– at the level of effector genes whose products are responsible for cell proliferation, differentiation and death (Myo D, Myogenin, Bax/Bcl-2)

Growth of skeletal muscles and other tissues, and the resulting balance which determines body composition are dependent upon genotype, age and level of feeding. The above factors strongly affect the endocrine system which can promote either the anabolism (insulin, IGFs, GH, etc.) or the catabolism (glucagon, corticoids, etc.). Both the release and the signalling of these hormones have to be understood. For instance, it is now possible to study glucagon release in isolated chicken islets. High concentrations of IGFs appear to be associated with a higher growth rate and increased fat deposition in genotype of fast growing chicken.

Bovine skeletal muscle is genetically heterogeneous with regard to regulation of proliferation and differentiation of myogenic cells.

Generally, there is an inverse relationship between the rate of myoblast proliferation and their capability of differentiation. Compensatory muscle growth is regulated by insulin and T3, which are implicated in the formation of new fibres from satellite cells. Susceptibility of skeletal muscle cells to programmed cell death depends on the degree of their development. Myoblasts and satellite cells are more sensitive to apoptogenic stimuli than differentiated muscle fibres.

Session 4: Protein metabolism

(Dr J. Grizard and Dr K. Grzelkowska)

It is crucial to understand the regulation of protein metabolism in both human and animal nutrition. Based on this knowledge, we could:

– limit muscle wasting in patients during ageing and catabolic states;

– achieve a better efficiency of feeding in animals.

Perhaps, we could also improve meat quality for consumers.

Different factors can affect protein turnover in the body:

– genotype,

– nutritional status,

–environmental conditions,

– endocrine regulation.

Hormones play a major role in the regulation of protein synthesis and degradation, especially insulin. This hormone is anabolic regardless of the protein metabolism (increasing protein synthesis and decreasing proteolysis). It appears also as a help to catabolic factors, since insulin action on muscle protein synthesis is decreased by glucocorticoids, diabetes, injuries, cytokines and thyroid dysfunction.

We have now begun to have a better understanding of the intracellular events surrounding the insulin receptors to the targets of insulin on protein metabolism. Studies are in progress to understand the insulin-resistant states at the insulin signalling level.