

Review of different day-old chick quality parameters in layer type breeds

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The aim of every commercial layer hatchery is a maximum hatchability of first quality chicks. Only healthy and vital chicks are able to have a good start in the rearing period after being handled and transported.

Good chick quality is clear to see with a low first week mortality rate and a uniform development of the whole flock. It is therefore the key to success not only for the hatchery but also the rearing farm.

The key to success

A first indicator for chick quality is the percentage of second grade chicks. This percentage is naturally influenced by the age of the breeder flock. Young breeder flocks, for example at <30 weeks, usually give poorer results.

If the chick quality does not improve with the age of the breeder flock, examinations need to be performed in order to find out the causes.

These causes can either be the age of the hatching egg and the general quality of the same, transport and storage conditions as well as the disinfection of the hatching eggs. Hatchery-related conditions might also have



Left, an example of a poor quality navel and right, a good quality navel.

an impact on the quality of day old chicks. These include temperature, humidity levels, ventilation, frequency and the angle of turning during incubation.

The evaluation of chick quality in the hatchery provides important information on the whole production process. If properly applied, it can be used to detect possible weaknesses of the hatchery and the working routines in the same. Either quantitative or qualitative traits can be used for the measurement of chick quality.

The qualitative traits are namely chick weight, chick yield, chick length and feather length. Qualitative traits include the vitality

of the chicks, the quality of their navel, their beaks and joints.

Many hatcheries still hesitate to apply the examination of the qualitative traits in their quality monitoring program as these traits are highly subjective and hardly reliable.

There are, however, methods that can help to measure the qualitative traits as objectively as possible, i.e. by reducing the individual subjectivity to a minimum.

These so-called 'scoring' systems enable recordings of the first visual quality traits of a chick to be transformed into a quantifying assessment with a maximum score of 10 points. For every negative factor, one point will be deducted from the total of 10 points. Parameters that can be included in the scoring system are all of the above-mentioned qualitative traits as well as additional factors, for example the efficiency of vaccination and injuries. This can help to monitor and improve the chick processing quality.



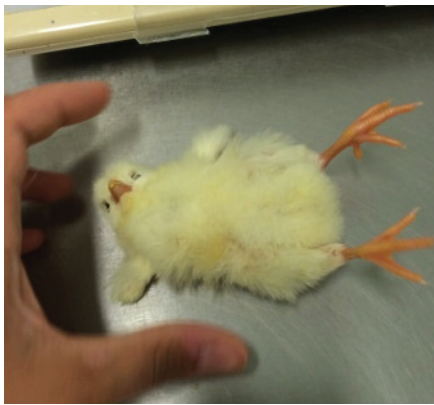
Left, recording single chick weight at the hatchery and, below, weighing a certain number of chicks. Do not forget to subtract the weight of the hatcher basket before calculating the average chick weight.



Investigating chick quality

The point of investigation should be determined by the aim of the quality control. If these investigations serve the primary purpose of improving internal production processes, then chick quality should be investigated at takeoff. The

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Investigating chick activity.

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advantage of this is that at this point of the production chain, an overview of the quality of all hatched chicks can be attained. This helps to make conclusions about the incubation process and can give important hints on what needs to be improved.

If it is desired to get an overview about the quality of the chicks that will be handed over to the customers, and if information about the sorting and handling of the chicks are just as required, then it can be more appropriate to conduct the examinations before transporting the chicks.

At this point, the quality of the vaccination and chick handling can be evaluated as well.

Chick weight

Chick weight is highly correlated with egg weight and therefore relatively predictable. If the incubation process is done properly, the chick weight will be two thirds of the egg weight.

An extended or reduced incubation time as well as too high or too low temperatures and humidity levels during incubation can also have an impact on chick weight.

The longer the chicks stay in the hatcher, the more weight they will lose due to dehydration. On the other hand, if the

chicks are pulled early, the chick weight can be higher than expected. Two methods can be used for measuring chick weight:

- Take single chick weights of a certain number of chicks. This allows the variation of chick weights within the group investigated to be calculated in addition to the average. A good or bad uniformity of chick weight can be used as an indication of the quality of hatching egg grading.
- The other possibility is to weigh a certain number of chicks at one time and calculate the average. This is a good and simple method, i.e. if only the average chick weight is of interest.

Chick yield

In relation to chick weight, the quantitative trait 'chick yield' (chick weight at hatch in % of the egg weight at point of set) must be mentioned.

This is a simple method of checking whether the hatch time and incubation parameters are correct.

To accurately measure chick yield, it is important to measure the weight of completely filled setter trays at the point of setting and to calculate the average egg weight (do not forget to subtract the weight of the empty setter tray before calculating the average egg weight).

The weighed setter trays must be labelled in order to identify them on the day of transfer. On the day of hatch, the chicks which originate from these labelled setter trays must be weighed in order to calculate the average chick weight.

