

# The Quality Assurance programs of the French Society for Vitamins and Biofactors

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# **The French Society for Vitamins and Biofactors**

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## The '*Société Francophone Vitamines et Biofacteurs*' (SFVB)

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- The SFVB is a non profit organisation which gathers French-speaking searchers, doctors, and industrials who are interested in the vitamins, their roles and their metabolism
- The SFVB was founded in 1998 by G. Le Moël and JL Guéant who were respectively its two first presidents.
- The SFVB organizes a meeting in French every two years. The next one planned in Tunisia in 2010. SFVB also publishes books on vitamins and has been organising an European QA program since 2002.

<http://www.sfvb.org>

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# The Quality Assurance Programs

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## Rationale and participation

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- ❑ In 2000, a national survey within the French laboratories showed that only few participated in a QA program
  - ❑ This survey also found wide dispersions in the results provided by laboratories.
  - ❑ Then the SFVB launched a program in 2002. In 2009 most laboratories participate in the programs
  - ❑ Currently, 52 labs participate in the programs, 40 French and 12 located in other European countries
  - ❑ 50 participants sent results in June 2009, 44 Vitamin A, 19  $\beta$ -carotene and 29 Vitamin C.
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## Organisation and fabrication

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- ❑ Vitamin A, E, C, D (25 OH Vitamin D), B6, B9, B12 and  $\beta$ -carotene & homocyst(e)ine are included.
  - ❑ luteine, zeaxanthine, cryptoxanthin, lycopene,  $\alpha$ -car
  - ❑ Participants receive 12 vials of lyophilised sera by the end of January as control materials. These are kept at  $-20^{\circ}\text{C}$  until analysis.
  - ❑ Result forms and methods files are sent along
  - ❑ Controls analysed in 3 rounds : February, June and October. 4 vials per round.
  - ❑ Anonymous reports in March, July and November.
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## Sera processing

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- ❑ Control materials consist in 12 different lyophilised sera.
  - ❑ Frozen sera – less than 6 months old - are purchased from the French bank of blood donor. They are tested and certified free of harmful germs
  - ❑ All sera are filtered ( $0.45 \mu$ ), then vitamins are added to compensate for losses due to the conservation and to the lyophilisation processes.
  - ❑ Few natural compounds are added to ensure good conservation, especially for vitamin C. Concentration never exceed 3 x the upper limit in normal serum
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# Vitamin conservation

Control material conserved at  $-20^{\circ}\text{C}$

Sera randomly chosen amongst 0 – 10

| All results in $\mu\text{M}$ | Vit C |      | Vit A |      | Vit E |      |
|------------------------------|-------|------|-------|------|-------|------|
|                              | 2/02  | 6/04 | 2/02  | 6/04 | 2/02  | 6/04 |
| Sérum 1                      | 5,7   | 7,0  | 1,73  | 1,78 | 22,0  | 20,4 |
| Sérum 3                      | 35,5  | 30,2 | 1,47  | 1,48 | 16,8  | 17,5 |
| Sérum 4                      | 25,9  | 29,1 | 3,26  | 3,30 | 47,1  | 45,9 |
| Sérum 6                      | 62,3  | 66,5 | 1,08  | 0,98 | 24,2  | 20,8 |





