3D mapping of Beef *m. longissimus* using near infrared spectroscopy changes and Mahalanobis distance

**Materials & methods**

Four pairs of beef *m. longissimus et lumbrorum* (LL) were removed from steers and wrapped in polyethylene cling film to prevent shortening (Devine, Wahlgren & Tornberg, 1999) and held at 15°C to enter rigor mortis and age for 24 h. The wrapped muscles, with an approximate circular cross section, were then positioned in a holder. A slice was removed from the rump end of the muscle and a fibre optic probe was moved across the face of the muscle and NIR recordings were obtained at 42 positions in a grid with spacing at 1.4 cm (Figure 1) across the face with a diode array unit from KES Analysis (NY, USA) covering the spectral range from 400 to 1700 nm. A 1.4 cm slice was removed and the process repeated, over the whole LL.

A PCA model was calculated. Standard Normal Variate (SNV) pre processing was applied to reduce light scatter effects. Normal Variate (SNV) pre processing was applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for applied to reduce light scatter effects. The optimal number of PCs used for

It is suggested to use D as a measure of how representative a given location inside a muscle is for the whole sample (i.e. its similarity to the mean NIR spectrum). The Mahalanobis distance is a distance measure that takes the variability along the axis of the data set into account. In practical terms it fits an N-dimensional hyper ellipsoid around the data set and means the distance using that as a ruler. This is different from the normal Euclidean distance where all directions have the same influence, independent of their variance. The advantage of D is that it allows even minor variations in the N-dimensional space to contribute to the distance. This is very useful when combining with PCA, which derives the principal components (PCs) according to their covariance.

**Objective**

To determine the most representative portions of beef strip loin for meat quality and NIR studies

**Results & discussion**

For the consistency required for NIR calibration or tenderness evaluation the centre of a piece of meat shows least variation. The least variability and best representation of a cut is in the region of the slice of 8-16 (11-22 cm from the rump end) (Figure 3). This suggests that many shear force measurements are required to characterise a piece of meat and that the most representative results are obtained in this region.

**References**


