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Glycogen Formation in Rats. III. Diets Containing 87.5 Per Cent of Total Caloric Value in Lactose, Glucose and Sucrose.*

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Each diet contained 87.5 gm. of the carbohydrate, 14.7 gm. of casein (85% casein) and 4 gm. of salt mixture 185. This gave a caloric value of 3.77 cal. per gm., of which 87.5% was derived from carbohydrate and 12.5% from protein (not considering digestibility). Each diet was supplemented by vitamin feeding daily.[1]

Adult rats which had served for breeding purposes until discarded, were used. The time on the test diet varied from 16 to 18 days. The food and water intake was measured. The technique followed at the end of the test period was similar to that previously described.[2]

The rats fed on the lactose diet developed a diarrhea. They disliked the diet as evidenced by their scratching it from the food box, consequently we could not measure the intake accurately. As nearly as we could tell, the average daily intake was 7.9 gm., and the intake during the last 24 hours was about the same. The daily intake on the glucose diet averaged 13.3 gm. with 14.4 gm. as the last 24-hour intake. The sucrose daily intake averaged 14.3 gm., with 14.0 as the average for the last 24 hours.

The water intake on the lactose diet averaged 27 cc. per day, influenced, of course, by the diarrhea. On the glucose diet it was 13.9 cc., and on the sucrose diet 10.8 cc.

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[1] Greisheimer, Esther M., and Johnson, Olga H., *Am. J. Physiol.*, in press.

[2] Greisheimer, Esther M., and Johnson, Olga H., *Am. J. Physiol.*, 1929, xc, 369.

The mean body weights are given for the beginning and end of the test period:
Lactose (6 females, 4 males) 283.9 gm.—246.3—loss 37.6 gm.
Glucose (6 females, 4 males) 311.6 gm.—314.2—gain 2.6 gm.
Sucrose (3 females, 2 males) 307.8 gm.—318.7—gain 10.9 gm.

The liver glycogen averaged 3.15 ± 0.12% on the lactose diet; 4.89 ± 0.21 on the glucose, and 4.89 ± 0.20 on the sucrose. Expressing the glycogen content as milligrams per gram of body weight gave 0.936 ± 0.057, 1.534 ± 0.066, and 1.764 ± 0.088 mgm., respectively. The glycogen is significantly lower on the lactose diet.

The mean absolute liver weights were 7.04 ± 0.25 gm. on the lactose diet, 9.84 ± 0.36 on the glucose, and 11.13 ± 0.70 on the sucrose. Expressing the liver weight as per cent of body weight gave 2.94 ± 0.11, 3.15 ± 0.07, and 3.62 ± 0.13, respectively.

The calorie intake per gram of body weight during the last 24 hours was determined. This was 0.1209 for lactose, 0.1728 for glucose, and 0.1656 for sucrose. If the liver glycogen, expressed as milligrams of glycogen per gram of liver, be divided by the calorie intake, we find that for each cal. (per gm. of body weight) intake on the lactose diet there are formed 260 mgm. of glycogen per gm. of liver. On the glucose diet the figure is 283, and on the sucrose 295. These figures suggest that if lactose were as readily digested and absorbed as the other sugars, we should find that glycogen is formed with equal ease from sucrose, glucose and lactose.

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Glycogen Formation in Rats. IV. Diet Containing 87.5 Per Cent of Total Caloric Value in Maltose.

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Fifteen healthy young male rats, varying from 145 to 226 gm. in weight, were given us by Dr. Palmer of the University Farm. They had been on a normal diet, and had not been subjected to experimental procedure. We placed 5 of them on McCollum's Stock Diet I, for controls. The remaining 10 were placed on a diet containing 87.5 gm. of maltose, 14.7 gm. casein (85% casein), and 4 gm. of salt mixture 185. This diet had a caloric value of 3.77 per gm., of which 87.5% was derived from maltose and 12.5%