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PROFICIENCY TESTING PT.UA.1.2.2016
MAIZE ANALYSIS (QUALITY)
PROFICIENCY TESTING REPORT
ROUND 7 FEBRUARY 2023

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2. SUMMARY

2.1. The purpose of proficiency testing in maize testing is to determine the characteristics of the operation (as described in ISO/IEC 17043:2010[1]) and improve the reliability of test results.

2.2. This proficiency testing involves the use of inter-laboratory comparisons to confirm the performance of individual laboratories' abilities and/or identify areas of improvement.

2.3. This is the final report on the PT.UA.1.2.2016 Round 7 held in February 2023. This report is issued according to ISO/IEC 17043[1] and PT.UA.1.2.2016 Round 7 Programme. The report is issued in two languages – Ukrainian and English. English should be considered as the basic language of the report. Both versions of this report can be found at: <http://www.metrologyservice.com.ua>.

2.4. A total of 42 participants have reported. Their results are presented in the next clauses.

2.5. Technical experts list and/or subcontractors for this round can be provided to the Participant by request.

2.6. Any calculations, formulas, raw and intermediate data used in this round can be provided to the Participant by request, except confidential information about other participants and information that may contain commercial secret.

3. GENERAL PROTOCOL FOR PROFECIENCY TESTING

3.1. MANAGEMENT SYSTEM.

3.1.1. The functioning management system of Metrology service Ltd. (further - Provider) complies with ISO/IEC 17043[1] requirements and covers all aspects of proficiency testing (further - PT) for all proficiency tests.

3.2. SAMPLES PREPARATION, HOMOGENITY AND STABILITY

3.2.1. Provider has used a validated procedure and appropriate technical experts and contractors for the samples' selection, production, homogenization and division designs that are proved to be satisfactory for the purposes of PT programme PT.UA.1.2.2016 Round 7. Details of test material preparation and homogenization are not published in the report, though can be provided to the Participant by request. Tests, required to prove (validate) homogeneity and stability of samples were performed by competent contracting laboratories according to [2-7]. These results with statistics are published in the report.

3.2.2. Participants may contact the Provider to request details of test material selection, preparation, homogenization and division of those test material samples, for which they tested in PT. Such information can be provided to the Participant in confidence and only if it cannot compromise other Participants and/or is not a commercial secret.

3.3. DISPATCH AND RECEIPT OF SAMPLES

3.3.1. Samples of test material – **Maize (*Zéa máys*)** were dispatched 20.01.2023 according to schedule of proficiency testing programme PT.UA.1.2.2016 Round 7.

3.3.2. Each produced and identified sample was hermetically sealed.

3.3.3. A total of 42 participants in 4 countries received one sample. Results were returned from 42 participants.

3.4. FOLLOW-UP SERVICES

3.4.1. If a participant wish to obtain advice/consultation on any aspect of their performance, one should contact the Provider. Provider can (with agreement with Participant) pass on the Participant's inquiry to a technical expert and/or contracting laboratory.

3.4.2. Surplus samples from this round are available for sale as certified reference materials (CRM) with the certified values and uncertainties. Please e-mail Provider for details.

3.5. PERFORMANCE ASSESMENT

3.5.1. Provider expressed Participant's results as traditional z-scores according to [1].

3.5.2. The assigned value for each analyte was calculated as the robust mean of the trial data using Huber H15 method [2,3]

3.5.3 The target standard deviation for each analyte was chosen from either the appropriate form of the Horwitz equation, method trial standard deviation (if stated in the method from inter-laboratory comparisons), standard deviation from the previous trials (PT rounds), or the robust trial standard deviation, after the removal of outliers. The choice was made using current industry practices used in other collaborative trials and proficiency testing schemes.

3.5.4. z-Scores were deemed satisfactory if $|z| \leq 2$. z-Scores were deemed questionable if $2 < |z| \leq 3$ (marked yellow in tables). If $|z| > 3$, the results were considered to be unsatisfactory (marked red in tables). The calculations were made according to [1,3,5]. Provider recommends corrective actions if $|z| > 3$ and preventive actions if $2 < |z| \leq 3$.

3.5.5. Only 1.47% (6 results) of all results in this round were considered to be unsatisfactory. In Round 6, there were 0.75% (4 results) unsatisfactory results.

3.5.6. In order to assess «Fat content, % (Expressed as a mass fraction of the product as received)» by «ISO 12099:2017», Provider used robust mean from «Fat content, % (Expressed as a mass fraction of the product as received)» by the method «ISO 6492:1999/ ДСТУ ISO 6492:2003».

3.5.7. Participant №11 stated the result for «Moisture content, %» according to «GOST 13586.5-2015» method instead of the «ГОСТ 13586.5-93» proposed by the Provider. This result was assessed by the Provider.

3.5.8. Participant №12 stated the result for «Moisture content, %» according to «GOST 13586.5-2015» method instead of the «ГОСТ 13586.5-93» proposed by the Provider. This result was assessed by the Provider.

3.5.9. Participant № 39 stated the result for «Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25)» according to «ISO 5983-2:2009» method instead of the «ISO 20483:2013/ ДСТУ ISO 20483:2016» proposed by the Provider. This result was assessed by the Provider.

4. HOMOGENITY AND STABILITY ASSESMENT

4.1. Samples were assessed for homogeneity and stability after blending and packing by selecting seven samples of material at random from all those produced. Four of these samples were tested in duplicate under repeatability conditions as only 64 samples were produced according to [7]. Three other samples for stability tests were stored in appropriate conditions for the period of preparation and test submission for this round. They were also tested in duplicate.

4.2. Statistical analysis of the resulting data for homogeneity and stability was carried out using the industry standard Cochran's 'C' test and analytical variance test for 'sufficient homogeneity' according to [3,4].

4.3. Produced samples were found to be sufficiently homogeneous and stable for every analyte according to programme, except for those that can be considered equivalent or homogeneity can be assumed from other analyte homogeneity.

4.4. ISO 6540:1980/ ДСТУ ISO 6540:2007 Moisture content, %

Moisture content, %			ISO 6540:2021/ ДСТУ ISO 6540:2007									
Дослідження гомогенності/Homogeneity test												
Аналіз викидів за тестом Кохрана(C -тест)/Cohran's C test for outliers						Аналіз на 'достатню однорідність'/Test for 'sufficient homogeneity'						
Sample number	Результат/ Result A	Результат/ Result B	Average	SD ²		Номер зразку /Sample number	Результат/ Result A	Результат/ Result B	SUM	Difference ²		
1	14,50	14,35	14,43	0,0113	0,00	1	14,50	14,35	28,85	0,0225		
2	14,36	14,43	14,40	0,0025	0,00	2	14,36	14,43	28,79	0,0049		
3	14,35	14,40	14,38	0,0013	0,00	3	14,35	14,40	28,75	0,0025		
4	14,37	14,40	14,39	0,0005	0,00	4	14,37	14,40	28,77	0,0009		
5	14,38	14,45	14,42	0,0024	0,00	5	14,38	14,45	28,83	0,0049		
6	14,31	14,40	14,36	0,0040	0,00	6	14,31	14,40	28,71	0,0081		
7	14,30	14,28	14,29	0,0002	0,00	7	14,30	14,28	28,58	0,0004		
										0,0442		
Mean	14,377		Worst pair	0,0113		Mean	14,377					
Max	14,50		SUM of SD ²	0,0221		Max	14,50					
Min	14,28		C	0,5090		Min	14,28					
			Ccr, 5%	0,7271								
			Ccr, 1%	0,8376		Analytical variance S ² ar	0,0032	SD		0,0598		
			Conclusion			Sanal	0,0562	RSDR		0,4159		
			5% PASS			Ssums	0,0081					
			1% PASS			MSb	0,0041					
						Between sample variance S ² sam	0,0005					
Remarks												
1. Cohran's C test is described in ISO 5727-2 and FAPAS protocol, sixth edition, 2002												
2. Test for 'sufficient homogeneity' is performed according to FAPAS protocol, sixth edition, 2002												

Source of σp value to use	
Use(write '1') Source	σp
1 C>13.8%, HORWITZ	0,3792
120ppb<C<13.8%, HORWITZ	0,3850
C<120 ppb	3,162971
MASS NEGATIVE POWER FOR HORWITZ EQUATION(%=2, ppb=9,ppm=6)	2
SD	0,0576
Trial SD	0,3780
Target SD chosen	0,3792
σ ² all	0,012939
Replicates	7
F1	2,1
F2	1,43
Critical value	0,0317
Between sample variance S ² sam	0,0005
Sufficient homogeneity test	PASS

4.5. Data for all analytes

	ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT)	ISO 6540:2021/ ДСТУ ISO 6540:2007	ISO 20483:2013/ ДСТУ ISO 20483:2016	ISO 2171:2007/ ДСТУ ISO 2171:2009	ISO 6865:2000/ ДСТУ ISO 6865:2004	ISO 11085:2015	ISO 6493:2000	GAFTA 7.0:2018	EN 16378:2013	EN 16378:2013	EN 16378:2013
	Test weight, g/l	Moisture content, %	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Ash yield, % (Expressed on dry matter)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Starch content, %	Volatile nitrogenous basis, %	Broken grains, %	Grain impurities, %	Miscellaneous impurities, %
Homogeneity and stability (Гомогенність та стабільність)											
Cohran's 'C' test (С-тест "Кохрана")											
Critical value (5%, 7pairs)=0,7271	0,5208	0,5090	0,4412	0,4516	0,2660	0,6850	0,4261	0,2183	0,2024	0,2776	0,2493
Mean Result	682,8571	14,3771	8,1250	1,1716	2,1800	3,0879	61,4214	0,0143	1,8800	2,6886	1,6736
Conclusion (Висновок)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
Analytical variance test (тест аналітичної дисперсії)											
S ² anal	3,4286	0,0032	0,0047	0,0003	0,0007	0,0034	0,0821	0,0000	0,0035	0,0050	0,0126
S _{anal}	1,8516	0,0562	0,0684	0,0159	0,0259	0,0581	0,2866	0,0006	0,0594	0,0710	0,1124
S ² sample	0,000	0,0005	0,002	0,000	0,0003	0,000	0,0000	0,000	0,005	0,0016	0,031
σ _p	6,0330	0,3792	0,2371	0,0458	0,0775	0,1042	0,7837	0,0011	0,0684	0,0927	0,3900
σ _p source	Trial SD	Horwitz	Horwitz	Horwitz	Horwitz	Horwitz	Horwitz	Horwitz	Horwitz	Horwitz	Method Tr SD
σ ² all	3,2757	0,0129	0,0051	0,0002	0,0005	0,0010	0,0553	0,0000	0,0004	0,0008	0,0137

5. DATA SUMMARY

Method	EN 16378:2013	EN 16378:2013	EN 16378:2013	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 7971-3:2019	ISO 6540:2021/ ДСТУ ISO 6540:2007	ISO 12099:2017	ISO 20483:2013/ ДСТУ ISO 20483:2016	ISO 16634-2:2016
	Broken grains, %	Grain impurities, %	Miscellaneous impurities, %	Broken grains, %	Damaged grains, %	Other grains, %	Miscellaneous impurities, %	Bulk density, kg/hl (use of Nilema litre apparatus)	Moisture content, %	Moisture content, %	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)
No of Results	15	15	15	7	7	7	7	10	18	7	14	2
No of Results z >3	0	0	0	0	0	0	0	0	0	0	1	0
No of Results z >3, %	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	7,143	0,000
Mean	1,643	1,884	1,115	1,659	2,373	0,087	1,226	70,361	14,248	14,159	8,254	8,475
Min	1,420	0,700	0,540	1,520	1,500	0,040	0,600	68,200	13,670	13,800	8,000	8,320
Max	1,990	3,320	1,820	1,860	3,530	0,150	2,090	72,490	14,530	14,550	9,000	8,630
SD	0,162	0,894	0,367	0,139	0,706	0,041	0,589	1,661	0,233	0,254	0,280	0,219
Median	1,580	1,620	1,160	1,610	2,100	0,080	1,220	71,150	14,300	14,200	8,160	8,475
Robust mean (assigned value)	1,632	1,876	1,105	1,659	2,343	0,087	1,226	70,361	14,277	14,156	8,203	8,475
Robust SD	0,142	0,880	0,333	0,139	0,650	0,040	0,589	1,661	0,178	0,249	0,170	0,219
SD from method (Tr.SD)	0,740	1,230	0,390	0,433	1,676	0,282	0,613	N/A	N/A	N/A	0,140	0,330
SD from Horwitz eq.	0,061	0,068	0,044	0,061	0,082	0,005	0,048	N/A	0,378	0,376	0,239	0,246
Target SD	0,216	0,880	0,390	0,139	0,650	0,040	0,589	1,661	0,378	0,376	0,140	0,246
Source of target SD of PT	Trial SD	Trial SD	Method Tr SD	Trial SD	Trial SD	Trial SD	Trial SD	Trial SD	Horwitz	Horwitz	Method Tr SD	Horwitz

Method	ISO 12099:2017	ISO 2171:2007/ ДСТУ ISO 2171:2009	ISO 6492:1999/ ДСТУ ISO 6492:2003	ISO 11085:2015	ISO 12099:2017	ISO 6865:2000/ ДСТУ ISO 6865:2004	ISO 12099:2017	ISO 6493:2000	ISO 12099:2017	GAFTA 7.0:2018	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)
	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Ash yield, % (Expressed on dry matter)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Starch content, %	Starch content, %	Volatile nitrogenous basis, %	Broken Corn, %	Foreign Material, %
No of Results	7	12	12	4	6	13	4	3	2	3	8	8
No of Results $ z > 3$	0	1	0	0	0	0	0	0	0	0	0	0
No of Results $ z > 3$, %	0,000	8,333	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,0000	0,000	0,000
Mean	8,170	1,157	3,200	3,158	3,308	1,890	1,945	62,553	61,585	0,0137	2,033	0,570
Min	7,580	0,270	3,030	3,050	3,010	1,560	1,800	60,890	60,600	0,0130	1,860	0,500
Max	8,490	1,290	3,410	3,360	3,410	2,150	2,230	65,400	62,570	0,0140	2,160	0,610
SD	0,306	0,283	0,138	0,138	0,151	0,167	0,198	2,477	1,393	0,0006	0,108	0,038
Median	8,270	1,250	3,200	3,110	3,365	1,950	1,875	61,370	61,585	0,0140	2,055	0,580
Robust mean (assigned value)	8,214	1,230	3,200	3,158	3,200	1,903	1,945	62,553	61,585	0,0137	2,035	0,573
Robust SD	0,215	0,054	0,138	0,138	0,059	0,130	0,198	2,477	1,393	0,0006	0,104	0,032
SD from method (Tr.SD)	N/A	0,033	0,199	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SD from Horwitz eq.	0,239	0,048	0,107	0,106	0,107	0,069	0,070	0,791	0,785	0,0010	0,073	0,025
Target SD	0,239	0,048	0,138	0,106	0,107	0,245	0,198	2,477	0,785	0,0010	0,104	0,112
Source of target SD of PT	Horwitz	Horwitz	Trial SD	Horwitz	Horwitz	Trial SD	Trial SD	Trial SD	Horwitz	Horwitz	Trial SD	Trial SD

Method	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT)	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 13586.5-93	ДСТУ 4117:2007	ДСТУ 7169:2010	ГОСТ 13496.15-97	ДСТУ 8844:2019	ГОСТ 10845-98
	Damaged kernels, %	Test weight, lbu/bu	Test weight, g/l	Foreign impurities, %	Grain impurities, %	Moisture content, %	Moisture content, %	Mass fraction of crude protein, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.0.)	Mass fraction of crude fat, % (Expressed on dry matter)	Mass fraction of crude fibre, % (Expressed on dry matter)	Starch content, % (Expressed on dry matter)
No of Results	8	7	22	34	34	40	21	13	10	8	4
No of Results $ z > 3$	0	0	0	1	0	0	0	1	1	1	0
No of Results $ z > 3$, %	0,000	0,000	0,000	2,941	0,000	0,000	0,000	7,692	10,000	12,500	0,000
Mean	3,160	53,864	687,024	1,273	4,516	13,952	14,070	8,000	3,872	2,158	73,718
Min	1,200	53,010	680,000	0,700	2,920	13,300	13,600	7,740	3,580	1,810	70,560
Max	5,610	55,000	698,000	3,150	7,090	14,340	14,600	8,660	4,400	3,430	76,820
SD	1,411	0,836	5,987	0,403	0,854	0,192	0,287	0,292	0,244	0,527	2,785
Median	3,365	53,850	684,300	1,210	4,430	14,000	14,000	7,890	3,825	2,010	73,745
Robust mean (assigned value)	3,081	53,864	686,672	1,217	4,483	13,971	14,053	7,946	3,844	2,006	73,718
Robust SD	1,265	0,836	5,389	0,160	0,394	0,104	0,243	0,184	0,187	0,143	2,785
SD from method (Tr.SD)	N/A	N/A	N/A	0,300	1,000	0,700	N/A	N/A	N/A	N/A	N/A
SD from Horwitz eq.	0,104	N/A	N/A	0,047	0,143	0,374	0,375	0,233	0,126	0,072	0,859
Target SD	1,265	0,836	6,033	0,300	1,000	0,374	0,375	0,233	0,126	0,143	2,785
Source of target SD of PT	Trial SD	Trial SD	Trial SD	Method Tr SD	Method Tr SD	Horwitz	Horwitz	Horwitz	Horwitz	Trial SD	Trial SD

6. RAW DATA

Method	EN 16378:2013	EN 16378:2013	EN 16378:2013	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 7971-3:2019	ISO 6540:2021/ ДСТУ ISO 6540:2007	ISO 12099:2017	ISO 20483:2013/ ДСТУ ISO 20483:2016	ISO 16634-2:2016	ISO 12099:2017
Laboratory number	Broken grains, %	Grain impurities, %	Miscellaneous impurities, %	Broken grains, %	Damaged grains, %	Other grains, %	Miscellaneous impurities, %	Bulk density, kg/hl (use of Nilema litre apparatus)	Moisture content, %	Moisture content, %	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)
1	1,86	2,68	1,82	1,86	2,63	0,05	1,82	68,30	14,32	14,27	8,20	8,32	8,49
2													
3													
4													
5													
6													
7	-	-	-	-	-	-	-	-	14,30	-	-	-	-
8	1,52	1,06	1,50	\	\	\	\	69,32	13,67	13,80	8,21	\	8,00
9	1,58	1,05	0,80	-	-	-	-	71,20	14,25	-	8,05	-	-
10	1,54	2,32	1,40	1,52	2,10	0,04	1,43	72,1	14,51	14,55	8,38		8,31
11	1,65	1,17	0,84	1,62	1,85	0,11	0,63	71,30	14,36	-	8,01	-	-
12	1,55	1,10	0,80	1,55	1,50	0,12	0,60	71,30	14,30	-	8,00	-	-
13													
14													
15													
16	1,52	1,62	1,23						14,34		8,12		
17													
18	1,67	2,75	0,83	1,61	2,97	0,15	0,79	68,20	14,52	14,09	8,06		7,58
19	1,42	3,32	0,54					72,49	14,00				
20													
21													
23													
24	1,80	0,70	0,80						13,92				
25	1,78	1,00	1,46						14,30				
26													
27													
28	1,99	3,13	1,50	1,85	3,53	0,08	2,09	-	14,18	14,20	8,11	-	8,14
29	1,74	2,62	0,83					71,10	14,22	14,30			8,27
30													
31									14,53		8,23		
32													
33	-	-	-	-	-	-	-	-	-	-	-	-	-
34											8,62		
35													
36													
37													
38	1,44	1,28	1,16						14,32		8,10		
39									13,94		8,46 *	8,63	
40	-	-	-	-	-	-	-	-	-	-	-	-	-
41										13,90	9,00		8,40
42	-	-	-	-	-	-	-	-	-	-	-	-	-
43	1,58	2,46	1,21	1,60	2,03	0,06	1,22	68,30	14,49				

Method	ISO 2171:2007/ ДСТУ ISO 2171:2009	ISO 6492:1999/ ДСТУ ISO 6492:2003	ISO 11085:2015	ISO 12099:2017	ISO 6865:2000/ ДСТУ ISO 6865:2004	ISO 12099:2017	ISO 6493:2000	ISO 12099:2017	GAFTA 7.0:2018	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)
Laboratory number	Ash yield, % (Expressed on dry matter)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Starch content, %	Starch content, %	Volatile nitrogenous basis, %	Broken Corn, %	Foreign Material, %	Damaged kernels, %	Test weight, lbu/bu
1	1,17		3,12	3,30	2,15	2,23	61,37	60,60	0,014	2,14	0,60	3,72	53,11
2													
3													
4													
5													
6													
7	-	3,03	-	-	1,785	-	-	-	-	-	-	-	-
8	1,28	3,40	\	\	1,95	\	\	\	\	2,09	0,59	5,61	53,85
9	1,25	3,10	-	-	2,03	-	-	-	-	-	-	-	-
10	1,28	3,41	3,36	3,38	1,56		65,4		0,014	2,08	0,55	3,85	54,2
11	1,29	3,05	3,05	-	2,03	-	-	-	-	2,03	0,61	1,45	55,0
12	1,27	3,10	3,10	-	2,00	-	-	-	0,013	1,90	0,57	1,20	54,8
13													
14													
15													
16	1,18	3,20			1,96								
17													
18	1,16	3,07		3,01	1,96	1,93							
19													
20													
21													
23													
24													
25										2,16	0,60	2,72	
26													
27													
28	1,28	3,39	-	3,41	1,81	1,82	-	-	-	1,86	0,54	3,15	53,01
29				3,40									
30													
31													
32													
33	-	-	-	-	-	-	-	-	-	-	-	-	-
34	0,27												
35													
36													
37													
38	1,20	3,22			1,92								
39		3,23			1,78								
40	-	-	-	-	-	-	-	-	-	-	-	-	-
41	1,25	3,20		3,35	1,64	1,80	60,89	62,57					
42	-	-	-	-	-	-	-	-	-	-	-	-	-
43										2,00	0,50	3,58	53,08

Method	ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT)	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 13586.5-93	ДСТУ 4117:2007	ДСТУ 7169:2010	ГОСТ 13496.15-97	ДСТУ 8844:2019	ГОСТ 10845-98
Laboratory number	Test weight, g/l	Foreign impurities, %	Grain impurities, %	Moisture content, %	Moisture content, %	Mass fraction of crude protein, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.0.)	Mass fraction of crude fat, % (Expressed on dry matter)	Mass fraction of crude fibre, % (Expressed on dry matter)	Starch content, % (Expressed on dry matter)
1	684,00	1,47	4,81	13,79		7,82		2,18	72,39
2		1,12	4,22	13,90					
3		1,25	4,30	13,90					
4		1,30	4,48	14,00					
5	689,22	1,21	4,63	14,05	14,00				
6		1,23	4,43	14,00	13,96				
7	-	1,099	4,290	14,10	14,60	8,14	-	-	-
8	693,40	\	\	\	13,70	8,11	4,04	3,43	\
9	-	-	-	-	-	-	-	-	-
10	682	1,61	4,40	14,12	14,18	8,04	3,83	1,81	
11	694	-	-	14,11	-	-	-	-	-
12	683	-	-	14,00	-	-	-	-	-
13		1,18	4,95	14,00					
14		1,15	4,75	14,00					
15		1,21	4,70	14,00	14,20				
16	682,00	1,10	3,08	14,18		7,80			
17		1,22	4,41	14,00					
18	681,00	0,93	4,43	14,34		7,74	3,58	2,01	
19	692,00	1,18	4,63	13,90	14,20				
20	686,00	1,84	3,57	13,80	13,90				
21	684,60	1,13	3,81	14,10	14,20				
23	680,00	0,98	4,43	14,00	14,50				
24		1,10	6,30	13,50					
25	684,00	1,28	3,04	14,00	14,30				
26				14,03		7,79	3,77	1,88	
27	697,00	1,38	4,20	14,10	14,60				
28	682,30	1,55	4,80	13,89	13,92	7,74	3,82	2,04	-
29	681,00	0,86	4,11	13,90	14,00				
30		1,09	5,68	13,90	13,70				
31				14,31		7,89			
32		1,22	4,47	13,91	14,20				
33	-	0,86	7,09	13,89	13,90	-	-	-	-
34		3,15	5,85	13,91			4,03		
35		1,21	5,12	13,90					
36	697	1,24	4,86	13,88	13,90				
37	693,00	1,39	4,77	13,90					
38	682,00	1,05	2,92	14,08		7,78			
39	698,00	0,70	3,37	13,60			3,60		76,82
40	686,00	-	-	13,30	13,60	8,00	4,40	-	75,10
41				13,68	13,72	8,66	3,71	1,90	70,56
42	-	1,40	4,24	14,00	-	8,49	3,94	2,01	-
43	683,00	1,59	4,39	14,10	14,20				

7. Z SCORES AND DATA SUMMERY FOR ASSESSMENT

Method	EN 16378:2013	EN 16378:2013	EN 16378:2013	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 19942:2018	ISO 7971-3:2019	ISO 6540:2021/ ДСТУ ISO 6540:2007	ISO 12099:2017	ISO 20483:2013/ ДСТУ ISO 20483:2016	ISO 16634-2:2016	ISO 12099:2017
Laboratory number	Broken grains, %	Grain impurities, %	Miscellaneous impurities, %	Broken grains, %	Damaged grains, %	Other grains, %	Miscellaneous impurities, %	Bulk density, kg/hl (use of Nilema litre apparatus)	Moisture content, %	Moisture content, %	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)	Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)
1	1,06	0,91	1,83	1,45	0,44	-0,92	1,01	-1,24	0,12	0,30	-0,02	-0,63	1,15
2													
3													
4													
5													
6													
7									0,06				
8	-0,52	-0,93	1,01					-0,63	-1,61	-0,94	0,05		-0,90
9	-0,24	-0,94	-0,78					0,51	-0,07		-1,09		
10	-0,43	0,51	0,76	-1,00	-0,37	-1,17	0,35	1,05	0,62	1,05	1,26		0,40
11	0,08	-0,80	-0,68	-0,28	-0,76	0,59	-1,01	0,57	0,22		-1,38		
12	-0,38	-0,88	-0,78	-0,78	-1,30	0,84	-1,06	0,57	0,06		-1,45		
13													
14													
15													
16	-0,52	-0,29	0,32						0,17		-0,59		
17													
18	0,18	0,99	-0,70	-0,35	0,97	1,59	-0,74	-1,30	0,64	-0,17	-1,02		-2,65
19	-0,98	1,64	-1,45					1,28	-0,73				
20													
21													
23													
24	0,78	-1,34	-0,78						-0,94				
25	0,69	-1,00	0,91						0,06				
26													
27													
28	1,66	1,43	1,01	1,38	1,83	-0,17	1,47		-0,26	0,12	-0,67		-0,31
29	0,50	0,85	-0,70					0,45	-0,15	0,38			0,23
30													
31									0,67		0,19		
32													
33													
34											2,98		
35													
36													
37													
38	-0,89	-0,68	0,14						0,12		-0,74		
39									-0,89		1,83	0,63	
40													
41										-0,68	5,69		0,78
42													
43	-0,24	0,66	0,27	-0,42	-0,48	-0,67	-0,01	-1,24	0,57				

Method	ISO 2171:2007/ ДСТУ ISO 2171:2009	ISO 6492:1999/ ДСТУ ISO 6492:2003	ISO 11085:2015	ISO 12099:2017	ISO 6865:2000/ ДСТУ ISO 6865:2004	ISO 12099:2017	ISO 6493:2000	ISO 12099:2017	GAFTA 7.0:2018	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)	USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020)
Laboratory number	Ash yield, % (Expressed on dry matter)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Fat content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Crude fibre content, % (Expressed as a mass fraction of the product as received)	Starch content, %	Starch content, %	Volatile nitrogenous basis, %	Broken Corn, %	Foreign Material, %	Damaged kernels, %	Test weight, lbu/bu
1	-1,26		-0,35	0,93	1,01	1,44	-0,48	-1,26	0,32	1,01	0,24	0,51	-0,90
2													
3													
4													
5													
6													
7		-1,23			-0,48								
8	1,05	1,46			0,19					0,53	0,15	2,00	-0,02
9	0,42	-0,72			0,52								
10	1,05	1,53	1,91	1,68	-1,40		1,15		0,32	0,43	-0,21	0,61	0,40
11	1,26	-1,09	-1,01		0,52					-0,05	0,33	-1,29	1,36
12	0,84	-0,72	-0,54		0,40				-0,64	-1,30	-0,03	-1,49	1,12
13													
14													
15													
16	-1,05	0,00			0,23								
17													
18	-1,47	-0,94		-1,77	0,23	-0,08							
19													
20													
21													
23													
24													
25										1,20	0,24	-0,29	
26													
27													
28	1,05	1,38		1,96	-0,38	-0,63				-1,68	-0,30	0,05	-1,02
29				1,86									
30													
31													
32													
33													
34	-20,13												
35													
36													
37													
38	-0,63	0,15			0,07								
39		0,22			-0,50								
40													
41	0,42	0,00		1,40	-1,07	-0,73	-0,67	1,26					
42													
43										-0,34	-0,65	0,39	-0,94

