"Further strengthening of capacities of phytosanitary sector in the fields of plant protection products, plant health and seeds and seedlings, including phytosanitary laboratories and phytosanitary inspections"
(TWINNING BA/12/IB/AG 01)

Component 3: Seeds and propagation materials

Check of balance

Rita Zecchinelli

Goal of this presentation

Control of Balances

- Check (predetermined frequency, e.g. daily or weekly)
- Calibration

Why?

To make sure that balances used in the seed laboratory work properly

Content

1. ISTA requirements - ISTA's Rules, Accreditation Standard and guidelines on use of balances
2. Calibration and Uncertainty of Measurement
3. Check of weights/balances (check weights, tolerance)
4. Reminder: procedures for the checking and use of balance
5. Practical questions

Accuracy of Weighing

The weight of masses is extensively used in seed testing: sampling, germination, purity tests, other seed, moisture content, tetrazolium, vigour tests, seed health tests……

The accuracy of this depends on:

- The balance itself (performance, precision, deviation)
- Methods, operating procedures
- Environment (atmosphere, air pressure, temperature, air flow)
- Operator





ISTA requirements and guidelines on use of balances

The number of decimal places when weighing is often given by the ISTA Rules e.g. the accuracy of weighing of the balances for moisture content determination must be at least ± 0.001 g

Purity test →

Weight of working sample or subsample (g)	Minimum number of decimal places
<1.000	4
1.000–9.999	3
10.00–99.99	2
100.0–999.9	1
≥1000	0

The Accreditation Standard states*:*

all sampling, measuring and testing equipment, for which this is possible, must be adequately calibrated before being placed into service and regularly afterwards, and a log book kept in which is recorded the results of each calibration, service and repairs). Calibration and servicing of equipment must be performed according to an established programme…

The ISTA Purity Committee has proposed 'ISTA minimum requirements and procedures for the testing and use of balances"

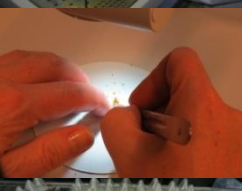
Calibration and Uncertainty of Measurement

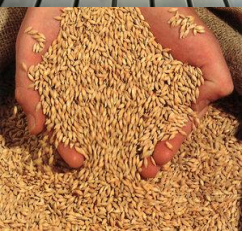
The Purity Committee's "ISTA minimum requirements and procedures for the testing and use of balances" states:

- *All balances used for testing purposes must be calibrated (preferably by a nationally accredited external body);*
- *In house calibration is accepted under strict conditions (training by external body advised);*
- *The error is generally small compared to the mass measured. The correction is not applied in seed testing"*







Calibration

Objective of the calibration

- To establish a connection between the balance and a known standard

Frequency

- Once a year by a nationally accredited external body. In house calibration is only accepted under strict conditions, e.g. training received by nationally accredited external body.

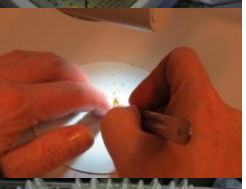
What should be measured?

- Calibration should include a repeatability and linearity check. Measurement of uncertainty is recommended.

The balance must be labelled indicating the calibration date





Calibration

Example of Calibration Certificate

CERTIFICATE OF CALIBRATION

ISSUED BY: European Instruments
DATE OF ISSUE: 07 February 2009 CERTIFICATE NUMBER: 50935

UKAS CALIBRATION 0438

PAGE 1 OF 2 PAGES

European Instruments
Shotover Kilns
Old Road
Headington Tel: 01865 750375
Oxford OX3 8ST Fax: 01865 769985

APPROVED SIGNATORIES
A.P.JANES , D.HITCHCOCK
A.W.MORRIS

Customer:
S.A.S.A.
Headquarters
: Roddinglaw Road
Edinburgh
Lothian
EH12 9FJ
UK

0315.

Nominated Contact: V.Cockerell

Calibration Date: 04 February 2009

Weight Unit Used: g
(Except where specific unit is indicated)

The calibration was carried out by placing weights on the load receptor as listed below.

