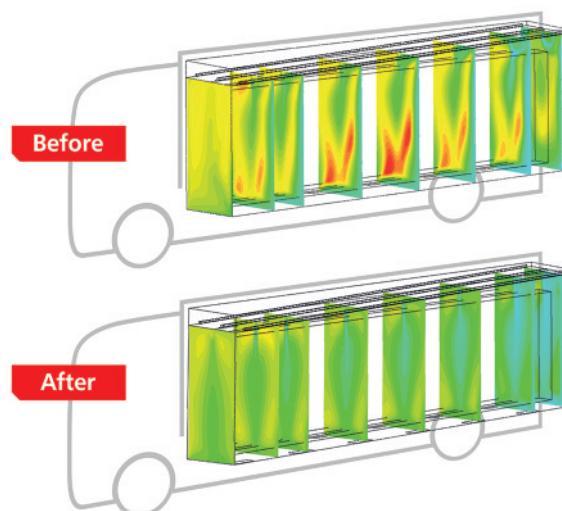
This further increases temperature uniformity, decreases power

requirements and simplifies the design.

How have Veit achieved this? Detailed computer simulations carried out with the technical university provided them with valuable knowledge needed to develop and realise this second generation ventilation. They used the university's 560-processor supercomputer to test more than 80 ventilation designs.

To feed the supercomputer with the initial conditions it was essential to mathematically describe the new ideas as well as the precious cargo and its behaviour.

The results speak for themselves. If the original successful design provides fully sufficient and reliable transport conditions, then the second generation's results are just perfect. Still lower power requirements and increased safety margin are the two fantastic goals achieved. This goes along with Veit's EcoTransport technology, which is now even more economical, ecological and safer than before.



Optionsfor

Exporting poultry equipment across all seven continents

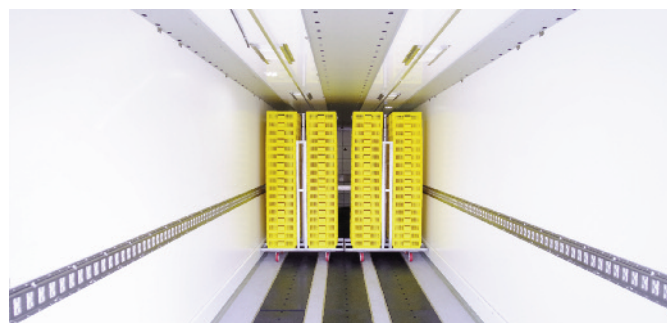
Aytav Poultry Equipment is one of the largest poultry equipment manufacturers in Turkey. They export their products to 65 countries across all continents.

aytav.com.tr

They produce all types of poultry equipment such as bird transport coops, chick and egg transport boxes, hatchery equipment and automatic nests, along with complete breeder and broiler houses.

They have five different types of chick boxes, two small and three big. The big chick boxes have a

choice of 1, 2 or 4 compartments. Aytav boxes are very chick friendly. The plastic used provides comfortable, smooth transportation and ventilation for chicks. Every detail is designed to provide the best environment when transporting the birds. When boxes are stacked on each other, air flow is possible in every part of the boxes and to all chicks. 80 chicks can be transported in the small boxes and 100 chicks in the big boxes. In addition, when the boxes are empty, they fit on each other, saving volume. Aytav also produce hatchery baskets and setter trays for 150 eggs and trolleys.



Track and trace technology in day old chick transport

Whereas day old chick transport used to be an uncontrolled factor in the supply chain from hatchery to farm, the trend now is to upgrade it as an integrated part of the poultry production chain.

heeringholland.com

The driver will normally have a view of the inside temperature. Recording by data loggers or print-outs at the end of the trip are limited in value and always late. The conditions involved in day old chick transport are diverse, all related and sensitive to change.

New technologies now make it possible to track and trace the unit and its specific conditions. The Heering Link telematics system will monitor and register all parameters and will immediately send out alerts in case deviations are detected.

● Loading/unloading
Time is of the essence when loading and unloading day old chicks. This starts at the hatchery. Here the chicks are loaded into plastic crates or cardboard boxes. For quick and easy loading/unloading, the use of trolleys is advised. At this point the day old chick transport unit is running at pre-set climate conditions. As soon as the doors of the unit open, the trolleys need to be transferred quickly from the unit. The

telematics system will detect a change of temperature and loading/unloading times should be kept to a minimum to prevent overheating of the chicks, even in cold conditions.

● In transit
Once inside the unit, the doors close, and the system automatically adapts the climate settings to the optimal point. During the trip Heering Link will monitor all parameters by means of multiple sensor systems installed in the unit: air-conditioning (CO₂), ventilation, cooling, heating, air circulation and relative humidity. In the cabin the driver has direct access to the data and the possibility to regulate manually. Additionally, the hatchery manager can log into the system and follow the truck in real-time. Data will also be stored and can later easily be accessed for analysis. Any deviations can be seen on the screen and audible and visible alerts will go off.

● Servicing
The system also allows for remote diagnostics by the Heering technical support team. The team, available 24/7, can advise in case of alerts. Heering Link also sends reminders for servicing, ensuring hatchery managers that maintenance can be planned in advance, thus reducing down-time and preventing unexpected costs.

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Heering Link									
System									
Trips									
System	Customer	Start date	End date	Start time	End time	Start location	End location	Status	Remarks
100000	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100001	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100002	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100003	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100004	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100005	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100006	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100007	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100008	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
100009	Customer	2017-07-13	2017-07-15	08:00	18:00	Portugal	Spain	OK	
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Ensuring a tight temperature bandwidth and hatch window

EmTech firmly believes that there is no substitute for a good, simple incubator design. No amount of gimmicks and gadgets will correct inherent inefficiencies in the basic structure and layout of the cabinet, trolleys and other internal components.

emtech-systems.com

Providing the basics have been taken care of, a temperature differential of $\pm 0.3^{\circ}\text{C}$ throughout the entire egg mass can be achieved year after year. A guaranteed homogenous environment inevitably ensures that all your chicks hatch around the same time and in perfect condition for the growing farm – what they call the 'EmTech Effect'.

