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A SURVEY OF LENGTH DISTRIBUTION DATA FOR NZ SCOURED CONSIGNMENTS THAT HAVE BEEN MEASURED FOR LENGTH AFTER CARDING (LAC)

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SUMMARY

The Length After Carding results of nearly 3000 commercial consignments of New Zealand wool were compiled and analysed. This paper presents mean length and length distribution results of some characteristics of interest. It was found that CV Hauteur percentage did not perform well as an indicator of short fibre content. It was also noted that most length variation between consignments was apparent in the longer wool components of the distributions.

INTRODUCTION

The New Zealand standard NZS8719¹ has been used extensively by New Zealand exporters since it was introduced in 1992 for measuring the Length After Carding of scoured wool consignments. Currently this test method is being reviewed for acceptance as a joint Australia-New Zealand standard.

The test method is based on a specialised sampling regime², and tightly-controlled semi-worsted processing, followed by measurement of the resulting sliver by a method similar to IWTO-17.

The primary measurement selected for certification under this test method is mean barbe as it approximates the mean length of the fibres biased by the weight of the fibres. When wool is blended or processed commercially it is usually performed on a fibre mass rather than a fibre count basis (which is used for the calculation of hauteur).

The Almeter apparatus produces comprehensive distribution information that is not certified under NZS 8719, but may be supplied as additional information if so requested. However, it has been suggested that the length distribution information produced by the Almeter may be useful to users of consignments of scoured wool.

This paper presents a short summary of typical results of New Zealand commercial consignments tested for LAC. The direct relationship between hauteur and barbe and some distribution information is presented graphically. This paper is intended for information only.

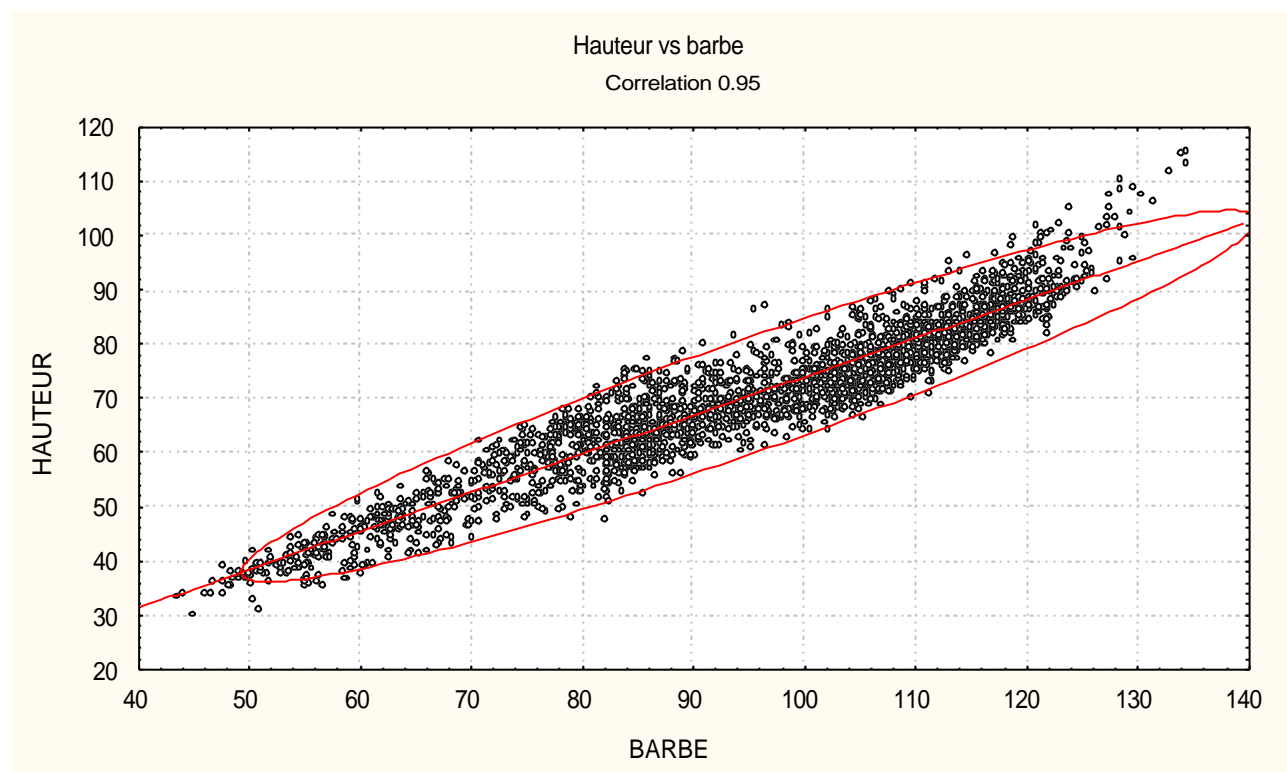
¹ NZS 8719 (1992), Method for the measurement of the fibre Length After Carding of scoured wool, Standards Association of New Zealand

