

Version 2

## CONTENT

| <u>1.</u> <u>SCOPE</u>                  | 2  |
|---|----|
| 2. GENERAL CONSIDERATIONS               | 2  |
| 3. PRECISION                            | 2  |
| 3.1. REPEATABILITY                      | 2  |
| 3.2.1. INTER-LOT VARIABILITY            | 3  |
| 3.2.2. INTER-ASSAY VARIABILITY          | 3  |
| 3.2.3. PERSONAL FACTORS                 | 4  |
| 3.2.4. ROBUSTNESS                       | 4  |
| 3.3. ANALYTICAL SENSITIVITY             | 7  |
| 3.4. DYNAMIC RANGE                      | 7  |
| 3.5. ACCURACY                           | 8  |
| 3.5.1. SPIKED MATRICES                  | 8  |
| 3.5.2. HEAT-TREATED MATRICES            | 9  |
| 3.5.3. ROUTINE SAMPLES FROM LABS        | 9  |
| 3.5.4. PROFICIENCY LEST MATERIAL        | 10 |
| 3.5.5. BIOLOGICAL OR PROCESSED VARIANTS | 11 |
| 3.6. SWABBING APPLICATION               | 12 |
| J. A. KINSE WATER / CIP                 | 13 |
| J.B. SPECIFICITY                        | 13 |



### 1. Scope

The **SENSI***Strip* **Peanut LFD** is designed for the determination of peanut in food, contaminated surfaces or CIP water. It is based on an antibody against peanut proteins. The present report describes the validation process and summarizes its results.

### 2. General Considerations

Allergen lateral flow devices are mainly intended as qualitative analytical method. Anyhow, for the sake of definition of specifications, profound evaluation and semiquantitative result comparison a color card was used. This graduates results into 10 incremental classes where "1" indicates absence of any visible signal and "10" the most intense line. "Classes" as stated in the tables below refer to the increments provided by the color card.

Applying semiquantitative evaluation, calculating a Coefficient of Variation is deemed to be mere mathematical exercise without practical relevance. Thus, only a qualitative assessment is given wherever appropriate.

### 3. Precision

### 3.1. Repeatability

Repeatability was determined by testing one negative and two positive samples at different concentration levels in 20fold replicates.

### Table 1: Repeatability of the SENSIStrip Peanut LFD

| Replicate | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------|--------------------|---------------------|----------------------|
| 1         | 1                  | 6                   | 8                    |
| 2         | 1                  | 7                   | 8                    |
| 3         | 1                  | 6                   | 8                    |
| 4         | 1                  | 7                   | 8                    |
| 5         | 1                  | 6                   | 8                    |
| 6         | 1                  | 6                   | 8                    |
| 7         | 1                  | 6                   | 8                    |
| 8         | 1                  | 6                   | 8                    |
| 9         | 1                  | 6                   | 8                    |
| 10        | 1                  | 7                   | 8                    |
| 11        | 1                  | 6                   | 8                    |
| 12        | 1                  | 7                   | 8                    |
| 13        | 1                  | 6                   | 8                    |
| 14        | 1                  | 7                   | 8                    |
| 15        | 1                  | 6                   | 8                    |

Technologies

# Validation Report SENSIStrip Peanut LFD (Cat. No. HU0030128)

Version 2

| Replicate | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------|--------------------|---------------------|----------------------|
| 16        | 1                  | 6                   | 8                    |
| 17        | 1                  | 6                   | 8                    |
| 18        | 1                  | 6                   | 8                    |
| 19        | 1                  | 6                   | 8                    |
| 20        | 1                  | 7                   | 8                    |
| Mean      | 1.0                | 6.3                 | 8.0                  |

Data show good repeatability of results, including 0 ppm standard assessed as "negative" in all cases.

### 3.2. Reproducibility

#### 3.2.1. Inter-lot Variability

Inter-lot variability was determined by testing one negative and two positive samples at different concentration levels in 3 different kit lots as duplicates.

| Lot  | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|------|--------------------|---------------------|----------------------|
| 1    | 1/1                | 6/6                 | 8/8                  |
| 2    | 1/1                | 6/7                 | 8/9                  |
| 3    | 1/1                | 6/6                 | 8/8                  |
| Mean | 1.0                | 6.2                 | 8.2                  |

#### Table 2: Inter-lot reproducibility of the SENSIStrip Peanut LFD

Data show good inter-lot reproducibility of results, including 0 ppm standard assessed as "negative" in all cases.