Trolleys take up most of the internal setter space so it is important that they are properly positioned in relation to the paddle fan so that every single egg receives the correct airflow. EmTech single-stage setters have only one trolley located each side of the paddle fan. Furthermore, every trolley is positioned end-on to the fan so that even when the eggs are turned they always receive the optimum amount of processed air without interference. These benefits, coupled with their new, highly efficient, tapered fan blade and VFD (forward and reversing) control of the fan speed guarantees that the entire egg pack is exposed to the correct environmental conditions.

Achieving a consistent 45° trolley turning angle is also crucial in helping to ensure a consistently tight hatch window. EmTech's trolleys are in individual actuator driven trolleys

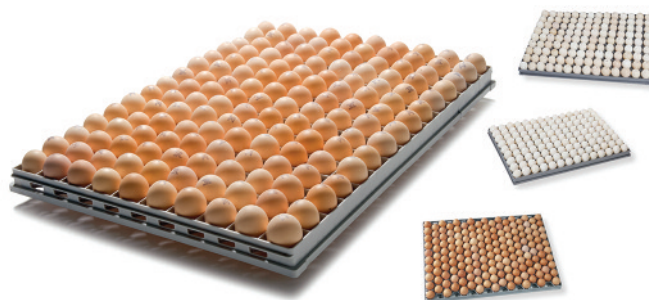
so achieving the correct turning angle is a given, regardless of where the trolley is positioned in the setter.

Another key feature in achieving the EmTech Effect is the unique cabinet design. Metal skinned, PIR insulated panels utilise (male and female) slip joints for strength and unparalleled insulation. Critically, the absence of aluminium or stainless steel T and H sections means that there is no heat loss from thermal leakage and further ensures the integrity of the internal environment.

It must make sense that if all the chicks hatch around the same time they have all been exposed to exactly the same environmental conditions. Conversely if the hatch window is wide it is a good indicator that the conditions within the setter vary considerably. This can be due to many factors but usually it is the lack of significant air movement at the extremities of the setter cabinet. This causes hot spots resulting in an accelerated development and exhausted, poorly conditioned, chicks. Or, equally, cooler pockets of air, resulting in delayed embryonic development, incorrect weight loss and a prolonged dragged-out hatch that puts even more stress on the earlier hatched chicks.

So, to sum up how they achieve the EmTech Effect – a single trolley end-on to the fan, a consistent 45° trolley turning angle, excellent 'chaotic' airflow, and a thermally sealed cabinet ensures a tight temperature bandwidth and a shortened hatch window maximising the quantity, quality and liveability of your chicks.

An EmTech PrimoTech single-stage setter showing trolleys positioned end-on to the paddle fan to ensure optimal airflow to every single egg.



Creating uniform airflow for enhanced embryo growth

Genetic selection for high post-natal growth has altered the patterns of development and rates of biosynthesis in modern embryos. In the egg, this results in ever higher levels of metabolic heat production, which needs careful management in the setter to deliver optimum hatching results.

pasreform.com

Pas Reform's SmartTray setter trays offer unrivalled performance in the modern hatchery. Designed to cradle hatching eggs of any size safely, the open construction is proven to deliver uniform airflow during incubation. This creates an optimal environment for the growing embryo, to promote day old chicks, turkey poults or ducklings of the highest quality. There are 10 good reasons to choose SmartTray over 'traditional' trays:

- One size fits all. The innovative design provides maximum protection for hatching eggs of all sizes with specially shaped support points at two levels. This prevents hairline cracks, which is ideal for farm traying.
- The open, spacious grid prevents the development of 'dead spots' and promotes the free movement of air for the uniform distribution of heat and humidity.
- It is the only setter tray to incorporate Microban antibacterial technology (optional). This remains active on every surface, even after washing, to provide continuous antibacterial protection during storage and in use.

Independent test results show that Microban active technologies in SmartTray kill up to 99.9% of *Escherichia coli*, *Salmonella enterica* and *Staphylococcus aureus*, for the most effective means of combating cross-contamination.

Independent test results show that Microban active technologies in SmartTray kill up to 99.9% of *Escherichia coli*, *Salmonella enterica* and *Staphylococcus aureus*, for the most effective means of combating cross-contamination.

- Suitable for the highly automated hatchery: superior construction, material stiffness and high impact resistance withstand temperature changes and weight load for the lifetime of the tray.
- Stable and self-centre egg positioning. This provides stability and security and is ideal for accurate in-ovo vaccination.
- Safe, secure stacking. The blind-find bottom design means it easily finds its secure locking position for fast, stable stacking.
- Ergonomic design with a lightweight, smooth finish for comfortable, easy handling.
- HACCP compliant. The completely smooth finish prevents the accumulation of dirt for easy, thorough cleaning.
- Space saving honeycomb design for improved cost per hatch. The range of capacities includes SmartTray 162, for the highest number of hatching hen eggs/m² in the setter.

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10 | THE FUTURE OF IN-OVO VACCINATION

In this age of modern animal welfare standards, an effective vaccination programme is absolutely essential for egg hatcheries large and small. Progress in vaccination technology has taken great strides in recent decades with in-ovo vaccination taking the lead in the battle against serious diseases such as Marek's, Gumboro, Newcastle and Avian Influenza. The next generation of in-ovo vaccination technology is Egginject from Ecat-iD.

The innovative, patented dual pressure system within Egginject guarantees an accurate vaccine to every single embryo, regardless of egg size or flock age. And with a processing speed of up to 60,000 eggs per hour, there is no compromise on productivity at the expense of accuracy.

Safety and biosecurity

With biosecurity of the utmost importance, high sanitary status of the eggs and equipment disinfection is vital to the success of a hatchery, minimising the risk of cross-contamination. Egginject performs the safest and most accurate in-ovo injection. In a double disinfection process, both egg shells before injection and needles after injection are disinfected.

Negligible damage to egg and embryo

Excessive intra-embryo perforation increases the chances of injury to the chick so an error-free vaccination process is imperative. The high pressure technology used in Egginject is applied to a very small area so the incidence of egg shell breakage practically disappears. Changing to low pressure once inside the egg, the injection depth is adapted to each embryo, thereby minimising damage from excessively deep intra-embryo injection.

