turkeybreeder**FOCUS**

1. Testing day old poults

by Dr Kenton Hazel, Aviagen Turkeys Ltd. www.aviagenturkeys.com

When poults arrive on farm they should be free from physical defects, actively looking for feed and water, able to respond to changes in temperature and generally exhibit typical behaviour. In addition, they should be free from zoonotic infections and pathogenic organisms that can result in disease or poor performance.

However, poults will never be sterile! Poults are hatched from an egg which is laid via the cloaca of the hen. The cloaca has a huge microbial population (~10^9 bacteria per gram of faeces) to which the egg is exposed when it is being laid. The egg surface will be heavily contaminated with these organisms and, despite egg sanitation procedures, some of these bacteria will persist through to the hatching stage where they will contribute to the formation of the gut flora of the newly hatched poults. The presence of 'normal' gut flora at delivery is not a cause for concern, or for the use of antibiotics, unless it is linked to clinical disease in a significant number of poults in the first few days of life. This will usually take the form of omphalitis, yolk sac infection or bacterial septicaemia.

Some organisms should not be present at any level in the poults leaving the hatchery. These include avian influenza virus (AI), the avian pathogenic mycoplasmas (M. gallisepticum, M. synoviae, M. meleagridis and M. iowae) and salmonellas, particularly those that are primary avian pathogens or are of human health significance. Most of these are covered by intracommunity trade legislation which requires turkey breeder flocks to be free from notifiable AI and ND, S. pullorum/gallinarum, S. arizonae, Mg and Mm.

HATCHERY ENVIRONMENT

The warm and humid hatchery environment provides ideal conditions for the survival of a number of environmental organisms aside from those that are part of the normal flora of the hen. These include Pseudomonas sp and Aspergillus fumigatus.

These organisms can enter the hatchery on the eggs from the farm environment or via a number of other routes from the external environment. The modern hatchery sanitation programmes are designed to keep these and other potentially infectious organisms under control but are unlikely to eliminate them entirely.

The aim of the hatchery sanitation procedures should be to limit the exposure of the eggs to these organisms in order to prevent the contamination of the developing embryo or newly hatched poult. High levels of challenge can result in infection of the embryo within the egg or an overwhelming challenge at hatch.

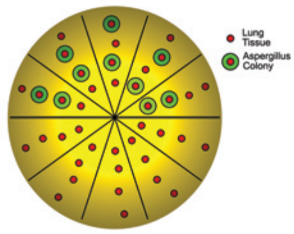
Transmission of infection from the breeder farm can occur due to the true vertical transmission of poultry pathogens in the egg, such as mycoplasmas and salmonellas etc, or through contamination of the egg shell on the farm, for example salmonellas. The use of these eggs can result in increased risk of overwhelming challenge at hatching leading to clinical disease.

The hatchery can pose a challenge through a variety of micro-organisms during incubation/hatching if inadequate management procedures are followed. Excellent hygiene is required if interventions such as in-ovo vaccination, toe trimming, beak trimming and de-snooding are carried out at the hatchery as these provide a break in the poults defences through which bacteria can pass, for example Staphylococcus aureus.

ORGANISMS LIKELY TO BE PRESENT IN DAY OLD POULTS

During hatching and processing, the poults will be exposed to bacteria which have survived in or on the egg despite egg sanitation procedures. These are likely to include bacteria that make up the 'normal' flora of the breeder hen, namely clostridia, lactobacilli, bacterioides, E. coli enterococci, etc.

In addition to the normal egg flora the poults will also be exposed to the environmental organisms that survive the hatchery sanitation procedures – these can include



Method to determine increased risk of aspergillosis

From 10 poults take four pieces of lung tissue (two from each lung) the size of a pin head and place on Sabouraud agar as shown opposite. If at least five poults have two or more positive lung samples then there is an increased risk of aspergillosis in the flock.

Fig. 1. An example of a published method used to predict the likelihood of aspergillosis (Hamet. N, 1990).

Pseudomonas sp and Aspergillus fumigatus. The detection of low levels of these organisms in healthy poults at delivery is not an immediate cause for concern.

