Do we fully utilise the data generated in the hatchery?

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Over the past few decades we have witnessed the poultry industry evolve from its small unit, agriculture background to the larger integrated industrial businesses that we are seeing today. These changes result in many benefits such as higher standards and lower pricing of the end product.

In order to survive in this new environment, topics such as efficiency and optimisation become critical factors in the ultimate profitability and subsequent longevity of all the companies involved in the industry.

The flowchart in Fig.1 shows, in general terms, the different phases of poultry production. Performance targets are set for each individual area leading to an overall performance forecast.

Whilst there is often synergy between maximum and optimum, sometimes they can be conflicting. For example, maximum hatchability may be irrelevant if the subsequent performance is a high mortality, high FCR, low growth rate with a poor meat yield. Target figures will never be realised without good feedback from an accurate and reliable system ascertaining the true optimal.

Without true optimisation many targets will be based around average maximum figures. This will never give, and this is the place where the word maximum does apply, maximum profitability.

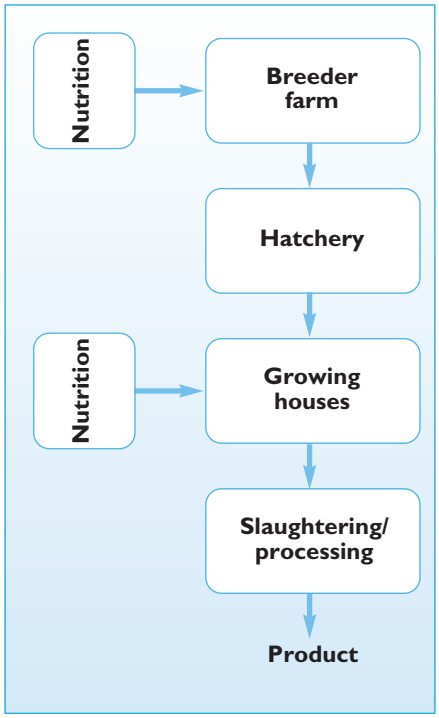

Fig. 1. The different phases of poultry production.

We may no longer consider the breeder farms, hatcheries, growing houses and other associated components as separate entities. Nor can we accept averaged or unreliable data. If we do, then valuable information will be missed that would allow us to identify critical elements.

A example of this is a producer who until recently assessed their farm's performance as an average of the six houses on site. The figure produced showed an average hatchability at peak of nearly 95% HoF. This was within the predetermined acceptable targets. The post-hatch performance was also within acceptable limits. So the client was relatively satisfied.

However, when the eggs were identified by house source in the hatchery it could clearly be seen how one specific house was underperforming by over 3%. This specific house clearly had a problem. After investigation, it also became clear that a disproportionate amount of the culls and post-hatch early mortality were being generated by this specific house.

Ultimately the client for this farm achieved a 0.5% increase in hatchability along with gains in mortality, uniformity, FCR and final bird weights.

In another example a large scale producer analysed their post-hatch data and associated it with the incubator shell temperature recordings. It was clearly identified how optimum performance was always related to the shell temperature range achieved in

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Fig. 2. Optimised shell temperature target (exothermic phase).

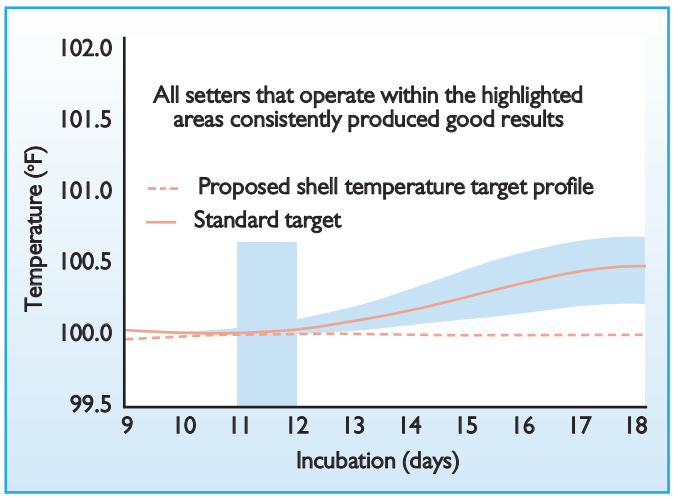
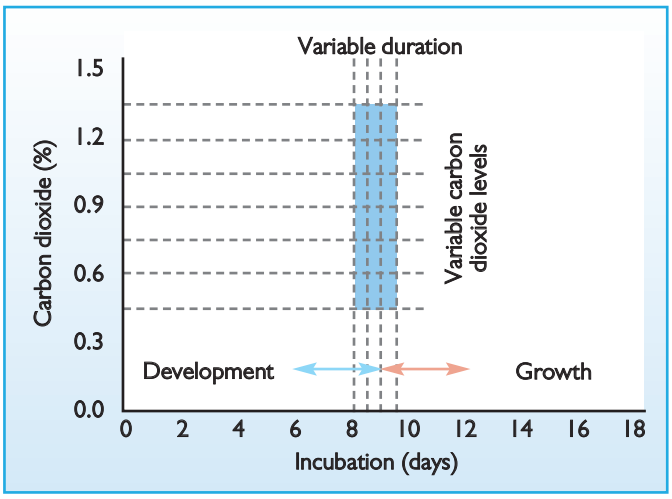


Fig. 3. Levels/duration relative to embryonic development.