Improving productivity and reducing labour costs

Ecat-iD is constantly looking for ways to help hatcheries improve performance in order to maximise productivity and profit. Even in a small hatchery, automating the process improves efficiency and chick welfare without compromising on speed and consistency. With vast expertise in hatchery automation, Ecat-iD helps businesses to introduce new technology to improve productivity.

Customised for large, medium or small facilities, its reliable systems (standalone or fixed to an existing line) are compatible with all types of incubation trays. Extensive R&D ensures exceptional ease-of-use and reduced labour costs as fewer operatives are required.

Conclusion

Poultry businesses face the constant risk of disease and viruses decimating the profitability of their production. New in-ovo vaccines and the cutting-edge Egginject technology to administer them offer a brighter and safer future for the industry.

Ecat-iD

ecat-id.com

contact@ecat-id.com

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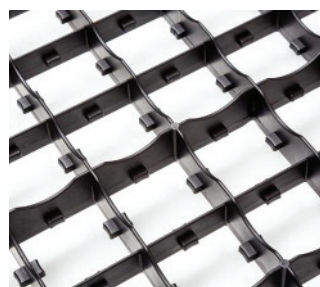
Supporting chicks, staff and equipment in the hatchery

HatchTech is using laminar airflow to keep the embryo temperature at an optimum level which provides superior chick quality. Every HatchTech product is specially designed to deliver this uniform airflow to every single egg.

hatchtech.nl

● 88 Setter Tray

The HatchTech 88 Setter Tray is specially designed for significantly more efficient heating and cooling of the eggs and perfectly controlled embryo temperatures.



The unique, patented honeycomb structure of the grid makes it possible to house 4,725 eggs per m². It fits all egg sizes. Unlike other trays, this tray has six support points which give more stability, prevent eggs coming into contact with other eggs and it prevents cracks in eggs during transportation.

● 150 Setter Tray

Are you tired of breaking 150 setter trays? The strong and flexible design of the HatchTech 150 Setter Tray makes it the most qualitative and unbreakable choice in the market. It is replaceable with any brand's 150 tray.

● 88 Setter Trolley

The HatchTech 88 Setter Trolley supports an optimal incubation process. Strong, durable and extremely stable, it improves your



efficiency and effectiveness. The individual motor makes it possible to fine tune the turning frequency of the eggs for optimal incubation.

The Setter Trolley can carry 7,040 eggs. The design of the trolley has ergonomic rounded edges which is easy to handle, long-lasting and less damaging during loading and unloading.

The HatchTech 88 Setter Trolley has no vertical bar in the centre so trays can be loaded onto the trolley from either side and pushed through until the level is completely filled. This can optimise your automation.

● HatchCare Basket

HatchCare – the hatcher with light, feed and water – comes with a tray/basket combination that is innovative, more animal friendly and highly efficient.

Chicks will now stay in the same basket with ad-lib access to feed and water immediately post-hatch until they arrive at the farm.

The floor of the basket features a special, non-slip layer that prevents eggs from shifting and turning. It also helps the hatchlings to stand up without sliding and prevents splayed legs.

Separators and chick counters are



no longer required, leading to highly efficient and more animal friendly production. Since the HT 88 Hatcher Basket holds just 88 eggs per basket, this makes it much more suitable for easy and efficient manual- or semi-automated handling, with less risk to personnel of strain or injury.

Chicks will enjoy more space and freedom of movement, since they are no longer surrounded by eggshells. This, combined with the light and direct access to feed and water, will result in a quiet more peaceful environment leading to superior chick quality!

trays, trolleys & transportation

Farm/machine racks: simply load, transport and incubate

Jamesway designs equipment with the user in mind. One of the best examples of this is their farm/machine racks. Jamesway racks include the ability to be used for two purposes: load racks at the farm, transport them, and then simply wheel them into incubators. There is no retraying at all. Lock the racks in place with Rack Stopper panels to ensure the flats do not slide during the transportation process and stabilise the turning mechanism with the built in key before the journey.

jamesway.com

The labour and equipment savings are considerable and, just like a car purchase includes the tyres, purchasing one of Jamesway's machines includes a complete set of racks.

Another rack improvement they have made is to re-engineer the turning mechanism.

The classic approach of connecting all racks to a central motor for turning is flawed since a turn failure on one rack will cause a turn failure on all racks. Jamesway uses a pneumatic air cylinder to turn each rack individually. This allows sensors to alert turn failure on individual racks – no other racks are affected!

Jamesway has also designed a series of 16 tier racks for their single-stage machines, as an option to the 15 tier rack. The 16 tier racks provide a 6% capacity increase over the 15 tier rack.

For example, the capacity of the Platinum P120 setter goes from 120,960 to 129,024 eggs and gives Jamesway machines one of the highest egg densities per square feet in the industry.

Self-stacking transport system

Another option for efficient transport of eggs is their self-stacking transport system, or SST. Using SSTs enables each truckload to double the amount of eggs transported with farm racks.

Upon arrival trays are easily transferred into incubator racks. After the eggs hatch and empty trays are washed, the special design allows them

to 'nest' together, reducing the space required to transport them back to the egg supplier.

With nesting racks, it requires only one truck to transport the empty racks of two and a half loaded trucks.



Constructed from resilient polypropylene material, the SST flat cushions eggs to protect against breakage. It is highly intolerant to micro-organisms, and easy to clean and disinfect, reducing the potential for disease.

Each flat holds 84 eggs and can be used in all Jamesway incubator racks. There is no need to purchase and dispose of traditionally used cardboard boxes. Fewer trucks, reduced transportation cost and less breakage add up to increased profit.



MASTERING THE HATCHERY

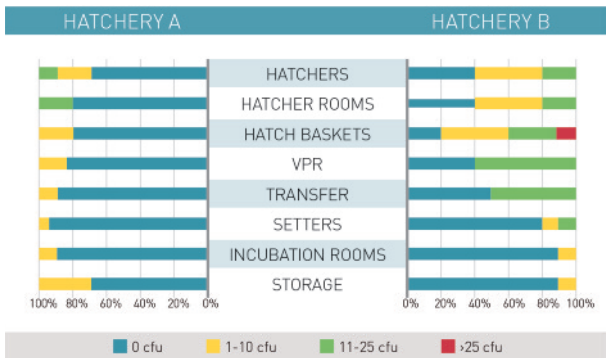
Understanding hatchery ventilation

On the farm, the importance of ventilation to meet broiler requirements is clear, but what about in the hatchery? The correct ventilation in a hatchery has a significant effect on the performance of the incubation equipment. It is vital to provide adequate oxygen levels to embryos to ensure a narrow hatch window and homogeneous chick quality.

