

Fleece Weighing Project

Project Goal

To develop a reliable system enabling fleeces to be accurately weighed and recorded on the wool table during shearing.

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for Merino New Zealand Inc.

**merino
inc.**

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Executive Summary

Accurate weighing of fleeces on the wool table can be achieved quite simply using existing weigh scales designed for livestock weight recording, however the design and structure of the wool table will have a significant impact on the accuracy obtained, as will the design of load cells used.

The biggest impact on accuracy is the rigidity of the wool table. If the table is able to flex under the weight of the fleece then this will place outward pressure on the load cell and a lesser weight will be recorded. A very small amount of flexing is enough to skew the weight and give an unpredictable result. If however the table is unable to flex then the weight will be transferred directly downward onto the load cell.

The Weigh Pads manufactured by Iconix are designed to weigh under a range of different platforms and under the wool tables tested they were the most accurate.

Based on the tests carried out the most accurate solution would be a rigid table with straight legs and Iconix weigh pads under each leg connected to an Iconix Weigh scale indicator.

The least accurate solution is a light weight metal table with sloping legs and standard load bars.

Currently Tru-Test do not supply weigh pads.

A simple but accurate weigh system using an Iconix FX1 Indicator could be set up for as little as \$1,488 +GST

Background

Fleece weighing has traditionally been the bane of owner and rousy alike. Most Current systems involve a separate weigh scales, where the fleece after being picked from the board is placed on a weigh tray, weighed then picked up again and thrown onto the wool table. Any farmer will agree that fleeces once put down can seldom be picked up again and thrown successfully. This results in more time taken to straighten the fleece on the table to enable proper skirting. In a busy shed time lost results in poorer quality preparation.

Many farmers already have livestock weighing systems therefore if these existing systems could be adapted to weigh fleeces then that would be an added bonus.

System Requirements

- Accurate weighing of fleeces from .5 to 20kg in 100 gram units
- Be able to attach to existing wool tables
- Be able to record EID tag Numbers.
- Be able to combine weight data with other fleece data e.g. Micron, Classing comments etc.
- Be cost efficient.

Methodology / Procedures

Most weigh systems found on farm are designed to either weigh sheep or cattle and have a total capacity of up to 3000kg, however fleeces typically only weigh from 1 to 8 kgs . An approach was made to two leading weigh scale manufacturers for load cells suitable for weighing fleeces that could be attached to a standard livestock weigh scale indicator. Both companies advised that their standard load cells were not designed for accurately weighing within the ranges required for weigh fleeces. One of the companies offered a different set of load cells which they were confident would meet the requirements.

The load cells were tested using standard wool tables the likes of which can be found in most wool sheds. Two different tables were used. One, an old wooden table and the other a modern metal table manufactured by Donalds of Lake Hawea.

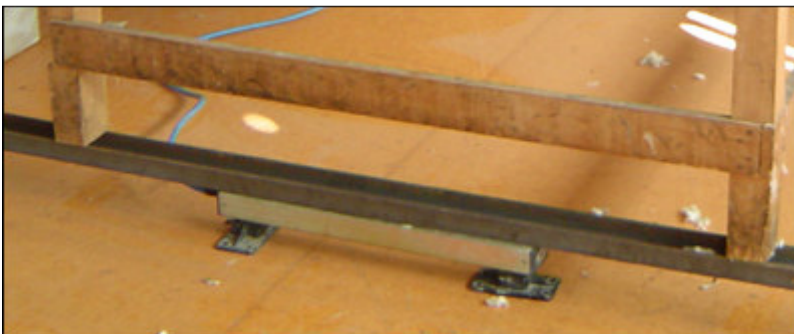
Two sets of load cells and weigh scale indicators were used.

Tru-Test XR3000 with MP600 Load bars
Iconix FX41 with Weigh Pad set

The load cells were placed directly under the tables. The Tru-Test load cells were placed under a steel U beam to span between the legs while the Iconix weigh pads were placed one under each leg.



Tru-Test Load Bars under Metal Table



Tru-Test Load Bars under Wooden Table

Weight Test

For each set of load cells Standard Weights of various measures were placed at different parts of the table and weighed. Then a range of Standard Weights were placed in the center of the table and weighed. The weights ranged from 1kg through to 15kgs. Each Standard Weight was weighed five times. The resulting recordings by each scale are shown in the tables below and on the next page.