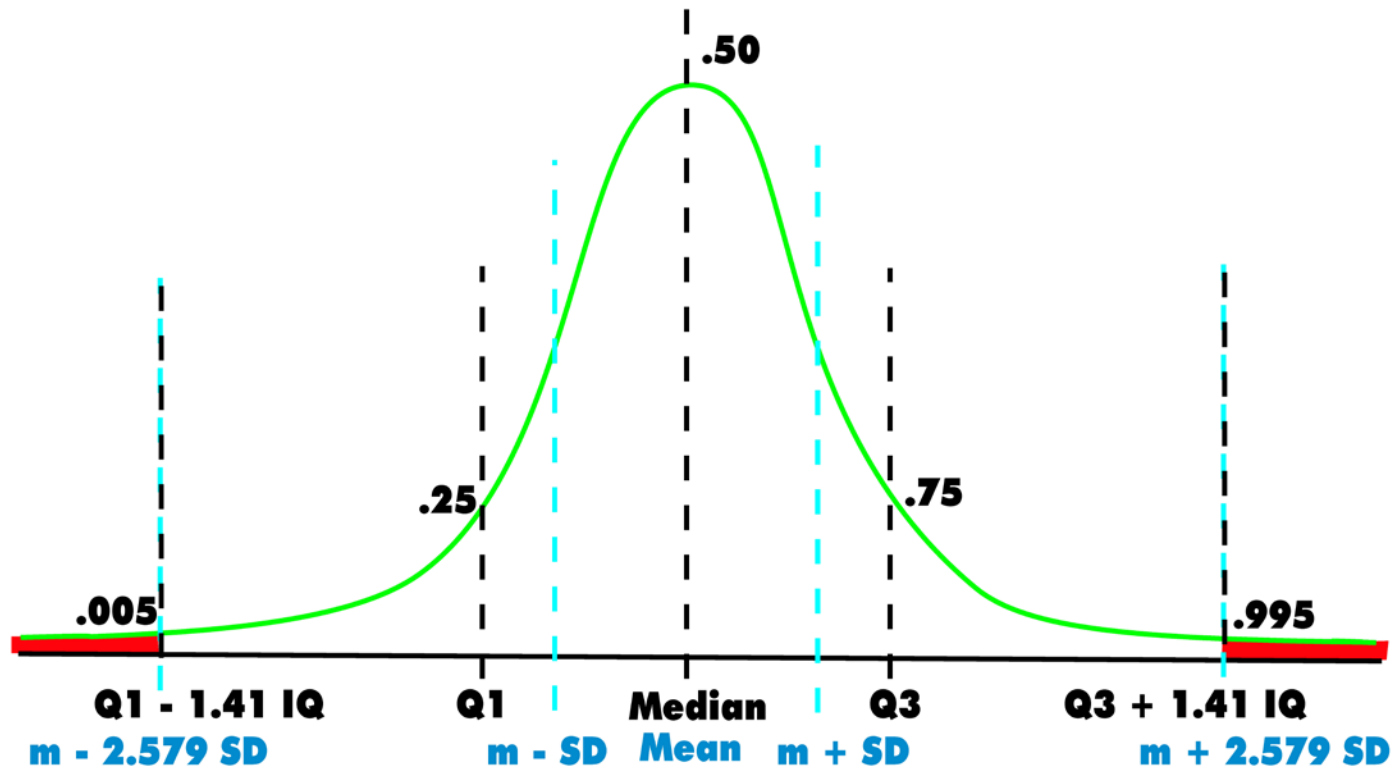
## Statistics

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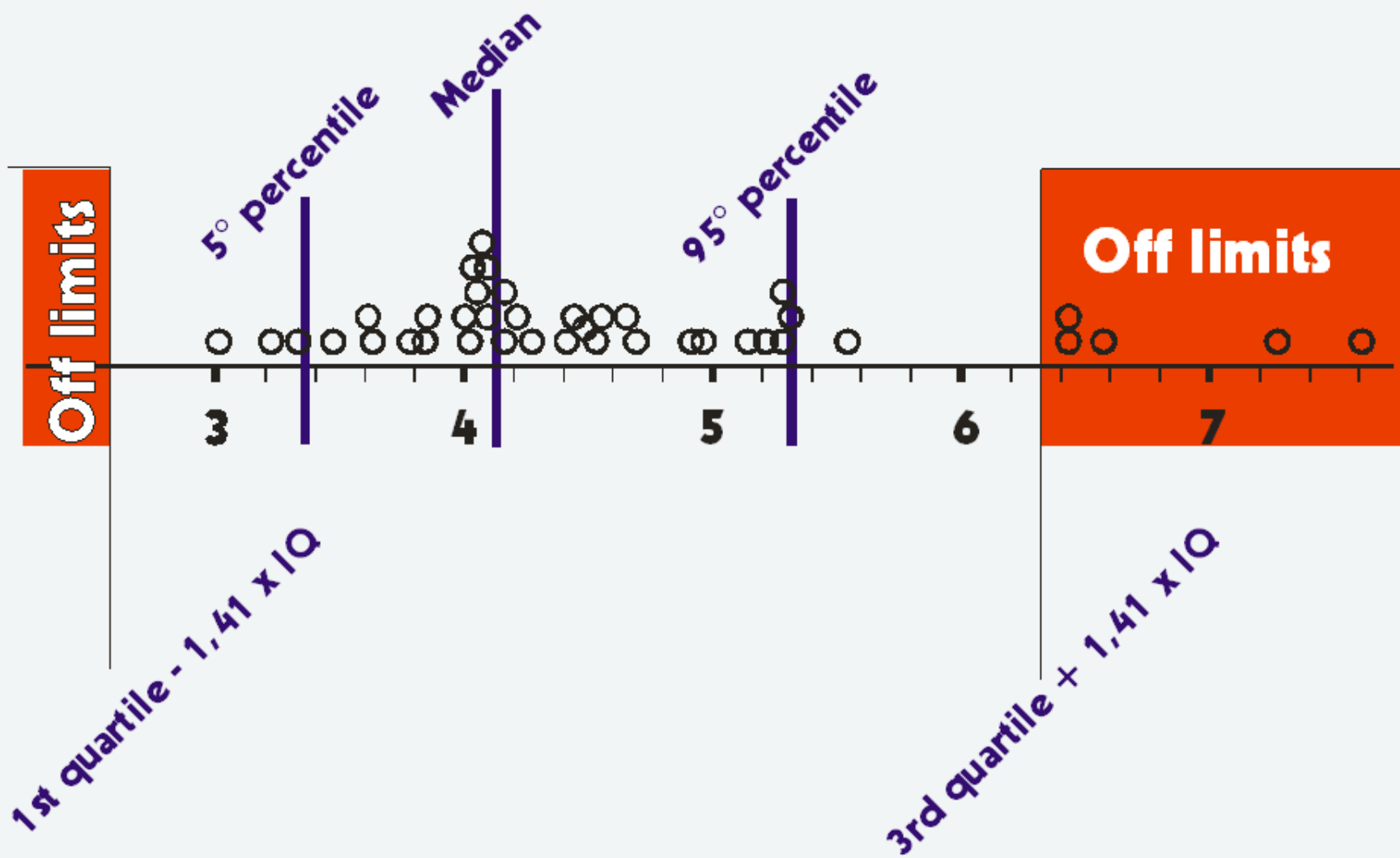
- ❑ To reach a minimum accuracy, at least 10 participants are required
  - ❑ In small series, medians and percentiles are more accurate than means and SD
  - ❑ Correlations between the participant's 4 values and the target values globally estimate the accuracies of target values
  - ❑ Outliers must be removed because they can bias target value
  - ❑ Outliers are searched with the box-plot method
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# Outliers



$IQ = Q3 - Q1$      $SD$  : Standard Deviation





# Reports

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Four pages:

