Collusion and falsification of results in proficiency testing

Asia Pacific Food Analysis Network (APFAN)
APFAN PT2 Workshop
"Food Analysis: Proficiency Testing and Reference Materials",
Bangkok, Thailand
19th-21st June 2019.

PROFICIENCY TESTING AUSTRALIA

Philip Briggs
General Manager, PTA
Associate Member, APLAC
Executive Member, ICASI

Overview

- ISO/IEC 17043 technical requirements
- Collusion
- Falsification of results
- Detection of suspect results
- Program design and actions

Introduction

The main purpose proficiency testing is to provide an evaluation of the performance of laboratories for specific tests or measurements and to monitor laboratories' continuing performance.

Introduction

PT participation - in a short time by multiple laboratories working in the same scientific field.

Common samples received in the form of a 'test' may lead to a change in laboratory operations.

Introduction

To provide a true evaluation of performance then the design of the programs should be to encourage the laboratories to treat the PT samples as routine samples received from a commercial client.

ISO/IEC 17043 Requirements

Section 4.4.1.3 j) states - "*reasonable precautions to prevent collusion between participants or falsification of results, and procedures to be employed if collusion or falsification of results is suspected*."

ISO/IEC 17043 Requirements

This requirement may be considered to place an unfair load of responsibility on the PT provider to attempt control the ethical and professional behaviour of organisations that have registered to participate in their PT programs.

Collusion

Collusion in PT may mean a form of cheating from the participating laboratory. Example - two or more people from two or more laboratories work together in a deceitful way to submit results for their benefit.

Collusion

Multiple staff involved from one laboratory are involved to submit results – is this collusion?

Collusion

Multiple laboratories from the same organisation are involved to submit results – is this collusion?

Collusion

Multiple laboratories from different organisations are involved to submit results – is this collusion?

Falsification

Falsification of results in PT may mean the submission of results are stated untruthfully or are being misrepresented as being from the participating laboratory.

Falsification

PT accepts results are from the identified laboratory in "good faith" –

- **Laboratory code**
- **Signature**
- **Laboratory logo**

Falsification

If the falsification of results is due to collusion then this may be detected quite easily if the results are identical.

Falsification

Aluminium

Results by Laboratory Code

Laboratory Code	Sample PTA 2A					
	Result	±	MU[1]	Robust z-score[2]	Method Code[3]	Digestion Code[3]
	mg/L					
103	4.05	±	0.10	0.16	2	14
129	3.83	±	0.113	-1.58	2	#
181	3.84		#	-1.50	2	7
230	3.71	±	0.0228	-2.53	2	7
233	4.04	±	0.063	0.08	2	14
303	3.99	±	0.20	-0.32	2	14
345	3.71	±	0.13	-2.53	2	14
359	4.04	±	0.063	0.08	2	14
369	4.05	±	0.06	0.16	2	14

Falsification

If the results reported were similar to other participants reported results then the falsification of results in this case would be quite difficult or impossible to detect.

Falsification

Aluminium

Results by Laboratory Code

Laboratory Code	Sample PTA 2A					
	Result	±	MU[1]	Robust z-score[2]	Method Code[3]	Digestion Code[3]
	mg/L					
103	4.05	±	0.10	0.16	2	14
129	3.83	±	0.113	-1.58	2	#
181	3.84		#	-1.50	2	7
230	3.71	±	0.0228	-2.53	2	7
233	4.04	±	0.063	0.08	2	14
303	3.99	±	0.20	-0.32	2	14
345	3.71	±	0.13	-2.53	2	14
359	4.074	±	0.815	0.35	2	14
369	4.05	±	0.06	0.16	2	14

Falsification

The participating laboratory sub-contracts the testing to another laboratory and then submit these results as their own to the proficiency testing provider.

Can the PT provider detect?

Falsification

Barium

Results by Laboratory Code

Laboratory Code	Sample PTA 1B					
	Result	±	MU[1]	Robust z-score[2]	Method Code[3]	Digestion Code[3]
	mg/L					
103	0.092	±	0.002	-0.17	2	14
129	0.090	±	0.023	-0.51	2	#
181	0.104		#	1.85	2	7
230	0.098	±	0.0176	0.84	2	7
233	0.092	±	0.051	-0.17	2	14
303	0.0934	±	0.005	0.07	2	14
345	<0.2		#	na	2	14
359	0.090	±	0.009	-0.51	2	14
369	0.0944	±	0.0017	0.24	2	14
381	0.084	±	0.014	-1.52	3	14

Detection of suspect results

Identical results reported by two or more laboratories.