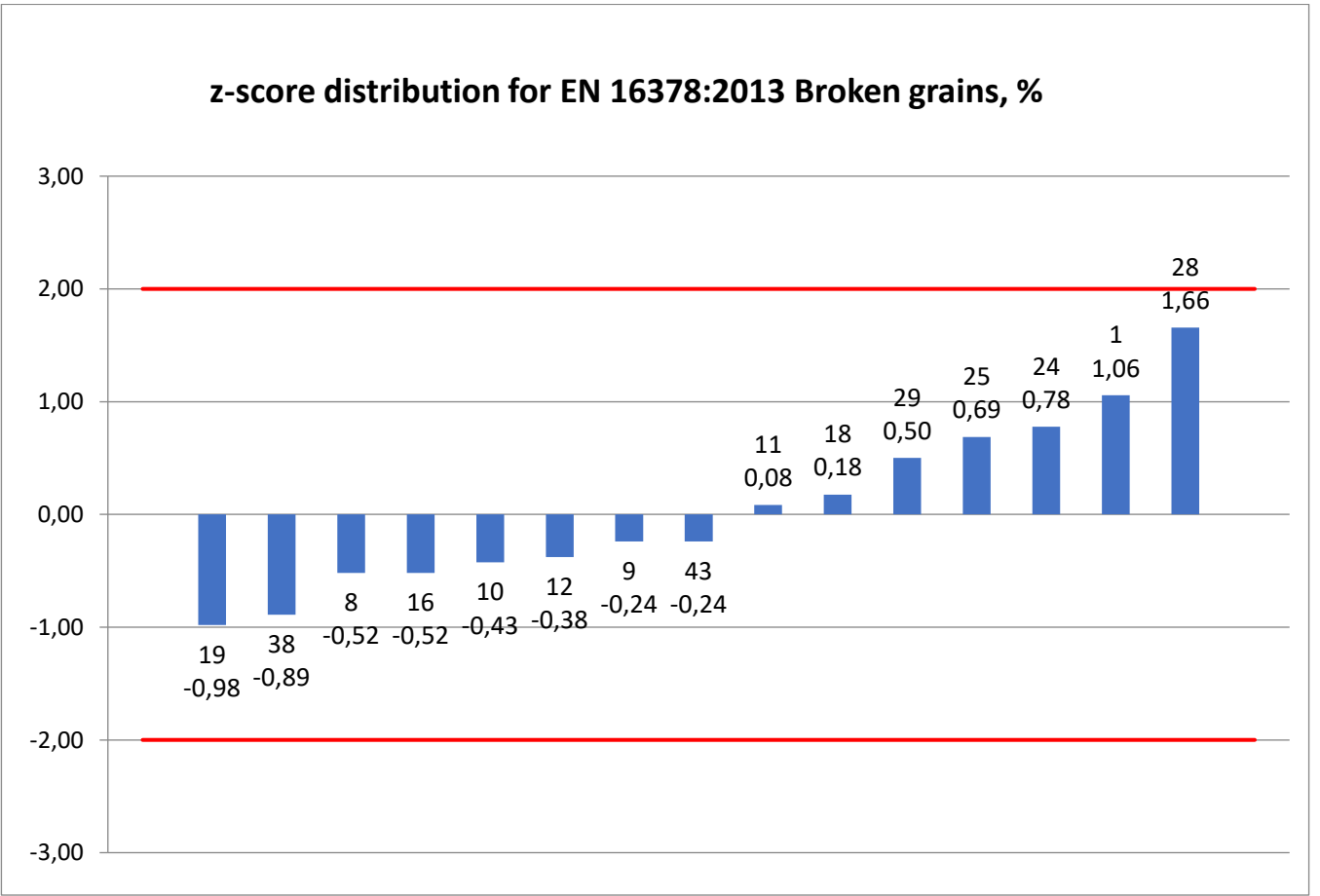
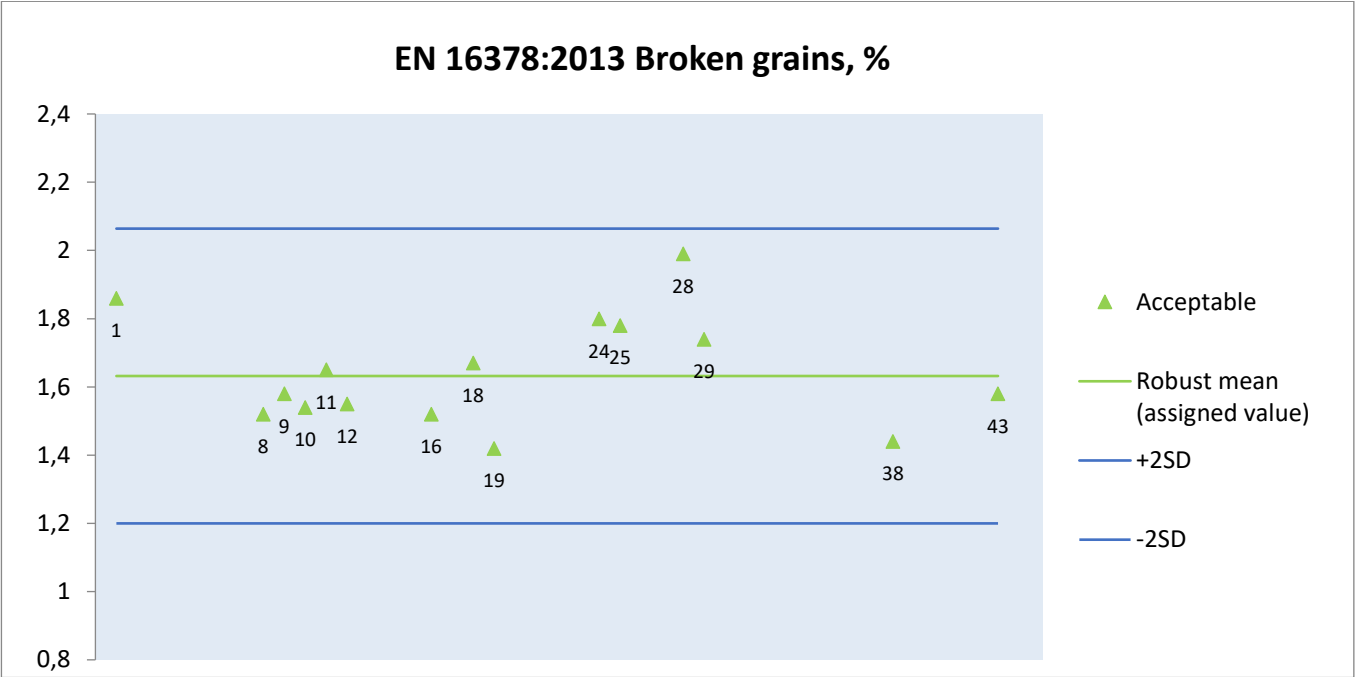
Method	ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT)	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 30483-97/ ДСТУ 4525:2006	ГОСТ 13586.5-93	ДСТУ 4117:2007	ДСТУ 7169:2010	ГОСТ 13496.15-97	ДСТУ 8844:2019	ГОСТ 10845-98
Laboratory number	Test weight, g/l	Foreign impurities, %	Grain impurities, %	Moisture content, %	Moisture content, %	Mass fraction of crude protein, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.0.)	Mass fraction of crude fat, % (Expressed on dry matter)	Mass fraction of crude fibre, % (Expressed on dry matter)	Starch content, % (Expressed on dry matter)
1	-0,44	0,84	0,33	-0,48		-0,54		1,21	-0,48
2		-0,32	-0,26	-0,19					
3		0,11	-0,18	-0,19					
4		0,28	0,00	0,08					
5	0,42	-0,02	0,15	0,21	-0,14				
6		0,04	-0,05	0,08	-0,25				
7		-0,39	-0,19	0,34	1,46	0,84			
8	1,12				-0,94	0,71	1,56	9,95	
9									
10	-0,77	1,31	-0,08	0,40	0,34	0,41	-0,12	-1,37	
11	1,21			0,37					
12	-0,61			0,08					
13		-0,12	0,47	0,08					
14		-0,22	0,27	0,08					
15		-0,02	0,22	0,08	0,39				
16	-0,77	-0,39	-1,40	0,56		-0,63			
17		0,01	-0,07	0,08					
18	-0,94	-0,96	-0,05	0,99		-0,88	-2,11	0,03	
19	0,88	-0,12	0,15	-0,19	0,39				
20	-0,11	2,08	-0,91	-0,46	-0,41				
21	-0,34	-0,29	-0,67	0,34	0,39				
23	-1,11	-0,79	-0,05	0,08	1,19				
24		-0,39	1,82	-1,26					
25	-0,44	0,21	-1,44	0,08	0,66				
26				0,16		-0,67	-0,59	-0,88	
27	1,71	0,54	-0,28	0,34	1,46				
28	-0,72	1,11	0,32	-0,22	-0,36	-0,88	-0,20	0,24	
29	-0,94	-1,19	-0,37	-0,19	-0,14				
30		-0,42	1,20	-0,19	-0,94				
31				0,91		-0,24			
32		0,01	-0,01	-0,16	0,39				
33		-1,19	2,61	-0,22	-0,41				
34		6,44	1,37	-0,16			1,48		
35		-0,02	0,64	-0,19					
36	1,71	0,08	0,38	-0,24	-0,41				
37	1,05	0,58	0,29	-0,19					
38	-0,77	-0,56	-1,56	0,29		-0,71			
39	1,88	-1,72	-1,11	-0,99			-1,95		1,11
40	-0,11			-1,80	-1,21	0,23	4,42		0,50
41				-0,78	-0,89	3,07	-1,07	-0,74	-1,13
42		0,61	-0,24	0,08		2,34	0,76	0,03	
43	-0,61	1,24	-0,09	0,34	0,39				

Remarks

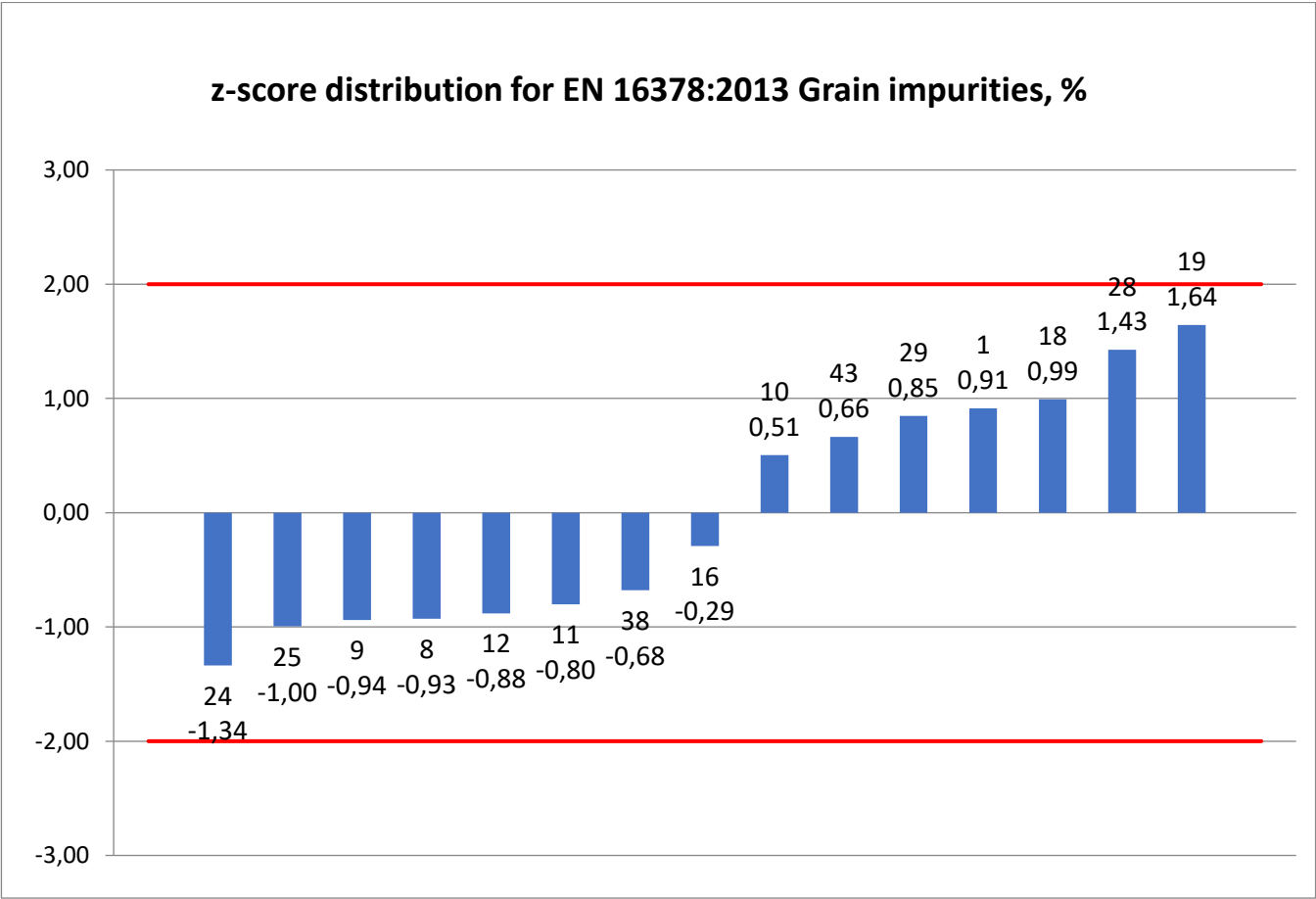
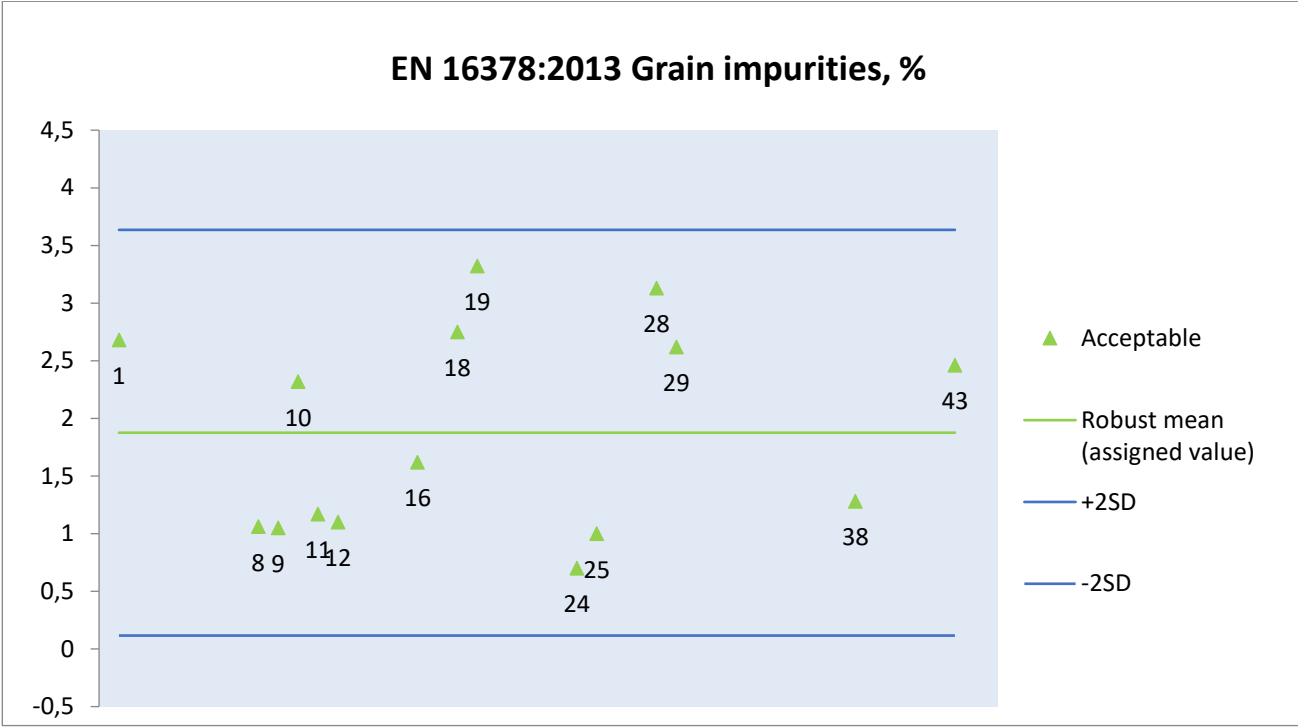
1. Green colored cells contain results that are considered to be satisfactory.
2. Red colored cells contain results that are considered to be not satisfactory.
3. Results that are considered to be questionable are marked by yellow colored cell.
4. Blank cell – results were not reported by the Participant

8. Z SCORE PLOTS AND RESULTS CHARTS.

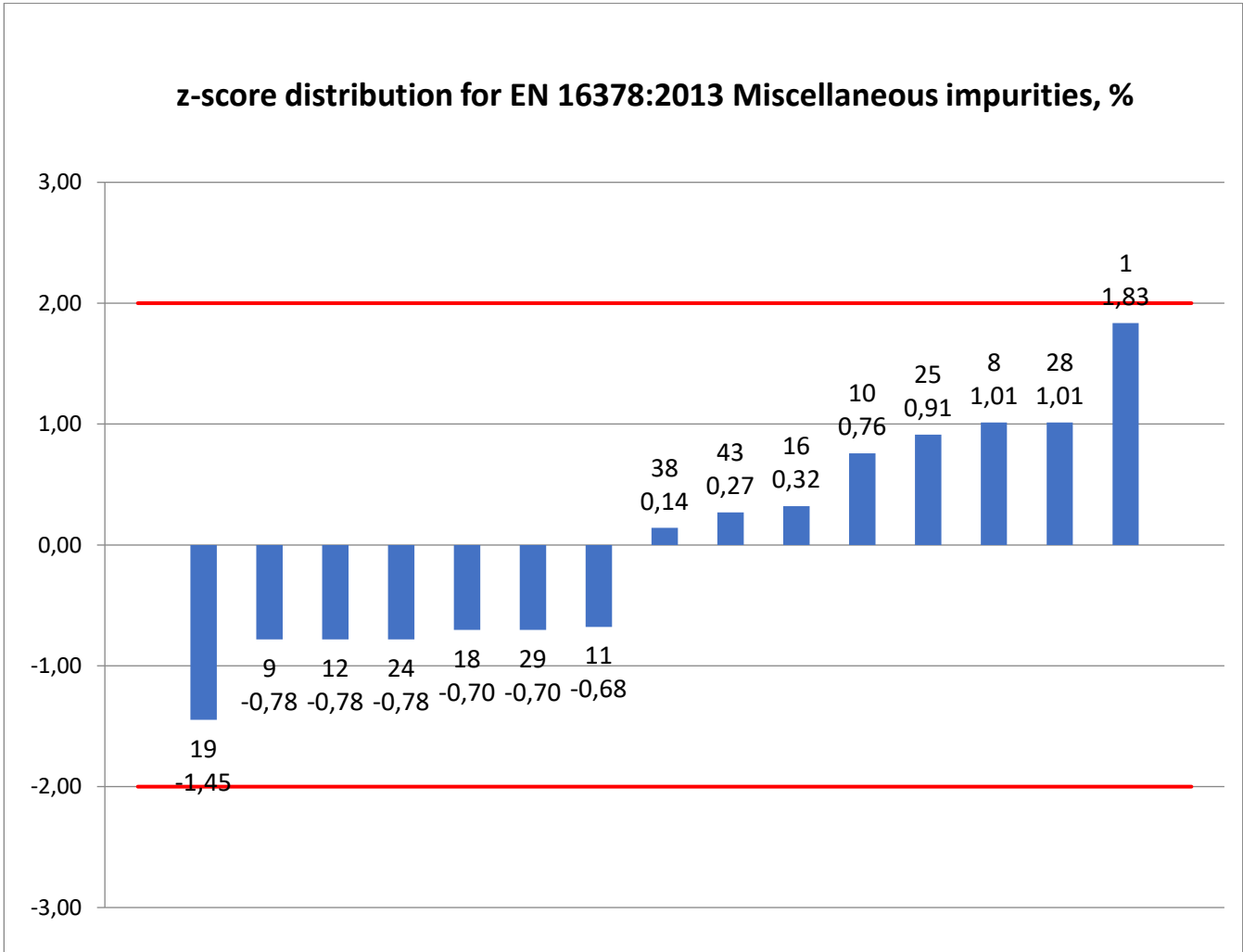
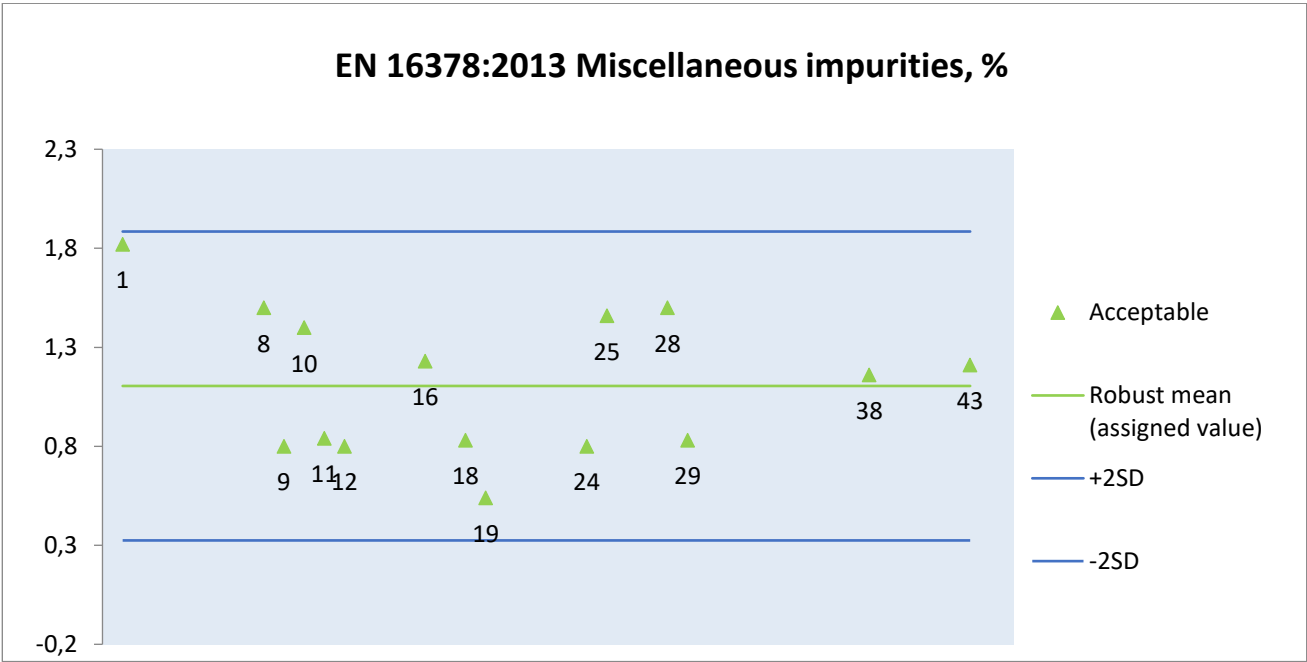
8.1. EN 16378:2013 Broken grains, %



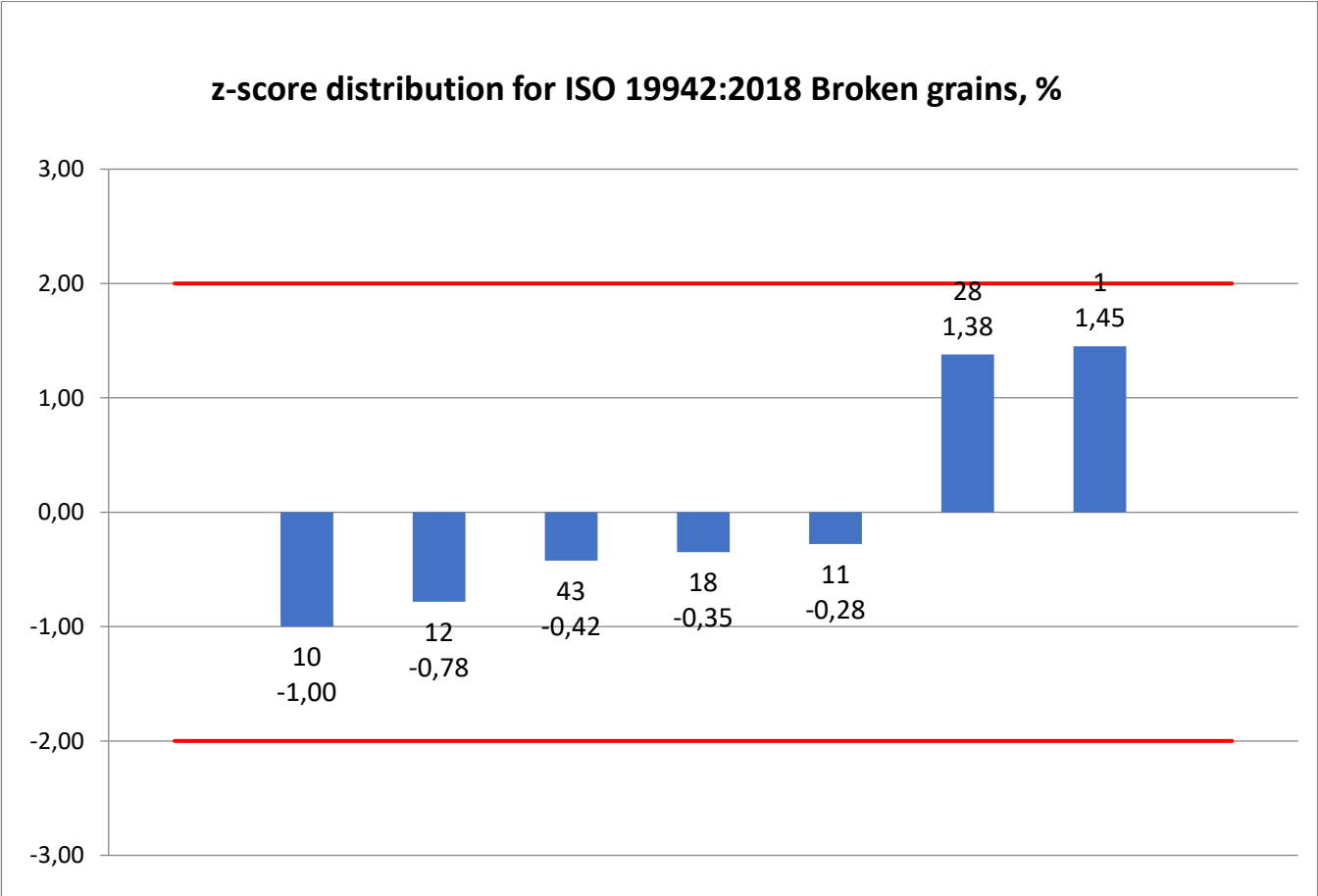
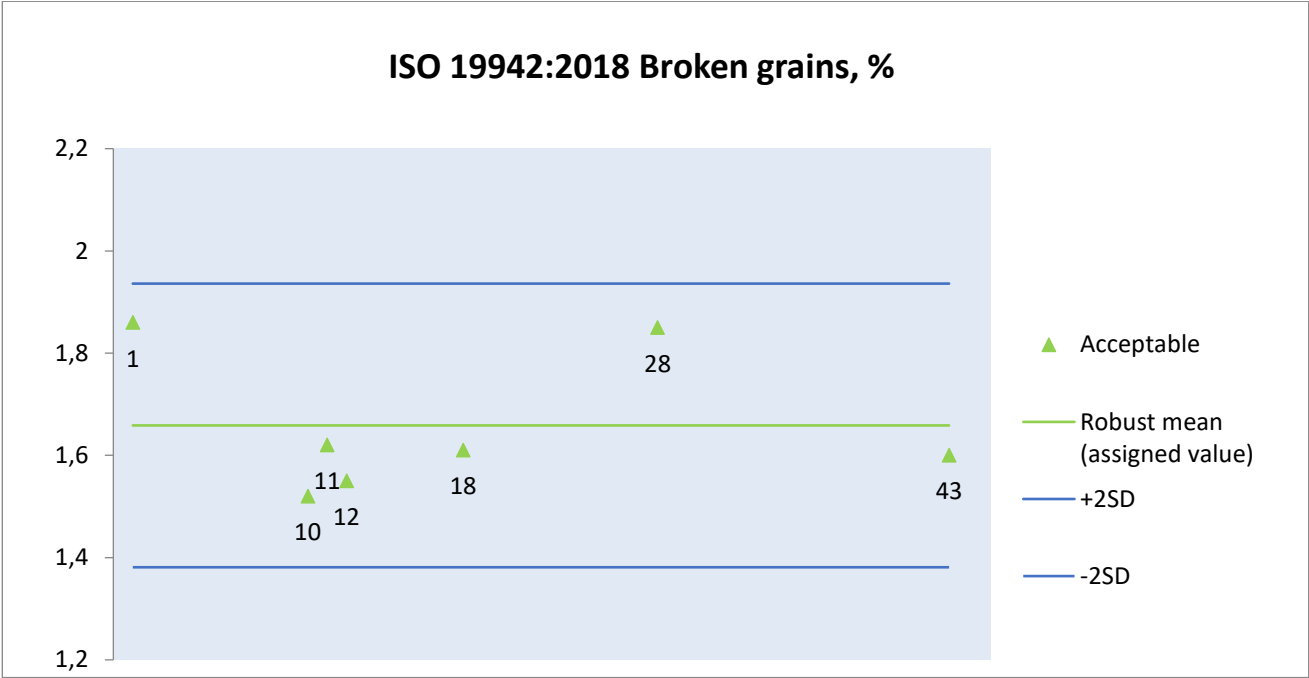
8.2. EN 16378:2013 Grain impurities, %



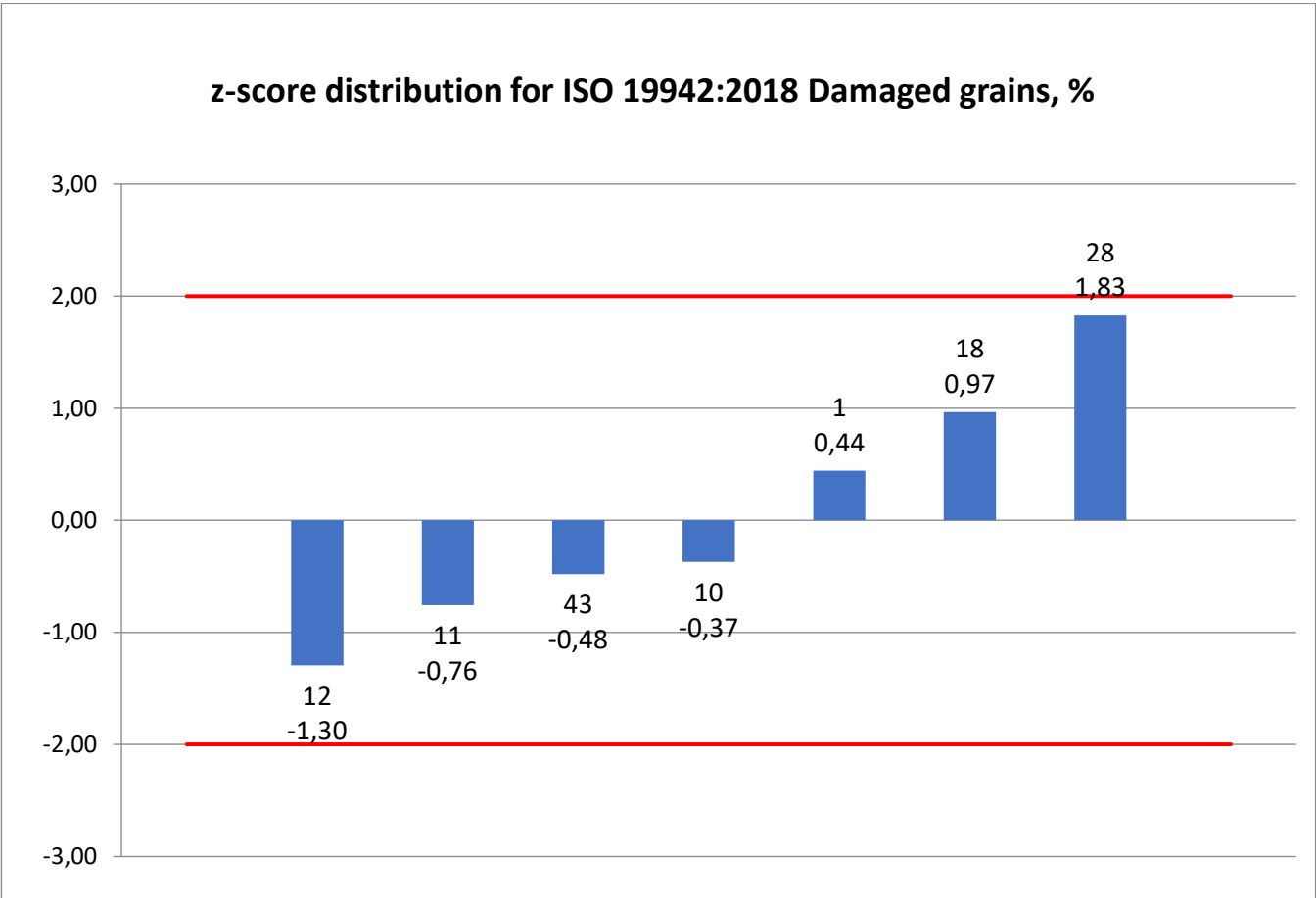
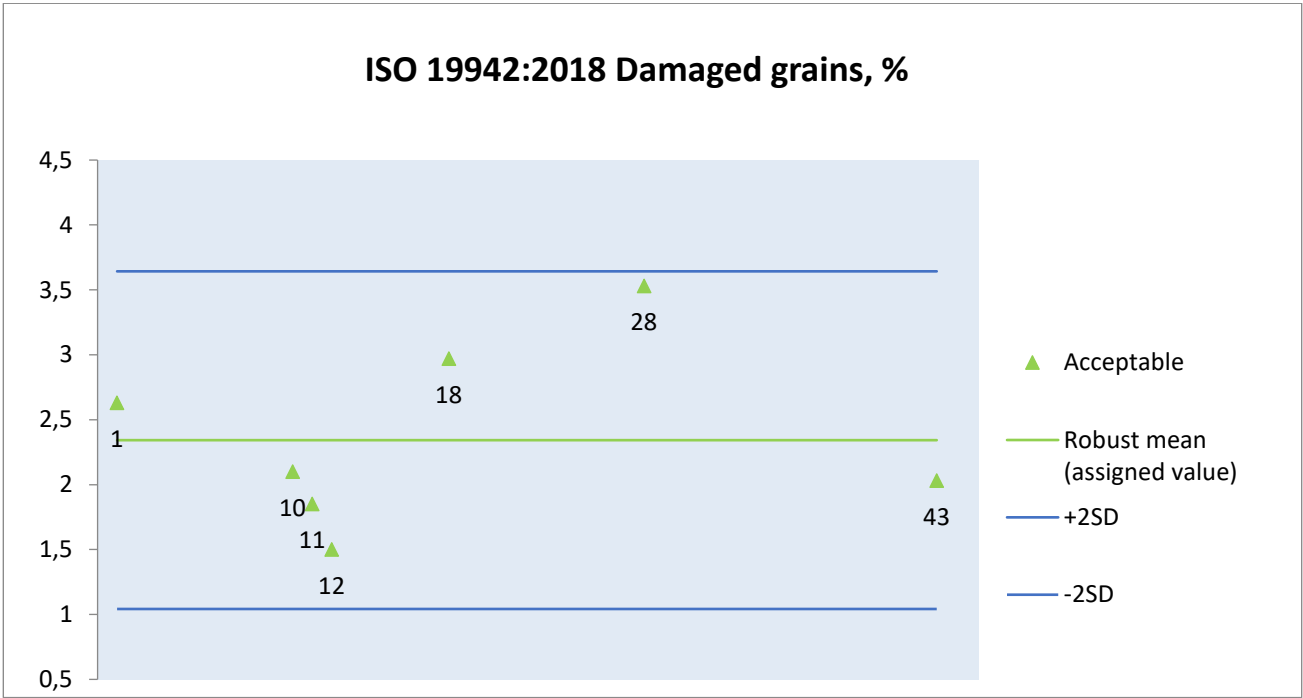
8.3. EN 16378:2013 Miscellaneous impurities, %