The ideal chick weight should be between 66-67% of the egg weight. If the chick weight is below target, this can be an indicator that the chicks were pulled too late and are therefore at the risk of dehydration. It can also be a sign that the humidity level chosen during incubation was too low.

If chicks are required to travel long distances, it can be appropriate to aim for a chick yield which is about 1% higher than the ideal of 66-67%. This can help to guarantee

that the chicks arrive as fresh as possible at the rearing farm.

In order to achieve reliable results in terms of chick yield, at least 70 eggs and 70 chicks per breeder flock must be weighed. It will surely be more accurate if from every flock, three setter trays in different positions in the setter are investigated.

Chick length

In addition to chick weight and chick yield, the length of the chicks is another quantitative trait which can be recorded in the hatchery.

In order to measure a chick, it has to be placed alongside a ruler and the length needs to be measured from the tip of the beak to the end of the middle toe.

This trait is often taken in broiler hatcheries as it is well known that the chick length measured on hatch day can have a significant impact on the performance at the end of the rearing period.

For layer type chicks, this trait is not relevant as the chicks are able to compensate body weight development during the long rearing period of 18 weeks. If the hatchery manager nonetheless decides that the chick length should be recorded, the figures should be interpreted only in accordance with the hatch window.

Layer type chicks can grow more than 1cm per day which means that the age of the chicks at the point of investigation is of crucial importance.

Measuring feather length

Examining the feather length of a newly-hatched chick can, in addition to other factors, help to optimise the incubation process. It can give an impression on how fresh the chicks are and if the incubation time chosen is either just right, too long or too short. It must be taken into consideration that the feather length varies

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Left, measuring the feather length of a wing of a Lohmann LSL chick and, right, measuring the length of the chick with a ruler.



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between breeds. Fast-feathering chicks (for example the female line of the LB parent stock) already have much longer feathers at the time of hatch and the growth rate of the primary feather is also higher than in genetically slow-feathering birds.

When measuring the length of a wing feather, a ruler must be placed carefully between the wing feather and then the length can be recorded.

In the hatchery, LSL parent stock chicks show an average feather length of 9.6mm with an average growth rate of 0.09mm per hour. LB parent stock chicks, however, already show an average wing feather length of 15.6mm which grows at 0.15mm per hour.

Chick vitality

Chicks of premium quality must be lively and have a good body tension. This can be checked by placing a day-old chick on its back.

A good chick does not struggle to get back directly on his feet. One can say that it should not take more than three seconds for the chick to get back in an upright position.

Navel

An essential element in investigating chick quality is examining the quality of the navel. A good navel is closed, dry and free of egg shell and membrane residues.

The chick needs to be handled manually to control the quality of its navel. Of course, it is not possible to check every chick in a commercial hatchery prior to delivery.

Beak and joints

Investigating the condition of the beak and joints of the chicks can give several hints on incubation conditions. Both must have a

Red dot beak.



Left, a badly absorbed yolk (big and stiff belly) and, right, a well absorbed yolk (soft and smooth belly).

normal appearance which means they have to be free of damage and wounds. Wounded beaks and joints are hints of non-optimal conditions in the hatcher.

Red dots on the beak indicate that the temperature in the hatcher was too high. Either the chicks wanted to break out of the egg shell too fast and damaged their beak by working too hard on the egg shell or they tried to regulate their body temperature by breathing through the openings of the hatch basket. By doing so, they damage the upper part of their beaks.

Injured joints can be a sign of a very high humidity level during incubation. Chicks which are hatched under these high humidity conditions must put in more effort to break out of the shell, which then harms their joints.

Investigating belly quality

The belly of day old chicks must be soft and smooth. Bloated, stiff and hard bellies are signs of a badly absorbed yolk.

This often leads to problems during brooding and results in a higher first week mortality rate.

Causes for big and hard bellies in layer type chicks might be due to both insufficient water loss and too high temperatures during the incubation process. A hard belly is also a sign of a yolk sac infection.

Evaluation of data

The collection of data can be done by means of written forms and/or can be directly entered into a computer program. A good practice is to collect the data based on breeder flock and hatch day. This aids an overview on performance fluctuations related to breeder flocks and/or to hatch day or even season of the year.

Of course, data collection only makes sense if one is able and willing to search for



the causes for obvious differences in chick quality. Only this can help to improve the production process.

Summary

The aim of every hatchery is to achieve the highest possible number of premium quality chicks. To get an idea on the quality of produced and ready to sell chicks, it makes sense to collect data of chick quality using clearly defined parameters.

These parameters can be both quantitative and qualitative traits. Quantitative traits are namely chick weight, chick yield, chick and feather length.

Qualitative traits are more subjective and include the investigation of chick activity and the quality of the navel, beak and joints. There are methods which can help to measure the qualitative traits as objectively as possible to achieve a reliable overview about the produced chick quality. ■

*References are available
from the author on request*

Wounded joints.

