1. Brooding: creating the right environment

by William Alexander, Technical Service Representative, Hybrid Turkeys.

Getting poults off to a good start is the most important time in the production cycle. It should begin with providing an environment that encourages good water and feed consumption. Chilling and overheating day old poults puts them at a great disadvantage by limiting early consumption, which in turn delays the development of the intestinal tract and immune system.

Poult body temperatures between 39.4-40°C have been shown to give the best outcome for consistent starts (Dr Vern Christensen, 2014).

The brooding environment should provide even distribution of the appropriate temperatures across the water and feed space, allowing for free movement and optimum results.

This can be accomplished through a variety of different barn layouts, each with specific temperature profiles to ensure flocks get off to a good start.

SINGLE RING BROODING

Single ring brooding is the traditional set up that has been used for many years. It consists of small rings and uses gas or propane fired brooder stoves (typically 30,000 btu each).

The area provided to the poults is limited by the infrared heat coverage of the heating unit. The number of poults per ring is limited to the space for feed and water access in the heat zone.

Room temperature is normally measured at the inside edge of the row of rings (furthest side from the barn wall), but outside of the infrared heat zone. The recommended room temperature here should be 29-30°C. The temperature range inside the ring should be 40-42°C directly underneath the stove with 29-31°C at the outer edge of the ring, depending on the height of the stove.

The stove should cycle on and off at regular intervals to create a temperature range between 32-35°C across the feed and water space. This allows the birds to move in and out as the stove cycles to find their comfort zone.

Individual stoves that are set too high or have inconsistent cycles can create hot spots that exceed what is required for the poults.

Temperatures directly underneath the stove that start to exceed 51-54°C during the heat cycle can result in over heated poults, flip-overs and poor consumption of water and feed.

This becomes evident when temperatures across the water and feed area are consistently over 35°C leaving the poults no place to escape the heat.

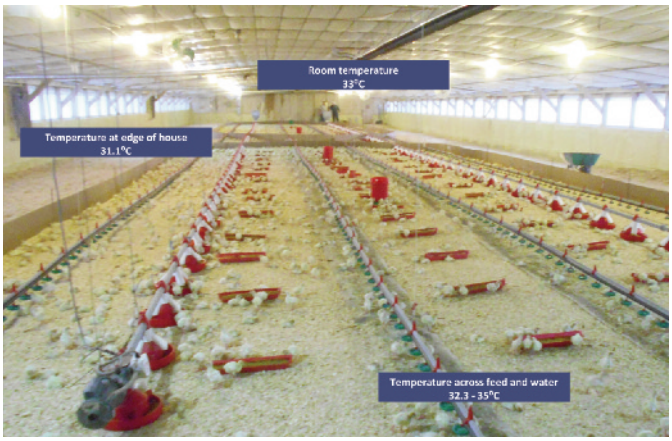
This can result in longer term uniformity issues across the flock if left unchecked.

WHOLE ROOM BROODING

Whole room, also known as large room, brooding is simply defined as brooding turkey poults without the use of rings to confine them under a single heat source. This method was patterned after brooding chicks in the broiler industry.

Whole room brooding is different from single ring as the overall room temperature in the brooder house is more closely related to the recommended temperature profile.

This allows the poults to move freely and have easy access to the feed and water across the entire brooding area. In other words, the whole house has become the ring.



Whole room brooding.

A heat system with a large infrared coverage or a large number of smaller heaters is needed to give the best result. The target temperature is normally measured near the outer edge of the house or in between the heater units, depending on the type of brooder stove.

The room target temperature can range from 31.1-33.3°C, depending on the heat source and the infrared heat distribution across the floor.

The infrared hot spot should range from 35-46°C. The floor temperature across the feed and water needs to be in the 32.3-35°C range at placement to promote good activity. It is important to have a heat source with ample infrared heat coverage and output that can adequately supply the heat needed without resulting in high carbon dioxide levels from high gas usage.

Long cycle times and high spot heat temperatures will lead to poor results with overheating; the same as with the smaller single rings.

Table 1. The recommended target house temperatures for brooding under conventional single ring versus whole room layouts.

