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Pond, W. G.; Van Vleck, L. Dale; Walker, E. F. Jr.; Eisenhard, C. F.; and O'Connor, J. R., "Changes in Body Weight and Composition of Adult Nongravid Female Rats Deprived of Dietary Protein" (1969). *Faculty Papers and Publications in Animal Science*. 175.

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Changes in Body Weight and Composition of Adult Nongravid Female Rats Deprived of Dietary Protein

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Seventy-six young adult nongravid female rats of the Carworth strain were used in two experiments to study the effect of dietary protein deprivation on body weight, feed consumption, body composition and serum protein concentration. Semipurified diets containing glucose, corn oil, vitamins and minerals with or without casein (protein-free = PF, 14% casein = C) were fed ad libitum in both experiments to rats caged in individual wire-bottom cages. Feeding the PF diet for up to 26 days resulted in a continuous weight loss over the entire period. The average loss in body weight as a percentage of initial weight of PF rats in experiments 1 and 2 was 32.9 and 25.7, respectively. Weight loss during 9 days in rats fed the PF diet was restored within 8 days following transfer to the C diet. Feed consumption was reduced only moderately by the PF diet, suggesting a large loss of ingested calories by excretion or metabolism to carbon dioxide and water. Body composition data supported this and indicated a greater relative loss of body energy than of body protein in PF rats. Blood serum protein concentration was reduced moderately ($P < 0.05$) in rats fed the PF diet. The absolute loss of serum protein may have been greater than suggested by the concentration if it is assumed that there was a reduction in blood volume associated with the observed weight loss. Blood serum protein concentration therefore does not appear to be as sensitive an index of protein nutrition in the adult as in the young animal. Final body energy, protein and water content were less in PF rats than in C rats in experiment 2 by an average of 176.5 kcal (36%), 10.9 g (23%) and 41.7 g (28%), respectively. Energy concentration (kilocalories per gram dry weight) was 11% greater in C than in PF rats (5.8 versus 5.2 kcal/g). These data indicate that the adult female nongravid rat can survive a loss of at least one-third of body energy and one-fourth of body protein induced by protein deprivation without developing severe hypoproteinemia, emaciation and edema.

Manuscript submitted July 17, 1968.

Published in *Journal of Nutrition* Vol. 97 No. 3 March 1969, pp. 343-347
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Online at: <http://jn.nutrition.org/cgi/reprint/97/3/343>