Serial No.	Cert. No.	Laboratory Number	Class	Boxed	Single (Value)
201600307	M19581	0438	E2	Yes	

Weighing Instrument and Environment:

Manufacturer:	Sartorius	Range Tested:	10		
Model/Type:	ME235S	Readability:	0.00001		
Serial No:	22513404	Location:	Rm C16 - Bal 19		
Capacity:	230	Temperature (°C):	Before: 22.3	After:	23.4
		Humidity (% RH):	Before: 22.0	After:	21.0
		Pressure (mbar):	Before: 991.0	After:	991.0

Mass values are reported on a weight-in-air basis where the mass is that of a hypothetical weight of density 8000kg/m^3, which it balances in air of density 1.2kg/m^3 at 20 °C.

This calibration was carried out following procedure NC/731 or one of its derivatives.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Certified By:

CERTIFICATE OF CALIBRATION

UKAS ACCREDITED CALIBRATION LABORATORY No 0438

CERTIFICATE NUMBER 50935

PAGE 2 OF 2 PAGES

Weight Unit : g **Calibration Type :** Post Adjustment

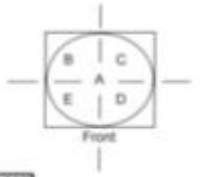
Repeatability Test
Applied Load: 10

Linearity Test
Adjustment Type : Internal

Unloaded Reading (+/-)	Loaded Reading	Difference	Applied Load	Indicated Reading	Applied Load	Indicated Reading
0.000 00	10.000 01	10.000 01	0	0.000 00		
0.000 00	10.000 02	10.000 02	0.009 996	0.009 99		
0.000 00	10.000 01	10.000 01	0.020 004	0.020 00		
0.000 00	10.000 00	10.000 00	0.050 010	0.050 01		
0.000 00	10.000 02	10.000 02	0.099 996	0.100 00		
0.000 00	10.000 03	10.000 03	0.200 018	0.200 03		
0.000 00	10.000 01	10.000 01	0.500 018	0.500 03		
0.000 00	10.000 01	10.000 01	1.000 008	1.000 00		
0.000 00	10.000 01	10.000 01	2.000 006	2.000 01		
0.000 00	10.000 02	10.000 02	5.000 036	5.000 02		
			10.000 018	10.000 00		
			0	0.000 00		

Difference Range: 0.000 03 Maximum Error: 0.000 018

Eccentricity Test
Applied Load : 3



POSITION	READING
Centre (A):	3.000 00
Rear Left (B):	3.000 02
Rear Right (C):	3.000 02
Front Right (D):	3.000 01
Front Left (E):	3.000 01
Centre (A):	3.000 00

Maximum deviation from centre reading: 0.000 02

Uncertainty of Measurement: +/- 0.000 037

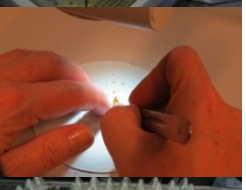
Observations:
Limited calibration to 10 gram only

Calibrator: Alan Janes
Instrument Serial No: 22513404 **Certified By:**

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.
The uncertainty evaluation has been carried out in accordance with UKAS requirements.





Calibration
Actions required by the Laboratory

When arranging calibration the laboratory must inform the calibration body:

1. The accuracy the balance is expected to weigh (the number of decimal places)
2. The range of use of the balance
3. Specific requirements

On receipt of the certificate the laboratory must:

1. Evaluate the results
2. Check the limit of calibration vs the range of use
3. Declare if the balance is fit for purpose/define
4. (Weigh check weights that will be used to monitor the balances performance)

Balances check

Must be performed according to an established programme (procedure/ frequency)

ID	Marca/Modello	Laboratorio	Decimali	Portata (g)	Range uso (g)	Pesi di controllo (g)		Tolleranza +/- (g)	Da (g)	A (g)
BIL.2	Mettler	Prep.campioni	0,01	600	30		50	0,05	49,95	50,05
	PE 3600		0,1	3600	1000		200	0,2	199,8	200,2
	tecnica						1000	1	999	1001
BIL.3	Metter	Analisi varietali	0,00001	41	0,005	E2	0,01	0,00005	0,00995	0,01005
	AG 204		0,0001	210	5	E2	0,1	0,0001	0,0999	0,1001
	analitica					E2	1	0,001	0,999	1,001