#### 3.2.2. Inter-assay Variability

Inter-assay variability was determined by testing one negative and two positive samples at 4 different days as duplicates in the same kit lot.

Table 3: Inter-assay reproducibility of the SENSIStrip Peanut LFD

| Day  | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|------|--------------------|---------------------|----------------------|
| 1    | 1/1                | 6/6                 | 8/8                  |
| 2    | 1/1                | 6/6                 | 9/9                  |
| 3    | 1/1                | 7/7                 | 9/9                  |
| 4    | 1/1                | 7/7                 | 9/9                  |
| Mean | 1.0                | 6.5                 | 8.8                  |



Data show good inter-assay reproducibility of results, including 0 ppm standard assessed as "negative" in all cases

#### 3.2.3. Personal Factors

To assess usability of the device and the robustness of the method with respect to individual handling one negative and two positive samples at different concentration levels were tested and evaluated as duplicates by three different persons. All persons were trained lab technicians, but not necessarily experienced with this peculiar design of lateral flow devices.

| User | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|------|--------------------|---------------------|----------------------|
| 1    | 1/2                | 6/7                 | 9/9                  |
| 2    | 1/1                | 7/7                 | 8/9                  |
| 3    | 1/1                | 7/7                 | 9/9                  |
| Mean | 1.2                | 6.8                 | 8.8                  |

#### Table 4: Usability of the SENSIStrip Peanut LFD

Data show reproducible performance of the test by various persons, including 0 ppm standard assessed as "negative" in all cases.

#### 3.2.4. Robustness

Robustness experiments shall characterize limitations of the tests with respect to variances of various parameters while performing the test. For this, incubation times, temperature, sample volume and time to evaluation were varied. All other conditions were kept constant according the Instruction for Use. One negative and two positive samples at different concentration levels were tested in duplicates.

#### Table 5: Robustness of the SENSIStrip Peanut LFD with respect to 1. incubation time

| 1. Incubation time<br>[min] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------------------------|--------------------|---------------------|----------------------|
| 1                           | 1/1                | 4/4                 | 8/8                  |
| 2                           | 1/1                | 6/6                 | 9/9                  |
| 3                           | 1/1                | 7/7                 | 9/9                  |
| 4                           | 1/1                | 6/7                 | 9/9                  |
| 5                           | 1/1                | 7/7                 | 9/9                  |
| 6                           | 1/1                | 7/7                 | 9/9                  |
| 7                           | 1/1                | 7/7                 | 9/9                  |
| 10                          | 1/2                | 7/7                 | 9/9                  |
| 15                          | 1/1                | 7/7                 | 9/9                  |



Technologies

## Validation Report SENSIStrip Peanut LFD (Cat. No. HU0030128)

Version 2

| 1. Incubation time | Level 1 | Level 2  | Level 3   |
|--------------------|---------|----------|-----------|
| [min]              | [0 ppm] | [15 ppm] | [250 ppm] |
| 20                 | 2/3     | 8/8      | 9/9       |

With respect to the negative sample no visible lines are found up to 7 minutes 1. incubation time. False positive results cannot totally be excluded after 20 minutes.

After 3 minutes 1. incubation time signals of positive samples reach equilibrium and do not change up to 20 minutes.

Thus, 1. incubation time yields constant results for negative and positive samples ranging from 3 to 7 minutes.

| 2. Incubation time<br>[min] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------------------------|--------------------|---------------------|----------------------|
| 1                           | 1/1                | 5/5                 | 9/9                  |
| 2                           | 1/1                | 6/6                 | 9/9                  |
| 3                           | 1/1                | 7/6                 | 9/9                  |
| 4                           | 1/1                | 7/7                 | 9/9                  |
| 5                           | 1/1                | 8/8                 | 9/9                  |
| 6                           | 1/1                | 7/8                 | 9/9                  |
| 7                           | 1/1                | 8/8                 | 9/9                  |
| 10                          | 2/3                | 8/8                 | 9/9                  |
| 15                          | 3/3                | 8/8                 | 9/9                  |
| 20                          | 4/3                | 8/8                 | 9/9                  |

With respect to the negative sample no visible lines are found up to 7 minutes 2. incubation time. False positive results cannot totally be excluded after 10 minutes.

After 4 minutes 2. incubation time signals of positive samples reach equilibrium and do not change up to 20 minutes.

