



Organic Food in Public Catering: How the Danish Organic Cuisine Label May Maintain Organic Food Production in the Longer Term

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Organic food in public catering: How the Danish Organic Cuisine Label may maintain organic food production in the longer term

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1 **Organic food in public catering: How the Danish Organic Cuisine**

2 **Label may maintain organic food production in the longer term**

3 The aim of this mixed-method longitudinal study was to explore the role the
4 Danish Organic Cuisine Label plays in maintaining organic food production in
5 public catering. Baseline, end-point and 1-year-follow-up were compared among
6 622 kitchens participating in organic conversion projects. Numbers of certified
7 kitchens increased from baseline to end-point ($p<0.001$). This level was
8 maintained at follow-up. Further, certified kitchens were found to increase their
9 use of organic food at 1-year follow-up ($p=0.012$) whereas non-certified kitchens
10 did not. The study identified motives and barriers behind acquiring the label. In
11 conclusion, the Organic Cuisine Label contributed to maintaining organic food
12 productions.

13 Keywords: Organic food conversion; public procurement; Organic Cuisine Label

14 Running head: The Danish Organic Cuisine Label in public catering

15 **Introduction**

16 Organic procurement in public kitchens has a long history over several decades of
17 implementation and development in Denmark, and public awareness of this area has
18 been increasing over time (ICROFS, 2015). More recently, the Danish Organic Action
19 Plan 2020 was launched in 2012, and updated in 2015, to establish political support for
20 organic food conversion projects targeting public kitchen workers (Ministry of
21 Environment and Food of Denmark, 2015). Organic food conversion projects have been
22 described as educational programs with several steps, in which kitchen workers learn
23 strategies to increase the share of organic food purchased within the existing food
24 budget despite the additional cost of organic food products (Thorsen & Jensen, 2016;
25 Mikkelsen & Sylvest, 2012). Besides buying organic food, these strategies include
26 using more fruit and vegetables, limiting meat consumption, using less processed food
27 products, buying local and seasonal food products and reducing food waste (Sørensen et

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3 28 al., 2015).

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6 29 Evidence on the effects of organic food conversion in public kitchens includes
7
8 30 indications of food waste reductions (Thorsen, Sabinsky & Trolle 2014), a healthier
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10 31 meal composition in favour of plant-based foods and a dietary pattern more in line with
11
12 32 food-based dietary recommendations (Mikkelsen et al., 2006; Denver & Christensen
13
14 33 2015). These results are in agreement with recent findings from a longitudinal study on
15
16 34 the effects of organic food conversion projects, reporting an emphasis on kitchen
17
18 35 worker training in nutrition guideline application (Sørensen et al., 2016a). Regarding
19
20 36 kitchen worker physical and psychological well-being during an organic food
21
22 37 conversion, no significant negative effects on wellbeing have been found, but rather
23
24 38 positive changes were identified in how kitchen workers perceived food quality and
25
26 39 their motivation for work (Sørensen et al., 2016b).