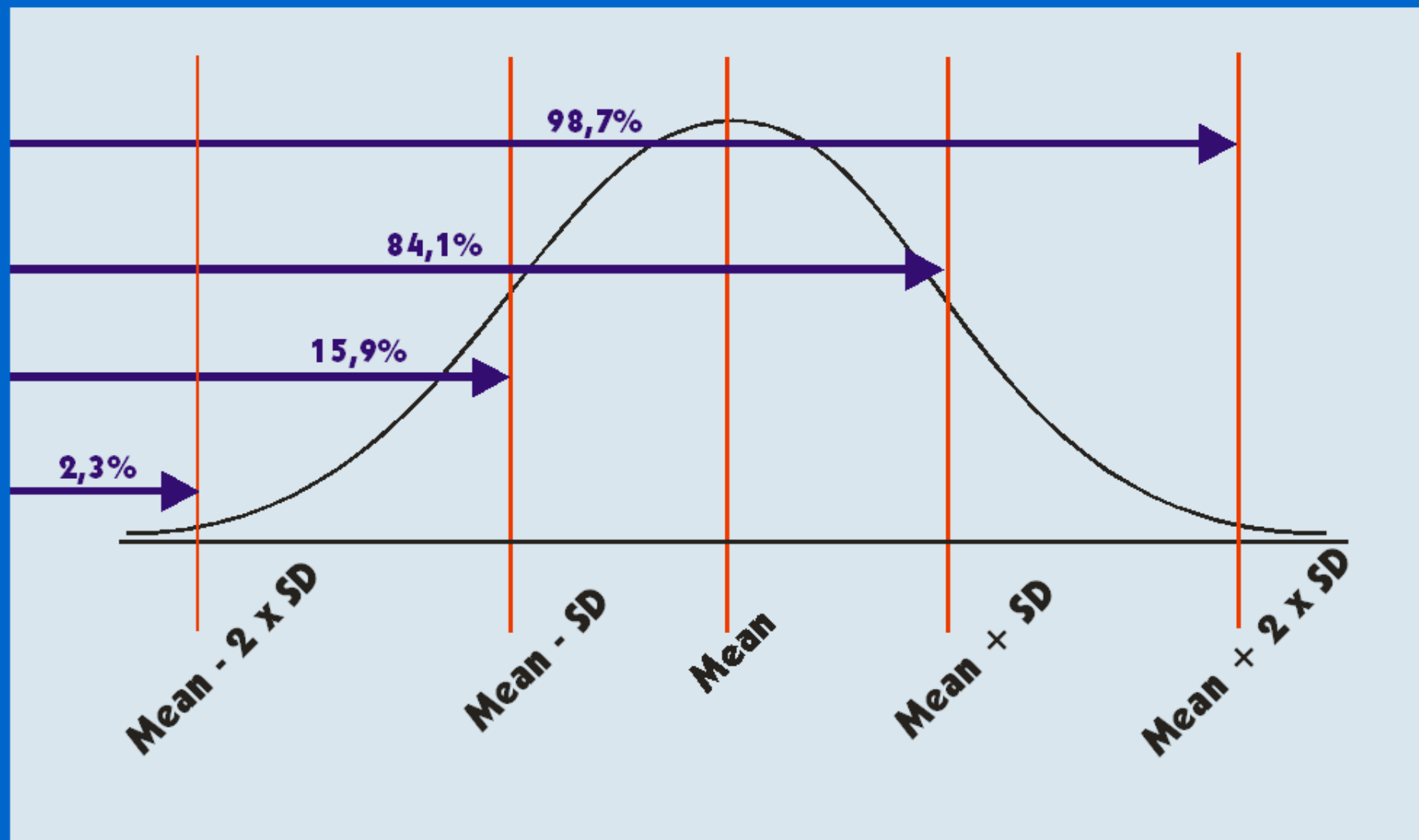
1/ Individual values, target values and acceptance limits