	Ring brooding		Whole room brooding	
	Temperature (°C)		Temperature (°C)	
Week	Female	Male	Female	Male
1	29-30	29-30	31.1-33.3	31.1-33.3
2	27.8	27.8	28.9	28.9
3	26.6	26.6	27.8	27.8
4	25.5	25.5	25.5	25.5
5	22.8	22.8	23.3	23.3
6	21.1	21.1	21.1	21.1
7	20	18.9	20	19.4
8	18.9	17.8	18.9	17.8
9	18.3	17.2	18.3	17.2
10	18.3	16.7	18.3	16.7
11	18.3	16.7	18.3	16.7
12	17.8	16.7	17.8	16.7
13	17.8	15.5	17.8	15.5
14	17.8	15.5	17.8	15.5
15	16.7	14.4	16.7	14.4

SUMMARY

Table 1 lists the recommended target house temperatures for brooding under conventional single ring vs. whole room layouts.

You can see that whole room brooding requires warmer temperatures, which must be consistent throughout the house to keep poults comfortable and evenly dispersed.

It must be emphasised that adequate air exchange needs to occur regardless of the room temperature, otherwise poult activity and feeding behaviour will decrease.

Regardless of which method is used to brood poults there is no substitute for being prepared prior to when poults arrive.

This includes a clean and disinfected house and water lines, sound nutrition, properly functioning and calibrated equipment, and supervision of the brooding process ■

For more information on brooding poults visit www.resources.hybridturkeys.com/brooding-whole-room

2. Antibiotic free turkey production

by Dr Wiebke Oellrich, Company Veterinarian, Aviagen Turkeys.

The production of turkeys without the use of antibiotics is an increasingly common goal across the globe due to the focus on antimicrobial resistance. For too long, the use of antibiotics has been seen as a quick and easy way for solving production or management related issues rather than tackling the underlying causes. The industry must aim at improving the conditions surrounding the birds to eliminate the need to use antibiotics. This can only be accomplished by investment in facilities and training, better management, and a fully integrated approach.

In order to achieve this goal a number of important factors need to be addressed. These include breeder health, biosecurity, flock health, gut health, water quality and environmental management.

BREEDER HEALTH

Sourcing poults from appropriately vaccinated, healthy breeder flocks which have been fed on a well-balanced good quality feed is essential for them to have the potential to withstand the early challenges of the brooding period and to go on to develop a good, balanced intestinal flora which is essential to antibiotic free production.

BIOSECURITY

A strict biosecurity programme must be in place. This is necessary to safeguard the health of the turkeys by preventing the introduction and exposure to infectious disease-causing agents like mycoplasma.

An effective programme requires identification of the most likely sources of disease and establishment of practices designed to prevent the introduction and the spread of these pathogens into and between flocks. Practices include 'exclusion' and 'containment'.

Exclusion applies for example to visitors, vehicles and equipment that visit other poultry or livestock farms as well as not sharing staff with other sides. Containment covers areas like isolating the houses, controlling rodents and insects, and the entry of wild birds and other animals to the house. Showering-in and farm dedicated clothing should be the standard on site.

It is worth noting that the downtime between flocks is equally crucial to good performance. In this regard it is more important how many days the turkey house is rested under dry and clean conditions after thorough cleaning and disinfection rather than how long the houses are empty. The time depends on the health challenges on the farm and the geographic location.

FLOCK HEALTH

Preventing coccidiosis and necrotic enteritis are usually the main concerns during antibiotic-free production. Litter management and stocking density play a part in this. The lack of availability of coccidiosis vaccines makes this difficult though.

The use of a vaccination programme tailored for the location and situation of the flocks can prevent a range of viral and bacterial diseases. Where needed, the use of autogenous vaccines, which are specifically designed for the individual operation and usually aimed at bacterial infections, can be a good tool to minimise impact of the pathogens common on a farm.

GUT HEALTH & FEED

In turkeys, many factors affect gut health and consequently performance and susceptibility to infection. Good quality feed is essential for optimum digestibility. Anti-nutritional factors, including the physical form of the feed, impeded accessibility to feed due to high stocking density, nutrient content, and mycotoxins play a role in reducing gut health.

Antibiotic-free production programmes need to place particular emphasis on avoiding levels of mycotoxins that exceed recommended limits. The risk levels can be elevated in many regions.

Producers should be monitoring feed for mycotoxin contamination and, if necessary, implement a mycotoxin management programme. Grain damage and conditions that could increase mould and insect spoilage must be minimised. Fats and oils with rancidity should be rejected.

Bacterial contamination of feed and/or water can damage the intestinal tract, leading to an inflammatory response within the intestine and a shorter transit time for the digesta in the gut. Nutrient availability is consequently reduced.

Poor environmental control, particularly poor management of ventilation can result in wet litter and/or chilling of the birds and subsequent gut health issues which further exacerbate the poor litter conditions as the outcome of reduced gut health can be diarrhoea. This can also lead to dirty eggs in laying flocks which may result in a greater number of eggs being rejected or becoming infected. Wet litter is also known to lead to increased foot pad lesions.

