

Claims for manuka honey activity

By Professor Peter Molan, University of Waikato

I have been asked to write this article for the benefit of the many new producers of manuka honey who have come into the industry.

However, I think it will be of benefit also for those who have been involved for a long time but may have never fully understood, or have been misled by much of the debate that has gone on in the past, about rating the antibacterial activity of manuka honey.

Whilst standards have been established to define whether or not a honey can be called manuka, little progress has been made with establishing a standard for describing the antibacterial activity of manuka honey. It is very much a case of *caveat emptor* ('let the buyer beware') in the marketplace.

Laws and regulations

In New Zealand and in other countries there are laws that protect consumers from being misled, and laws to protect traders from unfair competition.

Anyone making a claim for honey having a particular level of antibacterial activity when selling it needs to take care that they are not falling foul of these laws. This article has been written to ensure that false claims are not made unknowingly (which is not an excuse for offenders).

In some instances there are regulations or international agreements that give a tolerance for items being sold to fall by a specified margin below the level claimed. With there being no standards or agreements for the activity of manuka honey, any claims made have to be absolutely true. For this reason sellers need to allow for any margin of error in measuring the activity. This is like the 'baker's dozen' of years gone by: an extra loaf thrown in when selling a dozen in order to avoid the possibility of

being penalised for selling short weight. Honey producers use the term 'over-packing' to describe this. It needs to be done for antibacterial activity just as much as it does for the weight of honey put in jars.

Producers can easily check how accurate their packing equipment is regarding the weight of honey put in jars, and thus to know by how much they need to 'over-pack' to allow for the margin of error. But it is not so easy to know the necessary allowance for the margin of error in the level of antibacterial activity. Two different factors need to be taken into account: (1) the sampling error that can result from honey being viscous and varying in composition throughout a bulk quantity, and (2) the margin of error in the measurements made by the testing laboratory.

"Major problems may arise if claimed antibacterial activity is estimated rather than directly measured..."

The test report from the laboratory gives the activity of the sample of honey supplied. This will only be the activity of the batch of honey if every unit of that batch is identical. Stephens and Molan (2003) explained the reasons why a sample taken from bulk honey is often not representative of the whole quantity of honey. There is a good chance that the level of activity that is in the packed jars may be lower than the result from testing of a sample from bulk honey. If there is not good stirring of a batch, it is also likely that individual jars in a batch may have a level of activity lower than that claimed on the label if there is variation of activity throughout a bulk quantity of honey, or if blending has been done. Variation between jars can also occur if the filling machine is not flushed clear of any previously packed honey of lower activity.

The only reliable way of ensuring that the claim on the label is correct is to have testing done on jars of the finished product, with

the processing done in a way that prevents variation within a batch of jars. But allowance still needs to be made for the margin of error in the testing.

All laboratory assays have a margin of error, whether they are biological assays or chemical assays. International Accreditation New Zealand (IANZ) requires testing laboratories to make this margin of error known to clients on request for any testing method that IANZ accredits. Sellers of honey need to 'over-pack' by this margin to ensure that they do not make a false claim when a result reported is at the high end of the range of variation from the true value.

Activity claims and industry implications

Claims that are made regarding the level of antibacterial activity in manuka honey are usually done in one of two ways: (1) either the level of antibacterial activity is expressed as being equivalent to the concentration of a solution of a standard antiseptic, phenol, that has the same level of antibacterial activity; or (2) as the level of methylglyoxal, the antibacterial component of manuka honey.

The correlation between the level of methylglyoxal and the antibacterial activity of the honey is rough. Some sellers have the level of methylglyoxal measured, but instead of stating the level of methylglyoxal they state the level of antibacterial activity (as equivalent % phenol) estimated from the correlation. Where an IANZ-accredited laboratory is giving a result for the antibacterial activity that has been obtained by estimation in that way, then the margin of error will be available on request. This will permit sellers to 'over-pack' by a sufficient amount to make allowance for the margin of error in the estimation of activity. Regardless of how accurately the level of methylglyoxal has been measured, if it is antibacterial activity rather than the level of methylglyoxal that is being claimed, then that has to be a true claim.