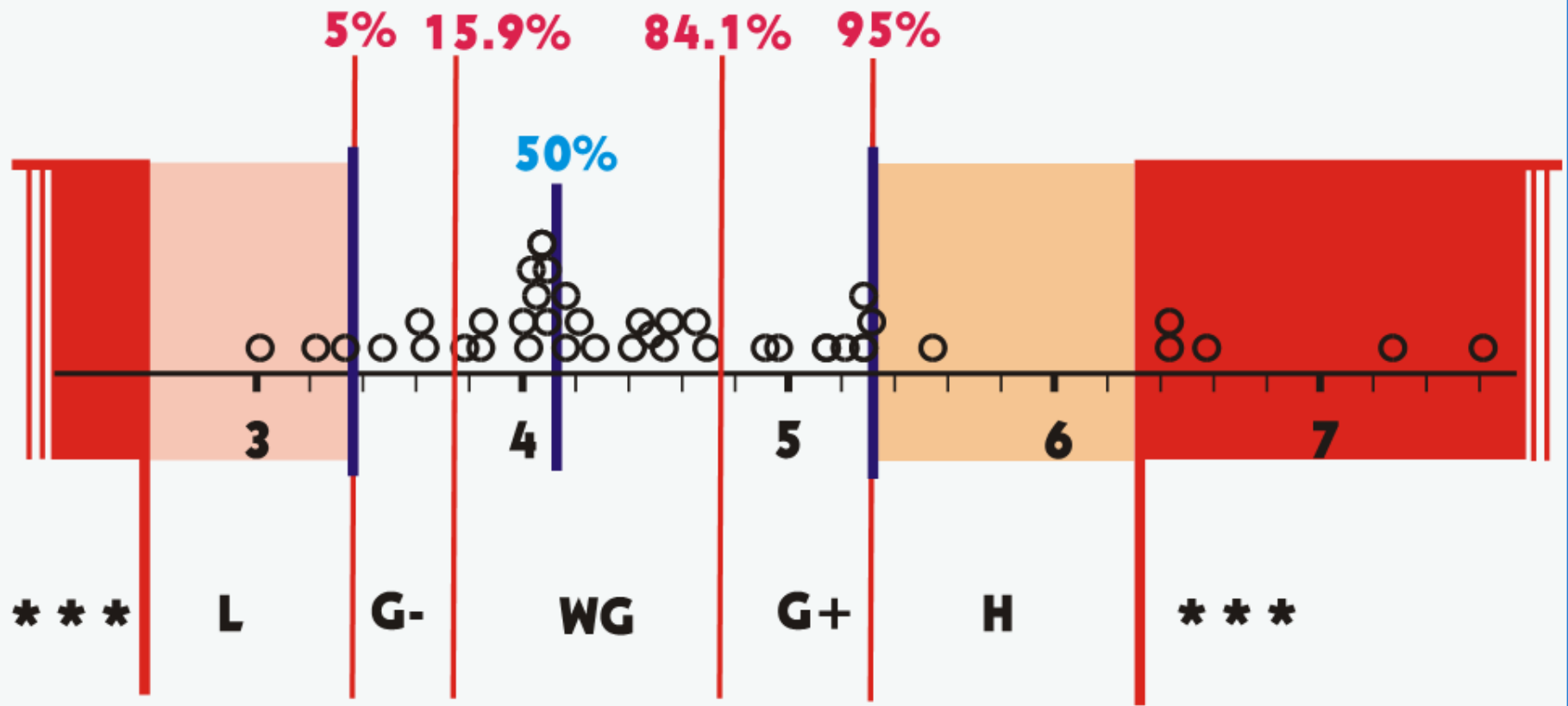
2/ Histograms and lab position

3/ Tentative rating

4/ Regression lines, equations and eCV

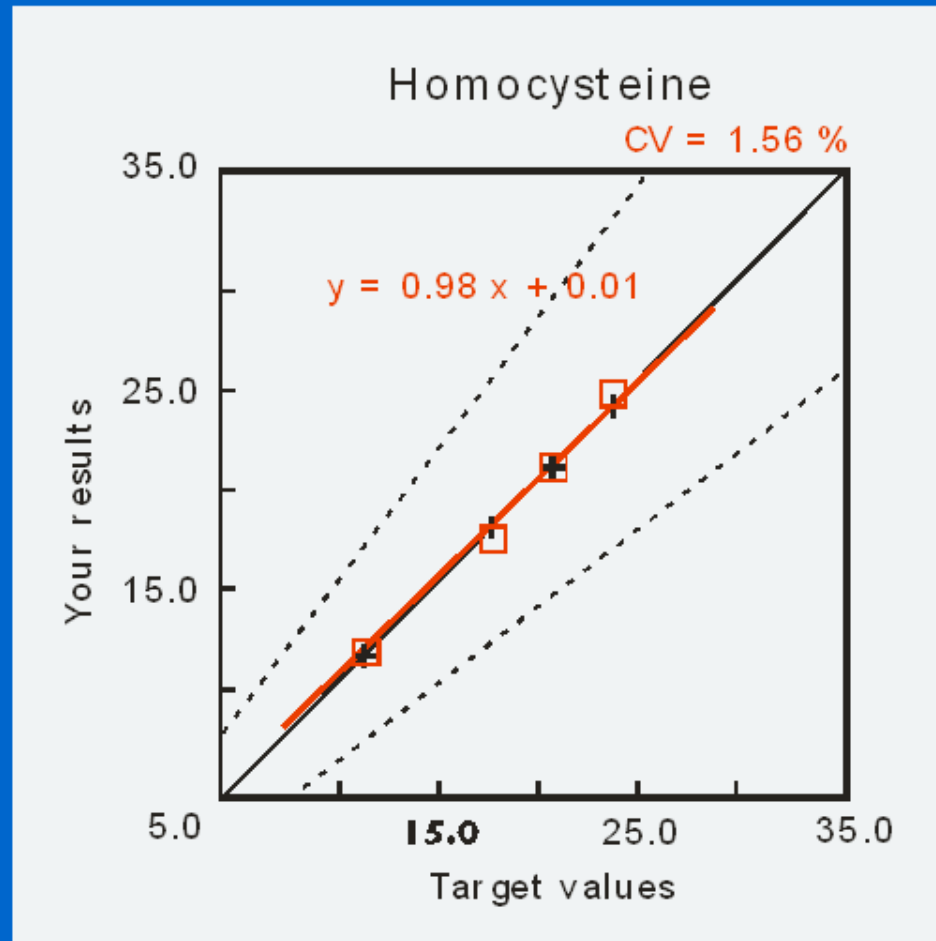
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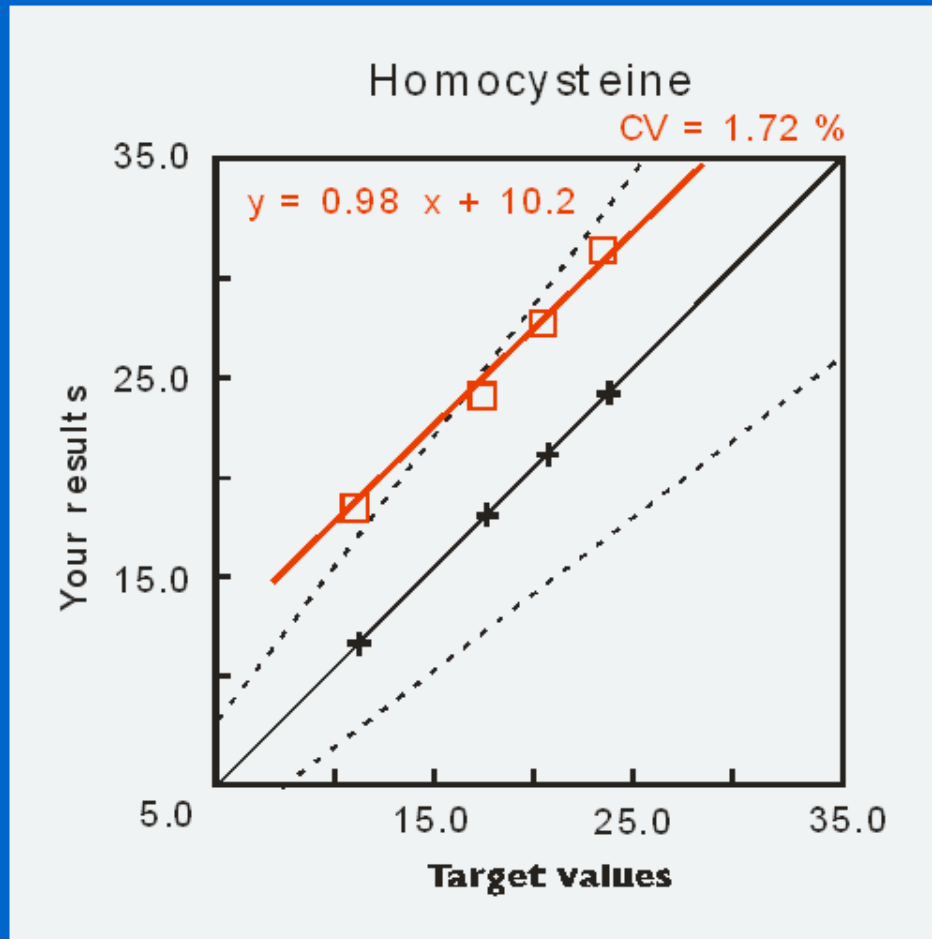