WATER QUALITY

Water quality is often overlooked in turkey production systems even though it is a vital nutrient and can have a negative impact on the birds when containing harmful pathogens or generally high numbers of bacteria, yeast or moulds. Whilst feed quality often gets a lot of attention, it needs to be kept in mind that a turkey will consume about twice as much water during its lifetime as feed.

Even if mains water of good quality is used, daily water line sanitation and regular drinker cleaning is required in addition to water line cleaning between flocks. This is because bacteria, fungi or yeasts can quickly re-establish a biofilm in the water system. Some additive products like vitamins or vaccines provided via the drinking water can also create conditions favourable for the growth of biofilms.

Mortality is reduced and health greatly improved when this biofilm is removed. Ideally the build-up of a biofilm should be prevented right from the start after thorough cleaning of the water lines between flocks.

A daily water sanitation programme will therefore benefit the birds and the water system.

Utilisation of disinfectants approved for use in the drinking water of food animals reduces the level of water-borne pathogens. Various sanitation methods are in use. It needs to be kept in mind though that turkeys are sensitive to taste and can reduce water intake as a result.

ENVIRONMENT

Good housing environmental conditions with low stocking density should be provided for effective antibiotic-free turkey production. Any bird not experiencing the right environmental conditions according to its age will be under stress and more susceptible to health challenges.

During brooding for example, it is important to provide sufficient feeding and drinking space to avoid competition. Stress has a negative impact on the birds' feed intake pattern which can affect intestinal motility, further impacting on gut health and disease resistance.

Maintaining precise temperature control to avoid heat stress or chilling and providing the correct ventilation to take away harmful gases and humidity as well as providing oxygen is helping to make the bird comfortable and eat properly.

Turkeys spend their life in close contact with litter material. The aim is to establish good, dry but dust-free litter conditions to avoid problems like respiratory disease. High ammonium levels in the air lead to damage of the airway tissues and therefore increased susceptibility to infection.

SUMMARY

Having had the option to use antibiotics for many years has resulted in embedded practices that will need to change as the industry moves towards antibiotic-free production. Antibiotic-free production is not really adding anything new to the current systems, but it requires careful attention to detail and making sure that no areas are left to chance.

Systems need to be tailored to specific operations, continually be reviewed and practices amended as necessary. Having a proactive rather than a reactive approach should lead to the desired result ■

3. Setting turkey drinkers at the correct height

by Ziggity Systems Inc. www.poultrywatering.com

Ziggity Systems Inc has seen the adage that 'old habits die hard' ring true in the turkey segment of the poultry market which, up until recent years, relied primarily on open bell type watering systems. Many turkey farmers continued using open type watering systems long after broiler producers had changed to enclosed systems because of the turkeys' aggressive behaviour coupled with poor beak-eye coordination.

Regular nipple-type drinkers were not a good solution because turkeys could easily damage them and the trigger pins were too small a target for turkeys to activate – vital for the drinking process.

However, these problems have been resolved with the development of stronger materials and a completely new semi-enclosed drinker design that complements the way turkeys drink.

Ziggity's T-Max drinkers are designed in a manner that releases water into a rugged activator vessel during the drinking process, ensuring that the vessel is filled with just the right amount of water for consumption, but not oversupply that leads to spillage.

Using T-Max drinkers mitigates the problem of turkeys spreading disease through the watering system by featuring a much smaller and self-cleaning water vessel – a major departure from open bell type systems with vastly more open water and more surface that can harbour biofilm.

Additionally, with T-Max, spillage is drastically reduced, thereby improving litter quality. With bell type drinkers, the opposite is the case – the litter is constantly wet, creating an environment where micro-organisms can quickly multiply and harm the bird, or forever stunt its growth because of the additional energy expended by a bird to fend off disease.

However, these major advantages of using T-Max in turkey operations mentioned above can be quickly lost if producers try to manage the drinker as if it were a bell drinker and adjust the height off the floor so that it is even with the turkey's back.

With T-Max, the lip of the drinker has to be much higher than a turkey's back throughout the production cycle. The reason for this is that the T-Max is designed to fit with the turkeys' drinking behaviour.

Turkeys, like other poultry, cannot swallow. They ingest water by scooping it with their beaks and then lifting their heads and necks and then allowing gravity to move the water downward into their digestive system.

At a bell drinker, turkeys lower their heads to get some water into their beaks and then they lift their heads back up to 'swallow' or let the water slide into their crops.