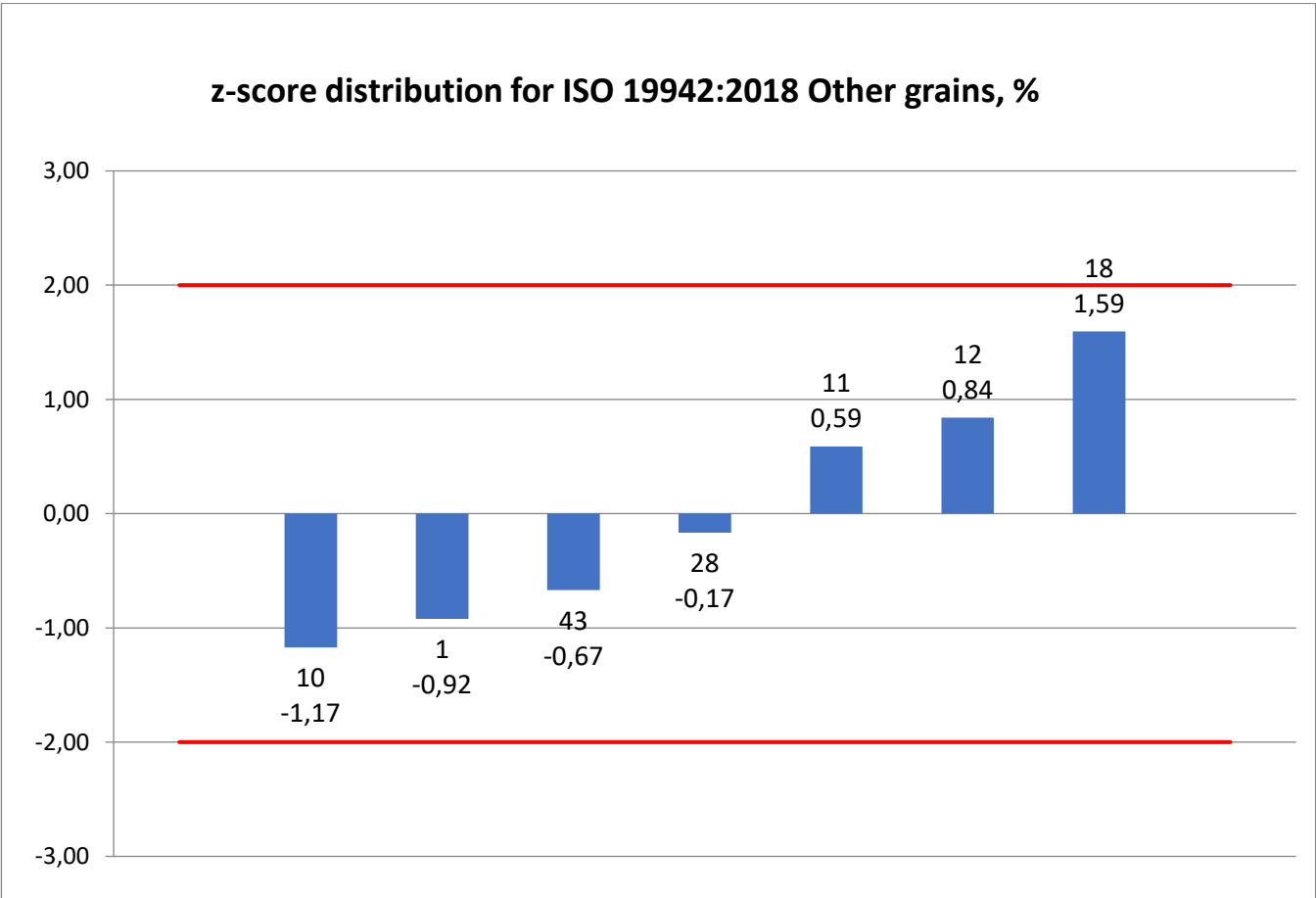
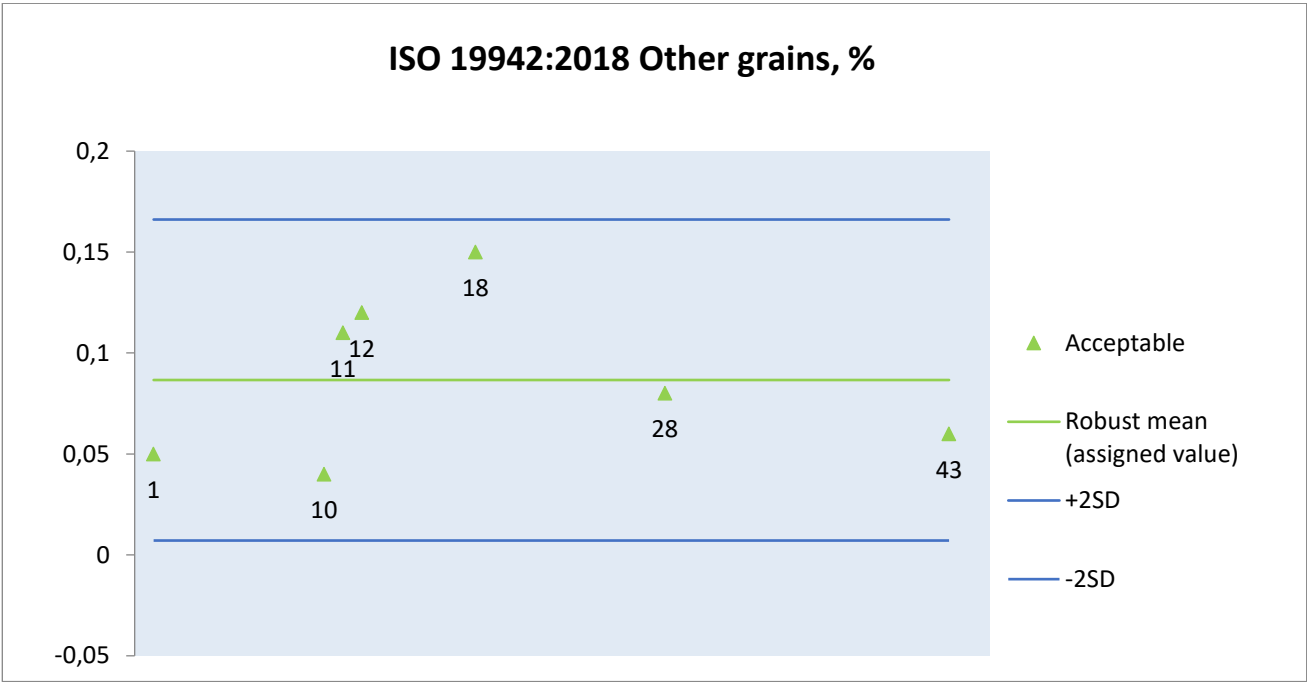
8.4. ISO 19942:2018 Broken grains, %



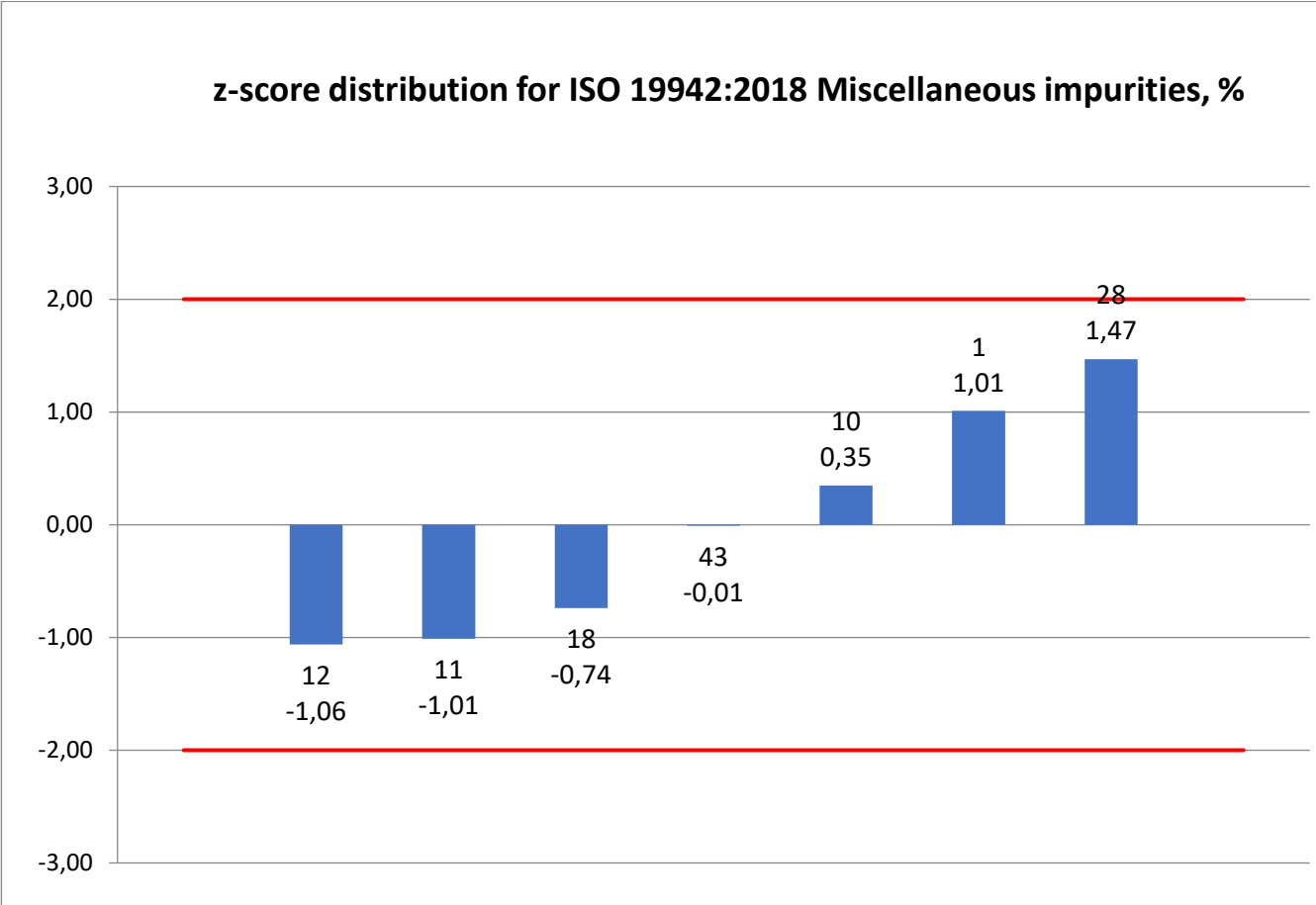
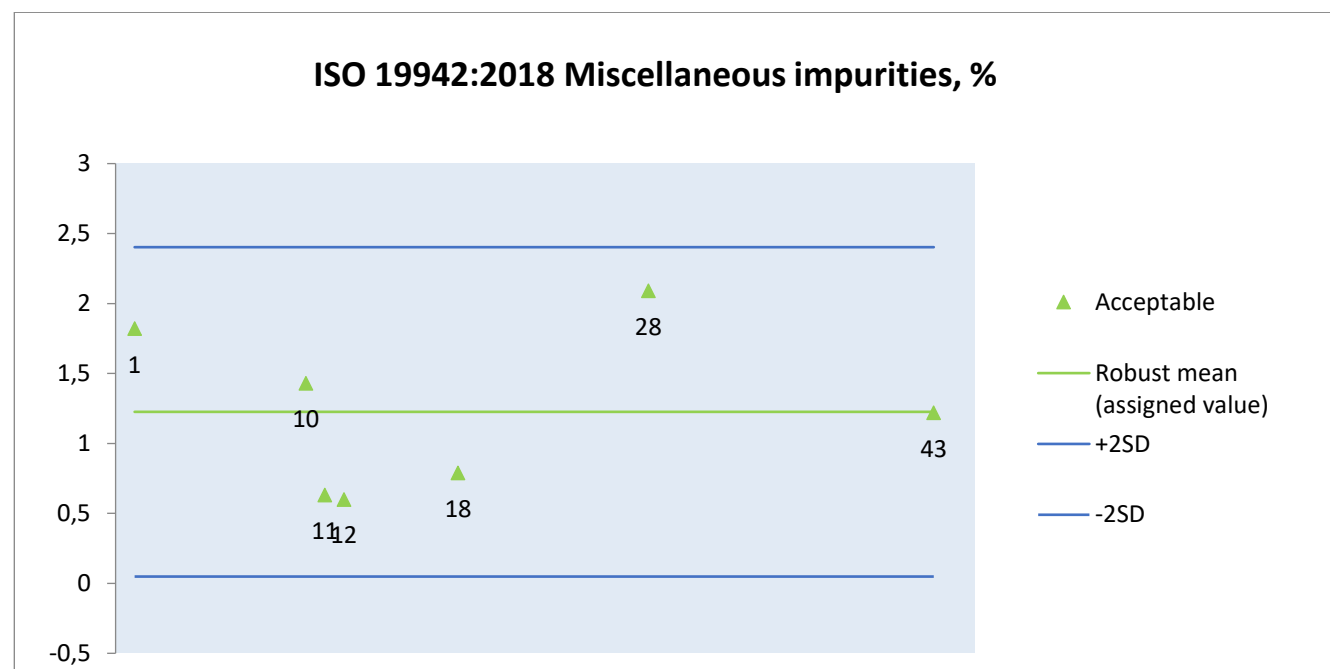
8.5. ISO 19942:2018 Damaged grains, %



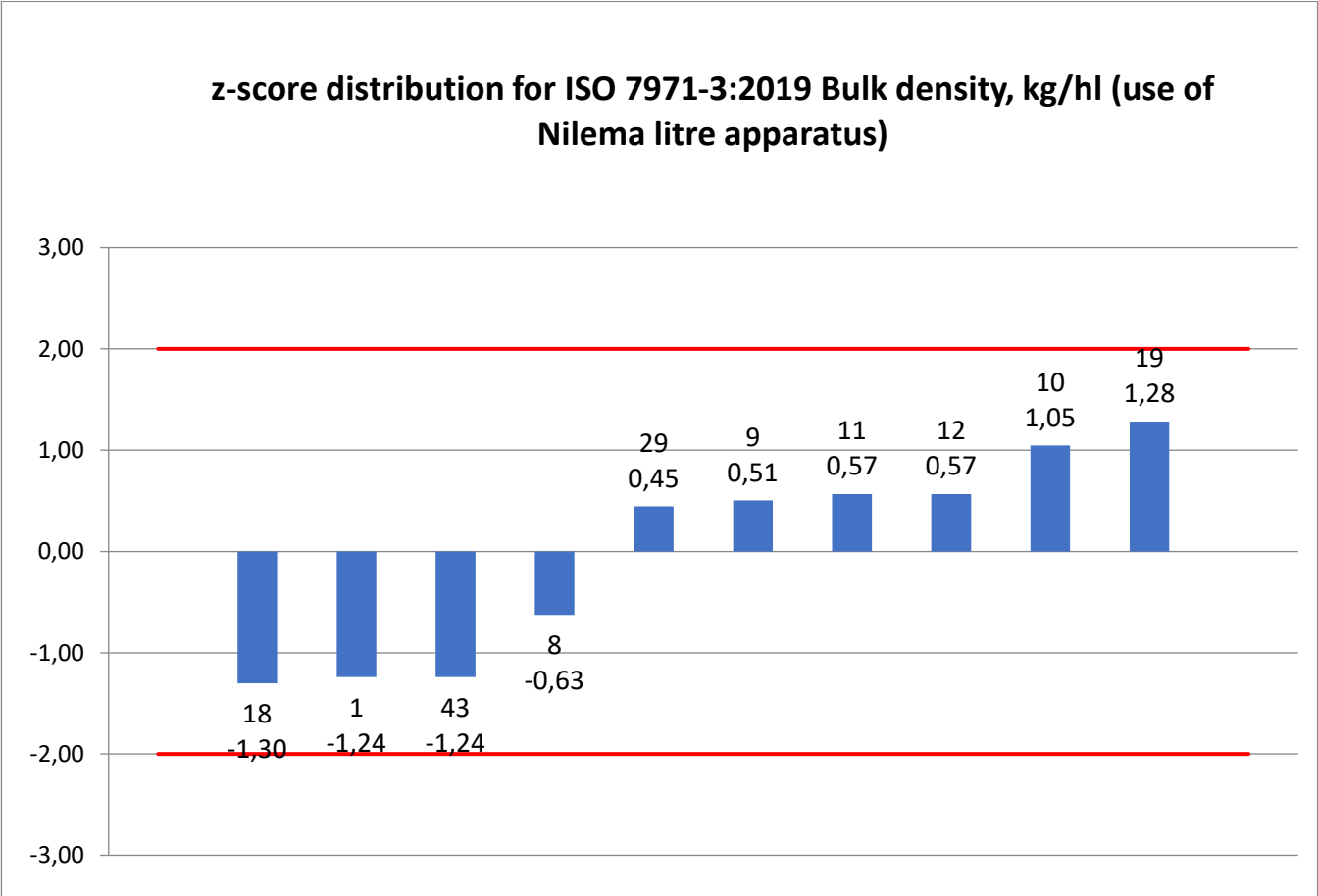
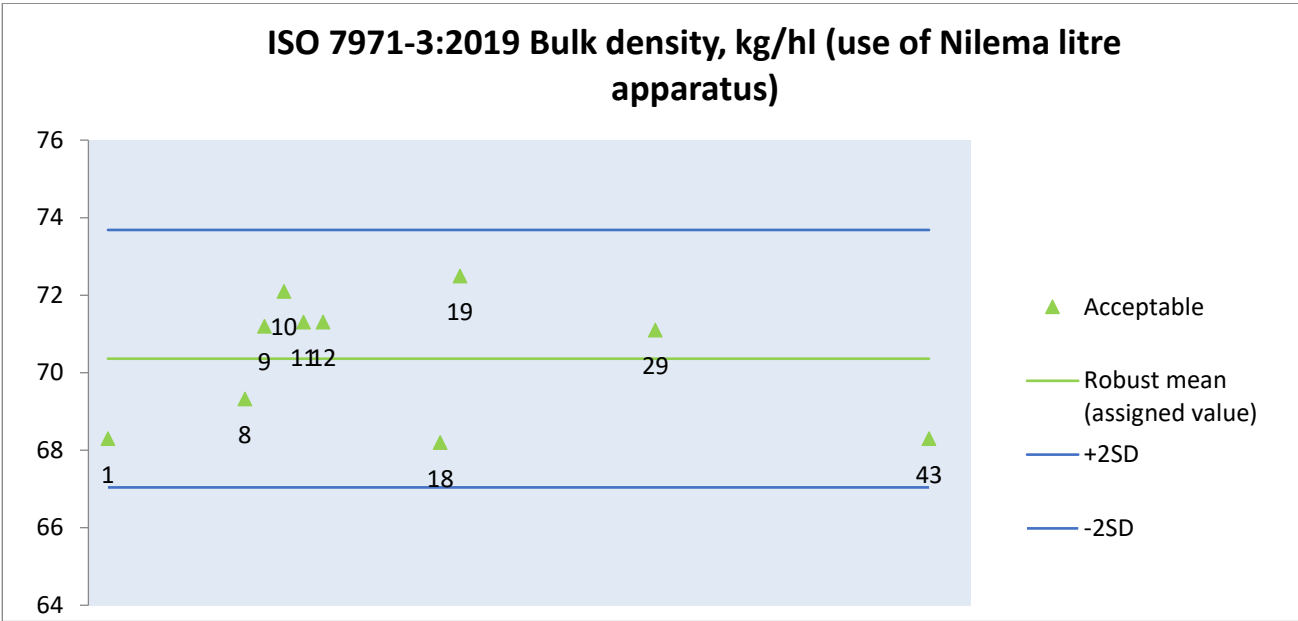
8.6. ISO 19942:2018 Other grains, %



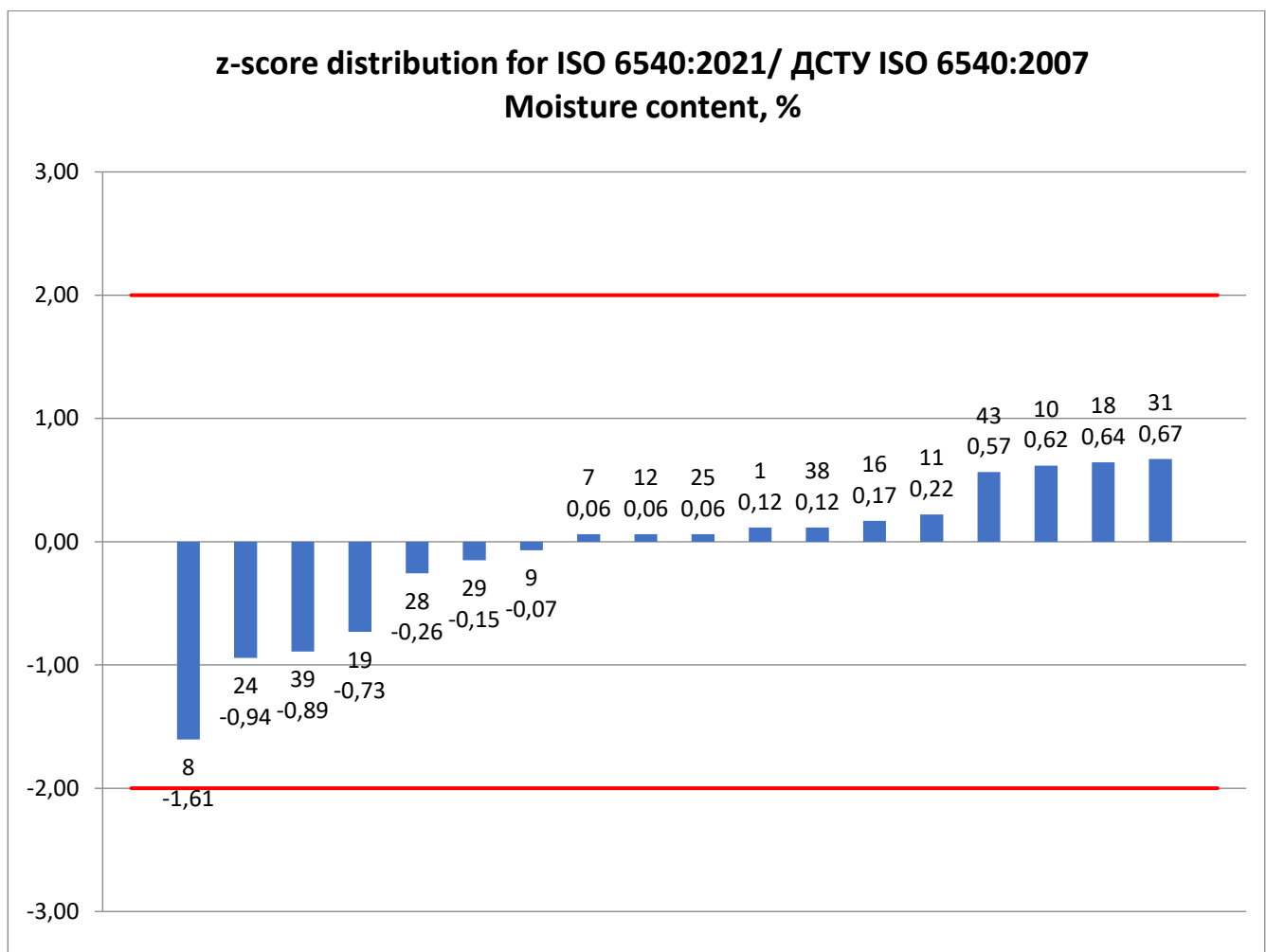
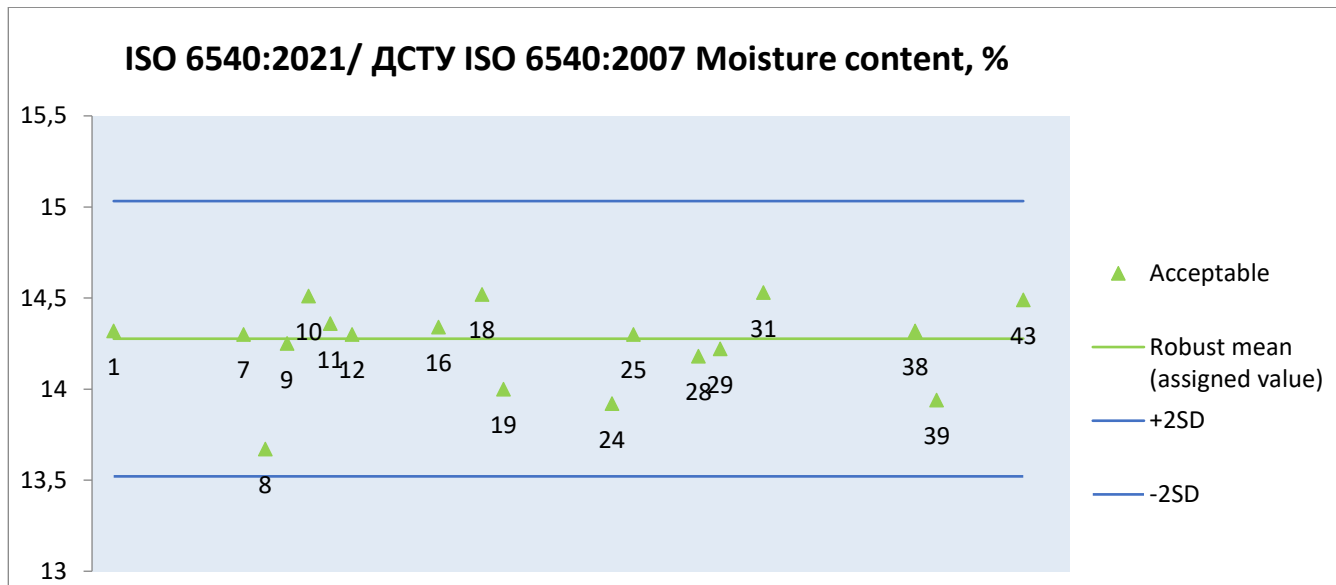
8.7. ISO 19942:2018 Miscellaneous impurities, %



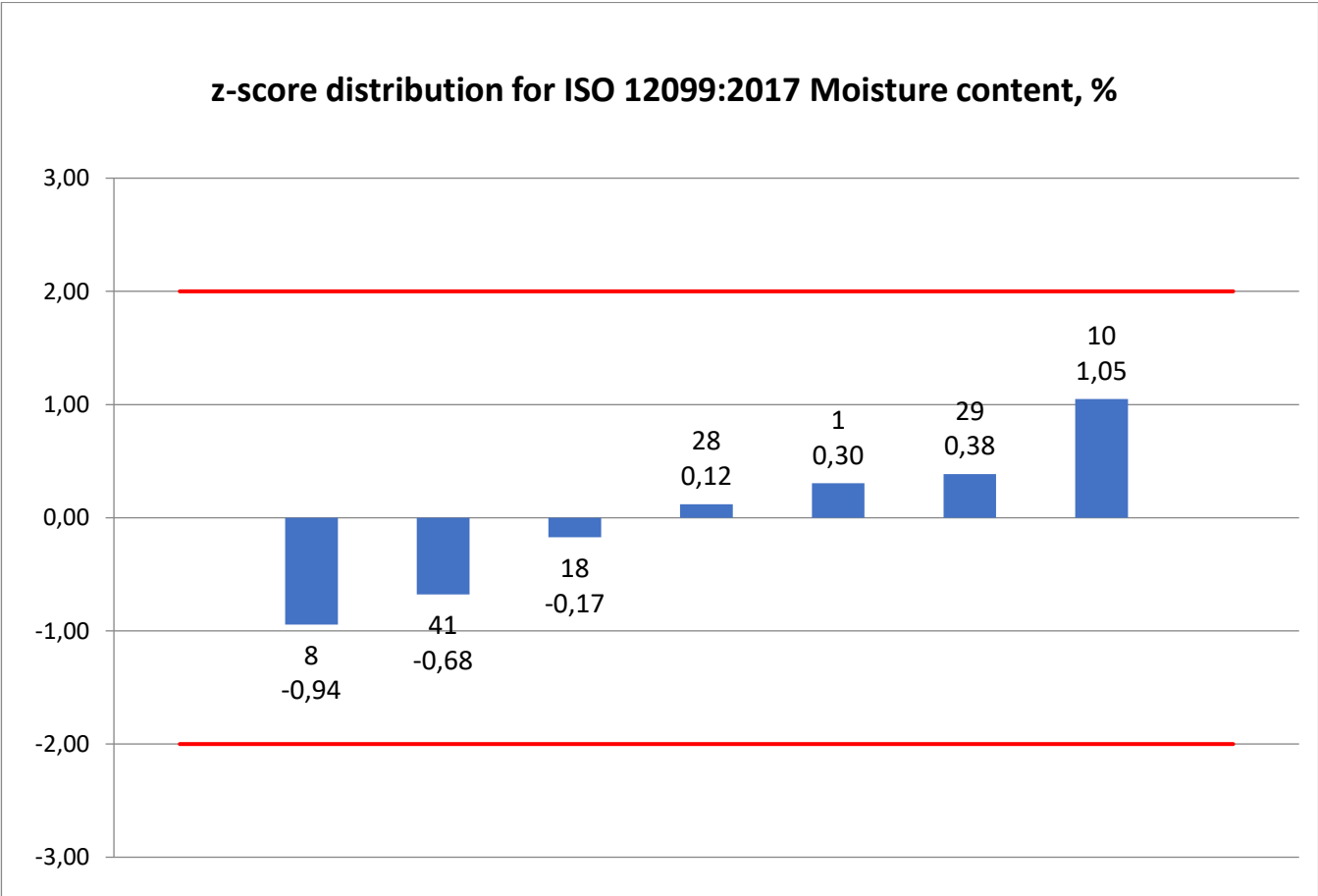
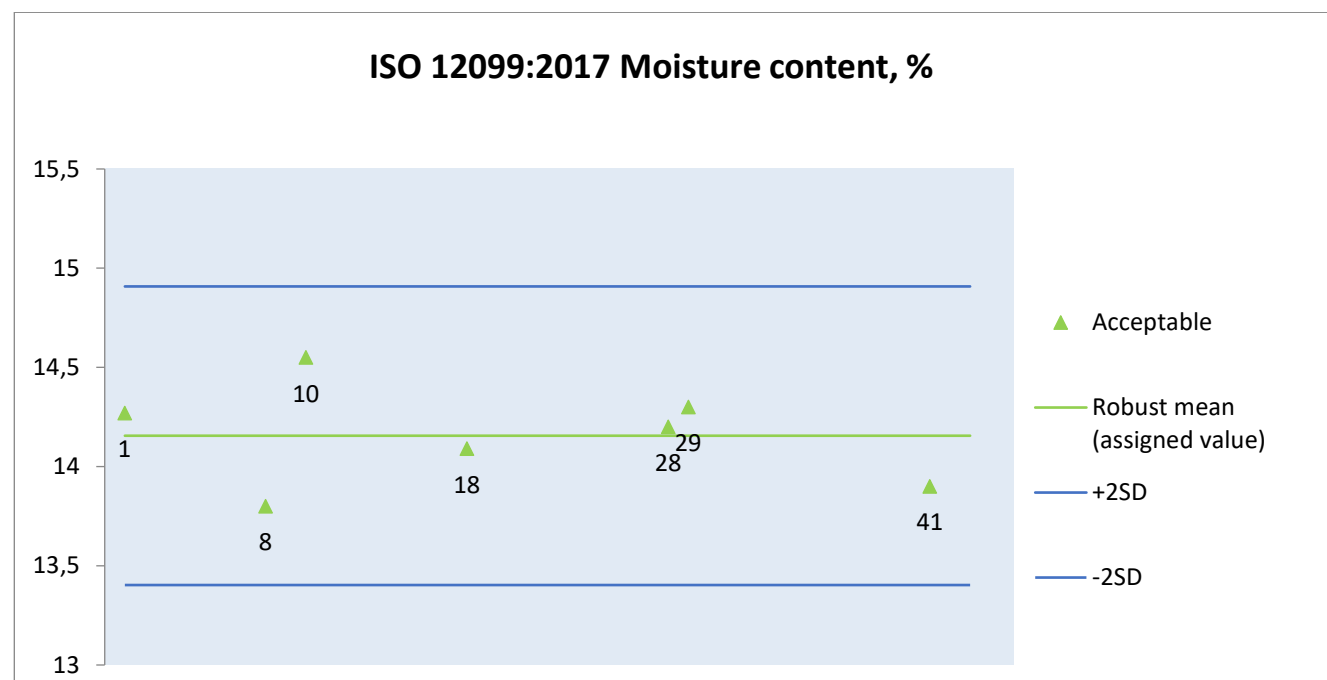
8.8. ISO 7971-3:2019 Bulk density, kg/hl (use of Nilema litre apparatus)