**Tentative lab. Rating**

# Regression: very good results



# Regression: interference





Lab. number:

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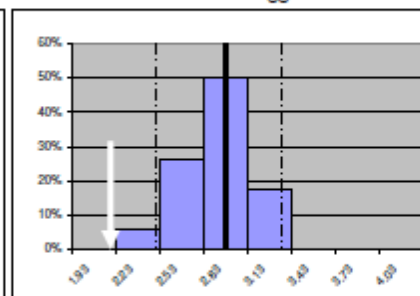
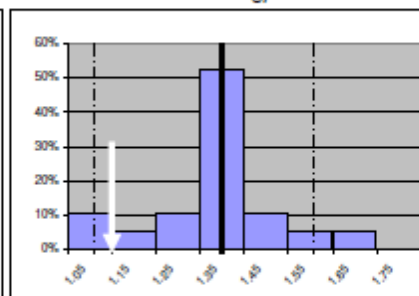
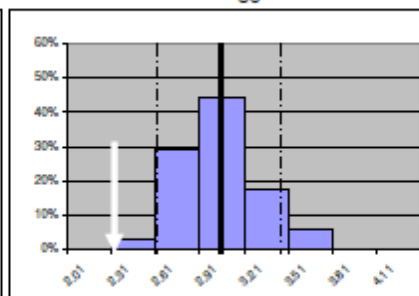
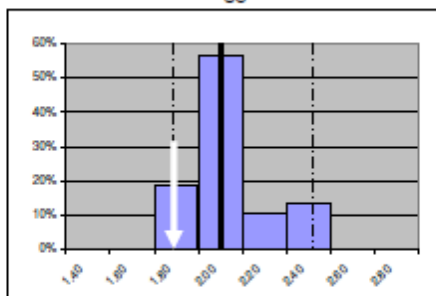
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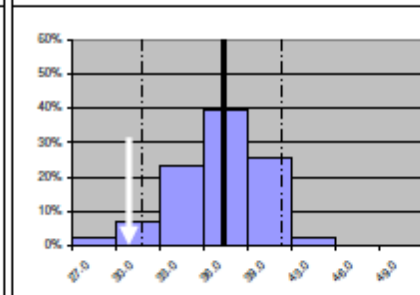
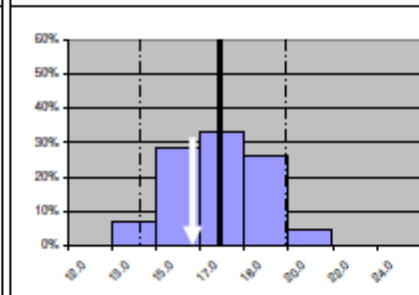
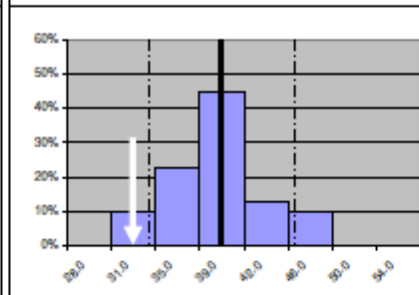
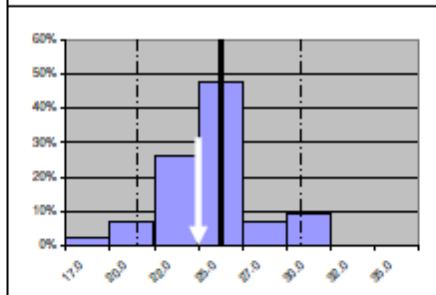
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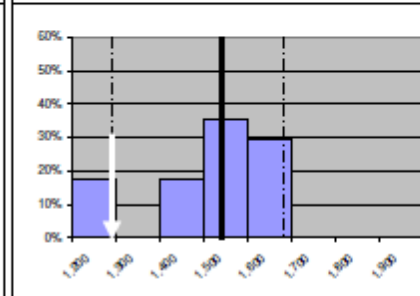
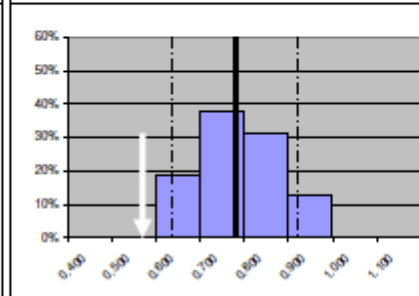
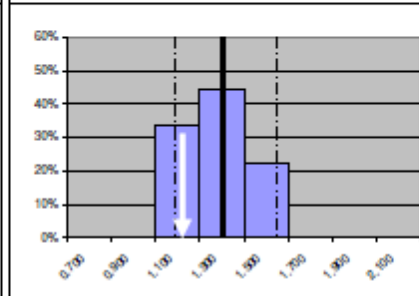
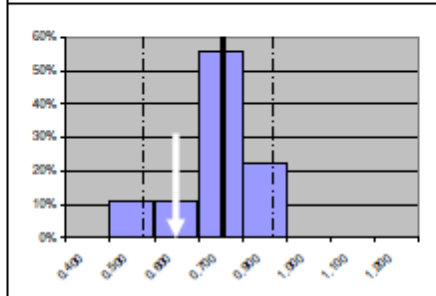
Vitamin A



