



Department of
Agriculture and Food



Using NeuralTools to generate a pricing model for wool

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Australian Wool Industry

- 70% of world trade in apparel wool is Australian wool
- Unlike other commodities
 - Each farm lot is fully measured
 - Each farm lot has an individual price
- About 450,000 farm lots sold each year in Australia

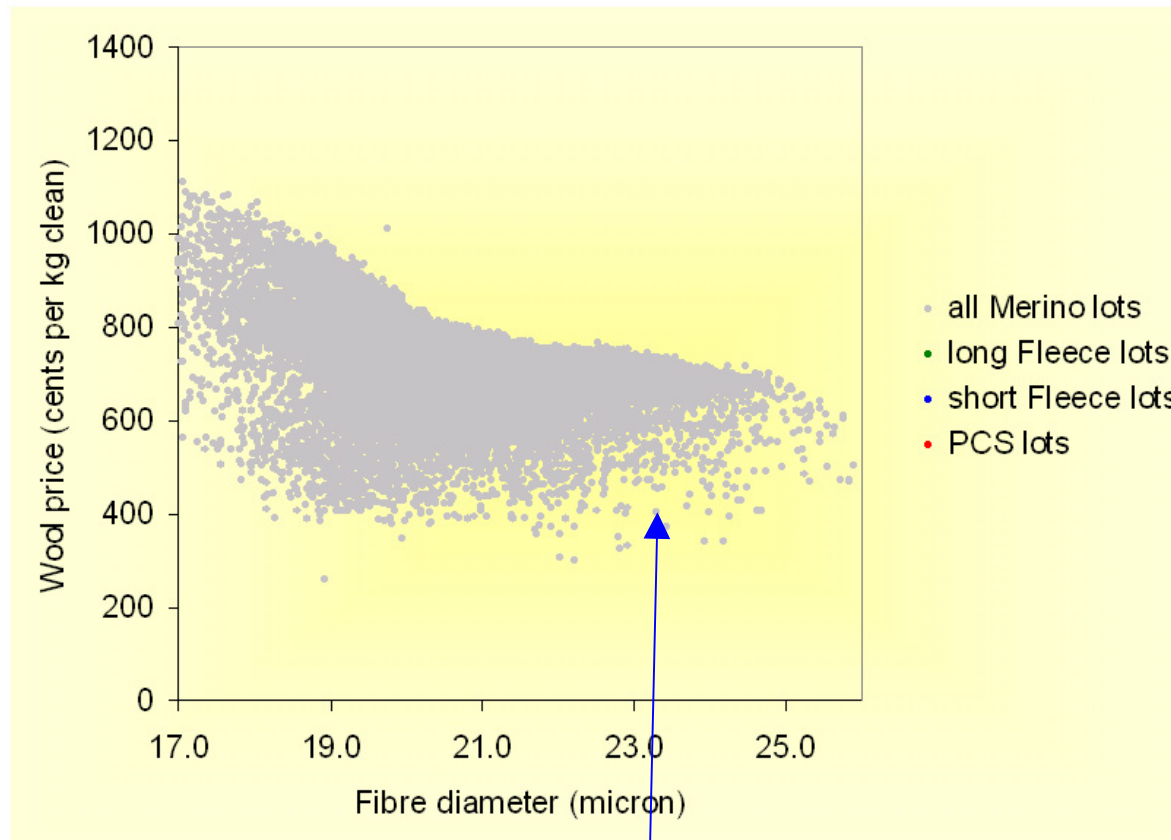
Wool prices & market reporting

- Estimates of auction price on individual lots needed by sellers (farmers)
- Forecast auction price on individual lots required by buyers for contracts
- Market reporting of price paid for different wool types

Neural nets & wool prices

- Neural nets attractive because
 - Number of records is large
 - Prices are dynamic
 - Price/attribute relationships are non-linear and interactive
 - Price/attribute relationships are dynamic over time
 - The data set is incomplete and imprecise