Therefore, air volumes required to meet oxygen demand depends on the number of eggs in the incubator or hatcher room, the volume of the room, the desired room pressure and the type of ventilation in use. Relative humidity in the incoming air and its temperature are also key to get the best egg water loss with efficient energy consumption.

Moreover, hatchery ventilation is a top priority to control biosecurity. Air pressure control throughout the hatchery regulates air movement from the clean areas to those areas more likely to produce harmful fungus or bacteria (egg to chick direction) and reduces the risk of environmental cross contamination.

However, biosecurity is not only controlled by the air pressure in a hatchery, good quality eggs and efficacy of cleaning and disinfection procedures of the facilities and materials involved in the incubation process are also key. Figure 1 shows two different realities of sanitary status in hatchery A and B by microbiological result classification according to contamination level.



Conclusion

Correct hatchery ventilation is key to ensuring a narrow hatch window, homogeneous chick quality and biosecurity in the hatchery. However, it must be complemented by an efficient cleaning and disinfection procedure, validated by pressure controls and microbiological monitoring.

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Optionsfor trays, trolleys & transportation

Improved egg trolley for multiple setter trays

Chick Master provides a wide choice of a newly designed Avida setter trolley that offers a better solution based on durability and transport.

chickmaster.com

The new trolley design was introduced in 2015 and has been in operation worldwide in many existing and new hatcheries. The specially designed corners add to greater strength and stability of the trolley allowing this model to be considered for farm to hatchery transport.

Available in a wide range of sizes,



it can be supplied to work with multiple trays manufactured by Chick Master or many of their competitors. Today, it is also supplied with all Avida models both with T or S turning systems and part of the Avida Symphony series.

The design allows for more eggs in less space, yet overall trolleys are dimensionally compatible with previous trolley designs, which is important when working with automated loading and unloading.

The lightweight, durable aluminium frames offer easy manoeuvrability. Stainless steel shafts and replaceable bearings at all pivot points deliver longer life and an accurate, repeatable turning motion.

Zinc, aluminium and magnesium (ZAM) plated tray carriers and hanger bars provide superior corrosion resistance.

Chick Master has a wide selection of setter tray options including their well known 132, 140, 150 and 165-egg one piece trays, 120-egg turkey tray, and several trays that are used in the same size trolley tray frame.

Their 82-egg tray is designed for egg transport on the European sized pallets and for use with automation systems. The 82-egg tray is widely used today in hatcheries in Europe, Russia, and Asia.

Trays and trolleys are important components for every hatchery and integral parts for egg transportation both to the hatchery and within the hatchery itself.

Chick Master offers many flexible solutions for both existing and new hatcheries.

Economic and user friendly solution for egg transfer

The Petersime egg transport system with pallets is a more economic and user friendly solution to transfer eggs from the breeder farm to the hatchery and back.

petersime.com

Loyal to the vision to maximise your profit for life, Petersime continuously searches ways to minimise your operational costs.

Cost reductions do not only happen at incubator or technology level. Small, everyday operational costs also make the difference. For example, egg transport is an inherent hatchery cost. Heavy farm or setter trolleys need to be transported from the breeder farm to the hatchery and back.

The alternative Petersime egg transport system with pallets offers you a more economic and more

user friendly solution. Eggs are collected on stackable Petersime HD trays, each holding 84 chicken eggs, and stacked on a corresponding pallet.



The transport system can hold up to 6,720 chicken eggs per pallet. The egg transport pallet makes transport solid and easy.

At the bottom of the stack and after every eight levels of trays, a connector secures a good stability. Using additional straps or shrink wrap is not needed.

Both pallet and connector are easy to clean. It is also possible to fumigate the eggs on the pallet.

The pallet with eggs can easily be transported by means of a pallet jack.

The egg transport system makes transportation from breeder farm to hatchery easy and requires minimal egg handling, which reduces the risk of cracked eggs.





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Immunomodulation and Marek's disease

This British review (**Vet. Res. 47 119**) highlights the lack of vaccines that can provide sterile immunity and inhibit transmission; such that vaccines are only capable of preventing neuropathy, oncogenic disease and immunosuppression but are unable to prevent Marek's disease transmission or infection which leads to the emergence of increasingly virulent pathotypes.

Hence, to address these issues, developing more efficacious vaccines that induce sterile immunity has become one of the most important research goals of today. Marek's disease virus shares very close genomic, structural and functional characteristics to most mammalian herpesviruses and also provides an excellent T-cell lymphoma model for gaining an insight into herpes induced oncogenesis in mammals and birds.

On-going research is needed of host-virus interaction and host immunity against Marek's disease, as is a better understanding of how the subtle genetic variations between chicken lines has a major impact on the outcome of infection.

This review article also looks at areas of research that need to be further explored.

Hypoxia and chicken embryos

This Israeli work (**Comp. Physiol. and Biochem. 203 32-39**) assessed the effect of hypoxic conditions (17% oxygen) during the plateau phase on embryonic metabolic rate, cardiovascular parameters and developments up to hatching.

Hypoxic embryos showed a significant increase in heart rate and an upwards trend in haematocrit and haemoglobin levels starting on day 17. There was no indication of an adaption following six hours of hypoxia per day.

Exposure to hypoxic conditions continuously for 72 hours resulted in significant physiological changes and a detrimental effect on embryonic development and growth. Exposure to 12 hours per day of hypoxic conditions produced moderate changes. This helped the embryo cope with the stress without having a significant influence on its growth and development.

The decrease in metabolism may represent a decrease in resting metabolic rate and reduced

heat production. Such alterations may affect post hatch performance and energy allocation between maintenance and growth, especially when under stress when there is an increased oxygen demand.