² New Zealand Standard Length After Carding Test Regulations, (1992), National Council of New Zealand Wool Interests Incorporated

RESULTS

Nearly 3000 test results were collected over a period of commercial production and the distribution information extracted using the PEYER-USTER PC Wool Almeter software³. Most consignments were of New Zealand crossbred wool types. Except for figure 2, length distribution information is presented in terms of barbe, as this is the certified measurement and the weight equivalent percentages of fibre lengths are of most use to wool users. Figure 1 depicts the hauteur plotted against the corresponding barbe values for all data. Each point is the mean value for each consignment.

Figure 1: Relationship between hauteur and barbe



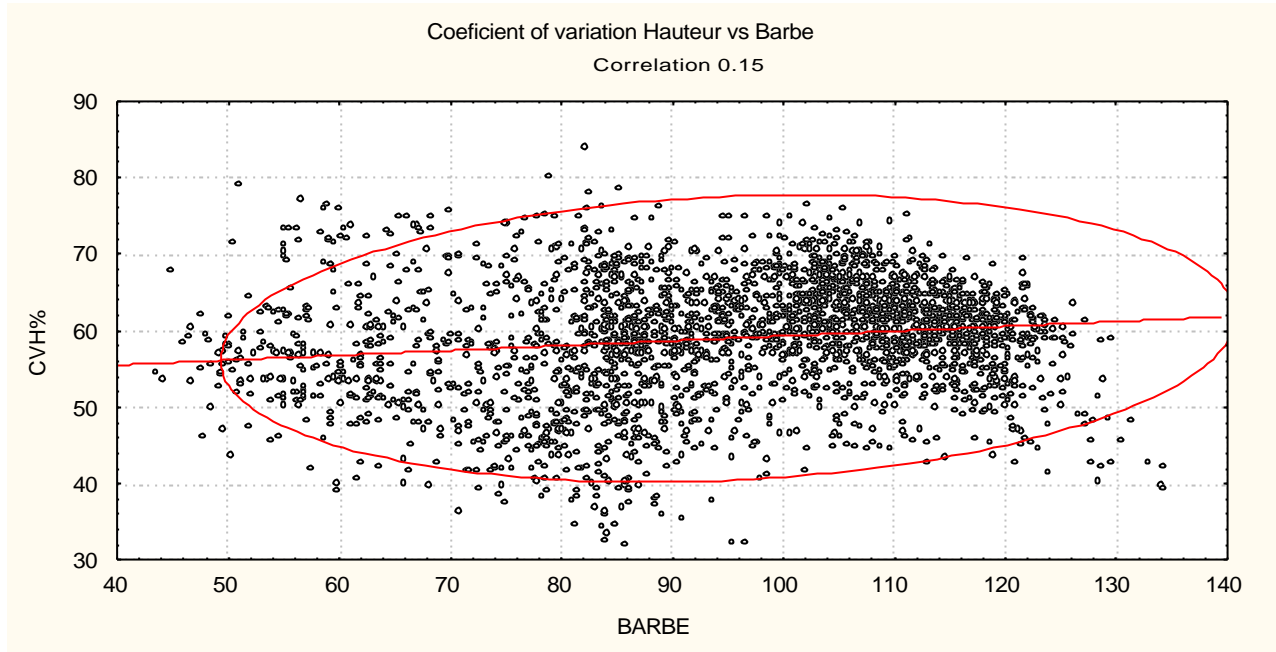
The ellipse encloses 95% of the data, and the linear regression equation is:

