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Factors Involved in Lactation and Rearing of Young.

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The work reported in this paper is a continuation of studies by Guest, Nelson, Parks, and Fulmer.[1] These investigators demonstrated that rats grow at the normal rate with various single foods as the only sources of vitamin B. However, although reproduction was approximately normal on these diets, there was a high mortality of the young. Furthermore, a large number of females died during pregnancy or parturition on these diets, the mortality varying with the nature of the seed used as a source of vitamin B. The present paper reports additional data regarding the failure of lactation on certain synthetic diets.

Oatmeal, yellow corn, white corn, and barley were each fed at a level of 60% as sole sources of vitamins B and G; likewise, wheat was fed at a 30% level as a source of these vitamins, and rice polishings, wheat germ, rice bran, and corn germ were each incorporated in the rations at levels of 10% as the only sources of vitamins B and G. The synthetic ration was composed of casein 18%, salt mixture 3.7%, butterfat 4.0%, cod liver oil 1.0%, varying amounts of the different individual foods, and dextrin to 100%. The different rations were fed to pregnant females transferred from the growing ration to the experimental diets at the time of parturition. The data from these experiments show that the mortality of the young was in practically all cases very high. Only in a few instances was the weaning weight normal; and it was also found that a high weaning weight is not necessarily accompanied by a low mortality.

1 Guest, A. E., Nelson, V. E., Parks, T. B., and Fulmer, E. I., *Am. J. Physiol.*, 1926, **76**, 339.

Another series of experiments was performed to determine whether the foods above were deficient in vitamin B or vitamin G as far as lactation is concerned. To the diets in the first series of experiments was added 10% of autoclaved yeast as a source of vitamin G. The autoclaved yeast was prepared by moistening Fleischmann's dried yeast with distilled water—so as to form a thick paste—and autoclaving for 5 hours at 15 lb. pressure; it was then dried at 80°C. The autoclaved yeast markedly reduced the mortality of the young and enhanced the weaning weight of the young from the mothers on the various seeds and products from seeds tested. Corn germ was an exception to this general statement, since in this case 10% of autoclaved yeast reduced the mortality only moderately and had no effect on the weight of the young at the time of weaning. Since the autoclaved yeast contained no vitamin B, it is evident that the factor or factors responsible for this favorable effect reside in the G fraction of the yeast.

A preparation of vitamin B adsorbed on Fuller's earth was prepared, and a preparation of vitamin G from hog liver was made; the effect of these preparations on lactation was studied when added to rations containing 60% yellow corn or 60% wheat as the only sources of B and G. The mortality of the young was not reduced by the addition of 0.318 gm. of the vitamin B fraction daily to the yellow corn ration, but it was reduced markedly by the daily addition of 1.66 gm. of the vitamin G preparation to the yellow corn ration; furthermore, the weight of the young at the time of weaning was markedly increased by the latter addition. Similar results were obtained with the 60% wheat rations. Daily addition of 0.318 gm. of vitamin B preparation to the 60% wheat ration had only a slight effect on mortality and no effect on the weight of the young when weaned. However, the addition of 1.66 gm. of the vitamin G preparation per day to the 60% wheat ration reduced mortality of the young to zero and increased the weaning weight by 90%.

Experiments were then initiated to ascertain whether the 2 preparations of vitamins B and G would suffice for normal growth, reproduction, and lactation as the sole sources of these 2 vitamins. The basal ration had the same composition as the one employed for the previous experiments, except it contained 1.0% of wheat germ oil as a source of vitamin E. The preparations of vitamins B and G served as the only source of these vitamins in the diet. The rats were taken from the growing ration at the time of weaning and placed on the experimental diets. The mortality of the young on most of these rations was very high. On the lower levels of the

vitamin B and vitamin G preparations the weaning weights were low; whereas, on the higher levels the weights of the young at the time of weaning were much greater. The weights of the young were less and the mortality greater than those obtained by supplementing natural foods with the vitamin G preparation. This indicates that another factor or factors aside from vitamins B and G is necessary for lactation. The preparations were fed at levels of 6 to 24 times the amount required for normal growth. The animals grew and reproduced normally but failed to rear their young. The unknown substance responsible for the favorable effects on lactation is not inorganic in character.

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Blood Loss During Normal Menstruation.*

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During the course of iron balance studies on patients with hypochromic anemia, the amount of blood lost during menstruation was determined on several occasions. The figures obtained were surprisingly high but since no uniformity of opinion exists as to the normal menstrual loss an analysis of this was made on 50 women. The individuals selected were for the most part members of the hospital staff whose ages ranged from 19 to 43 years, who had no known menstrual disorders and whose blood hemoglobin was at least 75% of normal (10.2 gm. per 100 cc.).

Cellulo cotton pads were used in most cases although in a few instances a vaginal cup was utilized for the collection of the menstrual flow. This was analyzed for iron by a modification of the method of Reis and Chakmakjian,[1] and the result interpreted in terms of grams of hemoglobin on the assumption that this iron was derived entirely from hemoglobin.

Blood hemoglobin determinations were made on all subjects several days after the menstrual period to avoid variations that may occur because of changes in the water balance and the consequent hydremia. These values ranged from 10.200 to 13.190 gm. per 100 cc. of blood.

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1 Reis, F., and Chakmakjian, H. H., *J. Biol. Chem.*, 1931, **92**, 59.