Thus, 2. incubation time yields constant results for negative and positive samples ranging from 4 to 7 minutes.

|--|

| Incubation<br>temperature [°C] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|--------------------------------|--------------------|---------------------|----------------------|
| 4                              | 1/1                | 6/6                 | 8/8                  |
| 15                             | 1/1                | 6/6                 | 8/8                  |
| 20                             | 1/1                | 7/6                 | 8/8                  |
| 25                             | 1/1                | 7/7                 | 9/9                  |

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Technologies

# Validation Report SENSIStrip Peanut LFD (Cat. No. HU0030128)

Version 2

| Incubation<br>temperature [°C] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|--------------------------------|--------------------|---------------------|----------------------|
| 30                             | 1/1                | 6/6                 | 8/8                  |
| 37                             | 1/1                | 6/6                 | 8/8                  |

Incubation temperature does not affect the accuracy of negative samples between 4 and 37°C.

Signals for positive samples remain constant between 4-37°C incubation temperature.

Thus, incubation temperature yields constant results for negative and positive samples ranging from 4 to 37°C.

| Table 8: Robustness of the SEN   | SIStrip Peanut I FD with | respect to sample volume |
|----------------------------------|--------------------------|--------------------------|
| Table 0. Nobustiless of the SLIN | SiSuip realiul LI D with | respect to sample volume |

| Sample volume<br>[µL] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------------------|--------------------|---------------------|----------------------|
| 100                   | 1/1                | 6/7                 | 8/8                  |
| 200                   | 1/1                | 7/7                 | 9/9                  |
| 300                   | 1/1                | 7/6                 | 9/9                  |
| 400                   | 2/1                | 7/8                 | 9/9                  |
| 500                   | 1/1                | 7/7                 | 9/9                  |
| 600                   | 1/1                | 6/7                 | 9/9                  |
| 700                   | 1/1                | 5/5                 | 8/9                  |
| 800                   | 1/1                | 5/5                 | 8/8                  |
| 1000                  | 1/1                | 1/1                 | 1/1                  |

Sample volume does not affect the accuracy of negative samples between 100 and 1000  $\mu\text{L}.$ 

At 100  $\mu L$  sample volume signals of positive samples reach equilibrium and do not change up to 600  $\mu L.$ 

Thus, sample volume yields constant results for negative and positive samples ranging from 100 to 600  $\mu L.$ 

Table 9: Robustness of the SENSIStrip Peanut LFD with respect to time to evaluation

| Time to<br>evaluation [min] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------------------------|--------------------|---------------------|----------------------|
| 0                           | 1/1                | 5/6                 | 9/9                  |
| 2                           | 1/1                | 5/5                 | 9/9                  |
| 5                           | 1/1                | 6/6                 | 9/9                  |
| 10                          | 1/1                | 7/6                 | 9/9                  |
| 15                          | 1/1                | 7/7                 | 9/9                  |



Technologies

# Validation Report SENSIStrip Peanut LFD (Cat. No. HU0030128)

Version 2

| Time to<br>evaluation [min] | Level 1<br>[0 ppm] | Level 2<br>[15 ppm] | Level 3<br>[250 ppm] |
|-----------------------------|--------------------|---------------------|----------------------|
| 30                          | 1/1                | 7/7                 | 9/9                  |
| 60                          | 2/2                | 7/7                 | 9/9                  |
| 120                         | 2/1                | 6/6                 | 8/8                  |
| 1200                        | 2/1                | 7/7                 | 8/8                  |

With respect to the negative sample no visible lines are found up to 30 minutes time to evaluation. False positive results cannot totally be excluded after 60 minutes.

Signals for positive samples remain constant between 0-10 minutes time to evaluation.

Thus, time to evaluation yields constant results for negative and positive samples ranging from 0 to 10 minutes.

Although the above results concerning robustness show some degrees of freedom, real samples could behave in a different manner. Thus, test execution and evaluation should always be done according the IFU.

