Evaluation Report
proficiency test

DLA ptSU10 (2021)

Free Amino Acids and Taurine:

in Infant Food

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General Information on the proficiency test (PT)

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Vertraulichkeit Confidentiality	Die Teilnehmerergebnisse sind im EP-Bericht in anonymisierter Form mit Auswertenummern benannt. Daten einzelner Teilnehmer werden ausschließlich nach vorheriger Zustimmung des Teilnehmers an Dritte weitergegeben. Participant result are named anonymously with evaluation numbers in the PT report. Data of individual participants will be passed on to third parties only with prior consent of the participant.

Contents

1. Introduction

The participation in proficiency testing schemes (PT) is an essential element of the quality-management-system of every laboratory testing food and feed, cosmetics and food contact materials. The implementation of proficiency tests enables the participating laboratories to prove their own analytical competence under realistic conditions. At the same time they receive valuable data regarding the verification and/or validation of the particular testing method [1, 5].
The purpose of DLA is to offer proficiency tests for selected parameters in concentrations with practical relevance.
Realisation and evaluation of the present proficiency test follows the technical requirements of DIN EN ISO/IEC 17043 (2010) and DIN ISO 13528:2009 / ISO 13528:2015 [2, 3].

2. Realisation

2.1 Test material

The test material is a common in commerce dietetic food "infant milk powder, for the dietetic treatment of severe food allergies from birth" based on free amino acids with a protein equivalent content <20% from a European supplier.
The raw material was sieved (mesh 600 µm) and homogenized.

Afterwards the samples were portioned to approximately 10 g into metallised PET film bags and chronologically numbered.

The composition (list of ingredients) is given in table 1.

Table 1: Composition of DLA-Samples

Infant Milk Powder
Ingredients: Glucose syrup, vegetable oils , L-arginine, L-aspartate, L-leucine, L-lysine acetate, calcium orthophosphate, potassium citrate, L-glutamine, L-proline, emulsifier (citric acid ester of mono- and diglycerides of fatty acids), L-valine, glycine, L-isoleucine, L-threonine, L-phenylalanine, L-tyrosine, L-serine, L-histidine, L-alanine, sodium chloride, L-cystine, L-tryptophan, magnesium chloride, choline tartrate, L-methionine, magnesium-L-aspartate, calcium citrate, inositol, vitamin C, taurine, iron-II-sulfate, zinc sulfate, L-carnitine, nucleotides (sodium salts of uridine-, cytidine-, inosine-, adenosine-, guanosine-5-monophosphate), niacin, pantothenic acid, antioxidants (L-ascorbyl palmitate, alpha-tocopherol, extracts high in tocopherol), vitamin E, copper sulfate, vitamin B1, vitamin B6, vitamin B2, manganese II-sulfate, vitamin A, potassium iodide, folic acid, chromium chloride, vitamin K, sodium selenite, sodium molybdate, biotin, vitamin D, vitamin B12   Nutrients per 100 g: Fat 25 g, carbohydrates 53 g thereof sugar 4,7 g, fiber 0 g, protein 13 g, salt 0,5 g

Note: The metrological traceability of temperature, mass and volume during production of the PT samples is ensured by DAkkS calibrated reference materials.

2.1.1 Homogeneity

The **mixture homogeneity before bottling** was examined 8-fold by **micro-tracer analysis**. It is a standardized method that is part of the international GMP certification system for feed [14]. Before mixing dye coated iron particles of µm size are added to the sample and the number of particles is determined after homogenization in taken aliquots. The evaluation of the mixture homogeneity is based on the Poisson distribution using the chi-square test. A probability of ≥ 5 % is equivalent to a good homogeneous mixture and of ≥ 25% to an excellent mixture [14, 15].
The microtracer analysis of the present PT sample showed a probability of 99%. Additionally, particle number results were converted into concentrations, statistically evaluated according to normal distribution and compared to the standard deviation according to Horwitz. For the assessment HorRat values between 0,3 and 1,3 are to be accepted under repeat conditions (measurements within the laboratory) [16, 17]. This PT sample gave a HorRat value of 0,60. The results of microtracer analysis are given in the documentation.

The calculation of the **repeatability standard deviation S_r of the participants** was also used as an indicator of homogeneity. For all analytes it ranges from 2,56% to 10,3% (see Tab. 2). Therefore, the repeatability standard deviations in this PT are similar to precision data of the referring standardized methods (e.g. ASU §64 L 49.07-01, s. 3.6.2), which are in the range of 2,4% to 7,9% (see Tab. 3) [18]. The repeatability standard deviations of the participants' results are given in the tables of statistic data (see 4.1 to 4.21).

Table 2: Repeatability standard deviation S_r of double determinations of the participants (coefficient of variation CV_r in %)

Parameter	CV_r	Parameter	CV_r
L-Alanine	8,61 %	L-Lysine	5,11 %
L-Arginine	8,84 %	L-Methionine	7,45 %
L-Aspartic acid	3,53 %	L-Phenylalanine	9,09 %
L-Cysteine	–	L-Proline	3,80 %
L-Cystine	2,56 %	L-Serine	4,25 %
L-Glutamine	3,87 %	L-Threonine	6,34 %
L-Glutamic acid	–	L-Tryptophan	4,36 %
Glycine	10,3 %	L-Tyrosine	3,70 %
L-Histidine	2,96 %	L-Valine	3,49 %
L-Isoleucine	2,62 %		
L-Leucine	2,97 %	Taurine	3,77 %

Furthermore, the homogeneity was graphically characterized for information by the **trend line function of participants' results for chronological bottled single samples** (s. 5.2.2 Homogeneity).

In case the criterion for sufficient homogeneity of the test items is not fulfilled the impact on the target standard deviation will be verified. If necessary the evaluation of results will be done considering the standard uncertainty of the assigned value by z'-scores (s. 3.8 and 3.11) [3].

2.1.2 Stability

A water activity (aW) of < 0,5 is an important factor to ensure the stability of dry and dried products during storage. The optimal condition for storage is the aW value range of 0,15 – 0,3. In this area the lowest possible degradation rate is to be expected [16].
Experience with various DLA materials shows, with a comparable matrix and water activity (aW value < 0,5), good durability of the EP samples and storage stability against microbial spoilage and with regard to the content of the EP parameters.
The aW value of the EP samples was approx. 0,55 (21,4°C). The stability of the sample material was thus guaranteed during the investigation period under the specified storage conditions.

2.2 Sample shipment and information to the test

Two portions of test material were sent to every participating laboratory in the 36th week of 2021. The testing method was optional. The tests should be finished at 05th November 2021 the latest.

With the cover letter along with the sample shipment the following information was given to participants:

The two portions contain identical samples of an infant food (balanced dietetic food) with the parameters of free amino acids and taurine in the matrix of powder for preparation of infant milk. The protein equivalent content is < 20%. The analysis method is optional.

Please note the attached information on the proficiency test.
(see documentation, section 5.4 Information on the PT)

2.3 Submission of results

The participants submitted their results in standard forms, which have been handed out with the samples (by email).

The finally calculated concentrations of the parameter as average of duplicate determinations of both numbered samples were used for the statistical evaluation. For the calculation of the repeatability- and reproducibility standard deviation the single values of the double determination were used.

Queried and documented were single results, recovery and the used testing methods. In case participants submitted several results for the same parameter obtained by different methods these results were evaluated with the same evaluation number with a letter as a suffix and indication of the related method.

Of 17 participants, 14 submitted at least one result.
3 participants did not submit any results.
One registration was canceled before the sample was sent.

3. Evaluation

3.1 Consensus value from participants (assigned value)

The robust mean of the submitted results was used as assigned value (X_{pt}) („consensus value from participants") providing a normal distribution. The calculation was done according to algorithm A as described in annex C of ISO 13528 [3]. If there are < 12 quantitative results and an increased difference between robust mean and median, the median may be used as the assigned value (criterion: Δ median - rob. mean > 0,3 σ_{pt}) [3].

The condition is that the majority of the participants' results show a normal distribution or are distributed unimodal and symmetrically. To this end, an examination of the distribution is carried out, inter alia, using the kernel density estimate [3, 12].

In case there are indications for sources of higher variability such as a bimodal distribution of results, a cause analysis is performed. Frequently different analytical methods may cause an anomaly in results' distribution. If this is the case, separate evaluations with own assigned values (X_{pti}) are made whenever possible.

The statistical evaluation is carried out for all the parameters for a minimum of 7 values are present, in justified cases, an evaluation may also be carried out from 5 results onwards.

The actual measurement results will be drafted. Individual results, which are outside the specified measurement range of the participating laboratory (for example with the result > 25 mg/kg or < 2,5 mg/kg) or the indicating "0" will not be considered for the statistic evaluation [3].

3.2 Robust standard deviation

For comparison to the target standard deviation σ_{pt} (standard deviation for proficiency assessment) a robust standard deviation (S*) was calculated. The calculation was done according to algorithm A as described in annex C of ISO 13528 [3].

3.3 Repeatability standard deviation

The repeatability standard deviation S_r is based on the laboratory´s standard deviation of (outlier free) individual participant results, each under repeatability conditions, that means analyses was performed on the same sample by the same operator using the same equipment in the same laboratory within a short time. It characterizes the mean deviation of the results within the laboratories [3] and is used by DLA as an indication of the homogeneity of the sample material.

In case single results from participants are available the calculation of the repeatability standard deviation S_r, also known as standard deviation within laboratories S_w, is performed by: [3, 4].

The relative repeatability standard deviation as a percentage of the mean value is indicated as coefficient of variation CV_r in the table of statistical characteristics in the results section in case single results from participants are available.

3.4 Reproducibility standard deviation

The reproducibility standard deviation S_R represents an inter-laboratory estimate of the standard deviation for the determination of each parameter on the bases of (outlier free) individual participant results. It takes into account both the repeatability standard deviation S_r and the within-laboratory standard deviation S_s. Reproducibility standard deviations of PT´s may differ from reproducibility standard deviations of ring trials, because the participating laboratories of a PT generally use different internal conditions and methods for determining the measured values.

In the present evaluation, the specification of the reproducibility standard deviation, therefore, does not refer to a specific method, but characterizes approximately the comparability of results between the laboratories, assumed the effect of homogeneity and stability of the sample are negligible.

In case single results from participants are available the calculation of the reproducibility standard deviation S_R is performed by: [3, 4].

The relative reproducibility standard deviation CV_R in percent of the mean is given as variation coefficient in the statistical data of participant for each parameter, if single results are available. The significance of CV_R is further explained in section 3.9.

3.5 Exclusion of results and outliers

Before statistical evaluation obvious blunders, such as those with incorrect units, decimal point errors, too few significant digits (valid digits) or results for another proficiency test item can be removed from the data set [2]. Even if a result e.g. with a factor >10 deviates significantly from the mean and has an influence on the robust statistics, a result of the statistical evaluation can be excluded [3].

All results should be given at least with 2 significant digits. Specifying 3 significant digits is usually sufficient.

Results obtained by different analytical methods causing an increased variability and/or a bi- or multimodal distribution of results, are treated separately or could be excluded in case of too few numbers of results. For this results are checked by kernel density estimation [3, 12].

Results are tested for outliers by the use of robust statistics (algorithm A): If a value deviates from the robust mean by more than 3 times the robust standard deviation, it can be classified as an outlier (see above) [3]. Due to the use of robust statistics outliers are not excluded, provided that no other reasons are present [3]. Detected outliers are only mentioned in the results section, if they have been excluded from the statistical evaluation.

3.6 Target standard deviation (for proficiency assessment)

The target standard deviation of the assigned value σ_{pt} (= standard deviation for proficiency assessment) can be determined according to the following methods.

If an acceptable quotient S^*/σ_{pt} is present, the target standard deviation of the general model by Horwitz is preferably used for the proficiency assessment. It is usually suitable for evaluation of interlaboratory studies, where different methods are applied by the participants. On the other hand the target standard deviation from the evaluation of precision data of an precision experiment is derived from collaborative studies with specified analytical methods.

In cases in which both of the above models are unsuitable, the target standard deviation is determined using values from the findings according to 3.6.3.

For information, the z-scores of both models are given in the analysis, if available.

In the present PT for valuation of the following parameters the target standard deviation according to the <u>general model of Horwitz</u> was applied (see 3.6.1):
<u>L-Alanine, L-Glutamine, L-Isoleucine, L-Leucine and Taurine.</u>

For the valuation of all following parameters the target standard deviation from <u>precision experiments</u> (s. 3.6.2) (German official ASU §64 methods: L 47.07-01) was applied:
<u>L-Arginine, L-Aspartic acid, L-Cystine, Glycine, L-Histidine, L-Lysine, L-Methionine, L-Phenylalanine, L-Proline, L-Serine, L-Threonine, L-Tryptophan, L-Tyrosine and L-Valine.</u>

Additionally for <u>L-Alanine, L-Glutamine, L-Phenylalanine and L-Valine</u> the standard uncertainty was considered by evaluation using z'-scores (see 3.6.8).

Due to the number of < 7, the results for <u>L-Cysteine and L-Glutamic acid</u> were not statistically evaluated.

3.6.1 General model (Horwitz)

Based on statistical characteristics obtained in numerous PTs for different parameters and methods Horwitz has derived a general model for estimating the reproducibility standard deviation σ_R [6]. Later the model was modified by Thompson for certain concentration ranges [10]. The reproducibility standard deviation σ_R can be applied as the relative target standard deviation σ_{pt} in % of the assigned values and calculated according to the following equations [3]. For this the assigned value X_{pt} is used for the concentration c.

Equations	Range of concentrations	corresponds to
$\sigma_R = 0,22c$	$c < 1,2 \times 10^{-7}$	< 120 µg/kg
$\sigma_R = 0,02c^{0,8495}$	$1,2 \times 10^{-7} \leq c \leq 0,138$	≥ 120 µg/kg
$\sigma_R = 0,01c^{0,5}$	$c > 0,138$	$> 13,8$ g/100g

with c = mass content of analyte (as relative size, e.g. 1 mg/kg = 1 ppm = 10^{-6} kg/kg)

3.6.2 Value by precision experiment

Using the reproducibility standard deviation σ_R and the repeatability standard deviation σ_r of a precision experiment (collaborative trial or proficiency test) the target standard deviation σ_{pt} can be derived considering the number of replicate measurements m of participants in the present PT [3]:

$$\sigma_{pt} = \sqrt{\sigma_R^2 - \sigma_r^2 \left(m-1 \, / \, m \right)}$$

The relative repeatability standard deviations (RSD_r) and relative reproducibility standard deviation (RSD_R) given in Table 3 were determined in ring tests using the indicated methods.
The resulting target standard deviations σ_{pt}, which were identified there, were used to evaluate the results and to provide additional information for the statistical data.

Table 3: Relative repeatability standard deviations (RSD_r) and relative reproducibility standard deviations (RSD_R) according to selected evaluations of tests for precision and the resulting target standard deviation σ_{pt} [18]

Parameter	Matrix (Amino acid mixture)	Mean [g/100g]	RSD_r	RSD_R	σ_{pt}	Method / Literature
L-Alanine	Dietetic food	3,09	2,75%	4,37%	3,91% [1]	ASU 49.07-1
L-Arginine	Dietetic food	2,94	3,41%	13,8%	13,6% [1]	ASU 49.07-1
L-Aspartic acid	Dietetic food	7,48	2,41%	5,88%	5,62% [1]	ASU 49.07-1
L-Cysteine	Dietetic food	2,21	7,71%	18,6%	17,8% [1]	ASU 49.07-1
L-Cystine	Dietetic food	2,21	7,92%	18,4%	17,5% [1]	ASU 49.07-1
L-Glutamic acid	Dietetic food	16,6	2,50%	6,93%	6,70% [1]	ASU 49.07-1
Glycine	Dietetic food	1,79	3,07%	5,59%	5,15% [1]	ASU 49.07-1
L-Histidine	Dietetic food	1,92	4,69%	16,4%	16,1% [1]	ASU 49.07-1
L-Isoleucine	Dietetic food	4,56	2,63%	4,93%	4,57% [1]	ASU 49.07-1
L-Leucine	Dietetic food	7,35	2,59%	4,69%	4,32% [1]	ASU 49.07-1
L-Lysine	Dietetic food	5,87	2,81%	12,9%	12,7% [1]	ASU 49.07-1
L-Methionine	Dietetic food	1,88	4,79%	7,45%	6,63% [1]	ASU 49.07-1
L-Phenylalanine	Dietetic food	3,19	5,64%	7,21%	6,01% [1]	ASU 49.07-1
L-Proline	Dietetic food	7,09	3,60%	6,56%	6,05% [1]	ASU 49.07-1
L-Serine	Dietetic food	4,00	2,63%	7,63%	7,40% [1]	ASU 49.07-1
L-Threonine	Dietetic food	3,59	3,34%	6,41%	5,96% [1]	ASU 49.07-1
L-Tryptophan	Dietetic food	1,32	4,92%	20,1%	19,8% [1]	ASU 49.07-1
L-Tyrosine	Dietetic food	4,04	5,07%	8,17%	7,34% [1]	ASU 49.07-1
L-Valine	Dietetic food	5,20	2,60%	5,20%	4,86% [1]	ASU 49.07-1

[1] *used in evaluation or given for information (s. chapter 4)*
The given values from ASU L 49.07-1 are mean values of samples I and II (exceptions: Methionine sample I, Phenylalanine sample II only)

3.6.3 Value by perception

The target standard deviation for proficiency assessment can be set at a value that corresponds to the level of performance that the coordinator would wish laboratories to be able to achieve [3].

For the present evaluation the target standard deviation according to 3.6.1 or 3.6.2. was regarded suitable.

Table 4 shows selected statistic data of participants' results of present PT compared to PT results of previous years.

<u>Table 4:</u> Characteristics of the present PT (on grey) in comparison to previous PTs since 2015 (SD = standard deviation, CV = coefficient of variation)

Parameter	Matrix (Powder)	rob. Mean [g/100g]	rob. SD (S*) [g/100g]	rel. SD (CV$_{S*}$) [%]	Quotient S*/σopt	DLA-report
L-Alanine	Diet. food	0,460	0,0369	8,02	1,8	DLA 43/2015
L-Alanine	Diet. food	1,95	0,170	8,75	1,9[1]	DLA 47/2017
L-Alanine	Diet. food	0,595	0,0340	5,71	1,3	DLA 50/2019
L-Alanine	Diet. food	0,609	0,0686	11,3	1,9[1]	DLA ptSU10 (2021)
L-Arginine	Diet. food	0,749	0,0616	8,22	0,61	DLA 43/2015
L-Arginine	Diet. food	1,42	0,222	15,6	1,1	DLA 47/2017
L-Arginine	Diet. food	1,00	0,0731	7,27	0,54	DLA 50/2019
L-Arginine	Diet. food	1,03	0,122	11,8	0,87	DLA ptSU10 (2021)
L-Aspartic acid	Diet. food	0,740	0,0332	4,49	1,1	DLA 43/2015
L-Aspartic acid	Diet. food	3,86	0,470	12,2	1,8[1]	DLA 47/2017
L-Aspartic acid	Diet. food	0,951	0,0663	6,97	1,2	DLA 50/2019
L-Aspartic acid	Diet. food	0,971	0,0915	9,42	1,7	DLA ptSU10 (2021)
L-Cysteine L-Cystine	Diet. food	**	–	–	–	DLA 43/2015
L-Cysteine L-Cystine	Diet. food	**	–	–	–	DLA 47/2017
L-Cysteine	Diet. food	**	–	–	–	DLA 50/2019
L-Cysteine	Diet. food	**	–	–	–	DLA ptSU10 (2021)
L-Cystine	Diet. food	0,376	0,219	58,4	2,1[1]	DLA 50/2019
L-Cystine	Diet. food	0,418	0,0520	12,4	0,71	DLA ptSU10 (2021)
L-Glutamine	Diet. food	1,32	0,179	13,5	1,7[1]	DLA 50/2019
L-Glutamine	Diet. food	1,34	0,117	8,72	1,7[1]	DLA ptSU10 (2021)

Parameter	Matrix (Powder)	rob. Mean [g/100g]	rob. SD (S*) [g/100g]	rel. SD (CV$_{S*}$) [%]	Quotient S*/σpt	DLA-report
L-Glutamic acid	Diet. food	**	–	–	–	DLA 43/2015
L-Glutamic acid	Diet. food	1,48	0,177	12,0	1,8	DLA 47/2017
L-Glutamic acid	Diet. food	**	–	–	–	DLA 50/2019
L-Glutamic acid	Diet. food	**	–	–	–	DLA ptSU10 (2021)
Glycine	Diet. food	0,688	0,0964	14,0	1,9[1]	DLA 43/2015
Glycine	Diet. food	0,755	0,0863	11,4	1,8[1]	DLA 47/2017
Glycine	Diet. food	0,920	0,107	11,6	1,9[1]	DLA 50/2019
Glycine	Diet. food	0,940	0,0785	8,35	1,6	DLA ptSU10 (2021)
L-Histidine	Diet. food	0,435	0,0354	8,14	0,51	DLA 43/2015
L-Histidine	Diet. food	1,66	0,404	24,4	1,5	DLA 47/2017
L-Histidine	Diet. food	0,590	0,106	17,9	1,1	DLA 50/2019
L-Histidine	Diet. food	0,590	0,0513	8,69	0,54	DLA ptSU10 (2021)
L-Isoleucine	Diet. food	0,686	0,0246	3,59	0,85	DLA 43/2015
L-Isoleucine	Diet. food	3,76	0,381	10,1	1,8[1]	DLA 47/2017
L-Isoleucine	Diet. food	0,917	0,0730	7,95	1,7	DLA 50/2019
L-Isoleucine	Diet. food	0,925	0,0535	5,78	1,4	DLA ptSU10 (2021)
L-Leucine	Diet. food	1,17	0,0237	2,03	0,52	DLA 43/2015
L-Leucine	Diet. food	6,56	0,532	8,12	1,9	DLA 47/2017
L-Leucine	Diet. food	1,55	0,100	6,47	1,5	DLA 50/2019
L-Leucine	Diet. food	1,54	0,100	6,47	1,7	DLA ptSU10 (2021)
L-Lysine	Diet. food	0,797	0,0666	8,36	0,66	DLA 43/2015
L-Lysine	Diet. food	4,01	0,435	10,9	0,85	DLA 47/2017
L-Lysine	Diet. food	1,07	0,124	11,6	0,91	DLA 50/2019
L-Lysine	Diet. food	1,08	0,168	15,5	1,2	DLA ptSU10 (2021)
L-Methionine	Diet. food	0,179	0,0164	9,16	1,8	DLA 43/2015
L-Methionine	Diet. food	1,17	0,108	9,21	1,4	DLA 47/2017
L-Methionine	Diet. food	0,252	0,0152	6,03	0,91	DLA 50/2019
L-Methionine	Diet. food	0,259	0,0224	8,65	1,3	DLA ptSU10 (2021)
L-Phenyl-alanine	Diet. food	0,515	0,0273	5,30	1,8	DLA 43/2015
L-Phenyl-alanine	Diet. food	1,89	0,157	8,28	1,4	DLA 47/2017
L-Phenyl-alanine	Diet. food	0,698	0,0621	8,90	1,5	DLA 50/2019
L-Phenyl-alanine	Diet. food	0,744	0,102	13,7	1,8[1]	DLA ptSU10 (2021)

Parameter	Matrix (Powder)	rob. Mean [g/100g]	rob. SD (S*) [g/100g]	rel. SD (CV$_{S*}$) [%]	Quotient S*/σpt	DLA-report
L-Proline	Diet. food	0,837	0,0915	10,9	1,9	DLA 43/2015
L-Proline	Diet. food	2,23	0,263	11,8	2,0	DLA 47/2017
L-Proline	Diet. food	1,16	0,112	9,65	1,6	DLA 50/2019
L-Proline	Diet. food	1,14	0,0952	8,35	1,4	DLA ptSU10 (2021)
L-Serine	Diet. food	0,500	0,0594	11,9	1,7	DLA 43/2015
L-Serine	Diet. food	1,80	0,256	14,2	1,6[1]	DLA 47/2017
L-Serine	Diet. food	0,693	0,0311	4,49	1,1	DLA 50/2019
L-Serine	Diet. food	0,709	0,0410	5,78	0,78	DLA ptSU10 (2021)
L-Threonine	Diet. food	0,608	0,0666	11,0	1,9	DLA 43/2015
L-Threonine	Diet. food	2,77	0,236	8,52	1,4	DLA 47/2017
L-Threonine	Diet. food	0,771	0,0498	4,46	1,1	DLA 50/2019
L-Threonine	Diet. food	0,776	0,0814	10,5	1,8	DLA ptSU10 (2021)
L-Tryptophan	Diet. food	**	–	–	–	DLA 43/2015
L-Tryptophan	Diet. food	2,75	0,199	7,25	0,37	DLA 47/2017
L-Tryptophan	Diet. food	0,305	0,0177	5,80	1,2	DLA 50/2019
L-Tryptophan	Diet. food	0,300	0,0311	10,4	0,52	DLA ptSU10 (2021)
L-Tyrosine	Diätet. LM	0,524	0,0213	4,06	0,92	DLA 43/2015
L-Tyrosine	Diätet. LM	1,18	0,0878	7,47	1,0	DLA 47/2017
L-Tyrosine	Diätet. LM	0,684	0,0445	6,51	0,89	DLA 50/2019
L-Tyrosine	Diätet. LM	0,682	0,0321	4,71	0,64	DLA ptSU10 (2021)
L-Valine	Diätet. LM	0,762	0,0320	4,20	1,0	DLA 43/2015
L-Valine	Diätet. LM	3,04	0,327	10,7	1,8[1]	DLA 47/2017
L-Valine	Diätet. LM	0,983	0,0950	9,66	2,0	DLA 50/2019
L-Valine	Diätet. LM	1,01	0,100	9,98	1,6[1]	DLA ptSU10 (2021)
Taurine	Diätet. LM	0,0317	0,00378	12,0	1,8	DLA 50/2019
Taurine	Diätet. LM	0,0494	0,00439	8,89	1,4	DLA ptSU10 (2021)

[1] *with target standard deviation σpt'*
*** no statistical evaluation (< 7 results)*

3.7 z-Score

To assess the results of the participants the z-score is used. It indicates about which multiple of the target standard deviation (σ_{pt}) the result (x_i) of the participant is deviating from the assigned value (X_{pt}) [3].
Participants' z-scores are derived from:

$$z_i = \frac{\left(x_i - x_{pt} \right)}{\sigma_{pt}}$$

The requirements for the analytical performance are generally considered as fulfilled if

$$-2 \leq z \leq 2 \ .$$

The valid z-Score for each parameter is indicated as z-Score (σ_{pt}) while the value referred to as the z-Score (Info) is purely informative. The two z-scores are calculated with the different target standard deviations according to 3.6.

