

variations in the concentration of sulfanilamide in different individuals are to be anticipated, since the resulting concentration of the drug depends not only upon the dosage given but also upon the weight of the individual, the amount of spinal fluid present, the intake of fluids, the efficiency of the kidney function, and so forth. The data presented may possibly serve as an aid in the treatment of purulent meningitis and may point to certain advantages and disadvantages of the intrathecal administration of sulfanilamide. Observations in cases of meningitis concerning the concentration of sulfanilamide in blood and spinal fluid, following a single intrathecal injection were not carried out for obvious reasons, nor was the concentration of sulfanilamide in cerebro-spinal fluid obtained by cisternal puncture determined. It is possible, as Dr. E. K. Marshall, Jr.,⁵ suggested that the concentration of the drug is lower in the cisternal fluid than in spinal fluid.

From the observations presented above it may be concluded that: (1) It is possible to obtain a relatively high concentration (10-16 mg %) of sulfanilamide in the spinal fluid 4 hours after a single intrathecal injection of 80 mg of sulfanilamide to patients free of meningitis; (2) The drug is readily eliminated from the spinal fluid of these patients within 18 to 24 hours. (3) The concentration of sulfanilamide in the blood at the periods of observation is relatively low (1 mg % or less).

10344

Comparative Nutritive Value of Firm and Watery Egg Albumen.*

N. B. GUERRANT AND W. J. RUDY.

From the Pennsylvania State College.

The question of egg quality has become a matter of economic concern to the producer, the distributor and to the consumer. Investigators who have attempted to study this problem have been unable to agree as to what constitutes egg quality. Needless to say this lack of agreement has been a considerable handicap to researches along this line. However, in spite of this lack of agreement as to the characteristics of quality, eggs with excessive amounts of watery

⁵ Marshall, E. K., Jr., personal communication.

*Authorized for publication on November 19, 1938, as paper No. 861 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

white have been discriminated against by the consumer and also by the wholesale distributor, mainly because the former has found that such eggs present a less desirable appearance when poached or fried than do eggs having the firm white. In contrast to this particular objection, some researches have shown that the watery egg white has more desirable whipping qualities than does the firm white. While watery and firm albumen differ markedly in physical characteristics, no data are available to show that they differ in nutritive properties.

Because of the increasing interest in the subject of egg quality, it appeared to us that an effort should be made to determine whether the physical state of the albumen (watery or firm) of a freshly laid egg is an index of nutritive value. With this point in view, a series of studies were made to determine the nutritive value of the two types of albumen as indicated by their relative capacity to produce growth in healthy young rats.

The eggs used in these studies were obtained from hens that were receiving an all-mash ration. The eggs were gathered and their fractionation carried out on the same day that they were laid. The method employed in fractionating the eggs was as follows: After breaking the shell, the total albumen was carefully separated from the yolk and poured on a brass sieve (openings 2.14 mm in diameter) while the yolk itself was placed in a separate glass receptacle. That portion of the albumen which passed through screen was designated as the watery albumen while that retained by the screen was likewise designated as firm albumen.

After all eggs had been fractionated in this manner, each of the 3 portions, *viz.*, yolks, watery albumens, and firm albumens, was thoroughly mixed and weighed in order to determine its relative percentage in the original eggs. A weighed portion of the yolk and of the watery albumen was recombined so as to give a mixture having the same relative composition as the original eggs. A similar mixture was made using weighed portions of the yolk and firm albumen. Each mixture of yolk and albumen was then coagulated by heating in a double boiler, broken into small lumps and dried on cheesecloth in a current of warm air. The dried product was mixed, ground to a satisfactory degree of fineness and stored in an electric refrigerator until fed to the test animals. For the first nutritional test the eggs were prepared in small weekly batches, while for the second test sufficient eggs were prepared at the beginning of the experiment to last during the entire period.

The nutritional studies consisted in feeding carefully matched groups of healthy young rats, maintained in individual metal cages, a diet consisting of one of the egg combinations. In order to bring

about a more favorable mineral balance calcium carbonate was fed *ad lib.* It was believed that differences in the nutritive value of the 2 types of albumen would be more readily demonstrated if the test diet consisted entirely of the egg products. The amount of egg fed daily was restricted so that each test animal consumed the same amount of the dried egg during the weekly period. The amount of