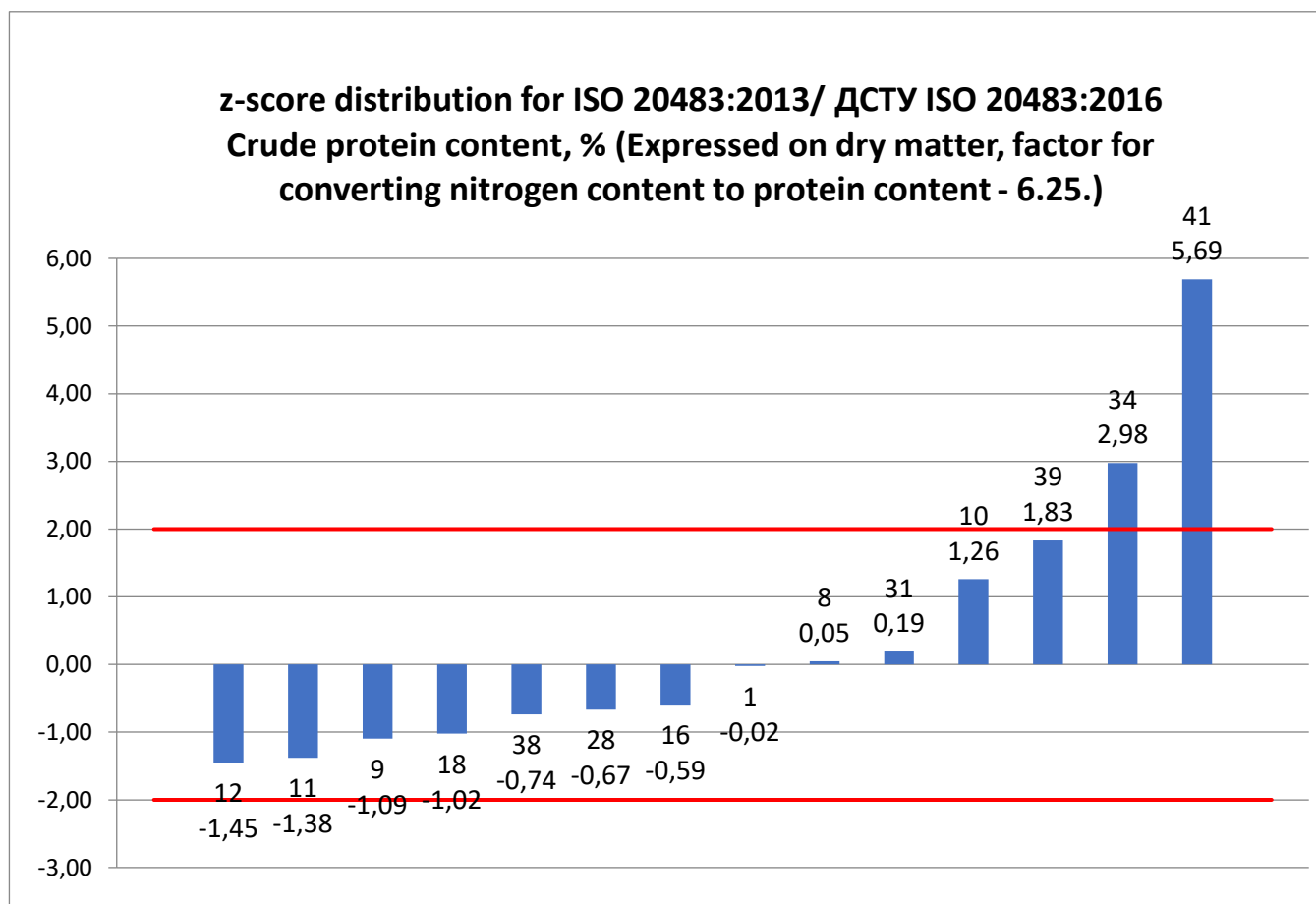
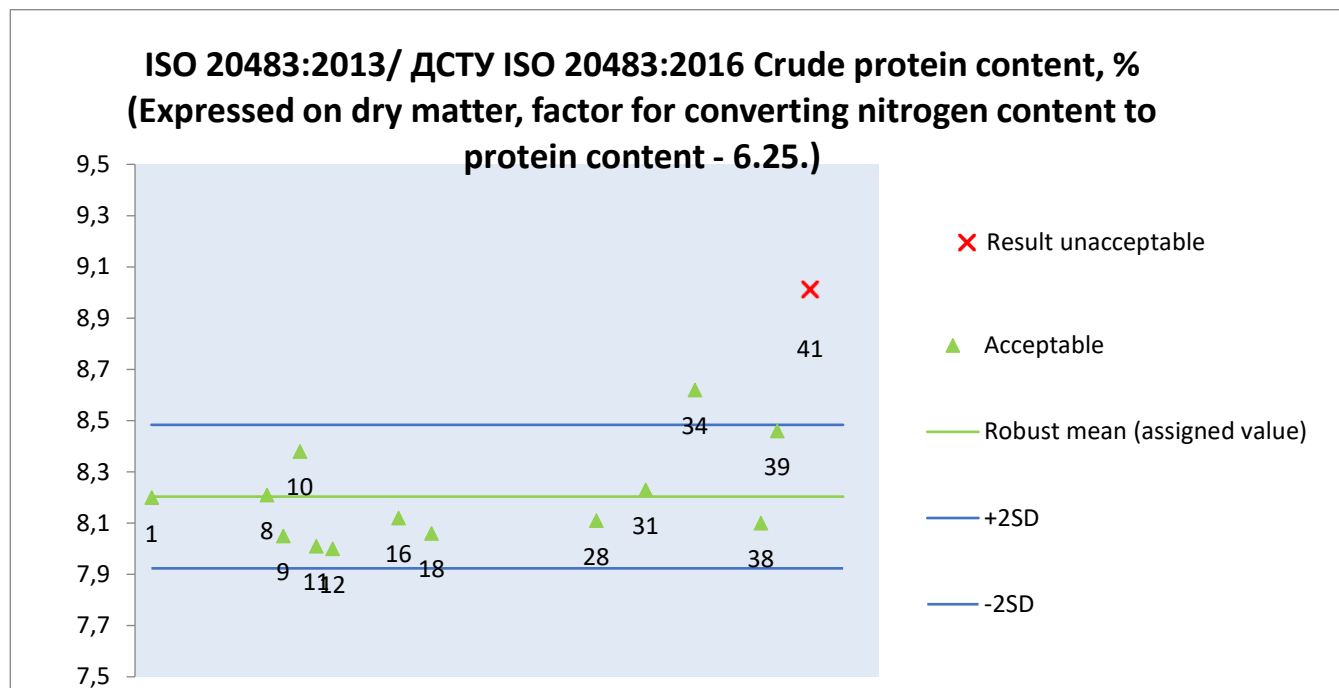
8.9. ISO 6540:2021/ ДСТУ ISO 6540:2007 Moisture content, %



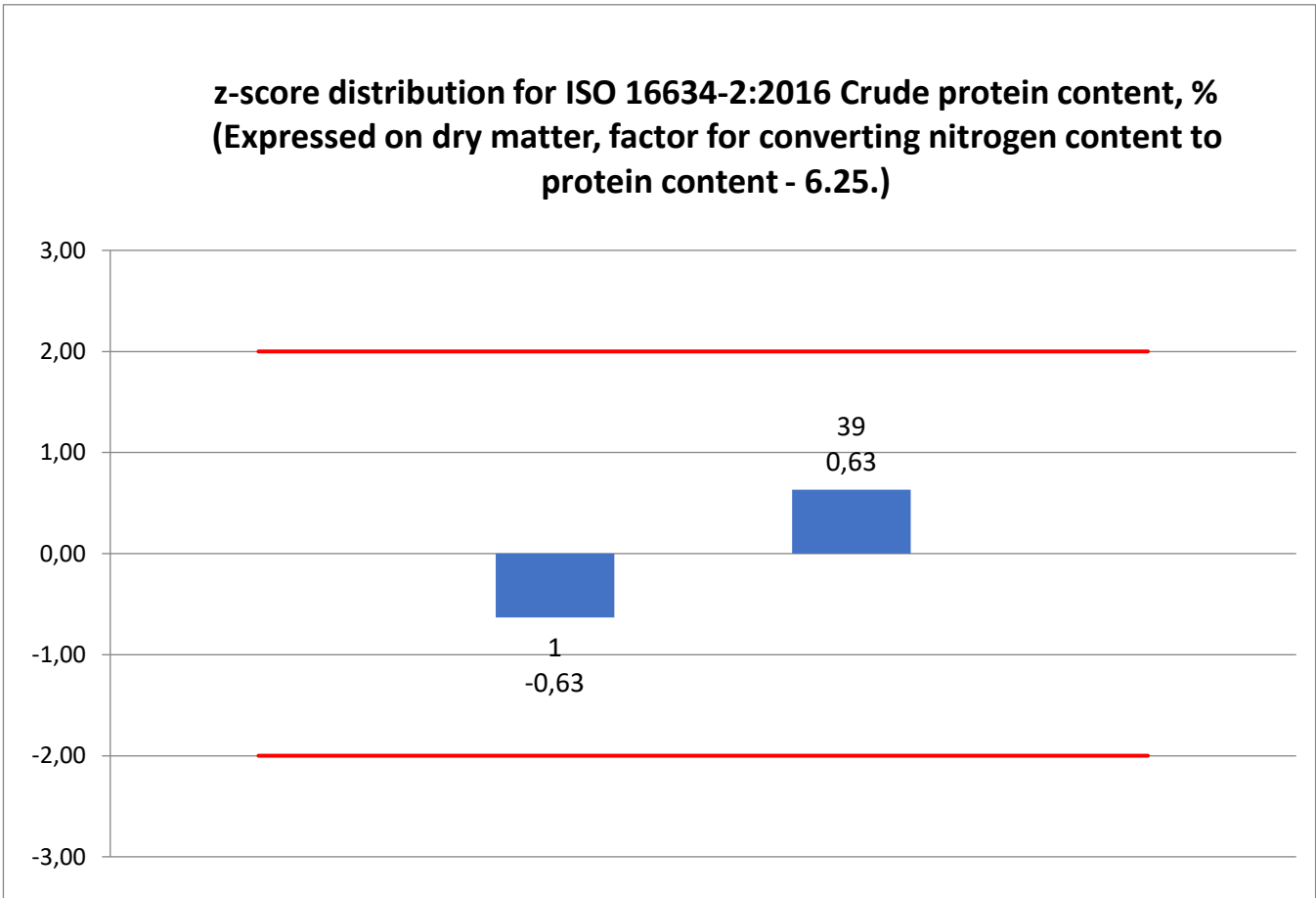
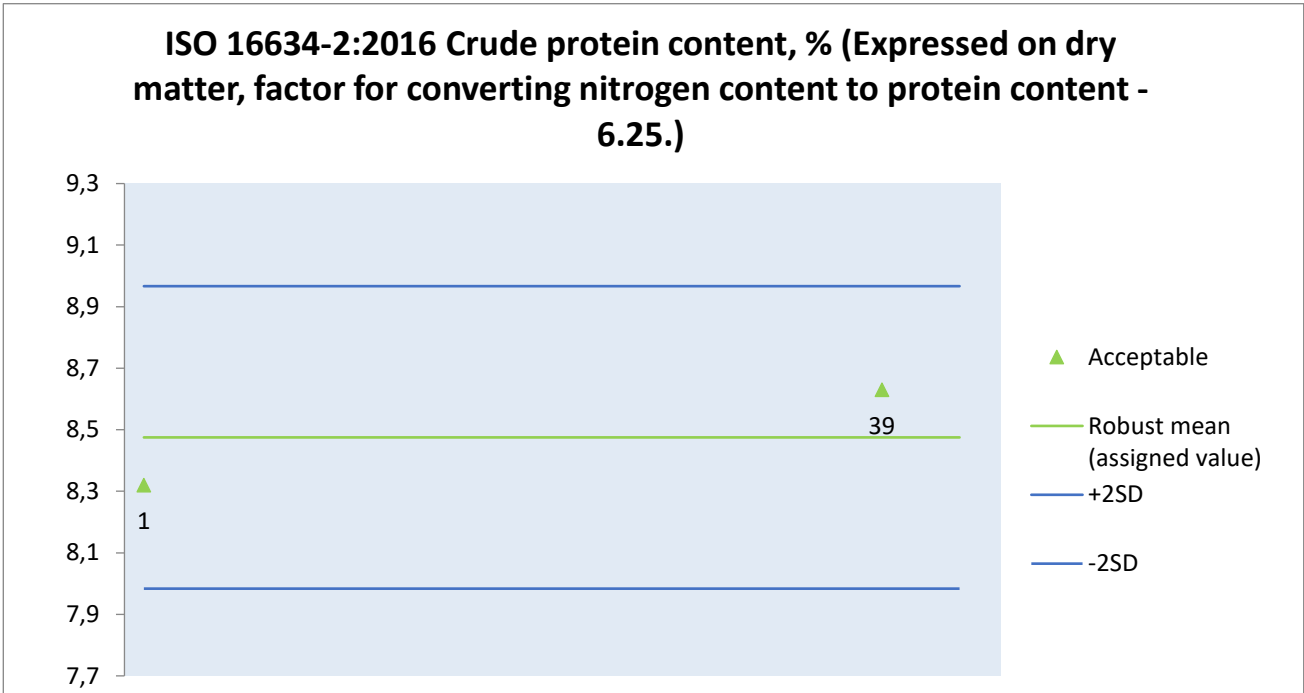
8.10. ISO 12099:2017 Moisture content, %



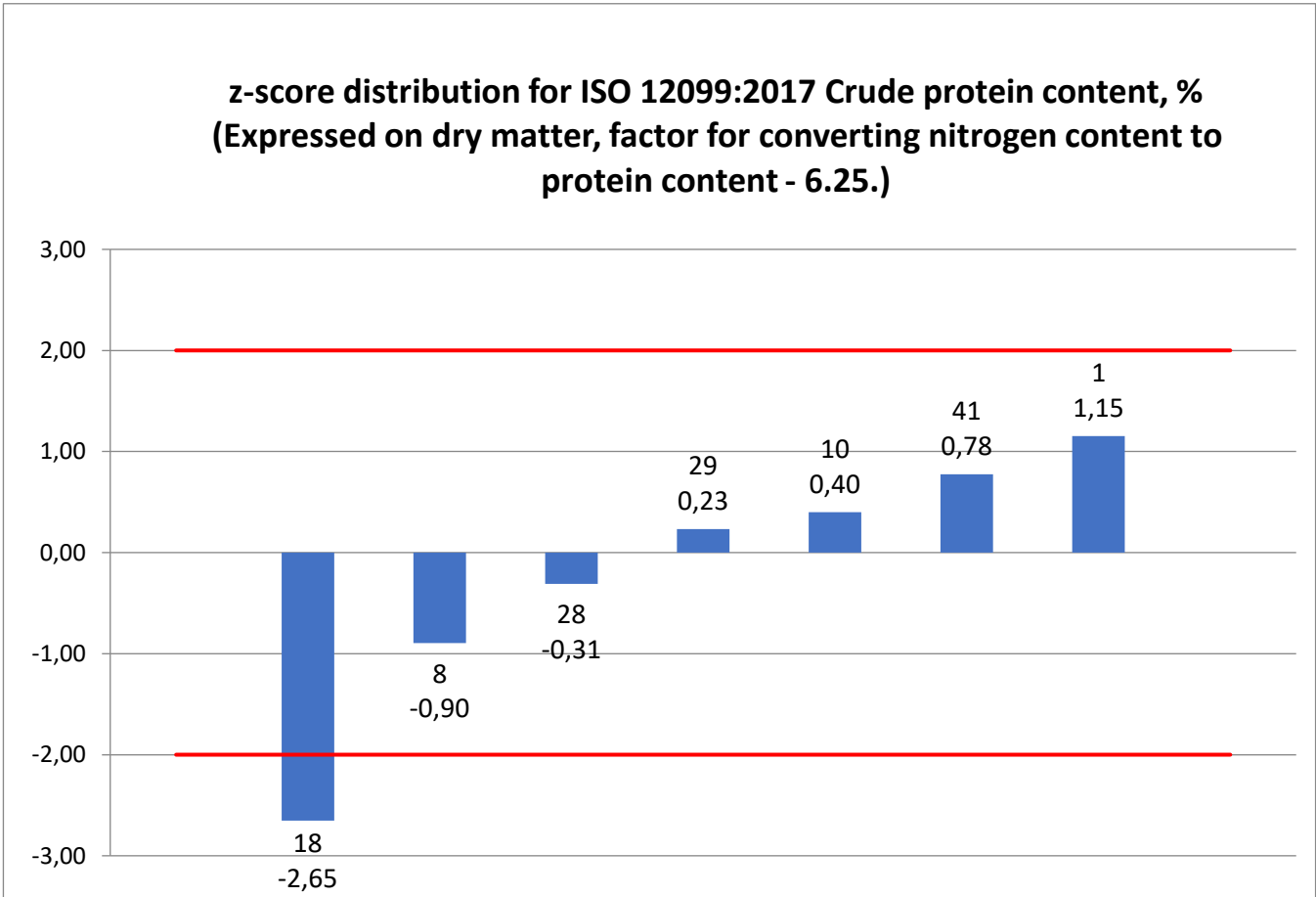
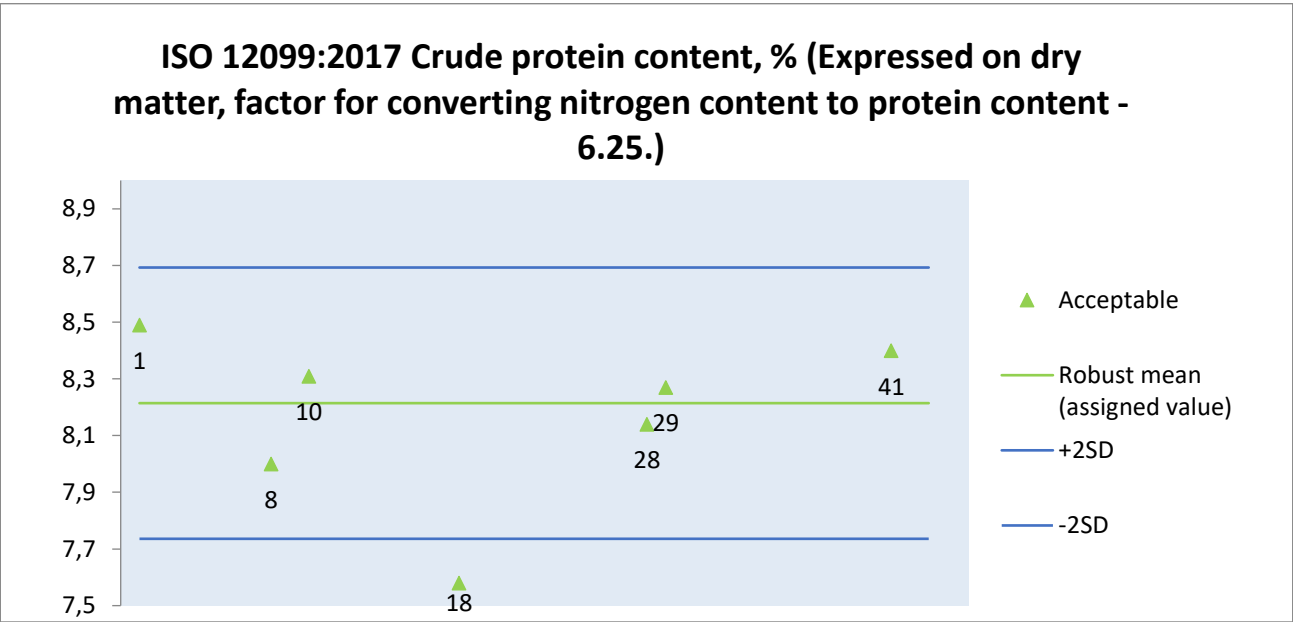
8.11. ISO 20483:2013/ ДСТУ ISO 20483:2016 Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)



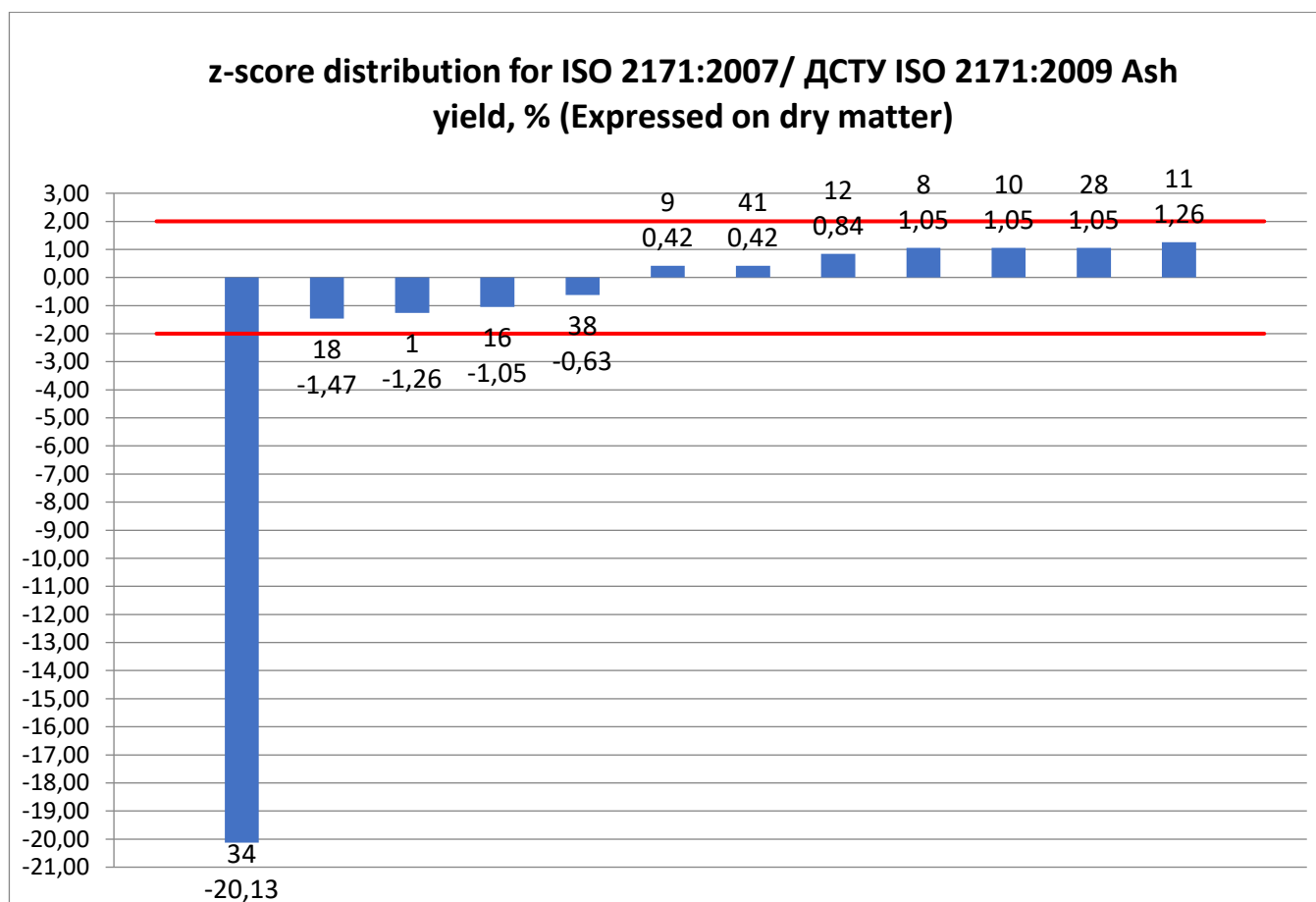
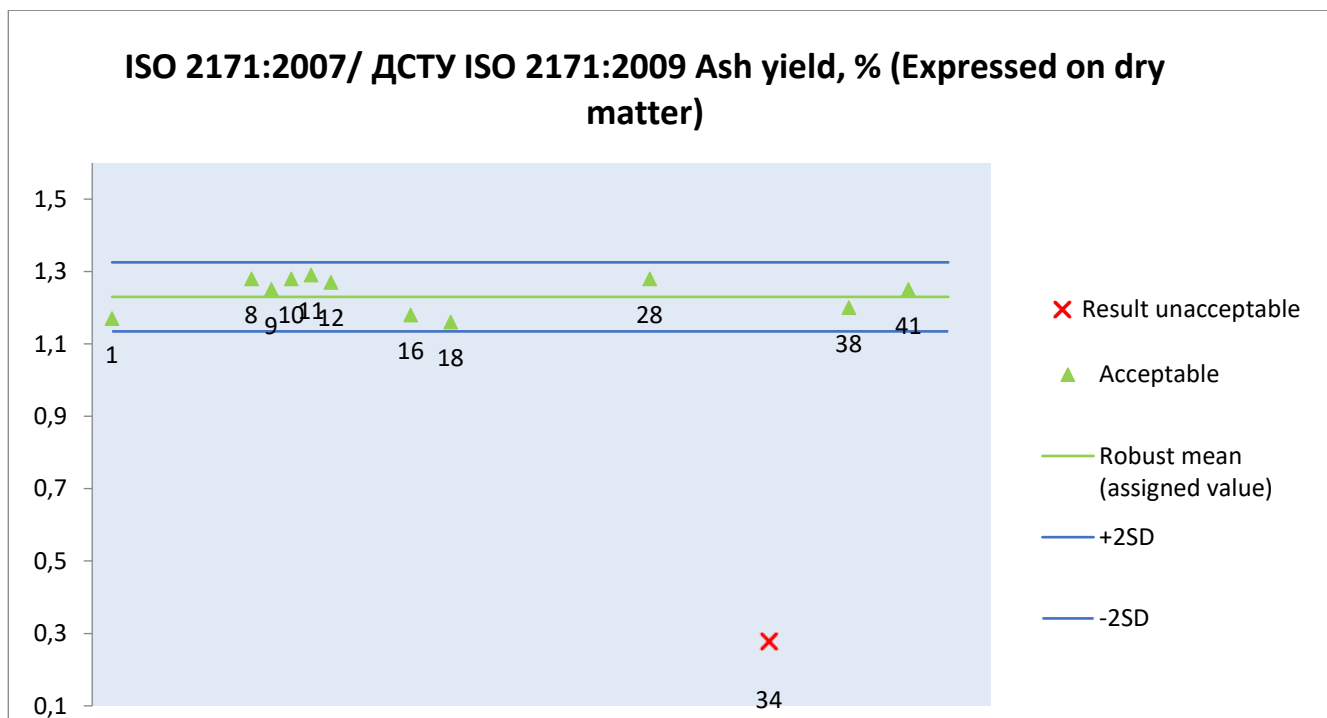
8.12. ISO 16634-2:2016 Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)



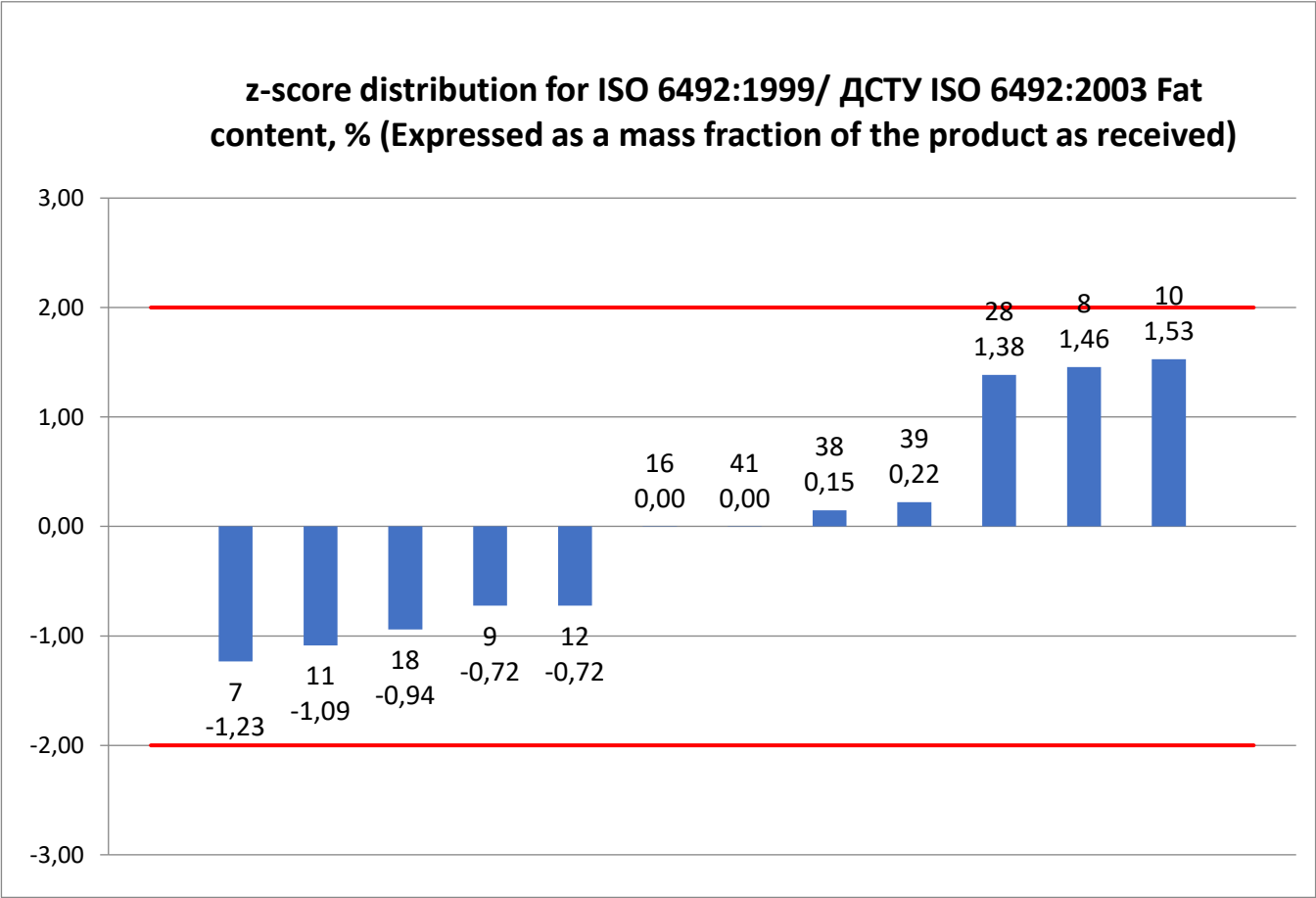
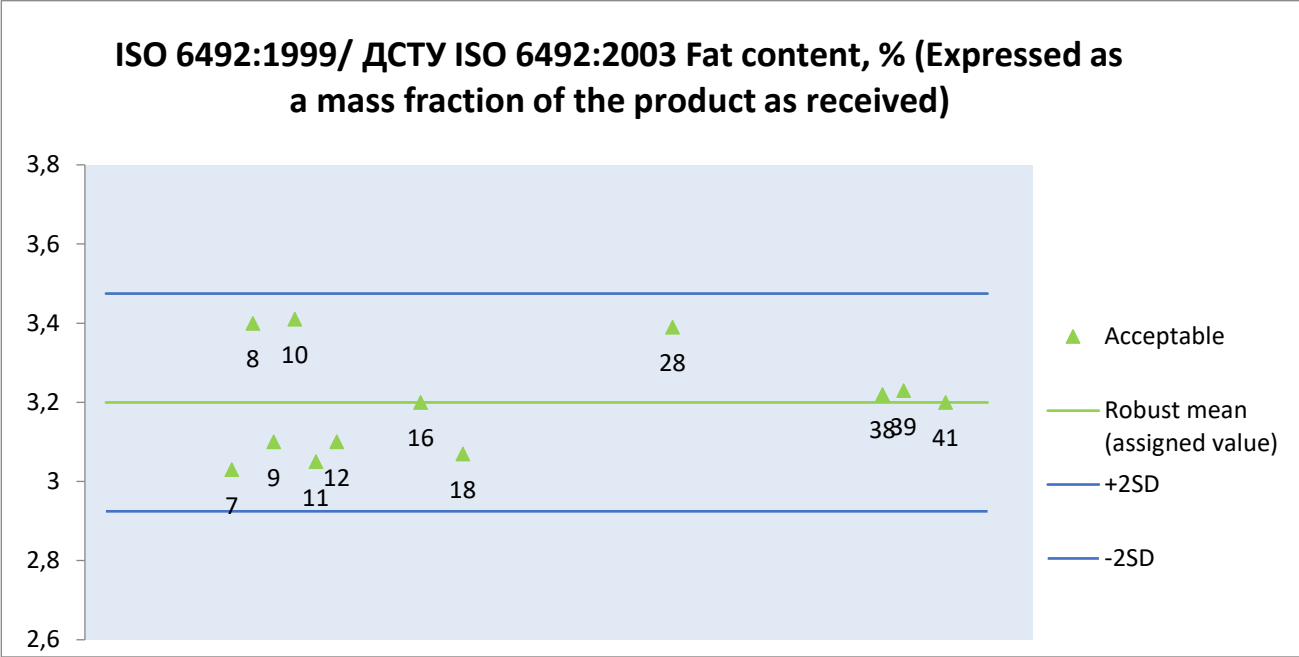
8.13. ISO 12099:2017 Crude protein content, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.25.)