Gut microbiota and resistance to *S. enteritidis*

This Czech study (**Veterinářství 66 774-776**) looked at the protective effect of microbiota from 1-, 3-, 16-, 28- and 42-week old donor hens against *Salmonella enteritidis* infection in newly hatched chicks. Both salmonella culture and chicken gene expression confirmed that the inoculation of newly hatched chicks with microbiota from 3-week, or older, donor hens protected the chicks against *S. enteritidis* infection.

However, chicks inoculated with microbiota from 1-week old donors were even more susceptible to *S. enteritidis* infection.

In subsequent work it was shown that microbiota from 35-week old hens protected chicks if it was administered 24 hours before the *S. enteritidis* infection, but no protective effect was seen when the two were added simultaneously.

Motility of thawed semen

This Italian study (**Cryobiol. 73 343-347**) assessed the combined effect of dimethylacetamide and two non-permeating cryoprotective agents (trehalose and sucrose) on the quality of post-thaw chicken semen.

Sperm quality was assessed immediately after thawing and at +5, +10 and +15 minutes. It was found that the different cryodiluent combinations significantly affected the kinetic parameters of the semen. The presence of trehalose alone or in combination with sucrose combined with dimethylacetamide improved sperm motion.

Overall, this study showed a positive synergic reaction of dimethylacetamide and trehalose on the motility of thawed chicken semen.

Amino acids in duck starter diets

This Chinese work (**Asian-Aust. J. of An. Scis. 29 1742-1747**) looked at the methionine (0.28 and 0.48%) and choline (0, 394, 823, 1,239 and 1,743mg per kg feed) requirements for duck starter rations.

Perosis and weight depression were seen in ducklings fed the methionine deficient (0.28%) diet and supplementation with choline reduced these effects. In addition, significant positive effects on weight gain and FCR were seen at the lower methionine level.

By broken line regression the optimum levels of choline for weight gain and feed intake were 1,472 and 1,424mg per kg feed at the 0.28% methionine level and 946 and 907mg per kg feed



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at the 0.48% methionine level. The authors recommended choline levels of 1,448 and 927mg per kg feed for diets containing 0.28 and 0.48% methionine respectively.

Antioxidants for ageing broiler breeder roosters

This Brazilian study (*Arquivo Brasil. de Med. Vet. e Zootec.* 68 1177-1182) was undertaken to assess the effect of dietary antioxidant supplementation on the reproductive characteristics of ageing broiler breeder roosters. The three test groups received 9ppm of citranaxanthin, 6ppm of canthaxanthin and 150ppm of vitamin E respectively. The fourth group was the control.

It was found that none of these treatments influenced semen quality or reproductive responses in ageing broiler breeder roosters.

In ovo inoculation of vitamin E

This Indian work (*Ind. J. of Poult. Sci.* 50 104-108) looked at the effect of inoculating eggs with vitamin E on their 18th day of incubation on the expression of Hsp-70 mRNA and subsequent body weight in life after hatching.

It was found that varying the concentration of vitamin E had no effect on mRNA expression.

It was concluded that in ovo inoculation with vitamin E revealed positive trends, but that these were not significant in terms of hatchability, growth and Hsp-70 gene expression. However, Hsp-70 expression was significantly higher in the heart and liver, which are important organs when it comes to stress management.

Pre-natal thermal conditioning

This Indian study (*Ind. J. of Poult. Sci.* 5 226-228) looked at the effect of pre-natal thermal conditioning (elevated incubation temperature of 39.5°C for 12 hours per day from 7-16 days of incubation) on pre- and post hatch broiler performances. This pre-natal thermal conditioning reduced hatchability and increased embryonic mortality after the thermal exposure. Post hatch performance in terms of body weight, body weight gain and FCR were adversely affected but feed intake remained the same.

Turkey semen storage

This Italian review (*Annals of An. Sci.* 16 961-974) updates the current status of technologies for the storage of turkey semen (hypothermic liquid storage and cryopreservation) with special emphasis on cryopreservation.

Liquid semen can be stored for up to 24 or 48 hours at 5°C, whereas cryopreservation allows long term storage at -196°C.

Importance of incubation temperature

In incubation, temperature is important for hatchability and growth performance and then continues to influence the physical characteristics of the offspring, such as final body weight and meat characteristics.

This Chinese review (*W. P. S. J.* 72 847-852) looks at the influence of incubation temperature on offspring phenotype, sex differentiation, immunity and development of muscle fibre in poultry.

In ovo feeding of L-arginine

This Indonesian study (*Media Paternakan* 39 168-172) was undertaken to evaluate embryonic

development, post hatch performances and growth rate of kampong chicken given L-arginine in ovo.

L-arginine increases the weight and circumference, but not the length, of the embryo.

In ovo L-arginine resulted in higher body weight gain and a lower FCR.

Feed intake was not affected. Growth rate up to six weeks was increased by 1.0%.



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On-farm traying: a smart idea?

78

www.pasreform.com

by Gerd de Lange, Senior Poultry Specialist, Pas Reform Academy

On breeder farms eggs are traditionally collected in paper or plastic trays that each hold 30 eggs. Typically, these are stacked six-high and transported to the hatchery in boxes, crates, trolleys or on pallets.

Before incubation, hatchery staff have to transfer the trayed eggs to setter trays, either manually or (semi)-automatically. So far, each hatching egg has already been handled at least twice before incubation begins – and each time with the risk of causing hairline cracks and contamination that will ultimately undermine hatch results.

On-farm traying, both manual and automatic, is becoming increasingly popular as it minimises labour and reduces the need for egg handling. With the eggs already placed on setter trays at the breeder farm, they are then transported in specially designed farm trolleys to the hatchery, where the setter trays are transferred from the farm trolleys to setter trolleys. The eggs are not handled individually any more – and even this final transfer before incubation can be automated.

When choosing a tray type for egg collection on the farm and subsequent transport to the hatchery, there are several important considerations that will also have important consequences for managing the hatching eggs:

Rate of cooling down

Egg temperature at the moment of collection varies from egg to egg. For those still holding a temperature of >25°F/77°F, further cooling is required. When placed at the centre of a paper tray and covered by the next full tray, a newly laid egg with a temperature closer to that of the hen's body (41°C/105.8°F), will take much longer to cool down than an egg placed at the side of the paper tray. And packing warm eggs on paper trays directly into egg boxes will certainly lead to high embryonic mortality!

