

improvement during the first 6 to 15 days of the experiment. The stomatitis of one individual improved and that of the 3 others became worse while they received the restricted diet. The 4 patients free of stomatitis at the beginning of the experiment did not develop it and none of the pellagrins used in this experiment showed any signs of central nervous system involvement.

It has been noted by the writer² as well as by others that pellagra may involve the central nervous system, the gastro-intestinal tract, and the skin in the same patient, while in other patients it may affect one or 2 organ systems. In several instances² the writer has observed that the dermatitis and stomatitis healed while there was a steady progression of the central nervous system disease. It seems from these observations that too much importance may have been attached to the healing of the skin lesions by some of the investigators of the past. In view of this work and of the known observations concerning the lack of uniformity of the disease in involving the various organ systems of the body, it even appears possible that the specific chemical substance related to the development of the dermatitis is not the same as that affecting the other manifestations of pellagra.

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Protein as a Stimulant for Secretion of Pepsin.

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Experiments were conducted on the secretion of gastric juice by Pavlov gastric pouch dogs in response to diets in which the protein was made the variable of interest. These diets were adequate for maintenance and differed only with respect to the kind and amount of protein present. Secretion was followed for 9 hours

² Spies, T. D., unpublished data.

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subsequent to feeding. Gastric juice samples were examined for free and combined acid by titration, chlorides by the method of Van Slyke,¹ and peptic activity by the procedure of Gilman and Cowgill.²

The following proteins were tested: commercial casein (2 levels of concentration in the diet), meat residue** (2 levels), lactalbumin,† hemoglobin,‡ mixed serum proteins, coagulated egg white, edestin,¶ and mixed proteins as combined in a commercial dog food.§

Total volumes of gastric juice secreted and rate of secretion varied widely, but, with a given protein, the total amount secreted was roughly proportional to the percentage of protein in the diet. Titratable acidities followed closely the rate of secretion as has been described by Pavlov³ and many others. Total chloride concentrations were constant within the range of about 150 to 160 milli-equivalents per liter, thus confirming the observations of Gamble and McIver,⁴ of MacLean and others,⁵ and of Gilman.⁶

The present results are not directly comparable with those of Pavlov³ because of differences in methods of estimation and calculation. It is interesting, however, to note that the observations made in this study differ from those of Pavlov in that the total pepsin secreted per hour (the product of the volume of juice in cubic centimeters and the peptic activity in units) maintained a remarkably constant value for each dog after the first hour of the post-prandial period. These results would tend to indicate that (a) the rate of secretion and, therefore, the amount of acid are markedly affected by the character and amount of protein fed, but that (b) the secretion of pepsin is almost as strictly a constant as the concentration of total chloride. Total pepsins for the first hour tended to be higher than those of the later periods. This can readily be explained as the result of a flushing effect on the glands, similar to that observed with histamine injection as reported by Vineberg and

¹ Van Slyke, D. D., and Sendroy, J., Jr., *J. Biol. Chem.*, 1923, **58**, 523.

² Gilman, A., and Cowgill, G. R., *J. Biol. Chem.*, 1930, **88**, 743.

** Obtained from the Valentine Meat Juice Co., Richmond, Va.

† Obtained from the Casein Co. of America, New York City.

‡ Obtained from the Eastman Kodak Co., Rochester, N. Y.

¶ Obtained from the Pfanstiehl Chemical Co., Waukegan, Ill.

§ Bal-Ra, prepared by the Richmond Abattoir, Richmond, Va.

³ Pavlov, I. P., *The Work of the Digestive Glands*, London, 1910.

⁴ Gamble, J. L., and McIver, M. A., *J. Exp. Med.*, 1928, **48**, 837.

⁵ MacLean, H., Griffiths, W. J., and Williams, B. W., *J. Physiol.*, 1928, **65**, 77.

⁶ Gilman, A., Dissertation, Yale University, 1931.

Babkin⁷ and by Gilman and Cowgill.⁸ Ten experimental dogs were used in the course of the 11 diets studied; 3 of the animals were used on every ration studied; the tests were confirmed by further studies on from one to 5 other dogs.

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Vitamin A Deficiency in Cattle Under Natural Conditions.*

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On California ranges during the dry feed season, conditions are favorable for the development of vitamin A deficiency in livestock. Under average conditions, however, the length of the dry season coupled with the varied sources of feed containing some vitamin A is such that the reserves accumulated in the bodies of the animals from the green feed season are sufficient to carry them through the drought period. While its existence has been suspected during recent years, the past winter has been the first time the diagnosis has been definitely established. This was possible because weather conditions and management of one ranch in southern Tulare County caused its development in such a severe form that 100 animals died with many more showing symptoms in a herd of about 250 head.

The ranch comprises 3000 acres of land practically all of which is farmed to wheat and barley. The owner maintains 75 dairy cows. Calves from these cows, together with others purchased when a few days old from dairy farmers, nurse these animals. The calves are finally sold for veal.

In the spring of 1932 rains ceased early, resulting in the feed being dry and grain fields yellow by May 15. In the fall the first rains came about the middle of December and were followed by such cold weather that green feed did not become available until the middle of February, 1933.

During this unusually long dry feed period, of 9 months, part of

⁷ Vineberg, A. M., and Babkin, B. P., *Am. J. Physiol.*, 1931, **97**, 69.

⁸ Gilman, A., and Cowgill, G. R., *Am. J. Physiol.*, 1931, **97**, 124.

* This report is part of an investigation on the relation of nutrition to reproduction in livestock which became cooperative with the United States Bureau of Animal Industry, July 1, 1929.