Go way down to get water and then all the way back up to swallow and repeat. This up, down, up, down and repeat movement means a lot of water is spilled off their beaks and the litter gets wet – very wet.

With Ziggity's T-Max, the lip of the activator should always be at least even with the beak of the turkey when standing upright with elevated heads.

When drinking they lift their heads over the top of the edge of the drinker, scoop water with their beaks, and then lift their heads while still over the vessel and allow gravity to do its thing. By drinking in this manner – head and beak remaining over the vessel while drinking – means any water that does fall from their beaks ends up in the drinker vessel and not on the floor.

A special measuring stick makes it easy to properly line up the height of the watering line with the age of the turkey by aligning the age mark with the lip of the activator vessel.

Turkeys activating and drinking from a T-Max turkey drinker. Turkeys activate the water release by bumping the activator vessel with their necks, and then can quickly ingest the water from the vessel.

LESS SPILLAGE

The result of using T-Max drinkers and maintaining an elevated drinking posture means an efficient and effective drinking motion that mitigates spillage. Litter stays drier, there is less ammonia release, a better environment for the turkeys, and improved performance results.

Because height is so critical for achieving the best litter and turkey performance, Ziggity has developed a measuring stick tool that makes it easy to set a drinker line to the correct height based on the sex and age of the turkey. Simply place the stick on the floor next to the T-Max drinker and adjust the drinker height accordingly.

The stick is two-sided – one for adult males and one for adult females. Ziggity also offers handy plastic pocket cards with recommended heights in both centimeters and inches. All you need is a tape measure.

Time after time, Ziggity has found that best management practices for poultry watering systems play a huge role in improved poultry production.

We want to help in this effort by not only providing tools to do so, but explain the reason for doing so as well. ■

4. Matching protein and lysine requirements in turkeys

by Samia Messaoud, Techna France Nutrition, Groupe Techna: www.feedexpertise-techna.com

The average growth performance potential of turkeys has increased over recent decades, mainly due to genetic progress. In the french context of commercial production, which mostly specialises in medium strains, daily weight gain rose from 80g/d in the 1990s to 121g/d in 2016.

As shown in Fig. 1, the average weight of french commercial turkey males currently revolves around 15.3kg at 130 days old, while 25 years ago, the average slaughter weight was 10kg at 106 days old (data drawn from Aviperf Techna database). Therefore, in order to cope with this evolution, the share of protein and amino acids supplied by turkey diets must absolutely match these higher requirements.

IDEAL PROTEIN CONCEPT

Protein is well known to have a major effect on growth performance, and this especially applies to the supply of amino acids. Lysine and methionine are the most limiting amino acids in commercial corn soya-bean diets. Threonine, valine and isoleucine are the next most limiting amino acids. In addition, the relationship between the various amino acids has a major impact on turkey growth.

In other words, feeding higher levels of one without consideration of the other may result in an amino acid antagonism which can limit growth.

Usually, lysine is used as the amino acid reference point in order to express all other essential amino acids relative to the lysine percentage: this is what is referred to as 'the ideal protein concept'.

This concept relates more precisely to the exact balance of essential amino acids required in order to meet an animal's needs. The contribution of feed should be neither excessive nor lacking, and it should not be used for energy purposes.

As the cinetic of tissues varies with age and their proportion changes, it is admitted that the ideal protein ratio usually evolves throughout an animal's growth cycle.

As the needs of animals increase, due to genetics or other factors, this concept is easily used to provide diets with balanced essential amino acids depending on the lysine requirements.

REDUCING CRUDE PROTEIN

Formulating feed according to the ideal protein concept allows for a lower protein level in diets which can help maintain good breeding conditions. Indeed, high levels of protein are likely to cause wet litter, resulting in serious issues such as footpad disease, breast blister and overall poor performance.

Reducing dietary crude protein content by formulating according to amino acids needs can also have economic and environmental benefits.

To evaluate the effect of crude protein and lysine level on turkey performance, a trial was run on an experimental farm (Techna, Saint Symphorien, France, 2016).

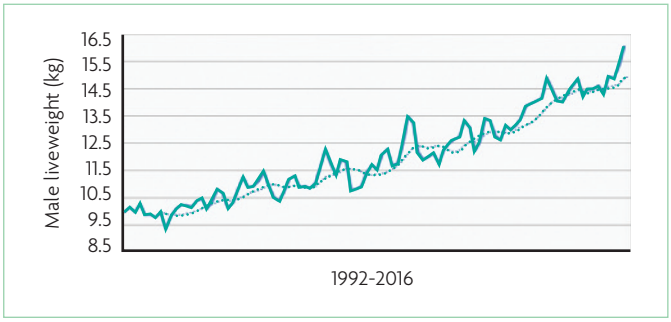


Fig. 1. Male liveweight 1992-2016. French commercial market - Aviperf database.