With a more open construction and the fact that they are not stacked

directly on top of each other, filled setter trays allow sufficient freely circulating air to pass around the trayed eggs. This greatly promotes uniform cooling, but if temperature in the egg collection room is too low, there is a risk that the eggs will cool too rapidly, especially if exposed to cold air or a draught.

Plastic trays provide a mid-point between paper trays and setter trays, because plastic is not as good thermal insulator as paper and it will allow some air flow over the eggs.

Mechanical impact

During loading, transport and unloading, shocks and jolts should be avoided, both to prevent damage to the fragile embryonic structure and hairline cracks in the shell.

Eggs are generally very well cushioned when transported on paper trays, so where road conditions are poor or trucks have poor suspension, paper trays may be the best choice. In other cases, well-designed setter trays without sharp edges provide good support for the hatching eggs and, when placed in farm trolleys with shock absorbing wheels, offer a valid alternative.

Further treatment of hatching eggs:

Placing eggs on setter trays is essential for effective disinfection or pre-storage incubation, neither of which is possible when eggs are tightly packed together on paper or plastic egg trays, as there is no free space around each egg.

Advice

- Think broadly about the various 'touchpoints' that hatching eggs will be subjected to from farm to hatchery when choosing a tray type.
- Choose paper trays when road or vehicle conditions from breeder farm to hatchery are poor.
- Recognise that eggs on setter trays may cool down too quickly after egg collection; do not place them immediately in the cold room.

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Expansion in Kazakhstan



JSC Agro Alel, a large and well-established poultry integration in Kazakhstan, has expanded its hatchery operations with the addition of new SmartHatch hatchers from Pas Reform. The new hatchers will increase Alel-Agro's total hatching capacity by two million eggs a year.

Alel-Agro's collaboration with Pas Reform began when the company commissioned a full set of Smart incubation technologies for its brand new 32-million eggs a year hatchery in 2007. Pas Reform also provided planning for the project, from designing the hatchery's layout, routing plans, floors, drains and ceilings, to engineering its ventilation, water and electrical systems, while at the same time ensuring that future expansion plans could be smoothly implemented.

This was, says Alel-Agro's CEO Raziya Zhatakpayeva, a smart decision. "The company's production capacity has increased to 34,000 tons of poultry meat per year," she told International Hatchery Practice, "and our intention is to increase that still further by almost 30%, to an annual production volume of 45,000 tons this year."

Established in 1998, the Alel-Agro integration currently includes the

hatchery, six poultry farms, a feed mill, slaughterhouse and sorting centre. With a vision for achieving quality and sustainability, the company has opted for advanced technologies and modern equipment from the very beginning.

"Our aim at all times is to meet or exceed international standards," added Raziya, "Our country consumes about 300,000 tons of poultry meat every year and with the production and sale of poultry and meat products as our core activity, our focus is on delivering continual growth in terms of production and quality control.

"This we continue to achieve by ensuring products of excellent quality for our customers: a job made much easier with the support and knowledge of Pas Reform's specialists."

Pas Reform's general director Wim Schaafsma concludes: "We understand that every operation is unique and our team has worked hand-in-hand with specialists at Alel-Agro, to support highly optimised workflows within the operation.

"We look forward to supporting the continuing growth and success of this committed and innovative company."

pasreform.com

Strategic probiotics collaboration



Boehringer Ingelheim Animal Health and Novozymes have announced a strategic collaboration to develop and commercialise probiotics for global poultry production. The parties will focus on developing products for hatcheries before the chickens move to grow-out farms.

As part of the agreement, Boehringer Ingelheim will market and distribute Novozymes' FloraMax probiotic product for the US poultry industry. Boehringer Ingelheim plans on expanding to other markets globally in the coming years.

boehringer-ingelheim.com

Cherry Valley in Germany



Cherry Valley Farms has recently completed the refurbishment of its German hatchery at Karlsdorf.

Norbert Winkler, Operations Manager, has planned and overseen the work, which has involved remodelling parts of the original buildings and increased the setter capacity to 284,256 eggs.

Norbert joined Cherry Valley in 2007, shortly after it established the production facility in Germany, which is intended to serve European customers in Germany, Netherlands, Hungary, the Czech Republic and Poland, as well as supplying export markets in Russia and beyond.

Norbert is also responsible for the farms and hatchery in Germany and looks after customers in Germany and Eastern Europe.

The hatchery was built as a pedigree duck breeding centre by the former East Germany and has remained in continuous use since it was built in the early 1970s. It has developed over the years and the hatchery team is now responsible for producing more than 2.5 million ducklings per year.

cherryvalley.com



Celebration in Nigeria



A delegation of senior Aviagen representatives recently visited CHI Farms, Nigeria, to celebrate the 10th anniversary of cooperation between the two companies. CHI is the exclusive distributor of Arbor Acres for the Nigerian market, one of Africa's fastest-growing economies. Tom Exley, president of Asia, Middle East and Africa, and Michael Garden, business manager Middle East and Africa, met representatives from CHI, including Martin Middernacht, managing director, and Johannes Flosbach, corporate strategy and business development manager.

Aviagen and CHI, which is part of Tropical General Investment, used the meeting to discuss their current

strategic approaches and latest business developments, as well as potential opportunities that could commercially benefit both companies in the future. During the visit, Exley presented Middernacht with a 10-year commemorative glass trophy as a token of Aviagen's appreciation for CHI's dedication over the years.

CHI has recently invested in a new state-of-the-art parent stock hatchery to satisfy the consistently growing demand for Arbor Acres parent stock for the Nigerian market.

There are also plans to refurbish existing grandparent farms and any future expansion plans will include environmentally controlled, world-class grandparent farms.

aviagen.com

Cobb's new male in Brazil



The new broiler breeder product, the Cobb MV male, has been introduced to the Brazilian poultry industry at a series of workshops across the country.

In running the workshops, Jairo Arenazio, Cobb general manager for South America, said the new male had been developed for greater robustness and adaptability to different environmental conditions as well as superior feed conversion.