3.7.1 Warning and action signals

In accordance with the norm ISO 13528 it is recommended that a result that gives rise to a *z*-score above 3,0 or below –3,0, shall be considered to give an "action signal" [3]. Likewise, a *z*-score above 2,0 or below –2,0 shall be considered to give a "warning signal". A single "action signal", or "warning signal" in two successive PT-rounds, shall be taken as evidence that an anomaly has occurred which requires investigation.

An error or cause analysis can be carried out by checking the analysis process including understanding and implementation of the measurement by the staff, details of the measurement procedure, calibration of equipment and composition of reagents, transmission error or an error in the calculation, in the trueness and precision and use of reference material. If necessary, the problems must be addressed through appropriate corrective action [3].

In the figures of z-scores DLA gives the limits of warning and action signals as yellow and red lines respectively. According to ISO 13528 the signals are valid only in case of a number of ≥ 10 results [3].

3.8 z'-Score

The z'-score can be used for the valuation of the results of the participants, in cases the standard uncertainty has to be considered (s. 3.11). The z'-score represents the relation of the deviation of the result (x_i) of the participant from the respective consensus value (X) to the square root of quadrat sum of the target standard deviation (σ_{pt}) and the standard uncertainty ($U_{(x_{pt})}$) [3].

The calculation is performed by:

$$z_i' = \frac{x_i - x_{pt}}{\sqrt{\sigma_{pt}^2 + u_{(x_{pt})}^2}}$$

If carried out an evaluation of the results by means of z 'score, we have defined below the expression in the denominator as a target standard deviation σ_{pt}'.

The requirements for the analytical performance are generally considered as fulfilled if

$$-2 \leq z' \leq 2 .$$

For warning and action signals see 3.7.1.

3.9 Reproducibility cofficient of variation (CV$_R$)

The variation coefficient (CV$_R$) of the reproducibility (= relative reproducibility standard deviation) is calculated from the standard deviation and the mean as follows [4, 13]:

$$CV_R = \frac{S_R * 100}{X}$$

In contrast to the standard deviation as a measure of the absolute variability the CV gives the relative variability within a data region. While a low CV, e.g. <5-10% can be taken as evidence for a homogeneous set of results, a CV of more than 50% indicates a "strong inhomogeneity of statistical mass", so that the suitability for certain applications such as the assessment of exceeded maximum levels or the performance evaluation of the participating laboratories possibly can not be done [3].

3.10 Quotient S*/σ_{pt}

Following the HorRat-value the results of a proficiency-test (PT) can be considered convincing, if the quotient of robust standard deviation S* and target standard deviation σ_{pt} does not exceed the value of 2.
A value > 2 means an insufficient precision, i.e. the analytical method is too variable, or the variation between the test participants is higher than estimated. Thus the comparability of the results is not given [3].

3.11 Standard uncertainty of the assigned value

Every assigned value has a standard uncertainty that depends on the analytical method, differences between the analytical methods used, the test material, the number of participating laboratories (P) and on other factors. The standard uncertainty ($U_{(Xpt)}$) for this PT is calculated as follows [3]:

$$u_{(x_{pt})} = 1{,}25 \times \frac{s^*}{\sqrt{p}}$$

If $U_{(Xpt)} \leq 0{,}3 \; \sigma_{pt}$ the standard uncertainty of the assigned value needs not to be included in the interpretation of the results of the PT [3]. Values exceeding 0,3 imply, that the target standard deviation could be too low with respect to the standard uncertainty of the assigned value.

The traceability of the assigned value is ensured on the basis of the consensus value as a robust mean of the participant results.

4. Results

Comments to the distribution of the results:

The kernel density plots showed for all parameters nearly a symmetrical distribution of results (figures see documentation 5.3). Partly slight shoulders and separate smaller peaks can be seen, which are due to individual values and outliers.

In the case of L-Alanine, a distribution of results with two peaks can be seen. However, the information provided by the participants on the method does not provide any obvious evidence for such a grouping of the results. When using the robust standard deviation as the estimator h, the distribution turns into a one-peak distribution, so that an evaluation was carried out.

Comments to the statistic data:

There were < 7 results for L-Cysteine and L-Glutamic acid, so that no statistical analysis could be carried out.

The target standard deviations were calculated for all other parameters according to the model of Horwitz or according to the data of a precision experiment (ASU §64 method: L 47.07-01). The evalutaion according to Horwitz was preferably used as long as the quotients $S*/\sigma_{pt}$ were in the range of ≤ 2,0 and the Horwitz target standard deviation did not result in an unreasonably small target range compared to the norm. In all other cases, the target standard deviation calculated from ASU §64 precision data was used. As far as available, the target standard deviation according to data of a precision experiment (ASU §64 method: L 47.07-01) or according to the model of Horwitz was given for information.

For L-Alanine, L-Glutamine, L-Phenylalanine and L-Valine, the distribution of results showed an increased variability. The quotients $S*/\sigma_{pt}$ were partly far above 2,0. The parameters were therefore evaluated using the z'-score, taking into account the standard uncertainty. The quotients $S*/\sigma_{pt}'$ were then in the range from 1,6 to 1,9 (see Table 4).

For the other parameters, the distribution of results showed a low or normal variability. The quotients $S*/\sigma_{pt}$ were all in the range from 0,52 to 1,8 (see Table 4).

The robust standard deviation and the repeatability and reproducibility standard deviations were in the expected range of usual values for the used determination methods (s. 3.6.2).
The comparability of the results is given.

73% to 100% of the results are within the respective target range.

All following tables are anonymized. With the delivering of the evaluation report the participants are informed about their individual evaluation number.

In the first table the characteristics are listed:

Statistic Data
Number of results
Number of outliers
Mean
Median
Robust mean(X_{pt})
Robust standard deviation (S*)
Number with m replicate measurements
Repeatability standard deviation (S$_r$)
Coefficient of Variation (CV$_r$)in %
Reproducibility standard deviation (S$_R$)
Coefficient of Variation (CV$_R$)in %
Target range:
Target standard deviation σ_{pt} or σ_{pt}'
Target standard deviation for information
lower limit of target range $(X_{pt} - 2\sigma_{pt})$ or $(X_{pt} - 2\sigma_{pt}')$ *
upper limit of target range $(X_{pt} + 2\sigma_{pt})$ or $(X_{pt} + 2\sigma_{pt}')$ *
Quotient S*/σ_{pt} or S*/σ_{pt}'
Standard uncertainty U(X_{pt})
Number of results in the target range
Percent in the target range

* Target range is calculated with z-score or z'-score

In the table below, the results of the participating laboratories are formatted in 3 valid digits**:

Auswerte-nummer	**Parameter**	**Abweichung**	**z-Score**	**z-Score**	**Hinweis**
Evaluation number	**[Einheit / Unit]**	**Deviation**	**σ$_{pt}$**	(Info)	**Remark**

** In the documentation part, the results are given as they were transmitted by the participants.

4.1 L-Alanine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11°
Number of outliers	1
Mean	0,609
Median	0,619
Robust Mean (X_{pt})	**0,609**
Robust standard deviation (S*)	**0,0686**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0524
Repeatability (CV_r)	8,61%
Reproducibility SD (S_R)	0,0732
Reproducibility (CV_R)	12,0%
Target range:	
Target standard deviation σ_{pt}'	**0,0369**
Target standard deviation (for Information)	0,0238
lower limit of target range	**0,536**
upper limit of target range	**0,683**
Quotient S*/σ_{pt}'	*1,9*
Standard uncertainty U$_{(Xpt)}$	*0,0259*
Results in the target range	*9*
Percent in the target range	*82%*

° Measurement results without outlier (result no. 14)
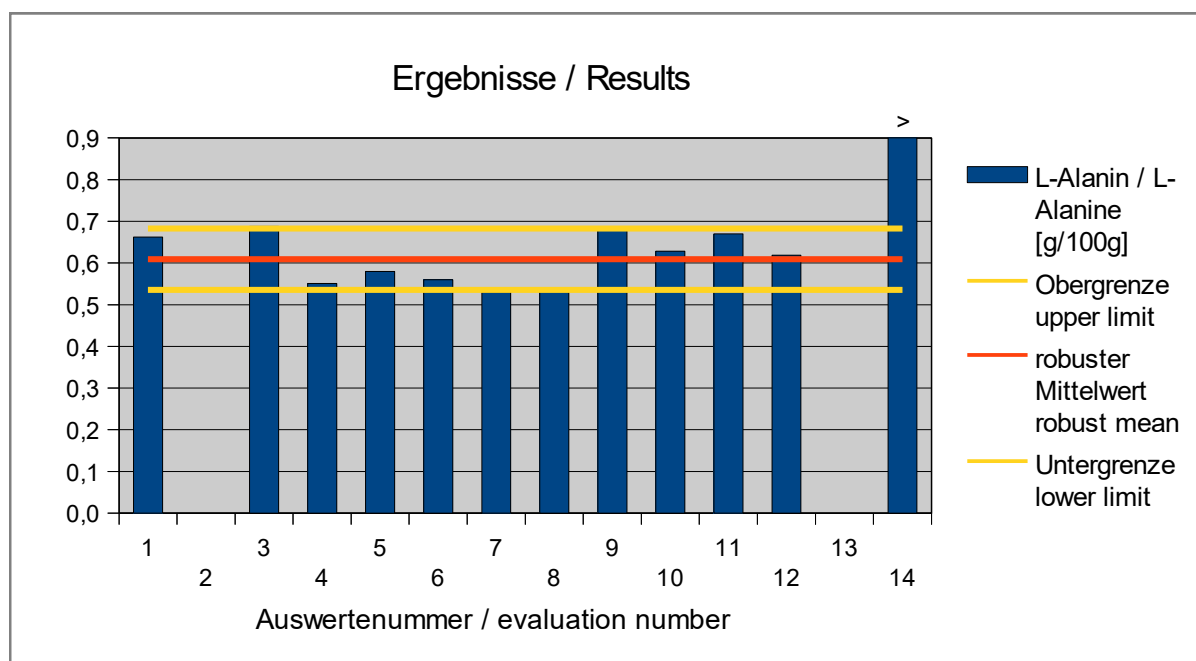
Abb. / Fig. 1: Ergebnisse L-Alanin / Results L-Alanine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Alanin / L-Alanine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z'-Score ($\sigma_{pt'}$)	z-Score (Info)	Hinweis / Remark
1	0,662 *	0,0526	1,4	2,2	
2					
3	0,688	0,0786	2,1	3,3	
4	0,551	−0,0584	−1,6	−2,4	
5	0,580	−0,0294	−0,80	−1,2	
6	0,560	−0,0494	−1,3	−2,1	
7	0,530	−0,0794	−2,2	−3,3	
8	0,535	−0,0744	−2,0	−3,1	
9	0,680	0,0706	1,9	3,0	
10	0,628	0,0186	0,51	0,78	
11	0,670	0,0606	1,6	2,5	
12	0,619	0,0096	0,26	0,40	
13	*				z'-Scores of the single values: 3,7 and −5,4
14	1,19				Ausreisser / Outlier

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
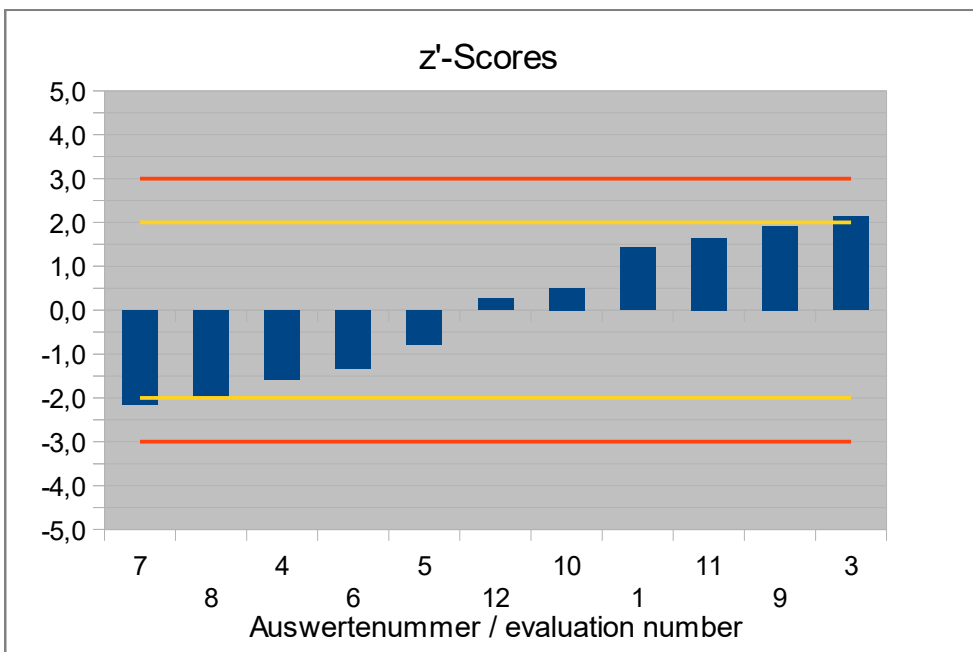
Abb. / Fig. 2:   z'-Scores L-Alanin / L-Alanine

4.2 L-Arginine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	14
Number of outliers	–
Mean	1,05
Median	1,03
Robust Mean (X_{pt})	**1,03**
Robust standard deviation (S*)	**0,122**
Number with 2 replicates	11
Repeatability SD (S_r)	0,0875
Repeatability (CV_r)	8,84%
Reproducibility SD (S_R)	0,144
Reproducibility (CV_R)	14,6%
Target range:	
Target standard deviation σ_{pt}	**0,141**
Target standard deviation (for Information)	0,0412
lower limit of target range	**0,753**
upper limit of target range	**1,32**
Quotient S*/σ_{pt}	*0,87*
Standard uncertainty $U_{(Xpt)}$	*0,0407*
Results in the target range	*12*
Percent in the target range	*86%*
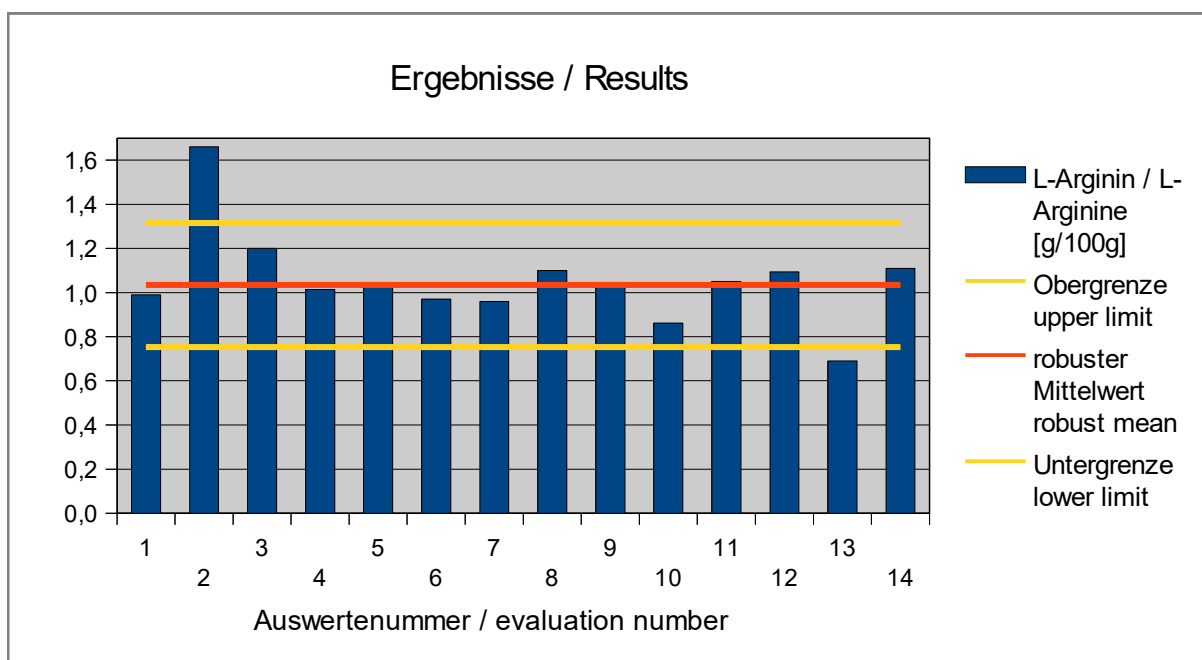
Abb. / Fig. 3: Ergebnisse L-Arginin **/** Results L-Arginine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Arginin / L-Arginine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1	0,990 *	−0,044	−0,31	−1,1	
2	1,66	0,626	4,5	15	
3	1,20	0,166	1,2	4,0	
4	1,01	−0,020	−0,14	−0,49	
5	1,03	−0,004	−0,03	−0,10	
6	0,970	−0,064	−0,46	−1,6	
7	0,960	−0,074	−0,53	−1,8	
8	1,10	0,066	0,47	1,6	
9	1,03	−0,004	−0,03	−0,10	
10	0,861	−0,173	−1,2	−4,2	
11	1,05	0,016	0,11	0,39	
12	1,09	0,060	0,43	1,5	
13	0,690 *	−0,344	−2,4	−8,4	
14	1,11	0,076	0,54	1,8	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
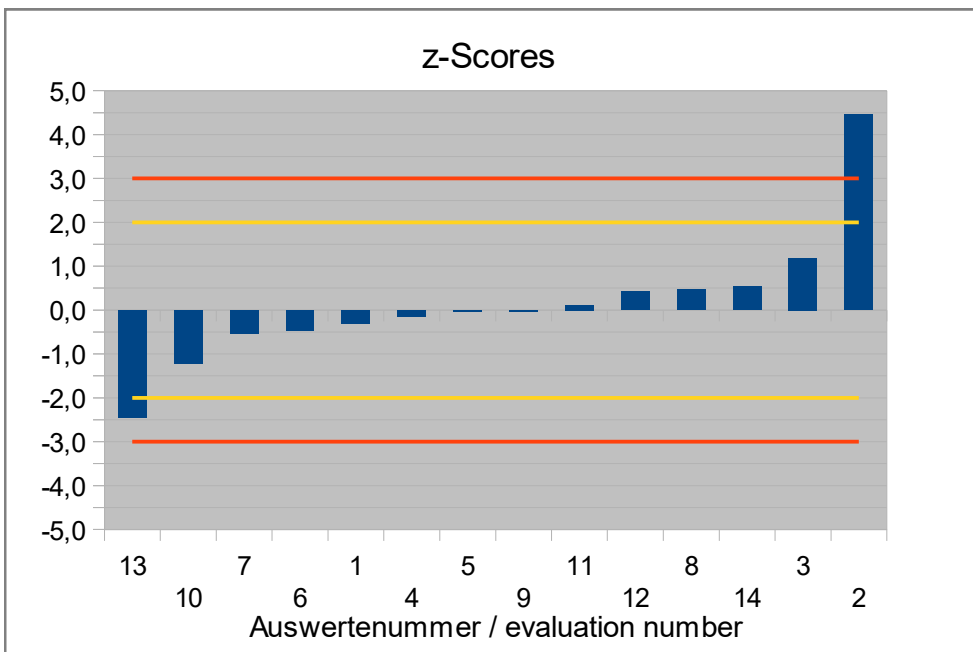
Abb. / Fig. 4: z-Scores L-Arginin / L-Arginine

4.3 L-Aspartic acid in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	0
Mean	0,962
Median	0,985
Robust Mean (X_{pt})	**0,971**
Robust standard deviation (S*)	**0,0915**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0346
Repeatability (CV_r)	3,53%
Reproducibility SD (S_R)	0,0810
Reproducibility (CV_R)	8,26%
Target range:	
Target standard deviation σ_{pt}	**0,0547**
Target standard deviation (for Information)	0,0390
lower limit of target range	**0,862**
upper limit of target range	**1,08**
Quotient S/σ_{pt}*	*1,7*
Standard uncertainty $U_{(Xpt)}$	*0,0330*
Results in the target range	*9*
Percent in the target range	*75%*
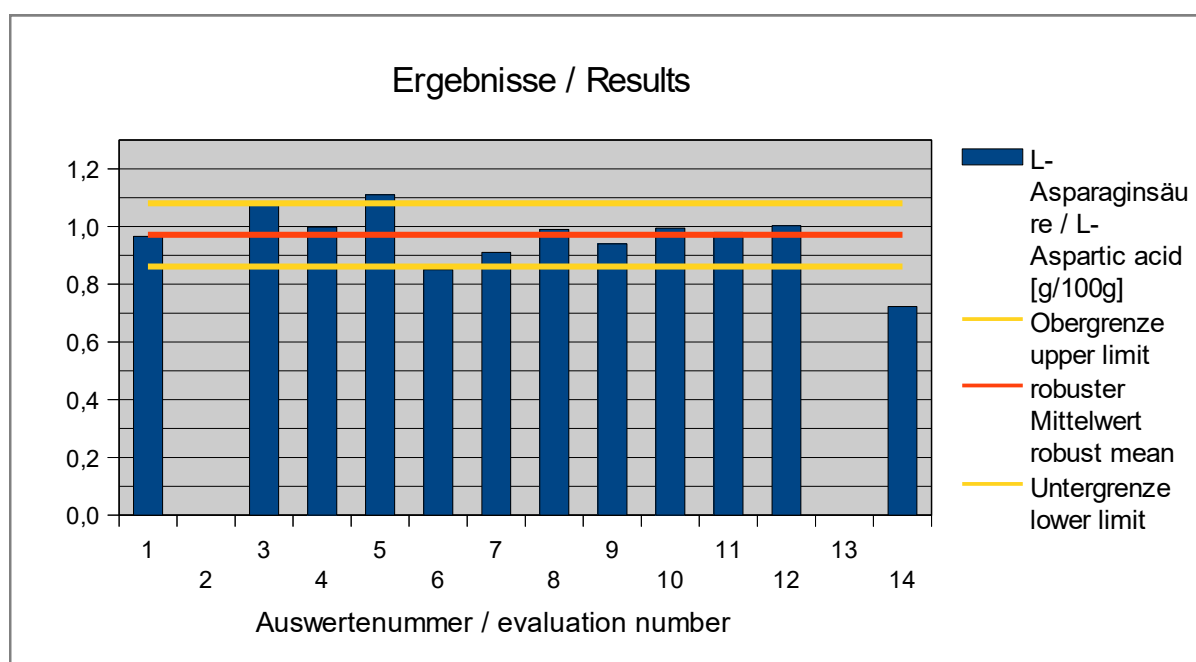
Abb. / Fig. 5: Ergebnisse L-Asparaginsäure **/** Results L-Aspartic acid

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Asparaginsäure / L-Aspartic acid [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1	0,966 *	−0,0051	−0,09	−0,13	
2					
3	1,08	0,109	2,0	2,8	
4	1,00	0,0269	0,49	0,69	
5	1,11	0,139	2,5	3,6	
6	0,850	−0,121	−2,2	−3,1	
7	0,910	−0,0611	−1,1	−1,6	
8	0,990	0,0189	0,35	0,48	
9	0,940	−0,0311	−0,57	−0,80	
10	0,994	0,0229	0,42	0,59	
11	0,980	0,0089	0,16	0,23	
12	1,00	0,0319	0,58	0,82	
13	*				z-Scores of the single values: 3,5 and −9,9
14	0,723	−0,248	−4,5	−6,4	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
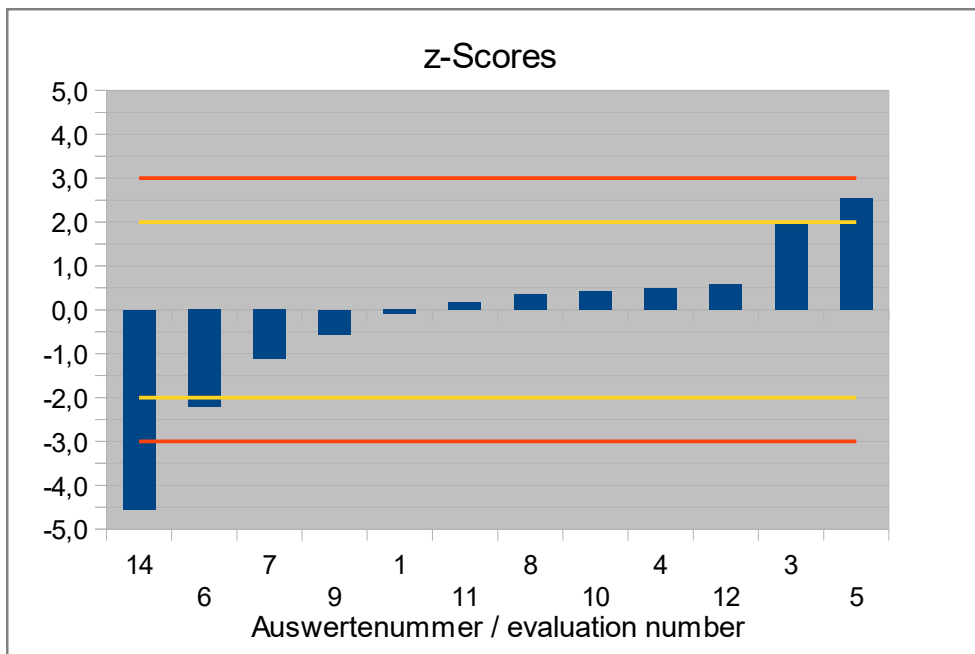
Abb. / Fig. 6:   z-Scores L-Asparaginsäure / L-Aspartic acid

4.4 L-Cysteine in g/100g

Since only one quantitative result is given, no statistical evaluation was carried out.

