Precision feeding: The future face of Australian chicken-meat production?

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Feed represents 70% of total chicken-meat production cost; hence, nutrition is an important area to improve efficiency. Broiler chickens grow rapidly and nutrient requirements change daily (Aviagen 2014). However commercially, broilers are fed 3-5 phases or diets, meaning nutrients are under and over-supplied throughout production. Increasing diet number or phases has been shown to improve production efficiency as there is less time in the production cycle that nutrients are in under- or over-supply (Hauschild *et al*. 2015; Kleyn 2013; Warren and Emmert 2000).

Nevertheless, the process of administering 4 or more diets is costly and often impractical. But, with advancing technology and computer science, new technologies are now available to model the daily nutrient requirements of broilers. Additionally, modern feed delivery systems may be installed on farm and programmed to automatically blend a protein-dense concentrate that can be subsequently diluted with a low protein but energy-dense concentrate on a daily basis to achieve the desired gradient of digestible lysine to energy intake desired. As only two dietary components are used in the process, the profitability of this regime won't be hindered by the practicalities of feed transportation and storage.

Recent work has shown promise; Sharma *et al*. (2014) demonstrated that broilers offered a nutrient dense starter diet which is diluted with whole wheat by increasing increments every 4 days up to 40 days post-hatch do not exhibit a significantly different weight gain or carcass composition than broilers offered standard starter and grower phases. Additionally, unpublished data by Feedworks demonstrated that feeding broilers to their daily requirements improved mortality corrected FCR by 5.2% (1.83 versus 1.93; $P<0.05$) at 42 days in comparison to a standard feeding regime. Thus, it appears that precision feeding may be an effective feeding strategy; however, there are few studies. Therefore, a trial was conducted to determine the effects of precision feeding versus a standard 4-phase commercial feeding program, with and without whole grain feeding, which is common practice in the Australian broiler industry. A total of 624 Cobb 500 off-sex males from the female line were evenly distributed amongst 48 pens (6 treatments, 8 reps per treatment, 13 birds/pen). The dietary treatments were offered from 1-42 days and consisted of; 1) standard 4-phase feeding regime, 2) standard 4-phase feeding program blended from energy and protein concentrates, 3) standard 4-phase feeding regime + 20% whole wheat, 4) precision feeding program blending energy and protein concentrates, 5) precision feeding program blending energy and protein concentrates, with 20% whole wheat within the energy concentrate and 6) precision feeding program adjusting the daily blends based off of weekly individual bird weights.

Birds offered precision feeding numerically improved 11-42d feed conversion ratio by 1.7% (1.423 versus 1.448). However, the greatest improvement was seen during the first week of the experiment, with precision feeding significantly improving feed efficiency by 4.8% (1.144 versus 1.202). It is sensible that precision feeding has the greatest benefit for young chicks, as the transition between starter and grower protein and energy levels represents the greatest nutritional change across the production phase. Additionally, the gut of young chicks is making crucial development of this period. Thus, precision feeding may be of particular importance to early chick nutrition. Weekly adjustment of the precision feeding regime (treatment 6) in accordance to the bird's weight achieved an almost identical feed efficiency in comparison to the precision feeding regime (treatment 4). However, weekly adjustment of the precision feeding regime to match broiler requirements based on their actual weight (rather than predicted weight for age) achieved the lowest relative fat pad weights, reducing fat pad weight by 23% in comparison to control diets (6.58 versus 8.57 g/kg) at d 28. Whole grain feeding within standard 4-phase diets significantly improved feed conversion ratio by 5.9% (1.363 versus 1.448; $P < 0.01$), however, significantly worsened feed conversion in precision fed birds by 4.4% (a.488 versus a.423). It is likely that feed flicking of diets containing whole grain may have skewed the results, as whole grain feeding is very seldom reported to worsen FCR. Thus, with the advancement of technology, precision feeding may provide a new approach to broiler nutrition. However, more research is warranted, particularly on the effects of precision feeding on early chick nutrition.

References

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