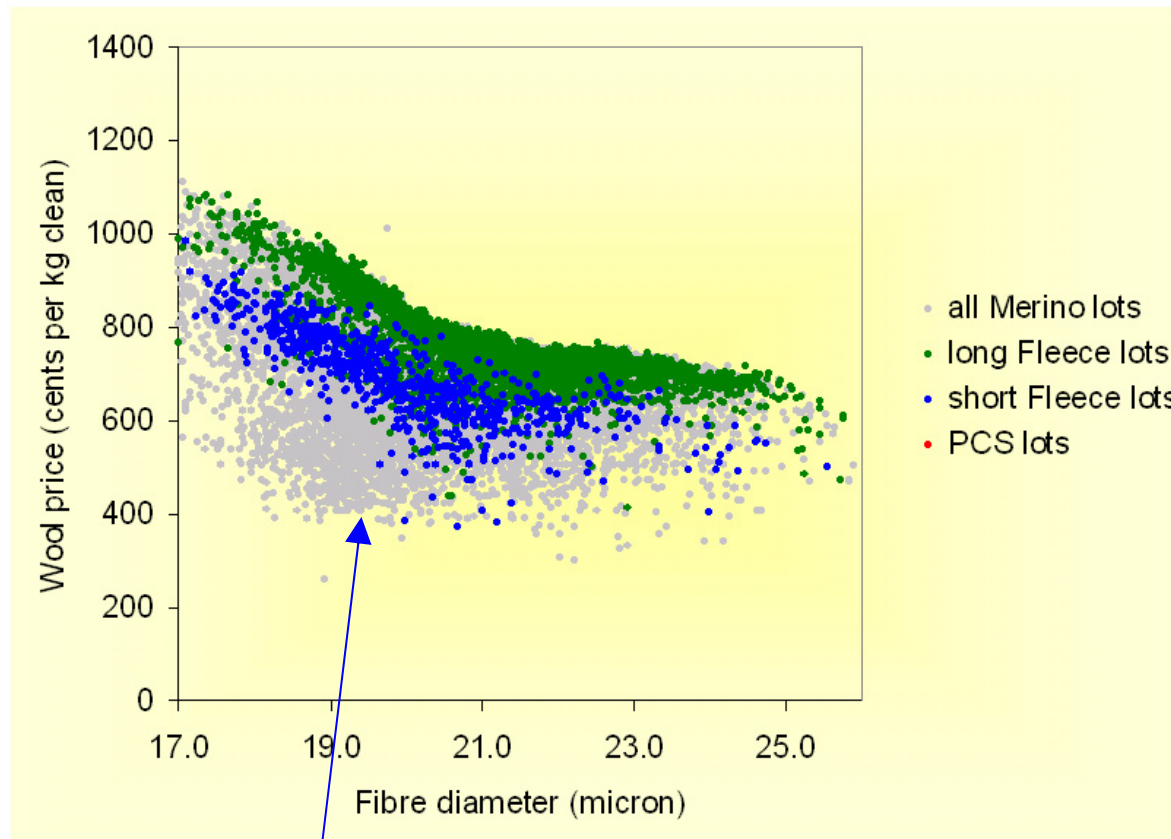
All Merino fleece lots



(Fremantle Jan-Mar 2006)

Each grey dot represents a parcel of wool sold at auction i.e. a 'case'

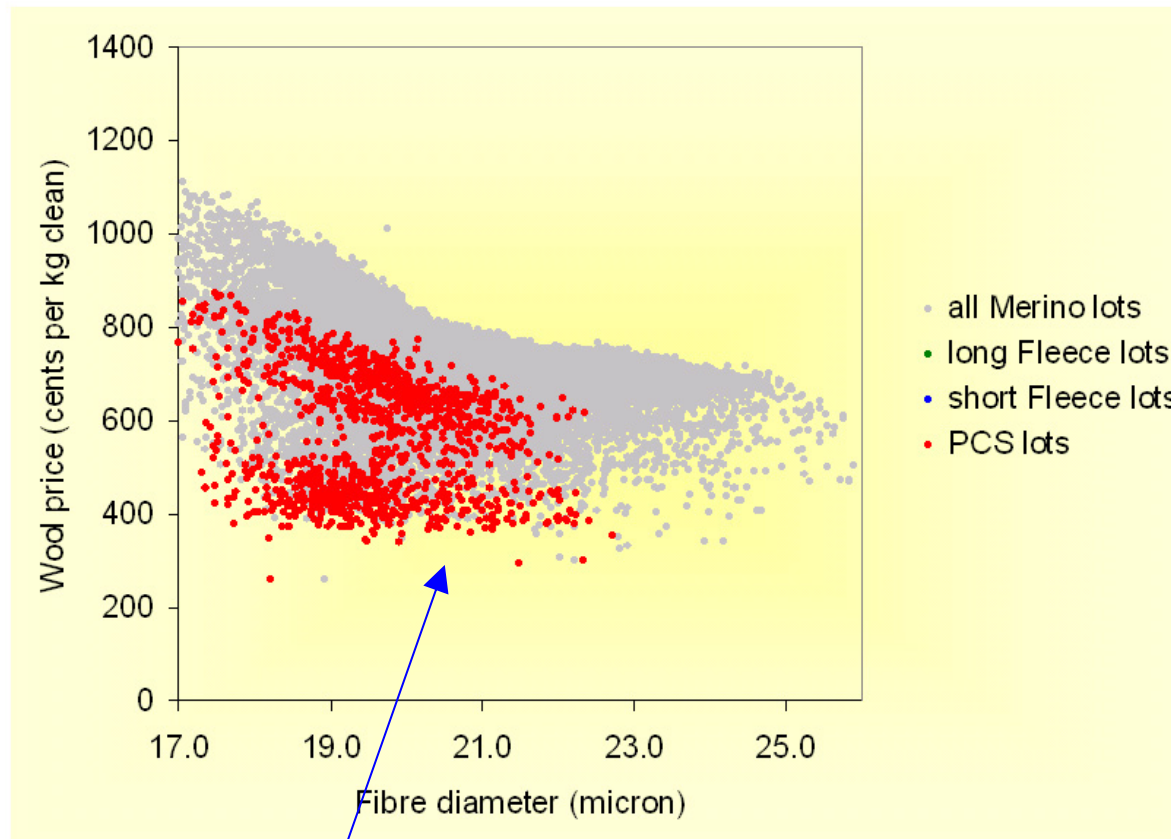
Long & short fleece lots



(Fremantle Jan-Mar 2006)