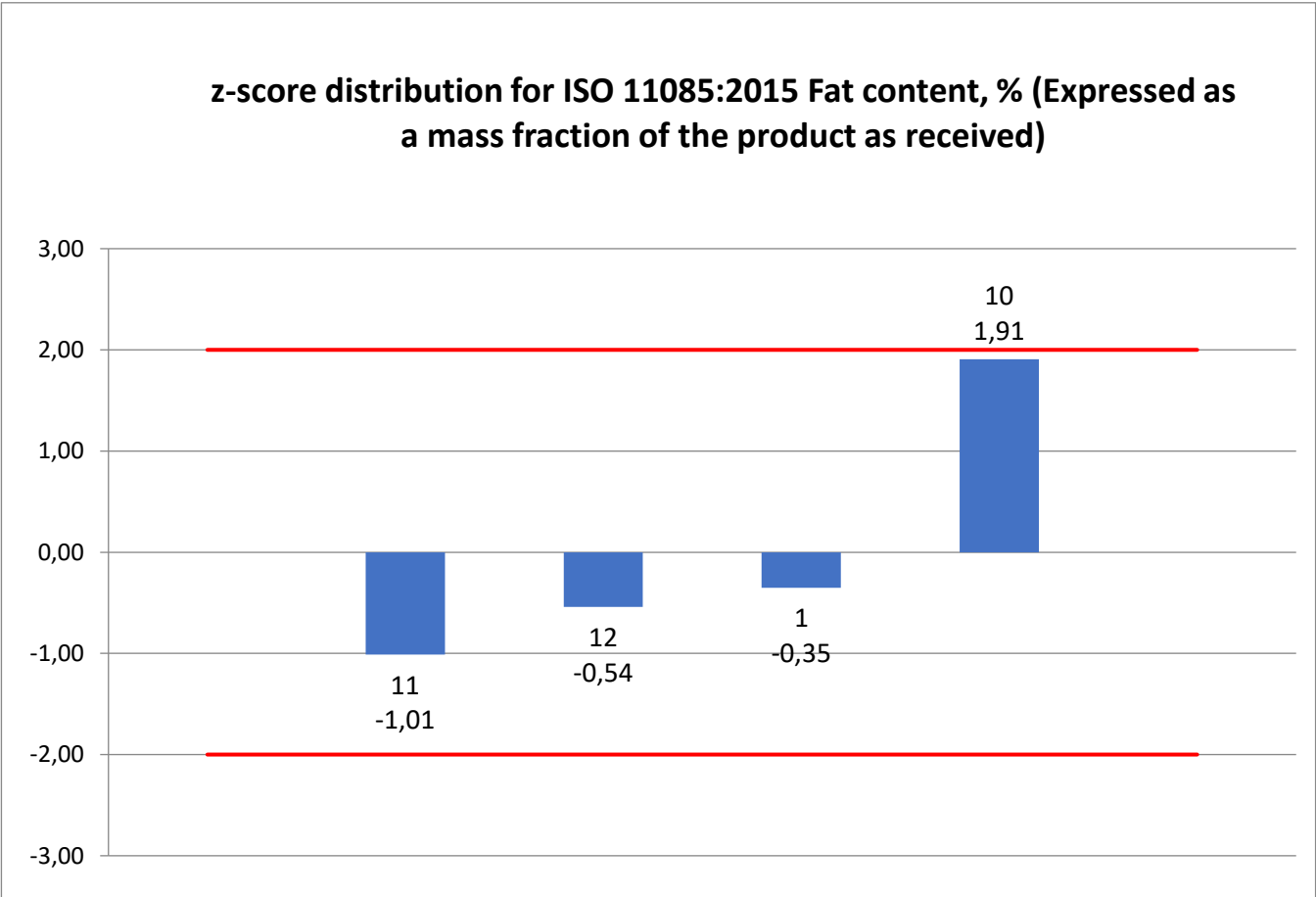
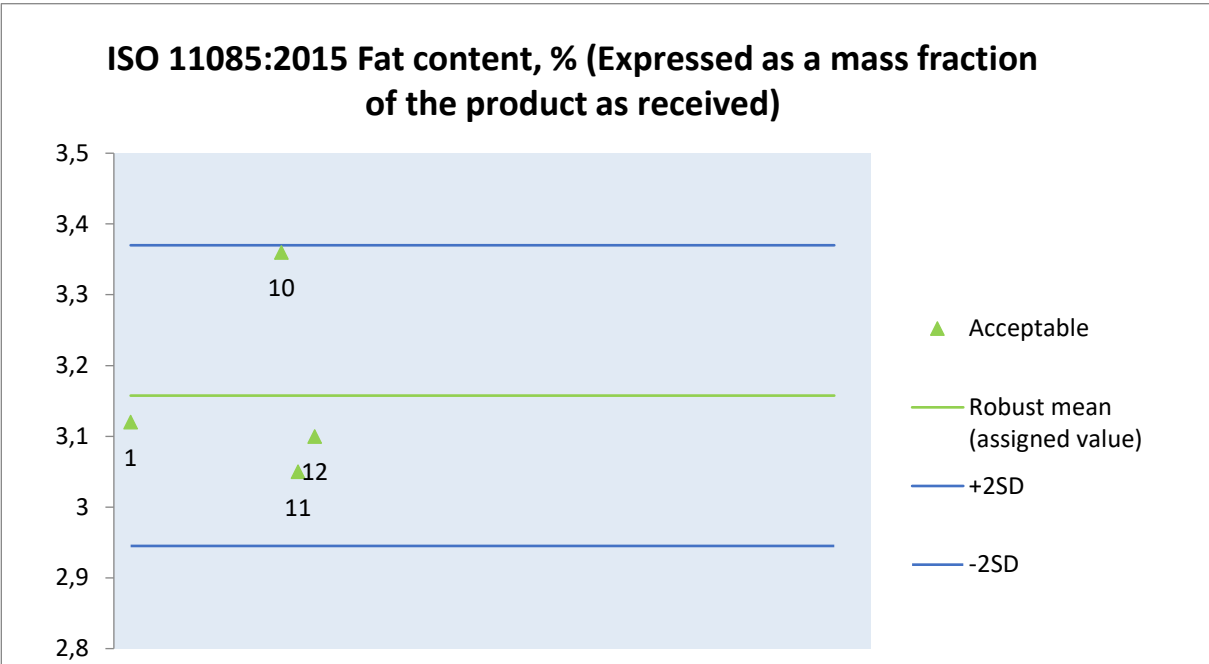
8.14. ISO 2171:2007/ ДСТУ ISO 2171:2009 Ash yield, % (Expressed on dry matter)



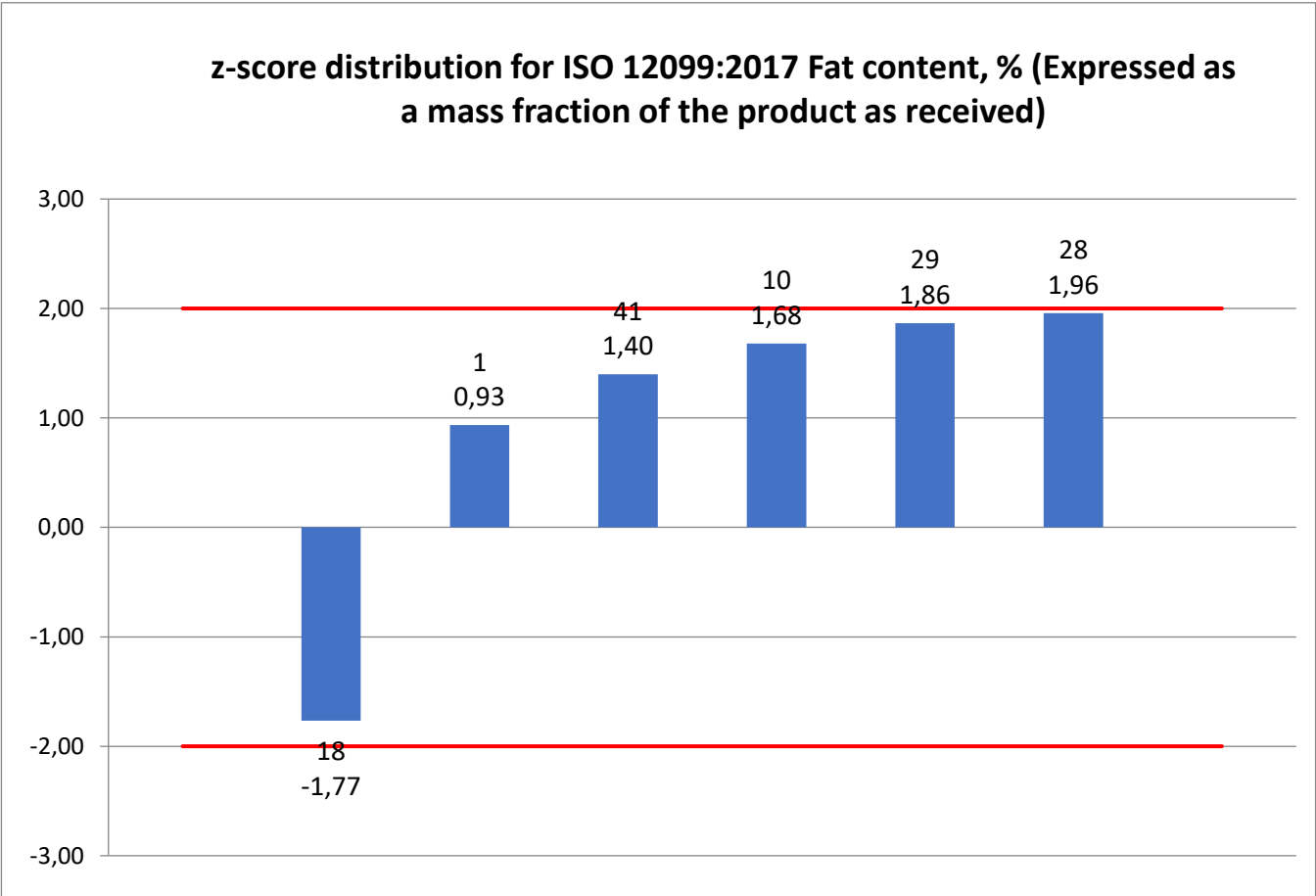
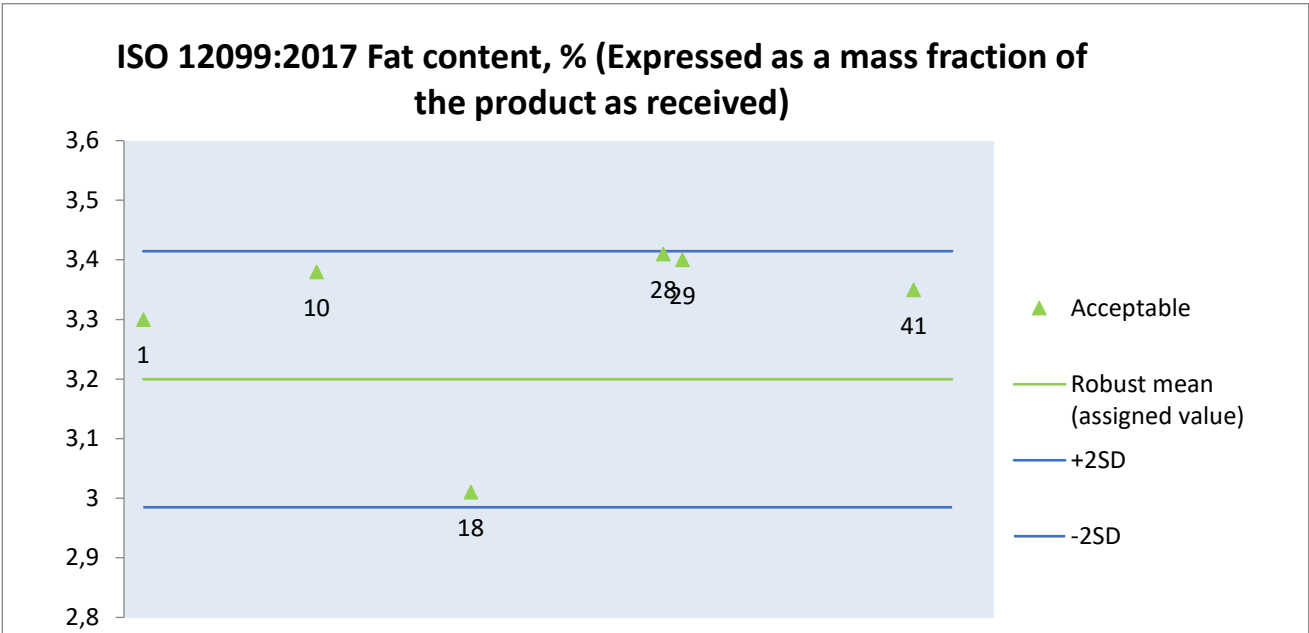
8.15. ISO 6492:1999/ ДСТУ ISO 6492:2003 Fat content, % (Expressed as a mass fraction of the product as received)



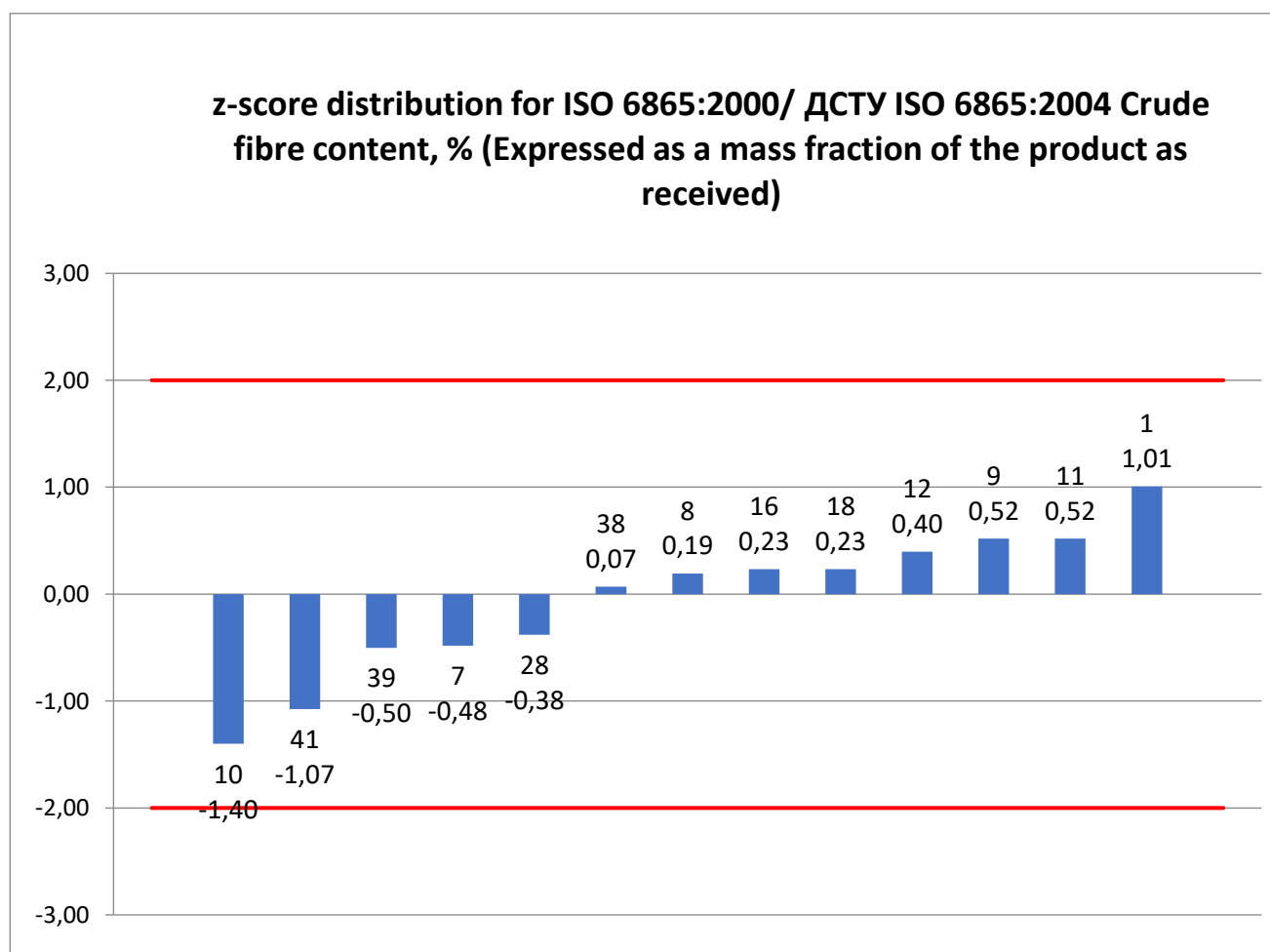
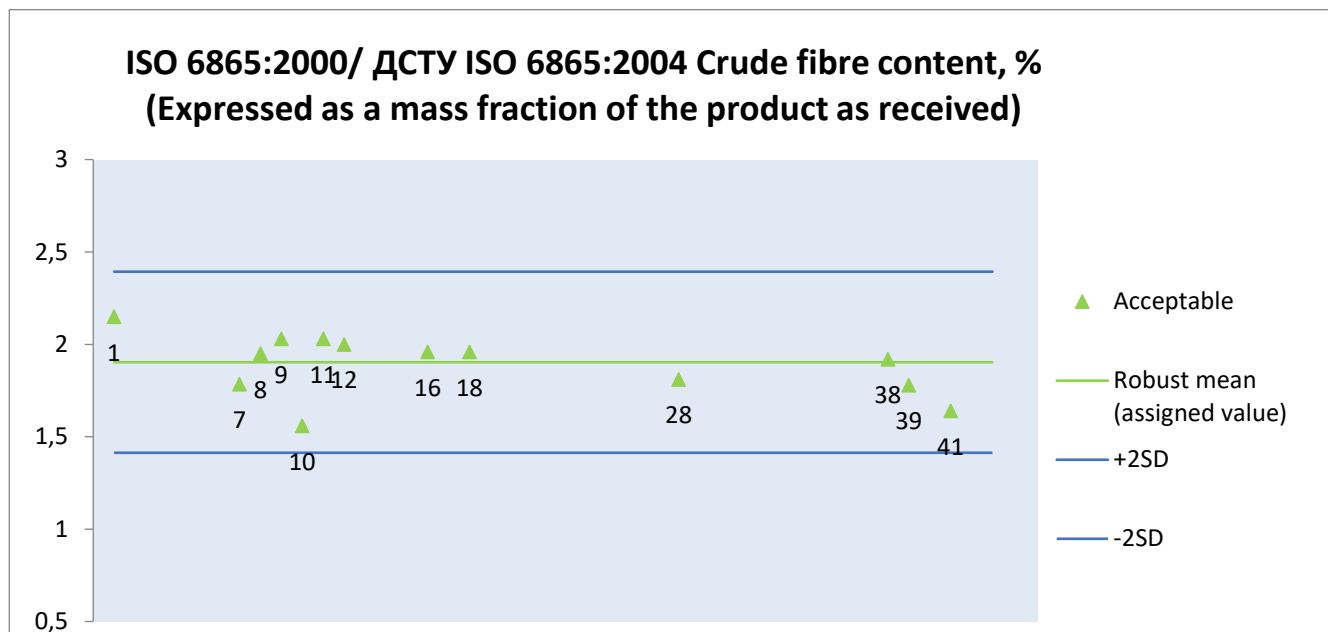
8.16. ISO 11085:2015 Fat content, % (Expressed as a mass fraction of the product as received)



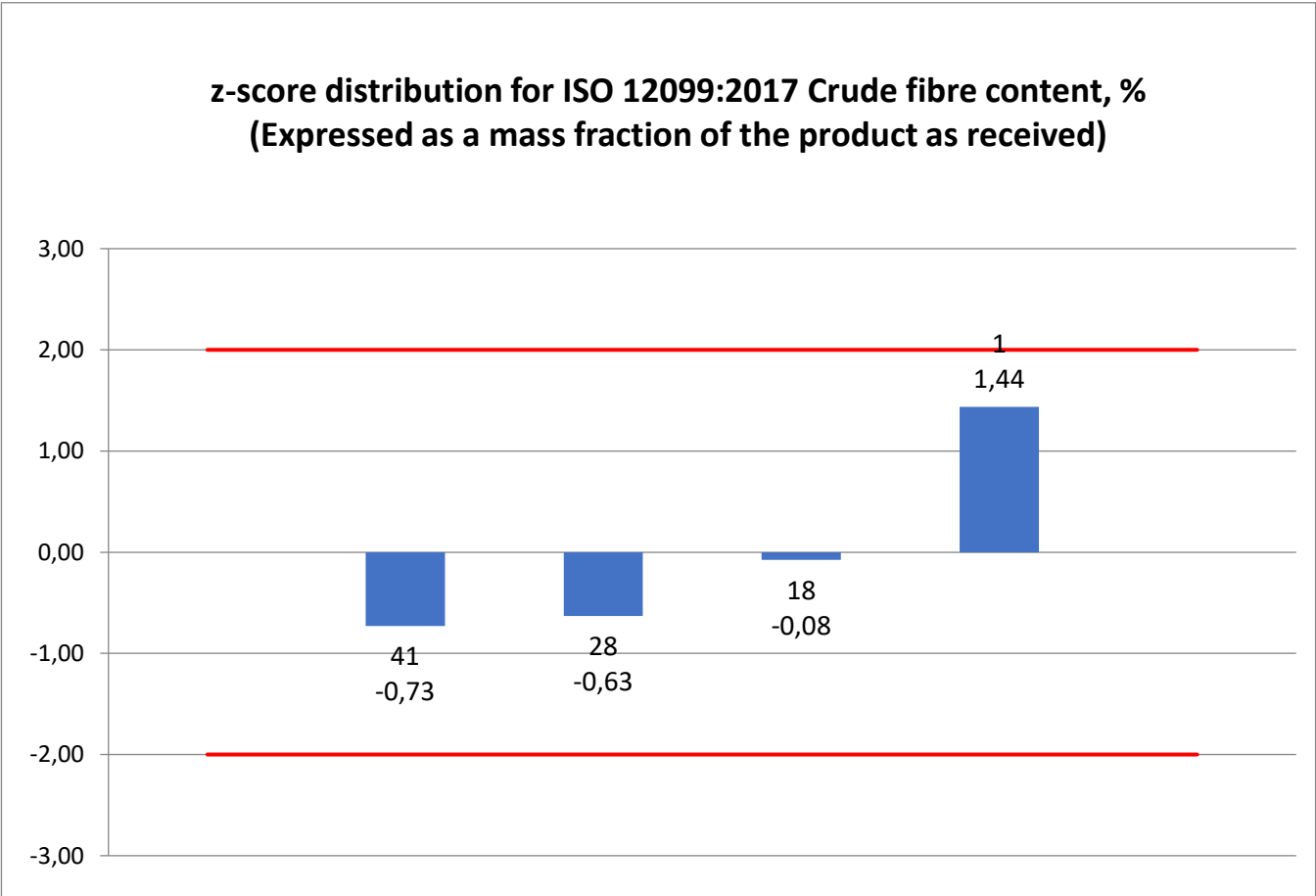
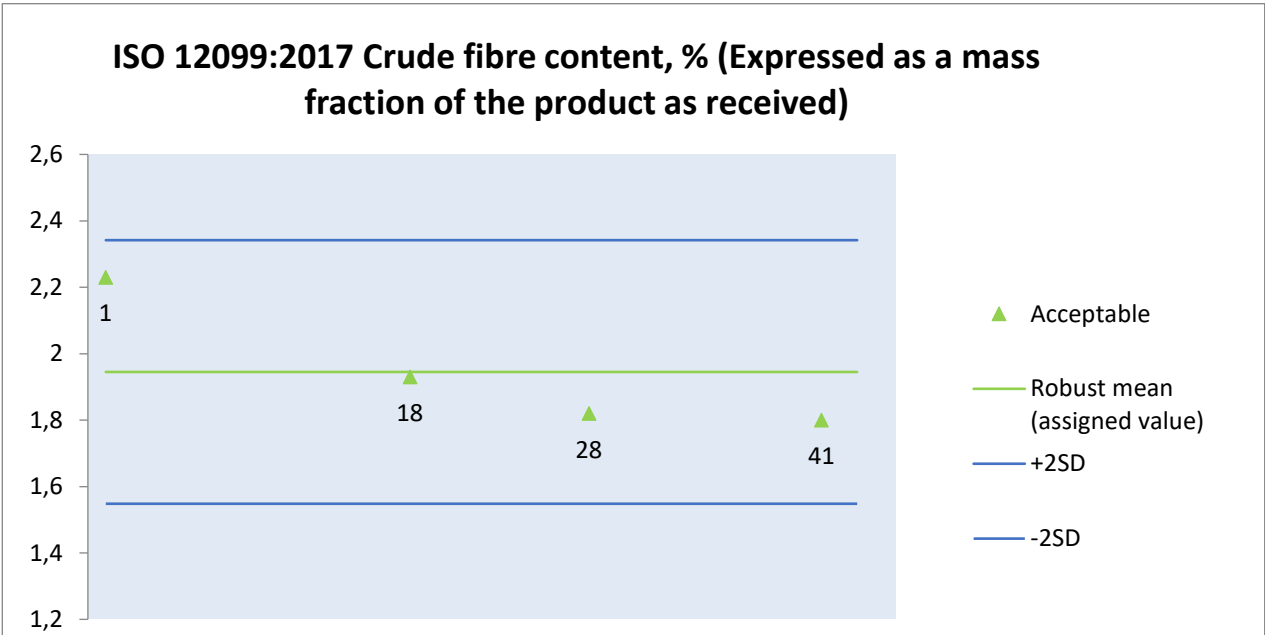
8.17. ISO 12099:2017 Fat content, % (Expressed as a mass fraction of the product as received)



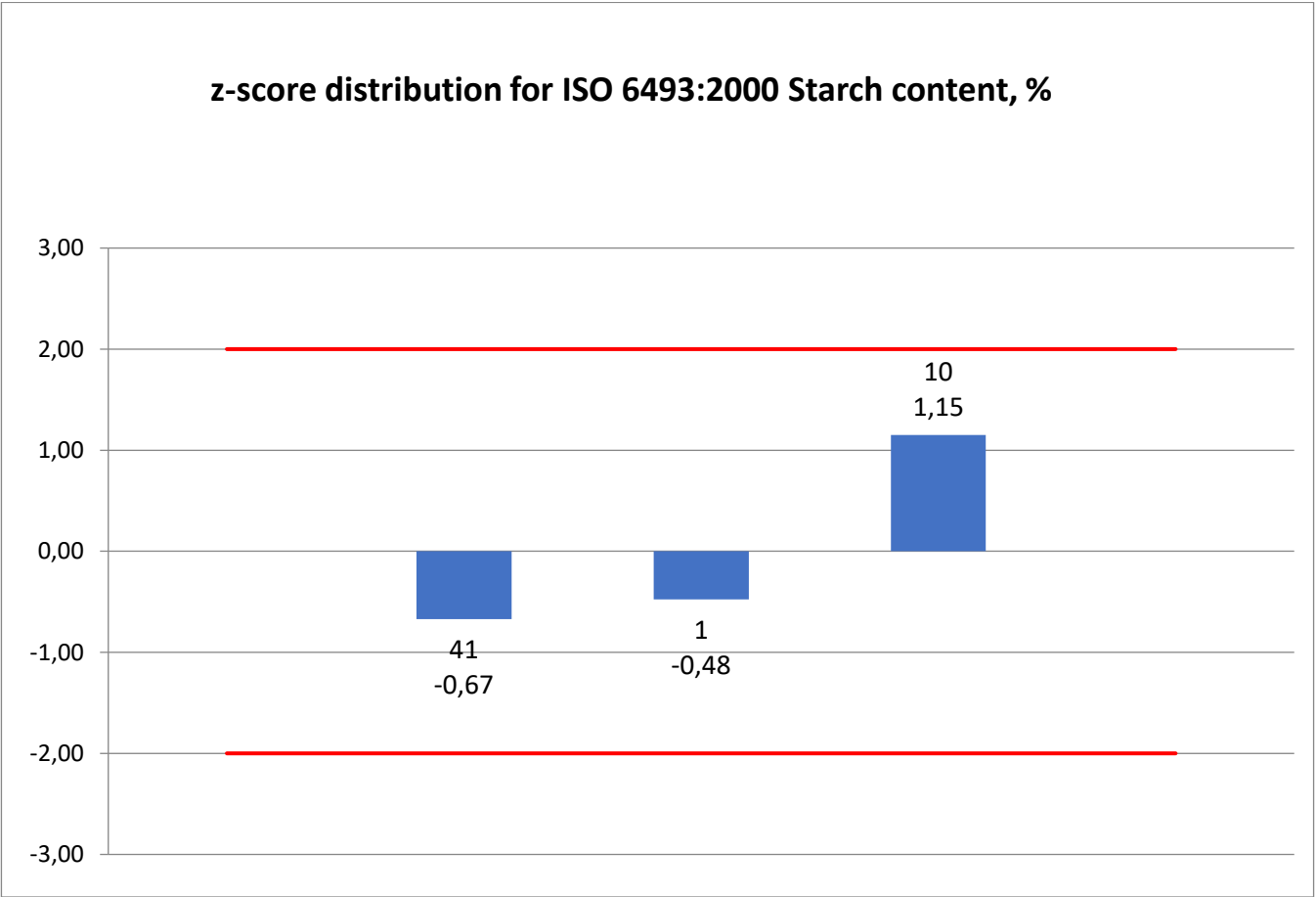
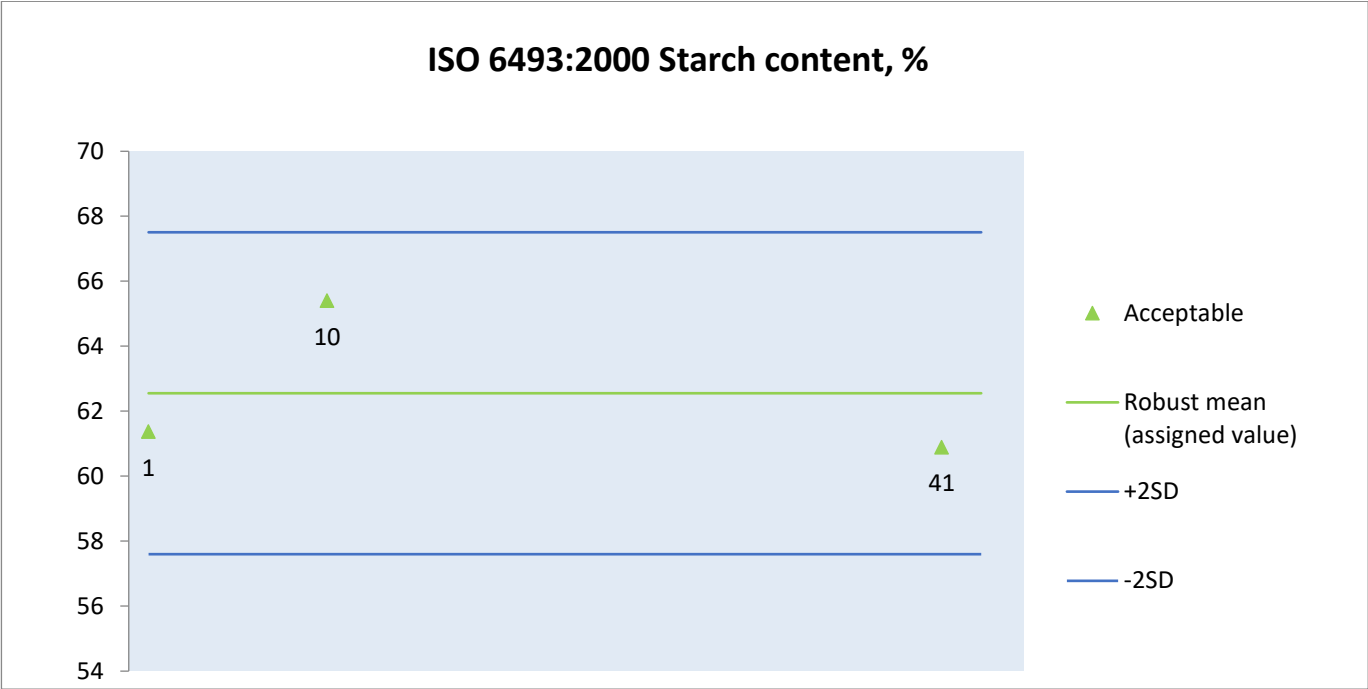
8.18. ISO 6865:2000/ ДСТУ ISO 6865:2004 Crude fibre content, % (Expressed as a mass fraction of the product as received)



