The effect of a macroalgae (seaweed) blend on egg production and quality in commercial layers

I. HUTCHINSON[1]*, S. ESCOBERO[1], H. GRAHAM[1], S. HALDAR[2] AND A. K. DHARA[2].

[1]Ocean Harvest Technology Group Plc. Theale, Reading, RG7 4SA, UK. [2]Agrivet Research and Advisory Ltd, Kolkata 700089, IN.*ian.hutchinson@oceanharvesttechnology.com

Introduction

The maintenance of gastrointestinal health and function for optimal nutrient digestion and absorption is a key element of poultry nutrition programmes. Due to societal and regulatory pressures, the use of effective alternatives to antimicrobial growth promoters to support digestive function and health are currently a high priority in the poultry industry globally.

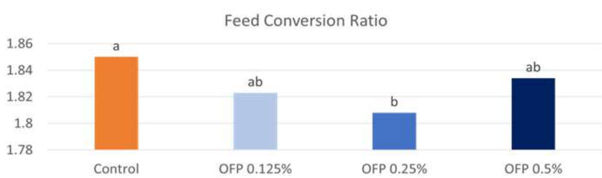
Seaweeds, or marine macroalgae, can be classified into three taxonomic groupings: brown (*Phaeophyceae*), red (*Rhodophyceae*), or green algae (*Chlorophyceae*) (Makkar et al. 2016). The use of seaweeds in monogastric animals has focussed on functional components such as polysaccharides, antioxidants, and phlorotannin (Holdt and Kraan 2011), and these bioactives have been linked to improvements in immune status, microbial balance and digestion (Makkar et al. 2016; Overland et al. 2019). The biodiversity of functional metabolites within brown, red and green seaweeds offers possibilities for developing blends of seaweeds to improve poultry gut health and eliminate the need for antibiotics and other synthetic growth promoters. The objective of the present study was to investigate the effect of a seaweed blend (OceanFeed™ Poultry: OFP, Ocean Harvest Technology) on production and egg quality traits in laying hens.

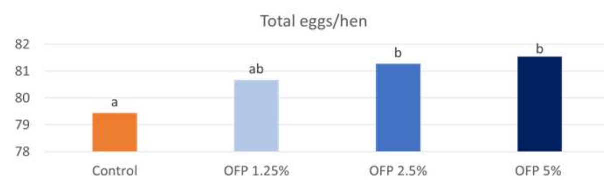
Materials and methods

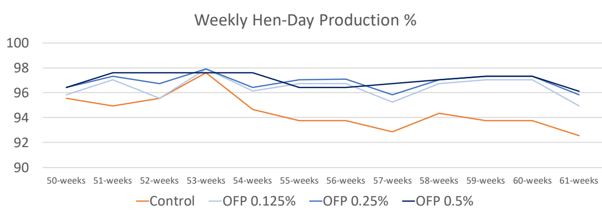
Corn and soyabean meal-based diets were formulated according to the nutritional requirements of laying hens, without feed additives designed to impact the GI microbiota. MAB (OceanFeed™ Poultry) was added to provide 4 dietary treatments as follows: 0 (Control) 1.25, 2.5 and 5.0 g/kg of diet. A total of 192, 50-week-old Lohman LSL Lite hens were allotted to cages using a completely randomized design. Each diet was fed to 16 replicate-cages of 3 hens for a total of 12 weeks. Feed was offered 3 times daily at 5 h intervals and water supplied continuously through nipple drinkers. The cages were checked daily for mortality and morbidity. Egg production was measured twice daily per cage and expressed on hen day basis as the average weekly hen-day production (HDP %). The average egg weight (EW) per cage was recorded by weighing all eggs collected from each replicate cage daily and then pooling weekly per replicate. Egg mass (EM) was calculated by multiplying the average EW with the total number of eggs produced per cage and expressed as g per hen per day (EW x HDP%). BW of hens was recorded at week-0 and at weekly intervals for 12 weeks. Feed intake was measured daily per cage and expressed as average daily feed intake (ADFI)/hen and cumulative feed intake (FI) calculated. Feed conversion ratio (FCR) was calculated at weekly intervals as the ratio of ADFI to EM. Egg quality traits, including albumen height (AH), Haugh Unit (HU) and eggshell breaking strength (EBS), were measured using an automated egg tester at the start and at 3 weeks intervals using three eggs per replicate cage. All data were pooled cage-wise and analysed by the general linear models SPSS (version 26.1) with polynomial contrast applied to determine the linearity of the response. Significance was assumed at the level of $P<0.05$ and means separated with Tukey's B test.