In this experiment, the aim was to examine whether two lysine levels combined with two different protein levels had an impact on BUT 6 male turkeys' feed intake, growth and water consumption during the starter-grower period (until 48 days old).

The higher level of protein and lysine was fixed according to Techna's nutritional standards. It was then compared with lower lysine and protein levels. From 0-48 days old, the average protein content in each group varied from 24.57-22.43%. The two digestible lysine levels tested amounted, respectively, to 1.41 and 1.31% (Fig. 2).

When increased by 0.1pt, digestible lysine levels clearly showed a positive effect on the weight of turkeys at 48 days.

Turkeys fed high levels of lysine showed significantly higher body weight (3.649kg vs 3.393kg, p=0.000), higher daily weight gain (74.6g/d vs 69.3g/d, p=0.000), higher daily feed consumption (119.7g/d vs 113.1g/d, P=0.007) and lower FCR (1.60 vs 1.63, p=0.006).

Although protein levels did not have a statistical effect on weight or on daily weight gain, these showed a statistical decrease in FCR (1.61 vs 1.63, P=0.07).

While turkeys fed higher level of lysine and protein diets ended up drinking more water, this did not statistically impact water to feed ratio during the 0-48 day period.

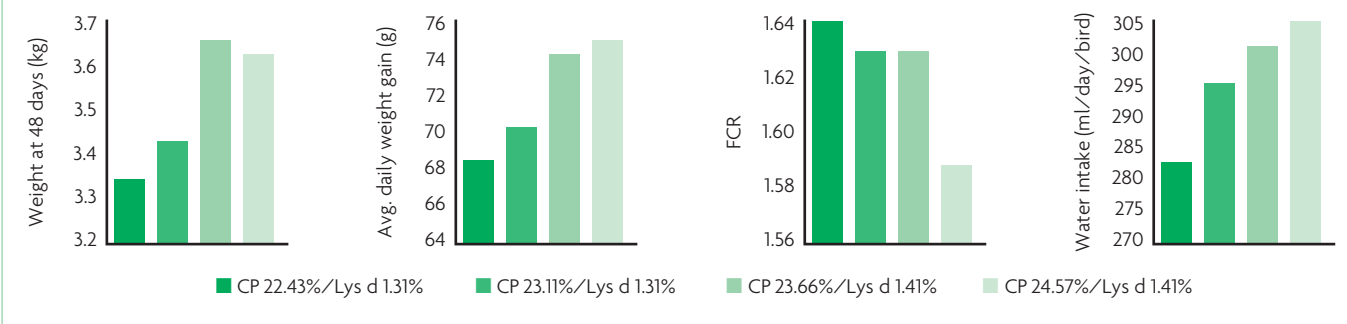
The group fed higher levels of lysine and protein achieved the best performance at 48 days old. This result suggests that the ratios of amino acid to lysine in the groups fed low protein diets were not optimal.

These findings confirm the interest and relevance of Techna nutritional standards within the framework of this experiment.

In addition to these trials, we should be reminded that amino acids needs usually differ depending on the objective sought by producers in terms of profitability.

Therefore, optimum diet formulations and feeding schedules must be tailored to each specific case. ■

Fig. 2. The impact of two different lysine levels combined with two different protein levels on BUT 6 male turkeys from 0-48 days.



5. Summer ventilation and maintaining good performance

by Pierre Dulac, Technical Support Manager, Hybrid Turkeys. www.hybridturkeys.com

Every summer, with different intensities depending on the year, the technical and economic performance of turkeys in the barn can decline. Of course, exposure to high heat results in higher mortality, but even just from 24°C (75°F) and up we start to see a decline in performance. A loss of 2kg live weight and 2% meat yield is not rare as well as an increase in feed conversion and decreased livability.

The comfort zone of an adult turkey is between 13 and 24°C (55-75°F). It is in this interval that we must look for the optimum performance area.

WIND CHILL

Using air speed is a very good method of cooling down the birds. Tunnel ventilation is a very efficient technology used in poultry buildings to remove heat from buildings and animals.

The air velocity in the poultry house depends on the power of the exhaust fans and the cross sectional area of the building. It is most often run between 2-3m/sec (400-600ft/min). It is recommended to increase the air speed if the following elements are in play: a higher temperature, a higher humidity, older birds, larger animals, a higher stocking density, or wet litter.