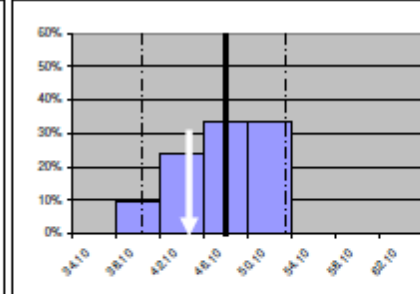
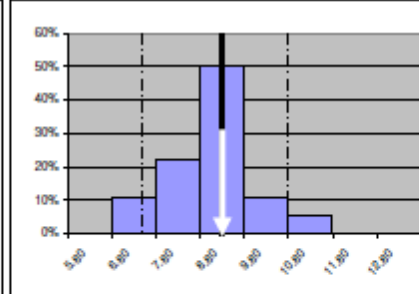
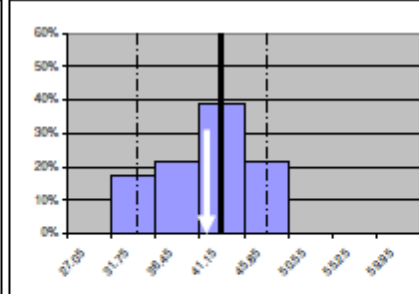
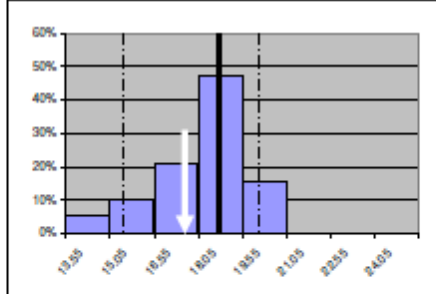
Vitamin E



beta-Carotene



Vitamin C

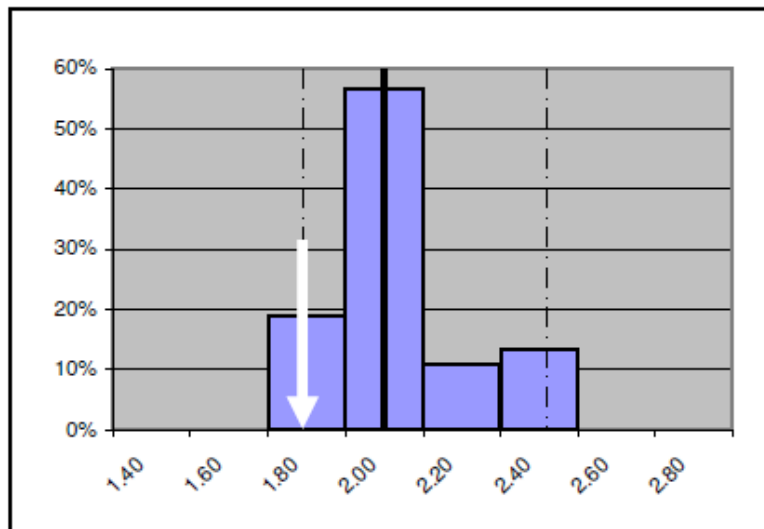


Lab. number:

