Atypical approaches for consistent broiler breeder performance

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Broiler breeder management can be a complicated area and one should not expect consistent flock performance to occur by only focusing on one or two variables. When assessing egg production, most people focus on body weights and body weight gains and compare this to a standard body weight curve.

This is largely an ineffective technique because pullet body weight is a crude indicator of subsequent hen performance. If it were that simple, over time every flock would follow the same body weight program.

Excellent egg production is achieved across a host of body weights; therefore body weight must not be as significant as some experts believe. Simply examining body weights in a best vs. worse egg production comparison is of minimum value. Body weight measurements should be used as a check and balance of the breeder program and has value in two distinct areas.

First, birds must have a minimum amount of muscle content at light stimulation and body weight is a means of evaluating this process.

Secondly, all breeder studies comparing high and low body weights that we have conducted indicate that body weight at light stimulation is positively correlated with egg production. From an egg production standpoint, it is beneficial to err on the side of heavier body weights than lower body weights.

Nutrient intake

The core factor influencing flock performance is nutrient intake not body weight. It appears that current recommendations have been correct but we have put the cart before the horse. We have been letting body weight determine how much to feed but in reality it should be the opposite (within reason). Supplying adequate nutrients at appropriate times provide a flock with positive well-being signals for good production.

Timing is critical and increased nutrient consumption at the wrong time will elevate mortality, reduce peak egg production and overall production. To date most breeder studies have focused on improving hen performance and less on strategies to help in reducing early mortality and improving the live performance of broiler chicks.

This article is created from breeder studies conducted by Cobb-Vantress and a review of worldwide customer data.

Let us first start our analysis in the hen house since this is where the results are generated. The complete egg production cycle is critical but peak egg production determines the sold flock performance 75% of the time.

In other words, if a flock peaks poorly it has a 75% chance of producing poorly. For every 1% increase in peak production, 1.6 TE/HH will be achieved. Factors occurring after peak are important but less critical as it relates to egg production. The intake of energy from light stimulation to first egg can have a dramatic effect on survivability and subsequent egg production.

Feeding a flock aggressively that was not ready for light stimulation will negatively affect flock performance, while aggressively feeding a flock that was ready will have no negative consequences. Light stimulation is one signal that a successful breeder flock must have but from this time until peak production the hen must receive controlled well-being signals via energy intake.

Achieving consistent flock performance through broiler breeder management.

The response of the hen to light stimulation is determined by its well-being or general condition. The well-being signal is defined as all variables (defined and as of yet undefined) that positively impact the hen's performance. After light stimulation, controlling nutrient intake is the primary driver defining the well-being of the bird.

Today's breeder diets oversupply the pullet and hen with all nutrients except for metabolisable energy, therefore energy is the limiting nutrient. Energy must be elevated during the flocks climb to peak egg production but high amounts of body weight coupled with increases in egg production will elevate mortality and lower total egg production.

The amount of energy supplied to the hen can exceed their oxidative capacity of converting feed energy into tissue and egg mass causing elevated mortality and creates superfluous stress.

Body weight is a crude measure of hen well-being. The hen's lean mass content (fleshing) is a critical component of well-being. The minimum lean (muscle) mass required at light stimulation is 1.9kg for the C500 hen.

Although muscle mass is the key compo-

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nent, a typical body weight to reach the critical muscle mass is 2.2kg for the C500 hen. If a flock contains a small number of underweight birds at light stimulation, these body weight targets may be slightly lowered.

The total amount of fat required for well-being is insignificant under today's management system. Fat is required for proper reproductive development but like many things more is not always better.

Studies have suggested that a minimal amount of carcase fat is required for proper sexual maturity. The period of accelerated feed intake and body weight gain from weeks 15 to light stimulation allows hens to have more than enough fat reserve for proper reproductive system development.

Light stimulation

During the time frame between light stimulation and 5% egg production, energy intake is negatively correlated with hen survivability. Assuming the correct muscle mass was achieved at light stimulation, hens need relatively low energy increases during this period. This is not the right time to try and correct an error associated with improper pullet management.

If a flock is not ready for light stimulation, it is much more beneficial to delay light stimulation then to aggressively feed the flock after light stimulation. The focus during this period should be on reducing stress related to transfer and reproductive system development not body weight gain. An average weekly energy increase should be no more than 9 kcal/day during this period.

The hen is very efficient at producing an egg. Not including the energy content of the egg, the hen only requires 11 kcal/egg. Adding the energy content of the egg, the hen requires 2.11 kcal/g of egg. For a hen laying a 60g egg, the energy needed to produce and lay this egg is 127 kcal.