**Long and short wool
differentiated on price**

Merino pieces lots

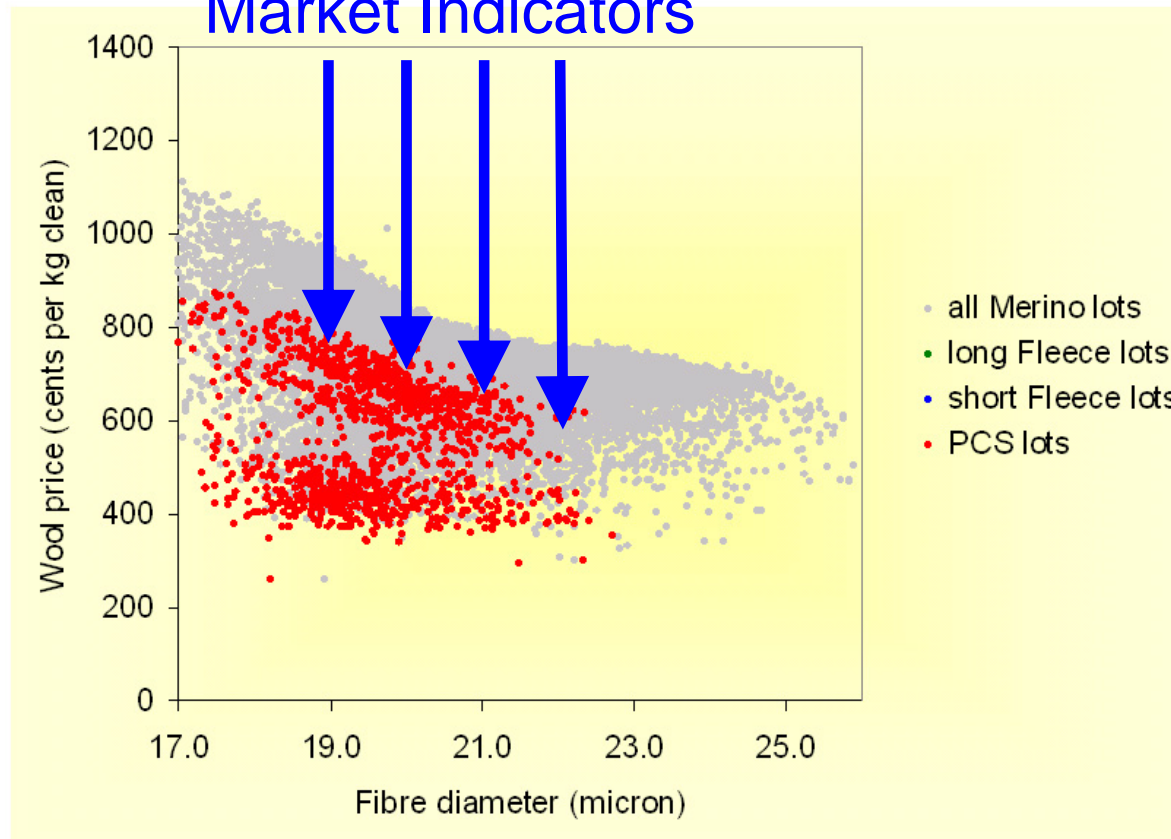


(Fremantle Jan-Mar 2006)

Pieces wool
(a subset of the wool clip)

The Challenge !

Market Indicators



(Fremantle Jan-Mar 2006)

Market indicators, like a stock market index, used to price wool

Model development (1)

- Assemble 6 month data set
 - Independent category and numeric variables
 - Dependent numeric variable (price)
 - Training, testing and prediction data
- Use Best Net Search
- Evaluate predictive capability
- Refine model