$$\text{Hauteur} = 0.7 \times \text{Barbe} + 2 \text{ mm}$$

The mathematical relationship between barbe and hauteur is defined in IWTO-17 as a function including the coefficient of variation of hauteur (CVH). CVH results for the samples are shown in Figure 2.

³ texLAB[®] P810 Data processing system, Siegfried Peyer

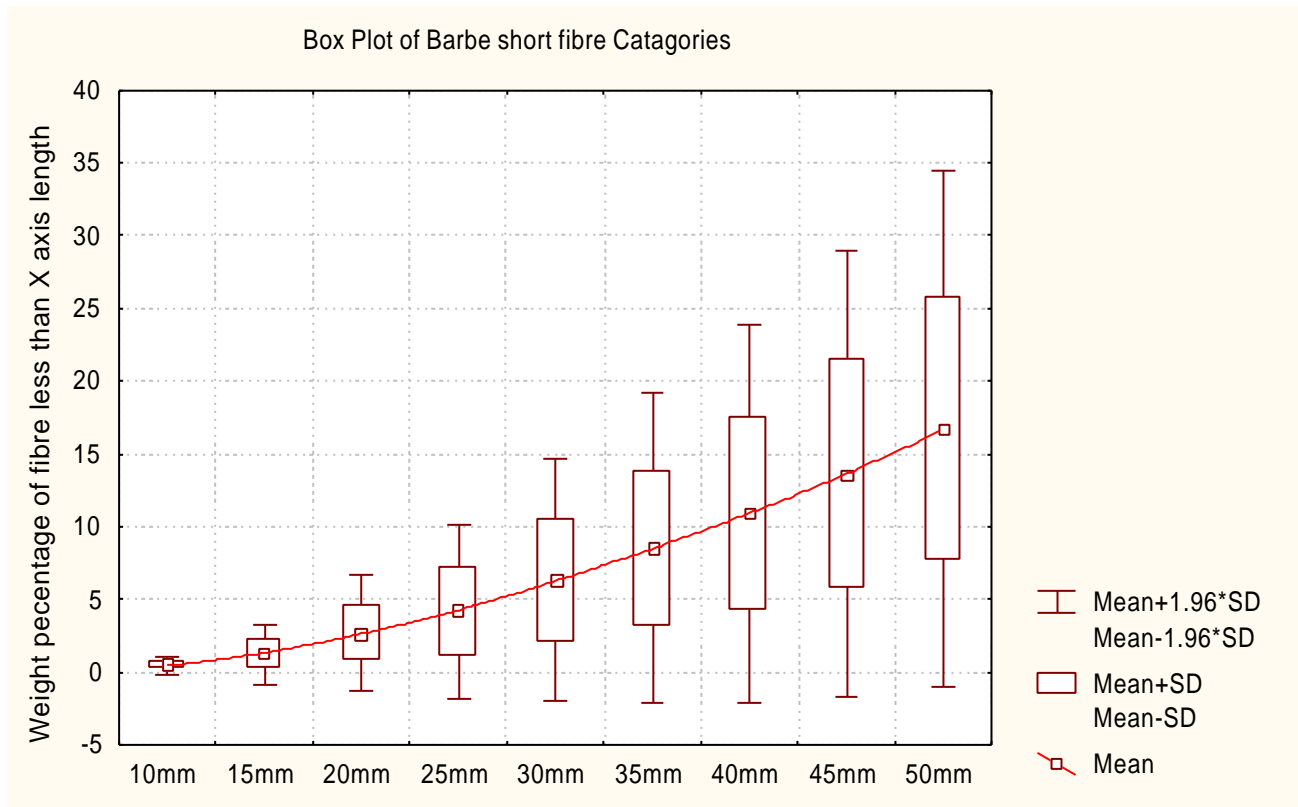
Figure 2: Relationship between CvH and Barbe



It is clear from figure 2 that the mean CVH was 59% and was relatively independent of the mean length of the consignment. Most of the data lies between 50% and 70% CVH.