The poults are also likely to be exposed to these organisms on arrival at the farm as they are likely to form part of the environmental flora on any poultry site.

TESTING DAY OLD POULTS

Any sampling strategy should be determined by the type of organism, the route of infection and the likely transmission rate.

- **Salmonella:** Sampling the poult transport materials (poult box liners) can provide a good composite sample to determine the status of the poults being received. To maintain the confidence of both the breeder and the farmer this sample is best taken on the delivery vehicle before the boxes in question enter the house, as boxes/poults can become contaminated in the first few minutes on a farm that has not been adequately cleaned and disinfected.
- **Mycoplasmas:** The best protection against receiving poults infected with mycoplasma is to source the poults from a reputable hatchery that guarantees freedom from infection. Testing at day old is very unreliable for a number of reasons. Serological tests are prone to false positive reactions; PCR and culture are highly unlikely to detect the presence of any mycoplasmas given the low transmission rate, number of source flocks and very small sample sizes usually involved. Farmers/companies that source flocks from a number of different hatcheries frequently carry out testing at placement. In these circumstances it is important that limitations of the testing regimes and the tests themselves are understood by their veterinary advisors and that positive results are confirmed by follow up testing.
- **Aspergillus:** Testing simply for the presence or absence of Aspergillus sp is of limited use given the widespread distribution of this organism. Any testing for the organism needs to give some measure of the potential for disease being caused i.e. it needs to be quantitative. The isolation of Aspergillus fumigatus does not mean the poults have aspergillosis. Aspergillosis cannot be treated with antibiotics.
- **Post mortems:** Monitoring mortality and responding rapidly to unusual or increased mortality is an extremely effective way of determining if hatchery related infections are occurring and allow for early appropriate intervention if it is required. Where possible, antibiotic sensitivity testing should be carried out to help determine what antibiotics are effective.

CONCLUSION

The practice of culling and testing day old poults occurs regularly in those markets where independent farmers source poults from a number of hatcheries, who may in turn have sourced eggs from a number of companies. It is important that positive results for either salmonella or mycoplamsas are confirmed – the sampling process needs to be carefully carried out and a laboratory with good quality control systems should be used. Overall, the decision to carry out testing to determine the microbiological status of poults and how the results are used needs to be based on accurate science, otherwise, the procedure is largely ineffective and simply another cost. ■

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2. Getting breeder poults off to a good start

by Hybrid Turkeys. www.hybridturkeys.com

Whether raising breeder or commercial turkeys, the first few days of life have a significant impact on their lifetime performance. Temperature, both of the poult and the environment, plays a significant role in getting a flock off to a good start.

A good indication that poults are comfortable in their setting is seeing them actively exploring their environment, eating and drinking. Especially during times of extreme cold weather outside, it is important to maintain focus on a few key areas related to brooding temperatures.

INTERNAL TEMPERATURE

At delivery, and then 12 hours post-placement, ensure the poults' internal temperature range does not fall below 39.4˚C and does not exceed 40.0˚C. To measure this, take a random sample of 10-12 poults and test their internal temperature using a poult thermometer.

- Expose the cloaca, then gently introduce the thermometer.
- Thermometer depth should not exceed 1/3".
- Leave the thermometer in place until the reader beeps.

BARN TEMPERATURE

The brooding environment should have an even distribution of floor temperatures ranging from 32.2˚C-35.0˚C across the feed and water space. It is important to make sure floor temperatures are in the correct range since cold floors can quickly reduce body temperature, making it more of a challenge for the poults to find feed and water sources.

When it comes time to prepare your brooder house, preheating is one area you do not want to miss. It is suggested to allow 24-48 hours to preheat the barn, and up to 72 hours during extreme cold. Bedding can act as an insulator, making it difficult for heat to reach below the surface. Make sure that preheating has had time to build heat deep into the bedding. You can measure this by following these steps with a temperature reader:

- Measure the temperature of the top level of the bedding.

- Push away bedding so that you have exposed about 1" underneath the top level.
- Measure the temperature again; if the temperature difference is significant, more time is needed to heat up the floors.

Alternatively, stove temperatures that are set too high, have inconsistent heat cycles or do not properly project their heat can create hot spots. This causes the poults to move away from feed and water if they are in an environment that is too hot.

