Feed utilisation with changing genetics

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Consumer demand for lean poultry products for healthy lifestyles at affordable prices maintains the focus on breeder and broiler performance and particularly on greater muscle production or yield.

With feed normally over 50% of the total cost and often the most variable cost component of broiler production, efficient utilisation of feed will require greater attention to the combined impact of broiler breeder genetics and bird management on muscle growth.

This will influence the way we grow broiler breeders, with specific research on energy and amino acids helping our understanding in achieving a balance between performance and efficiency.

Genetics and management

Today's commercial broiler is the fastest growing and most efficient bird ever produced. It represents the combined efforts of genetics and management. However, with this tremendous improvement in broiler performance there is a need to change the way broiler breeders are managed and fed.

Much like the broiler, the broiler breeder is also changing rapidly and although geneticists are also selecting for increased egg production, the overall emphasis is still on broiler traits.

This does not create broiler breeders that are more difficult to manage but, as the bird changes, innovative nutritional and management approaches must be developed to match these needs.

There is a wealth of information on nutrition and management of broiler breeders, but the industry often lacks basic knowledge of pullet and breeder hen metabolism and the amino acid requirements for optimal productivity.

Though many companies offer feed and bodyweight guidelines for rearing breeders, it seems that much of the industry practices and management guidelines are based more on circumstantial opinions and trial by error than on scientific evidence and documented solutions.

The broiler breeder energy requirements are dependent on energy needed for maintenance, tissue gain, egg production and management. The maintenance component contains the greatest variability and encompasses factors such as effective temperature, immune status and light period.

Interactive components

All components are interactive and can be quantified to allow managerial decisions to enhance efficiency of production. Tissue gain and egg production come after maintenance, which needs to be satisfied first. Any increase in bird maintenance need will divert energy away from growth and egg production, unless an increase in feed energy takes place.

Managerial decisions can have a positive or negative influence on breeder hen energy requirements. Decisions related to house design, ventilation, stocking density and lighting are among the many variables influencing maintenance. Various stress categories have the potential to adversely reduce performance, including ambient temperature and relative humidity extremes, immunological response, and atmospheric contaminants (ammonia, dust and brooder gases).

Specific energy data for a 3.6kg broiler breeder hen under thermoneutral conditions maintenance requirement is equal to 80kcal/kg body weight per day. The maintenance energy required is increased during heat or cold stress conditions.

Energy requirements

The maintenance energy requirement for a 3.6kg hen is 288kcal/day (3.6kg x 80kcal/kg) as measured under 16 hours of light. The energy needed for a 1g of body weight gain/day is 3.5kcal/day.

A broiler breeder gaining 10g/day (70g/week) requires 35kcal/day for body weight gain. The energy required to produce a 55g egg is only 11.1kcal but the energy of the egg must also be included. The energy content of a 55g egg is 105kcal; therefore, a hen will need 116.1kcal (11.1kcal + 105kcal) per day to lay a 55g egg.

Maintaining this flock at 80% daily egg production target will require an average energy intake of 397kcal/ hen/day. This is where the art or experience of poultry production comes into play.

If a manager feeds this flock 397kcal/day, 80% of the hens will not have enough energy to lay an egg, maintain body weight or grow. Previous research indicates that a hen will obtain the energy from body reserves for a period of time but egg production persistency will be negatively affected after some time.

A manager's only choice is to make certain that the hens laying eggs are receiving the proper amount of energy. This dilemma is exacerbated with poor producing flocks.

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The less eggs a flock produces, the greater number of hens will be overfed leading to overweight flocks and poor performance.

Another consideration in feeding broiler breeder hens efficiently is that amino acids must be balanced for maintenance, tissue accretion and egg production.

Optimum performance

Major breeds like the Cobb 500 have digestible amino acid requirements for maintenance and production researched and tabulated to assist in achieving optimum flock performance.

Fully pedigreed lines such as the Cobb 500 underwent multiple selection procedures to optimise breeder, broiler and processing performance.

Computing technology was fast developing, enabling highly accurate estimation of breeding value, combining the performance of individuals with that of their progeny, brothers and sisters and half sisters.

Additionally, unique selection indices were created, balancing selection across all production, health and well being traits.

Although feed conversion efficiency had been improving through selection for growth rate, Cobb understood its importance and introduced a method for collecting and combining data from thousands of

pedigree birds to accurately enhance genetic improvement in lowering feed conversion.

The company invested in state of the art testing facilities which are able to minimise differences in temperature, humidity and ventilation among the birds.

Individual bird measurements are critical and are taken for body fat and feed conversion and represent a powerful indicator and stronger selection value than data collected for families or colony pens. The dividends of this considerable effort are still being appreciated by the industry today when grain prices and the subsequent cost of poultry feeds are increasing to historic levels with no end in sight.

Advantages highlighted

Confirmation of this progress comes from many sources. One recent study at the Ustrasice Testing Station in the Czech Republic highlights the Cobb advantage when feed requirements were compared directly to those of a competitor.

Cobb broilers were fed a diet 2-3% lower in protein throughout growout along with lower lysine during starter and grower stages.

Feed worked out to €6-10 ($8-13.5) per tonne less than the competitor's cost. Assuming 250g of starter and 1,000g of grower, with the remainder finisher, this equates to feed cost per kg live weight of €0.302 ($0.40) with Cobb and €0.326 ($0.44) with the competitor on their respective feed requirements.

As with broilers, the nutrition and feeding guidelines of broiler breeders must be constantly updated in tune with the genetic improvements.

Management needs to respond to and utilise the information available while still being able to react to individual flock needs. With broiler breeder hens, feeding according to their requirement decreases production costs by decreasing feed costs and improving chick output.

As demonstrated, evaluation of the broiler breeders on the performance of the broiler is also important in optimising production and feed utilisation. ■