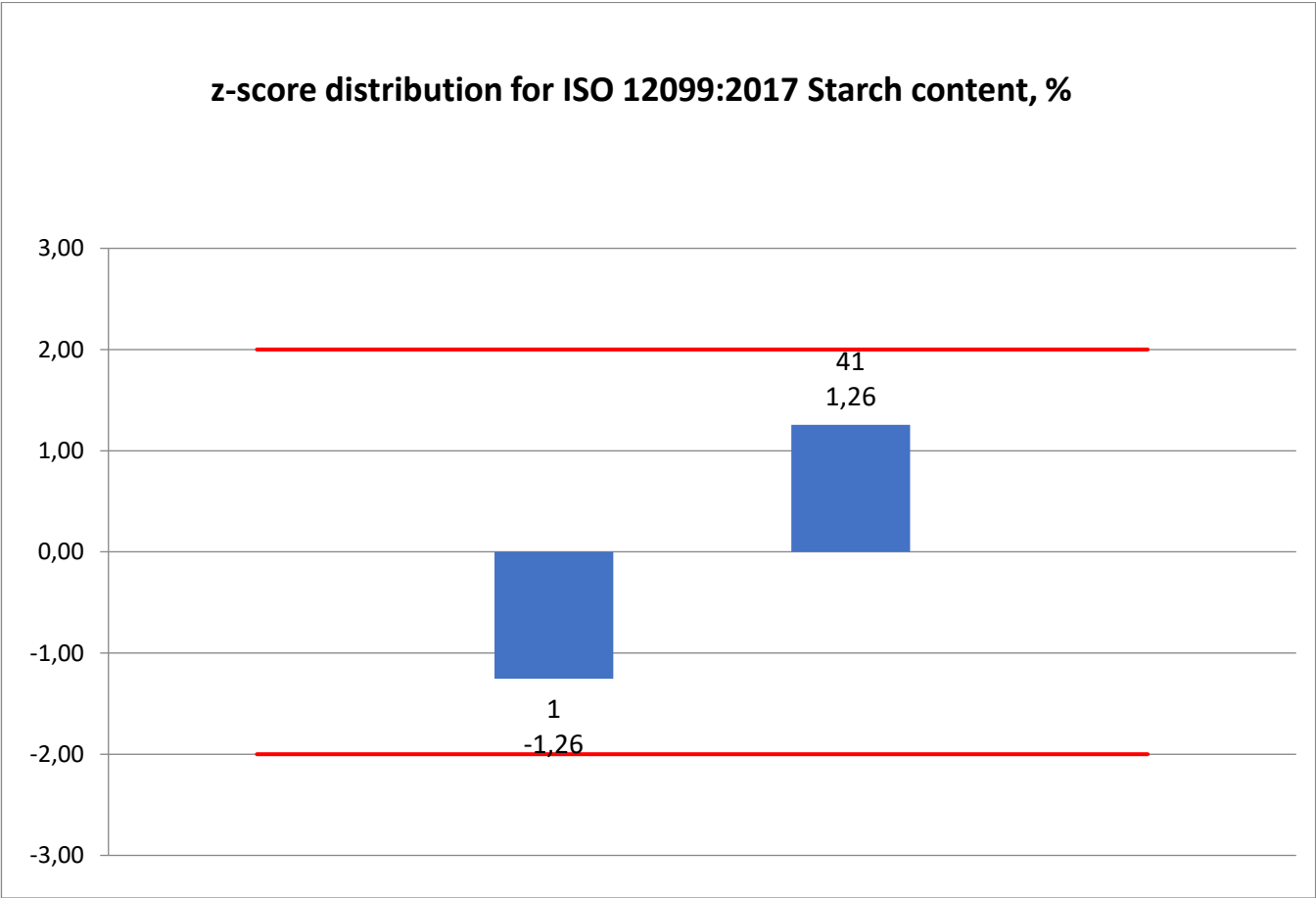
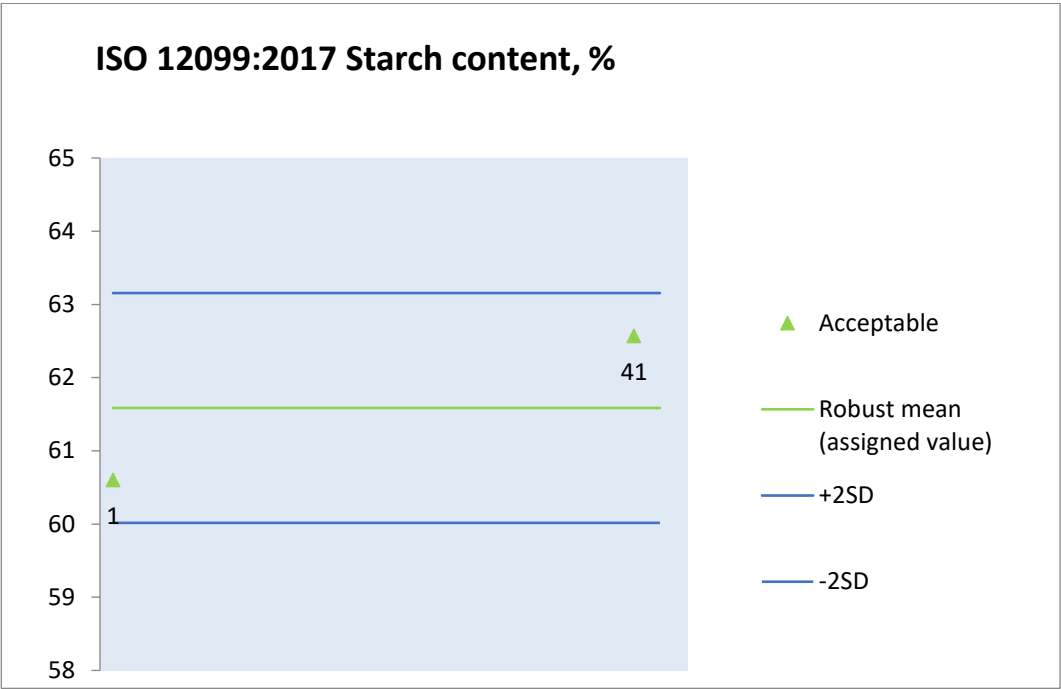
8.19. ISO 12099:2017 Crude fibre content, % (Expressed as a mass fraction of the product as received)



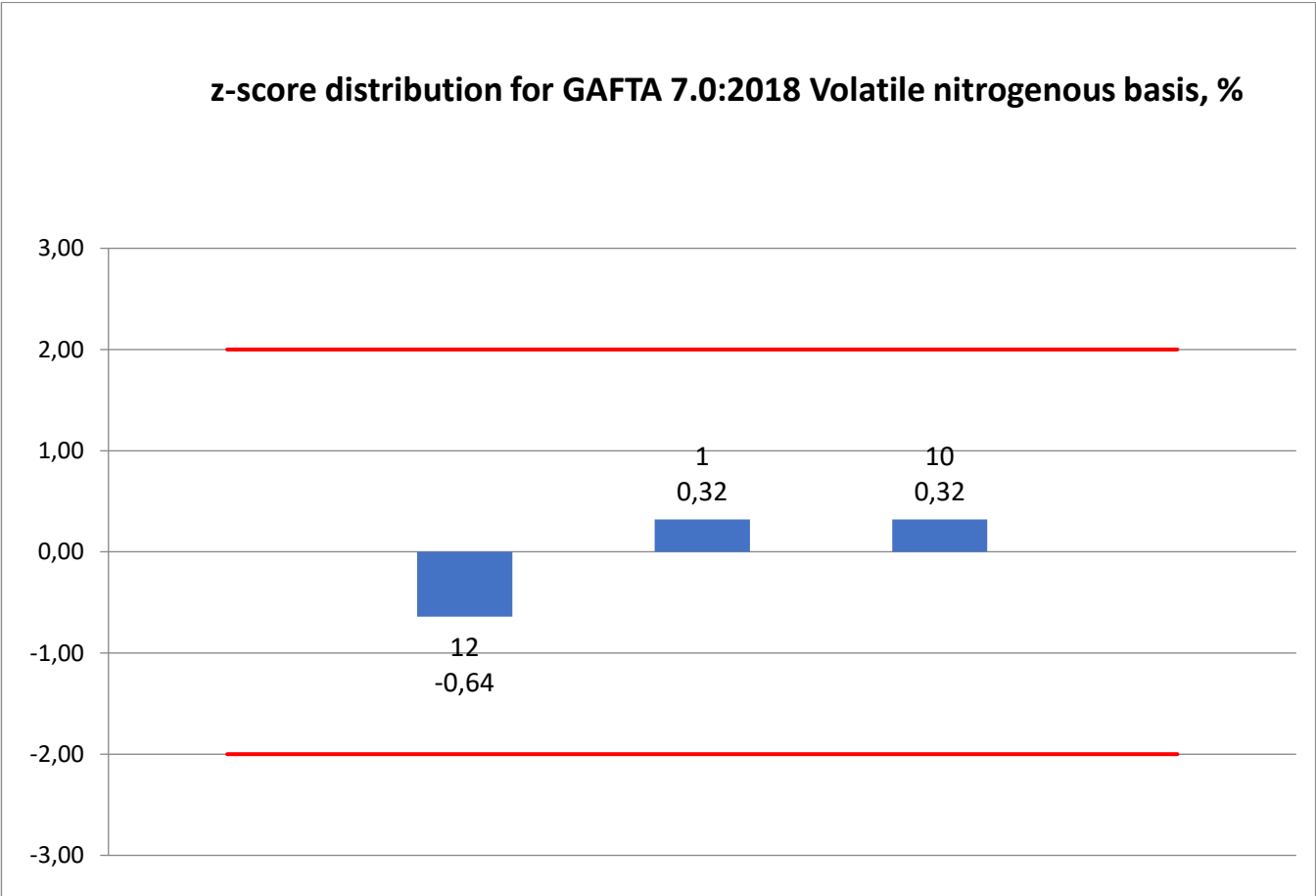
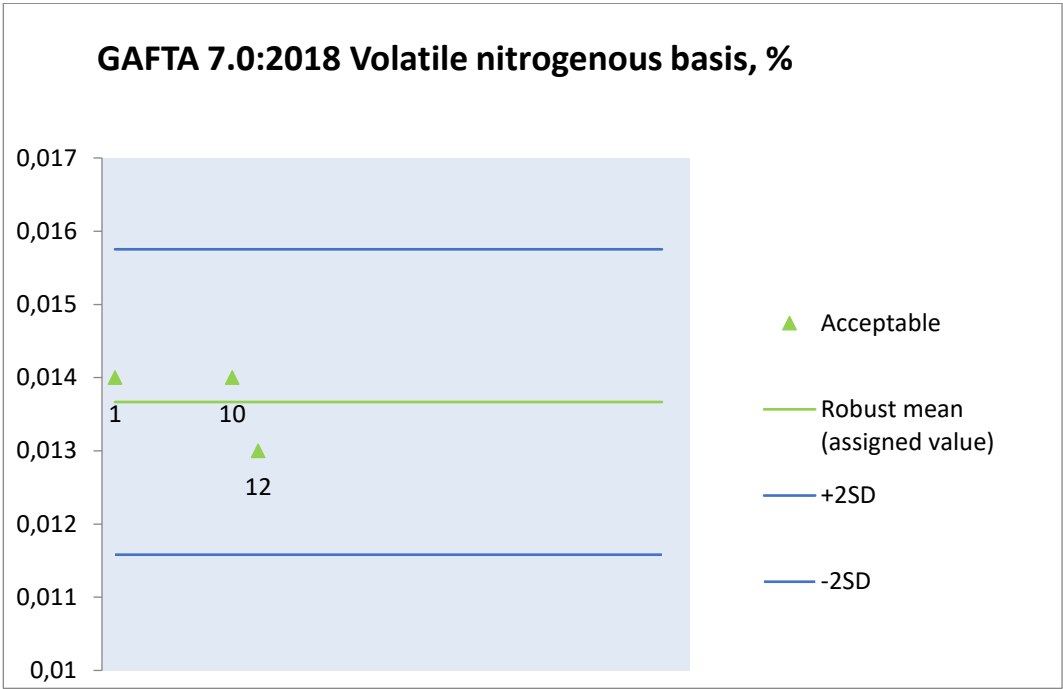
8.20. ISO 6493:2000 Starch content, %



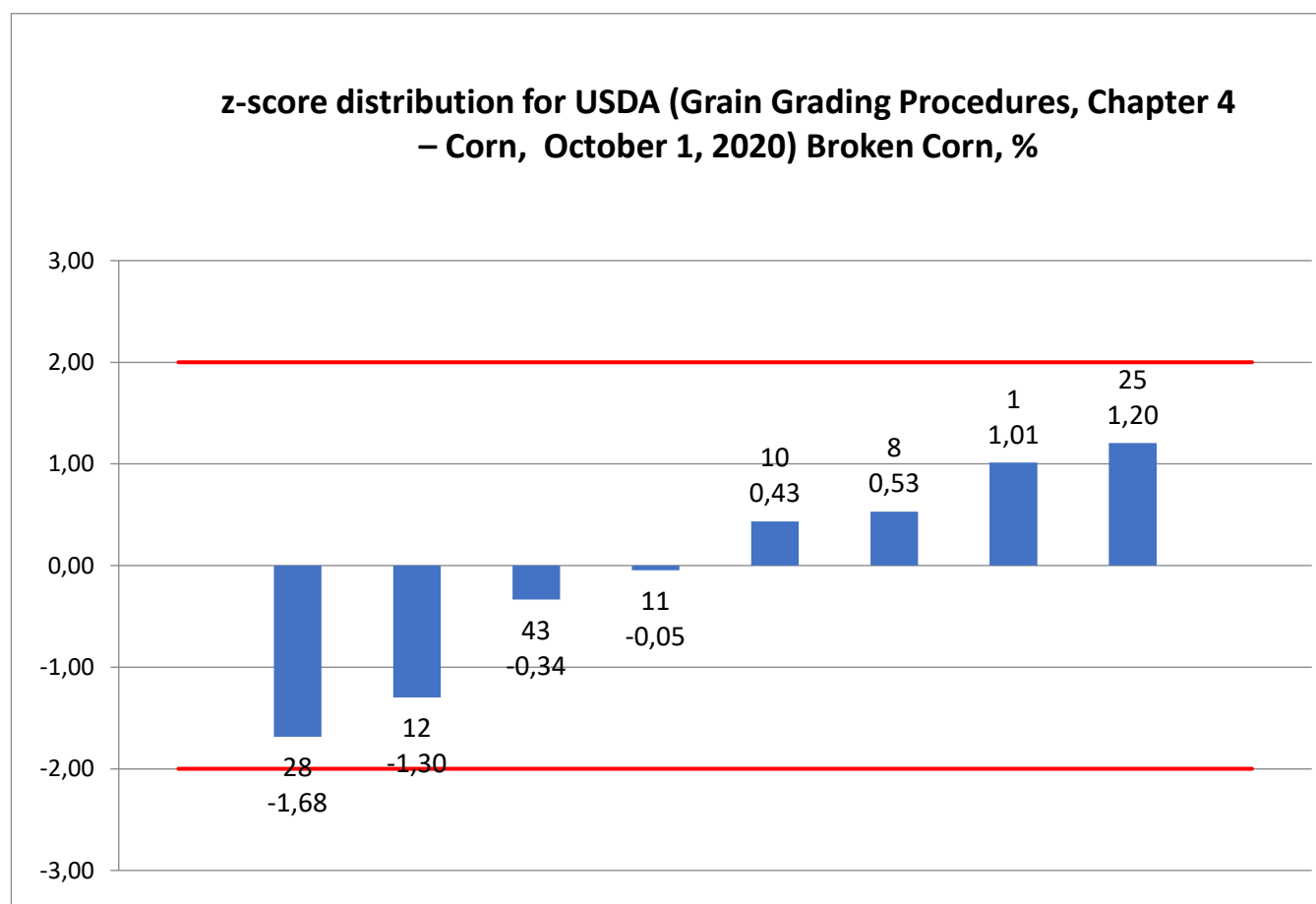
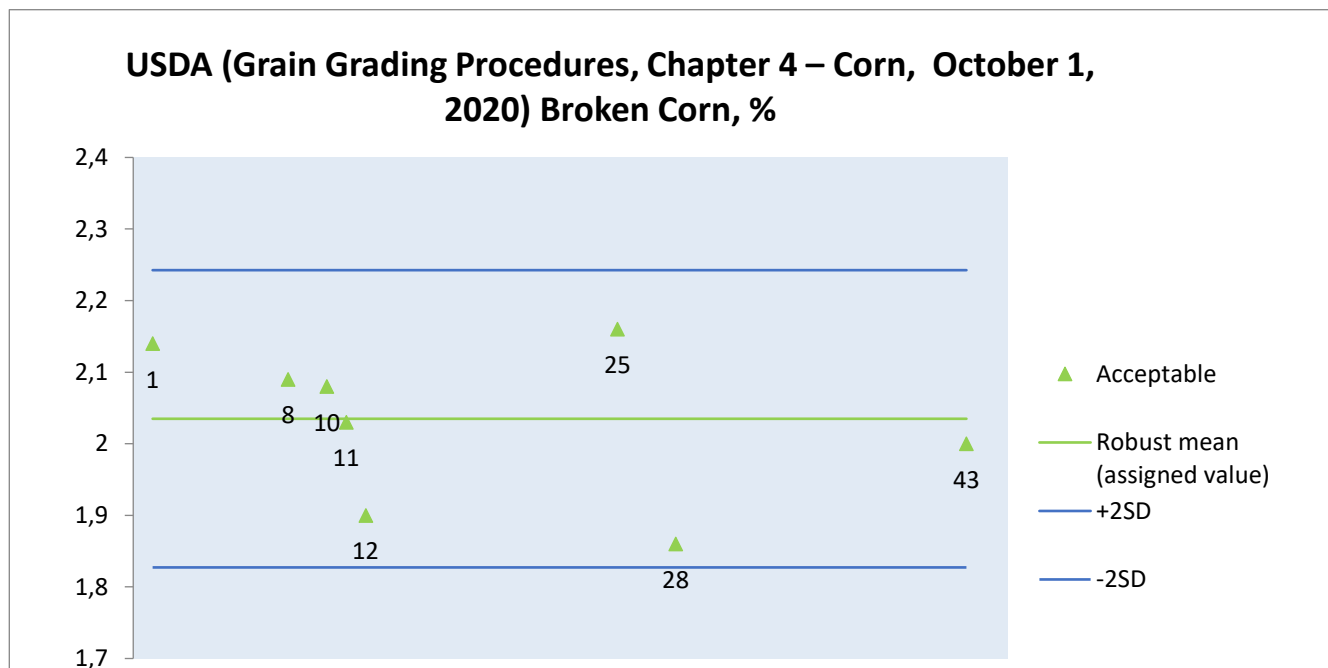
8.21. ISO 12099:2017 Starch content, %



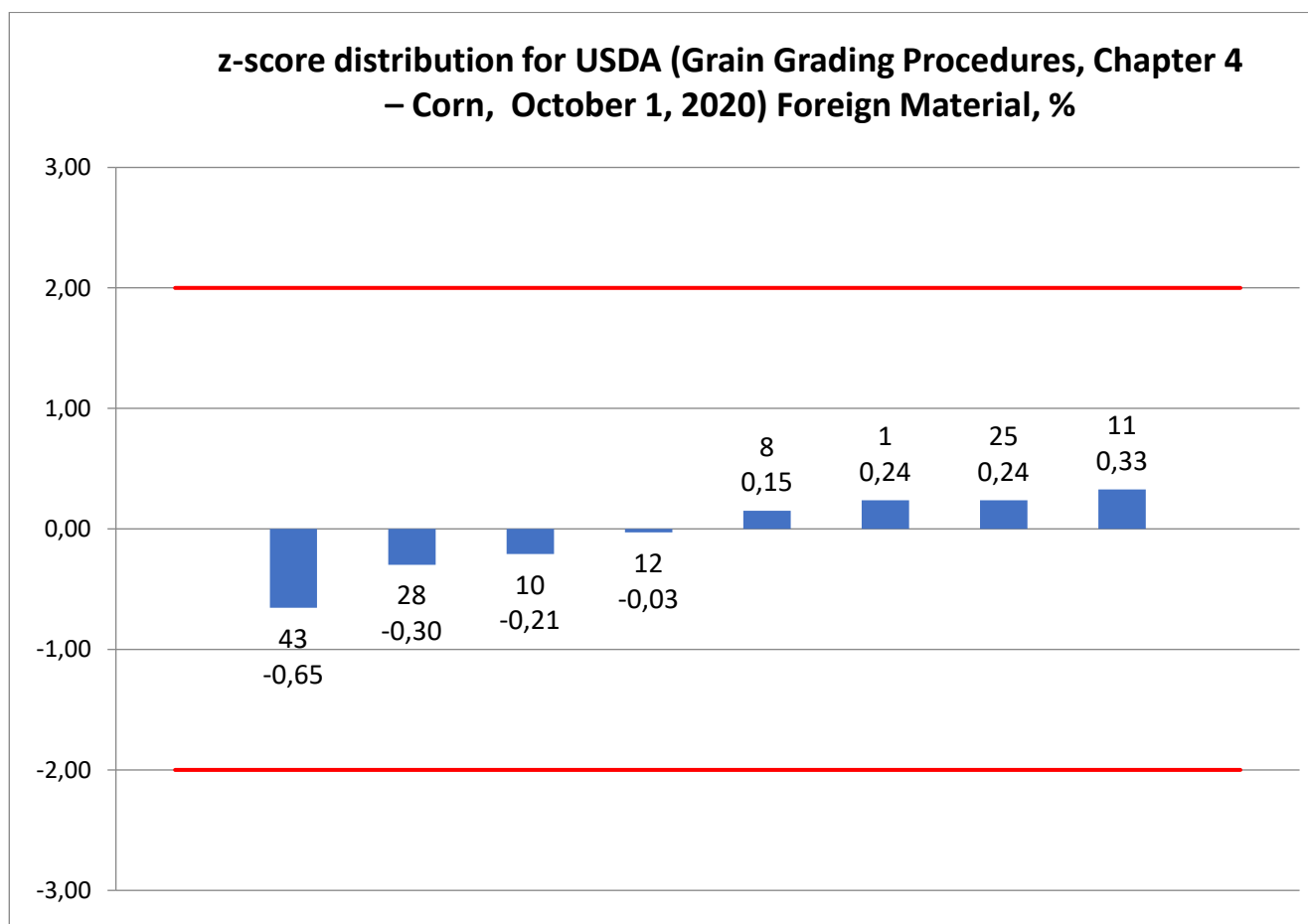
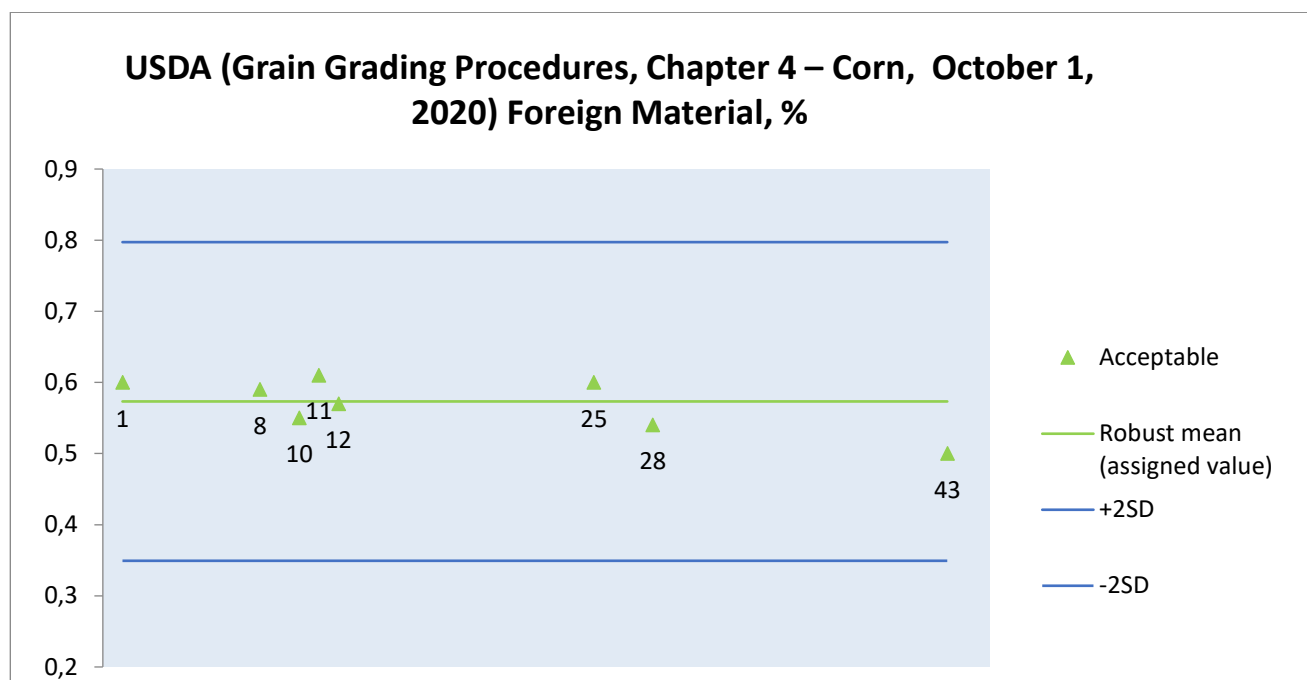
8.22. GAFTA 7.0:2018 Volatile nitrogenous basis, %



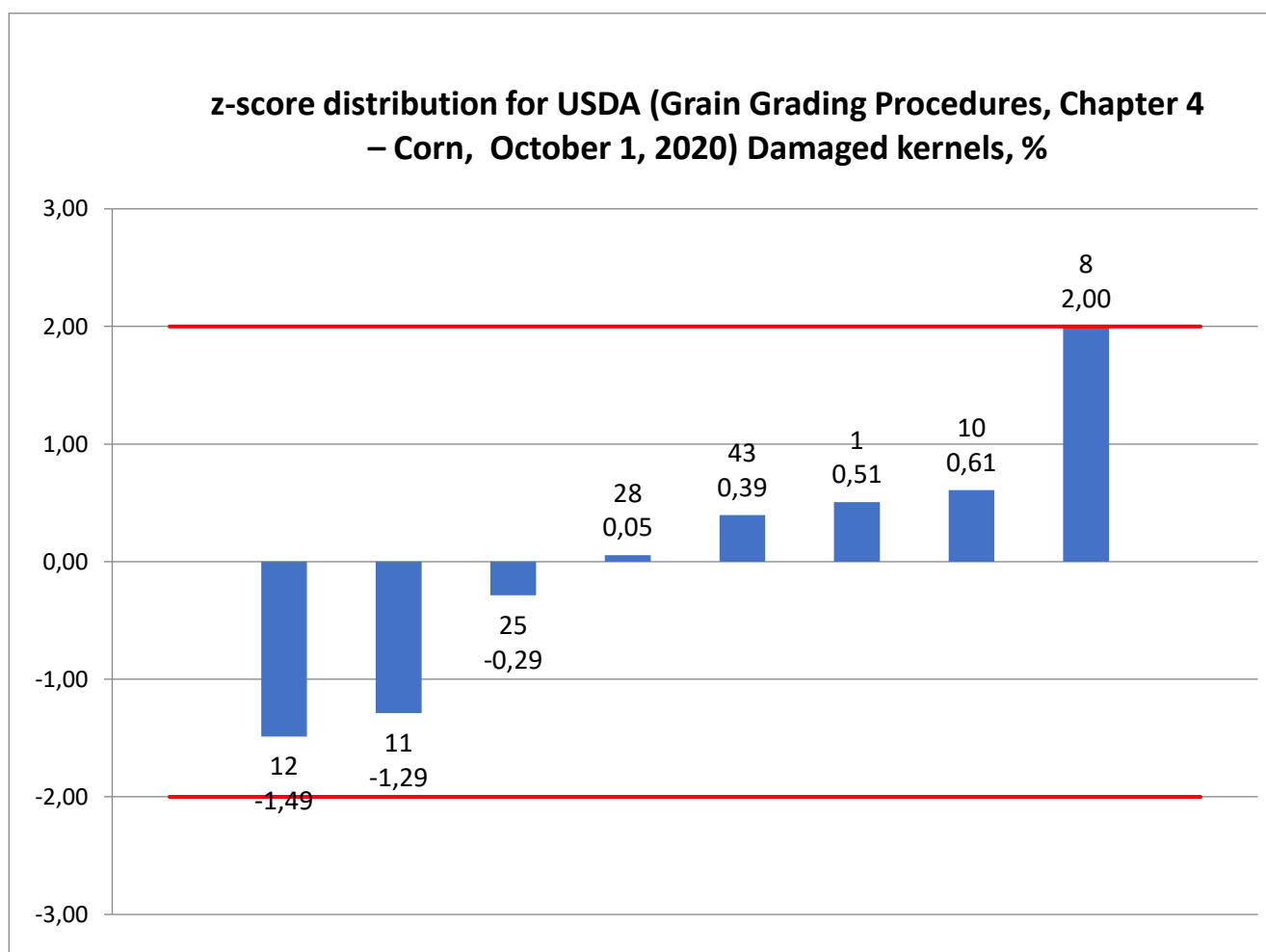
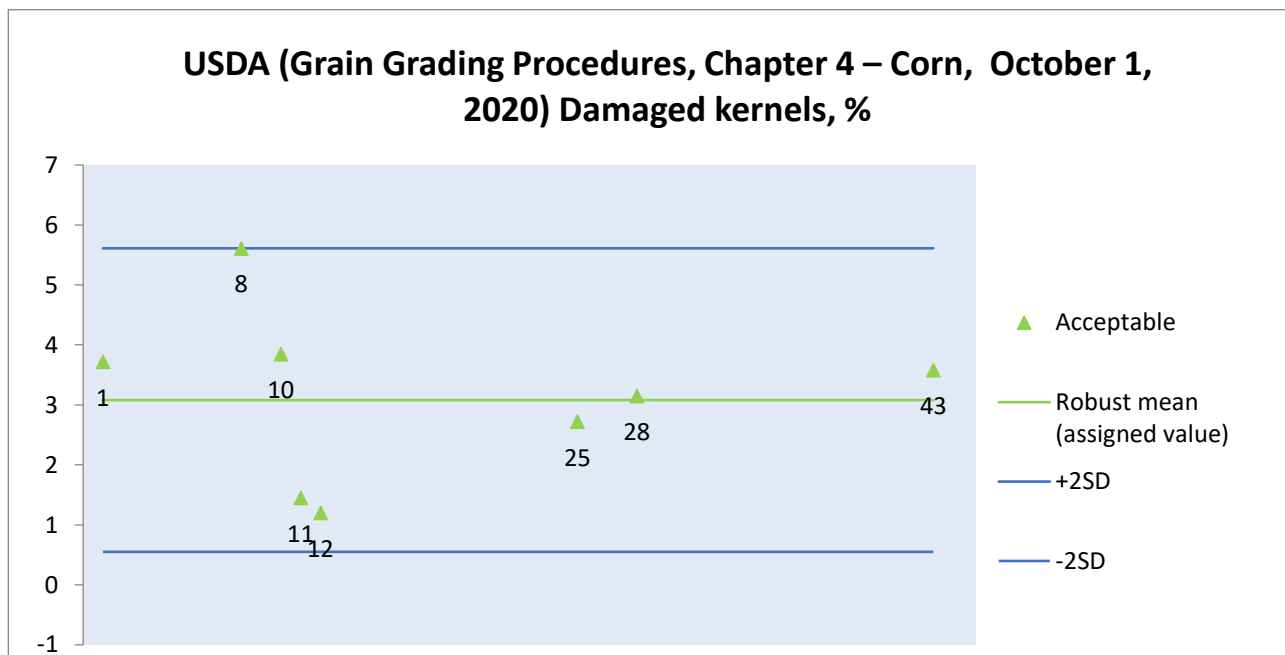
8.23. USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020) Broken Corn, %



