

Effect of Free Range Poultry on Soil and Pasture

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The *Free Range Poultry Demonstration* is a program conducted by NSW Agriculture (Windsor) in co-ordination with the University of Western Sydney - Hawkesbury. The trial involves establishing a flock of laying hens on a fully commercial scale, using perennial pasture as a source of supplementary feeding.

The demonstration site is located on flat land with a sandy top soil overlying a medium clay subsoil at a depth of about 60 cm. The soil is of alluvial origin and in its natural state had a pH of 4.7 (CaCl_2), available P of 7ppm (Bray) and 2% organic matter.

The paddock was cultivated and sown with a mixed pasture (perennial ryegrass cv Kangaroo Valley, white clover cv Haifa, and kikuyu cv Whittet) in early April 1991. Lime was applied at 2.5 t/ha and incorporated prior to sowing, superphosphate (250 kg/ha) was applied at sowing, and urea (180 kg/ha) topdressed two weeks after sowing.

Hens were introduced in July, approximately three months after sowing and increased to 1000 by October. A rotational grazing system is used whereby every 2-3

weeks hen houses are moved to a new location and a section of the paddock (approximately 25%) spelled using electric wires. Irrigation was supplied so that moisture did not limit pasture growth.

The aim of this paper is to provide some early data on the effects poultry are having on the grassland system.

Methods

The trial was established by slashing (20-10-91) and fencing off an area of the 2.16 ha paddock using electric wires. The fenced-off area totalled 0.372 ha after which 323 laying hens and four portable hen houses were introduced.

Pasture growth rates and intakes were estimated over the period 22.10.91 to 14.11.91. An electronic pasture probe was used to estimate yields at the start and finish of the period: (1) Across the section being grazed; and (2) Inside the five exclusion cages (1.0 m^2) placed evenly across the paddock at locations representative of

the paddock as a whole. No kikuyu had germinated at the time of sampling.

On 29.10.91, 50 individual soil samples (depth of 7 cm) from across the entire paddock area were collected and bulked to form the representative sample designated "pasture" in Table 1.

Another sample was obtained from areas of de-vegetated earth which had been occupied by hen houses in the three weeks prior to 22 October. Three different hen house sites were used as sample areas with 10 samples taken from each site which were bulked to form the representative soil sample designated "hen houses" in Table 1.

Results

Pasture on offer increased from 2.95 t/ha to 3.23 t/ha over the period. Average growth rate within the cages was 90 kg/ha/day. Average apparent pasture intake (estimated from the difference in yield inside and outside the cages) was 90 g/bird/day. Soil results are shown in Table 1.

Discussion

Soils

The effects of the hen houses (devegetation and manuring) on the soil has lead to an increase in pH, available P and salinity, but has not changes in total N. Changes in total N were expected to be minimal as a substantial portion of extra N put into the system through manure would be lost as gaseous NH_3 (Beauchamp, 1983).

Available P and salinity in the "hen house" sample is considerably higher than the paddock average. This is obviously a result of the heavy manuring the soil has received with no pasture to absorb the excessive nutrients and salts. Continuous heavy applications of manure have led to increases in soil salinity on some farms in the USA (Powell, 1992) although 0.91 ds/m is still

Table 1: Soil data from free range poultry demonstration unit.

	pH	P (ppm)	N (%)	ECE (ds/m)
Method	1:5 H_2O	Bray	Kjeldahl	
Pasture	5.3	45	0.06	0.29
Hen house	6.0	114	0.07	0.91

below the threshold of 1.25 ds/m at which stage clover yields begin to decline (Maas and Hoffman, 1977).

These results are, however, only preliminary and further monitoring is needed to determine if there is any lasting effect. As the hen houses occupy only a small portion of the paddock area (1%) there is ample opportunity to rest the sites.

Pasture

The growth rate of the pasture over the trial period (90 kg/ha/day) is similar to the maximum growth rate (Crofts *et al.*, 1963) achieved in trials at nearby Badgerys Creek.

Pasture intake per bird was estimated at 90 g /day. The feed requirements for laying hens varies from 100-150 g/day of balanced layer ration (Thear and Frazer, 1980). In an intensive unit, the particular breed of hens that are run on the demonstration unit would need an average 120 g/day of layer ration and this was expected to increase by 40 g/day when the hens were run as free range (Roger Packham, *pers. comm.*) to compensate for the extra energy expended. However, ration intake remained at 120 g/day and thus the hens are utilising the pasture as a supplementary feed source.

The apparent measured pasture consumption of 90 g/bird/day appears high in light of the above figures. The exact proportion of the pasture that is actually consumed as opposed to being destroyed through constant scratching is open to debate. However, this study has indicated that pasture may contribute substantially to the diet of laying hens, in a free-range situation.

References

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