

flow through the pulmonary circulation to the carotid sinus. Since the jugular circulation time did not change significantly, it is obvious that the increase in rate of blood flow occurred primarily in the segment of the fistula circuit extending from the fistula to the heart.

The significant increase in auricular pressure caused by an A-V fistula seems to substantiate the work of Holman, who maintained that there was an increase of pressure in the proximal venous portion of a fistula circuit.

15194

Value of Sunflower Seed Protein.

C. R. GRAU AND H. J. ALMQUIST.

From the Division of Poultry Husbandry, University of California, Berkeley, and the F. E. Booth Co., Inc., Laboratories, Emeryville, Calif.

From statements of a recent report, the nutritive value of sunflower seed meal would appear to depend more on its content of B-complex vitamins than of protein, even though 53% of the product studied was protein.¹ In a study of the biological value of the protein of sunflower seed meal by the nitrogen balance method, it was concluded that this protein is inferior to that of soybean meal, and is "in the same class as the better cereals oats, wheat, and barley."² These reports indicate that sunflower seed meal is of only mediocre value as a source of protein. On the other hand, the amino acid analysis of sunflower seed meal compares very favorably with analyses of beef muscle and other tissue proteins of high value.^{3,4} On the basis of known chick requirements,⁵ the meal should be adequate as a sole source of protein with the possible exception of a slight deficiency of lysine. The obvious disagreement between the biological and analytical data led us to conduct further tests with the chick.

Two-week-old White Leghorn chicks were segregated into groups on the bases of weight and gain during the second week after hatching, and were given the experimental diets, which were (except for the protein sources) identical with those previously used.^{6,7,8} All the protein (20% of the diet) was supplied by a South American sample of sunflower seed meal which contained 46.7% protein (N $\times$ 6.25) or by a laboratory-prepared meal which contained 39.9% protein. Supplemented casein and deboned sardine meal served as positive controls in these experiments.

The data on sunflower seed meal presented here (Table I) indicate quite clearly that the value of this product for chick growth and efficiency of feed utilization is very high. It compares favorably with other recognized complete sources of amino acids for the chick. In fact, the protein of sunflower seed meal is the most complete vegetable protein for chick growth that we have studied. This result is in agreement with the amino acid analyses of the protein^{3,4} and the known chick requirements.⁵ It is apparent that even lysine is present in adequate amount, although lysine is deficient in many cereal and oilseed meal proteins.

¹ Day, A. G., and Levin, E., *Science*, 1945, **101**, 438.

² Mitchell, H. H., Hamilton, T. S., and Beadles, J. R., *J. Nutrit.*, 1945, **29**, 13.

³ Block, R. J., and Bolling, D., *Arch. Biochem.*, 1945, **6**, 227. Also earlier private communications from R. J. Block.

⁴ Grau, C. R., and Almquist, H. J., *Arch. Biochem.*, 1945, **6**, 287.

⁵ Almquist, H. J., *Trans. Am. Assn. Cereal Chemists*, 1945, **3**, 158.

⁶ Grau, C. R., and Almquist, H. J., *Proc. Soc. Exp. Biol. and Med.*, 1944, **57**, 187.

⁷ Almquist, H. J., and Grau, C. R., *Poultry Sci.*, 1944, **23**, 342.

⁸ Grau, C. R., and Almquist, H. J., *Poultry Sci.*, 1944, **23**, 486.

TABLE I.
Comparative Gains on Chicks on Diets Containing the Equivalent of 20% Crude Protein Exclusively from Sunflower Seed Meal, Sardine Meal, or Casein Plus Certain Amino Acids.

Exp. No.	Amino acid source	Chicks per group, No.	Duration of exp., days	Avg total gain, g	Rate of gain per day, %	Gain per g feed consumed, g
1	Sunflower seed meal, com'l. Sardine meal*	5	11	62	5.3	
				67	5.7	
2	Same	6	12	121	5.7	0.36
				112	5.4	0.34
3	Sunflower seed meal, com'l. Casein, arginine, cystine, glycine	10	21	147	4.8	0.38
				147	4.8	0.39
4	Sunflower seed meal†	10	9	76	6.5	0.42
	Sunflower seed meal,† lysine			80	6.5	0.43
	Casein, arginine, cystine, glycine			57	5.5	0.43

*This product was deboned by floating on carbon tetrachloride; it contained 85.0% protein ($N \times 6.25$).

†Sample prepared in the laboratory from sunflower seed.

The amino acids which are required by the chick for optimal growth are greater in number and equal to or greater in quantity than those required by the rat.⁵ The disagreement between the rat biological data and the amino acid and chick biological data may be due to

the use of poor quality samples in the rat tests.

Summary. The protein of sunflower seed is a complete single source of amino acids for the growth of the young chick, when fed to provide 20% protein in the diet.

15195

"Thermostable" Thromboplastin from Human Placenta and Chicken Brain.*

BERNHARD ZONDEK AND MICHAEL FINKELSTEIN.*

From the Hormone Research Laboratory, Hebrew University, Jerusalem, Palestine.

In the course of a study of the hormones of placenta we observed that extracts of this organ exhibit a strong blood-coagulating action.¹ The active substance resembled thromboplastin, the factor which by converting prothrombin into thrombin activates the reaction fibrinogen $\rightarrow$ fibrin and thus promotes the coagulation of blood. It could be shown that this active agent is relatively thermostable.

Heat stable thromboplastin from placenta is of special therapeutic interest, since its use makes it possible to avoid the side-effects which attend the local or parenteral administration of thromboplastin from heterogenic source.^{2,3} Since thromboplastin of birds is less

active on mammal blood than is mammal thromboplastin and vice versa, it seems probable that the two are different. A comparison between these two thromboplastins was therefore carried out.

The properties of thromboplastin have been studied in the last few years by various laboratories. A very extensive research has been

* Generously aided by a grant from the Rockefeller Foundation.

¹ Finkelstein, M., *Nature*, 1945, **155**, 202.

² Eley, R. C., Green, A. A., and McKhann, C. F., *J. Pediat.*, 1936, **8**, 135.

³ Edsall, Y. T., Ferry, R. M., and Armstrong, S. H., *J. Clin. Invest.*, 1944, **23**, 557.