Auswerte-nummer Evaluation number	L-Cystein / L-Cysteine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1					
2					
3					
4					
5					
6	0,290				
7					
8					
9					
10					
11					
12					
13					
14					

4.5 L-Cystine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	6°
Number of outliers	3
Mean	0,418
Median	0,417
Robust Mean (X_{pt})	**0,418**
Robust standard deviation (S*)	**0,0520**
Number with 2 replicates	4
Repeatability SD (S_r)	0,0102
Repeatability (CV_r)	2,56%
Reproducibility SD (S_R)	0,0362
Reproducibility (CV_R)	9,12%
Target range:	
Target standard deviation σ_{pt}	**0,0733**
Target standard deviation (for Information)	0,0191
lower limit of target range	**0,272**
upper limit of target range	**0,565**
Quotient S*/σ_{pt}	*0,71*
Standard uncertainty $U_{(Xpt)}$	*0,0265*
Results in the target range	*6*
Percent in the target range	*100%*

° *results without outliers (results no. 6, 8 and 11)*
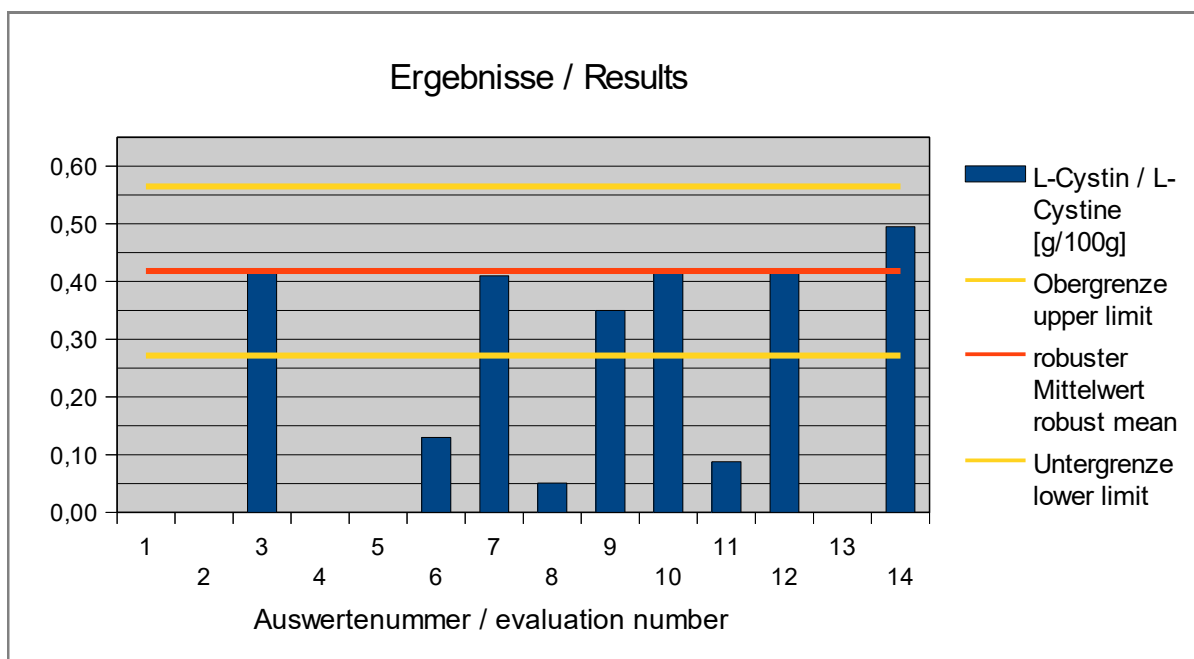
Abb. / Fig. 7: Ergebnisse L-Cystin **/** Results L-Cystine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte- nummer / Evaluation number	L-Cystin / L-Cystine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1					
2					
3	0,416	−0,0022	−0,03	−0,11	
4					
5					
6	0,130				Ausreisser / Outlier
7	0,410	−0,0082	−0,11	−0,43	
8	0,0510				Ausreisser / Outlier
9	0,350	−0,0682	−0,93	−3,6	
10	0,422	0,0038	0,05	0,20	
11	0,0880				Ausreisser / Outlier
12	0,417	−0,0012	−0,02	−0,06	
13					
14	0,495	0,0768	1,0	4,0	
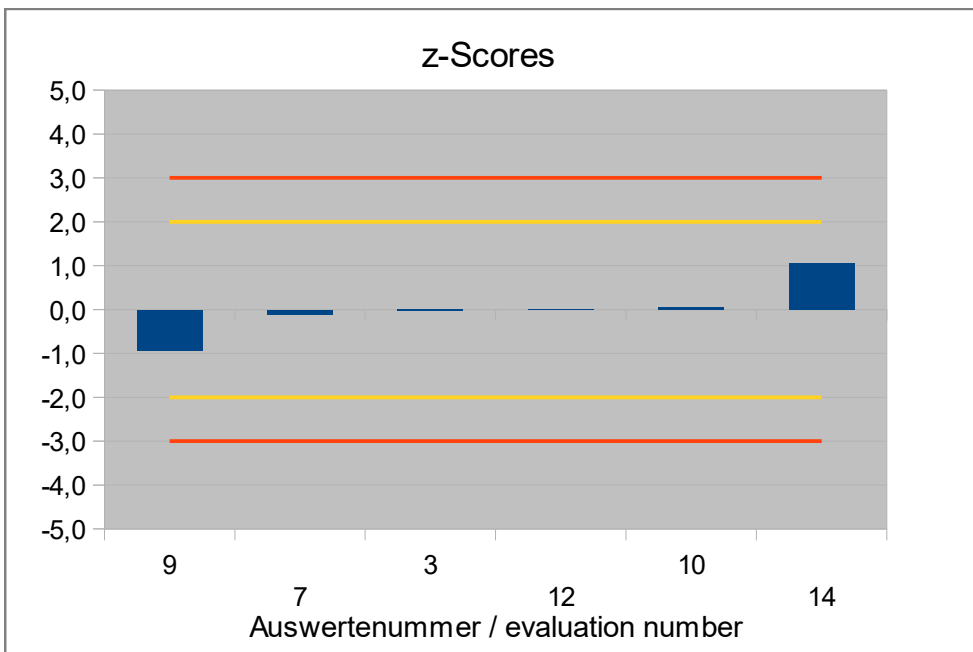
Abb. / Fig. 8:   z-Scores L-Cystin / L-Cystine

4.6 L-Glutamine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	10
Number of outliers	0
Mean	1,34
Median	1,35
Robust Mean (X_{pt})	**1,34**
Robust standard deviation (S*)	**0,117**
Number with 2 replicates	8
Repeatability SD (S_r)	0,0513
Repeatability (CV_r)	3,87%
Reproducibility SD (S_R)	0,105
Reproducibility (CV_R)	7,92%
Target range:	
Target standard deviation $\sigma_{pt'}$	**0,0691**
lower limit of target range	**1,20**
upper limit of target range	**1,48**
Quotient S*/$\sigma_{pt'}$	*1,7*
Standard uncertainty U$_{(Xpt)}$	*0,0462*
Results in the target range	*9*
Percent in the target range	*90%*
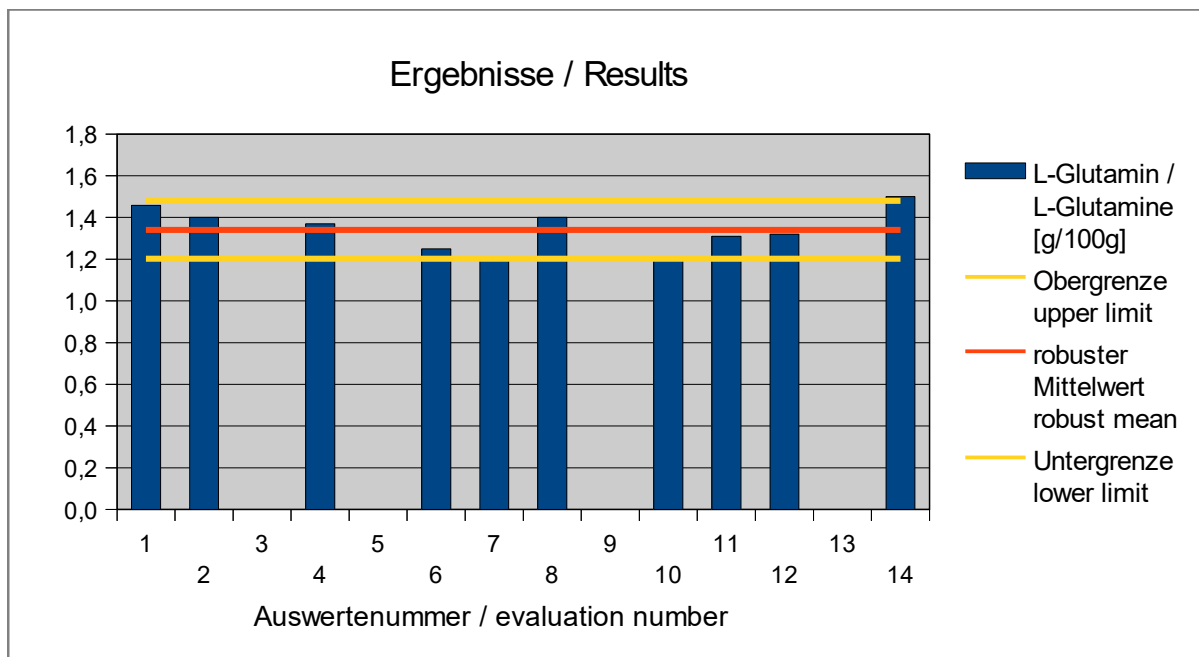
Abb. / Fig. 9: Ergebnisse L-Glutamin **/** Results L-Glutamine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte- nummer Evaluation number	L-Glutamin / L-Glutamine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z'-Score ($\sigma_{pt'}$)	Hinweis Remark
1	1,46 *	0,117	1,7	
2	1,40	0,059	0,85	
3				
4	1,37	0,029	0,42	
5				
6	1,25	−0,091	−1,3	
7	1,20	−0,141	−2,0	
8	1,40	0,059	0,85	
9				
10	1,20	−0,139	−2,0	
11	1,31	−0,031	−0,45	
12	1,32	−0,021	−0,30	
13	*			z'-Scores of the single values: 7,4 and −6,9
14	1,50	0,159	2,3	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
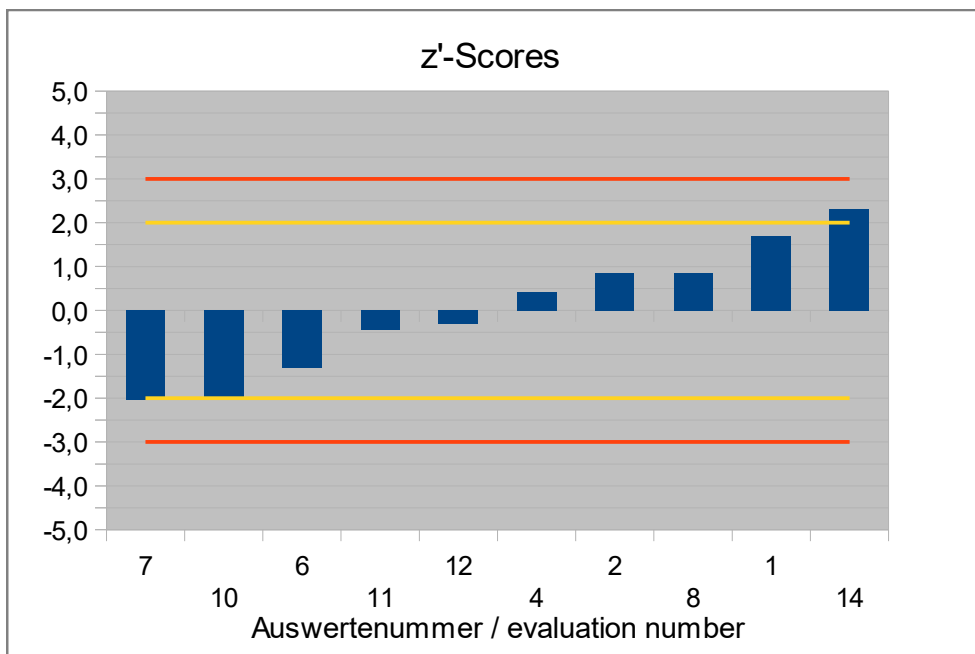
Abb. / Fig. 10:   z'-Scores L-Glutamin / L-Glutamine

4.7 L-Glutamic acid in g/100g

Since too few quantitative results are given, no statistical evaluation was carried out.

Auswerte-nummer / Evaluation number	L-Glutaminsäure / L-Glutamic acid [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1					
2					
3	0,061				
4	<0,050				
5					
6	0,130				
7	<0,02				
8					
9	<0,01				
10					
11					
12	< 0,01				
13					
14					

4.8 Glycine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11°
Number of outliers	1
Mean	0,928
Median	0,933
Robust Mean (X_{pt})	**0,940**
Robust standard deviation (S*)	**0,0785**
Number with 2 replicates	9
Repeatability SD (S_r)	0,0974
Repeatability (CV_r)	10,3%
Reproducibility SD (S_R)	–
Reproducibility (CV_R)	–
Target range:	
Target standard deviation σ_{pt}	**0,0484**
Target standard deviation (for Information)	0,0380
lower limit of target range	**0,843**
upper limit of target range	**1,04**
Quotient S*/σ_{pt}	*1,6*
Standard uncertainty U(X_{pt})	*0,0296*
Results in the target range	*9*
Percent in the target range	*82%*

° *results without outlier (result no. 14)*
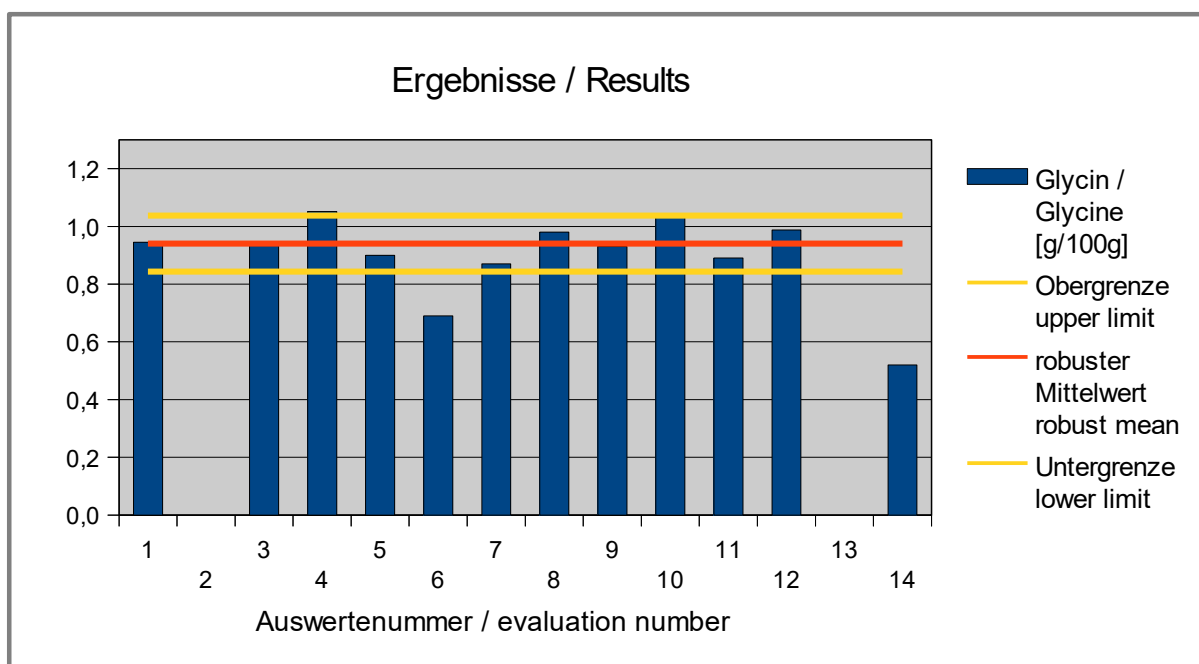
Abb. / Fig. 11: Ergebnisse Glycin **/** Results Glycine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	Glycin / Glycine [g/100g]		Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1	0,945	*	0,0048	0,10	0,13	
2						
3	0,933		−0,0072	−0,15	−0,19	
4	1,05		0,111	2,3	2,9	
5	0,900		−0,0402	−0,83	−1,1	
6	0,690		−0,250	−5,2	−6,6	
7	0,870		−0,0702	−1,4	−1,8	
8	0,980		0,0398	0,82	1,0	
9	0,930		−0,0102	−0,21	−0,27	
10	1,03		0,0938	1,9	2,5	
11	0,890		−0,0502	−1,0	−1,3	
12	0,987		0,0468	1,0	1,2	
13						
14	0,520					Ausreisser / Outlier

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
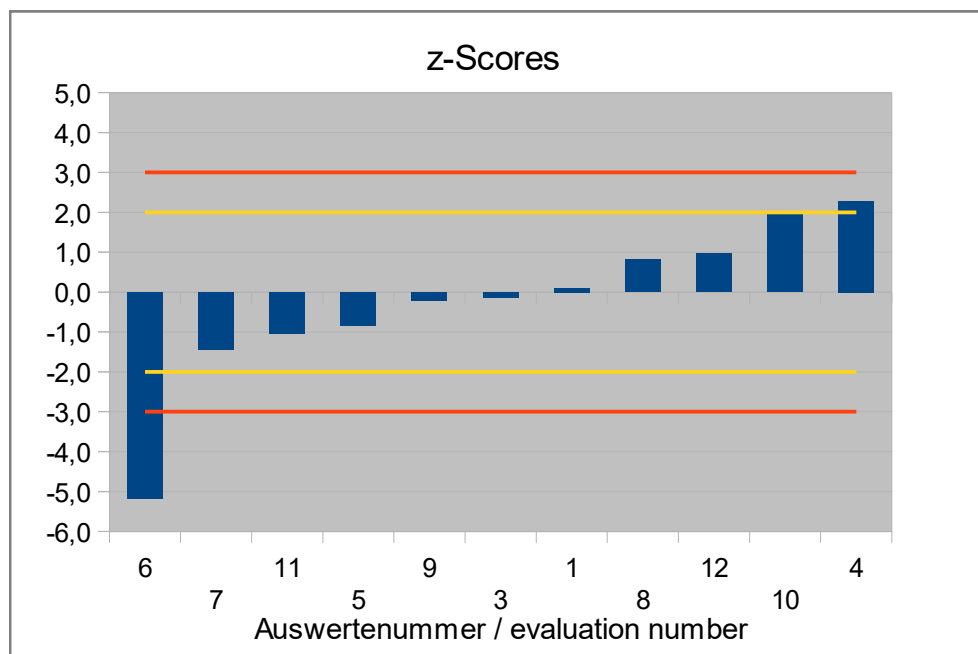
Abb. / Fig. 12:   z-Scores Glycin / Glycine

4.9 L-Histidine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11
Number of outliers	–
Mean	0,688
Median	0,580
Robust Mean (X_{pt})	**0,590**
Robust standard deviation (S*)	**0,0513**
Number with 2 replicates	9
Repeatability SD (S_r)	0,0173
Repeatability (CV_r)	2,96%
Reproducibility SD (S_R)	0,0464
Reproducibility (CV_R)	7,92%
Target range:	
Target standard deviation σ_{pt}	**0,0948**
Target standard deviation (for Information)	0,0256
lower limit of target range	**0,401**
upper limit of target range	**0,780**
Quotient S/σ_{pt}*	*0,54*
Standard uncertainty $U_{(Xpt)}$	*0,0193*
Results in the target range	*10*
Percent in the target range	*91%*
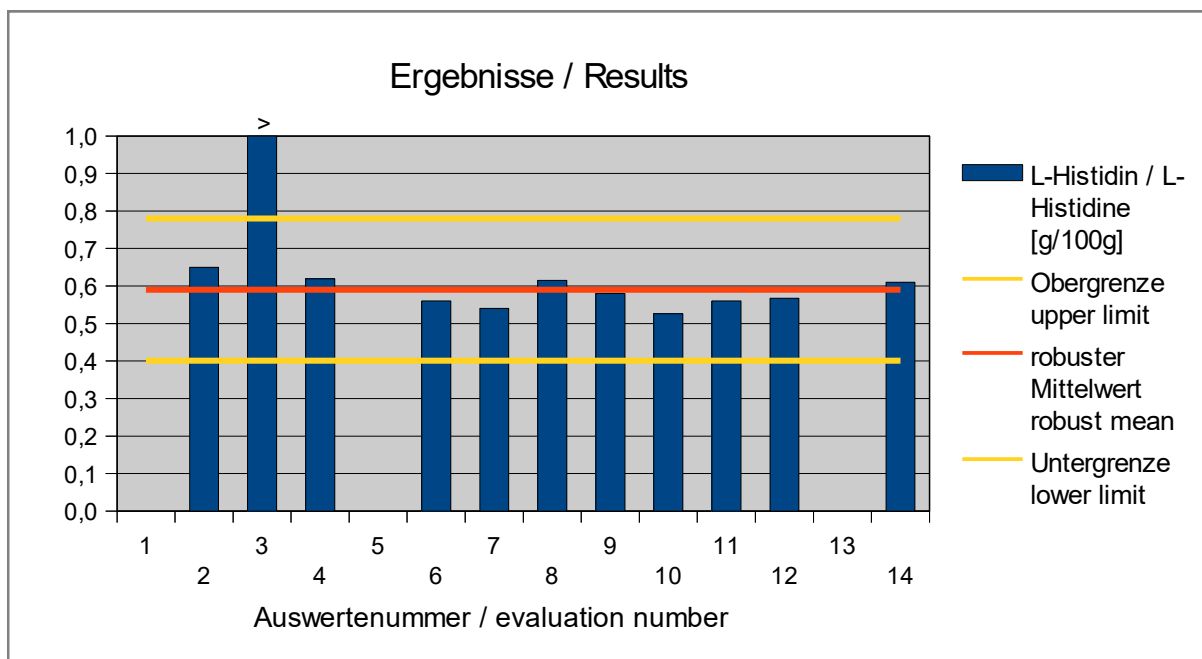
Abb. / Fig. 13: Ergebnisse L-Histidin **/** Results L-Histidine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Histidin / L-Histidine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1					
2	0,650	0,0596	0,63	2,3	
3	1,74	1,15	12	45	
4	0,619	0,0286	0,30	1,1	
5					
6	0,560	−0,0304	−0,32	−1,2	
7	0,540	−0,0504	−0,53	−2,0	
8	0,615	0,0246	0,26	1,0	
9	0,580	−0,0104	−0,11	−0,41	
10	0,526	−0,0644	−0,68	−2,5	
11	0,560	−0,0304	−0,32	−1,2	
12	0,567	−0,0234	−0,25	−0,92	
13					
14	0,610	0,0196	0,21	0,77	
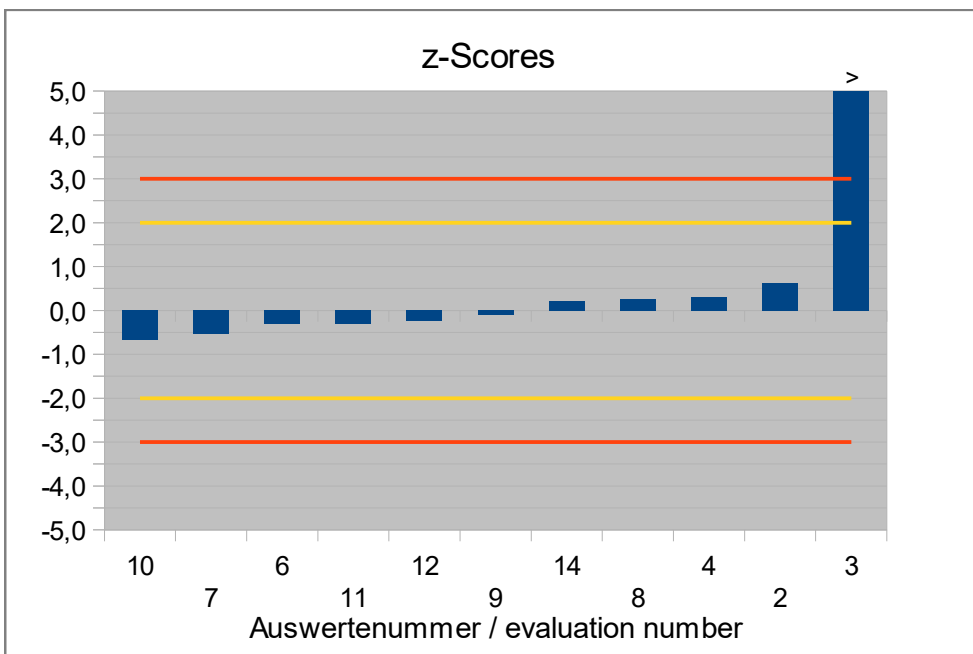
Abb. / Fig. 14:   z-Scores L-Histidin / L-Histidine