Among the benefits of the new MV male are reduced feed consumption of about 30g per kilogram of live weight and a larger appetite resulting in one to two days less in reaching the final processing weight.

Broiler specialist Matthew Wilson, Cobb technical services director for Europe, said development of the MV male began in 2011 with the target of greater adaptability to different processing weights and climatic conditions.

In selecting the new line, emphasis

was placed on animal welfare, robustness and enhanced disease resistance as well as the performance traits. Breeders and broilers were tested in a very cold climate in Switzerland, in extreme heat in Saudi Arabia, and high humidity in South Africa. The line was also tested using different types of diets based on corn and wheat and in all cases the MV male showed better welfare traits and economic results versus the MX male.

cobb-vantress.com



Aviagen

Hatchery
TIPS 23

EGG YOLK MOTTLING

Levels of mottling in egg yolks seem to be quite high at the moment. Mottling is something that is often identified when there are reports of high levels of very early dead embryos, or particularly poor hatch after egg storage longer than 4-5 days. Opening candled clear eggs shows that there is very little embryo development. But unlike infertile eggs, often the yolk membrane has broken and the yolk is mingled with the albumen.

Examining fresh eggs usually shows that fertility is normal for the flock age, but that the yolk surface looks different – there are areas of the yolk that look translucent in mild cases (below left) but a tan colour in more severe ones (below right). This is due to changes in the membrane around the yolk which allow water to collect between the layers. This makes the yolk more fragile, and less able to support normal embryo development.



It is normal to see some mottling, which will get worse as eggs age. It will not necessarily be easy to see in fresh eggs on the breeder farm. However, if the incidence of candled clear eggs is higher than expected and fertility is normal, it is worth checking eggs carefully for mottling.

Mottling can be caused by a variety of factors affecting the breeder hens. One of the best known is contamination of the feed with Nicarbazine (or an anticoccidial containing Nicarbazine). Wormers such as Piperazine can cause mottling, as can gossypol from cottonseed meal (above 0.005%) or tannins from sorghum (above 1%).

Yolk mottling also tends to be high in years where fungal diseases in wheat and maize cause a high or erratic mycotoxin burden in finished feed. Management factors which put the birds under stress can also cause them to lay eggs with mottled yolks.

Over mating is a surprisingly common cause – which tends to escalate if the candled clears are perceived to be due to poor fertility, triggering early or over generous spiking. The bird handling necessary for taking blood or swab samples can also cause a rise in mottling.

Sometimes the cause of mottling is not immediately obvious. In this case, a review of the feed formulation and raw materials in the feed mill will be helpful, along with a review of the birds' behaviour. This should include periods of observation in the house, watching the birds feeding, selecting nests to lay in and during peak mating times.

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Centre of excellence



Big Dutchman is marking another milestone in its fast-paced

development with the opening of a brand-new regional head office in Malaysia. The company has invested nearly 25 million euros in the project, which is also the logistics centre for the Asia-Pacific region.

The location is the largest and most modern centre in the entire Big Dutchman family, which is currently active in 120 countries and has about 3,000 employees.

"This is an important step in meeting the increasing demand for live-stock equipment, especially by the poultry sector, in this region of the world," Jan Hofstede, president of Big Dutchman Asia, told International Hatchery Practice.

This location with its 26,000m² of storage and office space shows Big Dutchman's firm commitment to establishing modern and sustainable systems for animal husbandry and

meat production permanently in this rapidly growing part of the world.

Conveniently located near the large Port Klang container port, the head office and logistics centre fits well into the environment and infrastructure. There is also sufficient room for additional growth.

A solar panel the size of two football fields has been installed on the warehouse roof to supply green power. Presentation and training rooms turn the location into a centre of excellence for modern live-stock production.

bigdutchman.de



Poised for strong, long-term growth



Just months after acquiring animal health leader Merial in a strategic transaction with Sanofi, Boehringer Ingelheim has revealed its ambition to compete for industry leadership worldwide in animal health.

Following a positive year for the animal health business in 2016 with net sales increasing by 8.5% in currency adjusted terms to 1.46 billion euros, Boehringer Ingelheim finalised the acquisition of Merial at the beginning of 2017.

With the combination of these two leading and highly complementary businesses, animal health has been identified as a strategic long-term development priority for the company.

"Acquiring Merial immediately positions us to be increasingly competitive in a high-growth sector that is in a consolidation phase."

Joachim Hasenmaier, Head of Boehringer Ingelheim's Animal Health Business Unit and a member of the board of managing directors, told International Hatchery Practice.

"By combining two dynamic companies that share the same long-term strategic vision, we are delivering a larger and more innovative portfolio of products and services to prevent disease and improve the health and productivity of animals around the world. We actively want to help shape the animal health industry by combining our forces, one with the power of two."

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Major US investment



Hybrid Turkeys has announced plans for ongoing and future investments in the US turkey industry. In order to deliver industry leading quality products throughout the supply chain, Hybrid will invest in two new hatcheries, new egg production farms together with new contract partners, state of the art transportation, and the skilled workforce needed to support these areas of operations.

"Our business is focused on creating value for customers and built on strong partnerships in the industry. As the demands of the modern consumer evolve, the stresses on a collaborative supply chain for the turkey industry have never been greater. A more transparent food system, with ever reducing use of antibiotics, means that the responsible production of high quality day old turkey poults is critical," Dave Libertini, Managing Director, told International Hatchery Practice.

The decision for Hendrix Genetics, parent of Hybrid Turkeys, does not

come lightly. This move represents a significant investment of financial capital and human resources in a market long overdue for this type of upgrade.

"We are committed to delivering the quality poults that Hybrid customers are looking for. We explored many options and have decided that making an investment in new, state of the art facilities is the only way we can satisfy our client's demands," added Peter Gruhl, GM Hybrid USA.

This move comes after an announcement in January 2015, in which Hybrid and Ag Forte entered into a commercial egg and poult supply agreement. In November 2016, Hybrid served notice that it would not seek to renew this arrangement beginning in January 2019.