The proportions of short fibre are shown in Figure 3.

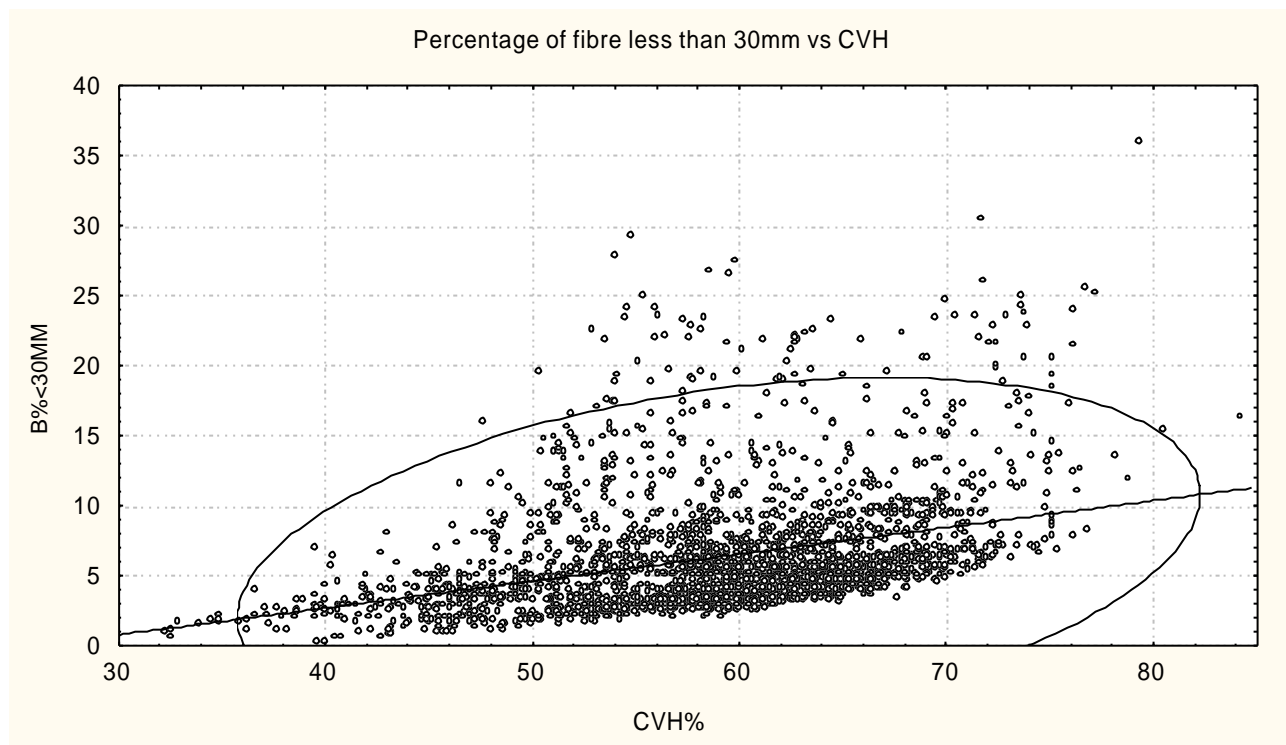
Figure 3: Short fibre contents at different short fibre lengths



Each box plot shows the distribution of results for the percentage of fibre (by weight) less than the value shown on the X-axis. The bars represent the boundaries for 95% of the data and the boxes for 66% of the data. The line is a least squares fit of the means.

We have observed a move towards the use of CvH as an indicator of consignment variability and short fibre content. To examine the feasibility of this, one may examine the relationship between CvH and the percentage of fibre at some nominal short length. Figure 4 shows the relationship for fibre <30mm.