Optimum floor coverage.

POULT ACTIVITY

At placement, and up to 12 hours after, be sure to monitor your poults' behaviour and activity. If you notice poults are backing away from feed and water underneath a heat source, the temperature in this area may be too high. If poults are huddling together and are not actively eating and drinking, they are probably too cold. Both overheating and cooling can result in large numbers of flip-overs if left unchecked.

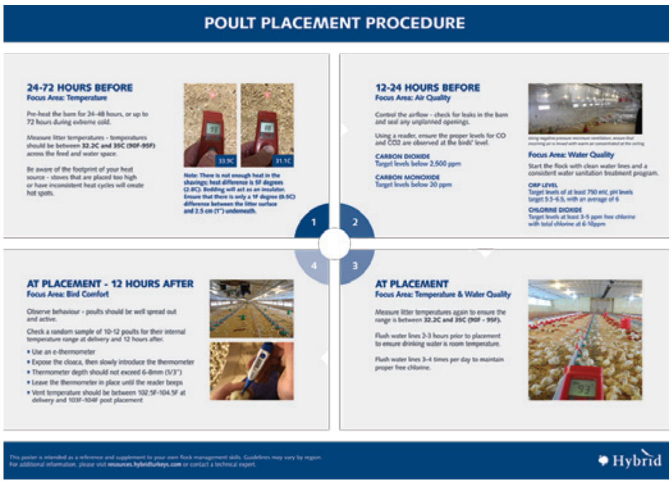
Maintaining optimal temperatures is just one of the focus areas when preparing for breeder poult placement. What are some other reminders when it comes to brooding? Hybrid Turkeys offers a poster that breaks down each step of the process, with major areas of focus, beginning a full 72 hours before placement.

Just like newborn babies, poults need careful attention and a clean, comfortable environment. It is up to each turkey producer to keep their flocks comfortable in the first few hours and days of placement.

Preparing for poult placement can be hard work and each breed, even each flock, is a little bit different.

Brooding requires careful attention to detail but with these tips in mind, and close attention to the behaviour of your birds, the long term benefits of strong breeder flock performance will be well worth the effort. ■

You can download the Hybrid poult placement procedures poster at www.resources.hybridturkeys.com/brooding-whole-room/birds



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3. An overview of gut health

by Dr Richard Bailey, Aviagen Ltd. www.aviagen.com

The efficient conversion of feed into its basic components for optimal nutrient absorption is vital for both commercial and turkey breeder production and welfare. Gut health, an intricate and complex area combining nutrition, microbiology, immunology and physiology, has a key role to play. When gut health is compromised, digestion and nutrient absorption are affected.

Failure of gut health can have a detrimental effect on feed conversion and increase susceptibility to disease; leading to economic loss.

In addition, recent changes in legislation on the use of antimicrobials, differing feed requirements and more efficient birds highlight the need for a better understanding of gut function and gut health. This article aims to explore the area of gut health and outline key factors that are important in the development and maintenance of optimal gut function.

AN OVERVIEW OF THE GUT AND HOW IT WORKS

The intestinal tract of a bird is a specialised tube that starts at the beak and ends in the cloaca. The primary function of the gut is the conversion and digestion of food into its basic components for absorption and utilisation by the bird.

The gut is separated into five distinct regions (Fig. 1): the crop, proventriculus, gizzard, small intestine (duodenum, jejunum, and ileum), and large intestine (caeca, colon and rectum).

Each of these regions has a specific role in the digestion process and absorption of nutrients. The feed enters the crop where it is stored for a short period of time and partially fermented by the resident bacteria. The feed then enters the proventriculus where is it mixed with acid and pepsin (an enzyme which breaks down protein) and then on to the gizzard. The gizzard acts like a grinding mill to break the feed into smaller particles, it will then release the feed into the small intestine once the feed particles are small enough.

Whilst the gizzard grinds the feed it is mixed with the acid and enzymes secreted by the proventriculus. This process allows for the breakdown of whole proteins into smaller peptides which can then be digested in the small intestine into amino acids for absorption. Within the small intestine the carbohydrates and fats are also broken down so that they can be absorbed and used by the birds.

