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Influence of Optical Activity on Utilization of Lysine for Growth.

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Recent studies on the relative value for growth of the optical isomers of 2 essential amino acids have yielded divergent results. Thus, *dl*-tryptophane promotes growth as readily as the natural *l* form[1] and the *d* form is likewise as efficient as the *l* form[2, 3]. On the other hand, *i*-cystine is less effective than *l*-cystine[4] and neither *d*-cystine[5] nor one half of the meso form[6] is available for growth. Several years ago McGinty, Lewis and Marvel[7], in studying the replaceability of lysine by related hydroxy compounds, fed control rats both natural (*d*) lysine and synthetic (*dl*) lysine. In the one experiment in which equal amounts of the 2 compounds were employed, the natural amino acid promoted somewhat better growth. As an initial step in evaluating the growth-promoting ability of *l*- and *d*-lysine, we undertook a more exact comparison of the *d* isomer and the *dl* mixture.

d-Lysine was prepared as the dihydrochloride by the method of Cox, King, and Berg[8] and racemized essentially as directed by Fisher and Weigert[9]. The *dl*-lysine was isolated as the dihydrochloride. $[\alpha]_D^{20}$ for the former dihydrochloride (3% solution in water) was +15.64, for the latter 0.0. Analyses for N and Cl agreed with the calculated values. Zein served as the lysine-deficient protein and was prepared essentially according to the method of Brazier[10]. The diet was composed of zein, 14.6; tryptophane, 0.2; cystine, 0.2; starch, 39.5; sucrose, 15.0; Crisco, 19.0; cod liver oil,

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5.0; salt mixture[11], 4.5; and agar, 2.0%. In each case the lysine supplement replaced an amount of zein. In addition, 200 mg. of yeast was supplied separately to each animal daily. Twelve rats were divided into 4 groups of 3 each. One group received no lysine supplement; the second, 0.125%; the third, 0.25%; and the fourth 0.5%, in the form of an equivalent amount of the dihydrochloride. During the first and third 20 days 2 animals of the second and fourth groups and one of the third received the *dl* modification. The others were fed *d*-lysine. On the second and fourth 20 day periods those animals which had received the *d*-lysine were fed *dl*-lysine, and *vice versa*.

The accompanying table summarizes the findings which indicate that only the dextro component of *dl*-lysine can be used by the rat for purposes of growth. Further studies are in progress.

TABLE I.
Comparative Average Growth of Animals on a Lysine-Deficient Basal Diet Supplemented with *d*- and *dl*-Lysine.*

Rat No., Sex	Aver. daily gain on *d*-Lysine gm.	Aver. daily gain on *dl*-Lysine gm.	Lysine Supplement %
137 ♀	1.20	.60	.5
138 ♂	1.03	.78	.5
144 ♂	.90	.48	.5
Aver.	1.04	.62	
135 ♀	.63	.23	.25
136 ♀	.70	.38	.25
143 ♂	.68	.20	.25
Aver.	.67	.27	
133 ♀	.53	.20	.125
140 ♀	.55	.35	.125
134 ♂	.45	.33	.125
Aver.	.51	.29	
Grand average	.74	.39	

[11] Hawk, P. B., and Oser, B. L., *Science*, 1931, **74**, 369.

* The average daily growth of the 3 rats on the unsupplemented basal diet was 0.17 gm.