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Fasting Ketosis in the Pregnant Rat as Influenced by Adrenalectomy.

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It is generally believed that in the human being ketonuria is more easily produced in pregnancy and it has been shown^{1, 2} that ketosis is provoked more rapidly and easily by carbohydrate starvation in this condition. However, Harding and Allin³ believe that it develops only in accordance with Shaffer's theory. Burn and Ling⁴ found that rats on a butter fat diet have a sharp rise in ketone body excretion during the several days of pregnancy before parturition after which it drops to a normal value. Butts, Cutler and Deuel⁵ found an excessively high ketone body excretion for one day in a fasting pregnant rat. In Table I we have demonstrated the

TABLE I.

No.	Body wt. gm.	Day				Day litter born
		1	2	3	4	
ketone bodies—mg.						
Group A—Pregnant						
1	215	1.7	97.6		149.0	6
2	242	35.6	167.0	127.0	90.5	5
3	230	0.0	176.0	6.0		6
4	205	0.0	99.4	37.7		4
5	216	3.5	93.9			2
Group B—Non-pregnant						
6	206	1.7	1.2	0.6	0.9	
7	204	1.2	1.4	1.0	2.3	
8	199	1.2	1.1	0.4	1.7	
Group A2—Non-pregnant (same rats as Group A)						
1	180	1.4	1.0	1.7	1.0	
2	210	2.1	1.4	2.8	1.5	
3	168	1.0	1.2	2.0	0.9	
4	168	1.0	1.2	2.2	1.3	
5	158	1.0	0.6	0.6	1.3	
Group C—Pregnant and Adrenalectomized						
9	255	0.5	0.8	4.1	0.8	2
10	240	0.9	4.3	1.8	1.1	3
11	228	0.7	2.1	4.3	0.7	5
12	203	0.2	2.4	0.3	0.6	6

1 Bokelmann, O., and Bock, A., *Arch. Gynakol.*, 1926-27, **120**, 542.2 Bokelmann, O., and Bock, A., *Z. Geburtsh. u. Gynakol.*, 1927-28, **92**, 184.3 Harding, V. J., and Allin, K. D., *J. Biol. Chem.*, 1926, **69**, 133.4 Burn, J. H., and Ling, H. W., *Quart. J. Pharm. and Pharmacol.*, 1933, **2**, 1.5 Butts, J. S., Cutler, C. H., and Deuel, H. J., Jr., *J. Biol. Chem.*, 1934, **105**, 45.

large fasting ketosis during the few days before parturition (Group A) in comparison with non-pregnant, adult, female rats fasted at the same time (Group B) and the same rats that were pregnant, when fasted 2 weeks after parturition (Group A2). Their young had not been allowed to nurse but were taken away at birth. The high fasting ketosis of pregnancy is quite obvious (Group A).

The possibility exists that the increased degree of ketosis during pregnancy results from excessive production of the so-called ketogenic principle of the anterior pituitary and we know that in other respects the anterior pituitary is very active at this time. In another note⁶ we have shown that this ketogenic principle is not active in the absence of the adrenal glands, the necessary part of the latter apparently being the cortex. We have examined the effect of adrenalectomy upon the fasting ketosis in pregnancy (Group C) and find that it does not occur if the adrenals have been removed.

We have suggested that the marked fasting ketosis of pregnancy may be due to an accentuation of anterior pituitary activity. The failure of pregnant rats to develop a significant ketosis in the absence of the adrenal glands lends indirect support to this view.⁶ A finding which may have a bearing on this point is the observation of Butts *et al.*⁵ that the pituitary-like gonadotropic factor from the urine of pregnant women ("Antuitrin S" of Parke, Davis & Co.) produces no ketosis and we have confirmed their experiments. The combined gonadotropic and ketogenic activity of anterior pituitary extracts means little because of our inability to definitely purify such preparations.

Summary and Conclusions. Fasting pregnant rats develop a ketosis of large magnitude when compared with non-pregnant controls. Removal of the adrenal glands abolishes this fasting ketosis in pregnant animals.

⁶ MacKay, E. M., and Barnes, R. H., *PROC. SOC. EXP. BIOL. AND MED.*, 1936,