During the normal digestion process, once the digesta reaches the last part of the ileum all the proteins, fats and carbohydrates should have been absorbed leaving behind the non-digestible components of the feed (for example cellulose, non-starch polysaccharides etc).

This material has two fates; it is either passed out in faeces or taken up by the caeca where bacteria ferment these materials to form organic acids, short chain fatty acids and vitamins which the bird can absorb for extra nutrients. At the end of digestion turkeys will produce two types of droppings; a caecal and a faecal which look very different.

GUT INHABITANTS

The gastrointestinal tract (GIT) consists of a diverse community of mainly bacteria, fungi, protozoa, and viruses (gut microbiota). The major development of this community begins on hatching; bacteria are picked up from the environment, the feed, and the people handling the poults post-hatch. Each of these three areas can therefore affect gut microbiota development.

MAINTAINING THE BALANCE OF GUT HEALTH

Maintaining good gut health is critical for maintaining the growth, health, and welfare of the bird. If digestion and nutrient absorption is compromised an imbalance or overgrowth of the gut microbiota can occur which in turn will affect bird health and performance.

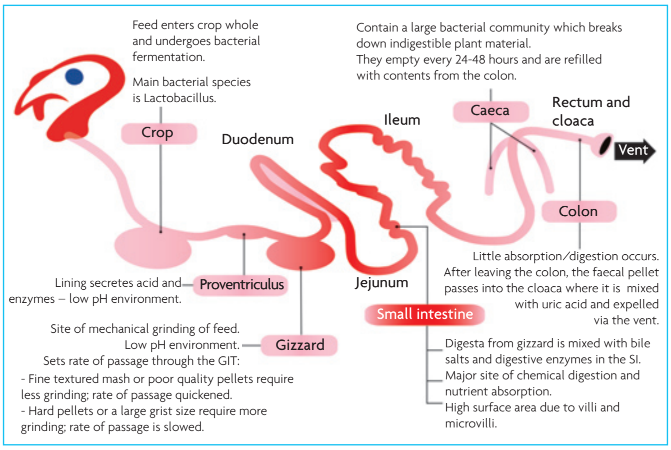

Fig. 1. The five distinct regions of the bird's intestinal tract.

The balance of the microbiota in the gut can be significantly affected by bird management and environment.

- **Diet:**
Feed changes, raw materials, and physical quality all influence the balance of the gut microbiota.
- **Brooding conditions:**
The provision of optimal brooding conditions is essential for ensuring optimal development of the gut tissues, immune system and microbiota. Birds receiving appropriate brooding develop a gut that performs well and has a greater capacity to cope with the challenges of the turkey shed. Early access to feed and water is essential.
- **Biosecurity:**
If clean-out and disinfection procedures are inappropriate, pathogens will be introduced into the poultry shed, exposure to these pathogens will influence gut health and development.
- **Risk periods:**
There are times during poultry production when the bird will be challenged, for example during feed change-overs or vaccination. During these periods, the gut microbiota can fluctuate and in some cases, if management is sub-optimal, dysbacteriosis can occur.
- **Environmental conditions:**
Temperature and ventilation. Achieving optimal environmental conditions will promote good gut health.
- **Mycotoxins and infections:**
These will also impact gut health.

GUT HEALTH RESEARCH

Gut health provides for an active area of research in both human and animal science. Aviagen Turkeys is committed to gaining a better understanding of gut flora, gut function, and gut immunity by undertaking internal research projects and collaborating with universities to ensure the latest technologies and knowledge are adopted to improve bird gut health in the field.

CONCLUSIONS

Maintaining the balance of good gut health is a key aspect of getting the best growth and FCR out of any food producing animal.

Many researchers have attempted to understand gut microbiota, gut function, and gut immunity. It is increasingly evident that the gut remains a highly complex area.

Regional variations in poultry production, management styles, climate, disease challenge, and feed raw materials add further complexity to maintaining good gut health.

