Asia Pacific Laboratory Accreditation Cooperation

WHY ARE THESE TEST RESULTS SO DIFFERENT?
The importance of testing methods in chemical and microbiological testing

PURPOSE

This document gives an explanation for the lay person of the reasons for difference in test results for chemical and microbiological testing, especially when empirical methods are used.

AUTHORSHIP

This document was produced by the APLAC Technical Committee.

COPYRIGHT

FURTHER INFORMATION

For further information about this document, contact the APLAC secretariat at:

NATA
Level 1
675 Victoria Street
Abbotsford VIC 3067
Australia
Tel: +61 3 9274 8200
Fax: +61 3 9421 0887
Email: aplac@nata.com.au
Web site: www.aplac.org

BACKGROUND

International trade in goods relies on the results of testing to verify conformity with national and international standards in order to protect public health and safety, to protect the consumer in regard to truth in labelling and to monitor and enforce tariff and quota requirements in trade agreements. All too frequently, test results verifying conformity and generated at the origin of export are not supported by test results generated in the importing economy. Such incidents are costly in terms of goods being delayed in their release to market and in the subsequent investigations and additional testing required. More importantly, such incidents may undermine the hard-earned confidence between trading partners.

In many cases relating to tests of a chemical or microbiological nature, and particularly so for trade in food and agricultural products, the apparent differences in test results are in fact scientifically justifiable; they reflect not so much the compliance status of the goods or the ability of the laboratories to conduct the testing, but rather how the testing was carried out in different laboratories.

WHAT ARE THE DIFFERENCES?

In many instances, in chemical testing and even more prevalent in microbiological testing, the attribute being measured is not well defined or evenly distributed in the sample. In the trade in food and agricultural products, examples include moisture content, fat content, pesticide and antibiotic residues, and others. In microbiological testing, it is not possible to isolate each individual microbial cell and count it.

To overcome this lack of definition, scientists define and measure the amount of an attribute or the number of micro-organisms by the test method used. For example, the moisture content of a sample is defined by the loss in weight when a sample is dried for a set time at a set temperature – and the result that is produced is not necessarily the same as if the water molecules were isolated and then weighed. Similarly, micro-organisms can be defined by the number of colonies grown in a Petri dish under specified conditions after a specified period of time, and this number may be the same as the unrealisable count of individual cells of that particular organism in the food sample.

Such defining test methods are often called empirical methods – the result one obtains is dependent on the method of measurement selected. In all but the most sophisticated of chemical tests, and in essentially all microbiological testing, the test result is empirical in nature.

WHAT DOES THIS MEAN?

This means that two different methods used to measure nominally the same attribute are likely to produce two different results. Therein lays a common reason behind disputes over test results in traded goods. The exporter uses Method A (a method in common use in the exporting economy) to measure Attribute X and declares that the goods conform. The importing economy uses Method B (which is that commonly used in laboratories in that economy) to measure the same Attribute X but gets a different result. Both results may be correct but in reality are probably measuring either:

(i) slightly different attributes that both economies call Attribute X, or;
(ii) the same Attribute X but to different levels of accuracy, as produced by the different Methods A and B.

While the cause for the difference could be determined by investigation, the situation could have easily been avoided by prior agreement between the two parties as to whether both Method A and Method B were equivalent and acceptable, or by agreeing which single

method was to be used to measure the critical attributes. Alternatively, the differences in Method A and Method B could be formally recognised and different pass/fail criteria established for the goods depending on the method selected.

HOW TO AVOID UNNECESSARY CONFLICT

The scientific resolution of test result differences between empirical test methods has been the subject of much work within the laboratory community. Until such a resolution is reached, important attributes associated with the regulated control in the trade of goods across borders will continue to be test method dependent. It is important for regulators involved in trade negotiations and in the control and enforcement of trade agreements to consider the selection of mutually agreed upon methods for the testing of traded goods.

As mentioned earlier, there are variations in the methods of preference between economies. While standard test methods may exist at the national, regional and international level, these standards may not always be equivalent and may yield differences in test results. The testing community has, in many instances, attempted to overcome these anomalies by mutually agreeing on internationally accepted reference test methods.

Current global trade agreements such as the Technical Barriers to Trade (TBT) agreement of the World Trade Organisation (WTO) encourage or require the use of international standards in the assessment of conformity in traded goods and services. This includes testing of such products and by association the test methods used. Variations from the use of international standards must be technically justifiable and fully transparent. The situation of an importing economy specifying its own unique test method when an international reference method is available may no longer be acceptable and could be considered as a technical barrier to trade given that the exporting economy would need to go to unnecessary expense of changing its own test methodology – and may have to do this for each and every economy to which it exports.

Thus, as far as possible, international standard or reference methods should be the agreed methods of choice. Alternative methods could be accepted provided they can be transparently demonstrated to be technically equivalent to the standard or reference method (using pre-defined equivalence criteria) for the attribute they are measuring.

SUMMARY

Trade negotiators and regulators involved in the monitoring and enforcement of trade agreements need to be aware of the importance of the selection of test methodology used in the testing of traded goods. Testing of chemical and microbiological attributes of such goods may give different results depending on the choice of test methodology used. At the very least all parties to a trade agreement must agree on exactly what the attribute is that is being measured and the test methodologies that define it. The method selection should favour international reference methods themselves, or methods that have been shown to produce results equivalent to the international method.

Trade officials are encouraged to consult and involve expert scientific testing advice while developing and implementing trade agreements. This should ensure method selection decisions are appropriate and justifiable and thereby avoid unnecessary disputes over test results in future transactions.