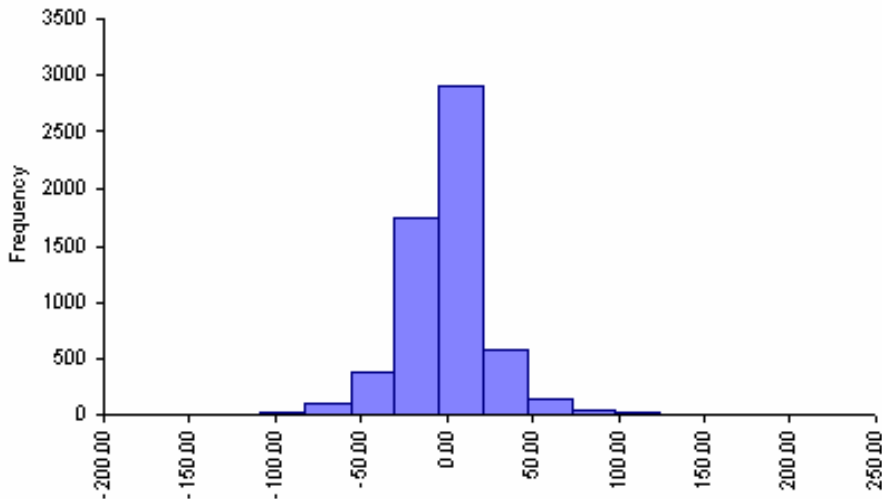
Configuration summary

Net Information

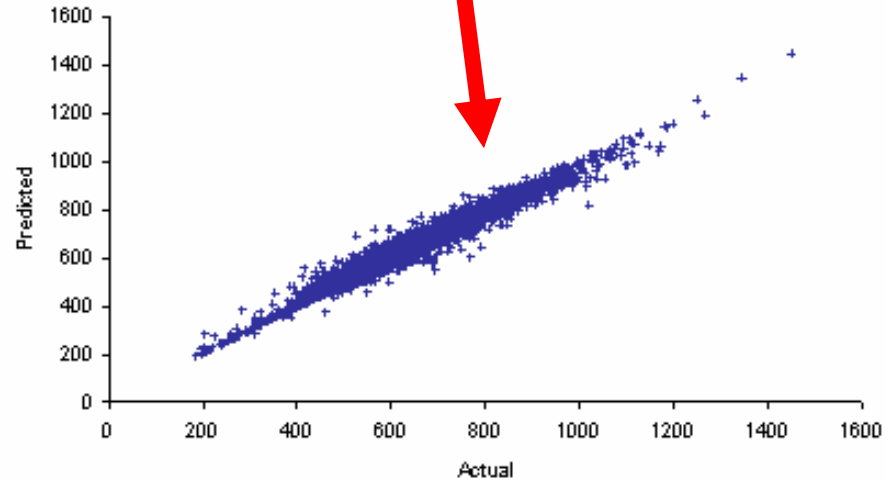
Name	Net Trained on Pieces wool sales, weeks 33 - 38, 2006 (3)
Configurations Included in Search	GRNN, MLFN 2 to 3 nodes
Best Configuration	GRNN Numeric Predictor
Location	Palisade Conf Curtis v6 BNS 6hrs.xls
Independent Category Variables	8 (Sale centre, Sale week, Sale outcome, Style, Med Hard Cotts, Unscourable Colour, Jowls, Dark Stain)
Independent Numeric Variables	8 (Staple Length, Staple Strength, Vegetable Matter, Diameter, CV Diameter, Mid Breaks, Yield, Hauteur)
Dependent Variable	Numeric Var. (Clean price)

Model evaluation - Training data (mean absolute error 16 cents)

Histogram of Residuals (Training)

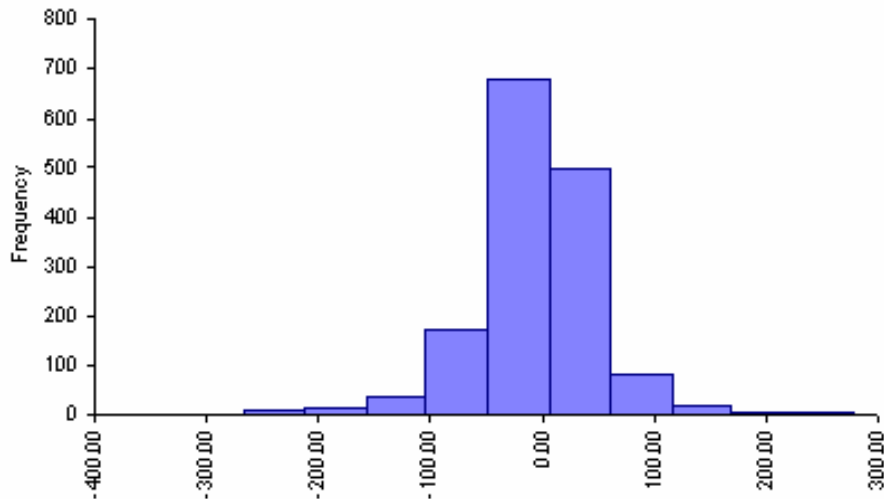


Predicted vs. Actual (Training)

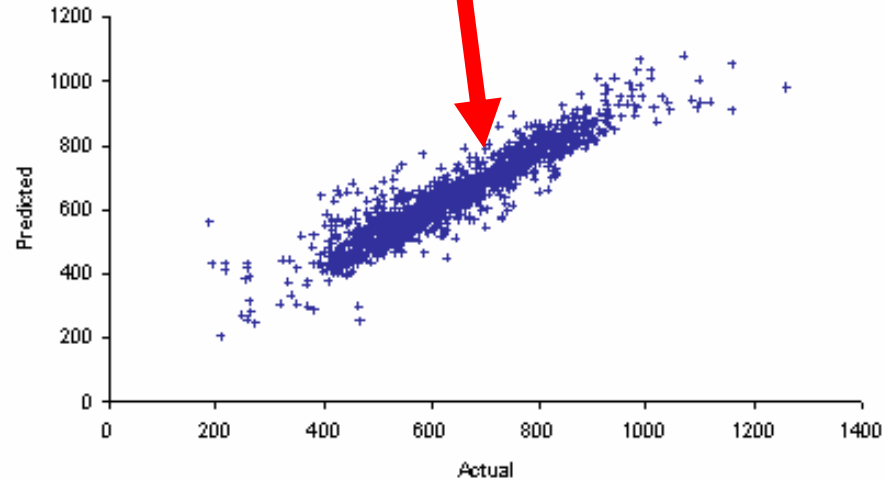


Model evaluation - Testing data (mean absolute error 37 cents)

Histogram of Residuals (Testing)



Predicted vs. Actual (Testing)