However, what is clear is that developing and maintaining gut health through good bird management practices is key to maintaining bird health, welfare, and performance. ■

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4. Using the right breed for the right market

by Paul Kelly, Kelly Turkeys. www.kellybronze.co.uk

What is currently happening in the turkey breeder world? As in all livestock sectors the advances in turkey breeding over the past 50 years has been phenomenal. The industry has done a spectacular job in producing affordable quality meat in the most efficient way possible. The continuous increase in growth rates year on year brings with it some challenges for some of the various sectors of the turkey market.

The international turkey breeders are, of course, breeding for the mainstream world market, which is for deboning into turkey primal cuts for further processing.

There are though various markets in the world that require whole birds and crowns and saddles for seasonal markets. In world terms they are niche, but of course important for the countries that have these whole bird markets.

These whole carcase markets require a breed that produces a quality carcase at popular table weights. Popular eviscerated carcase weights for the whole bird fresh market are 3.5-6.0kg.

The whole carcase requires different selection pressures and parameters to those for the further processing market.

To understand why different breeds are needed for the whole carcase market a simple lesson in physiology is needed.

There are five main stages of development in all species:

- **Stage 1:**
Development of blood supply and nervous system.

- **Stage 2:**
Development of vital organs.

- **Stage 3:**
Skeletal growth.

- **Stage 4:**
Muscle development.

- **Stage 5:**
Laying down of fat.

As the commercial turkey has been bred for processing and meat stripping at heavy weights the result is a bird that reaches popular whole carcase weights at a very young age.

Currently in most markets the females from standard large breeds are used to produce whole carcase and bone-in crowns and saddles.

The females take between 9-11 weeks to get to these popular weights; the male just 7-10 weeks.

In my opinion killing turkeys at this age produces a product that is simply not good enough and gives turkey a bad reputation for eating quality. The turkey is still in stage three of development and is just a bag of bones.

The large breeds were dual purpose in many ways in that the male was perfect for further processing and the female was perfect for the whole carcase market.

This has changed and to produce quality carcase weights at under 6kg then a smaller slower growing breed is needed to supply a good quality carcase. The pictures in Fig. 1 show the differences.

The turkey industry needs to accept that in order to keep and maintain the whole carcase market then it must not supply a product that is not fit for purpose. Many turkeys are killed when they are simply the right weight and not when they are ready to eat!

The pictures in Fig. 2 highlight these differences.

Fig. 1. To produce good quality carcase weights at under 6kg, then a smaller slower growing breed is needed.

Fig. 2. Many turkeys are killed when they are simply the right weight and not when they are ready to eat!

NOTES

- To supply these whole bird markets in the volumes needed in the seasonal peak weeks requires more females than males. So more eggs are set to supply the females and the males are, in many cases, surplus to requirements so therefore destroyed.

- An as-hatched program using smaller breeds supplies, in most cases, the perfect weight profile and therefore does not lead to the waste and perceived welfare issue of destroying surplus off sex.

- The costs of production are slightly higher but the reduction in downgrades in the factory (broken wings are not an issue) and the lower mortality of the smaller breeds more than compensates for the slight increase in live weight costs.

- Using the smaller breeds gives a much larger meat to bone ratio. Fig. 3 shows 50% more breast meat. ■

Fig. 3. Using the smaller breeds gives a much larger meat to bone ratio.

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5. Hot weather management

by Aviagen Turkeys Ltd www.aviagenturkeys.com

It is important that managers reduce the effects of heat on flocks by modifying husbandry practices to improve bird comfort and reduce the impact on flock performance. Thermoregulation is the ability of birds to maintain their body temperature across a range of environmental temperatures. Turkeys use a variety of physiological and behavioural mechanisms to maintain body temperatures (see Table 1).

Laying performance of female turkeys can be impaired by house temperatures above 20-25°C. Egg size and shell quality can also be affected by high house temperatures. Insulation to prevent solar heat gain will reduce the total amount of heat that has to be removed from the house. Evaporative cooling can be effective in reducing house temperatures in dry climates.

Elsewhere, the benefits of increasing air speed at bird level can be used to promote heat loss from the birds. Air speed can be increased by providing vertical or ceiling mounted circulatory fans. These fans can be successfully used in both fan powered and naturally ventilated houses.