The efficiency of the exhaust fans, and therefore the air velocity, depends on the static pressure in the building, which depends on the air inlet area. It can be reduced by several other factors, such as pad-cooling cells, the age of the fans or poor maintenance, obstacles such as light shutters upstream and downstream from the fans.

Some outside light covers can divide the fan power by two. If they are not essential, they can be removed in case of severe heat.

An additional tip is to reduce the cross sectional area of the building to increase air speed by adding ceiling triangle deflectors.

In an open building with curtains, it is easy, inexpensive and fairly efficient to add circulation fans in order to create a strong air flow on the birds. A good rule is to place one 40,000m³/h fan every 200m² of building surface.

Opening the gates (while ensuring a fence is in place to contain the birds) is also a good way to increase ventilation.

Circulation fans create a strong air flow on the birds.

COOLING SYSTEMS

Tunnel ventilation is often associated with a pad-cooling system. The air which passes through the damp cells is cooled by drying them. This is the most efficient system in poultry houses. The drier outside air, the more efficient cooling.

Pad-cooling system for efficient cooling.

Opening gates is a good way to increase ventilation.

High pressure fogging systems are also used to cool down ambient air. This method is slightly less efficient than the pad-cooling, but it is easier to install, especially in existing buildings and easier to maintain.

The air velocity must first be used at about 24°C (75°F) or, more precisely, before the animals begin to pant and then, in a second stage, pad-cooling or fogging can be used at 28°C (82°F).

RELATIVE HUMIDITY

Relative humidity plays a very important role in the comfort of birds, which they are much more sensitive to than humans.

The presence of water vapour in the air increases the sensation of heat when it is hot and makes the air feel cooler when it is cold.

As humidity increases, the effectiveness of panting decreases as well as the cooling produced by pads or foggers decreases. It is necessary to reduce this humidity as soon as possible (target: 40% <RH <60%) for the health of the birds.

OTHER FACTORS

- **Stocking density:**

Density can be very influential as it is the temperature around the birds that can make a large impact on their comfort. Moreover, in a poultry house more than 80% of the heat is produced by the animals. It is recommended that bird numbers are reduced in order to reduce the amount of heat the ventilation system must remove.

- **Litter management:**

Wet litter will increase the moisture levels in the barns and once manure begins to compost, it will add heat.

- **Nutrition:**

If an increase in feed conversion is noted, one method of compensating is to offer a more dense diet and increase the energy provided by fat rather than carbohydrates. The use of electrolytes in their diet can also help to manage the physical effects of high temperatures.

During extremely hot days there are a few additional options to manage heat stress:

- Reduce or remove feed during the hottest period of the day and instead light the barns at night so the birds can eat and drink when the temperature has dropped.
- For a longer period, add a night snack in their diet by lighting for 2-3 hours in the middle of the night. ■

To find out more visit resources.hybridturkeys.com

6. The effect of feed form on turkey performance

by Marcus Kenny, Company Nutritionist, Aviagen Turkeys Ltd, UK. www.aviagenturkeys.com

Aviagen Turkeys (ATL) provide guidelines on the nutritional specifications required to achieve breed performance objectives. However in order for birds to respond to feed nutrient density the birds need to be able to consume the required amount of feed on a regular basis to achieve these objectives.

Many factors influence feed consumption; environment and management being two of the most important. Feed form is known to have a significant impact on consumption and poor crumb or pellet quality results in the occurrence of fines which can have a negative effect on feed intake.

The effect of feed physical quality on bird performance is well established; work by Nixey (1994) demonstrated that even a moderate improvement in pellet quality resulted in a 5% improvement in performance. Brewer (1989) fed turkeys diets containing 10% and 50% fines, the resulting feed conversions were 2.61 and 2.71 respectively.

FEED FORMS EVALUATED

A small scale evaluation examining the effect of different feed forms was conducted in ATL facilities in the UK. This involved feeding B.U.T. 6 males 'good' and 'poor' quality crumbs and pellets from 0-20 weeks. Diets were prepared according to the ATL recommended nutrient specifications and feeding programme. The starter diet was provided as a sieved crumb for the 'good' feed physical quality control and an unsieved crumb for the 'poor' feed physical treatment. The 'poor' pellet quality treatment was prepared by hammer grinding pellets to a fine consistency (fines) and then blended with intact pellets to result in a 50:50 mix of pellets and fines.