Detection of suspect results

Boron

Results by Laboratory Code

Laboratory Code		Sample PTA 1A						
		Result	±	MU[1]	Robust z-score[2]		Method Code[3]	Digestion Code[3]
		mg/L						
103		0.080	±	0.011	0.47		2	14
129		0.0783	±	0.0009	0.31		2	14
181		0.050		#	-2.33		2	7
230		0.083	±	0.0282	0.74		2	7
233		0.141	±	0.069	6.14	§	2	14
303		0.0783	±	0.0009	0.31		2	14
345		0.119	±	0.0119	4.09	§	2	14
359		0.065	±	0.011	-0.93		3	14
369		0.0783	±	0.0009	0.31		2	14

Detection of suspect results

Narrow range of expected values then high probability that the results reported may be identical.

Detection of suspect results

Bismuth

Results by Laboratory Code

Laboratory Code	Sample PTA 2A						
	Result	±	MU[1]	Robust z-score[2]		Method Code[3]	Digestion Code[3]
	mg/L						
103	4.13	±	0.29	0.40		3	14
129	4.13	±	0.088	0.40		2	#
181	3.99		#	-0.46		2	7
230	4.12	±	0.0172	0.34		2	7
345	4.12	±	0.161	0.34		2	14
359	4.167	±	0.625	0.63		2	14
362	7.18	±	1.00	19.10	§	2	14
369	4.09	±	0.10	0.16		2	14
381	4.09	±	0.10	-2.97		3	14

Detection of suspect results

The probability of identical results being reported as coincidence lessens when the reporting accuracy increases and lessens further upon replicate reporting for single or multiple samples.

Detection of suspect results

Boron

Results by Laboratory Code

Laboratory Code	Sample PTA 1A						
	Result	±	MU[1]	Robust z-score[2]		Method Code[3]	Digestion Code[3]
	mg/L						
103	0.0783	±	0.0009	0.31		2	14
129	0.069	±	0.030	-0.56		2	#
181	0.050		#	-2.33		2	7
230	0.083	±	0.0282	0.74		2	7
233	0.141	±	0.069	6.14	§	2	14
303	0.075	±	0.004	0.00		2	14
345	0.119	±	0.0119	4.09	§	2	14
359	0.065	±	0.011	-0.93		3	14
369	0.0783	±	0.0009	0.31		2	14

Program design

Programs with large participation may be divided into two or more groups with each group receiving a unique set of samples.

Program design

Samples - Group 1 Instructions

Four plastic bottles labelled PTA 1A, PTA 1B, PTA 2A and PTA 2B supplied by PTA. The bottles contain approximately 200 mL of artificial potable water.

Program design

Samples – Group 2 Instructions

Four plastic bottles labelled PTA 3C, PTA 3D, PTA 4C and PTA 4D supplied by PTA. The bottles contain approximately 200 mL of artificial potable water.

Program design

Samples

PTA 1A = PTA 3C,
PTA 1B = PTA 3D,
PTA 2A = PTA 4C,
PTA 2B = PTA 4D.

Program design

pt:a proficiency testing australia

Programs with small participation the laboratories may be sent samples with unique sample identification.

Program design

pt:a proficiency testing australia

Lab 1 - Sample 1, Sample 2, Sample 3
Lab 2 - Sample A, Sample B, Sample C
Lab 3 - Sample 15, Sample 5, Sample 10
Lab 4 - Sample Y, Sample Z, Sample X

Program design

pt:a proficiency testing australia

Identical samples:

Sample 1

Sample A

Sample 15

Sample Y

Action for suspect results

pt:a proficiency testing australia

Established programs with many completed rounds may show no evidence of suspect results – so future rounds may need no new design.

Action for suspect results

- Accuse participant of dishonest reporting?
- Highlight suspect reporting in the commentary in the final report?
- Refuse request for future participation?

Conclusion

- To identify collusion or falsification of results in a PT program remains a challenge.
- The actions following detection of the suspect results are limited and the prevention may be restricted to changes program design.

How to contact PTA

Proficiency Testing Australia
PO Box 7507
Silverwater NSW 2128
AUSTRALIA

Ph: +61 2 9736 8397
Fax: +61 2 9743 6664
Email: ptaenquiry@pta.asn.au
Web: www.pta.asn.au

Thank you