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Rôle of Proteins in Growth, Reproduction and Lactation. I. Beef Liver.

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In previous studies of growth and reproduction of white rats on meat diets, whole raw, cooked or cooked and dried tissues have been used. Since the biological differences between such diets might reside not only in the protein but also in the tissue lipids, a series of experiments has been planned in which tissues extracted with alcohol until fat-free form the source of protein.

In these preliminary experiments on liver, the protein was fed at 2 levels, 15% (diet A) and 20% (diet B). In addition the diets contained 15% fat (hydrogenated cottonseed oil), 4% salts, 2% agar and starch to make 100%. Yeast and cod-liver oil were administered daily.

First generation animals on diet B showed a normal growth rate, while growth on diet A was considerably below normal. Three females on diet A gave birth to 11 litters containing a total of 73 young and 12 litters containing 84 young were born to 3 females on diet B. Lactation was deficient and only 40% of the young were weaned on each diet. The mothers lost considerable weight during the nursing period and the young animals averaged only 26 and 28 gm. in weight, respectively on the two diets, at 21 days of age.

Growth of the second generation animals was very much inferior to that of the first generation, averaging 25% less on both diets. Animals which received daily one-half gram of whole dried liver grew at a much faster rate than control animals. The increased growth was not related to the vitamin content of the liver. The reproductive function of the females was abnormal. Thirteen females on the 2 diets gave birth to 18 litters containing 109 young and showed an almost total inability to rear them, all but one having died within a few days after birth. Lactation was not improved by increased amounts of vitamins A and B. The majority of the second generation males were sterile and the oestrus cycles of the females were irregular.

Explanations for this beginning sterility and for the growth-accelerating effect of the whole liver are being sought.