AN ECONOMIC ANALYSIS OF LEAST-COST LAYER RATIONS

A thesis presented in partial fulfilment of the requirements for the degree of Master of Agricultural Science in Farm Management at Massey University.

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ABSTRACT

Fifteen treatments, replicated once, each containing eighty four birds of three strains of White Leghorn layers (White Base a, White Base b, M. Line) were fed rations ad libitum of five different metabolisable energy levels (2315, 2535, 2756, 2976, 3197 k. cal. M.E. per kg.) and three different protein levels (16, 17, 18 gms. per hen per day, based on an energy intake of 305 k. cals. per hen per day) to obtain quantitative estimates of the physical input/output relationships of layer production. Three other treatments, plus a control, were fed to obtain data on the response of laying hens to restricted energy intake and improved protein quality. All rations were formulated to least cost using Linear Programming.

Least Squares multiple regression was used to obtain linear response functions for feed intake, egg number, egg weight and liveweight gain (the variables included in a net revenue function for layers under New Zealand production conditions).

Feed intake was expressed in terms of dietary energy concentration and initial liveweight. Statistical problems encountered dictated that predicted nutrient intakes were used as the independent variables in the estimation of the egg number and liveweight gain functions. Predicted energy intake and methionine intake accounted for differences in egg number, particularly for White Base b layers. Predicted energy intake, methionine intake and isoleucine intake accounted for differences in liveweight gain. There were no significant differences between average egg weights.

There were significant strain differences in ad libitum feed consumption, egg number, average egg weight and liveweight gain.

A net revenue function was estimated in terms of the endogenous variables (dietary nutrient concentrations) which were included in the layer response functions. This was analysed in terms of the endogenous variables for the then current egg and feed prices.