External Quality Assessment / Proficiency Testing Schemes – why are they important to microbiology laboratories

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THE PROBLEM

Ensuring that accurate laboratory results are reported is crucial if public health incidents are to be managed.

- Food, water, environmental and clinical microbiology laboratories play a vital role in protecting people's health
  - by ensuring food is safe to consume
  - by identifying the causes of peoples illnesses
  - by identifying susceptibility to infectious diseases
  - by ensuring recreational waters do not make people ill
  - by ensuring that water is safe to use or drink

Reporting a **false negative** result on a sample can result in:

- incorrect patient management resulting in an infectious diseases not being treated properly
- unnecessary vaccination being given
- unsafe product released for sale which consequently makes people become ill
- unsafe waters being used making people ill

Reporting a **false positive** result on a sample can result in:

- unnecessary antimicrobial treatment of patients
- lack of action to vaccinate and prevent susceptibility to infection
- products on sale being recalled
- equipment or facilities taken out of action or use
- unnecessary vaccination or treatment monitoring

OUR SOLUTION

External Quality assessment (EQA) / Proficiency Testing (PT) schemes aim to educate and emphasise that reporting incorrect results can have severe consequences

Why laboratories do EQA/PT:

- To help demonstrate competence as part of accreditation requirement – such as ISO/IEC 17025:2005 - *General requirements for the competence of testing and calibration laboratories,* ISO 15189:2012 *Medical laboratories – Requirements for quality and competence or* Clinical Pathology Accreditation
- Helps to provide assurance of the results obtained provided they are treated and processed the same as other samples
- Helps to improve laboratory processes and understanding of regulation/legislation or other guidance documents
- To remain up to date with new and emerging organisms or methods - educational
- To challenge processes/media/training with difficult or atypical organisms
- Allows laboratories to compare performance with other providers
- To support work tendered for as an accredited laboratory

UKAS PROFICIENCY TESTING

All our schemes are accredited by the United Kingdom Accreditation Service (UKAS) to the international standard ISO 17043: 2010 *Competency assessment – General requirement for proficiency testing.*

EDUCATING AND RAISING AWARENESS

United Kingdom National External Quality Assessment Service (UK NEQAS) offer a broad portfolio of schemes to address the needs of clinical diagnostic laboratories. The MRSA screening scheme highlighted culture media failures for detection of Methicillin Resistant *Staphylococcus aureus* (MRSA).

Staphylococcus aureus is a bacterium that commonly colonises human skin and mucosa (e.g. inside the nose) without causing any problems. It can also cause disease, particularly if there is an opportunity for the bacteria to enter the body, for example through broken skin or a medical procedure. Most strains of *S. aureus* are sensitive to the more commonly used antibiotics, and infections can be effectively treated. Some *S. aureus* bacteria are more resistant. Those resistant to the antibiotic methicillin are termed methicillin-resistant *Staphylococcus aureus* (MRSA) and often require different types of antibiotic to treat them.

Specimen 0992 in distribution 3060 (June 2012)

This specimen contained a MRSA (*spa* type t4303) (picture 1). A total of 85% (253/298) of participants obtained a correct result via culture. An unusually high number of participants (n=45) reported a negative culture result for MRSA, 35 of whom used Oxoid Brilliance MRSA 2 media. This specimen yielded good growth on all the chromogenic selective media used in quality control testing in the UK NEQAS laboratory, including the Oxoid Brilliance MRSA 2 agar (lot number 1208632). The Quality Assurance department at Oxoid, Basingstoke (UK) has been notified.

Standard Scheme is suitable for laboratories that routinely test for a range of food-borne pathogens and indicator organisms. Participants are often private laboratories that test foods for clients in the food industry who may submit products routinely for microbial assessment, end product testing and customer complaints.

