

the unsupplemented values but the difference between the raw and heated proteins was still maintained. It seems probable that the cystine is not the damaged part of the molecule.

Both lysine and histidine supplements increased the value of the heated casein without affecting that of the raw. The gains per gram of protein eaten became 1.89 and 1.96 in these cases instead of 1.76 for the unsupplemented heated diet as compared with 2.00 and 2.14 for the supplemented and 2.10 for the unsupplemented raw diet. Both lysine and histidine appear to be injured by the heating process.

Results of Biological Value Determinations. The method suggested by Mitchell² was that used for the nitrogen balance determinations. Eight young adult male and 8 similar female rats were the subjects and all diets were made up containing 9% crude casein. Biological values were determined in duplicate on each of these rats with raw and heated casein alone and when supplemented by 0.2% (of the diet) cystine, tyrosine and lysine. The values obtained were for raw casein 68 and for heated casein 58. Addition of tyrosine made no change, cystine increased both values equally, lysine increased only that for the heated casein. Thus the difference between values for raw and heated protein unsupplemented is 10, supplemented with tyrosine 10, supplemented with cystine 12, but supplemented with lysine is only 3.

It is concluded that heating casein for 30 minutes at 140°C. produces a definite change in the lysine and histidine fraction of the protein which results in a measurable lowering of its nutritive value to rats.

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Effect of Feeding Egg Yolk on Liver Lipids of Rats.

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The deposition of fat and sterol-ester in the livers of animals fed diets rich in cholesterol has been reported by a number of workers. The following is a report of one of a series of experiments made to determine the influence of other dietary constituents than sterol on this lipid deposition in the livers of rats.

The experimental diet fed contained dried egg yolk powder 25.3%,

² Mitchell, H. H., *J. Biol. Chem.*, 1924, **58**, 873.

extracted casein 12.6%, agar 4%, Osborne Mendel salts 3%, starch 55.1% with supplements of yeast and cod liver oil. This represented egg yolk protein 8.4%, egg yolk lipids 16%, of which 1/16 was cholesterol, 1/4 lecithin. For the control diet the egg yolk powder was first extracted with alcohol-ether and the egg yolk lipid replaced by Crisco. Each experimental group consisted of 8 rats, while there were 12 in the control group, littermates of the experimental animals.

The rats were placed on the diet at weaning time. Both experimental and control groups grew extremely well. They were killed after approximately 60 days on the diet. The livers of the experimental animals presented the typical whitish coloration of sterol-fed animals. The average total fatty acid content of the livers was for the males of the experimental group, 9.3%; for the females, 11.7%. For the control groups the corresponding figures were: males 7.5%; females 7.4%. Total cholesterol (digitonid precipitation) for the males of the experimental group was 2.58%; for the females 3.86%. For the control groups the corresponding figures were: males .48%; females .30%. There was very little difference in the free cholesterol in the control and experimental groups. The average for both groups was approximately 0.3%. Likewise the figures for lecithin were not very different, the average for males in both groups being 2.7% and for females in both groups 2.25%. It was noted, however, that the odor of choline, presumably from decomposition of lecithin, was very strong in the tissues of the animals of the experimental group and absent in those of the control group.

Best¹ has stated that the feeding of lecithin in amounts comparable to those contained in these diets prevents the formation of fatty livers in rats. It is obvious that our results do not entirely bear out this conclusion; at least in so far as cholesterol ester deposition is concerned. The study is being repeated with larger numbers of animals. But egg yolk is being used extremely liberally in diabetic diets at the present time, and we feel that the high incidence of diseases associated with cholesterol deposition in diabetics (*e. g.*, gall stones and arteriosclerosis) may, at least, not be entirely unrelated to this fact. Hence, we believe that a preliminary report of our work is indicated at this time.

¹ Best, C. H., *et al.*, *J. Physiol.*, 1932, **75**, 56, 405.