#### 3.3. Analytical Sensitivity

For determination of the analytical sensitivity negative as well as multiple positive samples with increasing concentrations were tested in triplicates. The test was performed and evaluated by three different users.

| User | Level 1<br>[0 ppm] | Level 2<br>2.5 ppm] | Level 3<br>5 ppm] | Level 4<br>[10 ppm] | Level 5<br>[20 ppm] | Level 6<br>[40 ppm] |
|------|--------------------|---------------------|-------------------|---------------------|---------------------|---------------------|
| 1    | 1/1/1              | 3/3/3               | 3/3/3             | 6/6/6               | 7/7/7               | 8/8/8               |
| 2    | 1/1/1              | 3/3/3               | 5/5/5             | 6/6/6               | 7/7/7               | 8/8/8               |
| 3    | 1/1/1              | 2/3/3               | 4/4/4             | 6/6/6               | 6/7/7               | 8/8/8               |

Table 10: Limit of detection (LOD) of the SENSIStrip Peanut LFD

LOD was defined as the lowest concentration which was correctly assessed as a value of  $\geq$  3. Thus, LOD is 2.5 ppm.

### 3.4. Dynamic Range

Dynamic range is defined as the interval between LOD and beginning High-Dose-Hook Effect. For assessing the latter multiple positive samples with increasing concentrations were tested in duplicates.



Version 2

Table 11: High-Dose-Hook Effect of the SENSIStrip Peanut LFD

| Level [ppm] | Intensity |
|-------------|-----------|
| 0           | 1/1       |
| 5           | 6/6       |
| 10          | 7/7       |
| 25          | 8/8       |
| 50          | 8/8       |
| 100         | 8/8       |
| 250         | 8/8       |
| 500         | 8/9       |
| 1000        | 9/9       |
| 2500        | 9/9       |
| 5000        | 9/9       |
| 10000       | 9/9       |
| 25000       | 9/9       |
| 50000       | 8/8       |
| 100000      | 7/7       |
| 250000      | 7/7       |

Signals are constant up to 50000 ppm indicating no High-Dose-Hook Effect. Thus, with LOD as determined according to 3.3. dynamic range is defined as 2.5-50000 ppm.

### 3.5. Accuracy

### 3.5.1. Spiked Matrices

Relevant matrices were spiked at various levels and extracted according the Instruction for Use. Extracts were tested undiluted as well as in various dilutions. Additionally, non-spiked zero matrix was tested. All tests were performed in duplicates.

| Table 12: Accuracy | (spiked matrices) of the | e SENSIStrip Peanut LFD |
|--------------------|--------------------------|-------------------------|
|--------------------|--------------------------|-------------------------|

| Matrix          | Level 1<br>[0 ppm] | Level 2<br>[2.5 ppm] | Level 3<br>[5 ppm] | Level 4<br>[10 ppm] | Level 5<br>[20 ppm] | Level 6<br>[40 ppm] | Level 7<br>[80 ppm] |
|-----------------|--------------------|----------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| Cookie (TUC)    | 1/2                | 4/4                  | 5/5                | 6/6                 | 7/7                 | 8/8                 | 8/8                 |
| Biscuit         | 1/1                | 3/4                  | 5/5                | 6/6                 | 6/7                 | 7/7                 | 8/8                 |
| Shortbread      | 1/1                | 4/4                  | 5/5                | 6/6                 | 7/7                 | 8/8                 | 8/8                 |
| Ice cream       | 1/2                | 4/4                  | 6/6                | 6/7                 | 7/7                 | 8/8                 | 8/8                 |
| Chocolate 1)    | 1/1                | 3/3                  | 3/3                | 3/3                 | 4/4                 | 4/4                 | 4/4                 |
| Garlic, grained | 1/1                | 4/4                  | 5/6                | 7/6                 | 7/7                 | 8/8                 | 8/8                 |
| Garlic, fresh   | 1/1                | 3/4                  | 5/5                | 7/7                 | 7/7                 | 8/8                 | 8/8                 |

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Version 2

| Matrix           | Level 1<br>[0 ppm] | Level 2<br>[2.5 ppm] | Level 3<br>[5 ppm] | Level 4<br>[10 ppm] | Level 5<br>[20 ppm] | Level 6<br>[40 ppm] | Level 7<br>[80 ppm] |
|------------------|--------------------|----------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| Spices (Paprika) | 1/2                | 3/3                  | 4/4                | 5/5                 | 6/7                 | 7/7                 | 8/8                 |
| Milk             | 1/1                | 3/3                  | 4/4                | 5/6                 | 5/7                 | 7/7                 | 7/8                 |
| Muesli           | 1/1                | 3/3                  | 4/5                | 6/6                 | 7/7                 | 7/7                 | 7/8                 |

<sup>1)</sup> addition of extraction additive for polyphenol containing samples

**Technologies** 

Irrespective of the peculiar matrix, LOD as determined according to chapter 3.3. was confirmed. Special care has to be taken for chocolate where extraction additive was added to improve the extraction.