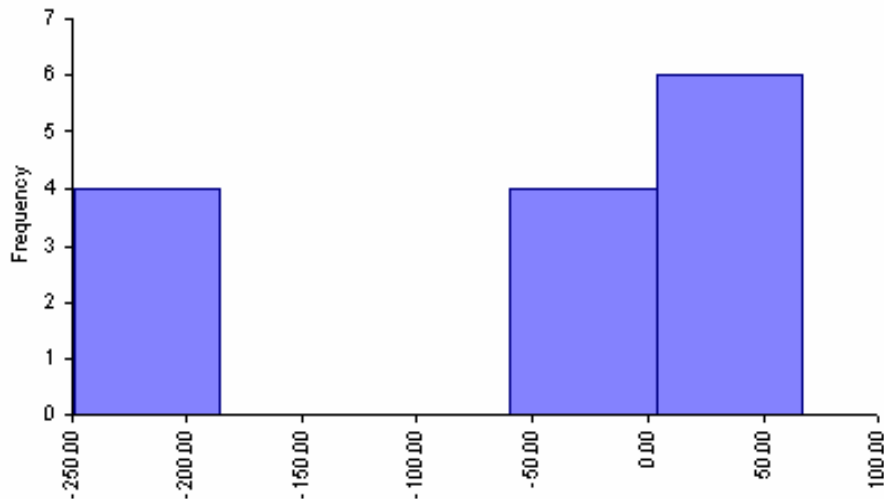


Model evaluation (1)

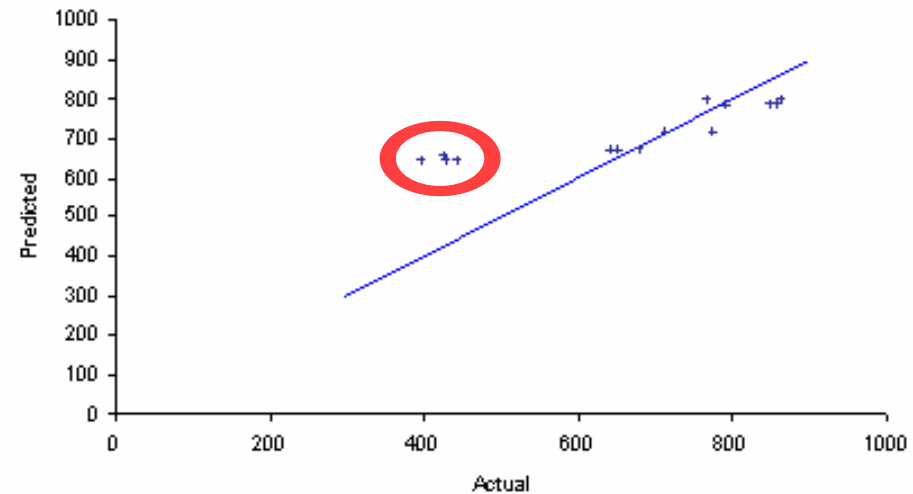
Testing data (indicators)

Observed versus predicted for the published Pieces Market indicators

Histogram of Residuals (Testing)



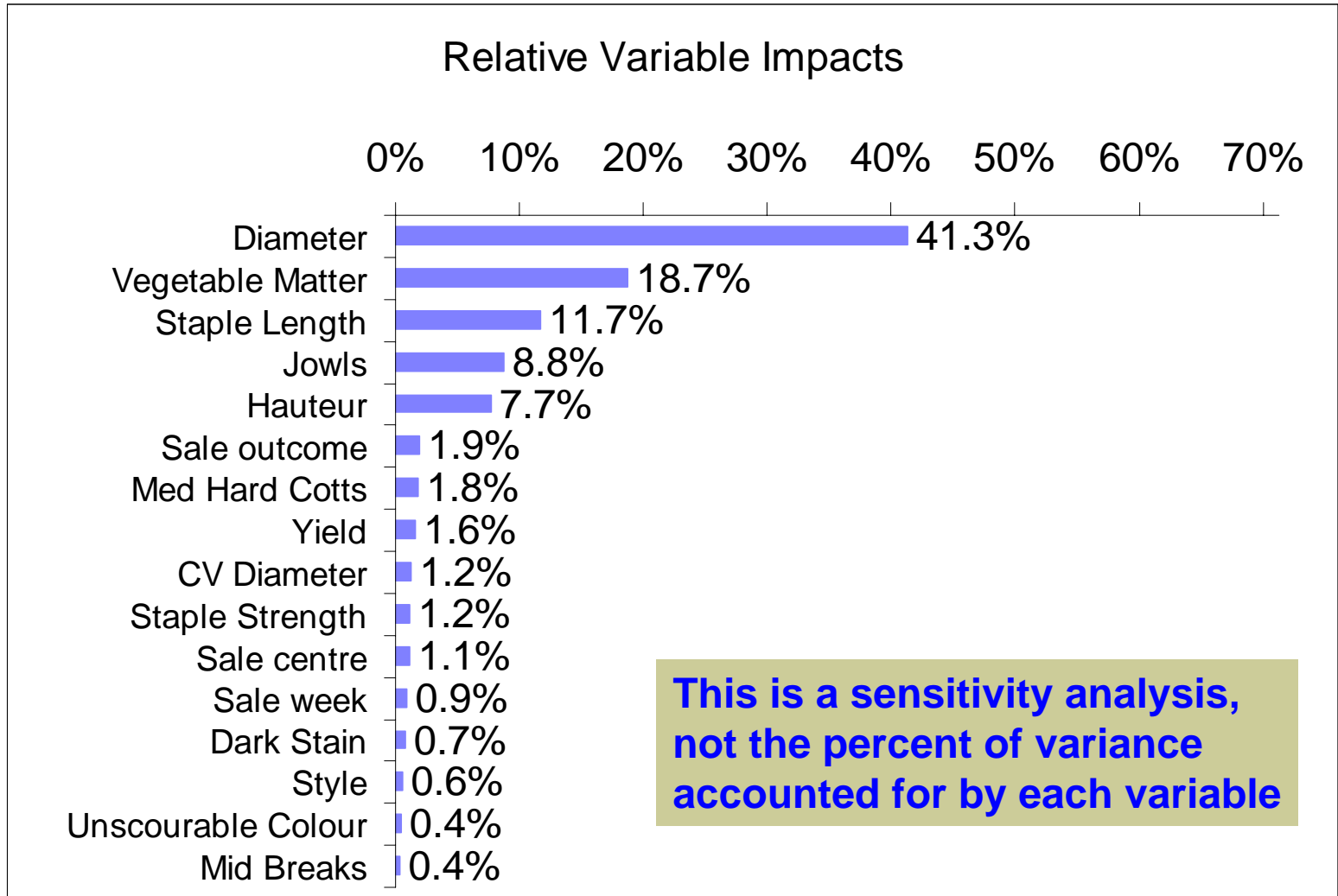
Predicted vs Actual (Testing)



