

or the size of the young. Similarly the addition of the wheat embryo extract to the evaporated milk groups did not influence the food ingestion nor the weight of the mother.

There seems to be a relation between the amount of food ingested and the gain in weight of the young in each group. The average weekly gain of the young of the animals receiving the dried milk feeding was greater than that of the young of mothers fed the evaporated milk. The caloric ingestion of the former group was slightly greater. Our results with dried milk are comparable to those previously reported. There is no evidence that the prelactation carry over of Vitamin F influenced our previous results to any great extent. The dried milk tested contained enough of the anti-neuritic vitamin for normal growth, reproduction, and successful suckling of 6 young. Our results with evaporated milk, on the other hand, suggest that some essential constituent may be low, since optimum results were obtained with none of these groups. The results with the Vitamin F additions were slightly better than those without this addition. However, the differences between the animals receiving Vitamin F addition and those not getting it were not sufficiently outstanding for us to conclude that this vitamin is the lacking substance.

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Vitamin F in Relation to the Development of the Thyroid and Thymus of Suckling Young.

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When high protein diets, adequate in all the known dietary constituents excepting Vitamin F, are fed to lactating rats, the young, besides manifesting the untoward symptoms previously described,¹ give evidence of abnormal glandular development. The thymus gland is much smaller than that of normal animals of the same age or weight, while the thyroid is much larger. Among our stock fed

¹ Hartwell, G. A., *Biochem. J.*, 1922, xvi, 825; 1925, xix, 227; Nelson, M. P., *J. Home Econ.*, 1926, xviii, 383; Daniels, A. L., and Brooks, L., *Proc. Soc. Exp. Biol. and Med.*, 1927, xxv, 161; Daniels, A. L., Giddings, M. L., and Jordan, D., *J. Nutrition*, 1929, i, 455; Lawrence, M. R., *Dissertation*, State University of Iowa, 1929.

animals the thyroid was found to average 0.23% of the body weight, whereas the thyroid of the young of the animals receiving high protein diets averages 0.40% of the body weight. When starch free yeast was added to the high protein diet, the thyroid averaged 0.22% of the body weight. When low protein was substituted for high protein in the basal diet, the thyroid averaged 0.28% of the body weight.

The young of animals receiving low protein diets to which was added respectively glycine and alanine, amino acids known to stimulate metabolism, developed symptoms comparable to those of the young of rats receiving high protein diets. The influence of these additions on the thymus and thyroid also was similar. The thyroids of the young of the animals receiving glycine averaged 0.40% of the body weight whereas those of the young of the animals receiving alanine averaged 0.30% of the body weight. Glutamic acid, known to be low in its stimulating effect, caused no hypertrophy; the weight of the glands of the young receiving this averaged 0.23% of the body weight.

The average weight of the thymus gland of the young of rats receiving the high protein diet without added antineuritic vitamin was 0.11% of the body weight. When Vitamin F was added the thymus averaged 0.43% of the body weight.

The addition of glycine and alanine to the low protein diets resulted in an atrophied thymus (0.12% of the body weight). With Vitamin F additions the glands averaged 0.42% of the body weight. The results with glutamic acid, on the other hand, compared with those of the low protein diets.

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Influence on Development of Suckling Young of Addition of Certain Amino Acids to Diet of Mother During Lactation.

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In studies pertaining to the influence of the diet of the mother on the development of the suckling young of rats, it was shown that a high percentage of protein and inadequate amounts of Vitamin F fed during the lactation period result in certain untoward symp-