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## STABLE ISOTOPE RESULTS

**Attention:**  
**Company:** Nelson Honey and Marketing (NZ) Ltd  
276 State Highway 6  
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Nelson 7072  
NEW ZEALAND

<b>SIL Order No.:</b>	J-1600187 ECON
<b>Client Ref.:</b>	
<b>Date Received:</b>	04/04/2016
<b>Date Measured:</b>	13/04/2016
<b>Approved By:</b>	Andy Phillips
<b>Date Reported:</b>	14/04/2016

**Sample Type:** Carbon isotope  $\delta^{13}\text{C}$  in whole honey and honey protein by AOAC 998.12 method (First Revision 2013)

Lab Sample ID	Client Sample ID	Average $\delta^{13}\text{C}$ value (‰) Whole Honey	Average $\delta^{13}\text{C}$ value (‰) Protein Extract	Difference (Honey – Protein Extract) (‰)	%C4 Sugars
J-1600187	240316MH	-26.0	-26.4	0.4	2.2

**Disclaimer:** This test result is obtained from the sample(s) supplied for analysis. We cannot guarantee that either the AOAC 998:12 test or our test results will be accepted by the regulatory/testing authorities of other countries.

All results are reported with respect to VPDB normalized to our internal standards Leucine (-28.3‰ for  $\delta^{13}\text{C}$ ), EDTA (-31.1‰ for  $\delta^{13}\text{C}$ ), Cane Sugar (-10.3‰ for  $\delta^{13}\text{C}$ ) and Beet Sugar (-24.6‰ for  $\delta^{13}\text{C}$ ). GNS Honey standard was run in the same way as the samples as a check on the procedure. The  $\delta^{13}\text{C}$  values obtained for this honey were within the analytical precision of 0.2‰ of the accepted values for  $\delta^{13}\text{C}$ .

**Honey Test** - (Stable Carbon Isotope Ratio Analysis) measures the carbon-13 content of the whole honey and protein, according to the International AOAC method 998.12 (First Revision 2013).

**Interpretation of Results** - Pure honey (free of corn or cane sugars) with an exception of a few unusual varieties yields a value of C-4 sugars less than or equal to 7%. Some unusual varieties may slightly exceed the range, but will have  $\delta^{13}\text{C}$  for honey which are in the normal range (more negative than -24.0‰).

$$\%C4 \text{ sugars} = 100 \times [\delta^{13}\text{C} (\text{protein}) - \delta^{13}\text{C} (\text{whole honey})] / [\delta^{13}\text{C} (\text{protein}) - (-9.7)]$$

Please note, in our considerable experience, we note that bioactive Manuka honey can be classed as an unusual variety and has a tendency to have C-4 sugars which slightly exceed the AOAC test limit of 7%.

Samples will be kept for 3 months from the date of the report and then discarded unless otherwise notified.