As egg production and egg size increases, it is logical to assume that the energy needs of the flock increases. For every 5% egg production, a flock requires an increase of 7.5 kcal/day of metabolisable energy. The 7.5 kcal/day increase includes the energy needed for body weight gain. If a flock's egg production responds to more aggressive energy intakes, then the flock's well-being has been compromised and undue stress and elevated mortality will occur. The error most likely occurred during pullet rearing and the pullet program must be adjusted to eliminate this stress.

Post-peak management is not as critical as pre-peak management. Body weights must be monitored as excessive body weights may decrease fertility and hatchability. For every 5% drop in egg production the flock will require a decrease of 7 kcal/day of energy intake.

There is a slight difference in pre and post-peak energy amounts for egg production due to the fact that egg size and body weight are larger and body weight gain is decreased.

When withdrawing feed, it may be necessary to prevent flocks from perceiving a large reduction in energy intake. It is better to be less aggressive in feed withdrawal than too aggressive as long as peak feed is not excessively high. If aggressive feed withdrawal does not affect egg production, peak feed amounts must be adjusted lower.

Absolute feed or energy intakes have not been mentioned. The energy (keep in mind energy is the limiting variable) requirement for body weight gain and egg production is constant under most environments.

Energy required for maintenance is highly variable and determined via body weight, ambient temperature exposure, immune system status, etc. From a practical view point, energy increases required for egg production should be added to the energy intake at the start of egg production. This accounts for maintenance energy differences as well as miscalculations in dietary metabolisable energy. In other words, peak energy amounts must float and never be a fixed amount.

The most critical time of a flock's life is the time prior to light stimulation. Unfortunately, this period covers five months and many factors can influence the well-being of the flock. It can be overwhelming to analyse this period as a whole. Breaking this period into segments is a much more manageable proposition and reveals that there are certain periods during the pullet rearing cycle when certain events must occur and periods that are less critical.

Energy intake and muscle accretion are highly correlated to egg production and have the most impact on performance. For the most part, body weights are of minimal consequence during this period.

The only time that crude protein and amino acid intake are truly limiting is during the first few weeks of a chick's life. Increased crude protein intake will improve flock uniformity but also increase body weights. Heavy body weights early will require a higher degree of feed restriction later. From an individual bird perspective, it is better to be underweight early and allow for less feed restriction later.

From a flock standpoint, there is a fine line between having good flock uniformity and heavy body weights. One misconception is that a chick with high amounts of skeletal mass early will cause a need for a larger bird at light simulation. In fact, the pullet only has 5% of its total mature skeletal mass produced at four weeks of age and subsequent growth has a much greater impact on frame size. Energy intake from 10-14 weeks of age is an important factor affecting breeder flock performance.

Flock analysis has revealed that increasing energy intakes during this time boosts egg production regardless of body weight gains. Obviously body weight and energy intake are positively correlated but the body weight gains are less critical compared with the energy intake. The energy bump required during this period is possibly associated with some type of metabolic/catabolic learning for future energy partitioning during egg production.

An average weekly energy increase of at least 7 kcal/day during weeks 10-14 days of age are required. If body weights are below target, weekly energy increases of greater than 7 kcal/day are required.

When body weights are at or above standard, the 7 kcal/day weekly energy increases still need to take place. The correction of heavy body weights needs to take place prior to 10 weeks of age.

In the past, Cobb has recommended feeding pullets on a sigmoid type of curve even though the body weight curve is somewhat linear. This reasoning is sound but less emphasis should be placed on body weight. During weeks 14 and light stimulation, the weekly increase of energy should average 18kcal/day. Body weights must still be monitored, since they provide us with a indicator of maintenance needs and environmental stress.

Metabolisable energy increases may be adjusted higher to achieve the minimum body weight standard but never lower.

Muscle accretion during this period is important but energy intake is probably the most important event. Under practical diets, muscle accretion is limited by energy intake.

Conclusion

Most breeder experts have focused on body weight and body weight gain to improve egg production and chick quality. The main focus should be placed on managing the bird according to the environmental conditions and always keeping in mind what the objectives are. One should not attempt to manage or troubleshoot flock performance by comparing body weights to a standard body weight which is printed in a manual. Each flock is different but each requires similar well-being signals.

Achieving consistent flock performance requires the magnitude of the well-being signals to change based on the situation. There are numerous variables impacting breeder performance but the primary factor to successful broiler breeder performance is energy intake. Every week of a pullet's life is important, however, flock well-being is validated during the ages of 10 weeks to first egg.

As our knowledge of the bird increases, breeder recommendations must be based on the environmental conditions. Modelling will provide a greater understanding of how the breeder hen functions and allow us to make breeder recommendations based on the environment, housing and management conditions and ultimately produce the best progeny.

One breeder program will not fit the world and what works for one customer will not necessarily work for another. ■