#### 3.5.2. Heat-treated Matrices

To exemplarily assess changes in analytical sensitivity for processed food samples, a cookie matrix was spiked with 80 ppm of peanut and divided in two parts. One part was baked at 150 °C for 20 min. Processed as well as unprocessed extracts were tested undiluted as well as in various dilutions. Additionally, non-spiked zero matrix was tested. All tests were performed in duplicates.

Table 13: Accuracy (heat-treated matrices) of the SENSIStrip Peanut LFD

| Matrix                  | Level 1<br>[0 ppm] | Level 2<br>[2.5 ppm] | Level 3<br>[5 ppm] | Level 4<br>[10 ppm] | Level 5<br>[20 ppm] | Level 6<br>[40 ppm] | Level 7<br>[80 ppm] |
|-------------------------|--------------------|----------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| Cookie /<br>unprocessed | 1/1                | 3/3                  | 4/3                | 6/5                 | 7/6                 | 7/6                 | 7/7                 |
| Cookie /<br>processed   | 1/1                | 2/2                  | 2/3                | 4/3                 | 4/4                 | 5/5                 | 6/6                 |

Analytical sensitivity for the heat-treated matrix decreases from 2.5 to 5 ppm.

### 3.5.3. Routine Samples from Labs

Other than spiked samples routine samples give more profound information about realistic conditions as they occur while food manufacturing. Expectancy values might not be too well established, but the analytes have undergone all processing steps with full impact of the sample matrix.

Thus, routine samples from labs were acquired and tested according to the Instruction for Use.

| Table 14: Acc | uracy (routine san | nples) of the SENS | IStrip Peanut LFD |
|---------------|--------------------|--------------------|-------------------|
|---------------|--------------------|--------------------|-------------------|

| Sample description  | Expectancy<br>evaluated by | Expectancy<br>[Peanut ppm] | Intensity |
|---------------------|----------------------------|----------------------------|-----------|
| Garlic. dried       | ELISA                      | <0.2                       | 1/1       |
| Chili/Cayenne       | ELISA                      | <0.2                       | 1/1       |
| Sweets in chocolate | ELISA                      | <0.2                       | 1/1       |
| Coconut concentrate | ELISA                      | <0.2                       | 2/2       |

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Technologies

## Validation Report SENSIStrip Peanut LFD (Cat. No. HU0030128)

Version 2

| Sample description    | Expectancy<br>evaluated by | Expectancy<br>[Peanut ppm] | Intensity |
|-----------------------|----------------------------|----------------------------|-----------|
| Food. not specified   | ELISA                      | <0.2                       | 2/2       |
| Food. not specified   | ELISA                      | <0.2                       | 1/1       |
| Curcuma               | ELISA                      | <0.2                       | 1/1       |
| Paprika               | ELISA                      | <0.2                       | 1/1       |
| Garlic. dried         | ELISA                      | <0.2                       | 1/1       |
| Plant protein         | ELISA                      | <0.2                       | 1/1       |
| Rose hip. dried       | ELISA                      | <0.2                       | 2/2       |
| Peanut oil            | ELISA                      | <0.2                       | 1/1       |
| Oil seed/Mustard seed | ELISA                      | <0.2                       | 1/1       |
| Cumin                 | ELISA                      | <0.2                       | 1/1       |
| Process water         | ELISA                      | <0.2                       | 1/1       |
| Hazelnut Paste        | ELISA                      | <0.2                       | 1/1       |
| Paprika               | ELISA                      | <0.2                       | 1/1       |
| Chili/Cayenne         | ELISA                      | <0.2                       | 2/2       |
| Gingseng. extract     | ELISA                      | <0.2                       | 1/1       |
| Parsley. dried        | ELISA                      | <0.2                       | 2/2       |
| Bread                 | ELISA                      | <0.2                       | 1/1       |
| Onion. dried          | ELISA                      | <0.2                       | 2/2       |
| Oil seed/Mustard seed | ELISA                      | <0.2                       | 1/1       |
| Potato product        | ELISA                      | <0.2                       | 1/1       |
| Cocoa compound        | ELISA                      | <0.2                       | 1/1       |
| Cocoa creme           | ELISA                      | 7.3                        | 5/5       |
| Garlic. dried         | ELISA                      | 1.3                        | 6/6       |
| Cocoa creme           | ELISA                      | 21                         | 5/5       |
| Sweets in chocolate   | ELISA                      | 11                         | 5/5       |
| Garlic powder         | ELISA                      | 4.1                        | 7/7       |
| Garlic. dried         | ELISA                      | 0.94                       | 4/4       |
| Garlic. dried         | ELISA                      | 7.7                        | 6/6       |
| Cumin                 | ELISA                      | 1.1                        | 1/1       |
| Chili/Cayenne         | ELISA                      | 0.53                       | 1/1       |
| Food. not specified   | ELISA                      | 2.9                        | 2/3       |
| Food. not specified   | ELISA                      | 1.2                        | 2/3       |