Figure 4: Relationship of CvH to short fibre content



As would be expected, there is a weak positive relationship between short fibre and CVH%, although this is probably influenced by extreme values. Incidents of a relatively high amount of short fibre (greater than 15% <30mm) are evenly spread between 45% and 80% CVH. Below 40% CVH there is not enough a data to draw conclusions. This indicates that CVH% is not a reliable indicator of excessive short fibre in the consignment.

It should also be noted that a significant proportion of any very short fibre in a sample is taken out during carding. This is collected in the card waste test, if this is requested. The joint AS/SNZ committee is considering incorporating the card waste test into the new joint standard (probably as some form of card yield estimate). This will provide a more comprehensive picture of the wool in the future.

The average percentages of shorter fibre as a function of mean fibre length are shown in figure 5 overleaf. Each curve is a least squares fit to the observed data for barbe less than successive 10 mm length increments.

Figure 5: Percentage short fibre content as a function of mean length

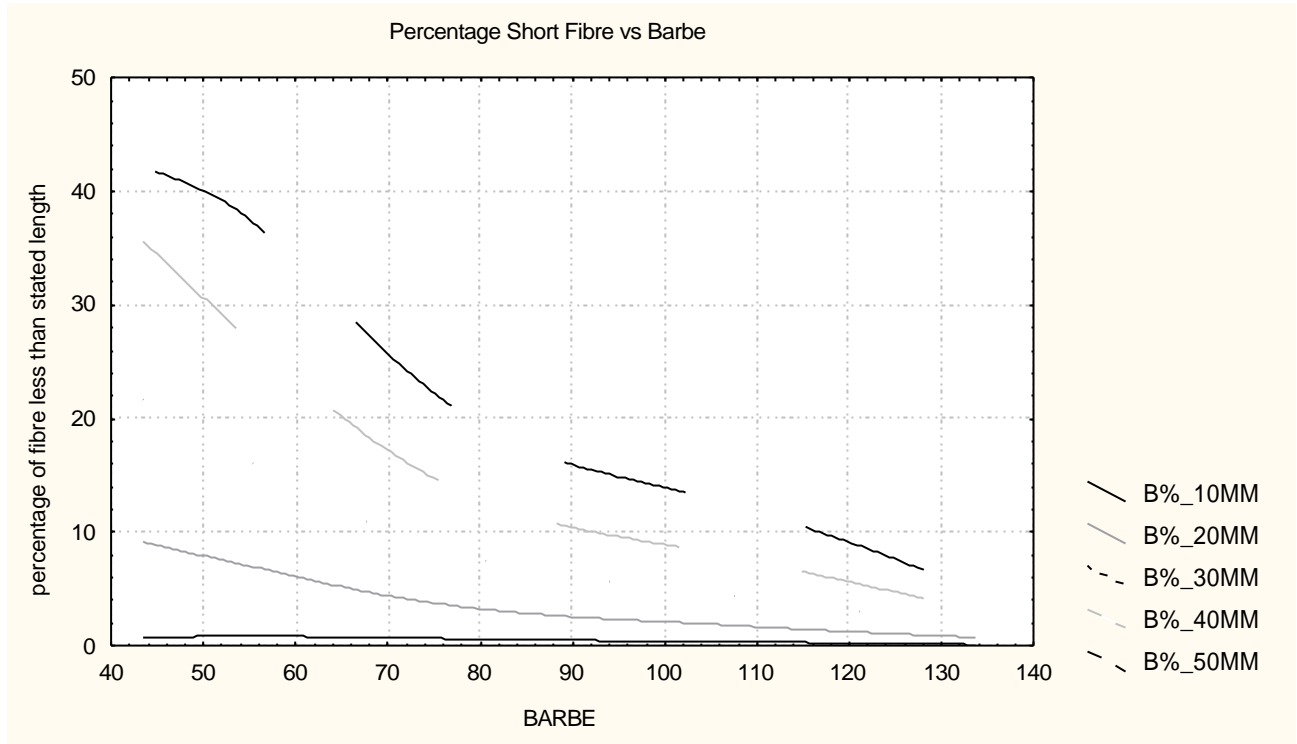
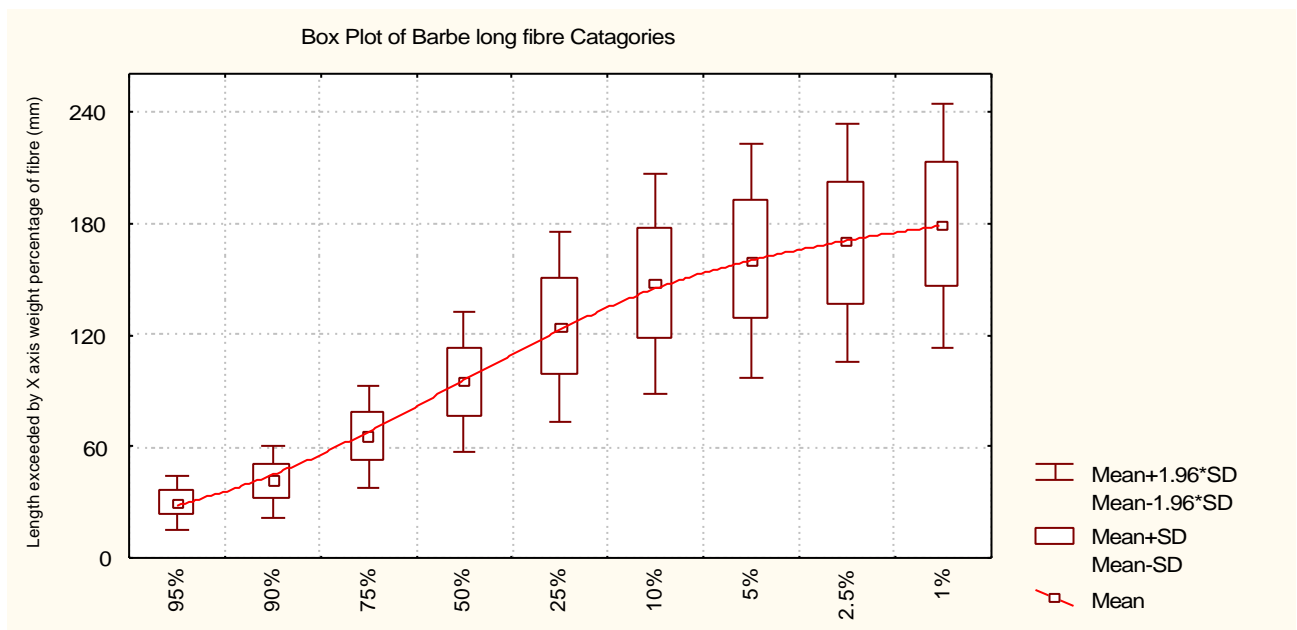


