Production, physiological and metabolic responses to alternative methods of calcium presentation to laying hens

by

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Declaration

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in the preparation of this thesis, and all sources used, have been acknowledged in this thesis.

Robert Donald Taylor
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Summary

Substantial debate continues as to the best method of supplying calcium to laying hens. Recommendations for calcium requirements have placed greater emphasis on the need to replace the traditional ground source with a proportion in particle form. This has stemmed from the growing problems with bone integrity and eggshell quality in the modern small-bodied layers which have limited appetites. Generally, calcium is supplied at fixed levels in the diet. As little effect of feed methods has been found in alleviating the above mentioned problems, it is suggested that calcium may be better supplied to the layer ad libitum and in a large, clearly defined form.

A 14 month field trial studied two strains of commercial layers provided with feed by two methods (compound and choice) and with calcium by three methods (ground limestone or grit, either daily or every second day). The method of feed and calcium presentation to layers had effects on the apparent metabolizable energy of the birds diet, gizzard function and digesta dynamics, calcium retention, bone volume and, in one strain, the expression of Marek’s Disease.

Grit feeding improved dietary AME in layers. This was due to grit feeding alone as energy intakes were similar in birds with or without grit. Improvement in AME was only maintained when grit was supplied daily.

Increased gizzard size occurred in layers when fed on whole grain but not on limestone grit. Layers had poor retention of grit irrespective of gut development and grit was not selectively retained in the gizzard; most of the daily intake of grit being lost within 24 h. A proportion of the flock (10-15 %) had large grit intakes (up to 120 g/d) but suffered no apparent side effects. The turnover of large grit (4.76-4.00 mm) was slightly lower than for finer grits (2.34-2.00mm or 2.00-1.18 mm) but, when surface areas were considered, finer grits allowed for greater potential solubility and, hence, calcium availability.

The individual bird may be able to maximize its dietary efficiency with the ad libitum provision of a particulate calcium source. Individual birds display a great range of requirements for calcium and the current methods of calcium provision, within fixed, narrow limits, may penalize a sizeable proportion of the flock. There would be substantial loss of calcium grit via gut throughput, however, instead of approaching this as a net loss in the production system, perhaps it is better considered as allowing all individuals the opportunity of efficiently utilizing their feed by satisfying the needs of gut function. If this is achieved, at the relatively minor cost of calcium efficiency, problems of bone integrity and sub-clinical stress which may exacerbate disease, may be tempered.
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