Hybrid will continue to supply breeding and commercial stock to the US market, and with access to a global supply chain, expects no interruption in supply for their clients.

hendrix-genetics.com

Aviagen's new appointment



Aviagen has appointed Dr Ampai Nangsuay as its new hatchery technical service manager for the Asia Pacific region. Ampai will be responsible for providing in-depth customer support in the hatchery and communicating any new developments and research in incubation. She is reporting directly to Mark Wright, regional technical service

manager, Asia and will service all Aviagen commercial brands – Arbor Acres, Indian River and Ross – that are actively sold and distributed in the Asia Pacific region.

Ampai is a graduate in Animal Science and also achieved a Master of Science degree in Animal Nutrition and Feed Technology from Kasetsart University, Thailand, before she went on to graduate with a PhD in June 2016, from Wageningen University in the



Over 25,000 people attended the first day of the recent VIV Asia exhibition in Bangkok, Thailand, exceeding even the organiser's optimistic forecasts. With more than 900 international exhibitors, VIV Asia offered a unique selection of global market leaders as well as national Asian players of growing importance.

vivasia.nl

Netherlands. Her doctorate was funded by the primary breeding industry and focused on the mechanisms and practical implications of incubating eggs from different origins and sources.

aviagen.com

Top US Cobb500 performance



The Tyson Foods' breeder complex at Wilkesboro, North Carolina, is the winner of the top US Cobb500 performance in 2016 for total egg production/hen housed.

This is the third year running for this complex to receive an award, having topped the Mid Atlantic Region in the previous two years.

In 2016, the Wilkesboro complex produced 177.42 total eggs/hen

housed in a survey of the US industry with production figures all adjusted to 65 weeks. This complex housed 36 flocks, representing over 500,000 hens housed.

Ken Semon, Cobb director of technical services for North America, added: "This is a great accomplishment for the Tyson Wilkesboro breeder department, and now the goal is to stay on top with Cobb500 and get to the same spot with the Cobb700."

cobb-vantress.com

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Manager, Asia Pacific region
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Cobb doubles share in Australia

More than 40 customers recently attended Cobb's Asia Pacific Technical Seminar (shown below) which took place in Sydney.

Customers from companies in Australia, New Zealand and the Pacific region included Inghams, Baiada, Cordina, Red Lea, Darwalla, Rooster Poultry, Hi Chick, Crest Poultry, Turi Foods, Woodland's and Bromley Park.

"In the past three years, Cobb has doubled its market share in the Australian market," Pelayo Casanovas, Cobb general manager for the region, told International Hatchery Practice. "The Cobb500 is the breed of choice in Asia, and we hope to achieve this same goal in the Pacific region. To help make this happen, we have upgraded our genetics for the region with our latest lines now readily available for our customers, including the new Cobb MV male."

Neal Scanlon, Cobb regional technical service director, added: "We have already seen the very first results with the new bird in Australia and New Zealand, showing excellent breed hatchability, broiler livability and feed conversion."

During the two-day event special-ists from the Cobb World Technical

Security of supply to Japan



Since January, Aviagen has delivered two shipments under its poultry compartment status to long-standing Ross grandparent stock distributor Nippon Chunky, ensuring a secure supply of poultry breeding stock to the Japanese market. The first shipment was delivered at the end of February and the second shipment at the beginning of March.

The Japanese government accepted the concept of compartmentalisation in August 2016, allowing Aviagen to continue supplies to Nippon Chunky in times when the UK is faced with a notifiable disease challenge.

Compartmentalisation is designed to facilitate the export of stock from approved farms in the event of an outbreak of avian influenza or Newcastle disease. Aviagen in the UK is a member of the Great Britain Enhanced standard, which was implemented specifically for high-generation breeding stock.

This scheme was developed, in conjunction with UK primary breeding companies, by the British Poultry

Council, the Department for Environment, Food and Rural Affairs and the Animal and Plant Health Agency, based on the original principle outlined by the World Organization for Animal Health.

In 2011, Aviagen was the first primary breeding company to be awarded compartment status and has since successfully exported to Japan and South Africa under this principle.

Since that time, Aviagen India received formal approval for compartmentalisation in 2014, and Aviagen in the US will apply for compartmentalisation certification this spring and expects certification before the end of this year.

"We are delighted to be able to import under compartmentalisation and to have a stable, ongoing supply to the Japanese market," Hideaki Kokubo, Nippon Chunky executive officer, told International Hatchery Practice. "It gives us and our customers a greater sense of security and helps us to fulfil the broiler meat production requirements of the Japanese market."

aviagen.com

Support Team covered such topics as breeder to broiler management, ventilation and nutrition.

cobb-vantress.com

Hy-Line seminar for Asia market



Hy-Line International recently brought together its growing number of Asian distributors to share strategic management methods for optimal breeder performance and

superior results. More than 100 participants took part in the Hy-Line Asian Technical Seminar, in Pattaya, Thailand, for two days of intensive training, marking Hy-Line's increased market share in the region.

Hy-Line has achieved increased market share in the region due to the prolific egg numbers, feed efficiency, exceptional livability and superior egg colour and quality of its layers.

They lead the way in a part of the world that accounts for more than 63% of the world's egg production by offering layer farmers a greater opportunity to make more profit.

With the Hy-Line Brown, W-36, W-80, Silver Brown and Sonia, Hy-Line delivers a bird for every market – every climate, every housing system, every country. The participants heard presentations on nutrition, lighting, disease management, breeder management, global markets and trends, and worldwide results of Hy-Line layers.

The seminar included experts from the Hy-Line Technical Services team as well as industry guest speakers.

hyline.com



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Quingdao, China
www.caaa.com.cn

VIV Russia

23-25th May
Moscow, Russia
www.vivruussia.nl

Livestock Philippines

24-26th May
Manila, Philippines
www.livestockphilippines.com

Xth Symposium on Poultry Welfare 2017

19-22nd June
Ploufragan, Brittany, France
www.poultrywelfare2017.com

Avi Africa

20-22nd June
Gauteng, South Africa
www.sapoultry.co.za

VIV Turkey

6-8th July
Istanbul, Turkey
www.vivturkey.com

Agrena

13-15th July
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www.agrena.net

Lanka Livestock

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Colombo, Sri Lanka
www.lankalivestock.com

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