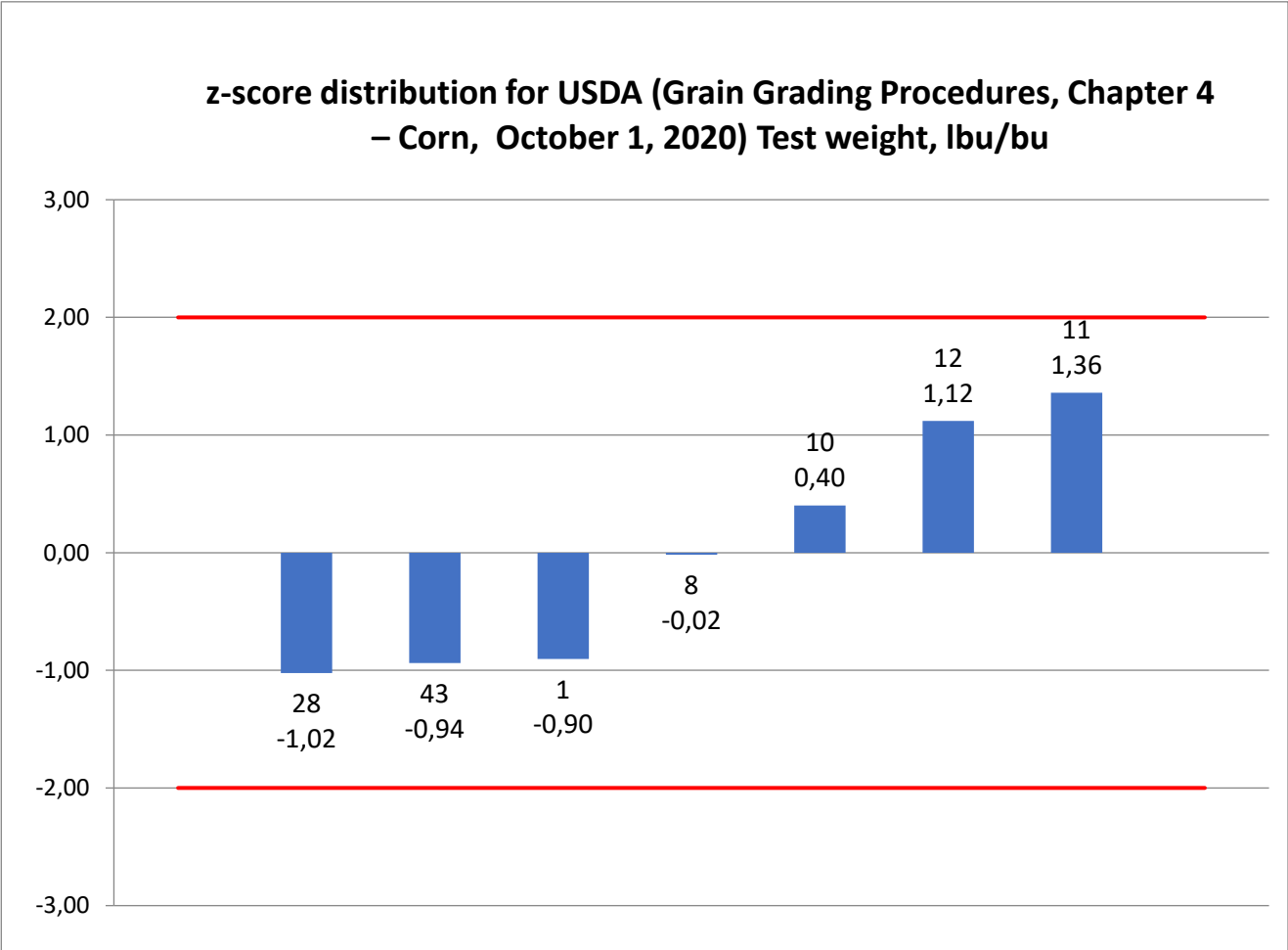
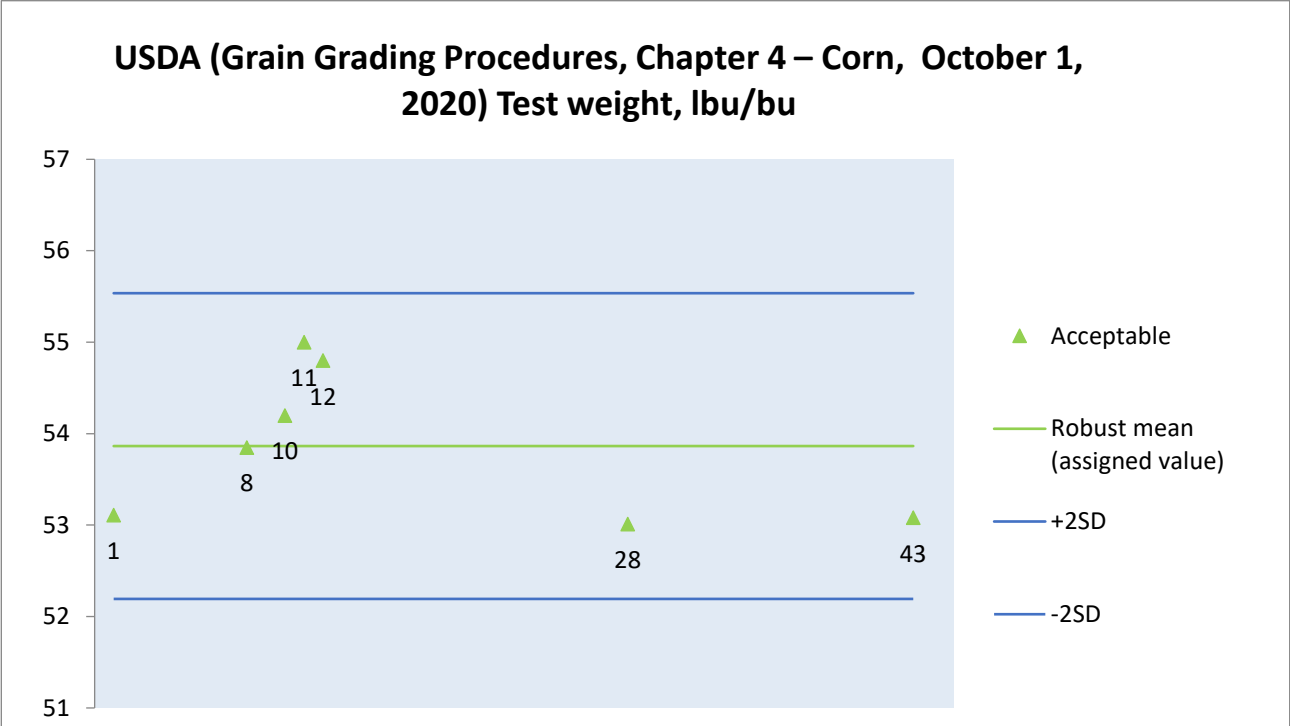
8.24. ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT) Foreign Material, %



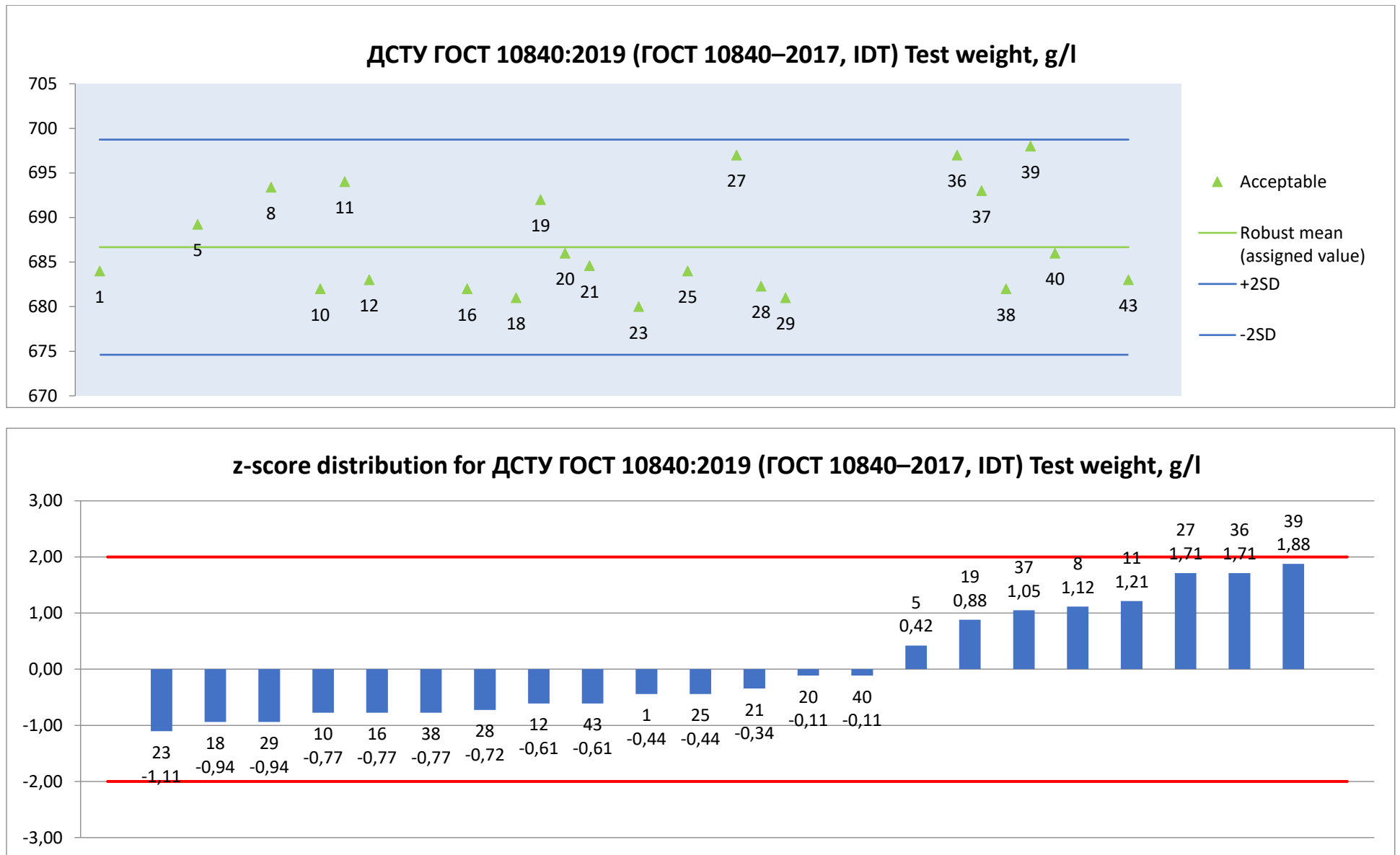
8.25. USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020) Damaged kernels, %



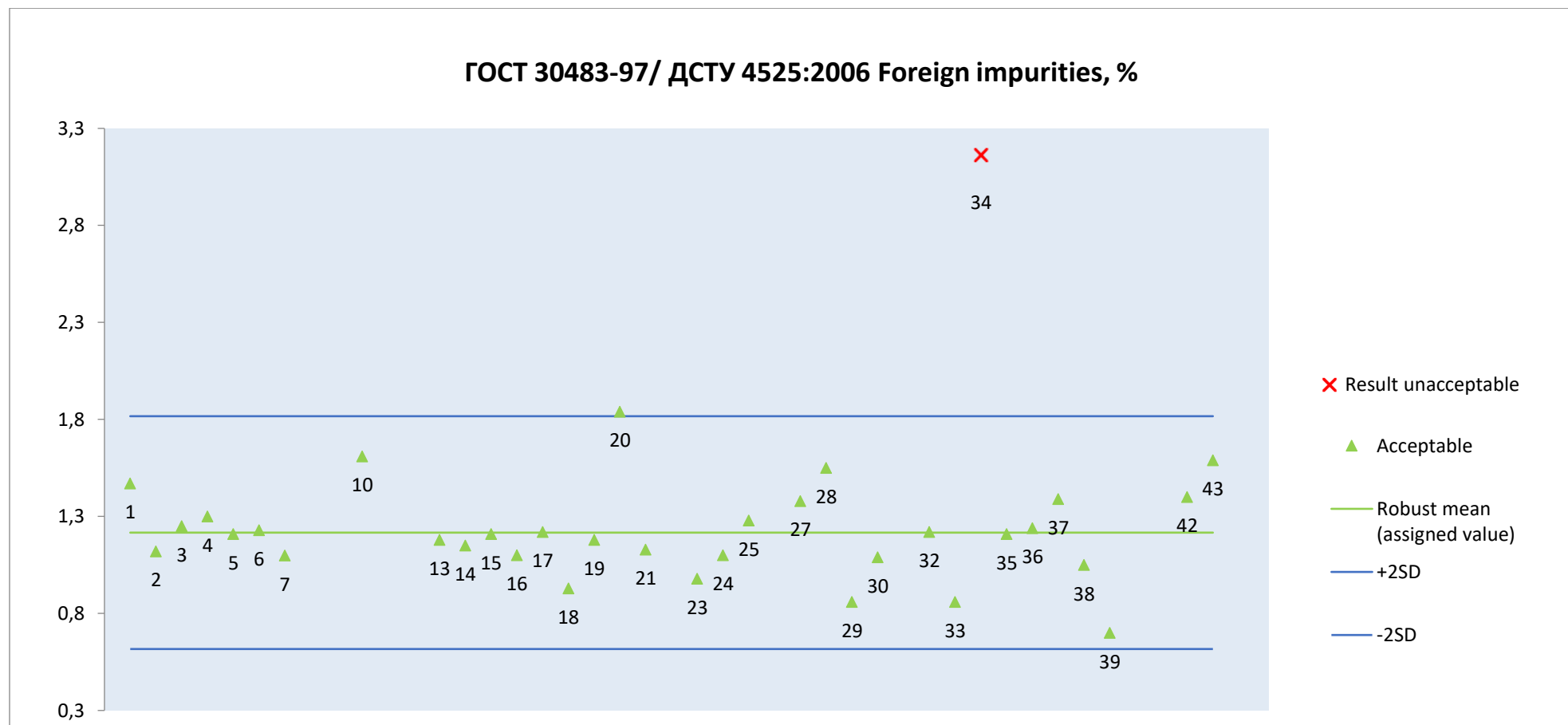
8.26. USDA (Grain Grading Procedures, Chapter 4 – Corn, October 1, 2020) Test weight, lbu/bu

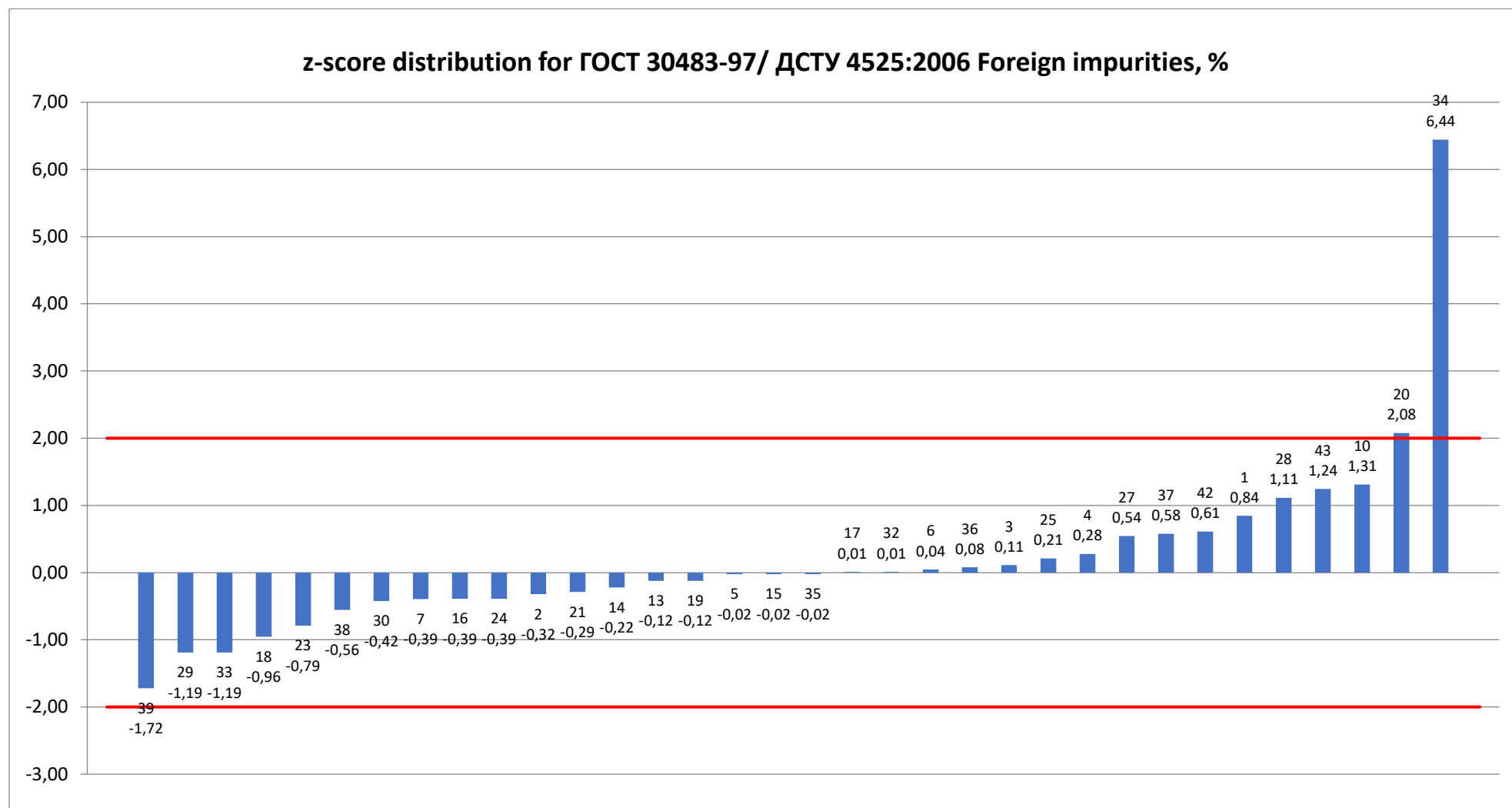


8.27. ДСТУ ГОСТ 10840:2019 (ГОСТ 10840–2017, IDT) Test weight, g/l

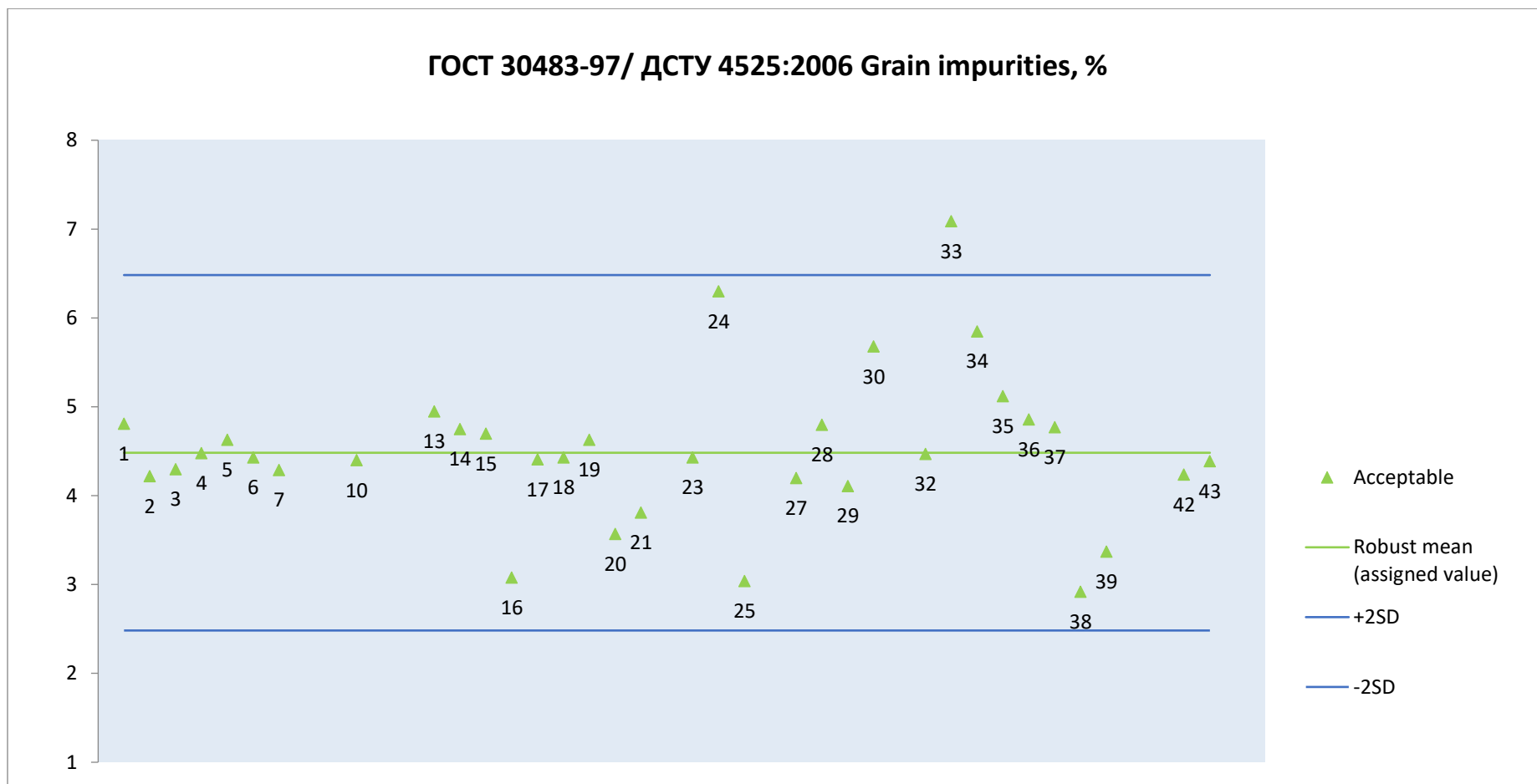


8.28. ГОСТ 30483-97/ ДСТУ 4525:2006 Foreign impurities, %

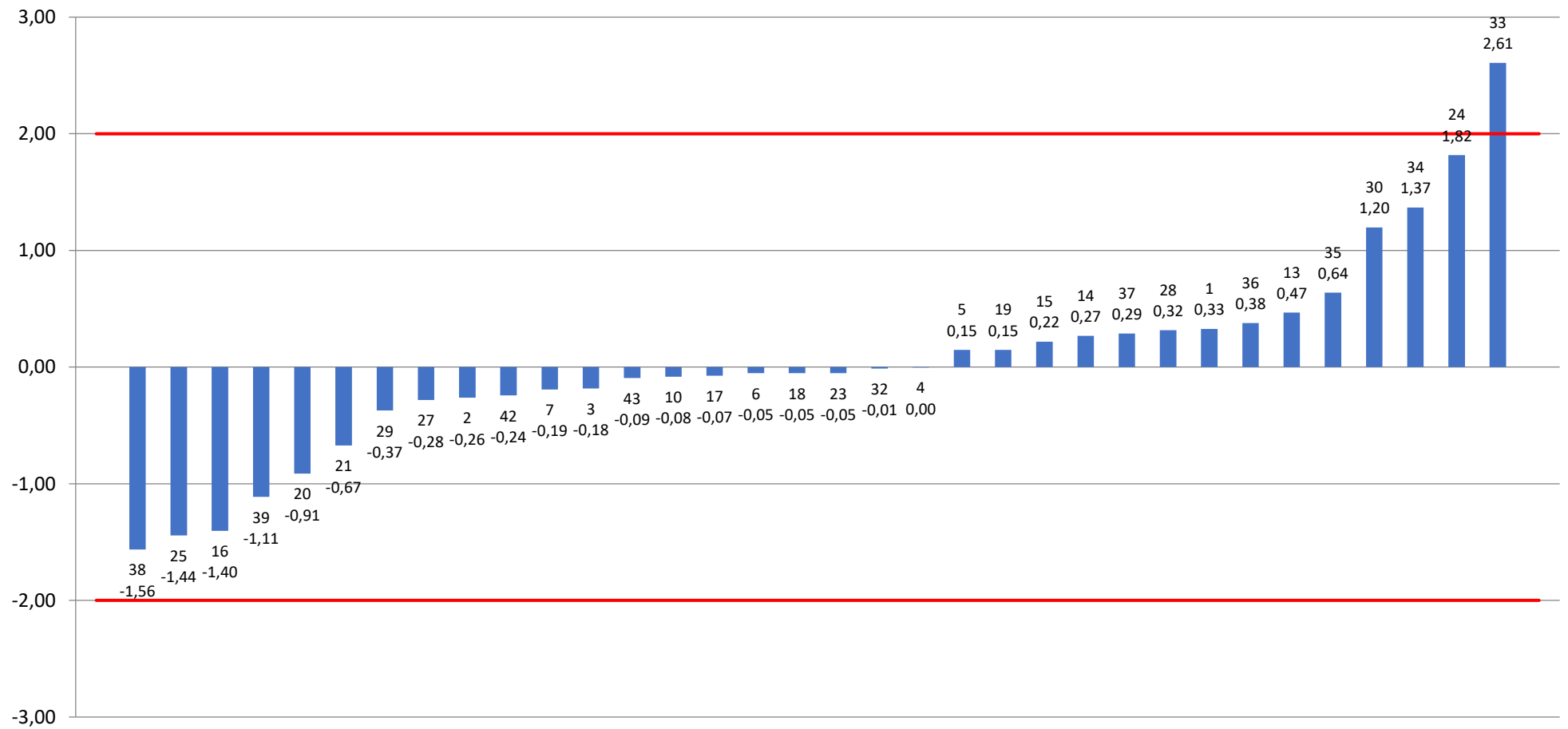




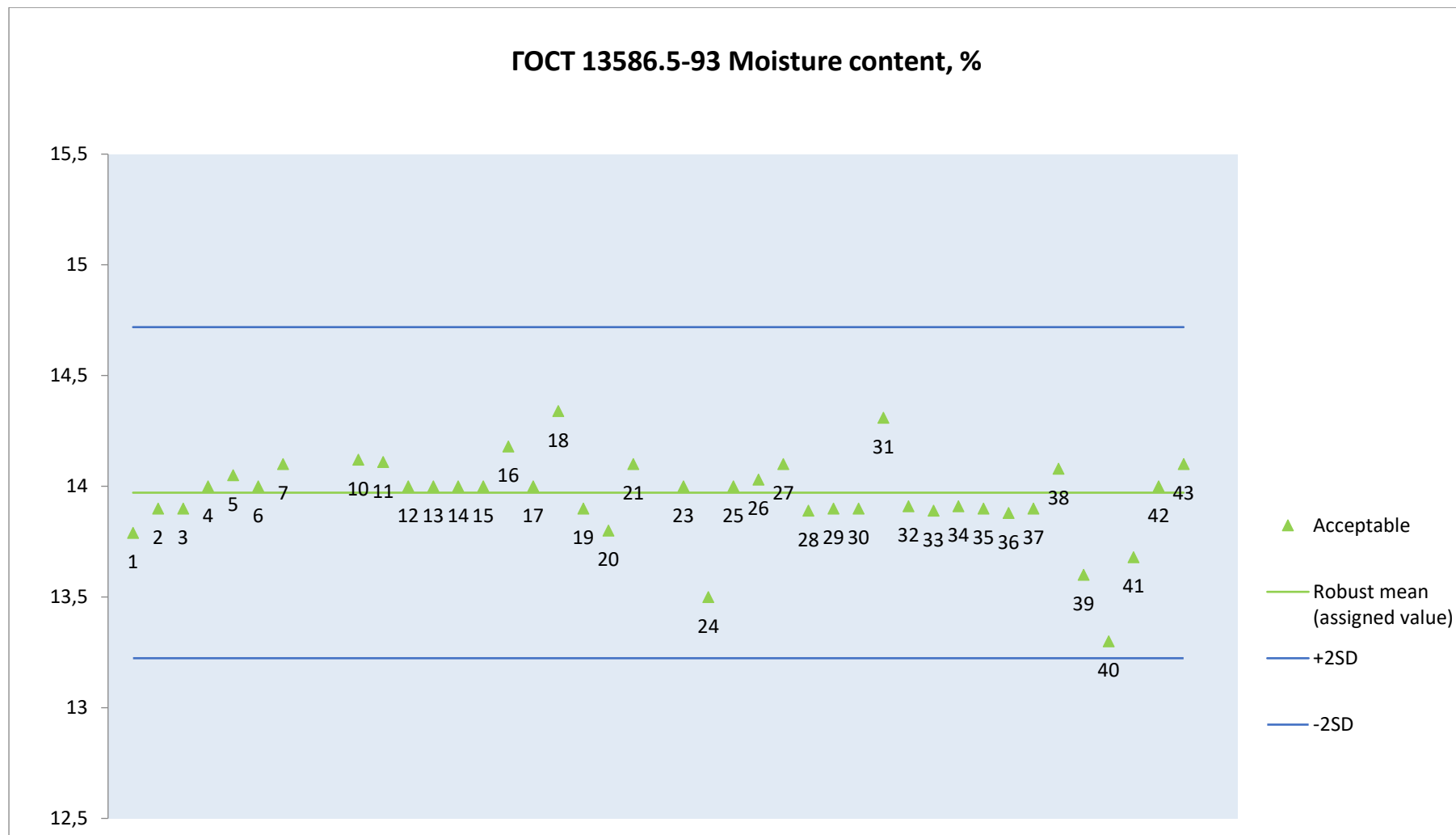
8.29. ГOCT 30483-97/ ДСТУ 4525:2006 Grain impurities, %