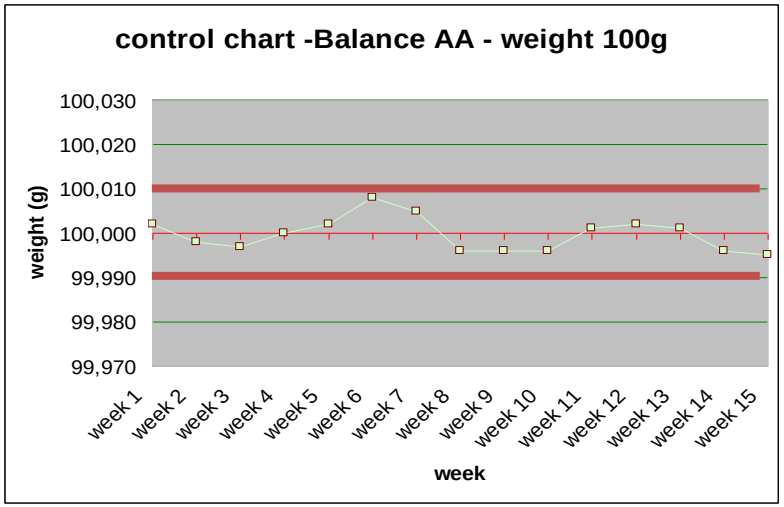
Pesi di controllo	Tolleranza +/- (g)	Da	A
50 g	0,05 g	49,95	50,05

Data														
49,94														
49,95														
49,96														
49,97														
49,98														
49,99														
50,00														
50,01														
50,02														
50,03														
50,04														
50,05														
50,06														
50,07														

Balances check

Example of Laboratory Procedure

- A check "weight" close to working range is chosen
- This weight is used to check balance. No need to calibrate the weight but it has to be checked immediately after annual calibration of balance to give its nominal weight



Record the weekly/daily checks on a form and plot them to ascertain trends

Tolerances on Checks

The tolerances must be defined by the laboratory.
The ISTA Purity Committee proposes a tolerance of either:

- The weight of the check weight divided by 1000 (0.01%), e.g. if the check weight is 5g then the tolerance is 5/1000 = ± 0.005g.
- A deviation of ± 5 divisions of the number of decimal places to which the balance weighs, e.g. if a balance weighs to 4 decimal places the tolerance is ± 0.0005g

Tolerances on Checks – example n.1

Number of decimal places the balance weighs to	Range of balance	Check weights	Tolerance A check weight/1000	Tolerance B ± 5 divisions	Tolerance on checks
One	1 – 3500g	100g 500g 1000g	0.1g **0.5g** **1.0g**	**0.5g** **0.5g** 0.5g	**0.5g** **0.5g** **1.0g**
Two	0.25 – 500g	10g 50g 100g	0.01g **0.05g** **0.10g**	**0.05g** **0.05g** 0.05g	**0.05g** **0.05g** **0.10g**
Three	0.001 – 130g	1g 10g 100g	0.001g **0.010g** **0.100g**	**0.005g** 0.005g 0.005g	**0.005g** **0.010g** **0.100g**
Four	0.0001 – 15g	0.5g 1g 10g	**0.0005g** **0.0010g** **0.0100g**	**0.0005g** 0.0005g 0.0005g	**0.0005g** **0.0010g** **0.0100g**

The largest tolerance is adopted (a deviation of ± 5 divisions or the check weigh divided by 1/1000).

Tolerances on Checks – example n.2

Number of decimal places the balance weighs to	Range of balance	Check weights	Tolerance A check weight/1000	Tolerance B ± 5 divisions	Tolerance on checks
One	1 – 3500g	100g 500g 1000g	**0.1g** **0.5g** **1.0g**		**0.1g** **0.5g** **1.0g**
Two	0.25 – 500g	10g 50g 100g	**0.01g** **0.05g** **0.10g**		**0.01g** **0.05g** **0.10g**
Three	0.001 – 130g	1g 10g 100g	**0.001g** **0.010g** **0.100g**		**0.001g** **0.010g** **0.100g**
Four	0.0001 – 15g	0.5g 1g 10g		**0.0005g** **0.0005g** **0.0005g**	**0.0005g** **0.0005g** **0.0005g**

