

APPENDIX

EFFECT OF REACTION WITH GLUCOSE ON THE
NUTRITIVE VALUE OF CASEIN

by

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In previous work¹ it was shown that a marked deterioration in the nutritive value of the protein of spray dried skim milk occurs when powder of high moisture contents is stored in inert gas or air, particularly at high storage temperatures. Much, but not all, of this reduction in nutritive value was traced to lysine becoming biologically unavailable through combination with lactose. Under certain conditions and in the presence of air histidine also suffered some loss.

The nutritive values for young rats of two samples of casein after storage for 5 and 30 days at 37° C and 70% R.H. with four equivalents (on the amino-N basis) of glucose have now been determined by the methods previously employed¹. The casein-glucose samples were similar to those examined by chemical and physical methods in the main part of this paper.

The results (Table I) show losses in nutritive value greater than any experienced in the experiments with milk powder, and in keeping with the much greater rapidity and extent of the reactions brought about by glucose, as compared with the lactose of milk powder^{2, 3}. The chemical estimations indicate that at least five of the amino acids 'essential' for the young rat are involved in these changes, and no attempt was therefore made to restore the nutritive value of the deteriorated proteins by supplementing with individual amino acids.

TABLE I
CHANGES IN THE NUTRITIVE VALUE OF CASEIN STORED WITH GLUCOSE UNDER
NITROGEN AT PH 6.3, 70% R.H. AND 37° C

Length of storage (days)	Biological value ⁴		True digestibility ⁴		Protein efficiency ⁵	
	Mean value for 12 rats	Standard error	Mean value for 12 rats	Standard error	Mean value for 12 rats	Standard error
0	77.9 ± 1.38		99.5 ± 0.28		2.42 ± 0.300	
5	61.6 ± 1.11		96.6 ± 0.67		1.95 ± 0.103	
30	38.7 ± 1.00		90.6 ± 1.25		0.32* —	

* Two rats lost weight.

References p. 456.

While this work was in progress a note by MCINROY, MURER AND THIESSEN⁶ appeared, describing a marked loss in the nutritive value of the protein when commercial casein was autoclaved with glucose and a little water for 2 hours at 250° F.

SUMMARY

The nutritive value of casein for young rats was greatly reduced by storage in the presence of glucose at 70% relative humidity and 37° C for 30 days. The change was considerable even after storage for 5 days.

RÉSUMÉ

La valeur nutritive de la caséine pour de jeunes rats était fortement diminuée par conservation en présence de glucose à humidité relative de 70% et à 37° C pendant 30 jours. Le changement était considérable même après conservation pendant 5 jours.

ZUSAMMENFASSUNG

Der Nährwert von Casein für junge Ratten war nach 30 tägigem Stehen in Gegenwart von Glucose bei 70% relativer Feuchtigkeit und bei 37° C sehr vermindert. Auch nach 5-tägigem Stehen war die Veränderung bedeutend.

REFERENCES

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