Egg production is often improved when there is a difference of at least 10°C between day and night temperatures. Maintaining this temperature difference is particularly important in hot climates to help control broodiness.

In fan powered ventilation systems, this can be difficult to achieve – especially in areas where high humidity occurs at night and evaporative cooling cannot be used. In well insulated naturally ventilated houses, it is also important to ensure that the ventilation rate at night is sufficient to remove heat accumulated during the day.

The effect of high temperature can be exacerbated by high humidity. Birds which are not used to warmer conditions may find it more difficult to adjust to hot weather. In regions where hot summers are common, bird housing should have already been designed with features to minimise the likelihood of heat stress.

VENTILATION

Increase ventilation rates and lower thermostat settings at cooler times of the day to reduce latent heat and allow birds to recover from hotter conditions. Ensure all fans are in working order, belts are tightened and fan housings are kept free of dust.

Minimise obstructions which may reduce air-flow: trim vegetation around the sheds, clean vent openings to remove dust accumulation, keep screens and light baffles clear of dust and feathers. Direct hanging fans so air flows across the birds.

Fully functioning and properly set alarm systems are essential in hot weather. Take care when altering alarm system settings to ensure they are appropriate for the difference in day and night temperatures. Separate day and night alarm settings may be required. Test life-support systems before placement and weekly thereafter. Check alarm systems, test and run automatic generators and check emergency ventilation (curtain drops etc).

Table 1. Physiological and behavioural mechanisms.

Methods of heat loss	Behavioural and physiological actions
• **Radiation:** Loss of heat by radiation to cooler surrounding surfaces	• Seeking shade/cooler areas
	• Reducing activity
• **Convection:** Heat loss via natural rising of warm air	• Panting
• **Conduction:** Heat transfer by contact with a cooler surface	• Spreading feathers
	• Vasodilation
• **Evaporation:** Heat loss from respiratory surfaces	• Reducing feed intake

EVAPORATIVE COOLING

- Test ALL fogging and evaporative cooling systems prior to use each summer.
- Fogging/misting nozzles can become clogged; hoses and pipes can become cracked. Depending on the system these need to be kept clean/dry to prevent a high microbiological load being spread onto the birds when starting to use them.
- Dripping nozzles will reduce mist onto birds, decrease the cooling capability of the system and create wet spots. Watch for drips and repair as needed.
- Fogging systems should be run at service technician recommendations on temperature and timer settings.
- Check egg storage conditions.

WATER

As water consumption doubles at temperatures above 30°C, available drinker space should be correspondingly increased in climates with high ambient temperatures.

- Monitoring daily water consumption will indicate potential problems.
- Header tanks should be situated within the house to ensure the water tanks are not exposed to heat from direct sunlight.
- Ensure all drinkers are in working order. Adjust drinker height and water depth to ensure good access to water.
- Ensure free access to cool water throughout the shed by providing sufficient drinkers for the number of birds being grown. Extra drinkers may be required in hot weather.
- Cooling water to lower temperatures will also assist the bird's thermoregulation. Ideally water should be cooled to below 25°C; levels in excess of 25°C will result in reduced water intake. Water can be cooled by flushing water lines, or altering water lines to run along the base of cool pads.
- Consider using electrolytes to reduce stress on birds at key times. Look for electrolyte packs with stabilised vitamin C.

• Excessive heat (>85°F/29°C) – run electrolytes during daylight hours and fresh water overnight.
• Moving birds to laying farms – run electrolytes for 24 hours before moving.

WORK SCHEDULE

Avoid handling or moving birds during the warmest time of day. If required, events such as bird movements, weighing, vaccination, re-bedding/litter tilling etc should be done at cooler times of the day. Avoid birds becoming crowded.

BIRD CONDITION

Ensure bird bodyweight and condition is optimal prior to the onset of hot weather, this will ensure the hen has adequate reserves when feed intake is compromised.

This is achieved by ensuring the birds are in a positive body weight trajectory from 22 weeks to lighting up, the feed density needs to be adjusted if weight gain is not keeping to target.

EGGSHELL QUALITY

As birds hyperventilate during heat stress, there is increased loss of CO_2 gas via the lungs. Lower CO_2 in blood causes blood pH to elevate or become alkaline resulting in a condition called respiratory alkalosis.