The tolerance A is adopted for selected balances (e.g. 1-3 decimals)
The tolerance B is adopted for selected balances (e.g. > 4 decimals)

Procedure for checking

- Comparison of measured check weight value with actual weight of the check weight
- If out of tolerance:
  - The balance must be labelled appropriately (e.g. "Out of calibration – do not use")
  - Inform responsible person
  - The balance should undergo a service/repair and full calibration before returning to service.
  - All tests carried out on it since the last check weighing should be re-checked and new certificates issued, if necessary

Monitoring Trends to prevent out of tolerance situations

By plotting the results of daily/weekly checks one can look for trends and take preventive action (e.g. have balance serviced/calibrated) before an out of tolerance situation occurs

≤0.995	0.995	0.996	0.997	0.998	0.999	1.000	1.001	1.002	1.003	1.004	1.005	>1.005
						X						
							X					
					X							
					X							
				X								
				X								
				X								
			X									
			X									
		X										
	X											

Question n.2

The weekly check of balances gives the data below. What are your conclusions, and which actions do you eventually undertake?

CHECK WEIGHING RECORD –BALANCES

Balance ID : B2	Range: 0.0001---160g (Range used: 0.25---15g)	Location : Room 2
Check weight id: CW1	Check weight nominal value and date: 0.5002g (Jan '13)	Allowed range (±): 0.0010g
Chart Number: 1	Start date: 05---01---13	End date:

Date	Zero Y/N	Checked by:	Next check due:		Lower Limit					Nominal (g)					Upper limit	
				<0,4990	0,4990	0,4992	0,4994	0,4996	0,4998	0,5000	0,5002	0,5004	0,5006	0,5008	0,5010	>5010
05/01/2013	*Y*	*RE*	*12/01/2013*								X					
12/01/2013	*Y*	*RE*	*19/01/2013*										X			
19/01/2013	*Y*	*RE*	*26/01/2013*										X			
26/01/2013	*Y*	*RE*	*02/02/2013*											X		
02/02/2013	*Y*	*RE*	*09/02/2013*													
09/02/2013	*Y*	*RE*	*16/02/2013*													
16/02/2013	*Y*	*RE*	*23/02/2013*												X	
23/02/2013	*Y*	*RE*	*02/03/2013*													X
02/03/2013	*Y*	*RE*	*09/03/2013*									X				
09/03/2013	*Y*	*RE*	*16/03/2013*								X					
16/03/2013	*Y*	*RE*	*23/03/2013*										X			

Chart accepted by.	Date . . . . .

Action on balance failure:
Immediately place a notice on it stating 'OUT OF CALIBRATION –DO NOT USE' and inform the Quality Manager (or suitable alternative).

Question n.3

The weekly check of balances gives the data below. What are your conclusions, and which actions do you eventually undertake?

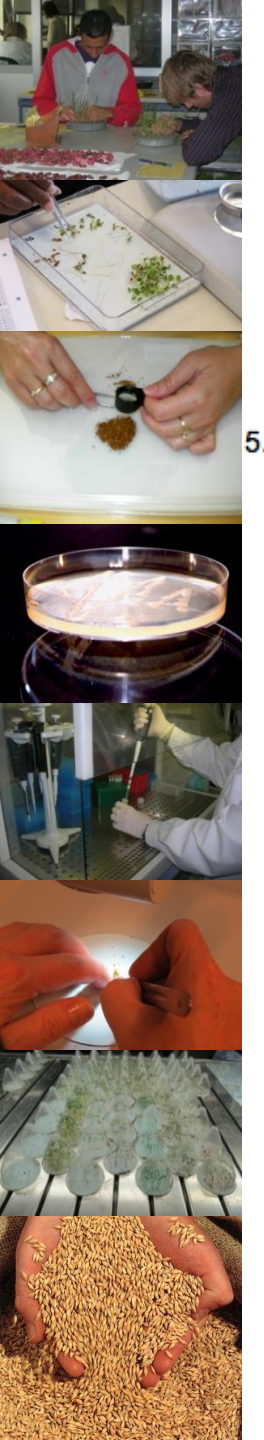
CHECK WEIGHING RECORD –BALANCES

Balance ID : B3	Range: 0.001---160g (Range used: 0.25-15g)	Location : Room 3
Check weight id: CW1	Check weight nominal value and date: 1.000g (Jan '13)	Allowed range (±): 0.005g
Chart Number: 1	Start date: 05---01---13	End date:

