EQCS Analysis Campaign 2018

The 2018's analysis campaign for the Voluntary Control Systems organised in the **EQCS** (European Quality Control System for Juices and Nectars from Fruits and Vegetables) put a focus on **apple juice** (NFC juice and juice made from concentrate) against the background of lively price developments and shortages on the raw material markets since autumn 2017.

Control Scheme/Country	NFC	From Concentrate	TOTAL
AEAZN	2	3	5
BSDA	3	3	6
QualiJus	5	3	8
SGF/IQCS	12	16	28
Belgium	2	2	4
Czech Republic	0	5	5
Denmark	2	2	4
Greece	0	3	3
Latvia	0	1	1
Luxembourg	1	3	4
Norway	0	3	3
Poland	0	4	4
TOTAL	***27***	***48***	***75***

The analysis scopes for NFC juice and juice made from concentrate in this campaign not only compared **classic quality parameters,** but also included specific checks of aspects **relevant to food fraud**, such as undeclared addition of sugar, acid, water and foreign fruit:

Scope of analysis
relative density 20/20
brix (table)
soluble solids
glucose
fructose
sucrose
titrat. acidity expr. as tart. acid pH 7.0
titrat. acidity expr. as citric acid pH 8.1
citric acid
arbutin
phloridzin
proline
oligosaccharide fingerprint (Low-GC)
patulin
$\delta^{18}O$ water (only NFC)
$\delta^{13}C$ malic acid
$\delta^{13}C$ sugars
SGF-Profiling™
ratio
total sugar
sugar-free extract
glucose-fructose ratio
% sucrose of the sugar

Beneath "classical" analytical parameters all samples have been screened via **SGF-Profiling™**: The SGF-Profiling™ is an NMR based quality control screening of fruit juices on the basis of SGF/IRMA authentic samples of fruit juices. Beneath a standard targeted multi-marker analysis with absolute quantification of diverse parameters this method delivers a non-targeted multi marker approach that is based on the simultaneous assessment of concentration deviations of hundreds of compounds. By this approach first evaluations regarding the authenticity of fruit juices can be done.

Non-targeted Analyses	Targeted Analyses	
Classification models fruit type product type origin *Verification models* univariate multivariate fruit content	ethanol lactic acid 5-hydroxymethylfurfural Titr. Acidity pH 7 Titr. Acidity pH 8.1 citric acid malic acid fumaric acid potassium magnesium glucose fructose glucose/fructose ratio sucrose % sucrose total sugar alanine	proline acetaldehyde acetoine arbutin benzaldehyde benzoic acid chlorogenic acid citramalic acid formic acid galacturonic acid malic/quinic ratio methanol pyruvic acid quinic acid sorbic acid succinic acid xylose

In 2018 the focus is set on authenticity and quality parameters with regards to fruit content, acid addition, sugar addition, addition of foreign fruit and water addition (NFC). Reasons for this are the very vital price developments of apple juice and apple juice concentrate in 2017 and 2018.

Summing up the outcome of this campaign for juices and juices from concentrate we observe a very clean market delivering good results.

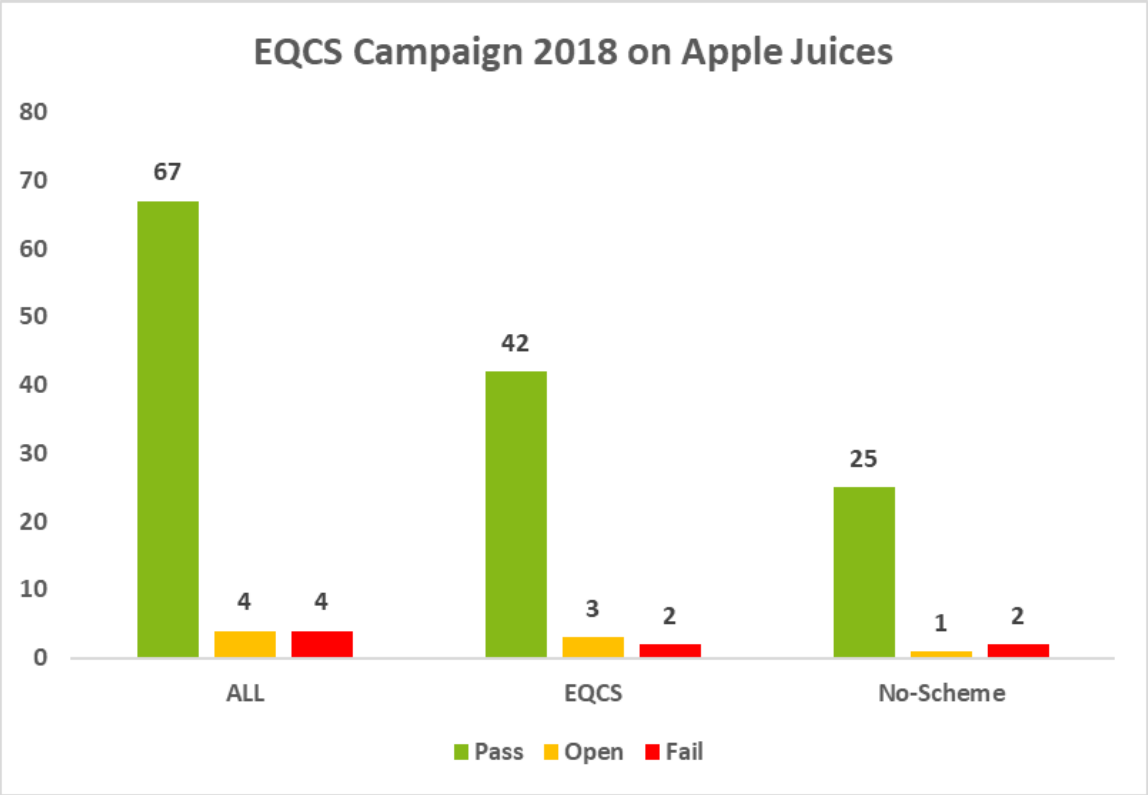
In the frame of the analysed parameters

- **no apple juice NFC** shows the **presence of exogenous water**,
- **no sample** shows the **addition of foreign fruit** (pear),
- only **two samples** show an **addition of exogenous sugar**,
- only **two samples** show an **addition of exogenous acid (citric acid)** and
- **two samples** show **elevated contents of 5-hydroxymethylfurfural** (> AIJN Code of Practice).

Out of **75 apple juices and apple juices from concentrate 4 samples** are evaluated as being not in conformity with legal and industrial requirements (**5.3%**). Beneath these clear deviations **four** other juice / juice from concentrate samples are **evaluated as open** (=further analytical examinations or traceability checks necessary):

- **three samples** were tested **positively** for **maltose** (oligosaccharide-fingerprint) – further analytical examination would make sense and
- **one sample** shows an **unusual content of proline and citric acid** – traceability checks and further analytical examination of possible pear addition (with a possible lower LoD for arbutin) could help.

Summing up the gained results from our campaign we can conclude that the observations **showed adulterations of apple juice only in very isolated cases**:



If we compare the results from countries without control scheme with the results from EQCS countries we conclude that existing and running control schemes **achieve slightly better results** than countries without control schemes.