APRI FACTS

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FACTSHEET #44
October 2020

EFFECTS OF DIETARY SEAWEED AND HEAT STRESS ON PERFORMANCE AND BLOOD CHEMISTRY IN TWO STRAINS OF LAYING HENS

Introduction: Blood biochemistry is utilized in many species to evaluate and diagnose health issues. Specific proteins or biomarkers present in the blood can reflect changes in the animal associated with such things as inflammation, liver or kidney damage. Specific antibody and white blood cell ratios have been associated with increased stress and mortality in broiler chickens (Krams et.al 2012). The type and intensity of response found in the blood depends on the environmental and genetic factors, as well as the physiological status of the animal.

Objective: This study looks at the effects of feeding red and brown seaweed, and inducing heat stress, on the performance and blood chemistry of white and brown hens.

Industry Impact: The identification of biomarkers associated with hen performance and health may provide researchers with more effective tools to rapidly evaluate the impacts of new dietary and other management intervention. These biomarkers can also provide a higher level of assurance to industry that innovations are beneficial to hen health and welfare.

Trial: Two trials were conducted. In the short-term trial, two strains of 55-week old commercial laying hens, Lohmann LSL-Lite (White) and Lohmann Brown-Lite (Brown) were utilized. Five white or brown hens were housed per cage. There were 2 diet treatments and 5 replications per treatment per strain for a total of 20 cages. Treatment 1 was a basal diet formulated based on commercial requirements and Treatment 2 incorporated 3% red seaweed *Chondrus crispus* (CC). The trial was conducted for 21 days. The long-term trial utilized 31-week old white and brown hens and included a heat stress period in the last four weeks. Five white or 5 brown hens were housed per cage. There were 3 diet treatments and 8 replications per treatment and per strain for a total of 48 cages. Treatment 1 was a basal diet formulated based on commercial requirements, Treatment 2 incorporated 3% red seaweed (CC) and Treatment 3 incorporated 0.5% brown seaweed *Ascophyllum nodosum* (AN) into the diet. At 68 weeks of age, two birds from each cage were transferred to mobile battery cage units in a separate room for the heat-stress evaluation, where temperatures gradually rose from 25˚C to 33˚C from 11 a.m. to 6 p.m. for 28 days. Both the heat-stressed and control birds continued to be fed the treatment diets to age 72 weeks. For both trials, eggs were collected daily and egg production was calculated on a per cage basis. Feed intake was also calculated daily. Body weights were taken at the start and end of the trial. At the end of the trial, one bird from each cage was euthanized and blood samples were collected.

Results:

- In the short-term 21-day feeding trial, there was no difference in feed intake and weight gain between the white and brown hens. However, feed intake, weight gain and feed/egg were lower for the birds (white or brown) fed the 3% red seaweed.

- In the long-term 41-week trial the effect of feeding the red seaweed disappeared and there was no difference in feed intake, weight gain and feed/egg between any of the feeding treatments, which may be associated with an improvement in gut health and/or adaptation to the change in palatability of the diets.

- In the short-term and long-term feeding study white hens consistently displayed higher egg production, lower body weights and improved feed conversion compared to brown hens.

- Both white and brown hens had elevated levels of an enzyme indicative of an inflammatory response or compromised liver two-three times higher than normal when heat stress was applied.

- Overall, results indicate that the brown strain is more susceptible to the adverse effects of heat stress than the white strain.

Table 2. Effects of strain and seaweed intake on layer hen performances in the short-term trial

	Brown Strain		White Strain	
Parameters	**0% CC**	**3% CC**	**0% CC**	**3% CC**
Egg production (%)	85.1	81.3	88.2	87.1
Feed Intake (g/bird/day)	95.1	85.9	90.6	87.1
Feed/egg	108.0	96.7	96.7	95.2
Body Weight (g)	2113.3	2083.9	1798.4	1743.6
Weight gain (g)	98.2	−119	135.8	−142.4

Note: No significant interaction was observed between the treatments.

References:

Krams, I.; Vrublevska, J.; Cirule, D.; Kivleniece, I.; Krama, T.; Rantala, M.J.; Sild, E.; Hõrak, P. Heterophil/lymphocyte ratios predict the magnitude of humoral immune response to a novel antigen in great tits (Parus major). Comp. Biochem. Phys. **2012**, 161, 422–428.

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Funding: Egg Farmers of Nova Scotia, Egg Farmers of New Brunswick, Egg Farmers of Canada and the Canadian Agricultural Adaptation Program - Atlantic Agriculture Research and Innovation Initiative.