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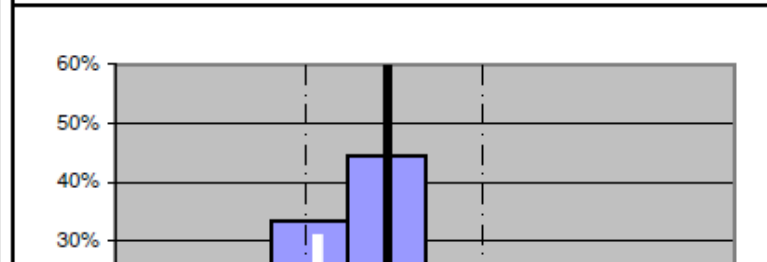
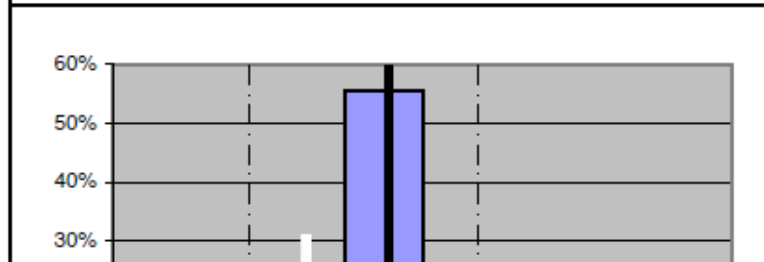
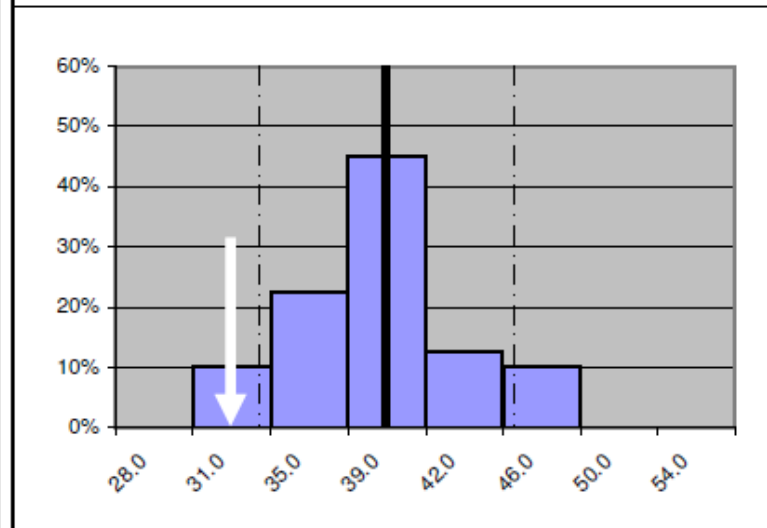
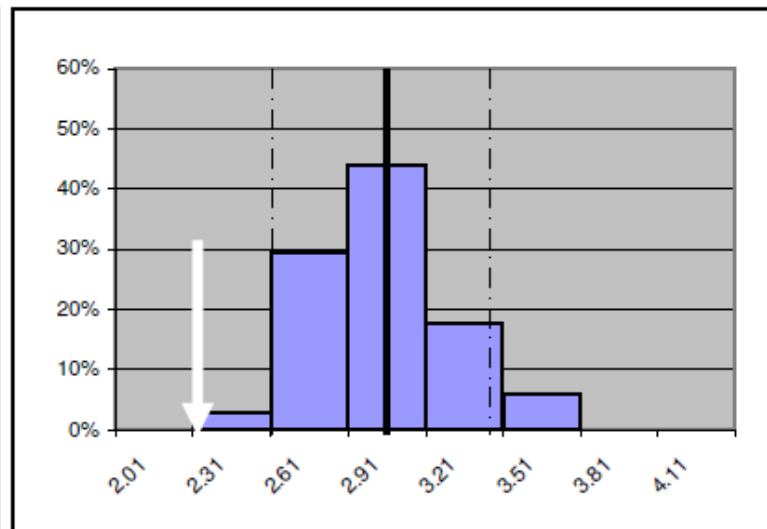
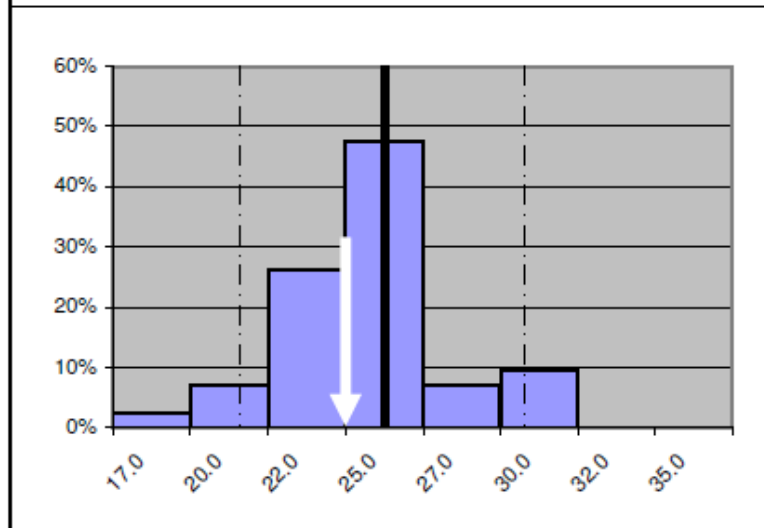
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Vitamin A