4.10 L-Isoleucine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	0
Mean	0,919
Median	0,927
Robust Mean (X_{pt})	**0,925**
Robust standard deviation (S*)	**0,0535**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0241
Repeatability (CV_r)	2,62%
Reproducibility SD (S_R)	0,0707
Reproducibility (CV_R)	7,69%
Target range:	
Target standard deviation σ_{pt}	**0,0374**
Target standard deviation (for Information)	0,0422
lower limit of target range	**0,850**
upper limit of target range	**1,00**
Quotient S*/σ_{pt}	*1,4*
Standard uncertainty $U_{(Xpt)}$	*0,0193*
Results in the target range	*10*
Percent in the target range	*83%*
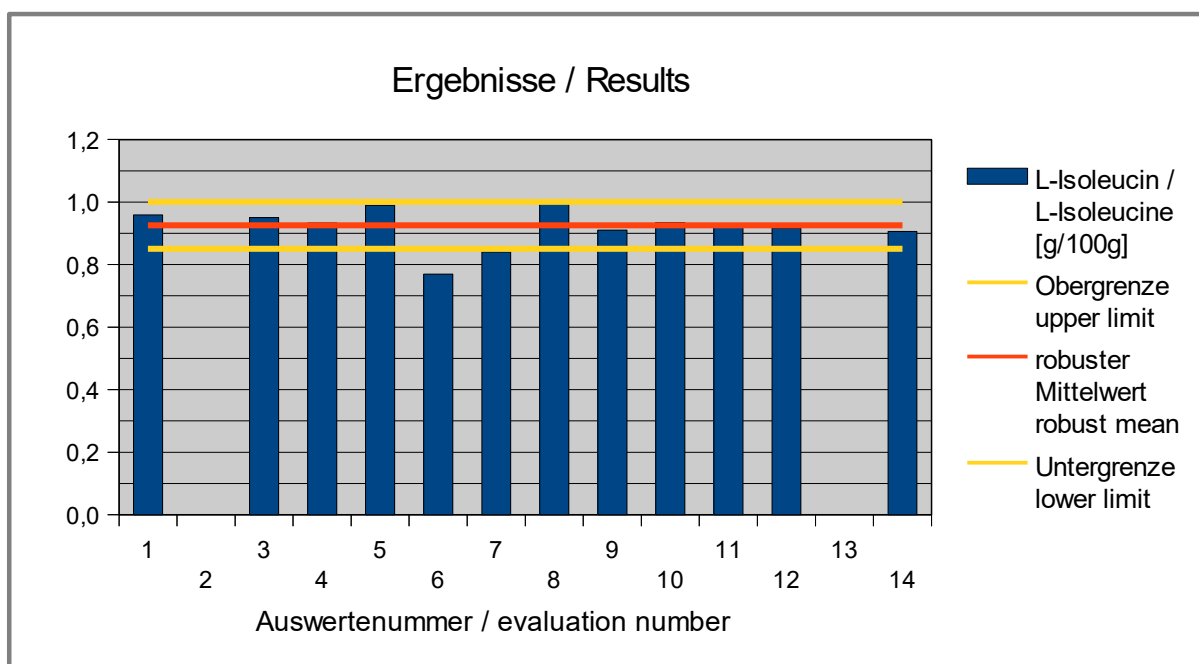
Abb. / Fig. 15: Ergebnisse L-Isoleucin **/** Results L-Isoleucine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Isoleucin / L-Isoleucine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1	0,959 *	0,0337	0,90	0,80	
2					
3	0,950	0,0247	0,66	0,58	
4	0,933	0,0077	0,20	0,18	
5	0,990	0,0647	1,7	1,5	
6	0,770	−0,155	−4,1	−3,7	
7	0,840	−0,0853	−2,3	−2,0	
8	0,995	0,0697	1,9	1,6	
9	0,910	−0,0153	−0,41	−0,36	
10	0,934	0,0087	0,23	0,20	
11	0,920	−0,0053	−0,14	−0,13	
12	0,917	−0,0083	−0,22	−0,20	
13	*				z-Scores of the single values: 0,67 and -11
14	0,906	−0,0193	−0,52	−0,46	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
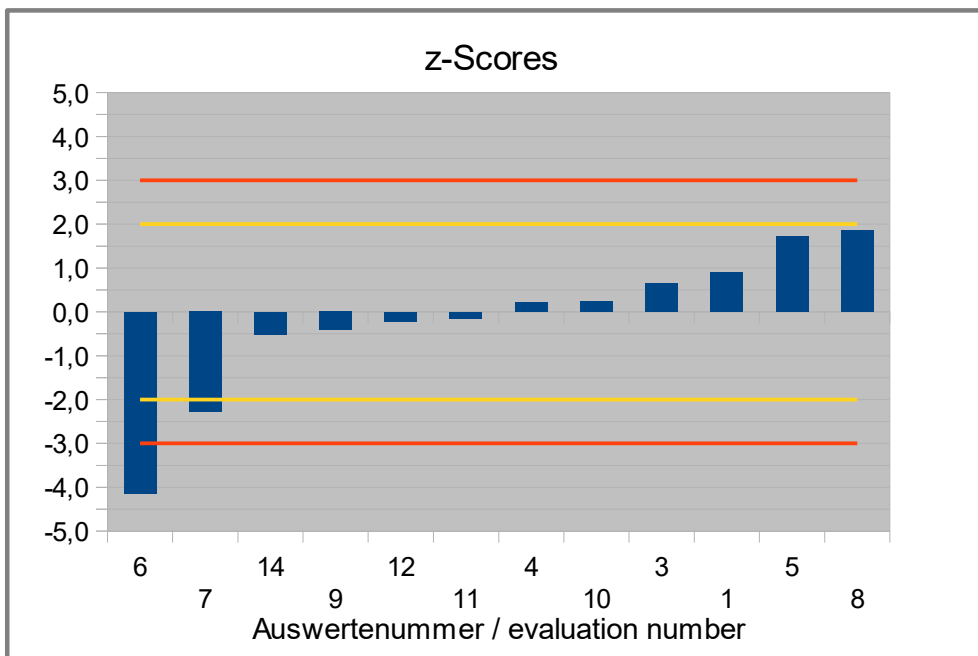
Abb. / Fig. 16:   z-Scores L-Isoleucin / L-Isoleucine

4.11 L-Leucine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	0
Mean	1,53
Median	1,54
Robust Mean (X_{pt})	**1,54**
Robust standard deviation (S*)	**0,100**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0457
Repeatability (CV_r)	2,97%
Reproducibility SD (S_R)	0,130
Reproducibility (CV_R)	8,45%
Target range:	
Target standard deviation σ_{pt}	**0,0579**
Target standard deviation (for Information)	0,0667
lower limit of target range	**1,43**
upper limit of target range	**1,66**
Quotient S*/σ_{pt}	*1,7*
Standard uncertainty $U_{(Xpt)}$	*0,0361*
Results in the target range	*10*
Percent in the target range	*83%*
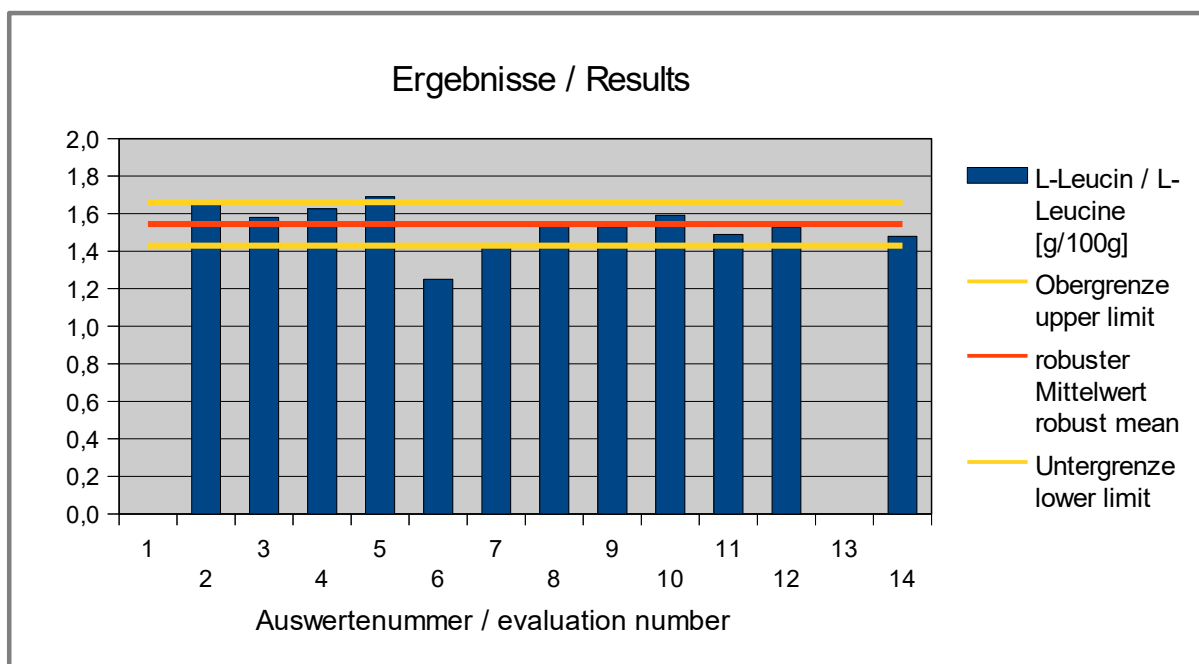
Abb. / Fig. 17: Ergebnisse L-Leucin **/** Results L-Leucine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Leucin / L-Leucine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1	*				z-Scores of the single values: 3,5 and 0,31
2	1,65	0,105	1,8	1,6	
3	1,58	0,035	0,61	0,53	
4	1,63	0,081	1,4	1,2	
5	1,69	0,145	2,5	2,2	
6	1,25	−0,295	−5,1	−4,4	
7	1,43	−0,115	−2,0	−1,7	
8	1,55	0,005	0,09	0,08	
9	1,53	−0,015	−0,26	−0,22	
10	1,59	0,046	0,80	0,69	
11	1,49	−0,055	−0,95	−0,82	
12	1,53	−0,018	−0,31	−0,27	
13	*				z-Scores of the single values: 2,4 and -13
14	1,48	−0,065	−1,1	−0,97	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
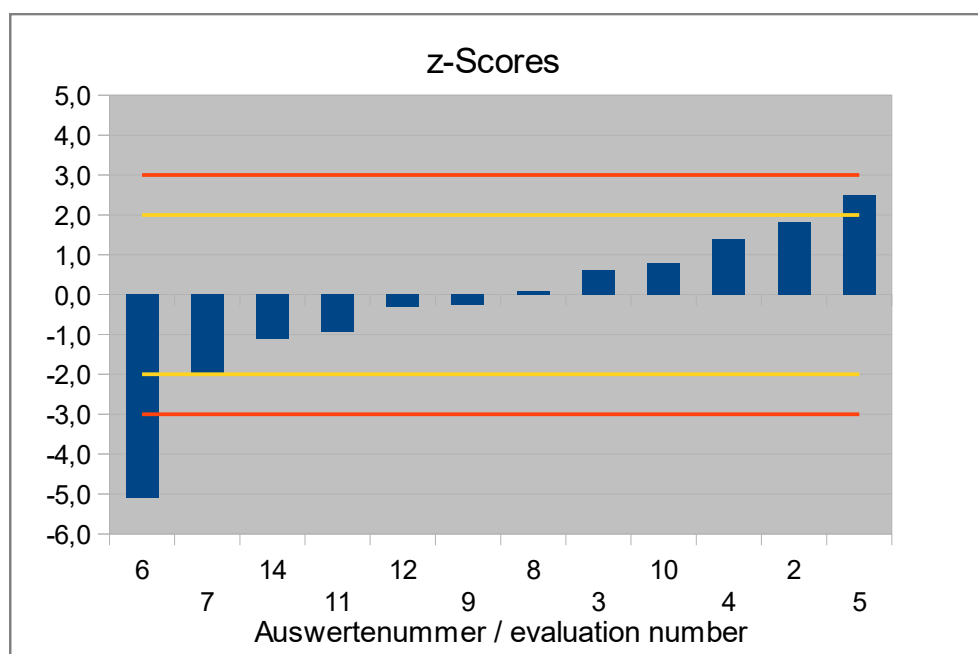
Abb. / Fig. 18:   z-Scores L-Leucin / L-Leucine

4.12 L-Lysine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	0
Mean	1,08
Median	1,12
Robust Mean (X_{pt})	**1,08**
Robust standard deviation (S*)	**0,168**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0561
Repeatability (CV_r)	5,11%
Reproducibility SD (S_R)	0,146
Reproducibility (CV_R)	13,3%
Target range:	
Target standard deviation σ_{pt}	**0,138**
Target standard deviation (for Information)	0,0427
lower limit of target range	**0,806**
upper limit of target range	**1,36**
Quotient S*/σ_{pt}	*1,2*
Standard uncertainty U(X_{pt})	*0,0604*
Results in the target range	*12*
Percent in the target range	*100%*
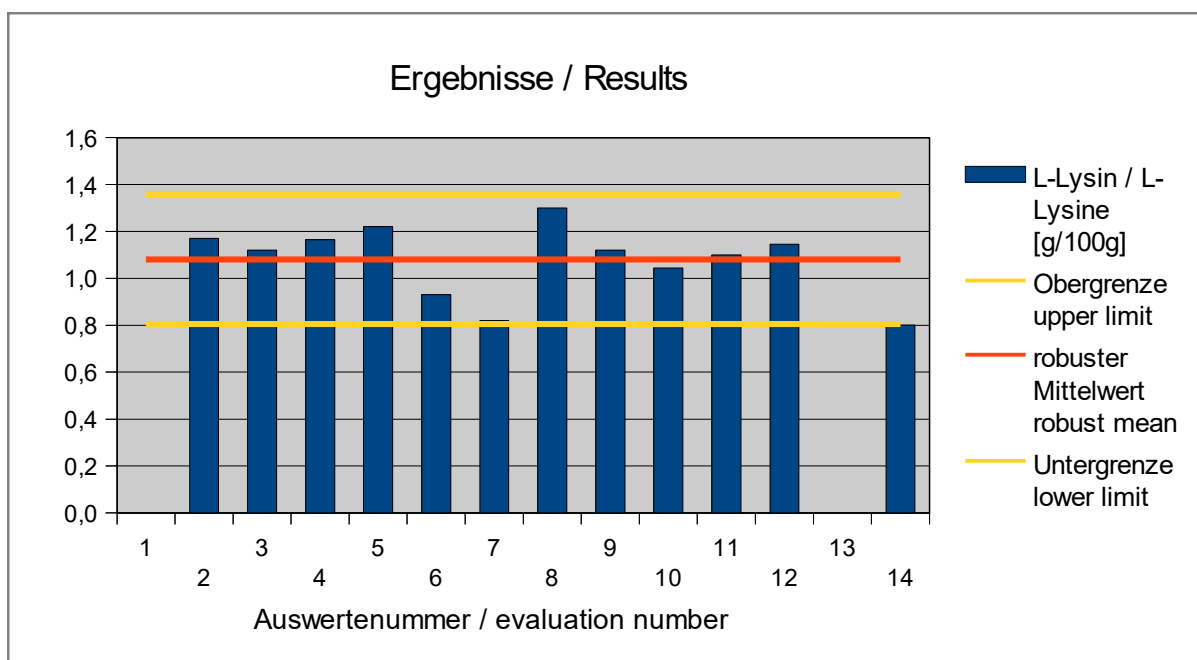
Abb. / Fig. 19: Ergebnisse L-Lysin **/** Results L-Lysine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Lysin / L-Lysine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_pt)	z-Score (Info)	Hinweis Remark
1	*				z-Scores of the single values: -0,78 and 2,0
2	1,17	0,089	0,64	2,1	
3	1,12	0,039	0,28	0,91	
4	1,17	0,084	0,61	2,0	
5	1,22	0,139	1,0	3,2	
6	0,930	−0,151	−1,1	−3,5	
7	0,820	−0,261	−1,9	−6,1	
8	1,30	0,219	1,6	5,1	
9	1,12	0,039	0,28	0,91	
10	1,04	−0,037	−0,27	−0,87	
11	1,10	0,019	0,14	0,44	
12	1,15	0,065	0,47	1,5	
13					
14	0,801	−0,280	−2,0	−6,6	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
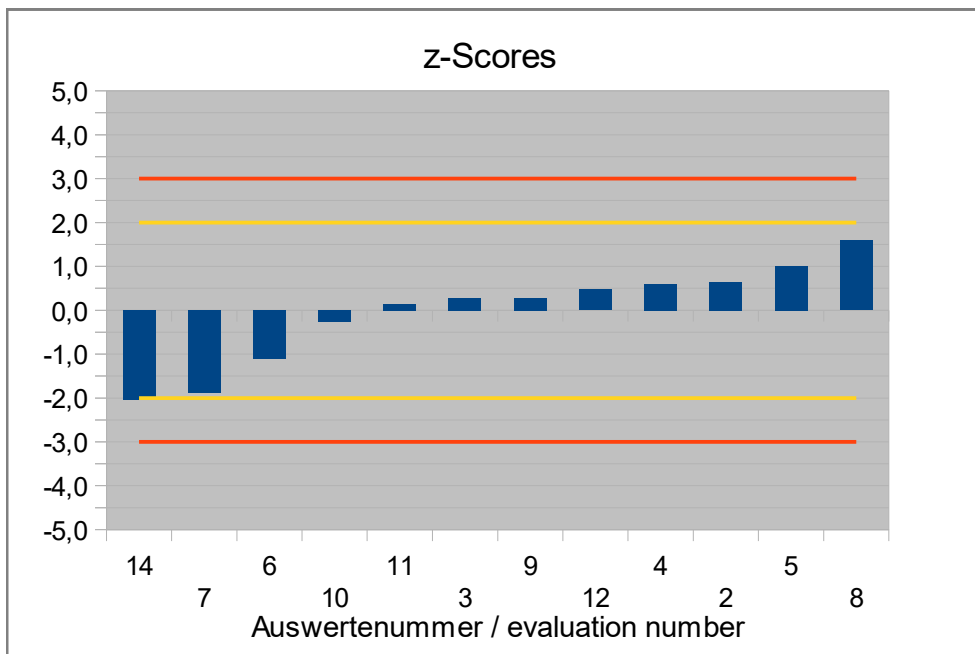
Abb. / Fig. 20:   z-Scores L-Lysin / L-Lysine

4.13 L-Methionine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	13
Number of outliers	0
Mean	0,260
Median	0,257
Robust Mean (X_{pt})	**0,259**
Robust standard deviation (S*)	**0,0224**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0196
Repeatability (CV_r)	7,45%
Reproducibility SD (S_R)	0,0260
Reproducibility (CV_R)	9,89%
Target range:	
Target standard deviation σ_{pt}	**0,0172**
Target standard deviation (for Information)	0,0127
lower limit of target range	**0,225**
upper limit of target range	**0,293**
Quotient S*/σ_{pt}	*1,3*
Standard uncertainty $U_{(Xpt)}$	*0,00777*
Results in the target range	*12*
Percent in the target range	*92%*
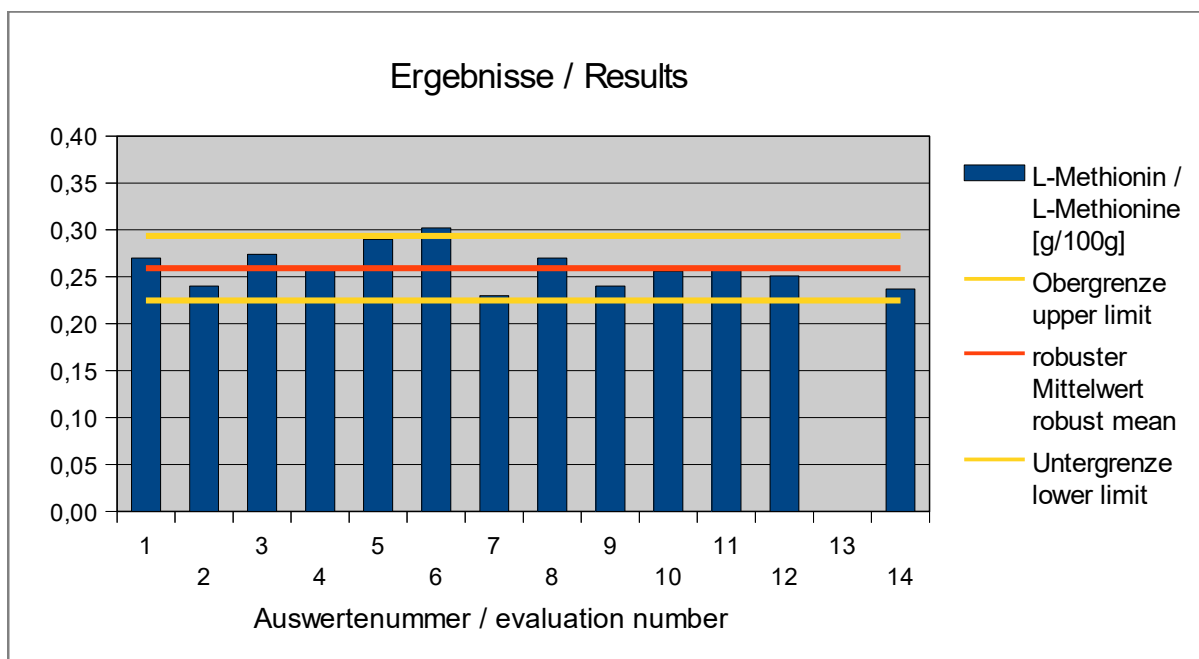
Abb. / Fig. 21: Ergebnisse L-Methionin **/** Results L-Methionine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Methionin / L-Methionine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1	0,270 *	0,0109	0,64	0,86	
2	0,240	−0,0191	−1,1	−1,5	
3	0,274	0,0149	0,87	1,2	
4	0,257	−0,0021	−0,12	−0,16	
5	0,290	0,0309	1,8	2,4	
6	0,302	0,0429	2,5	3,4	
7	0,230	−0,0291	−1,7	−2,3	
8	0,270	0,0109	0,64	0,86	
9	0,240	−0,0191	−1,1	−1,5	
10	0,256	−0,0031	−0,18	−0,24	
11	0,260	0,0009	0,06	0,07	
12	0,251	−0,0081	−0,47	−0,63	
13					
14	0,237	−0,0221	−1,3	−1,7	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
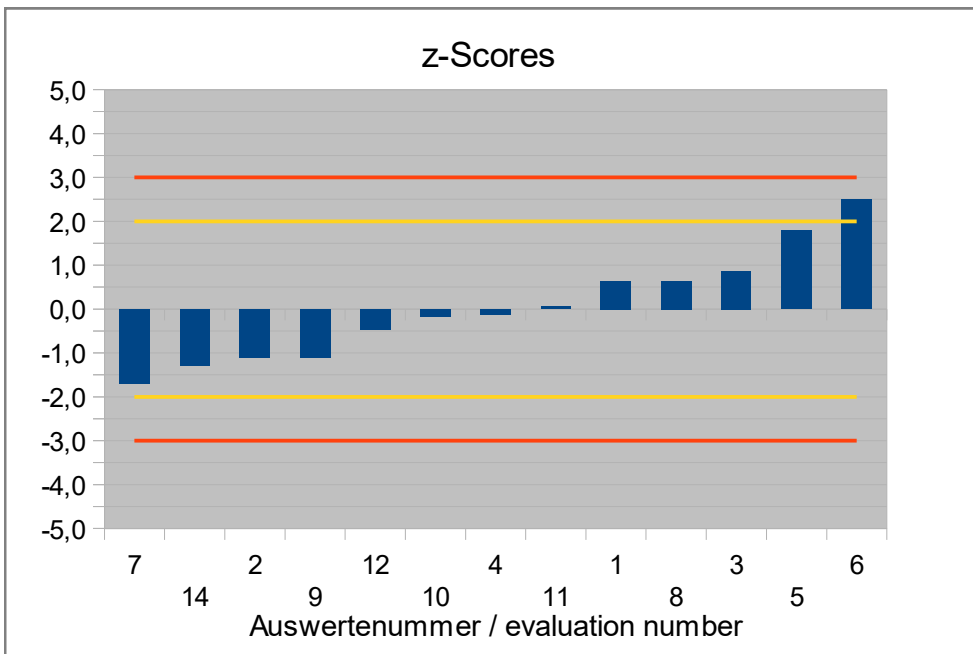
Abb. / Fig. 22:   z-Scores L-Methionin / L-Methionine

4.14 L-Phenylalanine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12°
Number of outliers	1
Mean	0,744
Median	0,761
Robust Mean (X_{pt})	**0,744**
Robust standard deviation (S*)	**0,102**
Number with 2 replicates	11
Repeatability SD (S_r)	0,0669
Repeatability (CV_r)	9,09%
Reproducibility SD (S_R)	0,101
Reproducibility (CV_R)	13,7%
Target range:	
Target standard deviation $\sigma_{pt'}$	**0,0579**
lower limit of target range	**0,629**
upper limit of target range	**0,860**
Quotient S/$\sigma_{pt'}$*	*1,8*
Standard uncertainty $U_{(Xpt)}$	*0,0368*
Results in the target range	*10*
Percent in the target range	*83%*

° results without outlier (result no. 14)
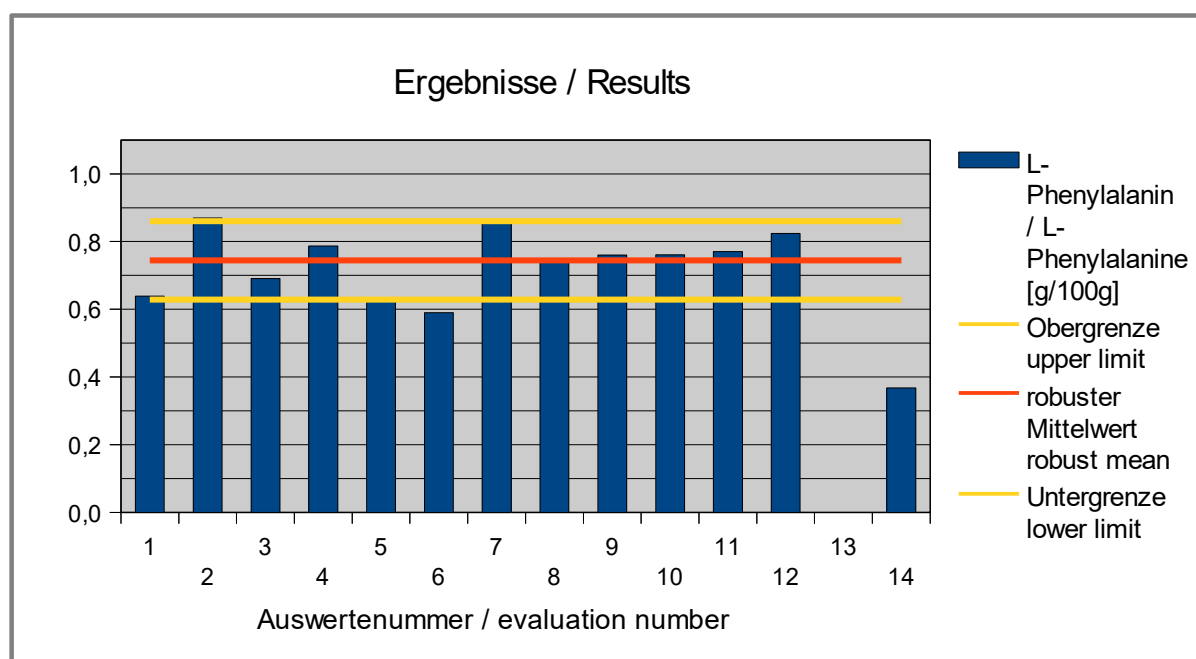
Abb. / Fig. 23: Ergebnisse L-Phenylalanin **/** Results L-Phenylalanine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Phenylalanin / L-Phenylalanine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z'-Score ($\sigma_{pt'}$)	z-Score (Info)	Hinweis Remark
1	0,639 *	−0,106	−1,8	−3,4	
2	0,870	0,126	2,2	4,0	
3	0,691	−0,0534	−0,92	−1,7	
4	0,787	0,0426	0,74	1,4	
5	0,630	−0,114	−2,0	−3,7	
6	0,590	−0,154	−2,7	−5,0	
7	0,860	0,116	2,0	3,7	
8	0,750	0,0056	0,10	0,18	
9	0,760	0,0156	0,27	0,50	
10	0,761	0,0166	0,29	0,53	
11	0,770	0,0256	0,44	0,82	
12	0,824	0,0796	1,4	2,6	
13					
14	0,368				Ausreisser / Outlier