Higher blood pH results in reduced calcium and carbonate ions transferred from the blood to the shell gland (uterus) resulting in thin, weak egg shells.

Increasing the amount of calcium in the diet will not correct the issue, however restoring the acid/base balance through supplementation with potassium chloride or sodium bicarbonate has been shown to improve the bird's tolerance to heat stress.

The bird also excretes more electrolytes during hot weather, higher sodium levels may be required (increased by 0.02% to 0.03%).

The ratio of chloride to sodium should increase to between 1:1 to 1.1:1 in hot weather conditions. The target electrolyte balance (molar balance equivalence of Na^++K^+-Cl^-) should be approximately 240-250 mEq/kg. ■

6. Multi stage incubation procedure

by Aviagen Turkeys Ltd www.aviagenturkeys.com

Multi-stage incubation is where the machines are operated continuously, with eggs being set and transferred in the machine once or twice a week. Multi-stage incubation uses the heat generated by the eggs at the end of incubation to warm the eggs at the start of incubation. The alternative system is single-stage incubation where all the eggs within the incubator are at the same stage of development.

The major advantages of multi-stage incubation are:

- Lower operating costs due to heat output from older eggs in the incubator being used to warm the younger eggs.
- Simplicity of operation.

This article is not able to provide exact incubation programmes for all types of multi-stage incubators, as different incubators will have different requirements. Incubator manufacturer's advice should be taken. However, it does indicate some basic principles when looking at multi-stage incubation programmes.

INCUBATOR MANAGEMENT

Setting patterns

- Multi-stage incubators rely on the efficient transfer of heat from the eggs at the end of incubation to those at the start of incubation.
- Eggs are normally set within a multi-stage machine either weekly or twice weekly.
- To ensure efficient heat transfer it is important that the eggs are set in the correct pattern within the machine. The manufacturer's recommended set pattern should be followed.

It is important that a similar number of eggs from each stage of incubation are placed within the setter and that the stages of incubation are evenly distributed across the incubation period.

Examples of good and bad multi-stage machine loading are shown in Table 1.

Loading pattern					
Incorrect		Incorrect		Correct	
Day of incubation	No. of eggs	Day of incubation	No. of eggs	Day of incubation	No. of eggs
1	2,000	8	4,000	1	4,000
8	2,000	16	4,000	8	4,000
15	2,000	20	4,000	15	4,000
22	10,000	24	4,000	22	4,000

Table 1. Examples of good and bad multi-stage machine loading.

CLEANING AND MAINTENANCE

As multi-stage incubators operate continuously, it is difficult to properly clean, disinfect and carry out routine maintenance within the machines.

For this reason it is important to programme a time when the multi-stage machines can be completely emptied of eggs.

If a high incident of contaminated (exploding) eggs occurs it is good practice not to refill the machine until it is empty, to allow thorough cleaning and disinfection.

INCUBATION PROGRAMMES

- Temperature:

The exact temperature programme used will depend on the temperature control characteristics of the multi-stage machine, but the objective should be to maintain egg temperature.

Typically, multi-stage incubators will be operating at 37.4-37.5°C. However, the tunnel type of incubator will normally operate at cooler temperatures, typically 37.0-37.1°C.

If eggs are being set into an empty multi-stage incubator (for example, after cleaning and maintenance) and there are no end of incubation eggs present, then better results can be obtained if a higher temperature is used.

The objective is to compensate for the lack of hot eggs in the setter.

As a guide:

- Day 1-3 after first set: +0.4°C.
- Day 2-6 after first set: +0.2°C.
- Day 7-9 after first set: +0.1°C.
- Day 10 onwards – normal multi-stage temperature.

Incubator humidity should be kept at the required level and ventilation is necessary to supply oxygen (O_2) to the developing embryo and to remove carbon dioxide (CO_2).

In multi-stage machines the ventilation should be sufficient to keep the CO_2 level below 0.3%.

Do not over ventilate as this will result in problems of temperature and humidity control.

Where air ventilation is the only method of cooling the incubator, then the level of ventilation must be determined by the machine temperature control system.