Date	Zero Y/N	Checked by:	Next check due:		Lower Limit					Nominal (g)					Upper limit	
				<0.995	0.995	0.996	0.997	0.998	0.999	1.000	1.001	1.002	1.003	1.004	1.005	>1.005
05/01/2009	*Y*	*RD*	*12/01/2013*							X						
12/01/2013	*Y*	*RD*	*19/01/2013*								X					
19/01/2013	*Y*	*RD*	*26/01/2013*						X							
26/01/2013	*Y*	*RD*	*02/02/2013*						X							
02/02/2013	*Y*	*RD*	*09/02/2013*					X								
09/02/2013	*Y*	*RD*	*16/02/2013*					X								
16/02/2013	*Y*	*RD*	*23/02/2013*					X								
23/02/2013	*Y*	*RD*	*02/03/2013*				X									
02/03/2013	*Y*	*RD*	*09/03/2013*				X									
09/03/2013	*Y*	*RD*	*16/03/2013*			X										
16/03/2013	*Y*	*RD*	*23/03/2013*		X											

Chart accepted by.	Date. . . . .

Action on balance failure:
Immediately place a notice on it stating 'OUT OF CALIBRATION – DO NOT USE' and inform the Quality Manager (or suitable alternative).



Check of weights: weights are reference materials

5.3. Calibration, reference and testing materials

5.3.1. All sampling, measuring and testing equipment, for which this is possible, must be adequately calibrated before being placed into service and regularly afterwards, and a log book kept in which is recorded the results of each calibration, service and repairs (see 5.2.7e and f). Calibration and servicing of equipment must be performed according to an established programme.

5.3.2. The overall programme of calibration of equipment must be designed and operated so as to ensure that, wherever applicable, measurements made in the laboratory are traceable to national and international standards of measurement.

5.3.3. Appropriate calibration samples, reference materials and reference standards of measurement must be held by the laboratory, and be used for calibration and reference purpose only. They should, where possible, be traceable to SI units of measurement, or to certified reference materials. Examples include calibration samples for seed blowers, standard buffer solutions for pH meters, calibration weights for balances, and reference collections of seed.

5.3.4. Reference materials must, if necessary, be verified by an authority nominated by the ISTA Secretariat.

5.3.5. Calibration samples for the blowers must be provided by arrangement with the ISTA Secretariat.

5.3.6. The laboratory must examine the effect of defective equipment on any previous tests, and withdraw and re-issue certificates where faulty results are suspected.

5.3.7. The laboratory must have procedures for safe handling, transport, storage and use of reference standards and reference materials in order to prevent contamination or deterioration and in order to protect their integrity.

Weight characteristics

- Still weight of class F (at least),
- Still weight of class E for analytical balances (designed to measure mass in sub-milligram range)
- Handle using forceps or gloves
- Store in protective boxes