Most points are on the 1:1 line, but a small group hover above i.e. they have higher predicted values than reported

Model evaluation (1)

Variable impact analysis



Model evaluation (2)

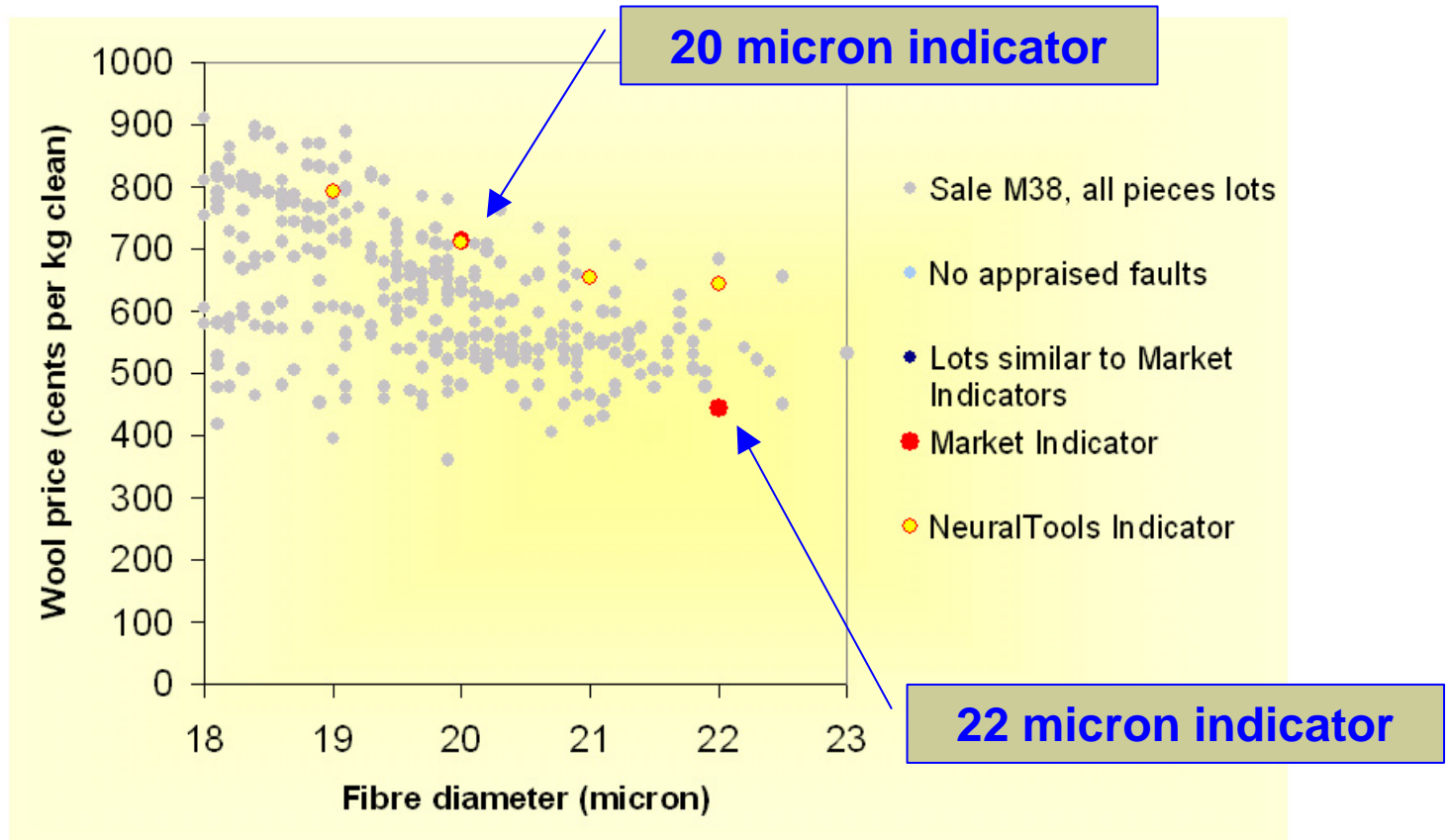
Live prediction

Simple spreadsheet pricing tool.