For sample S0521 a wide range of enumeration results reported for coliform $2.1x10^4$ - $3.0x10^5$ cfu / g (median 9.5×10^4), with 21 laboratories reporting an outlying results (figure 1). The sample contained *Staphylococcus aureus, Listeria pumilus, Cronobacter sakazakii, Pantoea agglomerans and Escherichia coli.*

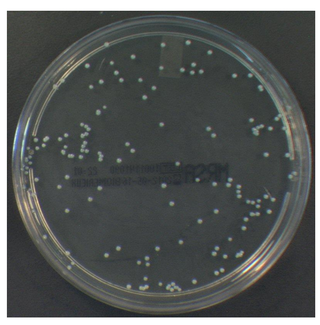
ISO 4832:2006 Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of coliforms - Colony-count technique recommends to count the purplish red colonies with a diameter of at least 0.5mm on Violet Red Bile Lactose Agar (VRBL). These are considered as typical colonies of coliforms and do not require further confirmation. The ISO document further states to count and confirm atypical colonies (e.g. of smaller size).

Both *C. sakazakii* and *P. agglomerans* produce 0.5mm colonies on VRBL (picture 2). If participants did a confirmation test: the *C. sakazakii* would not have produced gas in brilliant green bile broth (BGBB) therefore would not have been reported as a coliform where as the *P. agglomerans* produces gas and would have been reported as a coliform. Variation in the result may also be due to the different methods used.

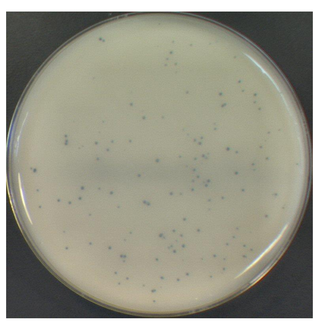
Raising awareness of atypical organism and subsequent impact on reported results

Picture 1: Specimen 0922 – MRSA present

18 hours incubation on Columbia Blood Agar at 37° C



18 hours incubation on bioMerieux *Chrom*IDT MRSA Agar



18 hours incubation on Oxoid Brilliance MRSA 2 Agar at 37° C

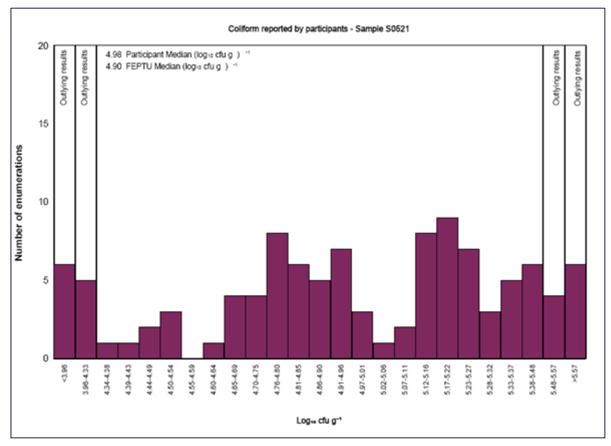
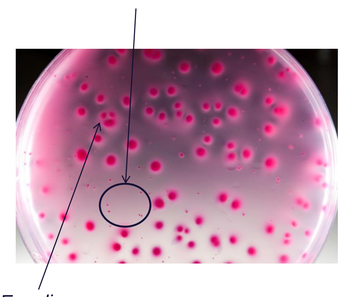


Figure 1: A graph showing the participants enumeration results

Cronobacter sakazakii and *Pantoea agglomerans* both produce 1mm purplish red colonies on violet red bile lactose agar.



2/3 of the 0.5mm small colonies were *P. agglomerans*

Picture 2: An image photograph of sample S0521

BENEFITS OF OUR SCHEMES

Our schemes operate to the highest quality standards and are organised by professionals in the microbiology field. Expert world renowned microbiologist are available to help participants improve their laboratory's ability to assure the results obtained.

This is achieved by:

- The high numbers of international participation across the world allowing peer assessment of performance
- Robust statistical analysis allowing laboratories to monitor their performance over time
- Using realistic raw materials to prepare simulated samples
- Wild type strains used for bacterial EQA/PT samples
- Schemes support local, national or international guidelines, regulation or legislation
- Some scheme reports have method based presentation of results allowing laboratories to assess the method used
- Free of charge repeat samples provided to allow laboratories to determine root causes of incorrect EQA/PT results reported

WORK WITH US

EQA/PT are distributed through a network of international distributors.

Work with us to:

- Develop further international opportunities
- Expand the provision of bespoke EQA/PT to a specialised market segment
- Continue development or improvement of existing EQA/PT schemes to address changes in technologies (now and the future), changes in legislations/recommendations or the changing environment
- Continue raising the education benefits of participating in EQA/PT

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