The mix of fines and pellets resulted in a feed physical quality similar to feed physical quality which can sometimes be seen in the field. The results showed there was a significant depression in bodyweights to 20 weeks of age; the poor treatment resulted in a 12.3% reduction in bodyweight loss relative to the control. FCR deteriorated by 36% in the poor treatment relative to the control at 20 weeks of age.

The negative effect of poor feed form on bodyweight was evident through the lifetime of the birds. The negative effect of the poor treatment was detected as early as three weeks of age and continued, with increasing effect, to the end of the trial period.

Breast meat yield was assessed at 20 weeks of age, the poor treatment reduced breast meat yield by 7.5%. This effect on breast meat yield is most likely related to the effect of feed form on physiological development to this age i.e. the birds fed the poor feed form were physiologically less developed at 20 weeks of age compared to the birds fed the control, hence breast meat was not as well developed.

The effect of feed form on performance was much greater than previously observed, in particular the magnitude of effect on FCR was unexpected. The data suggests that those birds fed the poor feed form ate significantly more feed than birds fed the control diet but did not convert this feed to liveweight.

Feed wastage is often evident when birds are fed poor quality pellets, while feed wastage was evident in some pens, this was superficial and not enough to account for the degree of difference in FCR. Another possible explanation for the degree of effect on FCR may be related to the preparation of the 'poor' feed treatment.

The degree of fine material within the poor feed treatment was very significant and also the extent of pulverisation during the feed grinding process may have resulted in a more extreme 'poor' feed form than assessed in some other trials which compared pellets to mash diets.

Nonetheless, the poor treatment was representative of poor feed form in the field and the results reinforce the importance of ensuring feed physical quality is optimal and is adequately assessed within the organisation.

Assessment of feed physical quality is usually measured by a sieving assessment of crumbs and a pellet durability index (PDI). Table 1 shows the target particle size profile for starter diets in a crumb form.

Pelleted products must contain a minimised quantity of fine particles (<1mm), aiming for less than 10% fines (farm sample assessment) with the remainder as intact pellets.

Pellet durability assessments are normally made at the mill laboratory via specialised devices such as a Holmen Tester or Tumbling Tester, a durability of >90% is realistic for most pelleted feeds.

These assessments involve placing a sample of feed through an aggressive process which is aimed at replicating the physical insults to the pellet in the field. This assessment allows the mill to know that manufactured feeds meet physical quality standards.

Assessment of feed physical quality should not just be conducted at the mill, farm assessments give a good indication as to what is provided to the bird especially if the sample is taken directly from the feed pan. This can be conducted via the use of a hand sieving device, the procedure is straightforward and practical for most farms to conduct.

There are many courses of action which the mill can take to improve poor feed physical quality. Behnke (1994) quantified the effect of different feed manufacturing processes on pellet durability, the main areas identified were grinding, conditioning and pelletising processes however changes in the formulation can also have an effect for example even 5% addition of wheat based materials can improve pellet durability very significantly.

The key point is that poor feed physical quality is not acceptable and there are means to improve feed physical quality.

Particle size	<1mm	1-2mm	2-3mm	>3mm
Starter 1	0-10%	45-55%	30-40%	0%
Starter 2	0-10%	25-30%	35-45%	10-15%

Table 1. Crumble particle size profile.

SUMMARY

- Feed physical quality has a significant impact on turkey performance, perhaps significantly more than previously determined.
- Optimising feed physical quality not only supports farm performance but also improves processing yield.
- Communication of feed physical quality standards between the farm and the mill is vital to ensure that the needs of the modern bird are understood and are met.
- There are several approaches to improving feed physical quality within the mill, some of which do not involve significant investment.
- Monitoring of feed physical quality in the mill and also on the farm is vital to ensure that feed form is continuously meeting standard. ■

For more information on how to examine feed physical quality through the use of Aviagen Turkeys hand sieves, please contact: yoakley@aviagen.com

Intact pellets.

Fines.

Pellet and fines blend.

7. Fungal infections in turkey flocks

by Albert Nakielski, DVM, Specialist of Poultry Diseases, BioPoint, Stawiguda, Poland. www.biopoint.eu

The most common fungal infections in turkey flocks are aspergillosis and candidiasis. In order to develop they need contributory factors, such as inappropriate conditions affecting bird welfare, the use of mouldy bedding material, fodder contaminated with fungal spores, lack of vitamins or accompanying infections causing lowered immunity.

ASPERGILLOSIS

Caused by: Aspergillus fumigatus, A. flavus, A. niger, A. nidulans.