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Vitamin E





## Methods most often used

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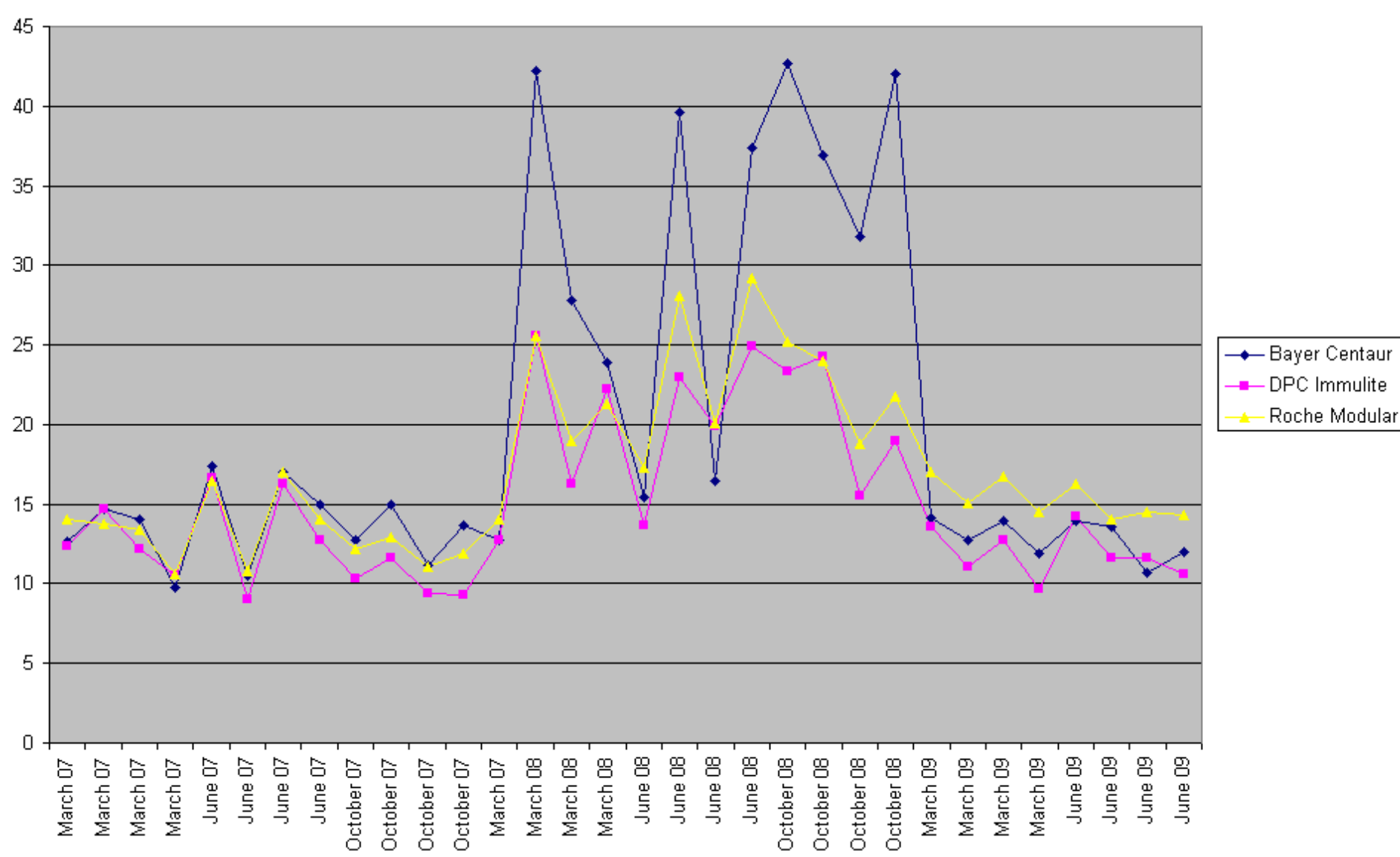
- ❑ Vitamin A and E : HPLV/UV exclusively
  - ❑  $\beta$ -carotene : HPLC/Visible detection exclusively
  - ❑ Vitamin C : HPLC/Fluorescence
  - ❑ 25-OH Vitamin D : still RIA but LC MS-MS gaining
  - ❑ Pyridoxal phosphate : HPLC/Fluorescence
  - ❑ Vitamins B9 and B12 : competitive chemiluminescence
  - ❑ Homocyst(e)ine : LC MS-MS
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## Methods and results

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- ❑ Vitamin A & E : HPLC/UV performs well
  - ❑  $\beta$ -carotene : HPLC/Visible is good
  - ❑ Vitamin C : HPLC/Fluo (OPDA) best, UV and EC
  - ❑ 25 OH Vitamin D : RIA methods best. HPLC wide
  - ❑ Vitamin B6 : Very well measured. HPLC/Fluo
  - ❑ Vitamin B9 : Centaur too sensitive to Folic acid
  - ❑ Vitamin B12: RIA and chemiluminescence are good
  - ❑ Homocyst(e)ine : IMx and MS-MS are the best
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## Future

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- ❑ The SFVB intends to fulfil the new standard of proficiency testing LAB ISO/IEC 17043 in addition to the French COFRAC standards when they are available
  - ❑ Full agreement is planned for the 2012 programs
  - ❑ The number of participants will be increased. The SFVB program will join with other QA organisations in the field of vitamins and micronutrients
  - ❑ Permanent personnel will be recruited and limits of uncertainty will be calculated as required
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## Conclusion

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- ❑ The SFVB QA programs for vitamins are now well established and has as participants as the largest international programs
  - ❑ One of the few which proposes 9 vitamins/compounds. Vitamin B1 will probably be included in the future like carotenoids
  - ❑ Must evolve to fulfil the new standards that will probably rule QA programs in Europe
  - ❑ Full agreement is planned to be reached by 2012
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