Hill Laboratories uses its own correlation data to estimate the antibacterial activity from the level of methylglyoxal they measure.

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This is proprietary information that has not been published. Estimating the level of antibacterial activity using published correlation data is a problem because there are big differences between different publications. Initially the three different sets of published data (two from Adams et al., 2008, by different methods of measurement; and one from Atrott & Henle, 2009) were in close agreement. Then Adams et al. (2009) published that they had made an error in one of the two methods of measurement, and increased their results for one of their two sets of data by 87%, bringing them well out of agreement with their other set of data and that of Atrott & Henle (2009). Another thing to take into consideration is that different laboratories get different results when they estimate the level of methylglyoxal in the same sample of honey.

Major problems may arise if claimed antibacterial activity is estimated rather than directly measured—the honey may be only partially inhibiting the growth of bacteria (i.e., only slowing, not stopping, the growth of bacteria). It has been widely experienced in the honey industry in the past that honey with an activity level of 10% phenol very frequently gives partial inhibition. If the antibacterial activity is estimated rather than directly measured, then it will not be known if it gives partial inhibition. The claim made is that the honey has the same antibacterial activity as 10% phenol, but it is not known if that is a true claim for honeys giving partial inhibition.

Some sellers of honey do not define what the numbers mean in the rating of activity of their products. This may not be allowed under consumer laws in some countries. But even if it does not infringe consumer laws, it still leaves the seller open to being sued for damages from competitors because of unfair competition. It would be a similar situation to a company putting '250' on a jar of honey that looked like a 250-gram jar when they were using their own unit of weight that was 0.9 gram and the jar actually contained 225 grams of honey. Regulations specify the precise meaning of the numbers '91' and '95' for the octane rating for petrol. No defined standard exists for manuka honey activity.

It is not generally understood that the commonly used unit of activity, the equivalent % phenol, depends on the testing

conditions. Unless the unit used is qualified by stating the testing method being specified, then the claim is absolute and the honey would have to be at least as active as a 10% solution of phenol under any testing conditions; otherwise it would be a false claim. Quite large differences in activity can be expected if the testing is done differently.

What has become virtually an industry standard internationally is to have the unit of activity stated to be the equivalent % phenol with the honey tested by the method published by Allen, Molan & Reid (1991). It should be noted that honey giving partial inhibition would not meet this definition of activity units, nor would honey with a rating of activity of less than 8. In order to be able to measure such low levels of activity (including in the testing done to obtain the correlation between methylglyoxal and antibacterial activity), the honey has to be tested as a 50% solution instead of a 25% solution. This gives a different numerical value to the activity measurement obtained. Although a correction factor is applied, this is approximate. Research at the University of Waikato has shown that there are substantial differences in the factor between batches of honey.

The published testing method (Allen, Molan, & Reid, 1991) describes testing for both types of antibacterial activity in honey—that due to hydrogen peroxide, and the non-peroxide activity (NPA) that occurs only in honey from manuka and other *Leptospermum* species. It was to distinguish the honey with NPA from other honey that the term 'active manuka honey' was coined. This term came

- Sellers are open to action against them in court if false claims are made about the antibacterial activity of manuka honey.
- The margin of error in determining the level of activity needs to be taken into account, and "over-packing" by at least this margin should be done to avoid a false claim being made.
- Bulk honey is not homogeneous, so thorough mixing needs to be done before a sample is taken to measure the activity of the batch.
- The units of activity need to be defined, as there is no standard for what numbers mean.
- The numbers obtained depend on the testing conditions, so the testing method used needs to be stated.

from it being noted in the paper by Allen et al. (1991) about NPA that, "the present survey has shown not all samples said to be manuka honey can be relied upon to provide this antibacterial activity." In subsequent publications, and in a large number of news media reports, the term 'active manuka honey' was used to distinguish manuka honey with NPA from manuka honey on sale that did not have NPA. In view of that, it would be quite reasonable for a competitor to claim unfair competition if someone were selling as 'active manuka honey' a product in which the activity was not NPA, or rating antibacterial activity without making it clear that the activity shown is hydrogen peroxide activity and not NPA.