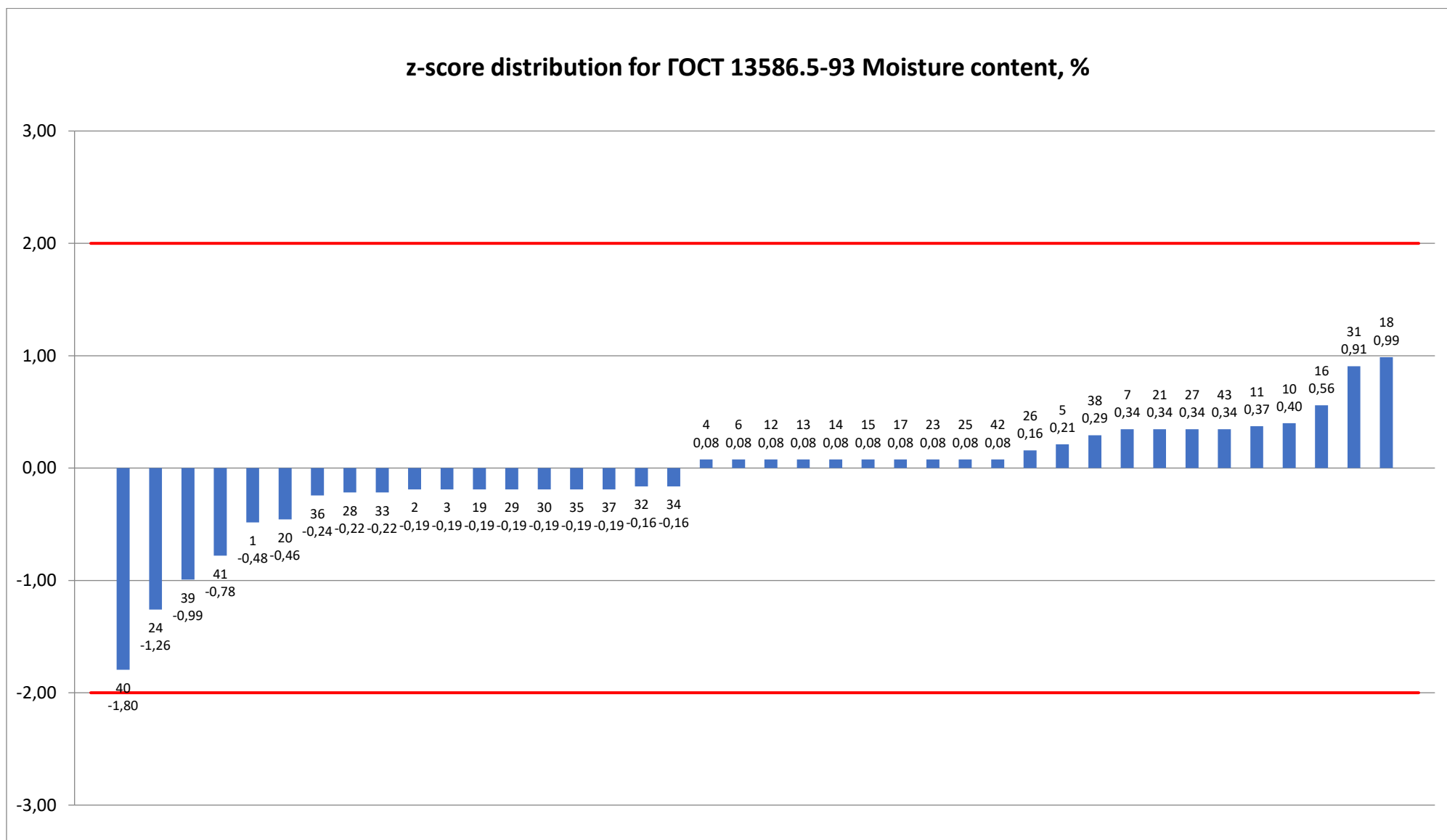


z-score distribution for ГОСТ 30483-97/ ДСТУ 4525:2006 Grain impurities, %

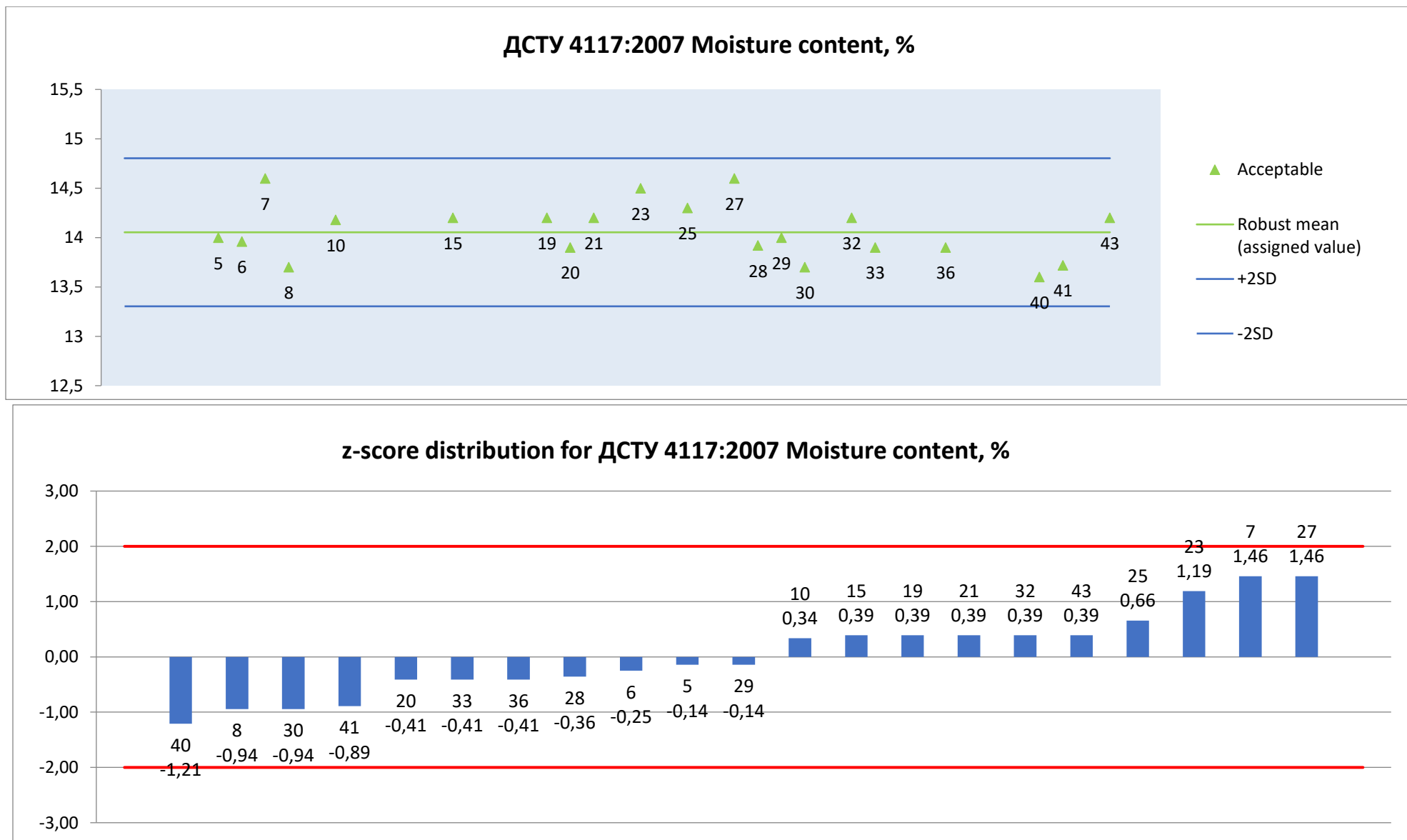


8.30. ГOCT 13586.5-93 Moisture content, %

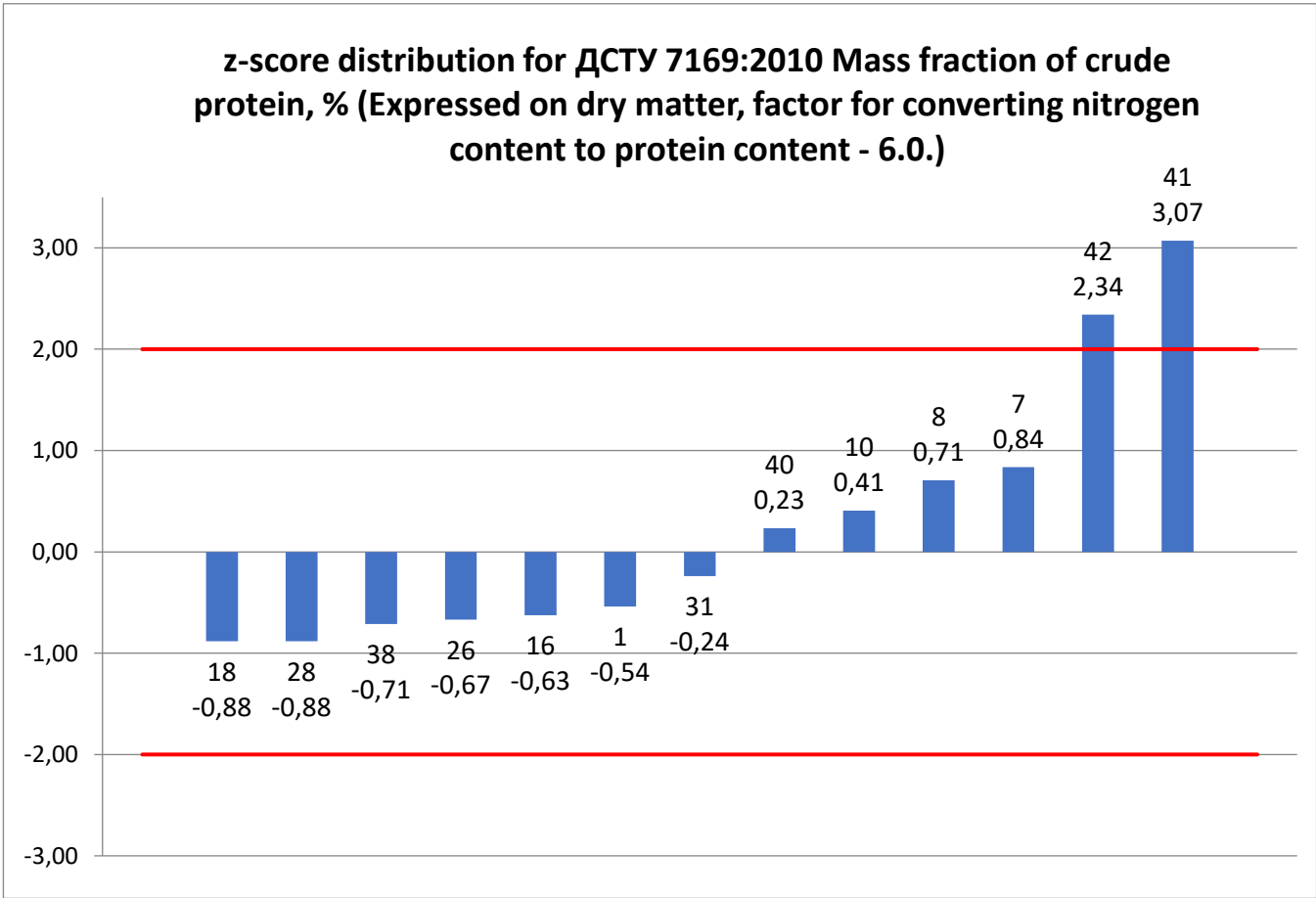
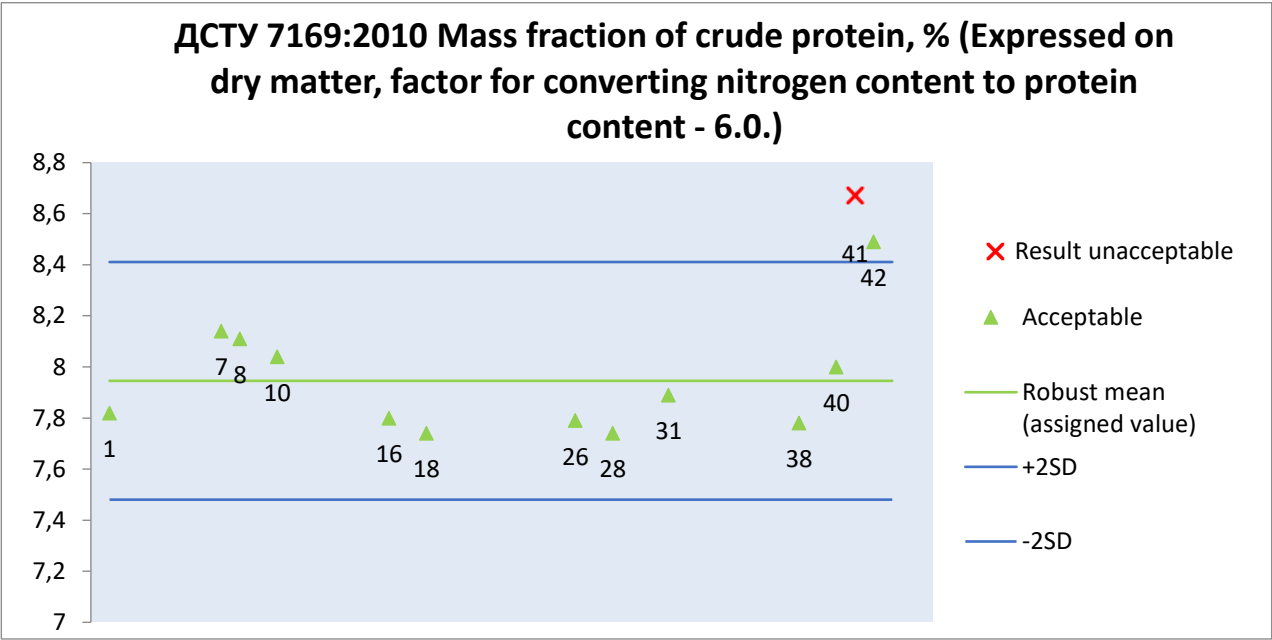




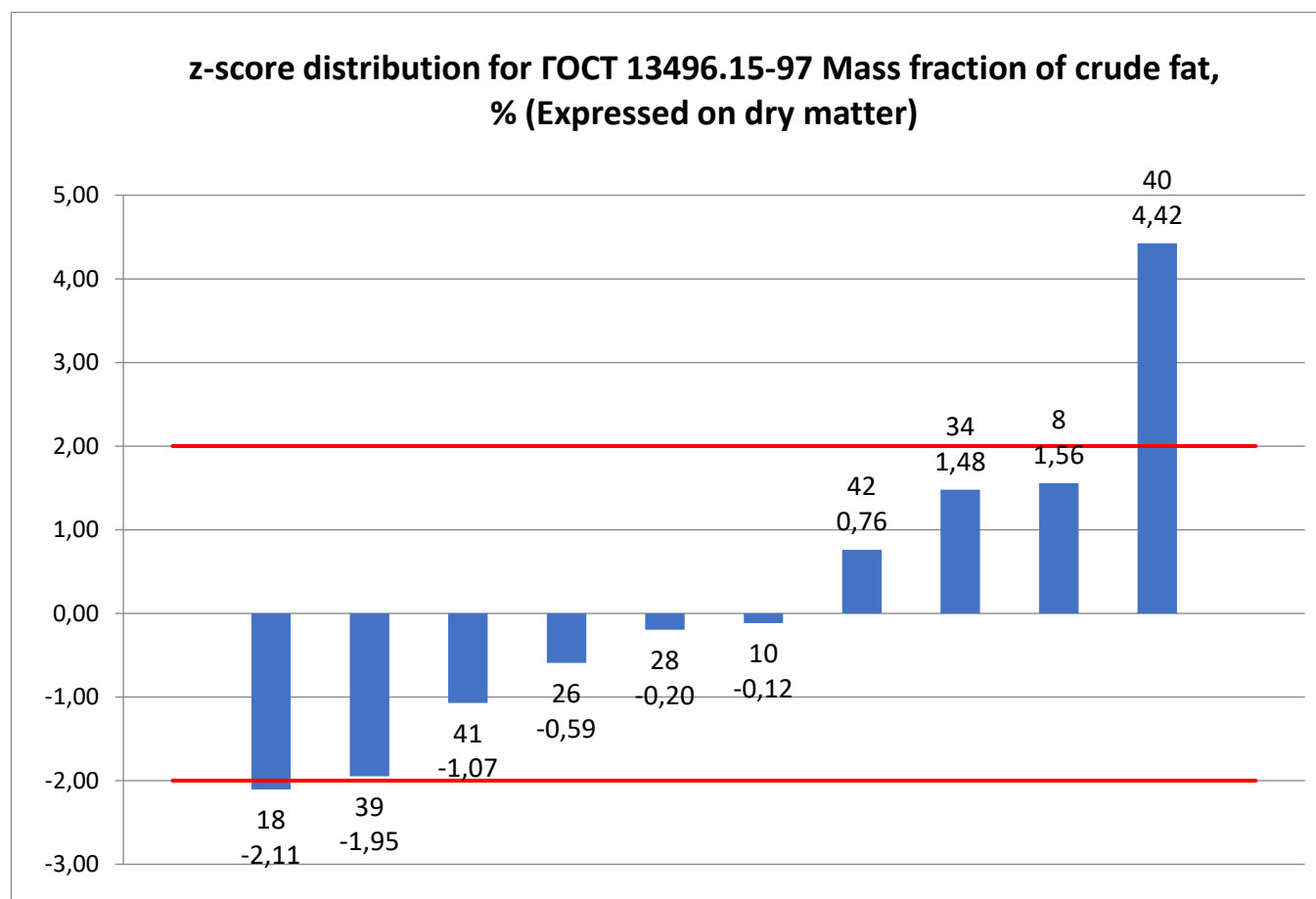
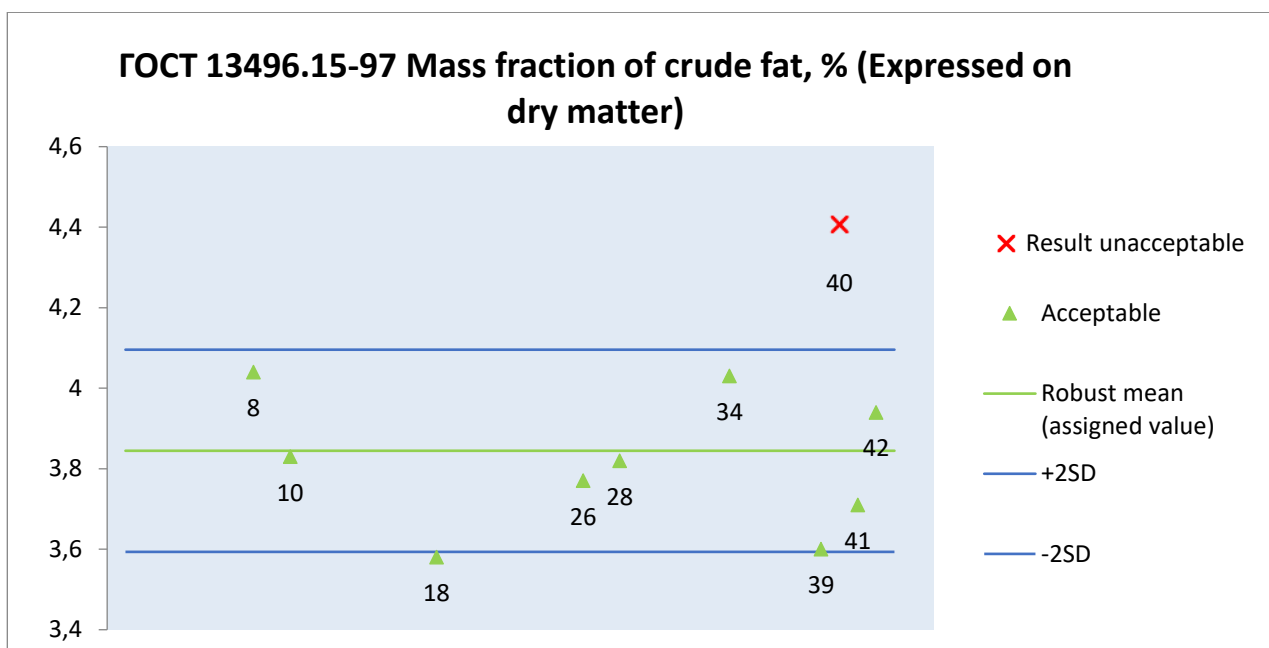
8.31. ДСТУ 4117:2007 Moisture content, %



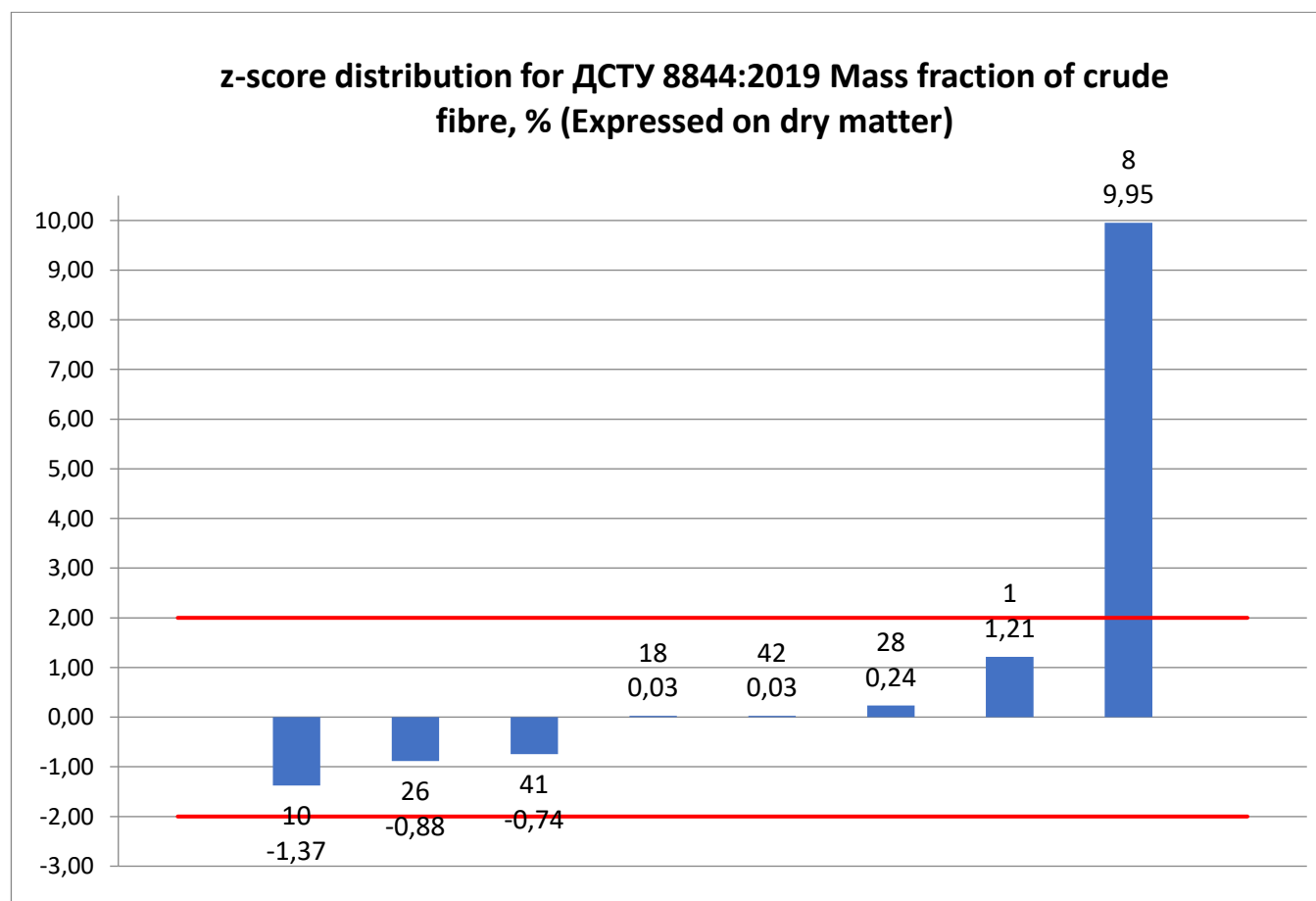
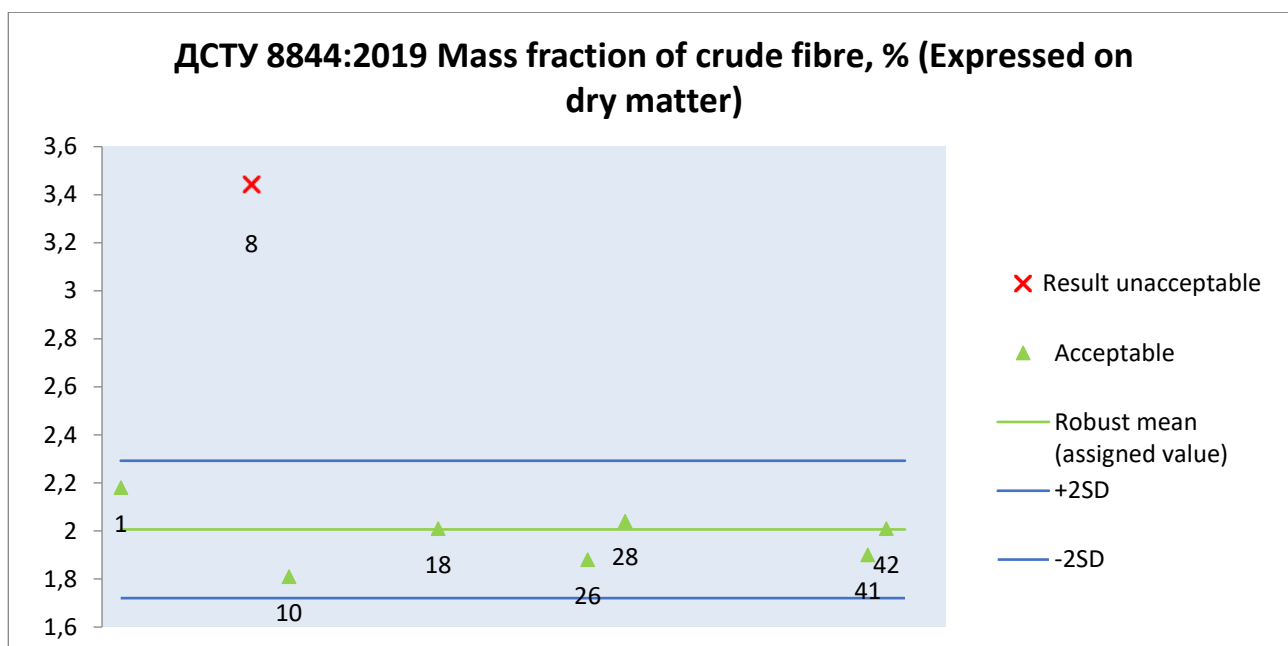
8.32. ДСТУ 7169:2010 Mass fraction of crude protein, % (Expressed on dry matter, factor for converting nitrogen content to protein content - 6.0.)



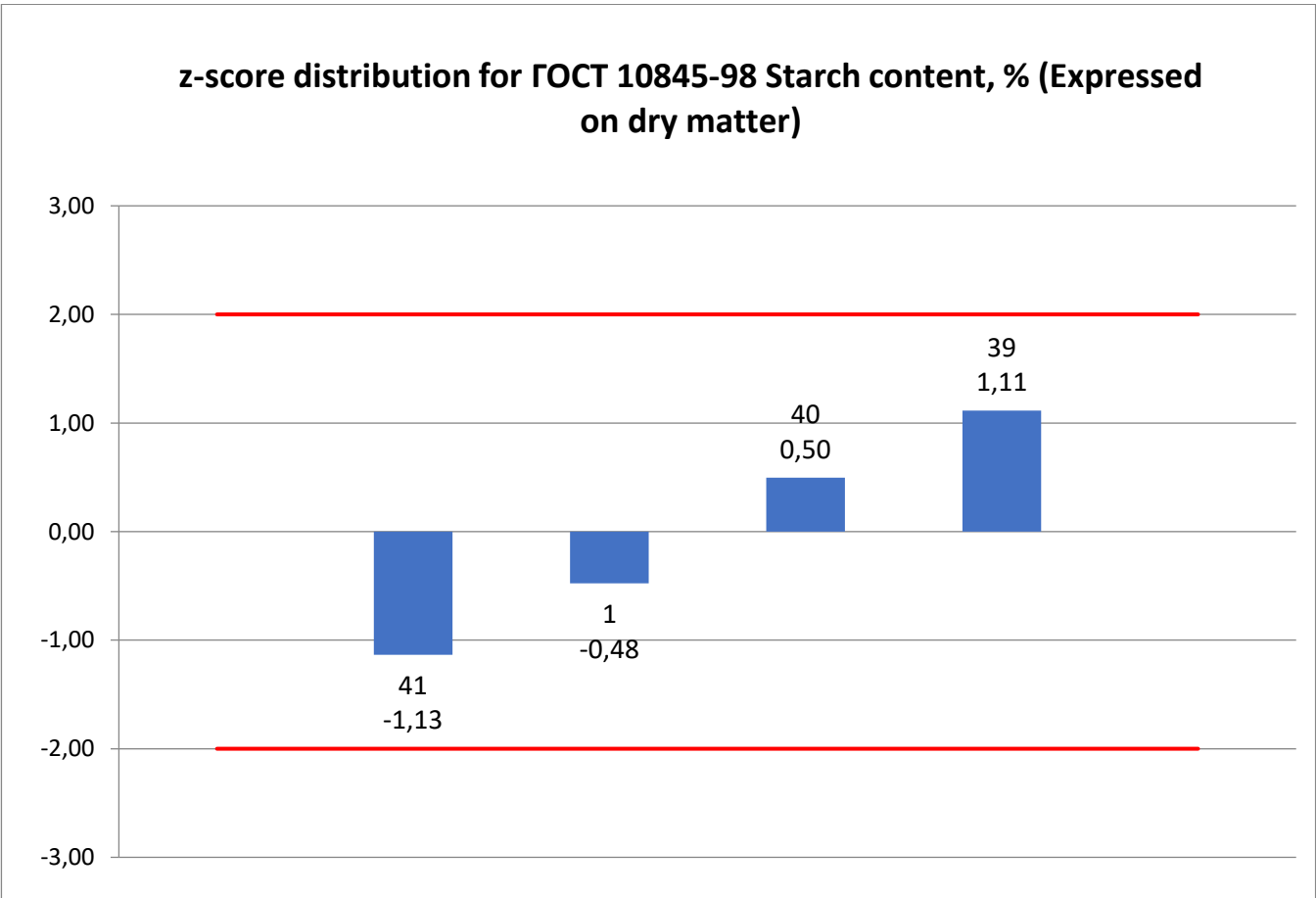
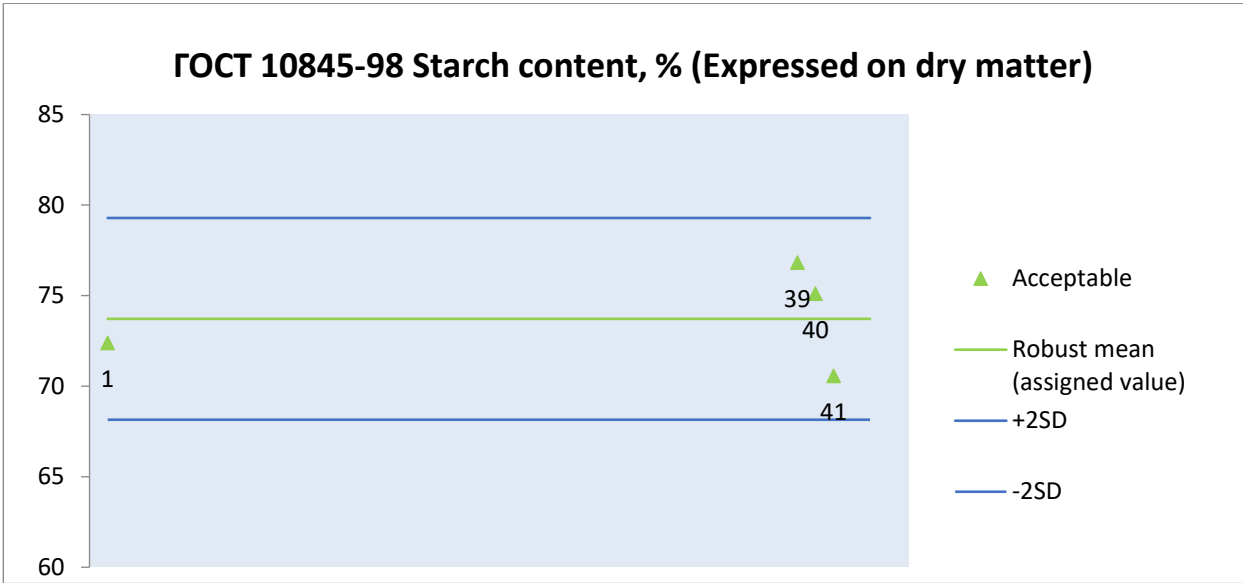
8.33. ГOCT 13496.15-97 Mass fraction of crude fat, % (Expressed on dry matter)



8.34. ДСТУ 8844:2019 Mass fraction of crude fibre, % (Expressed on dry matter)



8.35. ΓOCT 10845-98 Starch content, % (Expressed on dry matter)



9. NORMATIVE REFERENCE

1. ISO/IEC 17043:2010 Conformity assessment – General requirements for proficiency testing.
2. Analytical Methods Committee, Robust Statistics – How not to reject outliers Part 1. Basic Concepts, Analyst, 1989, 114, 1693-1697.
3. FOOD ANALYSIS PERFORMANCE ASSESSMENT SCHEME (FAPAS). Protocol for the organization and analysis of data, sixth edition, 2002.
4. Fearn, T. and Thompson, M, A new test for ‘sufficient homogeneity’, Analyst, 2001, 126, 1414-1417.
5. ISO 13528:2015 Statistical methods for use in proficiency testing by interlaboratory comparisons.
6. ISO Guide 35:2017 Reference materials – Guidance for characterization and assessment of homogeneity and stability.
7. ILAC Discussion Paper on Homogeneity and Stability Testing, April 2008.