HatchTech
INCUBATION TECHNOLOGY

Technical Information

Evaluation of chick quality; which method do you choose?

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In practice, a good chick quality is crucial to optimize performance. As the growth rate of broilers as been increased over the years, the length of the production cycle is decreased. Chicks with a poor quality start slowly in the field. With the reduced length of the production cycle, it is more difficult to compensate for a slow start. Modern strains of both layers and broilers are selected for a high level of genetic potential and relatively small imbalances in chick quality can have a major impact on subsequent performance.

Chick quality can be defined as chicks that are optimal developed during incubation and show a good performance such as daily growth, breast meat yield, eggs or livability in the field. Evaluating chick quality detects problems and improves profits in hatcheries and integrated companies and should be included in a standard quality analysis procedure. Chick quality can be measured by several methods. Choosing the right method depends on the goal of the evaluation and the available time. Sample size, accuracy and the required time for the various methods is not equal.

The most common used methods to evaluate chick quality are:

1. Visual scoring
2. Body weight
3. Yolk free body mass (=YFBM)
4. Chick length
5. Yield
6. Scoring systems like Tona or Pasgar score

Ad 1. **Visual scoring** of birds is used to obtain a general overview of chick quality. Approximately 100 chicks are evaluated on feather color, navel quality and chick behavior. Although this is a fast method and

used in a lot of hatcheries, chick quality is only estimated and not expressed or recorded by a number. Comparisons between days, flocks or hatcheries are difficult and visual scoring is influenced by personal opinions.

Ad 2. **Body weight** is measured by weighing the whole chick. To calculate an average body weight of the population, approximately 70 animals need to be weighed (See explanation about sample size calculation in the text box on page 4 and Table 1). However, body weight contains an unknown amount of residual yolk, which does not express the development of the bird. A heavy chick indicates a good development, but this is not true when this bird has a large residual yolk and a low yolk free body mass. Evaluating chick quality by measuring body weight is therefore difficult and can be misleading.

Ad 3. **Yolk Free Body Mass (YFBM)** is a better indicator of chick development than body weight. Different studies have shown a positive relation between YFBM and subsequent performance of the bird.

YFBM is calculated by subtracting the residual yolk from the body weight. Approximately 50 animals need to be measured. A higher YFBM indicates a better development of the chick during incubation. The increase in egg size due to an older breeder flock age must be taken into account in the evaluation. Although this is an accurate method to evaluate chick quality, animals have to be sacrificed and the method is time consuming.

Ad 4. A second indicator of the bird's development is **chick length**. Different studies have shown that chick length is related to YFBM and predicts subsequent performance. Chick length is determined by stretching the chick along a ruler and measuring the length from beak to the end of the middle toe. Chick length measurements can vary between persons, but research has shown that it can be standardized by experience. Like YFBM, flock age must be taken into account when data is evaluated. Measuring chick length is a fast method to evaluate chick quality. Only 25 animals need to be sampled.

Ad 5. The **yield percentage** evaluates the weight loss during incubation and is calculated as the percentage of chick weight to initial egg weight. A minimum of 60 eggs and the chicks from those eggs must be weighed to be accurate. In practice, the average egg weight of a tray and the average chick weight of that tray is weighed and yield is calculated. Eggs must be marked and followed from the setter to the hatcher and this requires some time. The other problem is that the amount of residual yolk is not taken into account. Yield percentage, like body weight, does not include the actual development of the chicks. A small poorly developed chick with a large yolk can have the same yield as a well developed chick with more YFBM from the same size of egg.

Measuring weight loss between set and transfer is an easier and faster method to evaluate eight loss during incubation. Sufficient weight loss during incubation is necessary to obtain a good chick quality.

Ad 6. Different scoring systems have been developed to evaluate chick quality. An example of these methods is the **Tona or Pasgar score**. The Tona or Pasgar score evaluates different criteria such as navel, legs, beak and yolk sac. These criteria are primarily created during the last part of incubation and they predict chick survival in the first week posthatch. A minimum of 44 chicks must be evaluated on all the different criteria, which makes this method time consuming in practice. Although several scoring systems have shown to be an indicator for first week mortality and chick livability, their relationship

to production performances such as daily growth is less clear.

Conclusion

Choosing the right method to evaluate chick quality is dependent on different factors. First of all, it is important to decide your goal of the chick quality measurements. Secondly, you have to consider the available time because sample size and the required time per method differs. Evaluation of chick quality can be successful and improve your profits when you consider these factors and develop an effective program.

Chick length is found to be positively related with subsequent performance. Chick length is a fast and repeatable, non-destructive method to evaluate your chick quality. Therefore, chick length can be used in a Standard Operating Procedure to evaluate chick quality on a regular basis.

The number of animals is calculated by a formula (see explanation about sample size calculation in the text box on page 4). The error in the formula, which is the difference you find acceptable between the mean of the real population and the mean of the sample size, is chosen. By choosing a small error, the accuracy of the measurements increases, as the mean of our sample will be closer to the mean of the whole population, but a larger sample size is required. If you accept a larger error, you can use a smaller sample size, but the real average of the population will be further away from the average of your sample.

Sample size calculation

The sample size to determine the mean of a population, can be calculated by a formula.

This formula is:

Number of animals = (Z2 × SD2) / E

Z = 1.96
This is a fixed number and express that this is a normal distribution with a 95% confidence interval.

SD = Standard deviation
Standard deviation is the variation between animals. Standard deviations used for the calculations in Table 1 are from data of HatchTech and from scientific articles.

E = Error
Error is the difference you find acceptable between the mean of the real population and the mean of the sample size.

When the Standard Deviation increases (more variation between birds), a larger sample is needed to get to the same accuracy. For example, chick weight has a higher standard deviation than yolk free body mass, resulting in a larger sample size.

The Error gives an indication of the accuracy of the measurement. If for instance we use an Error of 0.5 g for chick weight, it means that in 95% of the cases the average from the sample will differ no more than 0.5 g from the real average of the whole population.

Scoring method	Number	Error
Visual scoring	100	-
Chick weight	70	0,5 g
Yolk free body mass	50	0,5 g
Yield	60	1.00%
Tona Score	44	0,5%
Chick length	25	1.0 mm

Table 1: *Number of animals per chick quality scoring method*

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