### 3.5.4. Proficiency Test Material

In addition to routine samples proficiency test material serves as valuable information concerning the performance of a test system.



Version 2

Different proficiency test materials from DLA were applied and tested according the Instruction for Use.

| Table 15: Results | of the SENSIStrip | Peanut LFD applied | on Proficiency | <b>Test material</b> |
|-------------------|-------------------|--------------------|----------------|----------------------|
|                   |                   |                    |                |                      |

| Source      | Sample description                 | Concentration,<br>according provider<br>[ppm] | Intensity |
|-------------|------------------------------------|---|-----------|
| DLA 05/2014 | Bakery products, sample A          | 123   | 7/7       |
| DLA 05/2014 | Bakery products, sample B          | 0   | 2/1       |
| DLA 05/2016 | Butter cookie, sample A            | 0   | 1/2       |
| DLA 05/2016 | Butter cookie, sample B            | 10  | 7/7       |
| DLA 05/2017 | Potato powder,<br>unroasted peanut | 29  | 8/8       |
| DLA 05/2017 | Potato powder,<br>roasted peanut   | 32.2  | 8/8       |
| DLA 05/2017 | Potato powder,<br>peanut butter    | 26.3  | 7/7       |
| DLA 05/2017 | Potato powder,<br>Peanut paste     | 32.7  | 7/7       |
| DLA 05/2017 | Potato powder,<br>Peanut extrudate | 32.5  | 7/7       |
| DLA 05/2017 | Potato powder,<br>negative         | 0   | 1/1       |
| DLA 16/2017 | Peanut in cookie matrix            | 0   | 1/2       |
| DLA 16/2017 | Peanut in cookie matrix            | 0.51  | 2/2       |
| DLA 16/2017 | Peanut in cookie matrix            | 2.52  | 4/3       |
| DLA 16/2017 | Peanut in cookie matrix            | 5.05  | 5/5       |
| DLA 16/2017 | Peanut in cookie matrix            | 12.6  | 7/6       |
| DLA 16/2017 | Peanut in cookie matrix            | 25.3  | 7/7       |
| DLA 07/2017 | Soup powder, sample A              | 14.4  | 5/6       |
| DLA 07/2017 | Soup powder, sample B              | 0   | 2/2       |
| DLA 05/2018 | Butter cookie, sample A            | 0   | 1/1       |
| DLA 05/2018 | Butter cookie, sample B            | 32  | 7/7       |
| DLA 06/2019 | Cocoa cream, sample A              | 0   | 1/1       |
| DLA 06/2019 | Cocoa cream, sample B              | 37.5  | 7/7       |

All negative samples were identified as negative. All of the positive samples with expectancy values > LOD are identified as positive with reasonable intensity.

### **3.5.5. Biological or processed variants**

Peanut might occur in various variants due to industrial processing. Anyhow, in creating the immunological components of the test device only one of those can be considered. In



Version 2

the peculiar case antibodies are derived against unroasted peanut. To assess the reactivity towards other variants, those were extracted and diluted to various levels going down to LOD as stated in chapter 3.3.

| Table 16: Accuracy  | (relevant analyte      | variants) of the | SENSIStrip Pea        | nut LFD |
|---------------------|------------------------|------------------|-----------------------|---------|
| 14010 101 /10041409 | (i olo failt allary to | vananco, or cho  | 0 = 10 10 1 / 0 1 0 0 |         |

| Variant                          | Level 2<br>[2.5 ppm] | Level 3<br>[5 ppm] | Level 4<br>[12.5 ppm] | Level 5<br>[25 ppm] | Level 6<br>[50 ppm] | Level 7<br>[100 ppm] |
|----------------------------------|----------------------|--------------------|-----------------------|---------------------|---------------------|----------------------|
| Peanut,<br>unroasted             | 3/3                  | 4/4                | 5/5                   | 6/6                 | 7/7                 | 7/7                  |
| Peanut, roasted at 150°C, 30 min | 2/2                  | 3/3                | 3/3                   | 4/4                 | 5/5                 | 6/6                  |

Variant-dependent analytical sensitivity is ranging from 2.5 to 5 ppm.