Valore nominale	Limiti di errore OIML R111-2004 = tolleranze ammesse "Tol ± mg"						
	E1	E2	F1	F2	M1	M2	M3
1 mg	± 0.003 mg	± 0.006 mg	± 0.020 mg	± 0.06 mg	± 0.20 mg		
2 mg	± 0.003 mg	± 0.006 mg	± 0.020 mg	± 0.06 mg	± 0.20 mg		
5 mg	± 0.003 mg	± 0.006 mg	± 0.020 mg	± 0.06 mg	± 0.20 mg		
10 mg	± 0.003 mg	± 0.008 mg	± 0.025 mg	± 0.08 mg	± 0.25 mg		
20 mg	± 0.003 mg	± 0.010 mg	± 0.03 mg	± 0.10 mg	± 0.3 mg		
50 mg	± 0.004 mg	± 0.012 mg	± 0.04 mg	± 0.12 mg	± 0.4 mg		
100 mg	± 0.005 mg	± 0.016 mg	± 0.05 mg	± 0.16 mg	± 0.5 mg	± 1.6 mg	
200 mg	± 0.006 mg	± 0.020 mg	± 0.06 mg	± 0.20 mg	± 0.6 mg	± 2.0 mg	
500 mg	± 0.008 mg	± 0.025 mg	± 0.08 mg	± 0.25 mg	± 0.8 mg	± 2.5 mg	
1 g	± 0.010 mg	± 0.03 mg	± 0.10 mg	± 0.3 mg	± 1.0 mg	± 3.0 mg	± 10 mg
2 g	± 0.012 mg	± 0.04 mg	± 0.12 mg	± 0.4 mg	± 1.2 mg	± 4.0 mg	± 12 mg
5 g	± 0.016 mg	± 0.05 mg	± 0.16 mg	± 0.5 mg	± 1.6 mg	± 5.0 mg	± 16 mg
10 g	± 0.020 mg	± 0.06 mg	± 0.20 mg	± 0.6 mg	± 2.0 mg	± 6.0 mg	± 20 mg
20 g	± 0.025 mg	± 0.08 mg	± 0.25 mg	± 0.8 mg	± 2.5 mg	± 8.0 mg	± 25 mg
50 g	± 0.03 mg	± 0.10 mg	± 0.3 mg	± 1.0 mg	± 3.0 mg	± 10 mg	± 30 mg
100 g	± 0.05 mg	± 0.16 mg	± 0.5 mg	± 1.6 mg	± 5.0 mg	± 16 mg	± 50 mg
200 g	± 0.10 mg	± 0.3 mg	± 1.0 mg	± 3.0 mg	± 10 mg	± 30 mg	± 100 mg
500 g	± 0.25 mg	± 0.8 mg	± 2.5 mg	± 8.0 mg	± 25 mg	± 80 mg	± 250 mg
1 kg	± 0.5 mg	± 1.6 mg	± 5.0 mg	± 16 mg	± 50 mg	± 160 mg	± 500 mg
2 kg	± 1.0 mg	± 3.0 mg	± 10 mg	± 30 mg	± 100 mg	± 300 mg	± 1 000 mg
5 kg	± 2.5 mg	± 8.0 mg	± 25 mg	± 80 mg	± 250 mg	± 800 mg	± 2 500 mg
10 kg	± 5.0 mg	± 16 mg	± 50 mg	± 160 mg	± 500 mg	± 1 600 mg	± 5 000 mg
20 kg	± 10 mg	± 30 mg	± 100 mg	± 300 mg	± 1 000 mg	± 3 000 mg	± 10 g
50 kg	± 25 mg	± 80 mg	± 250 mg	± 800 mg	± 2 500 mg	± 8 000 mg	± 25 g
100 kg		± 160 mg	± 500 mg	± 1 600 mg	± 5 000 mg	± 16 g	± 50 g
200 kg		± 300 mg	± 1 000 mg	± 3 000 mg	± 10 g	± 30 g	± 100 g
500 kg		± 800 mg	± 2 500 mg	± 8 000 mg	± 25 g	± 80 g	± 250 g
1 000 kg		± 1 600 mg	± 5 000 mg	± 16 g	± 50 g	± 160 g	± 500 g
2 000 kg			± 10 g	± 30 g	± 100 g	± 300 g	± 1 000 g
5 000 kg			± 25 g	± 80 g	± 250 g	± 800 g	± 2 500 g

Balances check

Check weights

- Chosen in relation to the range of balance use and the number of decimal places the balance weighs to (cover your working range)
- May require to check with three weights to cover working range
- Frequency: to be decided by the laboratory (e.g. once a week)
- Working weights should be certified or checked

Check of weights: calibration weights–working weights

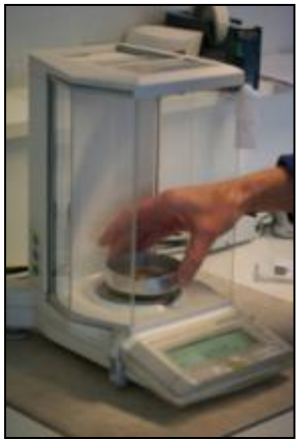
Calibration weights are certified (e.g. every 5 years) and used only for calibration purposes; working weights are not certified but checked against calibration weights once a year

or

All working weights are certified (e.g. every two years) and checked in the year in between (nominal weighing after external calibration of the balance)

Reminder

Balances – daily use Procedure



Before use and while weighing ensure that:

- ✓ The balance is calibrated
- ✓ The routine check with check weight has been performed
- ✓ The balance is level
- ✓ The balance is not in bright sunlight
- ✓ No windows are open near the balance
- ✓ There is no liquid near balances
- ✓ The balance is zeroed
- ✓ Place the object to be weighed in the middle of the pan
- ✓ The items subject to weighing are at room temperature
- ✓ Allow the display to stabilise before taking the reading

THANK YOU TO:

RONALD DON

ISTA SECRETARIAT

AND YOU FOR YOUR ATTENTION!