- One of the most dangerous diseases among turkey poults is aspergillosis.
- It usually develops in poults during the first two weeks of life.
- The occurrence of the disease has been linked to poults hatching or rearing in an environment contaminated with fungal spores.
- Young birds during their rearing are most vulnerable to the disease but it may also occur in older birds.
- Fungal spores enter the organism through the respiratory tract. When they reach parabronchi and epithelium of the air capillaries, the spores sprout and reach the circulatory system from there.
- The disease usually has an acute character and causes a sudden, uncontrollable increase in flock mortality.
- Characteristic mycosis symptoms are dyspnoea, frequent gasping, neck stretching and closing eyes.
- Main post-mortem lesions are single or multiple whitish fungal nodules in lung tissues and air sacs.
- Hyperaemia of the upper and lower respiratory tract and focal fungal lesions in the brain are also found.
- Sometimes necrotic lesions in nasal turbinates and fungal nodes on the surface of the cornea are noticeable as well.
- Prevention is currently the preferred approach to control this disease.

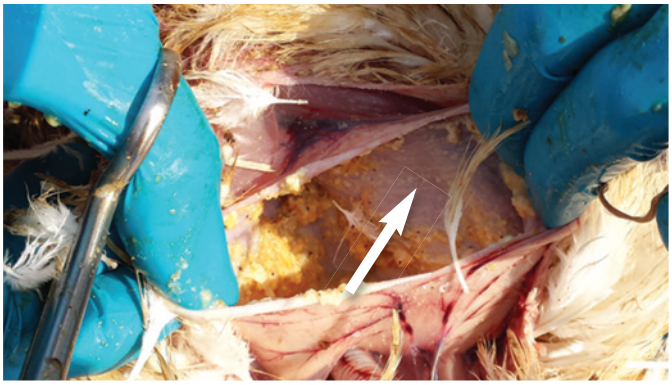
CANDIDIASIS

Caused by: types of yeast – Candida albicans, C. crusei, C. tropicalis – and often referred to as a fungal infection.

- It usually affects poults younger than three weeks, sometimes older, and 11-14 week-old birds.
- The infection is foodborne and occurs as a result of consumption of fodder, water or bedding contaminated with blastospores.
- The most important factor which encourages spreading of the fungal spores in the organism and the development of symptoms is long-lasting antibiotic treatment.
- Spores populate mostly the beak cavity, oesophagus, crop and proventriculus.
- Under appropriate conditions for development the fungus can spread on the surface of these organs and fungal filaments may penetrate into the top layers of epithelium.

The latter undergoes pathological outgrowth and a grey and yellow coating in the form of a pseudo-membrane appears on the surface of epithelium.

- Non-specific symptoms, such as lack of appetite, inhibition of growth, decrease in activity or ruffled feathers are commonly found in the course of the disease.
- Pendulous crop, neck stretching and beak opening as well as nervous ticks are also sometimes found.
- Confluent yellow or white coating tightly covering the mucosa can be seen in post-mortem observation of preferential sites of fungal development (usually in the crop).



Candidiasis – crop surface wrinkled and coated with confluent mass of white pseudomembrane (8-week old toms).

When the coating is removed, ulcers of varying intensity are noticeable.

Management of flocks in respect of fungal infections, as with many other health issues, should be focused on prevention, as treatment of the disease is difficult and often ineffective.

The best available solution to protect birds against infection is strict adherence to sanitation on the farm. However, both during prophylaxis as well as during disease outbreak, additional measures can be taken, such as application of herbal preparations.

In our practice we often apply with positive results: Defungal (a combination of herbal materials and potassium iodide) and Mintamix (a combination of herbal materials and vitamin A).

Caseous nodules due to aspergillosis in an air sac (2-week old turkey male).

PROPHYLAXIS

As a prophylaxis the following programme can be applied:

Defungal 200ml/1000l of drinking water/12 hours daily.
Duration of treatment: 3-5 days, starting from first week of birds' life.
Application route: Drinking line.

Prevention against Aspergillosis (additional measures):
Defungal 200ml; Mintamix 200ml/10l of warm water.
Frequency of administration: 2-3 times per week.
Duration of treatment: First two weeks of birds' life
Application route: Spray.

DURING DISEASE OUTBREAK

Barns should be fumigated with enilconazole according to label directions. Defungal may additionally help reduce the challenge.

Defungal 200 ml/1000l of drinking water/12 hours daily.
Duration of treatment: five days, starting from first signs of occurrence.
Application route: Drinking line.

Aspergillosis outbreak (additional measures): If enilconazole is not applied daily, then between successive applications of enilconazole spray application of Defungal is recommended. ■