Figure 5 indicates that undesirable very short fibre, less than 10 mm, was present in the carded sliver in very small amounts (less than 1%) regardless of the mean barbe result. As expected there is a change in the slope of the curves for consignments less than 80 mm as the mean approaches some of the short fibre content parameters reported. It should also be noted that as the relative differences between the curves appear to be similar at all lengths it is probable that the proportions of short fibre are also similar. This means that consignments on average do not have a disproportionate amount of short fibre of any of the categories included in their composition.

The full distribution of results across all length categories can be seen in figure 6.

Figure 6: Generalised length distribution on a cumulative basis



Each box plot shows the distribution of fibre lengths exceeded by the weight percentage of fibre shown on the X-axis. This plot shows that the greatest length variation between consignments (weight-biased) is apparent in the longest 25% of the fibre, and the least variation is in short fibre content.

CONCLUSIONS

It can be concluded from this work that for NZ scoured wool consignments tested for Length After Carding the average relationship between hauteur and barbe was $H = 0.7 \times B + 2\text{mm}$.

CVH on these consignments was an average of 59%. It normally fell between 50 and 70% and did not consistently deviate from this at different mean lengths. CVH does not appear to be an adequate indicator of short fibre content.

On average short fibre is present in the carded sliver in amounts proportional to the mean length, and most variation in barbe length between consignments is apparent in the longest 25% of the fibres.