Weight Test Results								
Tru-Test / Davidson Table								
Standard Weight	1st Weigh	2nd Weigh	3rd Weigh	4th Weigh	5th Weigh	Average Error	Max Error	
1	1	0.9	1	0.9	0.9	0.06	0.1	
1.5	1.5	1.5	1.4	1.5	1.4	0.04	0.1	
2	1.9	1.9	1.9	1.8	1.9	0.12	0.2	
3	2.8	2.8	2.8	2.9	2.8	0.18	0.2	
4	3.8	3.7	3.7	3.8	3.8	0.24	0.3	
5	4.6	4.6	4.6	4.7	4.7	0.36	0.4	
6	5.7	5.7	5.6	5.6	5.6	0.36	0.4	
7	6.6	6.6	6.6	6.6	6.6	0.4	0.4	
8	7.5	7.5	7.5	7.5	7.4	0.52	0.6	
9	8.5	8.4	8.4	8.5	8.4	0.56	0.6	
10	9.3	9.4	9.4	9.4	9.4	0.62	0.7	
15	14.1	14.1	14.1	14.1	14.1	0.9	0.9	
Iconix / Davidson Table								
Standard Weight	1st Weigh	2nd Weigh	3rd Weigh	4th Weigh	5th Weigh	Average Error	Max Error	
1	1	1	0.95	0.95	1	0.02	0.05	
1.5	1.5	1.5	1.5	1.5	1.5	0	0	
2	2	1.95	1.95	2	2	0.02	0.05	
3	3	3	3	3	3	0	0	
4	3.95	4	4	4	3.95	0.02	0.05	
5	5	5	5	4.9	5	0.02	0.1	
6	5.95	5.95	6	5.9	6	0.04	0.1	
7	7	7	6.95	7	7	0.01	0.05	
8	8	8	8	7.95	8	0.01	0.05	
9	9	9	8.95	9	9	0.01	0.05	
10	10	10	9.95	10	10	0.01	0.05	

Tru-Test / Wooden Table

Standard Weight	1st Weigh	2nd Weigh	3rd Weigh	4th Weigh	5th Weigh	Average Error	Max Error
1	1	0.9	0.9	1	0.9	0.06	0.1
1.5	1.5	1.5	1.5	1.5	1.4	0.02	0.1
2	2	2	1.9	1.9	2	0.04	0.1
3	3	3	3	3	3	0	0
4	3.9	4	4	4	4	0.02	0.1
5	4.9	5	4.9	5	5	0.04	0.1
6	6	6	5.9	6	6	0.02	0.1
7	7	7	7	6.9	7	0.02	0.1
8	8	8	7.9	7.9	8	0.04	0.1
9	9	9	9	9	9	0	0
10	10	10	10	10	10	0	0

Iconix / Wooden Table

Standard Weight	1st Weigh	2nd Weigh	3rd Weigh	4th Weigh	5th Weigh	Average Error	Max Error
1	1	0.95	1	1	0.95	0.02	0.05
1.5	1.5	1.5	1.5	1.5	1.5	0	0
2	1.95	2	2	2	2	0.01	0.05
3	2.95	3	3	2.95	3	0.02	0.05
4	3.95	4	4	4	4	0.01	0.05
5	5	5	5	5	5	0	0
6	6	6	6	6	6	0	0
7	7	7	7	6.95	7	0.01	0.05
8	8	8	8	8	7.95	0.01	0.05
9	9	9	9	9	9	0	0
10	10	10	10	9.95	10	0.01	0.05

Findings

Load Bars

Metal Table: During the testing it became clear that with standard load bars under the metal wool table that accuracy was a problem. The results showed that at 5kg the weight recorded was up to 400 grams under the actual weight placed on the table and at 10kg was up to 700 grams under. Further testing showed that when the Standard Weights were placed at the end of the table (it didn't matter whether the weight was split half each end or all at one end) the weight recorded was consistently accurate.

Wooden Table: The Load bars performed much better under the wooden table with the maximum error of only 100 grams under, across all weights. Unlike the metal table it made no noticeable difference in the recordings when the weights were placed at different places on the table.

Weigh Pads

Metal Table: The weights recorded with the Weigh Pads showed a maximum 100 gram error on the 5 and 6 kg weights and 50 grams on other weights. As with the load bars the accuracy was 100% when the weights were placed at the end of the table directly over the legs.

Wooden Table: The Weigh Pads were marginally better under the wooden table with the maximum error of only 50 grams over the entire weight range. It made no noticeable difference in the recordings when the weights were placed at different places on the table.

Weigh Scale Indicators

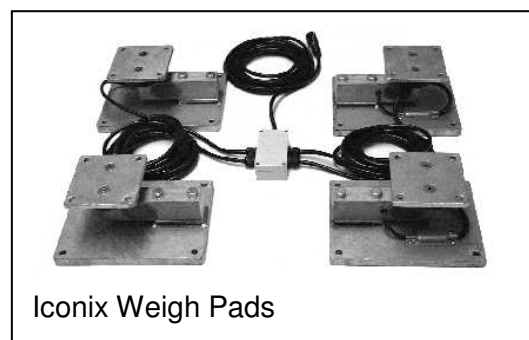
The Iconix FX41 indicator has a finer resolution than the Tru-Test XR3000 allowing it to record an accuracy down to 50 grams where as the XR3000 has a resolution down to 100 grams.