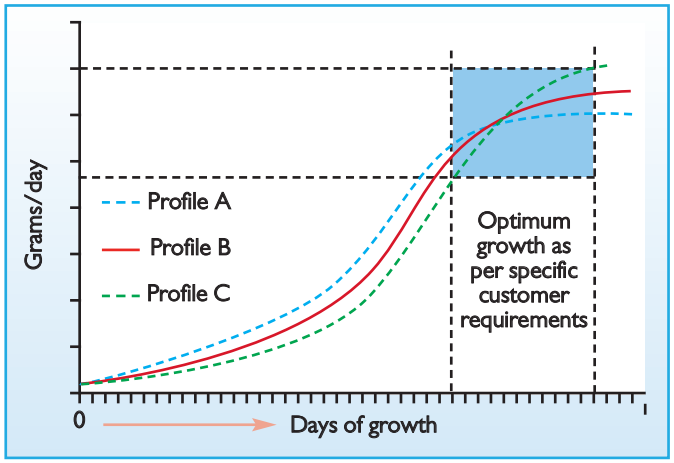


Fig. 4. Compensatory growth curves relative to carbon dioxide levels during embryo development.

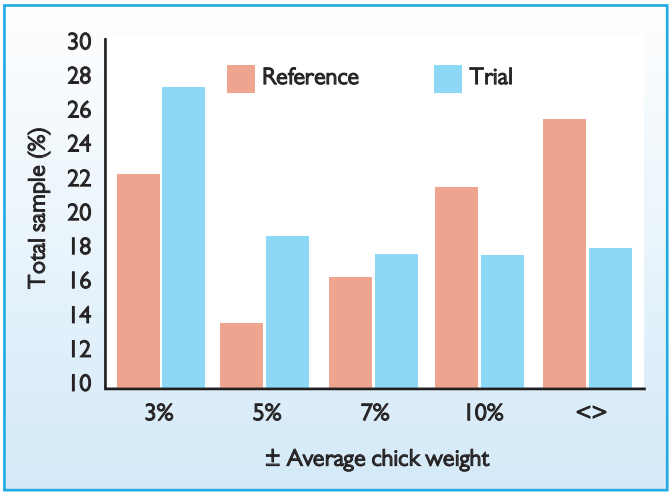


Fig. 5. Uniformity trial distribution.

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the second phase of incubation. This is shown in Fig. 2.

Specifically the combination of the point of the rise commencing, the rate of rise and the final temperature proved to be critical. Individually each point was not so relevant.

A methodology of good reliable data collection not only offers a true image of the entire operation's performance but it can also give the opportunity to assess controlled comparative trials. A good example of this is the recent work carried out in cooperation with a large scale integrated company. We associated post-hatch performance with specific elements within the incubation profiles. Significant gains were achieved by recording weekly post-hatch performance data and relating the grams/day growth rate, mortality, FCR, uniformity and final meat yields with the flock age, type, along with shell temperatures, weight loss and carbon dioxide levels at key points during the embryonic development.

As a result of numerous and extensive trials during one series of tests it was discovered that varying the duration and level of carbon dioxide at critical points consistently generated significant effects on the growth curve of the birds. As a consequence subsequent gains could be achieved in all areas of post-hatch performance. The parameters and boundaries are shown in Fig. 3.

It was recorded that relative to flock age a period of subdued early growth was followed by a later compensatory growth period. This can be generated in order to coincide with the target live bird weights, as shown in Fig. 4.

The most recent studies with this producer have revolved around chick uniformity. Through various incubation trials gains have been achieved in overall uniformity of chick weights. Fig. 5 shows the results.

Fig. 6 shows that the improved uniformity results in a 1.4g increase in average chick weight. This is translated into an overall improvement in post hatch-mortality, FCR and final bird weights.

This set of trials is currently ongoing. It has already demonstrated the value of further extending the assessment and data logging points. There is an element of increased manpower usage involved along with a degree of investment in data logging equipment. However, the potential benefits far outweigh all extra costs incurred.

The natural progression of these practices would be for hatcheries to cooperate and work closely with incubator suppliers. It would allow leveraging the application knowledge with their specialised expertise.

If it were not for such arrangements recent developments such as the synchronisation of the incubator to the actual hatching process would not have occurred so rapidly. Fig. 7 demonstrates the effect of synchronisation, resulting in a much narrower hatching window.

There is no short cut to achieving optimum performance. No single point reference or small 'one off' sample will give you an absolute indicator as to key factors that will make the significant gains that can be achieved.

Having said this, is it surprising how much data most producers collect or have available without extracting the key information. Many producers incubate according to house source, data log transport conditions, have historical incubation data and do breakout analysis on un-hatched debris. However, there are few that globally associate all this data along with their breeder farm conditions, nutritional data and final bird performance. This relatively simplistic process would undoubtedly yield gains and hopefully indicate to the producer the potential benefits of further expanding their data collection and analysis. ■

Fig. 6. Uniformity trial weights.

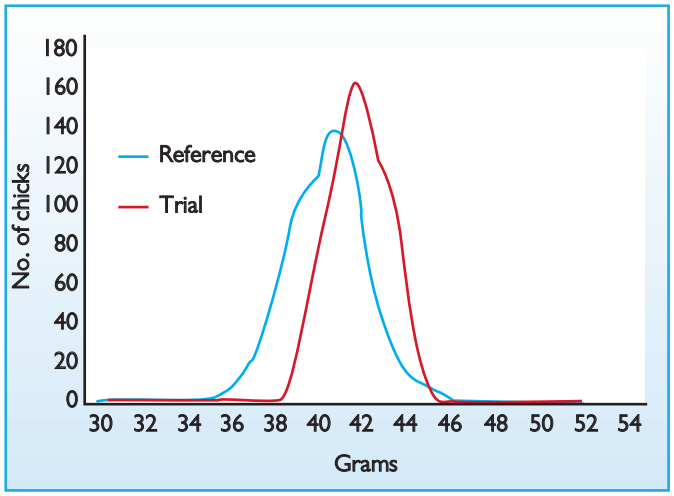

Fig. 7. Hatch window trial.