

Title: Accurate Determination of Thermal Properties in Non-Homogeneous Food Products

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The design of cooking and cooling processes is strongly dependent on the thermal properties of the food product involved. Two important thermal properties are the specific heat capacity and enthalpies of transition, which can be measured using a differential scanning calorimeter (DSC).

The accuracy and precision of DSC results are affected by several factors including cellular damage during preparation, uncertain moisture contents and non-homogeneity in the sample. Methods were developed to minimise these effects during the preparation of samples of beef components (collagen, myofibrils, sarcoplasmic and fat). Master samples were prepared using the methods developed with sub-samples being drawn and analysed in a differential scanning calorimeter.

Beef fractions were analysed between 20 to 90°C (cooking temperatures). The specific heat capacities and enthalpies of denaturation and/or melting, during heating and cooling, were measured. The consistency of the amplitude and onset of transitions demonstrated that accurate results could be obtained using the methods developed.

Paper Outline

This paper describes the methods that were developed, reports some example data collected using these methods and assesses the benefits of using these methods over less sophisticated approaches.