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
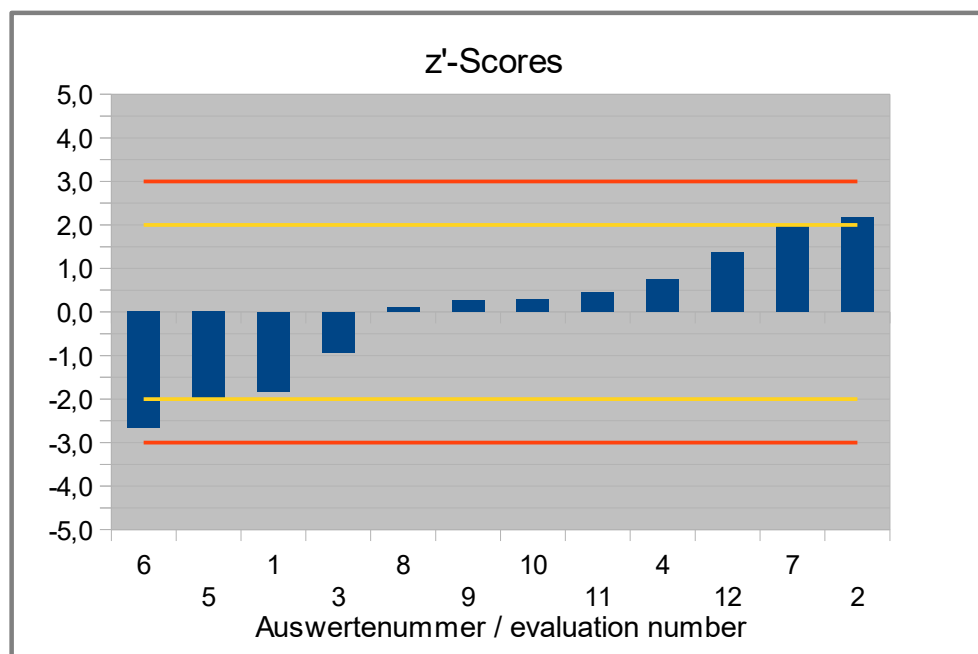
Abb. / Fig. 24:   z'-Scores L-Phenylalanin / L-Phenylalanine

4.15 L-Proline in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	–
Mean	1,11
Median	1,16
Robust Mean (X_{pt})	**1,14**
Robust standard deviation (S*)	**0,0952**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0433
Repeatability (CV_r)	3,80%
Reproducibility SD (S_R)	0,100
Reproducibility (CV_R)	8,74%
Target range:	
Target standard deviation σ_{pt}	**0,0689**
Target standard deviation (for Information)	0,0447
lower limit of target range	**1,00**
upper limit of target range	**1,28**
Quotient S*/σ_{pt}	*1,4*
Standard uncertainty U(X_{pt})	*0,0343*
Results in the target range	*10*
Percent in the target range	*83%*
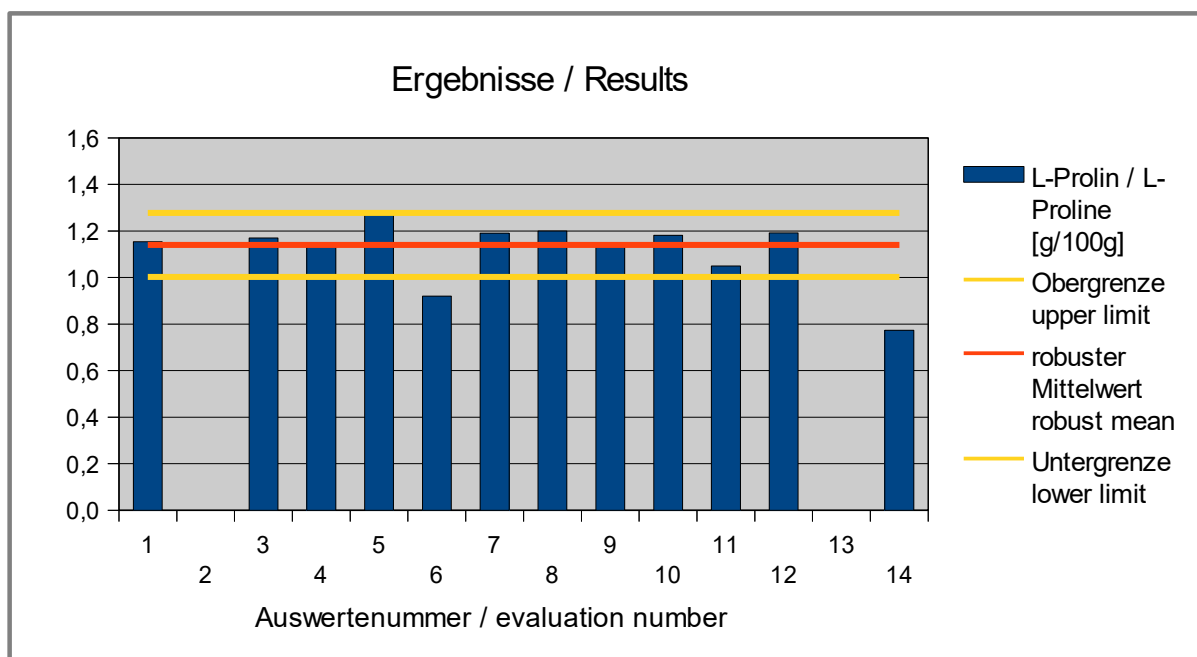
Abb. / Fig. 25: Ergebnisse L-Prolin / Results L-Proline

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Prolin / L-Proline [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1	1,15 *	0,014	0,20	0,31	
2					
3	1,17	0,030	0,44	0,68	
4	1,14	−0,004	−0,05	−0,08	
5	1,27	0,130	1,9	2,9	
6	0,920	−0,220	−3,2	−4,9	
7	1,19	0,050	0,73	1,1	
8	1,20	0,060	0,87	1,3	
9	1,14	0,000	0,00	0,01	
10	1,18	0,041	0,60	0,92	
11	1,05	−0,090	−1,3	−2,0	
12	1,19	0,052	0,76	1,2	
13					
14	0,773	−0,367	−5,3	−8,2	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
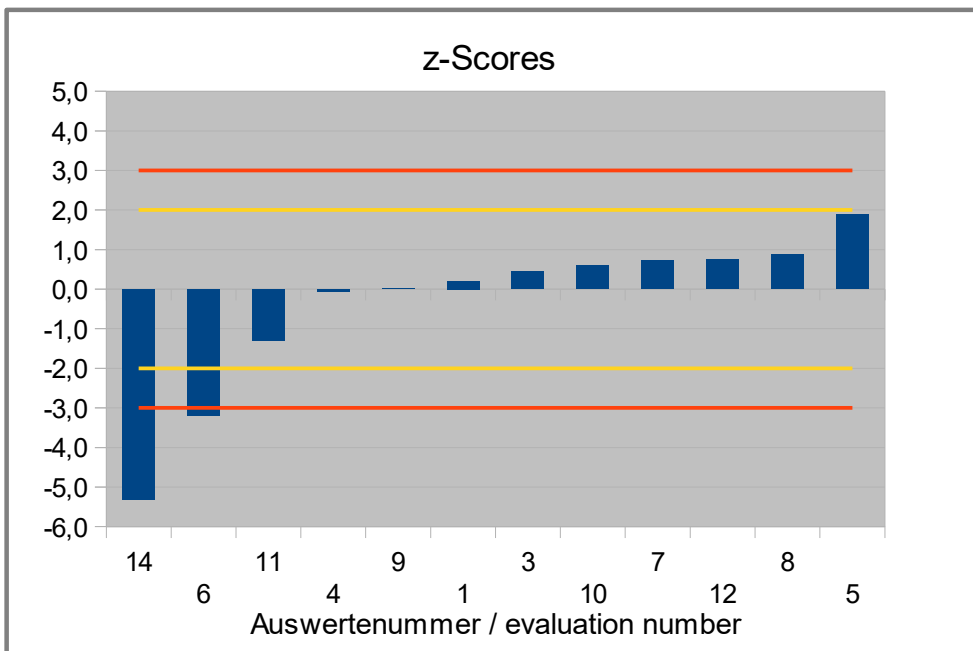
Abb. / Fig. 26:   z-Scores L-Prolin / L-Proline

4.16 L-Serine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11
Number of outliers	–
Mean	0,703
Median	0,722
Robust Mean (X_{pt})	**0,709**
Robust standard deviation (S*)	**0,0410**
Number with 2 replicates	8
Repeatability SD (S_r)	0,0304
Repeatability (CV_r)	4,25%
Reproducibility SD (S_R)	0,0406
Reproducibility (CV_R)	5,68%
Target range:	
Target standard deviation σ_{pt}	**0,0525**
Target standard deviation (for Information)	0,0299
lower limit of target range	**0,604**
upper limit of target range	**0,814**
Quotient S*/σ_{pt}	*0,78*
Standard uncertainty U(X_{pt})	*0,0154*
Results in the target range	*10*
Percent in the target range	*91%*
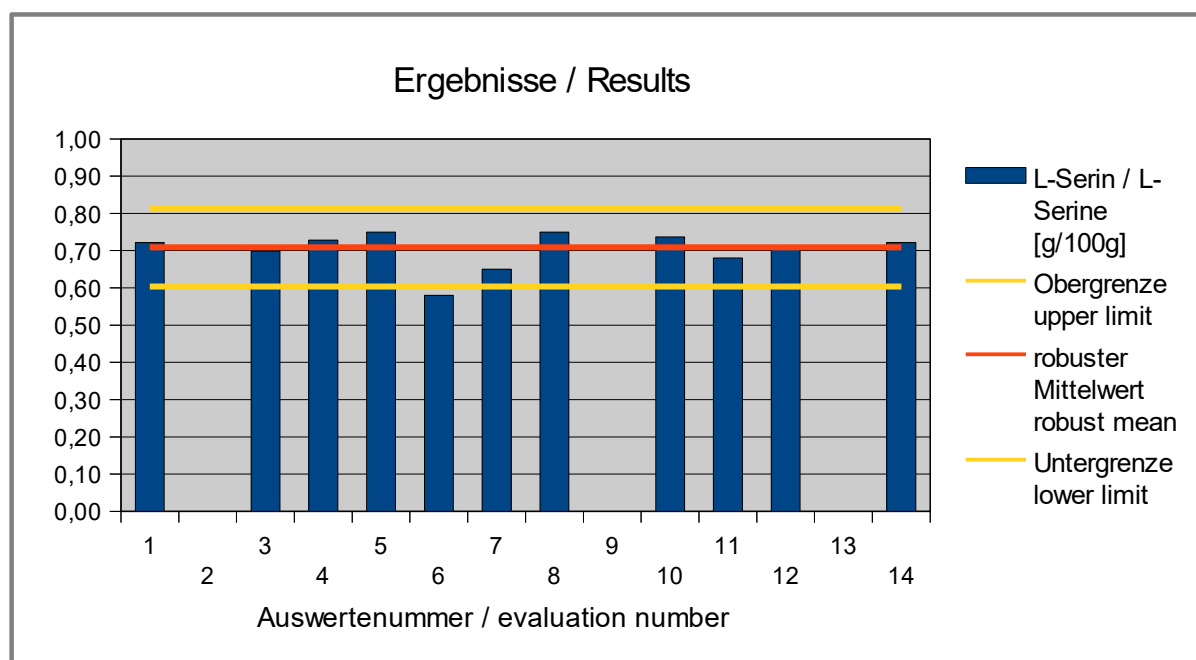
Abb. / Fig. 27: Ergebnisse L-Serin / Results L-Serine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Serin / L-Serine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis / Remark
1	0,722 *	0,0126	0,24	0,42	
2					
3	0,699	−0,0099	−0,19	−0,33	
4	0,728	0,0191	0,36	0,64	
5	0,750	0,0411	0,78	1,4	
6	0,580	−0,129	−2,5	−4,3	
7	0,650	−0,0589	−1,1	−2,0	
8	0,750	0,0411	0,78	1,4	
9					
10	0,737	0,0281	0,54	0,94	
11	0,680	−0,0289	−0,55	−0,97	
12	0,713	0,0041	0,08	0,14	
13	*				z-Scores of the single values: 16 and -10
14	0,722	0,0131	0,25	0,44	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
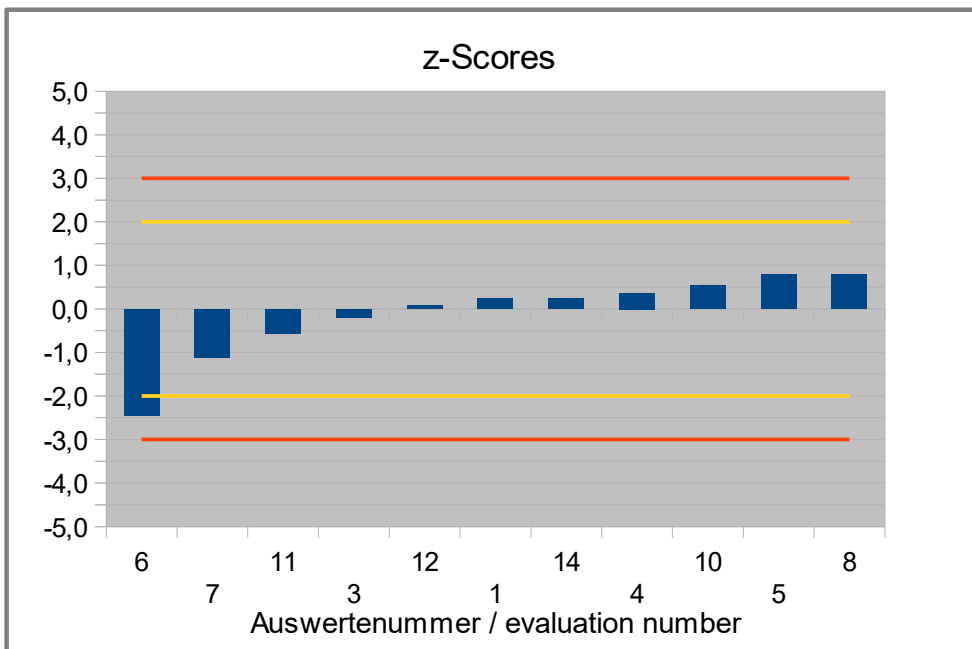
Abb. / Fig. 28:   z-Scores L-Serin / L-Serine

4.17 L-Threonine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11
Number of outliers	0
Mean	0,776
Median	0,787
Robust Mean (X_{pt})	**0,776**
Robust standard deviation (S*)	**0,0814**
Number with 2 replicates	9
Repeatability SD (S_r)	0,0496
Repeatability (CV_r)	6,34%
Reproducibility SD (S_R)	0,0768
Reproducibility (CV_R)	9,82%
Target range:	
Target standard deviation σ_{pt}	**0,0462**
Target standard deviation (for Information)	0,0323
lower limit of target range	**0,684**
upper limit of target range	**0,869**
Quotient S*/σ_{pt}	*1,8*
Standard uncertainty U(X_{pt})	*0,0307*
Results in the target range	*8*
Percent in the target range	*73%*
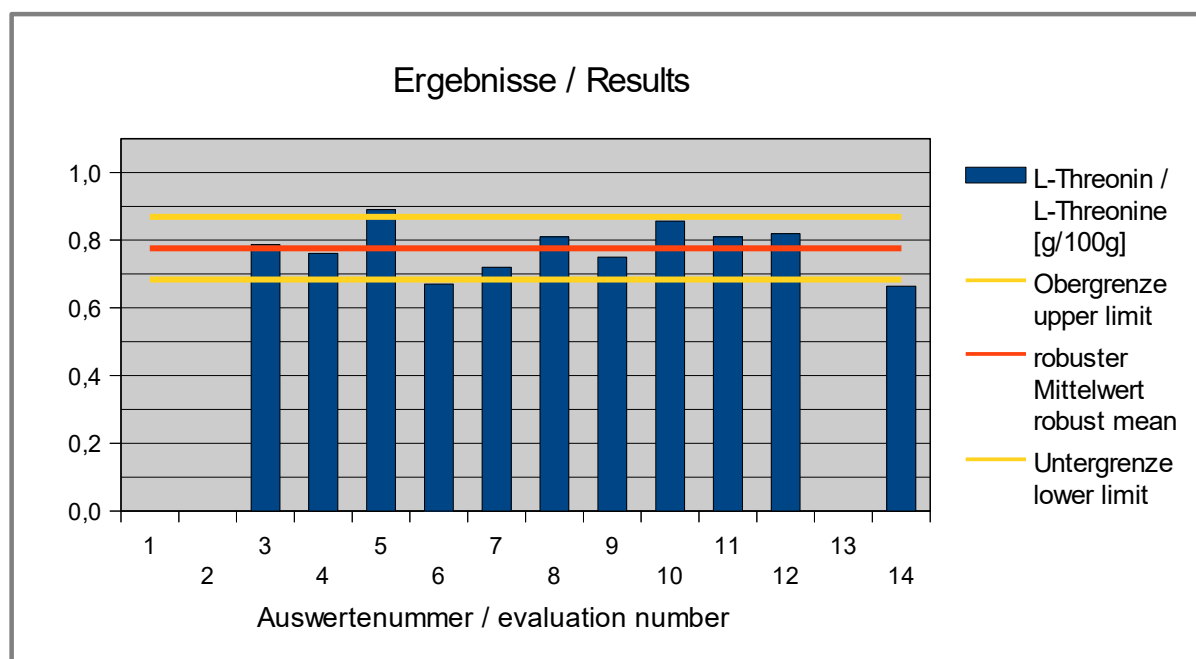
Abb. / Fig. 29: Ergebnisse L-Threonin **/** Results L-Threonine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Threonin / L-Threonine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1	*				z-Scores of the single values: 3,9 and 0,0
2					
3	0,787	0,0109	0,24	0,34	
4	0,761	−0,0151	−0,33	−0,47	
5	0,890	0,114	2,5	3,5	
6	0,670	−0,106	−2,3	−3,3	
7	0,720	−0,0561	−1,2	−1,7	
8	0,810	0,0339	0,73	1,1	
9	0,750	−0,0261	−0,56	−0,81	
10	0,856	0,0799	1,7	2,5	
11	0,810	0,0339	0,73	1,1	
12	0,819	0,0429	0,93	1,3	
13	*				z-Scores of the single values: 14 and −6,6
14	0,664	−0,112	−2,4	−3,5	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
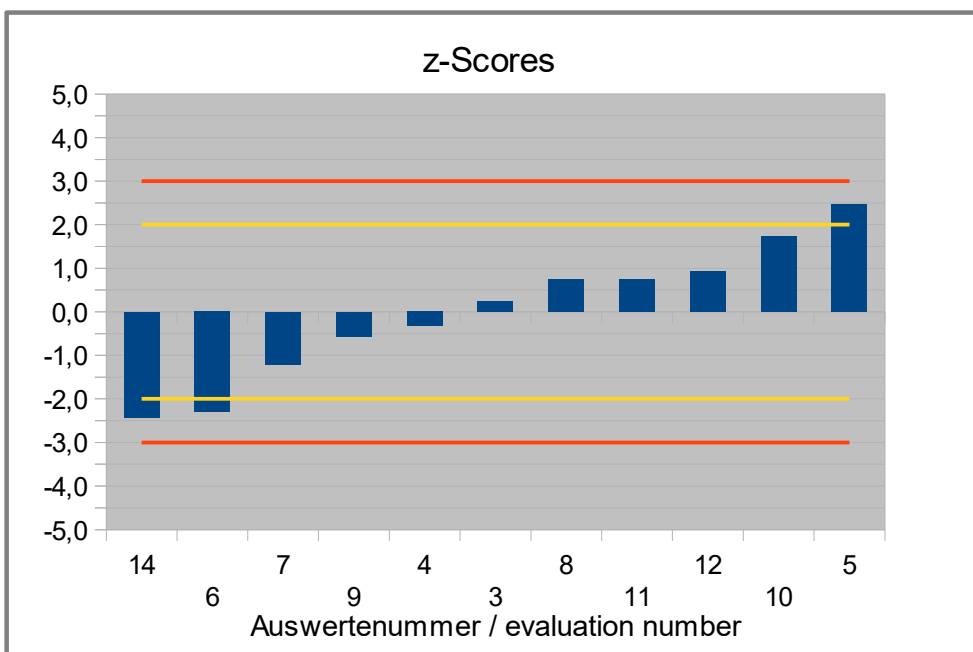
Abb. / Fig. 30:   z-Scores L-Threonin / L-Threonine

4.18 L-Tryptophan in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	13
Number of outliers	0
Mean	0,298
Median	0,300
Robust Mean (X_{pt})	**0,300**
Robust standard deviation (S*)	**0,0311**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0129
Repeatability (CV_r)	4,36%
Reproducibility SD (S_R)	0,0348
Reproducibility (CV_R)	11,8%
Target range:	
Target standard deviation σ_{pt}	**0,0594**
Target standard deviation (for Information)	0,0144
lower limit of target range	**0,181**
upper limit of target range	**0,419**
Quotient S*/σ_{pt}	*0,52*
Standard uncertainty U(X_{pt})	*0,0108*
Results in the target range	*13*
Percent in the target range	*100%*
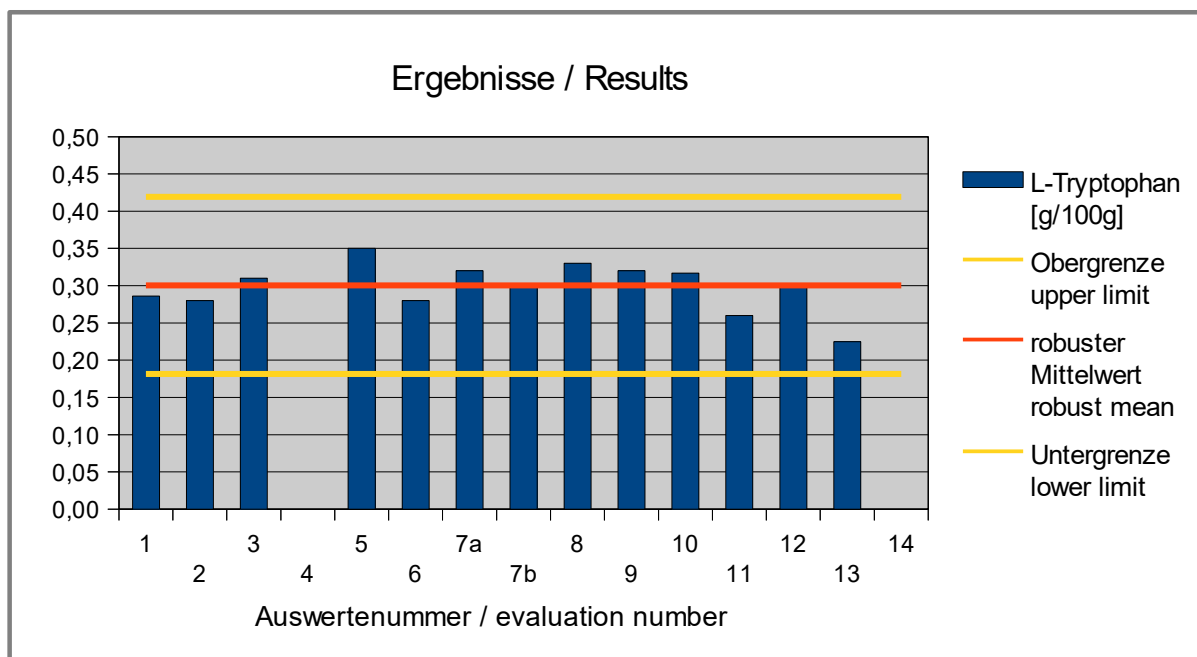
Abb. / Fig. 31: Ergebnisse / Results L-Tryptophan

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Tryptophan [g/100g]		Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	z-Score (Info)	Hinweis Remark
1	0,286	*	−0,0143	−0,24	−1,0	
2	0,280		−0,0203	−0,34	−1,4	
3	0,310		0,0097	0,16	0,68	
4						
5	0,350		0,0497	0,84	3,5	
6	0,280		−0,0203	−0,34	−1,4	
7a	0,320		0,0197	0,33	1,4	
7b	0,300		−0,0003	0,00	−0,02	
8	0,330		0,0297	0,50	2,1	
9	0,320		0,0197	0,33	1,4	
10	0,317		0,0167	0,28	1,2	
11	0,260		−0,0403	−0,68	−2,8	
12	0,300		−0,0003	0,00	−0,02	
13	0,225	*	−0,0753	−1,3	−5,2	
14						

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
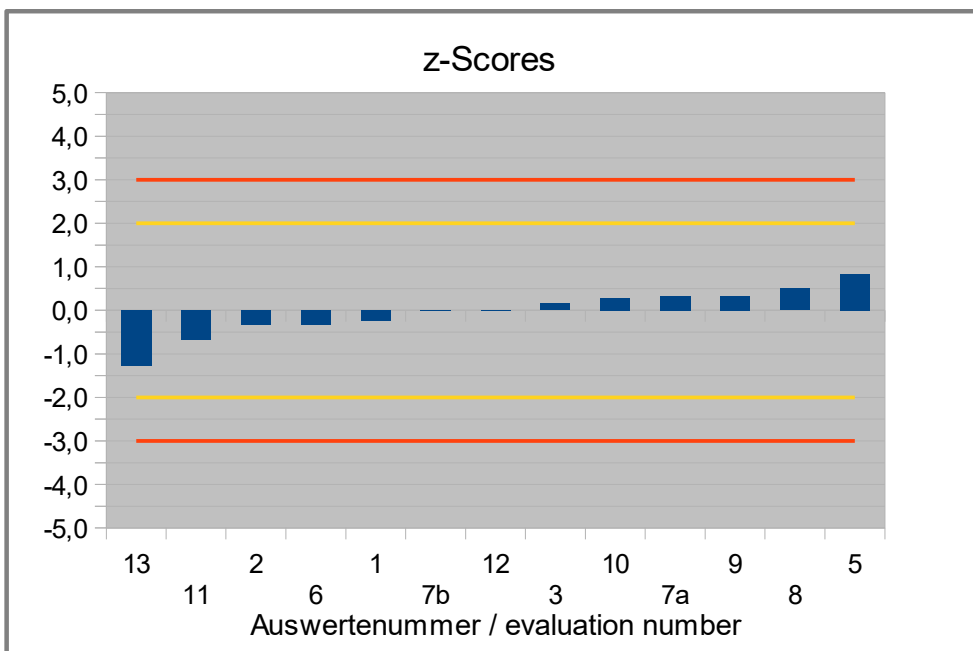
Abb. / Fig. 32:   z-Scores L-Tryptophan