In addition to the weight and tag number the FX41 has the ability to record two extra fields of numeric data.

The XR3000 has the ability to record in addition to the weight and tag number, three extra fields of any data type as well as the ability to display up to six other prerecorded information such Sire, Dam, EBVs etc.



Tru-Test MP600 Load bars

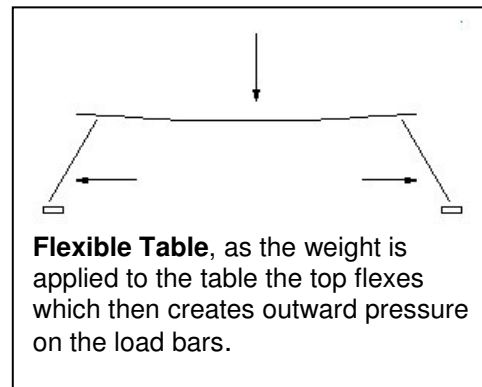


Iconix Weigh Pads

Conclusions

From the data collected from the weight testing the metal wool table has less accuracy than the wooden table and the load bars have less accuracy than the Weigh Pads.

It appears that the metal table flexes under the weight being placed on it which in turn places a sideways pressure on the load bar causing it to record a lower weight than that placed on it. This showed that the flexing of the table played a major role in determining the accuracy of the table.



The Weigh Pads were much less effected by the flexing of the table. This is shown in that the error rate of the Weigh Pads under the metal table was much less than those of the load bars.

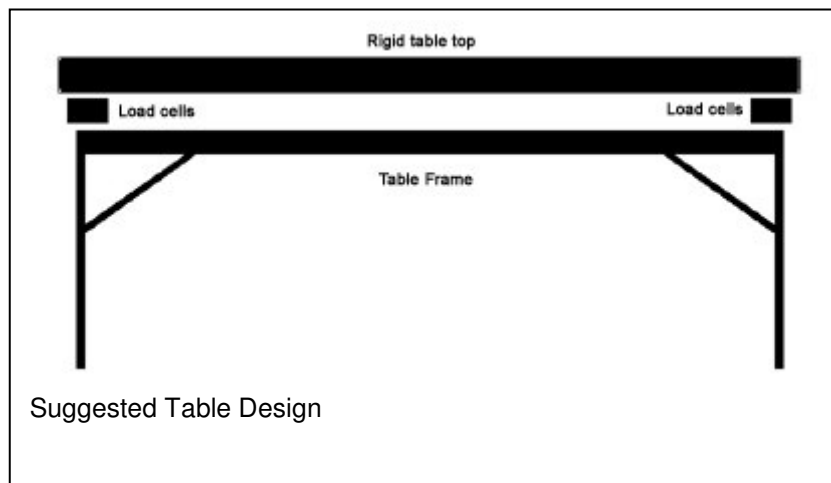
Recommendations

Many commercial wool growers will tolerate a lower level of accuracy than would stud breeders and therefore may be happy to work within the accuracies described in this report.

If load bars or weigh pads were to be on existing tables then the table height would need to be adjusted because the load cells would raise the table approximately 90mm (3.5 inches). Using load bars would tend to make the table a little unstable in that if someone were to sit on one side of the table, it would tip over, but under normal skirting there should be no problems.

For those who require a high level of accuracy and are prepared to have a wool table purpose built then the best weigh scale indicator and load cells to use would be the Iconix with Weigh Pads.

The table design below may help in building the ideal table.



Placing the load cells up under the table top will minimize the effect of any flexing while keeping cables etc. up off the floor. The table top needs to be strong enough not to allow any flexing. Hardened aluminum would be an ideal material as it is strong yet light weight.

References

Indicative Product pricing (RRP) excl GST

Iconix FX1 Indicator	\$ 449
Iconix FX41 Indicator	\$ 1,199
Iconix 600mm Load bar	\$ 849
Iconix 1000mm Load bar	\$ 969
Iconix Weigh Pads	\$ 1039
Tru-Test EziWeigh 1	\$ 824
Tru-Test XR3000	\$ 2284
Tru-Test MP600 load bar	\$ 1272

Note: The FX1 and the EziWeigh1 do not have the ability to store data for later download to computer. For more details regarding the feature of each indicator it is recommended you visit your local farm supplier.

www.tru-test.co.nz

www.iconix.co.nz

Acknowledgements

Iconix Ltd for advice and the loan of an indicator and weigh pads.

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