

binations used here. On the other hand the habitual use of whole wheat meal, in a similar food combination resulted in a very decided improvement in protein utilization. Whereas at the beginning of the experiment the protein of the white flour ration was much better utilized than that of the wheat meal ration, at the end of 6 months the digestibility coefficient of the latter exceeded the former. The effect of additions of cellulose only and of yeast only upon protein utilization was detrimental and this effect was cumulative. Cellulose and yeast together, added to the white flour ration, appears to be somewhat beneficial upon protein utilization, although the condition of the animals fed this combination was not as good as that of the other groups and there was some diarrhea, something never observed with the other diets.

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Avitaminosis. VI. Vitamin B Lipemia Versus Inanition Lipemia in the Lactating Rat and its Nursing Young.*

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The purpose of this study was to determine the effect of a deficiency of vitamin B *per se* on lipid metabolism of the lactating albino rat and its nursing young. The avitaminosis was produced according to technique previously described.¹ The experiments were conducted in triads. The pathological group received autoclaved dried baker's yeast as a source of vitamin G. Litter mates were restricted to the same amount of food and water of the same diet as consumed by the avitaminotic group, but the yeast in the ration was untreated. The plane of nutrition was the same in this diet, and the only limiting factor was the destruction of vitamin B in the process of autoclaving. Another group of litter mate lactating rats was fed the same ration, containing the untreated yeast, but the daily intake of food and water was unrestricted. As the only limiting factor between the second and third groups was the plane of nutrition, the difference is due to inanition.

One-half a cc. of blood was used for the determination of fatty

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¹ Sure, B., and Smith, M. E., *J. Nutr.*, 1929, **1**, 537.

acids, lecithins, and iodine number. When the cholesterol was determined it was obtained from a separate one-half cc. sample, because results were not satisfactory when cholesterol was first obtained by chloroform extraction and the residue used for the determination of the other lipid constituents.

Nine triads, each consisting of pathological, restricted, and unrestricted mothers with their litters, were studied. An analysis of the data obtained from these groups made the following conclusions possible: Vitamin B deficiency *per se* produces a very pronounced influence on the concentration of fatty acids in the blood of the lactating albino rat and its nursing young. It is also evident from determinations of the iodine number that a great proportion of the fatty acid increase belongs to the unsaturated series. The lecithins show a rise but to a much lesser extent. There is a definite rise in cholesterol of both mother and young as a result of vitamin B deficiency, but more data must be obtained before final conclusions can be drawn.

The effect of the deficiency of vitamin B *per se* in the diet of lactating mothers and nursing young can be more readily visualized by an examination of Table I, which shows the increase per cent of the lipid constituents of the blood of the pathological groups over the restricted groups.

TABLE I.

	Fatty Acids	Iodine No. of Fatty Acids	Cholesterol	Lecithins
	%	%	%	%
Mother	29	27	25	10
Nursing Young (Litters)	48	37	32	16

Inanition also produces an increase per cent of the lipids of the blood of restricted groups over the unrestricted mothers and litters, but to a much lesser extent than vitamin B *per se*. This is shown in Table II.

TABLE II.

	Fatty Acids	Iodine No. of Fatty Acids	Cholesterol	Lecithins
	%	%	%	%
Mother	18	18	6	7
Nursing Young (Litters)	19	12	0	9

It is quite apparent from the data that the lipemia found in vitamin B deficiency is not due to greater concentration of the blood,

as the blood of the restricted groups was either of the same or slightly higher concentration than the pathological groups.

All the lipemia could not be attributed to catabolism of body tissue because some of the mothers on a vitamin B deficient ration, owing to previous storage, did not decrease in body weight as much as their corresponding restricted controls.

For the past 4 years attempts were made to find a symptom complex in vitamin B deficiency produced in albino rats, as evidenced by the blood picture. The anhydremia and increase of non-sugar reducing substances in the blood were considered of interest but of relatively little clinical significance. The findings of a marked lipemia in this avitaminosis, reported in this communication, may prove of aid to the diagnostician in vitamin therapy.

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Glycogen Formation after Oral Administration of Sodium Salts of Propionic, Butyric, Valeric and Caproic Acids.

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By the use of Cori's method, the absorption of and the formation of glycogen from the salts of fatty acids of low molecular weight have been determined. Male rats previously fasted for 24 hours were used. The control and experimental animals although not litter mates were nearly of the same age and weight. The data in the table show that of the substances administered only sodium propionate affected the glycogen stores. The increments in liver glycogen resulting therefrom, although not large, are nevertheless definite, and are not to be ascribed to individual variations. The failure of butyric and caproic acids to form glycogen cannot be due to faulty absorption, since it was demonstrated that their salts were as well absorbed as sodium propionate. The data are sufficient to warrant the inclusion of propionic acid in that list of products that can be transformed into glycogen by the white rat. Butyric and caproic acids cannot be added to that list for under the conditions obtaining in this study no evidence of the formation of glycogen from these acids was secured. Further studies on the behavior of valeric acid are desirable, since it is possible that the dosage em-