4.19 L-Tyrosine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	13
Number of outliers	0
Mean	0,679
Median	0,690
Robust Mean (X_{pt})	**0,682**
Robust standard deviation (S*)	**0,0321**
Number with 2 replicates	11
Repeatability SD (S_r)	0,0250
Repeatability (CV_r)	3,70%
Reproducibility SD (S_R)	0,0385
Reproducibility (CV_R)	5,70%
Target range:	
Target standard deviation σ_{pt}	**0,0500**
Target standard deviation (for Information)	0,0289
lower limit of target range	**0,581**
upper limit of target range	**0,782**
Quotient S*/σ_{pt}	*0,64*
Standard uncertainty U(X_{pt})	*0,0111*
Results in the target range	*13*
Percent in the target range	*100%*
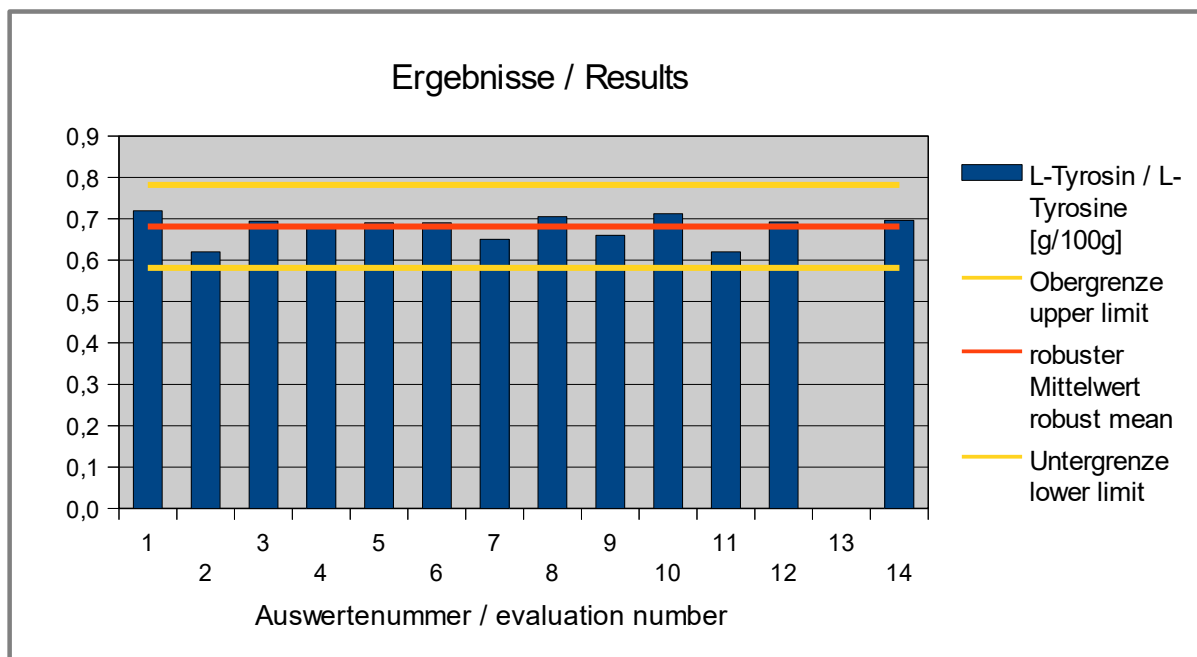
Abb. / Fig. 33: Ergebnisse L-Tyrosin / Results L-Tyrosine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer / Evaluation number	L-Tyrosin / L-Tyrosine [g/100g]	Abweichung [g/100g] / Deviation [g/100g]	z-Score (σpt)	z-Score (Info)	Hinweis / Remark
1	0,719 *	0,0375	0,75	1,3	
2	0,620	−0,0615	−1,2	−2,1	
3	0,694	0,0125	0,25	0,43	
4	0,685	0,0035	0,07	0,12	
5	0,690	0,0085	0,17	0,29	
6	0,690	0,0085	0,17	0,29	
7	0,650	−0,0315	−0,63	−1,1	
8	0,705	0,0235	0,47	0,81	
9	0,660	−0,0215	−0,43	−0,75	
10	0,712	0,0305	0,61	1,1	
11	0,620	−0,0615	−1,2	−2,1	
12	0,692	0,0105	0,21	0,36	
13	*				z-Scores of the single values: 0,36 and −6,24
14	0,696	0,0145	0,29	0,50	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
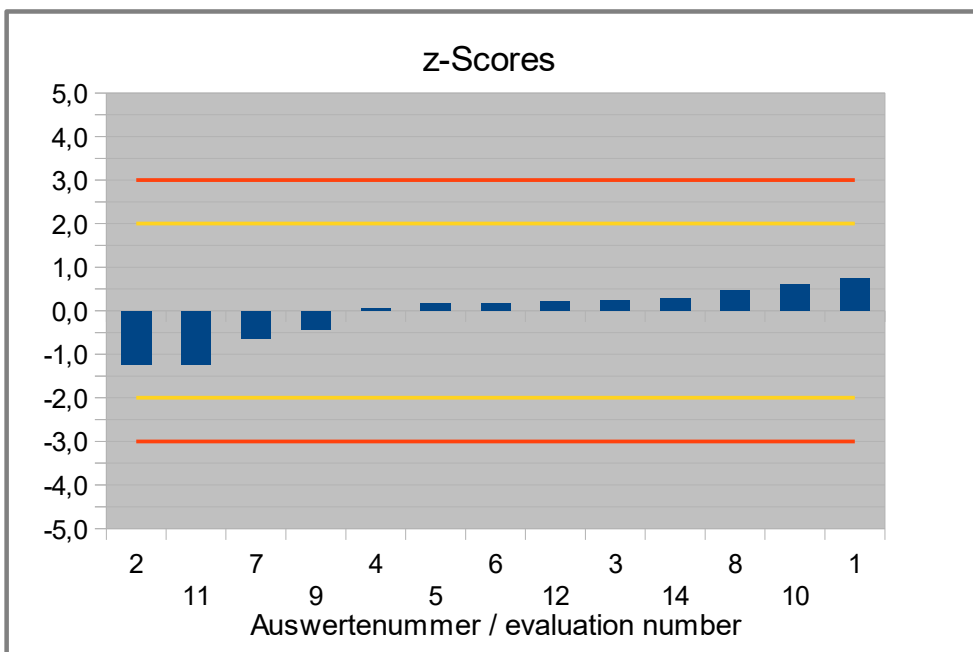
Abb. / Fig. 34:   z-Scores L-Tyrosin / L-Tyrosine

4.20 L-Valine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	12
Number of outliers	0
Mean	1,00
Median	1,01
Robust Mean (X_{Pt})	**1,01**
Robust standard deviation (S*)	**0,100**
Number with 2 replicates	10
Repeatability SD (S_r)	0,0351
Repeatability (CV_r)	3,49%
Reproducibility SD (S_R)	0,114
Reproducibility (CV_R)	11,3%
Target range:	
Target standard deviation σ_{pt}'	**0,0609**
Target standard deviation (for Information)	0,0402
lower limit of target range	**0,884**
upper limit of target range	**1,13**
Quotient S*/σ_{pt}'	*1,6*
Standard uncertainty U(X_{pt})	*0,0362*
Results in the target range	*11*
Percent in the target range	*92%*
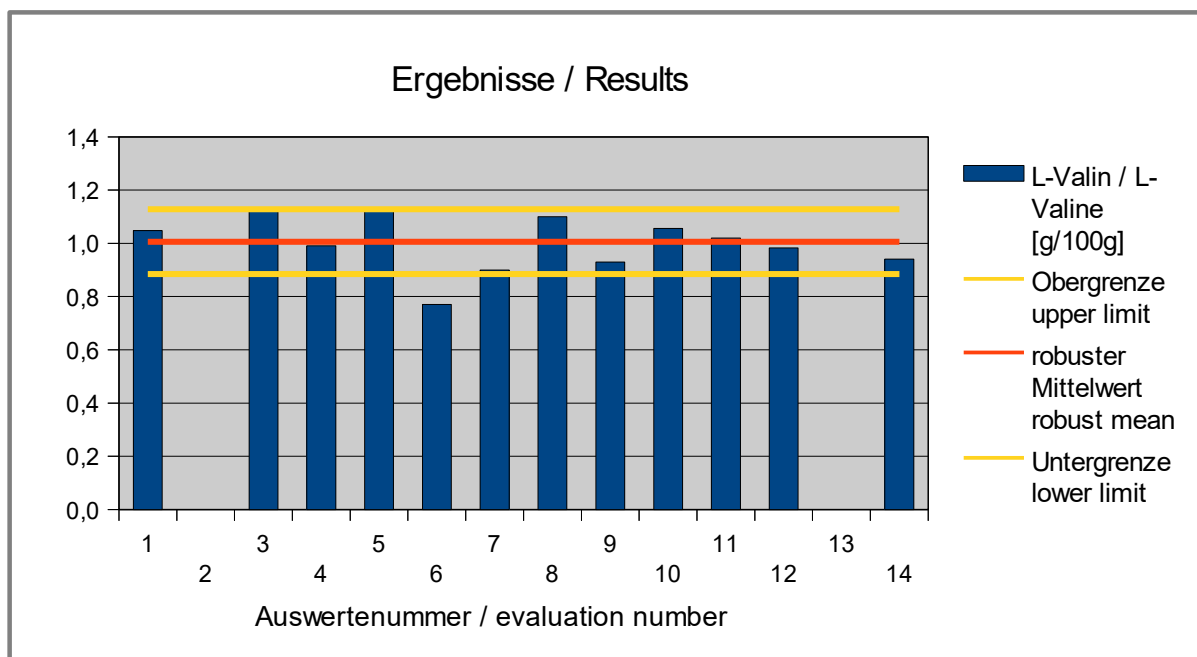
Abb. / Fig. 35: Ergebnisse L-Valin / Results L-Valine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	L-Valin / L-Valine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z'-Score ($\sigma_{pt'}$)	z-Score (Info)	Hinweis Remark
1	1,05 *	0,042	0,69	1,0	
2					
3	1,12	0,114	1,9	2,8	
4	0,991	−0,015	−0,25	−0,38	
5	1,13	0,124	2,0	3,1	
6	0,770	−0,236	−3,9	−5,9	
7	0,900	−0,106	−1,7	−2,6	
8	1,10	0,094	1,5	2,3	
9	0,930	−0,076	−1,3	−1,9	
10	1,06	0,050	0,82	1,2	
11	1,02	0,014	0,23	0,34	
12	0,983	−0,023	−0,38	−0,58	
13	*				z'-Scores of the single values: 151 and −6,9
14	0,941	−0,065	−1,1	−1,6	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
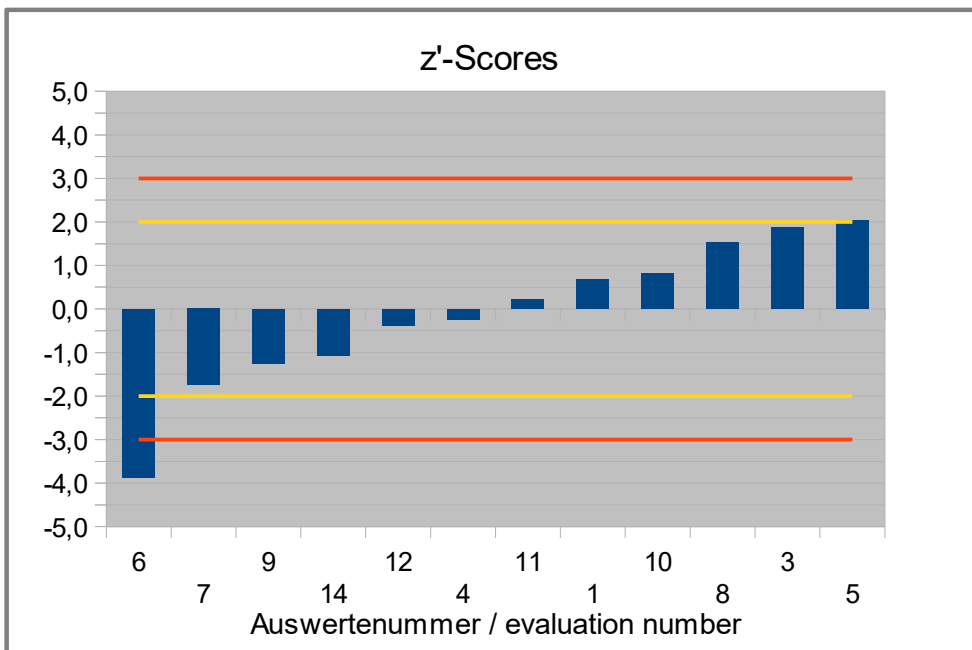
Abb. / Fig. 36:   z'-Scores L-Valin / L-Valine

4.21 Taurine in g/100g

Vergleichsuntersuchung / Proficiency Test

Statistic Data	
Number of results	11
Number of outliers	-
Mean	0,0525
Median	0,0490
Robust Mean (X_{Pt})	**0,0494**
Robust standard deviation (S*)	**0,00439**
Number with 2 replicates	8
Repeatability SD (S_r)	0,00185
Repeatability (CV_r)	3,77%
Reproducibility SD (S_R)	0,00414
Reproducibility (CV_R)	8,45%
Target range:	
Target standard deviation σ_{Pt}	**0,00311**
lower limit of target range	**0,0432**
upper limit of target range	**0,0556**
Quotient S/σ_{pt}*	*1,4*
Standard uncertainty $U_{(Xpt)}$	*0,00165*
Results in the target range	*10*
Percent in the target range	*91%*
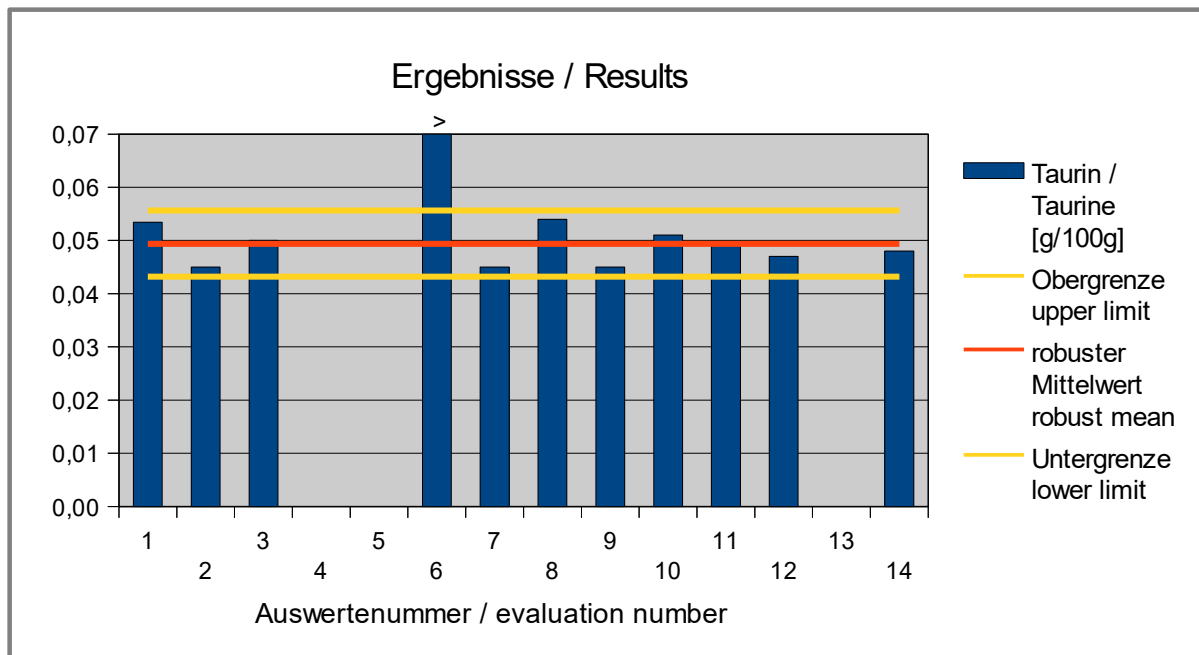
Abb. / Fig. 37: Ergebnisse Taurin / Results Taurine

Ergebnisse der Teilnehmer:
Results of Participants:

Auswerte-nummer Evaluation number	Taurin / Taurine [g/100g]	Abweichung [g/100g] Deviation [g/100g]	z-Score (σ_{pt})	Hinweis Remark
1	0,0535 *	0,00405	1,3	
2	0,0450	−0,00440	−1,4	
3	0,0500	0,00060	0,19	
4				
5				
6	0,0897	0,0403	13	
7	0,0450	−0,00440	−1,4	
8	0,0540	0,00460	1,5	
9	0,0450	−0,00440	−1,4	
10	0,0510	0,00160	0,51	
11	0,0490	−0,00040	−0,13	
12	0,0470	−0,00240	−0,77	
13				
14	0,0480	−0,00140	−0,45	

* Mean calculated by DLA if difference between single samples ≤ 3 σpt
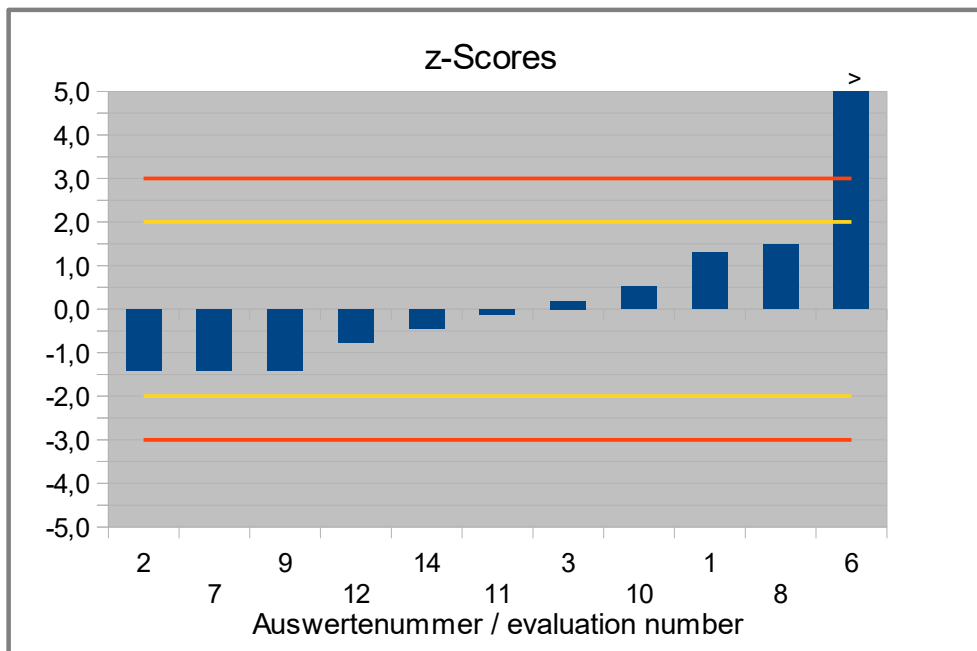
Abb. / Fig. 38:   z-Scores Taurin / Taurine

4.22 Participants' z-Scores: Overview table

Evaluation number	Ala	Arg	Asp	Cys	Glu	Gly	His	Iso	Leu	Lys	Met	Phe	Pro	Ser	Thr	Trp	Tyr	Val	Tau
1	1,4	-0,31	-0,09		1,7	0,10		0,90			0,64	-1,8	0,20	0,24		-0,24	0,75	0,69	1,3
2		4,5			0,85		0,63		1,8	0,64	-1,1	2,2				-0,34	-1,2		-1,4
3	2,1	1,2	2,0	-0,03		-0,15	12	0,66	0,61	0,28	0,87	-0,92	0,44	-0,19	0,24	0,16	0,25	1,9	0,19
4	-1,6	-0,14	0,49		0,42	2,3	0,30	0,20	1,4	0,61	-0,12	0,74	-0,05	0,36	-0,33		0,07	-0,25	
5	-0,80	-0,03	2,5			-0,83		1,7	2,5	1,0	1,8	-2,0	1,9	0,78	2,5	0,84	0,17	2,0	
6	-1,3	-0,46	-2,2		-1,3	-5,2	-0,32	-4,1	-5,1	-1,1	2,5	-2,7	-3,2	-2,5	-2,3	-0,34	0,17	-3,9	13
7 / 7a	-2,2	-0,53	-1,1	-0,11	-2,0	-1,4	-0,53	-2,3	-2,0	-1,9	-1,7	2,0	0,73	-1,1	-1,2	0,33	-0,63	-1,7	-1,4
7b															0,00				
8	-2,0	0,47	0,35		0,85	0,82	0,26	1,9	0,09	1,6	0,64	0,10	0,87	0,78	0,73	0,50	0,47	1,5	1,5
9	1,9	-0,03	-0,57	-0,93		-0,21	-0,11	-0,41	-0,26	0,28	-1,1	0,27	0,00		-0,56	0,33	-0,43	-1,3	-1,4
10	0,51	-1,2	0,42	0,05	-2,0	1,9	-0,68	0,23	0,80	-0,27	-0,18	0,29	0,60	0,54	1,7	0,28	0,61	0,82	0,51
11	1,6	0,11	0,16		-0,45	-1,0	-0,32	-0,14	-0,95	0,14	0,06	0,44	-1,3	-0,55	0,73	-0,68	-1,2	0,23	-0,13
12	0,26	0,43	0,58	-0,02	-0,30	1,0	-0,25	-0,22	-0,31	0,47	-0,47	1,4	0,76	0,08	0,93	0,00	0,21	-0,38	-0,77
13		-2,4													-1,3				
14		0,54	-4,5	1,0	2,3		0,21	-0,52	-1,1	-2,0	-1,3		-5,3	0,25	-2,4		0,29	-1,1	-0,45

Bewertung des z-Scores / valuation of z-score (DIN ISO 13528:2009-01):
-2 ≤ z-score ≤ 2 erfolgreich / successful (in green)
-2 > z-score > 2 „Warnsignal" / warning signal (in yellow)
-3 > z-score > 3 „Eingriffssignal" / action signal (in red)

Abbreviations: Ala: L-Alanin/L-Alanine; Arg: L-Arginin/L-Arginine; Asp: L-Asparaginsäure/L-Aspartic acid; Cys: L-Cystin/L-Cystine; Glu: L-Glutamin/L-Glutamine; Gly: Glycin/Glycine; His: L-Histidin/L-Histidine; Iso: L-Iso-leucin/L-Isoleucine; Leu: L-Leucin/L-Leucine; Lys: L-Lysin/L-Lysine; Met: L-Methionin/L-Methionine; Phe: L-Phenylalanin/L-Phenylalanine; Pro: L-Prolin/L-Proline; Ser: L-Serin/L-Serine; Thr: L-Threonin/L-Threonine; Trp: L-Tryptophan; Tyr: L-Tyrosin/L-Tyrosine; Val: L-Valin/L-Valine; Tau: Taurin/Taurine

5. Documentation

Note: Information given in German were translated by DLA to the best of our knowledge (without guarantee of correctness).

5.1 Details by the participants
5.1.1 Primary data

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Alanin / L-Alanine	1	g/100g	26	70	16.09.21		0,612	0,712	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,688	0,722	0,654			
	4	g/100g	33	63	7.10.201	0,551	0,568	0,534	0,08	no	89
	5	g/100g	32	64	25.10.21	0,58	0,49	0,67	0,02	no	
	6	g/100g	29	67	26.10.21	0,56	0,54	0,58		no	
	7	g/100g	21	75	21.09.21	0,53	0,55	0,51		no	
	8	g/100g	30	66	19.10.21	0,535	0,54	0,53		no	
	9	g/100g	11	85	27/9+21/10	0,68	0,67	0,69		yes	98-103%
	10	g/100g	46	50	12.10.	0,628	0,638	0,617	0,001	no	
	11	g/100g	13	83	26.10.21	0,67	0,69	0,64	0,03	no	
	12	g/100g			14.09.2021	0,619			0,01	no	
	13	g/100g			04.11.21		0,74	0,42	0,3m/m%		
	14	g/100g	1,19			1,19					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Arginin / L-Arginine	1	g/100g	26	70	16.09.21		0,95	1,03	0,01	no	-
	2	g/100g	2	94	7.10.	1,66	1,57	1,76		no	
	3	g/100g	38	58	03.10.21	1,2	1,16	1,23			
	4	g/100g	33	63	7.10.201	1,014	0,981	1,046	0,14	no	96
	5	g/100g	32	64	18.10.21	1,03	1,08	0,99	0,04	NO	
	6	g/100g	29	67	26.10.21	0,97	0,94	1,01		no	
	7	g/100g	21	75	21.09.21	0,96	0,86	1,05			
	8	g/100g	30	66	19.10.21	1,1	1,1	1,1		no	
	9	g/100g	11	85	27/9+21/10	1,03	1,04	1,01		yes	98-103%
	10	g/100g	46	50	12.10.	0,861	0,858	0,865	0,001	no	
	11	g/100g	13	83	26.10.21	1,05	1,04	1,06	0,09	no	
	12	g/100g			14.09.2021	1,094			0,01	no	
	13	g/100g			04.11.21		0,85	0,53	0,3m/m%		
	14	g/100g	1,11			1,11					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Asparag-insäure / L-Aspartic acid	1	g/100g	26	70	16.09.21		0,931	1,001	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	1,08	1,08	1,08			
	4	g/100g	33	63	7.10.201	0,998	0,98	1,016	0,11	no	94
	5	g/100g	32	64	18.10.21	1,11	1,13	1,09	0,03	NO	
	6	g/100g	29	67	26.10.21	0,85	0,82	0,87		no	
	7	g/100g	21	75	21.09.21	0,91	0,85	0,96			
	8	g/100g	30	66	19.10.21	0,99	0,98	1		no	
	9	g/100g	11	85	27/9+21/10	0,94	0,92	0,95		yes	98-103%
	10	g/100g	46	50	12.10.	0,994	0,989	0,999	0,001	no	
	11	g/100g	13	83	26.10.21	0,98	0,97	0,98	0,05	no	
	12	g/100g			14.09.2021	1,003			0,01	no	
	13	g/100g			04.11.21		1,16	0,43	0,3m/m%		
	14	g/100g	0,723			0,723					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Cystein / L-Cysteine	1	g/100g									
	2	g/100g									
	3	g/100g									
	4	g/100g									
	5	g/100g									
	6	g/100g	29	67	04.11.21	0,29	0,26	0,34		no	
	7	g/100g									
	8	g/100g	30	66	19.10.21	N/A	N/A	N/A		no	
	9	g/100g									
	10	g/100g									
	11	g/100g									
	12	g/100g			14.09.2021	-			0,01	no	
	13	g/100g							0,3m/m%		
	14	g/100g									

