

POOR SHELL QUALITY FROM UNDERGROUND WATER

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Underground water supplies, which are usually high in dissolved salts, are an important source of water for many poultry producers in Australia and overseas. During recent investigations of a poor shell quality problem in western N.S.W. we identified the source of water as a possible cause. In particular, the bore water in use had substantially increased concentrations of sodium, potassium, calcium, magnesium, chloride, sulphate, and nitrate ions. A study was undertaken to examine the incidence of shell defects in laying hens given municipal town water to which had been added NaCl (250 mg/l), KCl (40 mg/l), CaCl₂ (120 mg/l), hydrated MgSO₄ (300 mg/l), anhydrous CuSO₄ (200 mg/l), and NaNO₃ (350 mg/l) to increase the concentrations of the above ions to levels previously found in the bore water. The results of the study are shown in the following table.

Mineral Supplement	% Shell Defects	% Egg Production	Food Intake	Shell weight/unit surface area (mg/cm ²)
None	3.1	74.0	123.4	70.5
NaCl	6.5***	68.6***	122.5	70.2
KCl	6.4***	71.4	124.6	68.7*
CaCl ₂	5.2*	72.5	119.4*	71.5
MgSO ₄	4.0	73.8	122.2	69.9
CuSO ₄	5.3*	70.5*	124.8	71.6
NaNO ₃	4.7	70.1**	122.2	69.7
Combined	5.8**	73.4	124.2	69.7

* P<0.05, ** P<0.01, *** P< 0.001 significantly different to controls receiving no mineral supplement

It is apparent that the inclusion of small quantities of these mineral salts in the water supply substantially increased the incidence of shell defects. This was apparently not due to decreased food (i.e. calcium) intake OR to increased egg production. Similarly, it did not appear to be associated with the pH of the water although in all cases the water consumption was reduced by between 10 and 20 per cent of that of birds receiving no added minerals.

Shell characteristics were measured on all treatments using eggs of normal appearance within a 59-66 g. weight range, but differences were difficult to detect using this procedure. The only effect on the albumen quality of these eggs was a significant (P<0.01) reduction in Haugh units in birds given CuSO₄.

The intakes of these ions via the water supply were low compared with intakes from the diet. Nevertheless, significant losses in production through reduced rates of lay and increased shell defects were observed.

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