7th January 2021

Development of NIR Technology to Read Wool Colour.

Wool Testing Authority Europe Ltd (*WTAE*) were fortunate enough to be awarded funding from the European Union and Welsh Assembly in the form of an Innovate Voucher Plus grant in early 2021. This has allowed WTAE to begin researching the use of Near Infra-Red (*NIR*) technology to read the colour of wool samples. Wool colour is an important determinant in the price of wool and is used in business transactions throughout global wool markets. Developing the use of NIR to read the colour of wool will be a huge advancement in the technologies already employed within the wool industry. NIR has been used for over 10 years to read the ash and grease content of wool samples, however the technology has never been developed further. In securing this funding, WTAE have been able to begin developing and building its wool testing capabilities using NIR.

Wool colour is expressed in 2 ways: Y which measures the brightness of the wool with the higher Y values representing brighter wool. Y readings can range from 45 to 75 YZ measures the yellowness of the wool with the lower YZ values representing whiter wool. YZ readings can range from 5 to 20. Current methods for determining these values involve a meticulous sample preparation whereby the sample has to be scoured, dried and then conditioned for a period of 12-18 hours before reading. If successful, this project will remove some of this time-consuming sample preparation allowing for a more efficient testing process.

This project comprises of 4 stages:

1. Implementation of a new spectrophotometer using a newly developed and bespoke software programme which allows for the automation of colour analysis.

2. Data generation, collation and calibration build for a working calibration model using the NIR.

3. Period of calibration monitoring for assessment of performance.

4. Data analysis and reporting of results.

Summary of Findings.

WTAE are pleased to report that the project has been successful in showing that NIR can be used to read the colour of wool samples. A dataset of 1109 samples were used to build a calibration model which was then used in subsequent analysis to predict the colour of scoured wool samples presented to the NIR. It was found that the prediction model was at its most accurate between Y colour readings of 60 – 75 units with some reduction in the ability of the model to predict the lower Y values (or the dirtier coloured wool types).

Monitoring over several weeks showed that the calibration was stable and continued to give accurate data during “live testing”. Y values of less than 60 did present some problems due to the higher content of coloured wool fibres, but future work can look at addressing and resolving this.