

## Dietary ractopamine increases glucose turnover but not in vivo adipose tissue lipogenesis in the pig

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Ractopamine (RAC) is a  $\beta$ -adrenergic agonist which increases lean tissue deposition in pigs, without necessarily altering fat deposition (1). The major form of energy in the pig is glucose derived from digestion of carbohydrate or from gluconeogenesis. It is possible that increased lean tissue deposition with no change in fat tissue deposition may increase the demand for glucose during RAC treatment. The aim of this study was to determine the effect of dietary RAC on the rates of glucose turnover and adipose tissue lipogenesis from glucose.

Ten male and ten female pigs (initial body weight 80 kg) with venous catheters were offered 3 kg/d of a protein and energy adequate diet containing either 0 or 20 ppm RAC. Lipogenesis was measured in vivo on d 4 and d 23 using a modification of the technique of Dunshea et al (2). [ $U$ - $^{14}C$ ]-glucose was given as a bolus injection via the cannula and blood samples obtained over the next 4 h to determine the plasma glucose specific radioactivity (SRA) versus time profile to measure glucose turnover and obtain the average SRA of the fat precursor pool. Adipose tissue biopsy samples were taken after 4 h to determine incorporation of [ $U$ - $^{14}C$ ]-glucose into fat.

	Control				Ractopamine				sed	Significance <sup>1,2</sup>
	Male		Female		Male		Female			
	d 4	d 23	d 4	d 23	d 4	d 23	d 4	d 23		
Plasma glucose (mmol/L)	5.27	3.86	4.84	4.21	4.90	4.14	5.11	4.42	0.26	D***
Glucose turnover (mmol/min)	3.12	3.34	3.21	4.31	4.08	5.46	4.49	3.19	0.71	R*,R.S*,R.D.S*
Lipogenesis (nmol/g fat.min)	111	79	128	123	114	149	207	75	42	R.D.S*

<sup>1</sup>D= day; S= sex; R= ractopamine; <sup>2</sup>\*= P<0.05; \*\*\*= P<0.001

Daily gain was higher for males than females (P<0.05) and was increased by RAC (P<0.01) (1097 and 1174 g/d for males and 893 and 1097 g/d for females treated with 0 and 20 ppm RAC, respectively). Plasma glucose was not affected by RAC or sex but decreased with time, most likely due to feed intake being fixed despite a 25% increase in live weight. Glucose turnover was increased by RAC, particularly in the males. Adipose tissue lipogenesis was not different between the sexes and was not changed by RAC.

In conclusion, dietary RAC increased glucose turnover in the pig possibly to support a greater lean tissue mass. Since RAC does not alter lipogenesis, glucose is not partitioned from adipose tissue to lean tissue. As feed intake was fixed, there must be an increase in gluconeogenesis during RAC treatment.

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1. Dunshea FR. Effect of metabolism modifiers on lipid metabolism in the pig. *J Anim Sci* 1993;71:1966.
2. Dunshea FR, Harris DM, Bauman DE, Boyd RD, Bell AW. Effect of porcine somatotropin on in vivo glucose kinetics and lipogenesis in growing pigs. *J Anim Sci* 1992;70:141.