The dictionary definition of 'deceive' is, "To cause to believe what is not true; mislead." To make the claim of activity unambiguous, it should be stated which type of activity is being shown, as well as showing the units and method of measurement. The component giving manuka honey its NPA has been identified as methylglyoxal, so a claim that honey being sold contains a substantial level of methylglyoxal unambiguously shows that it is 'active manuka honey' as originally defined.

Some beekeepers in other countries are resentful that imported manuka honey is selling at much higher prices than their own honey gets. Although direct restriction on imports is against the principles of free trade, there are other ways of imposing trade barriers. New Zealand exporters are already having shipments held up for testing as a result of excessive levels of sucrose having been found in some manuka honey. Complaints about false claims of activity levels could also lead to similar trade barriers. Not telling the truth about the level of activity could cause financial loss to many more parties than just the offending company.

References

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NBA CONFERENCE

Thanks to you all!

By the Hawke's Bay Branch Conference Organising Committee

The Hawke's Bay Branch thanks everyone who participated in the 2012 NBA Conference, whether speaker, sponsor or attendee.

The conference was the culmination of a lot of work, but we feel it ran very smoothly overall and have certainly appreciated the positive comments from participants.

We initially budgeted for the conference to run at cost; however, due to the greater-than-expected attendance we made a profit. The Branch therefore is donating the profit to various research projects we consider are particularly important to the industry. We are pleased to donate \$5,000 plus GST each to three Bee Products Standards Council research projects: Pyrrolizidine Alkaloids, C4 sugars, and the production of New Zealand honey standards. We have also set aside \$5,000 towards finding a predator or parasite for *Scolypopa australis*, the passion vine hopper responsible for our tutin honey issues, a new project approved at the Annual General Meeting. When the expected GST refund comes in, further allocations will be made to the research projects needed at present to retain market access for New Zealand's honey.

One clear highlight was the conference dinner at the Mission Estate, which included the traditional auction of the late Richard Bensemans' tie. The auction took on a life of its own and transformed into a collection, and a whopping \$11,800 was raised. We are pleased to be working with the Royal New Zealand Foundation for the Blind, and our donation has gone towards the breeding and training of a guide dog. We have a blind beekeeper among our number, and we hope with this donation we can get Bryce one place closer to the front of the queue for a new guide dog. Please visit our Facebook page at <http://tinyurl.com/hbnbafb> to read the whole story, and maybe add a small donation of your own.

We've collected conference photos that are available on Facebook. Please visit and tag yourself and your friends!

An outstanding group of speakers brought great relevance and value, and we know many of the topics sent attendees home with at least a 'thinking' list, if not a 'to do' list.

Greg Zemke-Smith's presentation on the EDecs or transfers may have confused many, but if you break it down using his notes it makes sense and it works. Greg's notes are now available from the Hawke's Bay Branch website <http://tinyurl.com/hbnbafb>. Most people have had difficulty locating the training site and the online site in MPI's website. The training site is at <https://ectrain.maf.govt.nz/ectrain/>. At the bottom of the page you will find the link for both training and LIVE. It is wise to get into that site and spend some time trying out a couple of simple transfers or your own actual example. For LIVE you need a sign-in code: be aware that this sign-in is different from MPI's actual website sign-in code. When you do register, make sure to include both your RMP number and Exporter number (if you have one) so they are both available in the drop-down menus. The E-Cert application form is available from <http://www.foodsafety.govt.nz/elibrary/industry/application-form-cert-billing/billing-application.pdf>

We wish the Canterbury Branch all the best as they prepare for next year's conference, and wish you all a happy, healthy and prosperous season.



This is the guide dog puppy being sponsored by the Hawke's Bay Branch. Photo supplied by the Royal New Zealand Foundation of the Blind.

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