Quality considerations with high pressure processing of fresh and value added meats

High Pressure Processing (HPP) is a well-known non-thermal preservation method. Pressure can be applied by high hydrostatic pressure or by hydrodynamic pressure. Both impact in different ways on the structure of meat and meat products. The use of HPP is known to inactive spoilage and pathogenic bacteria and in this way increase the shelf-life and food safety in fresh and processed meat and meat products in particular when thermal pasteurization is not applicable. One of the major limitations of HPP is, depending on the process parameters, undesired changes in products, mainly related to protein denaturation. For fresh meat for example, discoloration and texture changes increased lipid oxidation, are observed. In contrast to heat induced denaturation proteins denaturation by HPP is reversible depending on the pressure level and HPP can enhance the functional properties of proteins. By altering the myofibrillar proteins, HPP influence the functional properties of muscle proteins resulting in increased water-holding capacity, soluble proteins and changed structure and rheological characteristics. On the other hand, HPP effects myoglobin resulting in significant drastic changes in the colour of red muscle meat. These can be modified by adjusting product parameters and choosing the right packaging material. In contrast to HPP, shockwave or hydrodynamic pressure is not altering the proteins but has a mechanical effect on meat and meat tissue. Shockwave and HPP are nonthermal methods on the basic principle of high pressure which can be applied to fresh and value added meat resulting in novel processes and products for the meat industry.

Volker Heinz is director & CEO of the German Institute of Food Technologies (DIL), a non-profit research centre based in northern Germany. Founded in 1985 the DIL is specialized in food process engineering, microbiology and food chemistry. Until 2005 Heinz was principal scientist and lecturer at TU Berlin’s Food Engineering Department. Currently he is actively involved in the Life Science teaching programme of the Leibniz University Hannover. He has a record of more than 100 scientific publications and invited lectures. Fields of research are: food structure related high pressure processing, pulsed electric fields and ultrasound applications. Since 2009 he is coordinator of the EU FP7 Network of Excellence “HighTech Europe”.