Quality table eggs – right genes, right management

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Maximising quality table egg production for a particular market relies on combining the right genetics with careful management, particularly in regard to nutrition.

In all egg markets quality is a key factor determining profitability. The difference in income for the producer largely depends on delivering good quality eggs to the customer.

While egg number, feed conversion and liveability remain fundamental production traits, in the majority of table egg markets producers must also satisfy specific customer quality requirements in regard to size, shell colour and strength.

In countries such as Japan where raw eggs are popular with consumers, internal quality traits such as Haugh units, meat and blood spots also gain particular importance.

Internal quality. Haugh units are calculated by measuring the thickness of the egg white. Haugh units and internal egg quality are particularly important in the Japanese market where consumption of raw eggs is popular.

Breeding for egg quality

Hendrix Poultry Breeders (HPB) is one of the largest layer breeding companies. The Bovans, Hisex and Dekalb products are recognised worldwide for their strengths in different sectors of the table egg market.

With access to a very large and refined gene pool, the breeders select the best pure lines to optimise product performance and egg quality traits for different sectors. HPB utilise detailed information from the pure line farms, where birds are housed under ideal circumstances, and also rely on comprehensive field data collected from test farms, situated throughout the world, as well as the company's own facility at Stevensbeek, in the Netherlands.

Improving external and internal egg quality is a key focus of the programme. Eggs from the pure line and test farms are sent to the company's egg testing laboratory where shell strength, shell colour, shell shape and internal egg quality are routinely tested and measured.

While the colour of each individual egg is measured and recorded, HPB also look for uniformity of colour in a range of eggs. In brown eggs the market trend is towards darker shells, and HPB select accordingly. For white eggs the focus is on selecting pure white and minimising tinted coloured shells.

In regard to internal egg quality, selections are carried out using data generated on Haugh units, meat and blood-spots.

Managing egg quality

The genetics of a bird can only be fully utilised when proper management tools are employed.

Good management begins in the rearing period. Important points in the rearing period are:

- Bodyweight at five weeks.
- Uniformity at 16 weeks.
- Bodyweight development during start of production.

The skeleton, digestive tract, and immune system are all formed during the first five weeks. Achieving a good bodyweight at five weeks provides a sound basis for the production period when producers want a highly productive, robust layer.

At 16 weeks flock uniformity is key. At this stage uniformity of at least 75% is recommended, as the flock is easier to manage as the birds enter the egg production phase at the same time.

Bodyweight development becomes a key issue again from the start of egg production to its peak.

During this phase the bird can be more susceptible to disease, however it is a time when egg weight increases and the bird continues to grow.

Ideally birds should grow at least 300 grams in the period between 5% production and peak production of more than 90%. Achieving this provides a good basis for production persistency and eggshell quality later in the laying period.

Maintaining eggshell quality

An egg takes between 26 to 28 hours to form, depending on production and age of the bird. The shell is formed during the dark period. It is, therefore, advisable to make sure the bird's intestines are full during the night, promoting calcium from the feed to be used to produce quality eggshells.

It is also advisable to feed birds in the morning, immediately after the lights have been turned on. In this way calcium used from the breastbone during the night is quickly replenished.

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Table 1. Summary of HPB's expected yearly breeding targets for improving egg quality.

Trait	Brown breeds	White breeds
Shell colour*	+ 0.5 darker	White
Shell colour uniformity	More uniform	
Shell strength	+25-75g	+25-75g
Haugh units	+ 0.4 hu	+0.4 hu
Meat and blood spots	Minimise	Very few

**Shell colour is measured with a reflectometer*

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It is important to have a good balance between fine and coarse particles of calcium.

In the period from 17 weeks of age, to 10% production, it is advisable to use a pre-layer diet containing lower levels of calcium. This improves eggshell quality later in the laying period.

20-40 weeks of age

At the 20-40 weeks stage, both production and egg mass are at their peak. Egg size has not yet peaked and with high calcium utilisation quality problems tend to be few.

However, diseases such as infectious bronchitis (IB), egg drop syndrome (EDS) and turkey rhinotracheitis virus (TRT) – also known as swollen head syndrome or avian pneumovirus (APV) – can have a negative impact on eggshell strength and egg colour.

40-60 weeks of age

During the 40-60 week phase, egg mass production remains high, while calcium utilisation tends to fall. This can lead to a negative calcium balance. Providing extra oyster shells, or other calcium sources can alleviate this.

At this stage it is important to supply feed in the late afternoon as well as the early morning. At least 50% of the feed intake should ideally occur in the last four hours of the light period. The addition of extra vitamins, such as A and D3, can also positively influence eggshell quality. Some producers introduce midnight feeding, which supplies calcium when the shell is formed.

60 weeks plus

During this last phase of production, the egg mass output is still relatively high but the calcium utilisation tends to fall rapidly. While continuing with the same management techniques, it may be necessary to implement additional measures to improve calcium utilisation, particularly if the addition of extra calcium is not producing an effect.

Of course a healthy flock has a better utilisation of calcium, so minimising stress is important. Other measures include adding hydroxyl, vitamin D3 or sodium salts.

Shell colour

For many producers, eggshell colour and uniformity are very important traits. Diseases such as IB, which affects the ovary of the bird, can cause problems.

It has also been noted that shell colour quality can be reduced in birds in free range systems. Although the cause is unclear, it is likely to be an influence of the direct sunlight and/or the fact the birds have access to, and consume, grass or sand. Usage of some antibiotics can influence eggshell colour making it paler.

Producers checking external egg quality on a farm.

Internal egg quality

In regard to internal egg quality, there are steps that producers can take to maximise Haugh units while minimising meat and blood spots.

Poor Haugh units, or watery whites, can result from poor packing facilities or be a sign that eggs are not being collected frequently enough. The Haugh unit of an egg reduces over time, and is also negatively influenced by high temperature and low humidity.

Meat and blood spots can be a direct result of stress or related to feed factors, such as moulds. It is important that feed does not contain too high a dose of lucerne meal, as this can affect the intake of vitamins A and K. Quality is also compromised if the eggs develop a tainted odour. While this can result from feed containing too a high a level of rapeseed, alternatively it can be a sign of disrupted digestion by the bird.

External quality. Eggshell breaking strength measurements being taken at Hendrix Poultry Breeders' test laboratory.

Other factors

As well as genetics and flock management, other production processes can have a negative impact on quality.

Shell strength is particularly important in large scale production sites, where eggs are often transported over considerable distances using conveyor belts to egg packing equipment, and then by truck to packing stations or direct to the supermarkets.

While the slope from the cage or nest boxes to the conveyor should obviously be sufficiently gentle so as not to damage the egg, some producers also employ egg savers to prevent shells from cracking and to shield them from dust.

To maintain quality during transportation to the customer, eggs should of course be packed point down, and it is recommended stacks are limited to six trays maximum.

Conclusion

In conclusion, to optimise production of quality table eggs relies on a combination of good genetics, achieved through careful selection and testing of production and egg quality traits, as well as good management practices.

It is only by employing both that producers can optimise the genetic potential of the birds helping to maximise returns and ultimately profitability. ■