

Regulation of Fat Metabolism and Deposition in the Pig

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The pig has an enormous capacity for growth of both lean and adipose tissue. In a pig consuming a high carbohydrate diet, the major source of energy for both oxidation and storage as fat is glucose. The partitioning of glucose between oxidation and lipogenesis is influenced by a number of factors including nutrition, sex, age, liveweight, ambient temperature and genetic background. The purpose of this review is to provide some background on the metabolic events involved in fat deposition and to understand the hormonal regulation of these pathways. The review also deals with some of the factors influencing fat deposition and some of the technologies that are available to manipulate body fat and their mechanisms of action. The major site of fat deposition in the pig is in subcutaneous adipose tissue and the major source of substrate for *de novo* lipogenesis is glucose. In pigs consuming a typical high carbohydrate diet, *de novo* lipogenesis from glucose accounts for about 75% of lipid synthesis. The remaining fatty acids arise from pre-formed fatty acids derived from either the diet or fat mobilisation. In the growing pig, lipogenesis is much greater than lipolysis and, under most conditions, the relatively high-energy intakes and insulin secretion of pigs will ensure low rates of lipolysis and fat mobilisation. The rate of fat deposition is influenced by a number of factors including nutrition, sex, age, live weight, ambient temperature and genetic background. Genetic selection in Australia and elsewhere has focused on decreasing subcutaneous backfat depths at the P2 site with resultant decrease in fat over the entire body, including IM fat. However, recent observations suggest that the relationship between backfat at the P2 site is not as strong as it once was and that current selection pressure is redistributing fat to other parts of the body, particularly the belly. These changes in fat distribution have focused attention on the fat content of various primal cuts and the importance of producing primals with appropriate levels of fat, including IM fat, for various market segments. In some countries, pig producers have access to a number of technologies such as somatotropin, ractopamine and GnRF vaccination that will allow manipulation of carcass fat to suit various markets.