CHANGES IN EGG SHELL FORMATION POTENTIAL OF SHELL GLAND TISSUE IN HENS FED WHOLE BARLEY

D. BALNAVE , D. ZHANG AND NADA USAYRAN

Resting hens from lay is an important management option for controlling egg production in commercial flocks. A procedure used in Australia utilises whole barley as the sole feed. This procedure allows the hen to satisfy its appetite while ceasing to lay eggs. Hens re-commence laying when the barley is replaced with a complete layer diet.

While this procedure is advantageous from an animal welfare viewpoint no attempt has yet been made to evaluate the responses in shell gland metabolism associated with the cessation in lay. This has been examined in the present study by measuring the concentration of calcium-binding protein (CaBP) and the activities of the calcium-metabolizing enzyme, calcium ATPase (Ca-ATPase), and the bicarbonate-forming enzyme, carbonic anhydrase (CA), in shell gland mucosa of 40-week-old laying hens transferred from a complete layer mash to whole barley for various periods of time. The results are shown in the Table.

Table 1 Concentration of calcium-binding protein (CaBP), and the activities of calcium ATPase (Ca-ATPase) and carbonic anhydrase (CA) (as a percent of control hens receiving a complete layer mash).

	Comparison 1		Comparison 2	
Days on barley	CaBP	CA	Ca-ATPase	CA
4	83.9^{+a}	51.7^{**}	-	-
8	-	-	38.5^{**}	43.3^{*}
11	46.2^{***}	8.5^{***}	-	-
15	-	-	30.0^{**}	16.5^{***}
18	46.4^{***}	10.4^{**}	-	-
23	-	-	26.6^{***}	5.7^{**}

[a] Significantly different to hens receiving a complete layer mash. + P<0.10, * P<0.05, ** P<0.01, *** P<0.001

The results show an immediate reduction in the egg shell-forming capacity of the shell gland within four days of introducing the whole barley. The activity of carbonic anhydrase was reduced to about 59 to 10 per cent of that recorded in hens maintained on the layer mash. The effect on calcium metabolism was less marked with reductions of 50 per cent in the concentration of calcium-binding protein and 75 per cent in the activity of calcium ATPase. The responses were reversed when the hens were re-fed the layer mash.

Department of Animal Science, University of Sydney, Werombi Road, Camden, NSW 2570