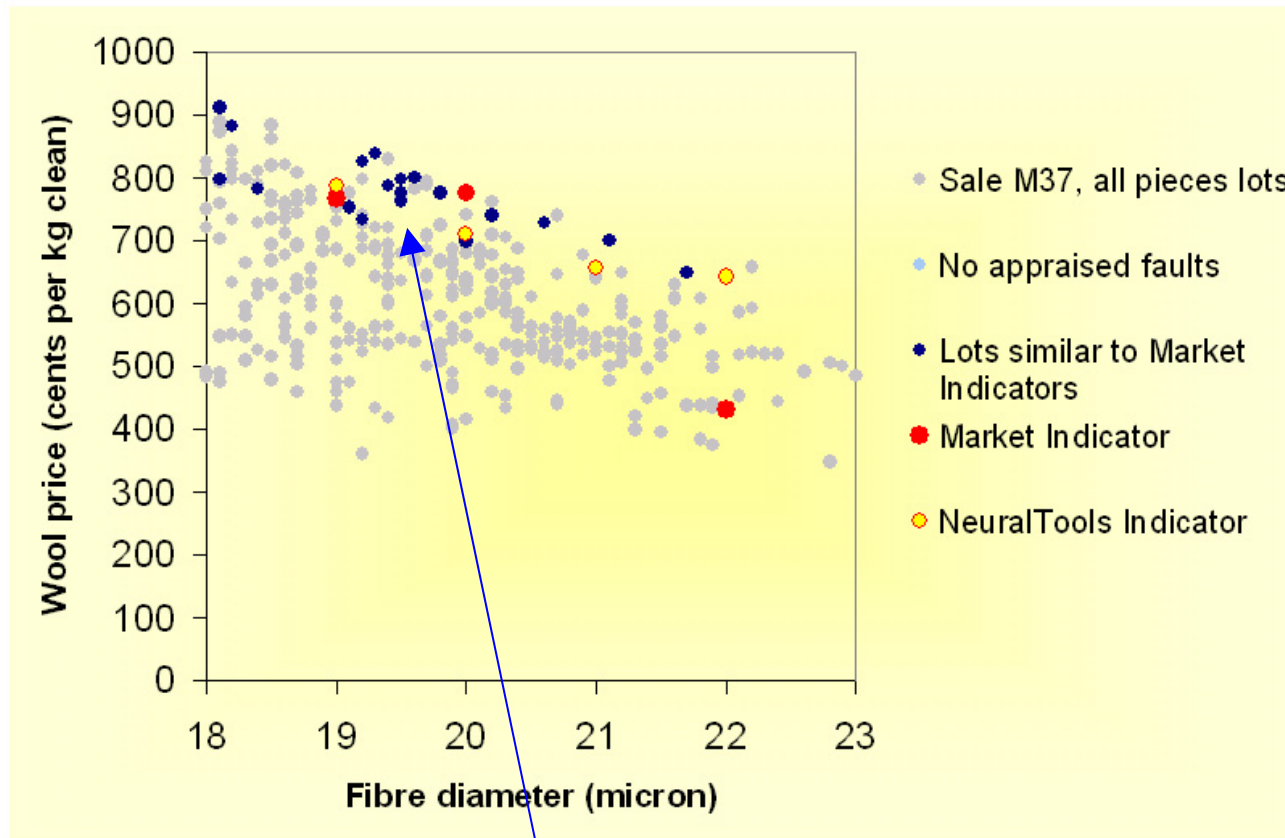
Change any of the values in the yellow cells, and '*Live prediction*' updates the clean price

Sale centre	Fremantle
Sale week	W38
Style	Average
Med Hard Cotts	C0
Unscourable Colour	H0
Jowls	J0
Dark Stain	S0
Diameter	20.0
Yield	50.0
Vegetable Matter	2.5
Staple Length	80
Staple Strength	35
Mid Breaks	55
Hauteur	62
Clean price	664

Model evaluation (4) predictive capability



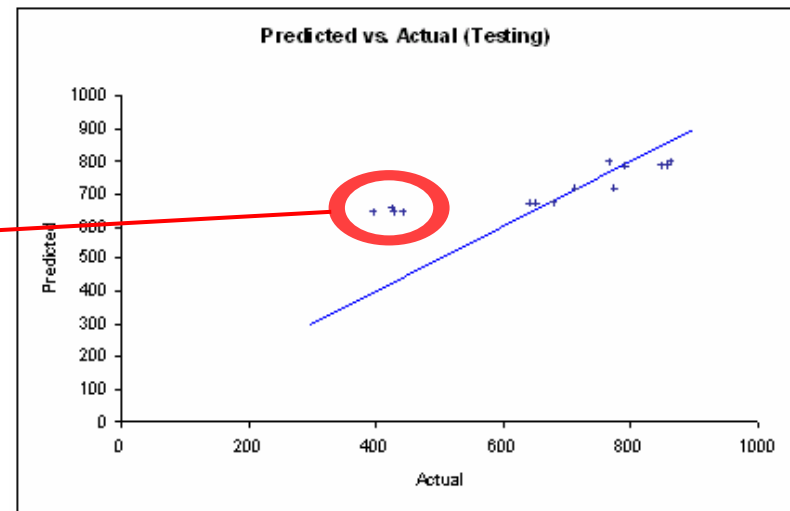
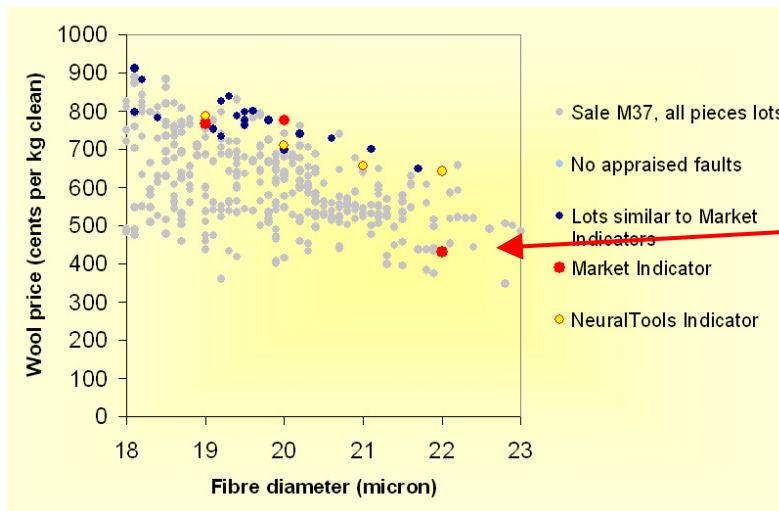
Model evaluation (4) predictive capability