### 3.6. Swabbing Application

Major application for lateral-flow devices is the test of swab samples. SENSI*Strip* product line is harmonized with the SENSISwab swabbing kits. To assess its applicability, surfaces were contaminated with spiked sample matrices at various levels. Those were dispersed in assay buffer and dispensed on a 5x5 cm surface area in duplicates. Each swabbing sample was tested in duplicates as well, resulting in a total of 4 determinations. Concentrations below refer to the spiked samples.

| Table 17: Accuracy | (relevant analyte | variants) of the | SENSIStrip Peanut LF | ۶D |
|--------------------|-------------------|------------------|----------------------|----|
|                    | (                 |                  |                      | _  |

| Sample description | Level 1<br>[0 µg/cm²] | Level 2<br>[0.07 µg/cm <sup>2</sup> ] | Level 3<br>[0.20 µg/cm <sup>2</sup> ] | Level 4<br>[0.67 µg/cm <sup>2</sup> ] |
|--------------------|-----------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Buffor             | 1/1                   | 3/3                                   | 4/4                                   | 7/7                                   |
| Builei             | 1/1                   | 3/3                                   | 4/4                                   | 6/6                                   |
| Cookie (TUC)       | 1/1                   | 2/3                                   | 3/4                                   | 7/7                                   |
|                    | 1/1                   | 3/3                                   | 4/4                                   | 7/7                                   |
|                    | 1/1                   | 3/3                                   | 5/5                                   | 7/7                                   |
| ice Cream          | 1/1                   | 3/3                                   | 5/5                                   | 6/7                                   |
| Chapalata          | 1/1                   | 3/3                                   | 4/4                                   | 6/6                                   |
| Chocolate          | 1/1                   | 3/3                                   | 3/4                                   | 6/6                                   |

Dependent on the sample matrix, swab samples can be detected as low as 0.07 µg/cm<sup>2</sup>.

Repeated swabbing of the same surface indicates that varying recoveries are an intrinsic feature of the method which can only be improved by multiple repetitions. Recoveries are affected by solubility of proteins, residual liquid and complete swabbing of the surface area.

Note that surfaces were contaminated by protein extracts and not complete commodities. As the latter are more particulate by nature they might be swabbed more easily. Thus, the approach chosen here reflects a worst-case scenario.



### 3.7. Rinse water / CIP

The sensitivity for rinse water / CIP was determined by diluting peanut extract in different commonly applied water-based rinse solutions to various concentrations. The pH was adjusted to  $7.0 \pm 0.5$  before running the test. All tests were performed in duplicate.

| Rinse solution               | Level 1<br>[0 mg/L] | Level 2<br>[0.17 mg/L] | Level 3<br>[0.33 mg/L] | Level 4<br>[0.67 mg/L] | Level 5<br>[1.33 mg/L] | Level 6<br>[2.67 mg/L] |
|------------------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Pure water                   | 1/1                 | 3/3                    | 5/5                    | 6/6                    | 6/6                    | 7/7                    |
| 2% NaOH                      | 1/1                 | 2/2                    | 3/3                    | 4/4                    | 5/5                    | 6/6                    |
| 0.5% Citric acid             | 1/1                 | 2/3                    | 5/5                    | 6/6                    | 7/7                    | 7/7                    |
| 0.6% nitric acid             | 1/1                 | 2/3                    | 4/4                    | 5/5                    | 6/6                    | 7/7                    |
| 0.5% sodium tripolyphosphate | 1/1                 | 3/3                    | 5/5                    | 5/6                    | 6/7                    | 7/7                    |

 Table 18: Sensitivity of the SENSIStrip Peanut LFD for Rinse Solutions

**Technologies** 

LOD for rinse solutions was defined as the lowest concentration which was correctly assessed as a value of  $\geq$  3. Thus, LOD for pure water, 0.5% citric acid, 0.6% nitric and 0.5% sodium tripolyphosphate solution is 0.17 mg/L and LOD for 2% NaOH is 0.33 mg/L.

