

EFFECTS OF DIET AND FASTING ON GLUCONEOGENIC ENZYME
ACTIVITIES IN PREGNANT GUINEA PIG LIVER

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The guinea pig produces short chain fatty acids in its caecum and has similar gluconeogenic features to those in the ruminant. The purpose of this experiment was to determine the activities of key gluconeogenic enzymes in the livers of pregnant guinea pigs fed diets which provided different quantities of starch and complex carbohydrates with a view to determining whether activities were changed by substrate supply and therefore potentially limiting to gluconeogenesis.

Three groups of guinea pigs were fed isoenergetic and isonitrogenous diets containing 6.7% (low), 13.8% (medium) and 20.4% (high) crude fibre and animals were killed when 50-55 d pregnant. Livers from fed and 48 h fasted animals were assayed for fructose diphosphatase (FDP), pyruvate carboxylase (PC) and both mitochondrial (m) and cytoplasmic (c) phosphoenolpyruvate carboxykinase (PEPCK). The activities, expressed as $\mu\text{mol}/\text{min}/\text{g}$ fresh wt are shown in the table below.

	LOW FIBRE		MEDIUM FIBRE		HIGH FIBRE		SEM
	fed	fasted	fed	fasted	fed	fasted	
FDP	7.21 ^a	8.10 ^b	8.51 ^b	9.58 ^c	7.54 ^a	10.82 ^d	0.33
PC	4.10 ^e	5.27 ^f	3.64 ^e	7.39 ^g	3.19 ^e	9.60 ^h	0.34
PEPCK(c)	3.21 ^k	3.68 ^k	2.87 ^k	3.97 ^k	3.07 ^k	5.47 ^m	0.51
PEPCK(m)	4.80 st	6.05 st	5.26 st	6.61 st	3.01 ^s	7.13 ^t	0.11

Each value is the mean of three animals and row means with dissimilar superscripts differ significantly ($P < 0.05$).

The activities of FDP and PC were significantly higher in fasted than in fed animals and in fasted animals the activities increased significantly as the roughage content of the diet was increased. The activities of PEPCK(c) and PEPCK(m) did not vary significantly between diets but fasting induced a significant increase of both forms in animals fed the high fibre diet and the change was greatest for the mitochondrial enzyme (Elliott et al. 1977). The results show increased activities of key gluconeogenic enzymes with decreasing dietary starch intake.

ELLIOTT, K.R.F. and POGSON, C.I. (1977). *Biochem. J.* **164**: 357.