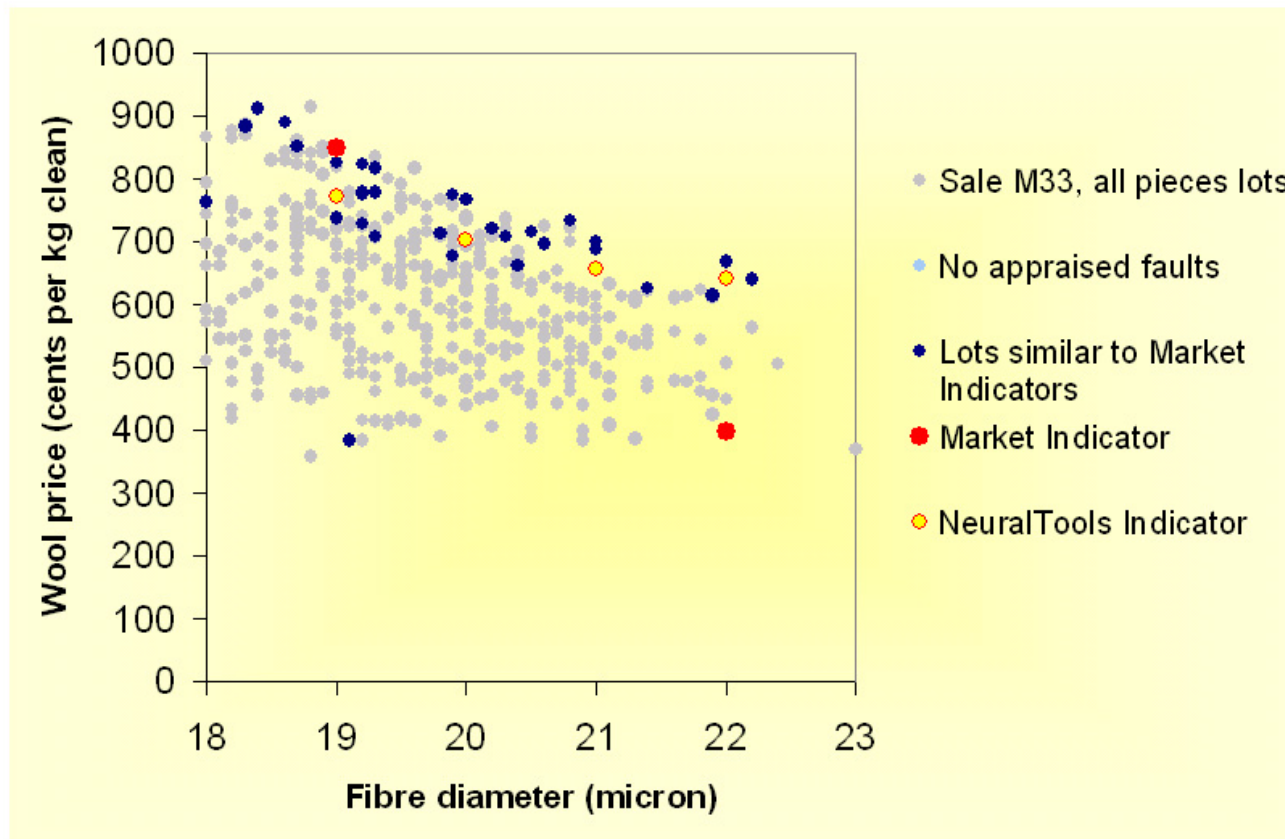
Melbourne
Week 37

Dark blue lots have SL, SS and VM
“similar” to market indicator definition

Model evaluation (4) predictive capability



Model evaluation (4) predictive capability



Some Neural Net applications

- Market reporting
- Price predictor
- Validation check for other estimates
- Missing sale problem
- Estimate premiums and discounts
- Generate price matrices
 - Using *Live Prediction* and *@Risk*

Summary

- Data rich application with characteristics that looked ideal for NeuralTools
- Solutions generated which can support industry analysis and generation of indicators