Solution n. 2

II. Tolerances limits for check of weight in seed testing

II.3.2 Tolerance limits for check of weight in seed testing

❖Exercise 3 : Solution

CHECK WEIGHING RECORD - BALANCES

Range: 0.0001-160g
(Range used: 0.25-15g)

Balance ID : B2 — Location : Room 2 — Allowed range (±): 0.0010g

Check weight id: CW1 — Check weight nominal value and date: 0.5002g (Jan '09)

Chart Number: 1 — Start date: 05-01-09 — End date:

Date	Zero Y/N	Checked by:	Next check due:		Lower Limit					Nominal (g)					Upper limit	
				≤0,4990	0,4990	0,4992	0,4994	0,4996	0,4998	0,5000	0,5002	0,5004	0,5006	0,5008	0,5010	>5010
05/01/2009	Y	MM	12/01/2009								X					
12/01/2009	Y	MM	19/01/2009										X			
19/01/2009	Y	MM	26/01/2009										X			
26/01/2009	Y	MM	02/02/2009											X		
02/02/2009	Y	MM	09/02/2009											X		
09/02/2009	Y	MM	16/02/2009												X	
16/02/2009	Y	MM	23/02/2009												X	
23/02/2009	Y	MM	02/03/2009													
02/03/2009	Y	MM	09/03/2009									X				
09/03/2009	Y	MM	16/03/2009								X					
16/03/2009	Y	MM	23/03/2009										X			

Chart accepted by..... Date.....

Action on balance failure:
Immediately place a notice on it stating 'OUT OF CALIBRATION - DO NOT USE' and inform the Quality Manager (or suitable alternative)

Limits with correct nominal weight and a ±0.0005g tolerance

- The nominal weight should be the exact nominal weight of the check weight or a correction should be applied
- The tolerance limits are too large. The calculated tolerance suggest 0.0005
- With the form corrected, some values are out of tolerance. The samples should be retested, the client informed

Solution n. 3

II. Tolerances, limits for check of weight in seed testing

II.3.2 Tolerance limits for check of weight in seed testing

❖Exercise 5: Solution

CHECK WEIGHING RECORD - BALANCES

Range: 0.001-160g
(Range used: 0.25-15g)

Balance ID : B3 — Location : Room 3

Allowed range (±): 0.005g

Check weight id: CW1 — Check weight nominal value and date: 1.000g (Jan '09)

Chart Number: 1 — Start date: 05-01-09 — End date:

Date	Zero Y/N	Checked by:	Next check due:		Lower Limit						Nominal (g)					Upper limit	
				<0.995	0.995	0.996	0.997	0.998	0.999	1.000	1.001	1.002	1.003	1.004	1.005	>1.005
05/01/2009	Y	MM	*12/01/2009*							X						
12/01/2009	Y	MM	*19/01/2009*								X					
19/01/2009	Y	MM	*26/01/2009*						X							
26/01/2009	Y	MM	*02/02/2009*						X							
02/02/2009	Y	MM	*09/02/2009*					X								
09/02/2009	Y	MM	*16/02/2009*					X								
16/02/2009	Y	MM	*23/02/2009*					X								
23/02/2009	Y	MM	*02/03/2009*				X									
02/03/2009	Y	MM	*09/03/2009*				X									
09/03/2009	Y	MM	*16/03/2009*			X										
16/03/2009	Y	MM	*23/03/2009*		X											

Chart accepted by..... Date.....

Action on balance failure:
Immediately place a notice on it stating 'OUT OF CALIBRATION - DO NOT USE' and inform the Quality Manager (or suitable alternative).

There is a trend ⇨ Action = service, repair, recalibrate of change the balance before it is out of tolerance