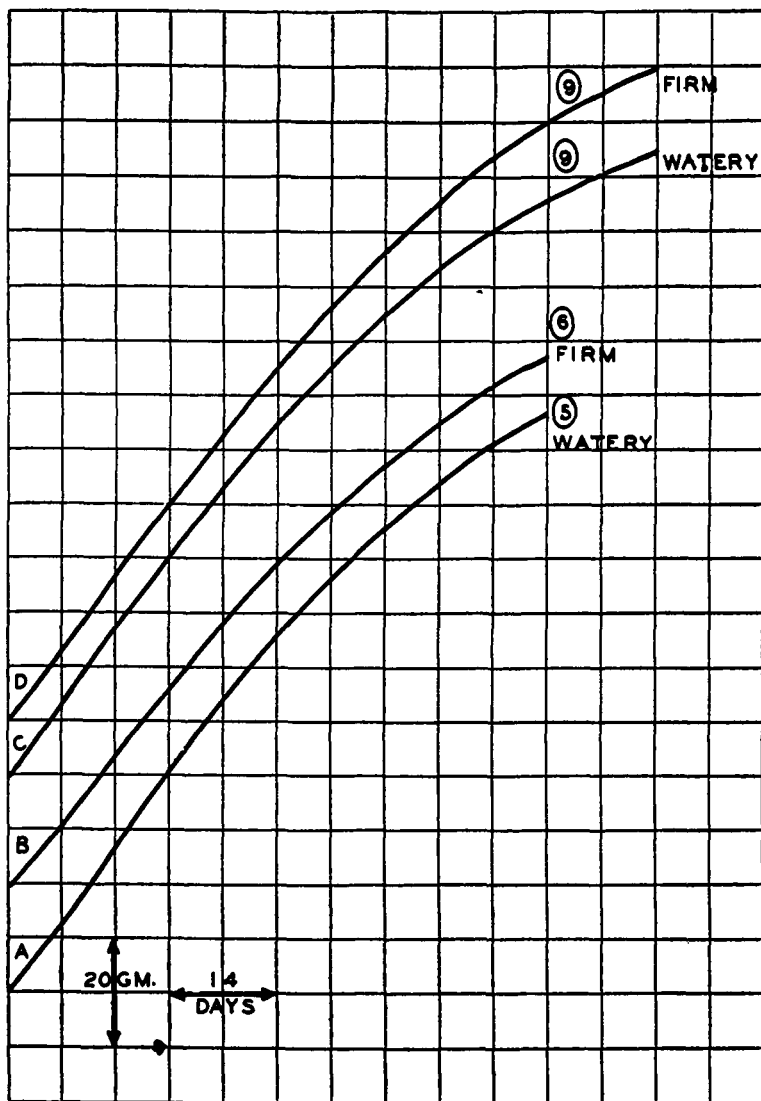


FIG. 1.

Average growth responses of young rats receiving diets composed entirely of dried eggs. These diets differed only in the type of albumen which they contained.

diet was increased from week to week in order to compensate for increases in body weight of the animals. A liberal amount of calcium carbonate (U.S.P. grade) was maintained in a separate container in each cage. Each animal was weighed at weekly intervals and was given the usual care and attention accorded experimental animals. The first feeding test was continued for a period of 10 weeks while the second test lasted 12 weeks. It was believed that experiments of this duration were sufficient to determine whether or not marked differences existed in the nutritive value of the two types of albumen.

The growth responses made by these groups of animals are presented in the accompanying graph.

Curves A and B represent the average growth response of the test animals used in the first feeding test, while curves C and D represent similar data for the animals used in the second test. The enclosed numerals denote the number of test animals considered in each feeding test.

It may be observed from the above graph that the growth responses made by the animals receiving the diets containing the 2 types of albumen are quite similar for both feeding trials. In the first test (Curves A and B) the animals which received the watery albumen made slightly greater gains in body weight than did their litter mates which received a similar diet containing firm albumen. The growth response made by the test animals used in the second feeding test (Curves C and D) was of approximately the same magnitude as that of the first test, but in this trial the animals receiving the diet containing the firm albumen made the greatest average gain. The average gains for the 12-week period were 119 and 115 g, respectively.

When the above growth responses were considered as a whole, from the standpoint of growth production per unit weight of moisture-free diet consumed, it was found that one gram of the diet containing the firm albumen produced an average gain in body-weight of 0.2817 g, while an equal weight of the diet containing the watery albumen produced a gain of 0.2813 g. Such differences in growth responses are not significant. It, therefore, appears from the data obtained in the above feeding tests that there is no difference in the nutritive value of the 2 types of egg albumen.

Summary. Groups of young rats were fed diets composed solely of dried egg products, the difference in the diets being the type of albumen which they contained. The resultant growth of these animals indicates that there is no difference in nutritive value of watery and firm albumen.