### 3.8. Specificity

Specificity was assessed by extracting and testing multiple commodities in pure form. Tests were performed in duplicates.

| Commodity   | Intensity | Commodity    | Intensity | Commodity    | Intensity |
|-------------|-----------|--------------|-----------|--------------|-----------|
| Almond      | 1/1       | Cow's milk   | 1/1       | Oyster       | 1/1       |
| Adzuki bean | 1/1       | Cumin        | 1/1       | Paprika      | 1/1       |
| Apple       | 1/1       | Curcuma      | 1/1       | Pea          | 1/1       |
| Apricot     | 1/1       | Dill         | 1/1       | Peach        | 1/1       |
| Barley      | 1/1       | Dried milk   | 1/1       | Pecan nut    | 1/1       |
| Bean, white | 1/1       | Duck         | 1/1       | Pepper       | 1/1       |
| Beef        | 1/1       | Ewe's milk   | 1/1       | Pine nut     | 1/1       |
| Bell pepper | 1/1       | Fennel       | 1/1       | Pistachio    | 1/1       |
| Brazil nut  | 1/1       | Flaxseed     | 2/2       | Poppy seed   | 1/1       |
| Buckwheat   | 1/1       | Garden cress | 1/1       | Pork         | 1/1       |
| Caraway     | 1/1       | Garlic       | 1/1       | Potato       | 1/1       |
| Cardamom    | 1/1       | Gelatin      | 1/1       | Pumpkin seed | 1/1       |
| Carob bean  | 1/1       | Gliadin      | 1/1       | Radish       | 1/1       |
| Carrot      | 1/1       | Goat's milk  | 1/1       | Rice         | 1/1       |
| Cashew      | 5/5       | Guar gum     | 2/2       | Rye          | 1/1       |

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|            | Technologies |

Version 2

| Commodity | Intensity | Commodity       | Intensity | Commodity      | Intensity |
|-----------|-----------|-----------------|-----------|----------------|-----------|
| Cayenne   | 1/1       | Hazelnut        | 1/1       | Sesame         | 1/1       |
| Celery    | 1/1       | Horseradish     | 1/1       | Shrimp         | 1/1       |
| Cherry    | 1/1       | Kidney bean     | 2/2       | Soy flour      | 1/1       |
| Chestnut  | 1/1       | Kiwi            | 1/1       | Soy lecithin   | 1/1       |
| Chia      | 1/1       | Lamb            | 1/1       | Soy milk       | 1/1       |
| Chicken   | 1/1       | Leek            | 1/1       | Split peas     | 1/1       |
| Chickpea  | 1/1       | Lentil          | 1/1       | Sucrose        | 1/1       |
| Chili     | 1/1       | Lupin           | 1/1       | Sunflower seed | 1/1       |
| Cinnamon  | 1/1       | Macadamia nut   | 1/1       | Thyme          | 2/2       |
| Clove     | 1/1       | Milk powder     | 1/1       | Tomato         | 1/1       |
| Cocoa     | 1/1       | Mustard, yellow | 1/1       | Turkey         | 1/1       |
| Coconut   | 1/1       | Nutmeg          | 1/1       | Walnut         | 1/1       |
| Cod       | 1/1       | Oats            | 1/1       | Wheat          | 1/1       |
| Corn      | 1/1       | Onion           | 1/1       | White cabbage  | 1/1       |

With LOD = 2.5 ppm (see 3.3.) for most commodities no cross-reactivity could be determined.

For cashew additional dilutions of the extract were tested. Cross-reactivity was calculated considering concentration and LOD.

| Table 20: Specificity (cros | s-reactivity) of the \$ | SENSI <i>Strip</i> Peanut L | .FD (2) |
|-----------------------------|-------------------------|-----------------------------|---------|
|-----------------------------|-------------------------|-----------------------------|---------|

| Commodity | Concentration [ppm] | Intensity | Cross-reactivity |
|-----------|---------------------|-----------|------------------|
| Cashew    | 1 M                 | 6/6       |                  |
|           | 500 K               | 5/5       |                  |
|           | 250 K               | 5/5       |                  |
|           | 125 K               | 3/3       | 0.004%           |
|           | 62.5 K              | 3/3       |                  |
|           | 31.3 K              | 2/2       |                  |
|           | 15.6 K              | 1/1       |                  |