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Influence of some nutritional factors on productive performance and digestive tract traits in commercial Brown-egg laying pullets

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Abstract

The general objective of this Master Thesis was to study the influence of some nutritional factors that might affect the productive performance and the development of the gastro intestinal tract (GIT) of commercial brown egg-laying pullets from 1 to 120 d of age. In this respect, the influence of cereal type, energy level, and feed form of the diet were studied.

In experiment 1, the influence of the main cereal and feed form of the diet on performance and digestive tract traits was studied in 576 brown-egg laying pullets from 1 to 120 d of age. From 1 to 45 d of age, 4 diets arranged factorially with 2 cereals (corn vs. wheat) and 2 feed forms (mash vs. pellets) were used. Each treatment was replicated 6 times (24 pullets per replicate). From 46 to 120 d of age all diets were offered in mash form and therefore, the only difference among diets was the cereal used. Cumulatively, pullets fed the corn diets had higher body weight (BW) gain ($P < 0.05$) but similar feed conversion ratio (FCR) than pullets fed the wheat diets. From 1 to 45 d of age, pullets fed pellets consumed more feed ($P < 0.001$) and had higher BW gain ($P < 0.001$) than those fed mash. Most of the beneficial effects of pelleting on productive performance were still evident at 120 d of age. At 45 d of age, gizzard relative weight (RW; g/kg BW) was higher ($P < 0.01$) in pullets fed corn than in pullets fed wheat diets. Feeding pellets reduced the RW of the digestive tract and the gizzard ($P < 0.001$) as well as the relative length (RL; cm/kg BW) of the small intestine ($P < 0.01$) at both ages. The pH of gizzard contents at 120 d of age was not affected by cereal but was lower in pullets that were fed mash from 1 to 45 d of age ($P < 0.01$).We conclude that wheat can be used in substitution of corn in pullet diets with only a slight reduction in BW gain and that feeding pellets from 1 to 45 d of age increased BW gain and pH of the gizzard, and reduced the RW of the gizzard and the RL of the GIT at 120 d of age.

In experiment 2, a total of 1,152 one-day-old Hy-Line Brown pullets were used to study the influence of the energy content of the diet and feed form on productive performance and several digestive tract traits. From 1 to 45 d of age, there were 6 diets arranged factorially with 3 concentrations of Apparent Metabolizable Energy nitrogen corrected (AMEn; low: 11.66, medium: 12.05 and high: 12.66 MJ/kg of diet) and 2 feed forms (mash vs. pellets). From 45 to 120 d all diets were fed in mash form and therefore, the only difference among treatments was the energy content of the diets. Each of the 6 treatments was replicated 8 times and the experimental unit was formed by 24 pullets. Cumulatively, BW gain and FCR improved as the AMEn of the diet increased ($P < 0.001$). Pullets fed pellets from 1 to 45 d of age had higher feed intake and BW gain ($P < 0.001$) in this period and higher BW gain ($P < 0.01$) cumulatively, than pullets fed mash. At 45 d of age, the relative weight (RW; g/kg BW) of all the segments of the GIT was lower for pullets fed the high- than for pullets fed the mediumor low- energy diets. At 120 d of age the RW of the gizzard was higher ($P < 0.01$) for pullets fed the low energy diets than for pullets fed the other diets. The RL of the GIT was not affected by the energy content of the diet. Feeding pellets reduced the RW of the proventriculus ($P < 0.05$), the gizzard ($P < 0.001$), and the GIT ($P < 0.001$), and the RL of the small intestine ($P < 0.05$) and the ceaca ($P < 0.001$) at 45 d of age. The effects of feeding pellets on RW of gizzard and proventriculus were still evident at 120 d of age. We concluded that feeding pellets from 1 to 45 d of age improved feed intake and BW of pullets at 120 d of age and that an increase in the energy content of the diet increased pullet performance at all ages but reduced the RW of the proventriculus and gizzard.

We conclude that corn and wheat can be used indistinctly in diets for pullets from 1 to 120 d of age with only a slight reduction in BW when wheat is used. Pelleting of the feeds from 1 to 45 d of age and the use of high density energy diets are recommended in order to achieve adequate target BW at 120 d of age. However, pelleting of the feed and the use of high AMEn diets might jeopardize the development of the GIT especially that of the gizzard, which might affect feed intake of laying hens especially early in the production cycle.