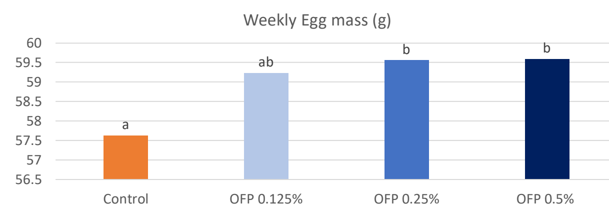
Results

A seaweed blend significantly improved production and efficiency measures in laying hens, in a dose dependent manner. Feed conversion ratio and weekly egg mass shown are the treatment means of the 12-week experimental period. Total eggs/hen are the treatment means for the total number of eggs laid per hen over the 12-week experimental period.

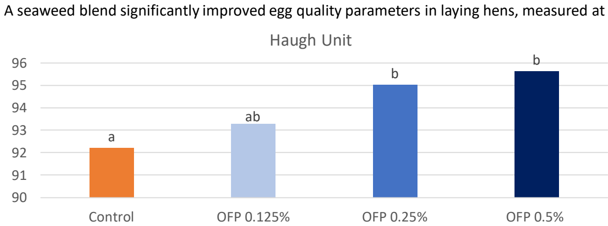


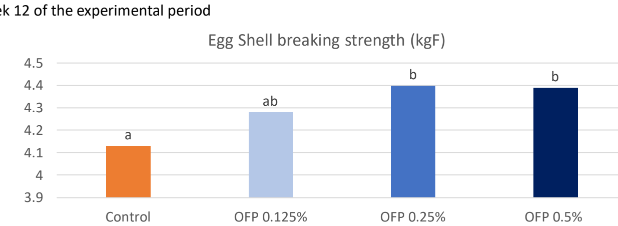






A seaweed blend significantly improved egg quality parameters in laying hens, measured at week 12 of the experimental period





[ab]Values with different superscripts denote significance differences ($P \leq 0.05$).
OFP 0.125%, 0.25% & 0.5%; Control with 1.25, 2.5 or 5 kg/ton OceanFeed™ Poultry Seaweed blend

Conclusions

Based on the findings of this study, adding a seaweed blend to diets for laying hens can improve egg production, egg mass and feed efficiency. Seaweed blends can also improve egg quality traits such as Haugh unit and shell breaking strength. The optimum dose for inclusion is between 2.5 and 5 kg/tonne, and further research is required to fully elucidate the mode of action of seaweed blends on production performance and egg quality in laying hens.

References

Holdt, S. L., and S. Kraan. 2011. "Bioactive Compounds in Seaweed:Functional Food Applications and Legislation." *Journal of Applied Phycology* 23: 543.

Makkar, H. P. S., G. Tran, V. Heuze, S. Giger-Reverdin, M. Lessire, F. Lebas, and P. Ankers. 2016. "Seaweeds for Livestock Diets: A Review." *Animal Feed Science and Technology* 212: 1–17.

Overland, M., L. T. Mydland, and A. Skrede. 2019. "Marine Macroalgae as Sources of Protein and Bioactive Compounds in Feed for Monogastric Animals. *Journal of the Science of Food and Agriculture* 99 (1): 13–24.