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Cystin / L-Cystine	1	g/100g									
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,416	0,428	0,404			
	4	g/100g									
	5	g/100g									
	6	g/100g	29	67	26.10.21	0,13	0,13	0,12		no	
	7	g/100g	21	75	21.09.21	0,41	0,41	0,4			
	8	g/100g	30	66	19.10.21	0,051	0,053	0,049		no	
	9	g/100g	11	85	27/9+21/10	0,35	0,35	0,34		yes	98-103%
	10	g/100g	46	50	12.10.	0,422	0,419	0,426	0,001	no	
	11	g/100g	13	83	26.10.21	0,088	0,092	0,084	0,006	no	
	12	g/100g			14.09.2021	0,417			0,01	no	
	13	g/100g							0,3m/m%		
	14	g/100g	0,495			0,495					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Glutamin/ L-Glutamine	1	g/100g	26	70	16.09.21		1,554	1,362	0,01	no	-
	2	g/100g	2	94	7.10.	1,4	1,37	1,43		no	
	3	g/100g									
	4	g/100g	33	63	7.10.201	1,37	1,378	1,362	0,15	no	92
	5	g/100g									
	6	g/100g	29	67	26.10.21	1,25	1,25	1,25		no	
	7	g/100g	21	75	23.09.21	1,2	1,19	1,21			
	8	g/100g	30	66	19.10.21	1,4	1,4	1,4		no	
	9	g/100g									
	10	g/100g	46	50	12.10.	1,202	1,201	1,204	0,004	no	
	11	g/100g	13	83	02.11.21	1,31	1,32	1,29	0,01	no	
	12	g/100g			14.09.2021	1,32			0,01	no	
	13	g/100g			04.11.21		1,85	0,86	0,3m/m%		
	14	g/100g	1,5			1,5					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Glutamin- säure / L- Glutaminc acid	1	g/100g	26	70	16.09.21		<0,01	<0,01	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,061	0,06	0,062			
	4	g/100g	33	63	7.10.201	< 0,050	< 0,050	< 0,050	0,05	no	98
	5	g/100g	32	64	18.10.21				0,04	NO	
	6	g/100g	29	67	26.10.21	0,13	0,13	0,12		no	
	7	g/100g	21	75	21.09.21	<0,02	<0,02	<0,02	0,02		
	8	g/100g	30	66	19.10.21	N/A	N/A	N/A		no	
	9	g/100g	11	85	27/9+21/10	<0,01	<0,01	<0,01		yes	98-103%
	10	g/100g									
	11	g/100g									
	12	g/100g			14.09.2021	< 0,01			0,01	no	
	13	g/100g			04.11.21		<LOQ	<LOQ	0,3m/m%		
	14	g/100g									

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
Glycin / Glycine	1	g/100g	26	70	16.09.21		0,913	0,977	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,933	0,806	1,06			
	4	g/100g	33	63	7.10.201	1,051	0,983	1,118	0,06	no	107
	5	g/100g	32	64	18.10.21	0,9	0,9	0,91	0,02	NO	
	6	g/100g	29	67	26.10.21	0,69	0,66	0,71		no	
	7	g/100g	21	75	21.09.21	0,87	0,91	0,82			
	8	g/100g	30	66	19.10.21	0,98	0,97	0,99		no	
	9	g/100g	11	85	27/9+21/10	0,93	0,99	0,87		yes	98-103%
	10	g/100g	46	50	12.10.	1,034	0,913	1,155	0,001	no	
	11	g/100g	13	83	26.10.21	0,89	0,91	0,86	0,03	no	
	12	g/100g			14.09.2021	0,987			0,01	no	
	13	g/100g							0,3m/m%		
	14	g/100g	0,52			0,52					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Histidin / L-Histidine	1	g/100g	26	70	16.09.21		0,66	0,609	0,01	no	-
	2	g/100g	2	94	7.10.	0,65	0,63	0,67		no	
	3	g/100g	38	58	03.10.21	1,74	1,81	1,67			
	4	g/100g	33	63	7.10.201	0,619	0,609	0,628	0,12	no	94
	5	g/100g									
	6	g/100g	29	67	26.10.21	0,56	0,56	0,57		no	
	7	g/100g	21	75	23.09.21	0,54	0,54	0,53			
	8	g/100g	30	66	19.10.21	0,615	0,61	0,62		no	
	9	g/100g	11	85	27/9+21/10	0,58	0,57	0,59		yes	98-103%
	10	g/100g	46	50	12.10.	0,526	0,522	0,529	0,002	no	
	11	g/100g	13	83	26.10.21	0,56	0,55	0,56	0,09	no	
	12	g/100g			14.09.2021	0,567			0,01	no	
	13	g/100g			04.11.21		0,98	0,41	0,3m/m%		
	14	g/100g	0,61			0,61					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Isoleucin / L-Isoleucine	1	g/100g	26	70	16.09.21		0,988	0,930	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,95	0,988	0,911			
	4	g/100g	33	63	7.10.201	0,933	0,933	0,933	0,11	no	92
	5	g/100g	32	64	18.10.21	0,99	0,97	1,01	0,03	NO	
	6	g/100g	29	67	26.10.21	0,77	0,76	0,78		no	
	7	g/100g	21	75	21.09.21	0,84	0,84	0,84			
	8	g/100g	30	66	19.10.21	0,995	0,99	1		no	
	9	g/100g	11	85	27/9+21/10	0,91	0,91	0,9		yes	98-103%
	10	g/100g	46	50	12.10.	0,934	0,929	0,939	0,002	no	
	11	g/100g	13	83	26.10.21	0,92	0,92	0,92	0,06	no	
	12	g/100g			14.09.2021	0,917			0,01	no	
	13	g/100g			04.11.21		0,95	0,5	0,3m/m%		
	14	g/100g	0,906			0,906					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Leucin / L-Leucine	1	g/100g	26	70	16.09.21		1,741	1,,558	0,01	no	-
	2	g/100g	2	94	7.10.	1,65	1,65	1,64		no	
	3	g/100g	38	58	03.10.21	1,58	1,64	1,52			
	4	g/100g	33	63	7.10.201	1,626	1,604	1,649	0,11	no	87
	5	g/100g	32	64	18.10.21	1,69	1,63	1,74	0,03	NO	
	6	g/100g	29	67	26.10.21	1,25	1,24	1,26		no	
	7	g/100g	21	75	21.09.21	1,43	1,41	1,45			
	8	g/100g	30	66	19.10.21	1,55	1,5	1,6		no	
	9	g/100g	11	85	27/9+21/10	1,53	1,54	1,52		yes	98-103%
	10	g/100g	46	50	12.10.	1,591	1,582	1,599	0,002	no	
	11	g/100g	13	83	26.10.21	1,49	1,48	1,5	0,07	no	
	12	g/100g			14.09.2021	1,527			0,01	no	
	13	g/100g			04.11.21		1,68	0,75	0,3m/m%		
	14	g/100g	1,48			1,48					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Lysin / L-Lysine	1	g/100g	26	70	16.09.21		0,972	1,362	0,01	no	-
	2	g/100g	2	94	7.10.	1,17	1,14	1,19		no	
	3	g/100g	38	58	03.10.21	1,12	1,08	1,16			
	4	g/100g	33	63	7.10.201	1,165	1,152	1,178	0,12	no	106
	5	g/100g	32	64	18.10.21	1,22	1,17	1,27	0,04	NO	
	6	g/100g	29	67	26.10.21	0,93	0,95	0,91		no	
	7	g/100g	21	75	21.09.21	0,82	0,76	0,87			
	8	g/100g	30	66	19.10.21	1,3	1,3	1,3		no	
	9	g/100g	11	85	27/9+21/10	1,12	1,11	1,12		yes	98-103%
	10	g/100g	46	50	12.10.	1,044	1,03	1,057	0,001	no	
	11	g/100g	13	83	26.10.21	1,1	1,02	1,19	0,08	no	
	12	g/100g			14.09.2021	1,146			0,01	no	
	13	g/100g							0,3m/m%		
	14	g/100g	0,801			0,801					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Methionin/ L-Methioni-ne	1	g/100g	26	70	16.09.21		0,29	0,249	0,01	no	-
	2	g/100g	2	94	7.10.	0,24	0,24	0,24		no	
	3	g/100g	38	58	03.10.21	0,274	0,283	0,264			
	4	g/100g	33	63	7.10.201	0,257	0,247	0,267	0,12	no	101
	5	g/100g	32	64	18.10.21	0,29	0,26	0,33	0,04	NO	
	6	g/100g	29	67	04.11.21	0,302	0,31	0,29		no	
	7	g/100g	21	75	21.09.21	0,23	0,23	0,23			
	8	g/100g	30	66	19.10.21	0,27	0,27	0,27		no	
	9	g/100g	11	85	27/9+21/10	0,24	0,24	0,24		yes	98-103%
	10	g/100g	46	50	12.10.	0,256	0,256	0,256	0,001	no	
	11	g/100g	13	83	26.10.21	0,26	0,24	0,28	0,01	no	
	12	g/100g			14.09.2021	0,251			0,01	no	
	13	g/100g			04.11.21		<LOQ	<LOQ	0,3m/m%		
	14	g/100g	0,237			0,237					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Phenyl-alanin / L-Phenylala-nine	1	g/100g	26	70	16.09.21		0,618	0,659	0,01	no	-
	2	g/100g	2	94	7.10.	0,87	0,85	0,88		no	
	3	g/100g	38	58	03.10.21	0,691	0,586	0,796			
	4	g/100g	33	63	7.10.201	0,787	0,745	0,829	0,13	no	99
	5	g/100g	32	64	18.10.21	0,63	0,59	0,67	0,04	NO	
	6	g/100g	29	67	26.10.21	0,59	0,62	0,56		no	
	7	g/100g	21	75	21.09.21	0,86	0,88	0,83			
	8	g/100g	30	66	19.10.21	0,75	0,74	0,76		no	
	9	g/100g	11	85	27/9+21/10	0,76	0,84	0,68		yes	98-103%
	10	g/100g	46	50	12.10.	0,761	0,724	0,797	0,002	no	
	11	g/100g	13	83	26.10.21	0,77	0,75	0,78	0,08	no	
	12	g/100g			14.09.2021	0,824			0,01	no	
	13	g/100g			04.11.21		1,12	<LOQ	0,3m/m%		
	14	g/100g	0,368			0,368					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Prolin / L-Proline	1	g/100g	26	70	16.09.21		1,11	1,197	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	1,17	1,19	1,15			
	4	g/100g	33	63	7.10.201	1,136	1,161	1,112	0,09	no	85
	5	g/100g	32	64	18.10.21	1,27	1,22	1,32	0,03	NO	
	6	g/100g	29	67	26.10.21	0,92	0,93	0,92		no	
	7	g/100g	21	75	21.09.21	1,19	1,22	1,16			
	8	g/100g	30	66	19.10.21	1,2	1,2	1,2		no	
	9	g/100g	11	85	27/9+21/10	1,14	1,19	1,08		yes	98-103%
	10	g/100g	46	50	12.10.	1,181	1,18	1,182	0,003	no	
	11	g/100g	13	83	26.10.21	1,05	1,04	1,05	0,05	no	
	12	g/100g			14.09.2021	1,192			0,01	no	
	13	g/100g							0,3m/m%		
	14	g/100g	0,773			0,773					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Serin / L-Serine	1	g/100g	26	70	16.09.21		0,758	0,685	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,699	0,721	0,677			
	4	g/100g	33	63	7.10.201	0,728	0,745	0,71	0,09	no	96
	5	g/100g	32	64	18.10.21	0,75	0,73	0,76	0,03	NO	
	6	g/100g	29	67	26.10.21	0,58	0,59	0,57		no	
	7	g/100g	21	75	21.09.21	0,65	0,62	0,68			
	8	g/100g	30	66	19.10.21	0,75	0,74	0,76		no	
	9	g/100g									
	10	g/100g	46	50	12.10.	0,737	0,724	0,75	0,001	no	
	11	g/100g	13	83	26.10.21	0,68	0,67	0,696	0,04	no	
	12	g/100g			14.09.2021	0,713			0,01	no	
	13	g/100g			04.11.21		1,2	0,4	0,3m/m%		
	14	g/100g	0,722			0,722					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Tryp-tophan	1	g/100g	26	70	16.09.21		0,311	0,261	0,01	no	-
	2	g/100g	2	94	7.10.	0,28	0,27	0,28		no	
	3	g/100g	38	58	11. Okt	0,31	0,3	0,31			
	4	g/100g									
	5	g/100g	32	64	18.10.21	0,35	0,34	0,36	0,05	NO	
	6	g/100g	29	67	26.10.21	0,28	0,28	0,28		no	
	7a	g/100g	21	75	23.09.21	0,32	0,29	0,34			
	7b	g/100g	21	75	21.09.21	0,3	0,29	0,3			
	8	g/100g	30	66	19.10.21	0,33	0,33	0,33		no	
	9	g/100g	11	85	24/9+21/10	0,32	0,32	0,31		yes	98-103%
	10	g/100g	46	50	12.10.	0,317	0,319	0,314	0,004	no	
	11	g/100g	13	83	28.10.21	0,26	0,26	0,26	0,02	no	
	12	g/100g			14.09.2021	0,3			0,01	no	
	13	g/100g			04.11.21		0,3	0,15	0,3m/m%		
	14	g/100g									

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Threonin / L-Threonine	1	g/100g	26	70	16.09.21		0,955	0,776	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	0,787	0,759	0,814			
	4	g/100g	33	63	7.10.201	0,761	0,738	0,784	0,1	no	91
	5	g/100g	32	64	18.10.21	0,89	0,94	0,84	0,03	NO	
	6	g/100g	29	67	26.10.21	0,67	0,64	0,69		no	
	7	g/100g	21	75	21.09.21	0,72	0,78	0,66			
	8	g/100g	30	66	19.10.21	0,81	0,78	0,84		no	
	9	g/100g	11	85	27/9+21/10	0,75	0,78	0,72		yes	98-103%
	10	g/100g	46	50	12.10.	0,856	0,849	0,862	0,002	no	
	11	g/100g	13	83	26.10.21	0,81	0,84	0,77	0,05	no	
	12	g/100g			14.09.2021	0,819			0,01	no	
	13	g/100g			04.11.21		1,43	0,47	0,3m/m%		
	14	g/100g	0,664			0,664					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Tyrosin / L-Tyrosine	1	g/100g	26	70	16.09.21		0,76	0,678	0,01	no	-
	2	g/100g	2	94	7.10.	0,62	0,63	0,61		no	
	3	g/100g	38	58	03.10.21	0,694	0,707	0,681			
	4	g/100g	33	63	7.10.201	0,685	0,684	0,685	0,15	no	96
	5	g/100g	32	64	18.10.21	0,69	0,65	0,72	0,05	NO	
	6	g/100g	29	67	26.10.21	0,69	0,68	0,69		no	
	7	g/100g	21	75	21.09.21	0,65	0,64	0,66			
	8	g/100g	30	66	19.10.21	0,705	0,71	0,7		no	
	9	g/100g	11	85	27/9+21/10	0,66	0,66	0,66		yes	98-103%
	10	g/100g	46	50	12.10.	0,712	0,709	0,714	0,001	no	
	11	g/100g	13	83	26.10.21	0,62	0,61	0,63	0,09	no	
	12	g/100g			14.09.2021	0,692			0,01	no	
	13	g/100g			04.11.21		0,7	0,37	0,3m/m%		
	14	g/100g	0,696			0,696					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
L-Valin / L-Valine	1	g/100g	26	70	16.09.21		1,074	1,022	0,01	no	-
	2	g/100g									
	3	g/100g	38	58	03.10.21	1,12	1,17	1,06			
	4	g/100g	33	63	7.10.201	0,991	0,987	0,994	0,1	no	99
	5	g/100g	32	64	18.10.21	1,13	1,11	1,15	0,03	NO	
	6	g/100g	29	67	26.10.21	0,77	0,77	0,78		no	
	7	g/100g	21	75	21.09.21	0,9	0,87	0,93			
	8	g/100g	30	66	19.10.21	1,1	1,1	1,1		no	
	9	g/100g	11	85	27/9+21/10	0,93	0,95	0,91		yes	98-103%
	10	g/100g	46	50	12.10.	1,056	1,061	1,051	0,001	no	
	11	g/100g	13	83	26.10.21	1,02	0,997	1,05	0,06	no	
	12	g/100g			14.09.2021	0,983			0,01	no	
	13	g/100g			04.11.21		10,2	0,59	0,3m/m%		
	14	g/100g	0,941			0,941					

Analyte	Participant	Unit	Sample No. 1	Sample No. 2	Date of analysis	Result (Mean)	Result 1	Result 2	Limit of determination	Incl. RR	Recovery rate [%]
Taurin / Taurine	1	g/100g	26	70	16.09.21		0,056	0,0509	0,01	no	-
	2	g/100g	2	94	7.10.	0,045	0,044	0,046		no	
	3	g/100g	38	58	11.10.21	0,05	0,048	0,051			
	4	g/100g	33	63	7.10.201	< 0,050	< 0,050	< 0,050	0,05	no	98
	5	g/100g									
	6	g/100g	29	67	26.10.21	0,0897	0,0899	0,0895		no	
	7	g/100g	21	75	21.09.21	0,045	0,044	0,045			
	8	g/100g	30	66	19.10.21	0,054	0,053	0,055		no	
	9	g/100g	11	85	27/9+2/10	0,045	0,046	0,043		yes	98-103%
	10	g/100g	46	50	12.10.	0,051	0,051	0,052	0,002	no	
	11	g/100g	13	83	01.11.21	0,049	0,049	0,0498	0,04	no	
	12	g/100g			14.09.2021	0,047			0,01	no	
	13	g/100g									
	14	g/100g	0,048			0,048					

5.1.2 Analytical Methods

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Alanin / L-Alanine	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2							
	3						Yes	
	4	Waters - ACCQ.TAG Chemistry Package – Instruction Manual, WAT 052 874 TP, rev. 0 April, 1993 *			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6		All: Samples crushed, suspended in acidic buf-fer after weighing and treated in an ultrasonic bath	all: ion exchange chro-mium with ninhydrin post-column derivatizati-on; Detection at 570nm, Proline at 440nm, Trp at 280nm	all external with stock solution From Sigma Aldrich Amino Acid Standard AAS18; Calibra-tion range 1.25 to 20nmol		no	
	7	Total amino acids (analogous to VO (EG) No. 152/2009)	dissolve in hydrochloric acid solution. (0.1 mol/L) fill up with Li citrate loa-ding buffer pH 2.20		int. Std. 1pt. calibration, feed		yes	
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10	Determination of free amino acids using HPLC with post-co-lumn derivatization	aqueous extract after protein precipitation with 5-sulfosalicylic acid solu-tion	Ion exchange chromato-graphy with post-column derivatization (ninhydrin)	External standard, one-point ca-libration, Teewurst		yes	
	11	Determination of free amino acids using an amino acid ana-lyzer			internal standard		yes	
	12							NOTE: The two samples were not analyzed sepa-rately. We therefore only provide you with an ave-rage value
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Arginin / L-Arginine	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2	HPAEC-IPAD		HPAEC-IPAD	external standard, AAS 18 Sigma and individual substances		Yes	
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Asparag-insäure / L-Aspartic acid	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Cystein / L-Cysteine	1							
	2							
	3							
	4							
	5							
	6		Oxidation to cysteic acid		externally with self-made stock solution. From cysteic acid hydrochloride monohydrate (Merck); Calibration range 0.4 to 2.8 nmol		no	calculated by certain amount of substance Cysteic acid and molar mass of cysteine
	7							
	8	UHPLC-DAD					no	
	9							
	10						yes	
	11							
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Cystin / L-Cystine	1							
	2							
	3						Yes	
	4							
	5							
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	Yes	
	10						Yes	
	11				Internal standard		Yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Glutamin/ L-Glutami-ne	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3							
	4	same method			Merck/Sigma Aldrich	yes	yes	
	5							
	6						no	
	7							
	8	UHPLC-DAD					no	
	9							
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Glutamin-säure / L-Glutaminc acid	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	Not determined
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11							
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
Glycin / Glycine	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	Yes	
	10						Yes	
	11				Internal standard		Yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Histidin / L-Histidine	1	ASU L 49.07-1:1985-05			IC-UV		Yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5							
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	Yes	
	10						Yes	
	11				Internal standard		Yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Isoleucin / L-Isoleucine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Leucin / L-Leucine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Methionin / L-Methio-nine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Phenyl-alanin / L-Phenylala-nine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Lysin / L-Lysine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Prolin / L-Proline	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	440nm
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Serin / L-Serine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9							
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Threonin / L-Threonine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Tryp-tophan	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						No	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6				externally with self-made stock solution. From solid (Serva Feinbiochemica); Calibration range 0.2 to 3.0 nmol		No	UV-Det 280nm
	7a							
	7b	HPLC (analogous to No. 4.11.2 VDLUFA Method Book III, 2nd supplement 1988)			3-point calibration, feed			
	8	UHPLC-DAD					No	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Tyrosin / L-Tyrosine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	The data is Cysteine + Tyrosine result
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
L-Valin / L-Valine	1	ASU L 49.07-1:1985-05			IC-UV		yes	
	2							
	3						Yes	
	4	same method			Thermo scientific	yes	yes	
	5	Precolumn derivatization of amino acids with AQC and detection by HPLC-PDA	None		Standard AA (Waters, Ref WAT088122)		YES	
	6						no	
	7							
	8	UHPLC-DAD					no	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13	Agilent Publications: 5990-4547EN					yes	
	14							

Analyte	Partici-pant	Method description	Sample preparation	Measuring method	Calibration and reference material	Recovery with same matrix	Method accredited	Further remarks
Taurin / Taurine	1	Internal method			IC-UV		yes	
	2							
	3						No	
	4	same method			Merck/Sigma Aldrich	yes	yes	
	5							
	6						No	
	7							
	8	UHPLC-DAD					No	
	9	DIN EN ISO 13903:2005-09				yes	yes	
	10						yes	
	11				Internal standard		yes	
	12							
	13							
	14							

5.2 Homogeneity

5.2.1 Mixture homogeneity before bottling

Microtracer Homogeneity Test
DLA-ptSU10

Weight whole sample	1,21	kg
Microtracer	FSS-red lake	
Particle size	75 – 300	µm
Weight per particle	2,0	µg
Addition of tracer	24,5	mg/kg

Result of analysis

Sample	Weight (g)	Particle number	Particles [mg/kg]
1	5,01	49	19,6
2	5,03	46	18,3
3	5,01	49	19,6
4	5,01	51	20,4
5	5,01	52	20,8
6	5,03	51	20,3
7	5,05	44	17,4
8	4,98	46	18,5

Poisson distribution		
Number of samples	8	
Degree of freedom	7	
Mean	48,5	Particle
Standard deviation	2,93	Particle
χ^2 (CHI-Quadrat)	1,24	
Probability	**99**	%
Recovery rate	79	%

Normal distribution		
Number of samples	8	
Mean	19,3	mg/kg
Standard deviation	1,17	mg/kg
rel. Standard deviaton	6,00	%
Horwitz standard deviation	10,2	%
HorRat-value	**0,60**	
Recovery rate	79	%

5.2.2 Trend line function of the participants' results

By comparison of the increasing sample numbers and the measurement results of participants, the homogeneity of the chronological bottled PT items can be shown by the trend line for information:
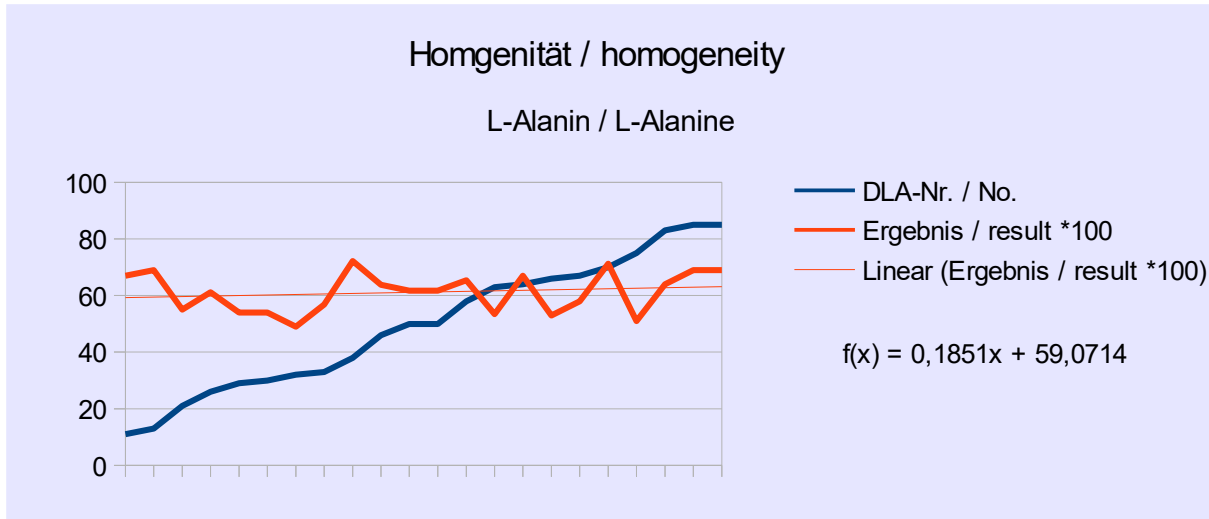
Abb./Fig. 39:
Trendfunktion Probennummern vs. Ergebnisse: L-Alanin (1*100 dargestellt)
trend line function sample number vs. results: L-Alanine(1*100 shown)
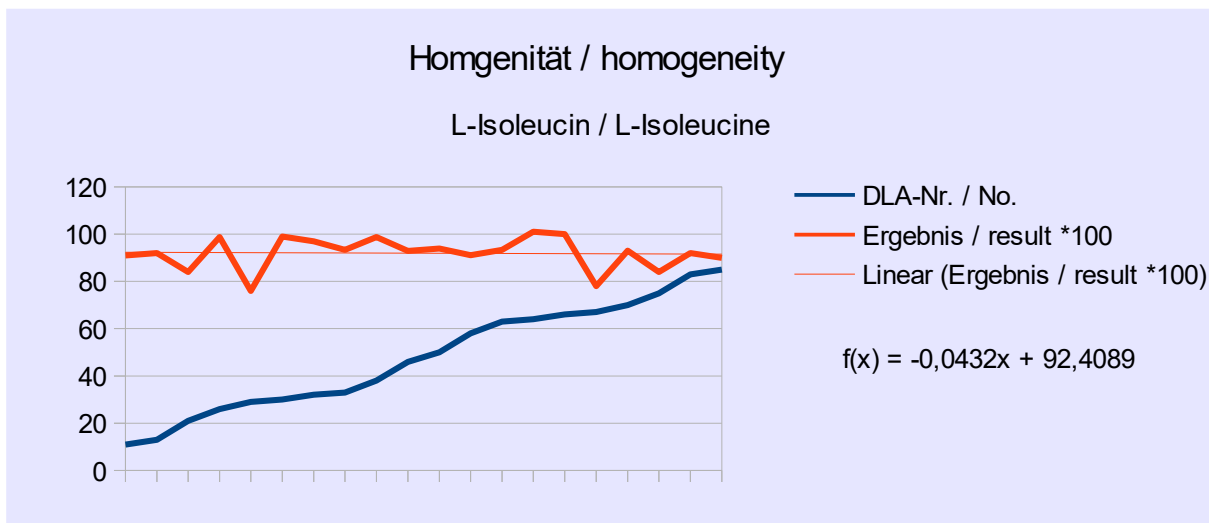
Abb./Fig. 40:
Trendfunktion Probennummern vs. Ergebnisse: L-Isoleucin (1*100 dargestellt)
trend line function sample number vs. results: L-Isoleucine (1*100 shown)
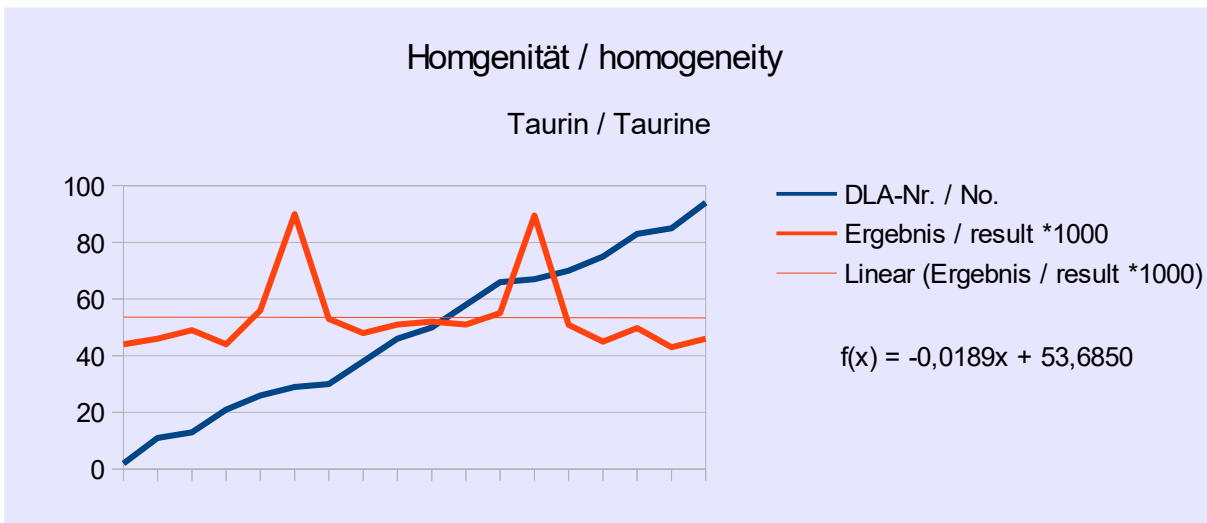
Abb./Fig. 41:
Trendfunktion Probennummern vs. Ergebnisse: Taurin (1*1000 dargestellt)
trend line function sample number vs. results: Taurine (1*1000 shown)
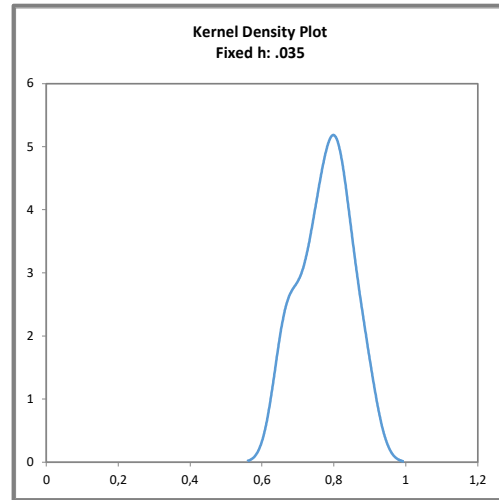
5.3 Kernel Density Plots of Results

