

AN EVALUATION OF
EFFECTIVE ENERGY IN THE
FORMULATION OF DIETS FOR LAYING HENS

MARION BELINDA YOUNG
B.Sc.AGRIC. NATAL

Submitted in partial fulfilment of
the requirements for
the degree of
MASTER OF SCIENCE IN AGRICULTURE

in the
Department of Animal Science and Poultry Science
PIETERMARITZBURG

1998

ABSTRACT

Emmans (1994) introduced a concept of energy utilisation applied across species, in which a heat increment in feeding is considered to be linearly related to five measurable quantities. Subtracting the heat increment of feeding from the metabolisable energy supplied defines the energy supply scale called effective energy.

Two trial protocols were developed and run in controlled environment chambers at hot and cold temperatures using laying hens in individual cages. The first trial tested the response of hens at temperatures of 18°C and 32°C to the dilution of a basal diet with ingredients selected to promote a heat increment in different manners, according to the effective energy system. Diluents were soy protein isolate, fishmeal, sunflower oil, husks and sugar and starch mix. Six diets were offered to Amberlink and Hyline Brown hens for two successive periods of six weeks at the two temperatures. Responses in performance and calculated heat production indicated that heat increments could be induced by particular diluents. These affected the response in laying performance of the birds, particularly at high environmental temperatures.

A second protocol tested the absolute value of the effective energy system by using Amberlink hens for three consecutive seven week periods at 30°C, 20°C and 30°C, respectively. High and low effective energy diets were formulated, and blended, and compared against commercial high and low density diets. The effective energy diets and the commercial diets were also offered as a choice to the hens. The data illustrate a marked linear response to the effective energy in the diet. High effective energy produced the same response as a high nutrient density at high temperatures. Highest performances in lay were achieved on the choice diets. The hens demonstrated the ability to change the proportion of the choice of the effective energy diets at the different temperatures.

Dynamic heat exchanges with the environment become significant, especially at higher temperatures in the thermally active hen. Effective energy considers this heat response,

and can assist in ameliorating the response of the laying hen to high environmental temperatures when incorporated into principles of feed formulation.