- Turning

Eggs should be turned hourly for at least the first 18 days of incubation. After day 18 the decision of whether to turn or not will depend on the impact of turning on airflow through the eggs and egg temperature and the machine design.

In some machines (tunnel machines) it is possible to stop turning eggs after day 18 of incubation and improve the airflow through the eggs. In some cases this has been found to be beneficial. ■

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7. Optimising egg production through weight management

by Dennis Bauman, Technical Service Representative, Hybrid Turkeys www.hybridturkeys.com

Today's turkey breeders are in a unique and challenging position. They are under pressure to deliver a high number of top quality eggs. At the same time, the demand for more meat from commercial birds has increased, resulting in larger sized breeders. Larger breeder hens are at risk for issues such as multiple ovulations, low egg production, and poor shell quality.

The larger the birds become, the more difficult it becomes for farm labour to manage the birds when many operations are already under pressure to minimise worker strain.

In order to optimise egg production, focusing on weight profiles is one area of importance that is often overlooked.

WEIGHT PROFILES AND FEEDING PROGRAMMES

Weight profiles and feeding programmes play an important role in breeder performance, especially during rearing. Heavier birds and reproduction are negatively correlated. This presents a challenge given the demand for producing a heavier bird for the processing plants. Breeders should follow the recommended parent stock body weight, growth curve, and diet proposed by their genetic providers in order to achieve the full genetic potential of their flock.

SAMPLING PROCEDURES TO OBTAIN BODY WEIGHTS

The following method is recommended to ensure that body weight samples are representative of actual flock values:

- Walk through the barn to encourage mixing of the flock prior to sampling. Pay special attention to move birds away from the walls and corners of the building.
- Use a weigh scale that is accurate to at least 0.2kg. More accurate measures will be obtained with a more sensitive scale.
- Sample birds at random from several locations in the barn.
- When possible, use a small catch pen to corral birds and record weights of all birds in the pen to ensure random sampling.
- Weigh at least 1% of the flock or a minimum of 50 birds.

With the data collected, you can determine the sample average and compare it to the recommended standards to see if your flock is growing according to the breeder recommendations. Frequent body weight sampling and quick reaction with management changes is critical to ensuring optimal flock weights.

MANAGING BODY WEIGHT DEVIATIONS

To troubleshoot body weight deviations from the recommended standards, growers should measure flock growth and understand the correlation to various diets.

Adjustments to diet durations can be made if you find your flock weights are not in line with the recommended standards.

For example, if you are noticing that your birds are trending underweight, you can extend the diet you are currently using until you reach the next milestone. If the birds are trending overweight, change to the next diet earlier in order to manage weight gain.

The best practice is to follow diets to the desired weights not solely based on the general diet timeline.

Table 1. An example of how to troubleshoot flock performance.

Age (weeks)	Body weight (kg)	Sample weight (kg)	Weekly feed consumption (kg)	Ration type	Potential troubleshooting action
1	0.18	0.18	0.15	Starter 1	
2	0.35	0.35	0.28		
3	0.57	0.51	0.44	Starter 2	Example 1: If sample weights are light as you near the end of Starter 2, extend this ration type
4	0.89	0.80	0.62		
5	1.32	1.32	0.81	Grower 1	
6	1.79	1.79	0.99		
7	2.32	2.32	1.17		
8	2.89	2.89	1.34	Grower 2	
9	3.46	3.46	1.49		
10	4.03	4.03	1.62		
11	4.60	4.83	1.74		Example 2: If sample weights are trending overweight as you near the end of Grower 2, change to next ration type one week early
12	5.15	5.40	1.84		
13	5.68	6.25	1.92	Holding	
14	6.20	6.51	1.99		

SUMMARY

Focusing on weight and feed management, especially in the rearing phase, will put you on the right path to optimising egg production.

In addition to understanding where your flock is trending along the growth curve, it is important to know the distribution of weights within the flock. For best results, the rule of thumb is to have more than 90% of your birds within approximately 10% of the average sample weight.

Beyond weight and feed, managing parent stock birds involves many other areas of focus including lighting and water sanitation. Visit the Hybrid Turkeys' resources section on their website to learn more. ■