FATS AND PROTEINS RESEARCH FOUNDATION, INC.

Director's Digest

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Dietary Fats Regulate Lipid Metabolism

Dietary fats influence fat synthesis (lipogenesis) differently in rats, chicks and pigs according to the investigations of Prof. Dale Romsos and his associates at Michigan State University.

Because single-stomached animals, including man, usually eat spaced meals, nature has provided a mechanism for the storage and release of energy between meals. A large portion of dietary carbohydrate is converted to fatty acids and subsequently oxidized to provide energy. In a well-fed animal on a high carbohydrate diet the conversion: 'carbohydrate ⟶ glucose⟶fatty acid' takes place readily. The undernourished animal or one on a high fat diet, on the other hand, exhibits depressed fatty acid synthesis.

Rats, chicks and pigs are known to differ in the principal sites of fatty acid synthesis. In the chick lipogenesis takes place mainly in the hepatic (liver) tissues. Adipose or fatty tissues account for over half of the fatty acid synthesis in rats and are responsible for virtually all of it in pigs.

The present investigation, which was supported by grant from the Fats and Proteins Research Foundation, compared the effects of saturated and polyunsaturated fats on lipogenesis in the three species. Compared with the effects of safflower oil, tallow containing diets increased the plasma triglyceride level in rats, decreased it in pigs and had no effect in chicks. Dietary tallow increased the rate of fatty acid synthesis in the livers of rats and chicks and reduced it in their adipose tissues. In pigs fed tallow the fatty acid synthesis of adipose tissues was appreciably higher than in those fed safflower oil. These data demonstrate that the lipogenic response elicited by saturated and polyunsaturated fats is different in rats, chicks and pigs and that their adipose and hepatic tissues also respond differently to these fats.