Abbildungen:
Kerndichte-Schätzungen
der Teilnehmerergebnisse
(mit h = 0,75 x σ_{pt} von Xpt)

Figures:
Kernel density plots
of participants' results
(with h = 0,75 x σ_{pt} of Xpt)

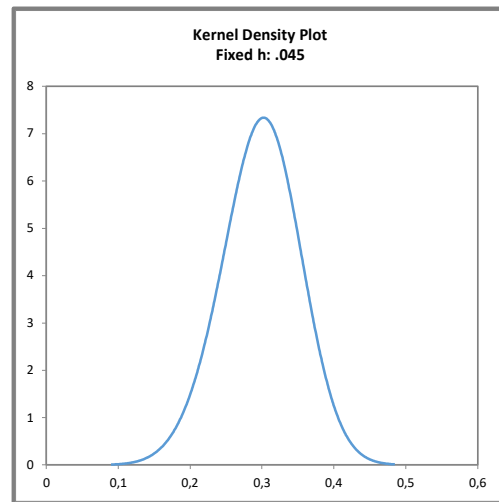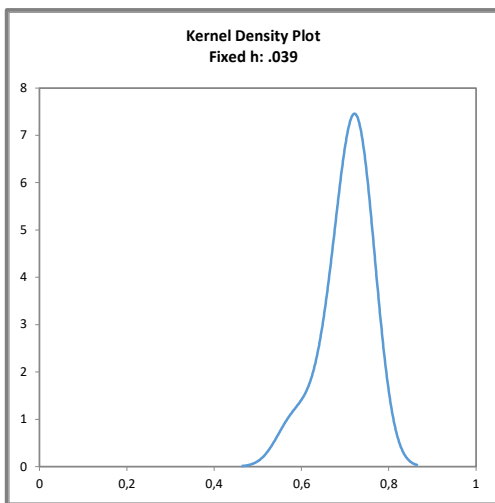L-Arginin / L-Arginine

Kernel Density Plot
Fixed h: .105

L-Alanin / L-Alanine

Kernel Density Plot
Fixed h: .028

L-Asparaginsäure / L-Aspartic acid

Kernel Density Plot
Fixed h: .041
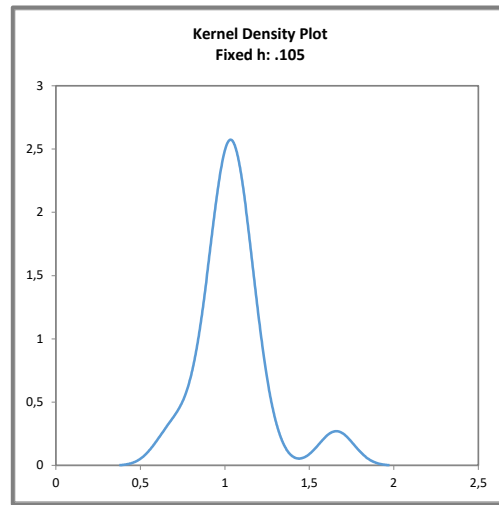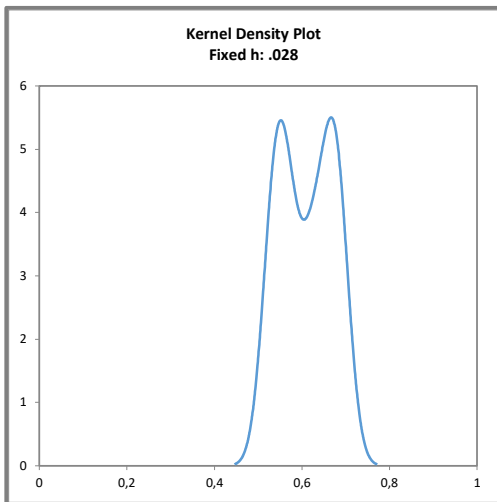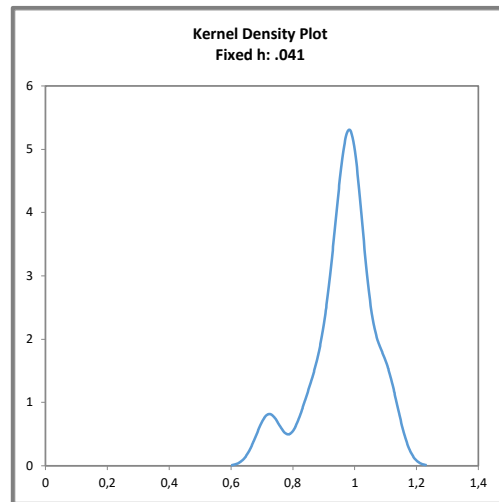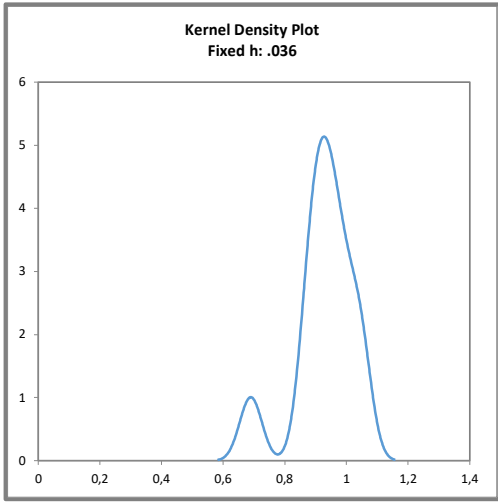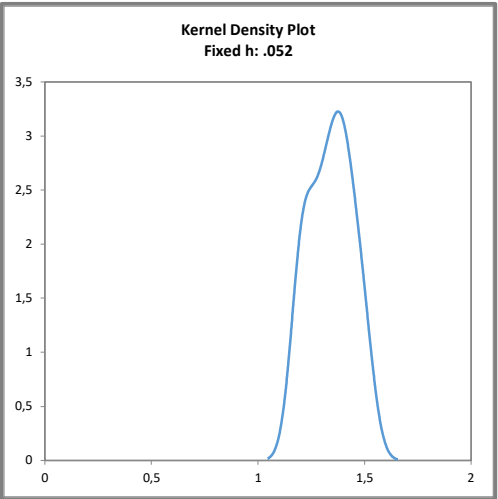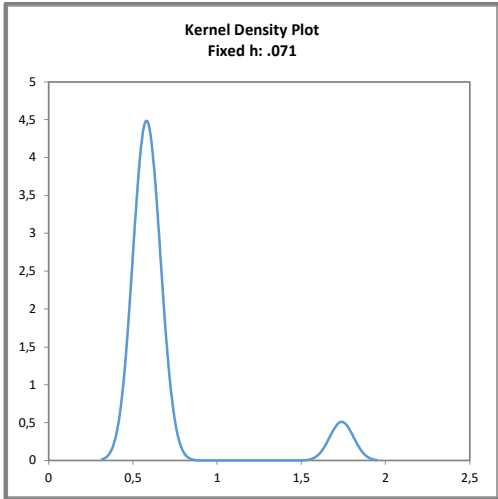
L-Alanin / L-Alanine   (with h = rob. SD)

Kernel Density Plot
Fixed h: .051
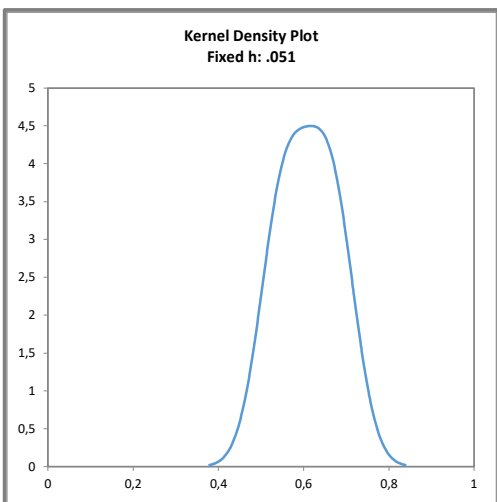
L-Cystein / L-Cysteine

< 8 Ergebnisse

< 8 Results

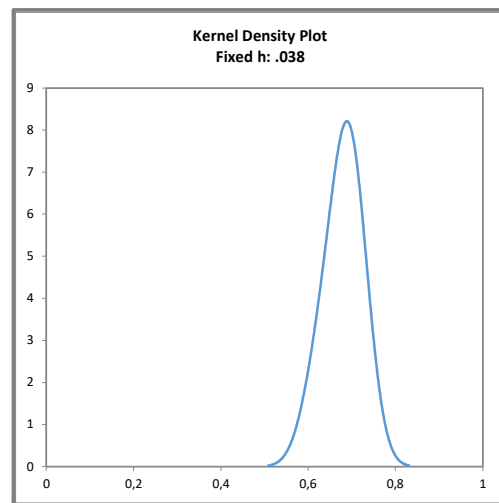|	L-Glutaminsäure / L-Glutamic acid
Abbildungen: Kerndichte-Schätzungen der Teilnehmerergebnisse (mit h = 0,75 x σ_{pt} von X_{pt}) **Figures:** Kernel density plots of participants' results (with h = 0,75 x σ_{pt} of X_{pt})	< 8 Ergebnisse < 8 Results
L-Cystin / L-Cystine < 8 Ergebnisse < 8 Results	**Glycin / Glycine**
L-Glutamin / L-Glutamine 	**L-Histidin / L-Histidine**

Abbildungen:
Kerndichte-Schätzungen
der Teilnehmerergebnisse
(mit h = 0,75 x σ_{pt} von X$_{pt}$)

Figures:
Kernel density plots
of participants' results
(with h = 0,75 x σ_{pt} of X$_{pt}$)

L-Lysin / L-Lysine
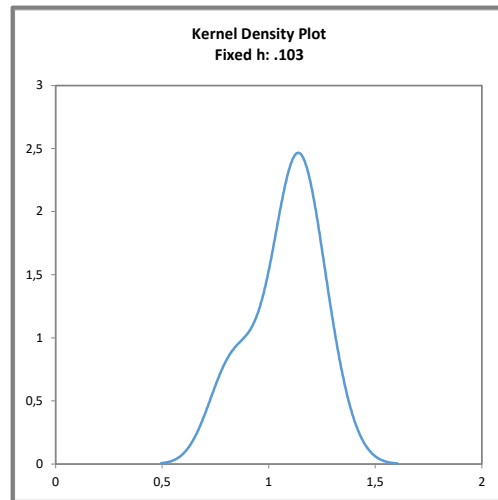
L-Isoleucin / L-Isoleucine
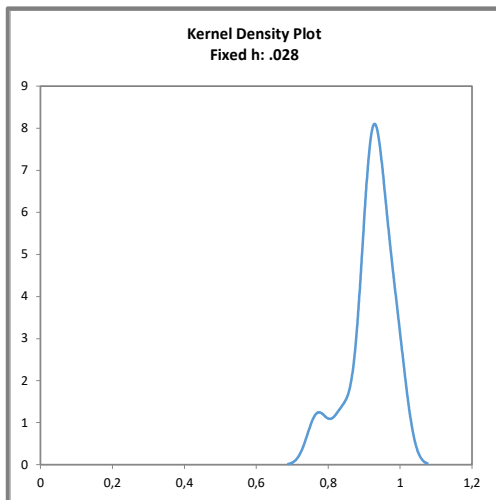
L-Methionin / L-Methionine
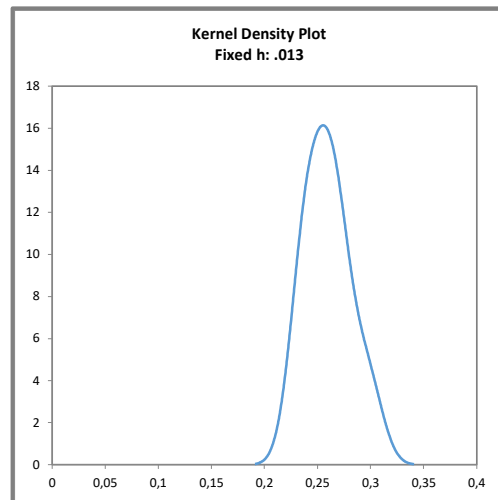
L-Leucin / L-Leucine
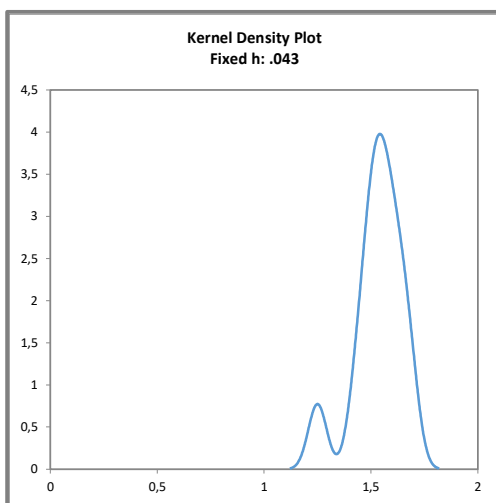
L-Phenylalanin / L-Phenylalanine
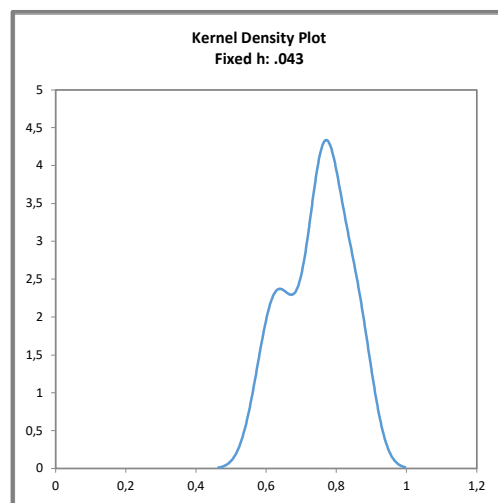
Abbildungen:
Kerndichte-Schätzungen
der Teilnehmerergebnisse
(mit h = 0,75 x σ_{pt} von X_{pt})

Figures:
Kernel density plots
of participants' results
(with h = 0,75 x σ_{pt} of X_{pt})

L-Threonin / L-Threonine
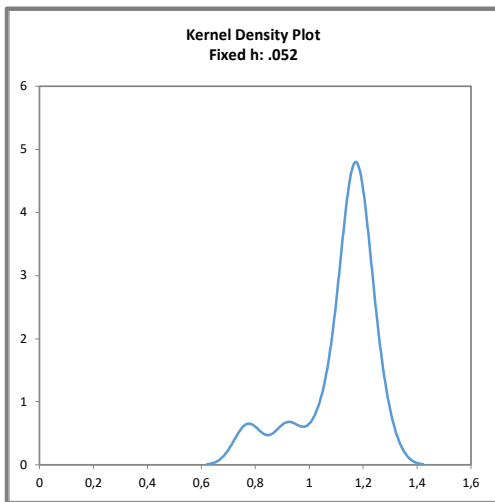
Kernel Density Plot
Fixed h: .035

L-Prolin / L-Proline

Kernel Density Plot
Fixed h: .052

L-Tryptophan

Kernel Density Plot
Fixed h: .045

L-Serin / L-Serine

Kernel Density Plot
Fixed h: .039

L-Tyrosin / L-Tyrosine

Kernel Density Plot
Fixed h: .038

Abbildungen:
Kerndichte-Schätzungen
der Teilnehmerergebnisse
(mit h = 0,75 x σ_{pt} von X_{pt})

Figures:
Kernel density plots
of participants' results
(with h = 0,75 x σ_{pt} of X_{pt})

L-Valin / L-Valine
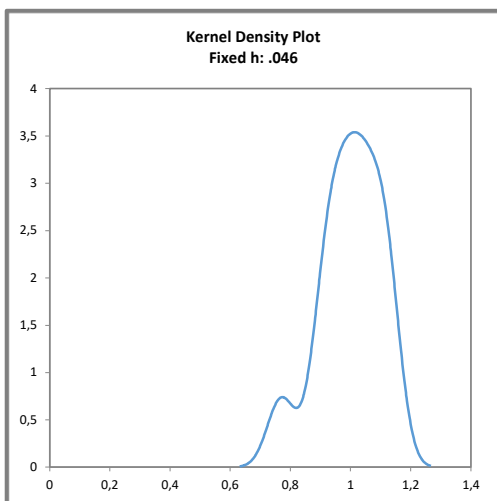
Taurin / Taurine
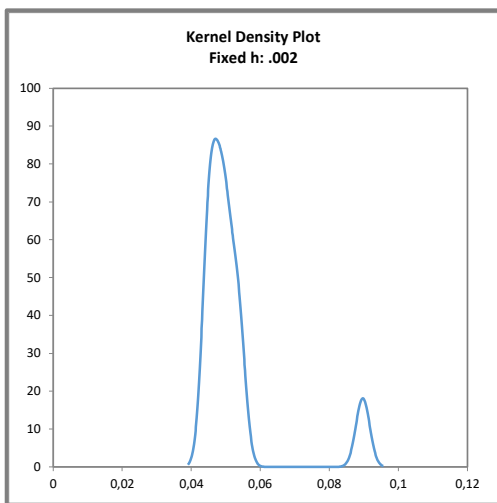
5.4 Information on the Proficiency Test (PT)

Before the PT the participants received the following information in the sample cover letter:

PT number	**DLA ptSU10 - 2021**
PT name	**Free Amino Acids and Taurine in Food**
Sample matrix*	Samples I + II: Infant food (balanced dietetic food, powder for preparation of infant milk) / ingredients: Glucose syrup, vegetable oils, amino acids, vitamins, minerals and other food additives; Protein equivalent content <20%
Number of samples and sample amount	2 identical samples I + II, 10 g each.
Storage	Samples I + II: room temperature (PT period), cooled 2 - 10°C (long term)
Intentional use	Laboratory use only (quality control samples)
Parameter	quantitative: Deoxynivalenol (DON), Zearalenone (ZEA), further results possible.
Methods of analysis	Analytical methods are optional
Notes to analysis	The analysis of PT samples should be performed like a routine laboratory analysis. In general we recommend to homogenize a representative sample amount before analysis according to good laboratory practice, especially in case of low sample weights.
Result sheet	The results for sample I and II as well as the final results calculated as mean of the double determination (samples I and II) should be filled in the result submission file. The recovery rates, if carried out, has to be included in the calculation.
Units	g/100g
Number of significant digits	at least 2
Further information	For information please specify: – Date of analysis – DLA-sample-numbers (for sample I and II) – Limit of detection – Assignment incl. Recovery – Recovery with the same matrix – Method is accredited
Result submission	The result submission file should be sent by e-mail to: pt@dla-lvu.de
Last Deadline	**the latest November 05th 2021**
Evaluation report	The evaluation report is expected to be completed 6 weeks after deadline of result submission and sent as PDF file by e-mail.
Coordinator and contact person of PT	Matthias Besler-Scharf PhD

* Control of mixture homogeneity and qualitative testings are carried out by DLA. Any testing of the content, homogeneity and stability of PT parameters is subcontracted by DLA.

6. Index of participant laboratories in alphabetical order

Teilnehmer / Participant	Ort / Town	Land / Country
		FRANCE
		GREAT BRITAIN
		HUNGARY
		Germany
		Germany
		Germany
		CZECH REPUBLIC
		Germany
		SPAIN
		Germany
		Germany
		Germany
		Germany
		Germany
		Germany
		Germany
		Germany

[Die Adressdaten der Teilnehmer wurden für die allgemeine Veröffentlichung des Auswerte-Berichts nicht angegeben.]

[The address data of the participants were deleted for publication of the evaluation report.]

7. Index of references

1. DIN EN ISO/IEC 17025:2005; Allgemeine Anforderungen an die Kompetenz von Prüf- und Kalibrierlaboratorien / General requirements for the competence of testing and calibration laboratories
2. DIN EN ISO/IEC 17043:2010; Konformitätsbewertung – Allgemeine Anforderungen an Eignungsprüfungen / Conformity assessment – General requirements for proficiency testing
3. ISO 13528:2015 & DIN ISO 13528:2009; Statistische Verfahren für Eignungsprüfungen durch Ringversuche / Statistical methods for use in proficiency testing by inter-laboratory comparisons
4. ASU §64 LFGB: Planung und statistische Auswertung von Ringversuchen zur Methoden-validierung / DIN ISO 5725 series part 1, 2 and 6 Accuracy (trueness and preci-sion) of measurement methods and results
5. Verordnung / Regulation 882/2004/EU; Verordnung über über amtliche Kontrollen zur Überprüfung der Einhaltung des Lebensmittel- und Futtermittelrechts sowie der Bestimmungen über Tiergesundheit und Tierschutz / Regulation on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules
6. Evaluation of analytical methods used for regulation of food and drugs; W. Hor-witz; Analytical Chemistry, 54, 67-76 (1982)
7. The International Harmonised Protocol for the Proficiency Testing of Ananlytical Laboratories ; J.AOAC Int., 76(4), 926 – 940 (1993)
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9. Protocol for the design, conduct and interpretation of method performance studies; W. Horwitz; Pure & Applied Chemistry, 67, 331-343 (1995)
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11. The International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories; Pure Appl Chem, 78, 145 – 196 (2006)
12. AMC Kernel Density - Representing data distributions with kernel density estim-ates, amc technical brief, Editor M Thompson, Analytical Methods Committee, AMCTB No 4, Revised March 2006 and Excel Add-in Kernel.xla 1.0e by Royal Society of Chemistry
13. EURACHEM/CITAC Leitfaden, Ermittlung der Messunsicherheit bei analytischen Messun-gen (2003); Quantifying Uncertainty in Analytical Measurement (1999)
14. GMP+ Feed Certification scheme, Module: Feed Safety Assurance, chapter 5.7 Check-ing procedure for the process accuracy of compound feed with micro tracers in GMP+ BA2 Control of residues, Version: 1st of January 2015 GMP+ International B.V.
15. MTSE SOP No. 010.01 (2014): Quantitative measurement of mixing uniformity and carry-over in powder mixtures with the rotary detector technique, MTSE Micro Tracers Services Europe GmbH
16. Homogeneity and stability of reference materials; Linsinger et al.; Accred Qual Assur, 6, 20-25 (2001)
17. AOAC Official Methods of Analysis: Guidelines for Standard Method Performance Re-quirements, Appendix F, p. 2, AOAC Int (2016)

18. ASU §64 LFGB L 49.07-1 Bestimmung der Aminosäuren in Aminosäurengemischen (1985) [Determination of amino acids in amino acid mixtures]
19. ASU §64 LFGB L 49.07-2 Bestimmung der Aminosäuren in diätetischen Lebensmitteln auf Basis von Proteinhydrolysaten (1986) [Determination of amino acids in dietetic foods on the basis of protein hydrolysates]
20. ASU §64 LFGB L 49.07-3 Bestimmung des Tryptophangehaltes in diätetischen Lebens-mitteln auf Basis von Proteinhydrolysaten (1989) [Determination of tryptophan in dietetic foods on the basis of protein hydrolysates]
21. Verordnung 152/2009/EG zur Festlegung der Probenahmeverfahren und Analysemethoden für die amtliche Untersuchung von Futtermitteln / Regulation 152/2009/EC laying down the methods of sampling and analysis for the official control of feed