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29
30 40 The longitudinal study on the effects of organic food conversion projects reported a
31
32 41 significant increase in organic food percentages among 622 Danish public kitchens with
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34 42 a difference of 24 percentage points over 1.5 years (Sørensen et al., 2016a). The
35
36 43 measurement method used was the Organic Cuisine Label method, which was
37
38 44 developed by the Danish Veterinary and Food Administration in 2009 for official
39
40 45 organic procurement registrations (Danish Veterinary and Food Administration, 2014).
41
42 46 This method is based on procurement invoices and has been found to result in valid
43
44 47 measurements. Organic procurement levels are divided into four percentage intervals: 0-
45
46 48 30% (no label), 30%-60% (bronze label), 60%-90% (silver label) and 90%-100% (gold
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48 49 label) (Sørensen et al., 2015; Danish Veterinary and Food Administration, 2014).
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53 50 **The Organic Cuisine Label is a scheme managed and controlled by the Danish**
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55 51 **Veterinary and Food Administration with relevance to all public and private large-scale**
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3 52 kitchens and institutions as well as restaurants in Denmark. The label scheme was
4
5 53 developed as part of a governmental initiative to promote organic production and
6
7 54 consumption on market-driven conditions, as well as in response to the growing need
8
9 55 for consumer-oriented documentation of organic food production experienced by large-
10
11 56 scale food establishments (Hillgrén et al., 2016; Kortesoja et al., 2018). The Organic
12
13 57 Cuisine Label can be awarded to caterers applying for it, if they are able to document
14
15 58 calculations of an organic food percentage within one of the three percentage intervals
16
17 59 using invoices from suppliers. This organic food percentage level will then be
18
19 60 monitored through annual inspections and audits of purchase records by the Danish
20
21 61 Veterinary and Food Administration (Danish Veterinary and Food Administration,
22
23 62 2014). The Organic Cuisine Label as a scheme has received attention internationally in
24
25 63 terms of sustainable food systems and consumer information, and has recently been
26
27 64 implemented in Norway and Germany by the private certification schemes Debio and
28
29 65 Bioland, respectively (Hillgrén et al., 2016; Kortesoja et al., 2018; Matvalget, 2017;
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31 66 Danish Veterinary and Food Administration, 2018).

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36 67 In Norway, “Valørmerkerne” was implemented by the advisory service called
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38 68 “Matvalget” in 2013, but differs from the Organic Cuisine Label by including food
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40 69 markets in their target group and by requiring a minimum of 15% organic food
41
42 70 production or turnover regarding food markets (Debio, 2017). The German labels
43
44 71 recently implemented by Bioland are similar to the Organic Cuisine Labels in terms of
45
46 72 percentage intervals but unlike the Danish labels, the eligibility of the Bioland labels is
47
48 73 based on a point-system. For public kitchens to achieve a Bioland label, they have to
49
50 74 collect points and the more Bioland products of local origin a kitchen includes, the more
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52 75 points they receive (Bioland, 2017; Organic-market.info, 2018). Both the Norwegian
53
54 76 and German labels are fairly new compared with the Organic Cuisine Labels, thus no
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3 77 reports are available their acceptance or influence. Other European countries have also
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5 78 shown interest in implementing the Organic Cuisine Labels, including France and
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7 79 Estonia, but so far, measured effects of organic label schemes outside of Denmark
8
9 80 remain to be seen (Danish Veterinary and Food Administration, 2018).

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11
12 81 Implementing the Organic Cuisine Labels in public kitchens during organic food
13
14 82 conversion projects has been suggested to anchor and motivate further organic food
15
16 83 production (Sørensen et al., 2016a; NIRAS, 2014). However, there is currently no
17
18 84 research supporting this argument because the one existing longitudinal study on the
19
20 85 effects of organic food conversion projects did not include measurements taken beyond
21
22 86 1.5 years among the 622 participating kitchens. Hence, the sustainability of the organic
23
24 87 conversion projects in public kitchens and the suggested anchoring and motivational
25
26 88 effects of applying the Organic Cuisine Label are still unknown.

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30 89 The objectives of this study are therefore to explore official Organic Cuisine Label
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32 90 certifications among 622 public kitchens that participated in the Danish Organic Action
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34 91 Plan 2020 from 2013 to 2015, and to measure the effectiveness of the Organic Cuisine
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36 92 Label certifications on the kitchens' ability to maintain organic food production in the
37
38 93 longer term. A further objective is to investigate public kitchen workers' motives behind
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40 94 either acquiring the Organic Cuisine Label or not.

45 **Methods**

46 47 48 96 *Study design and data collection*

49
50 97 This longitudinal study applied a mixed-method research design with both qualitative
51
52 98 and quantitative data collection methods within a study population of 622 public
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54 99 kitchens that completed organic food conversion from 2013 to 2015. The kitchens

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3 100 represent eight different kitchen types according to the classifications by the Danish
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5 101 Diet and Nutrition Association: childcare, school, afterschool, canteen, elderly, hospital,
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7 102 central kitchen or residential institution (Sørensen et al., 2016a; Christiansen & El-
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9 103 Salanti 2000). Results on distribution of public kitchen types and specific organic food
10
11 104 percentages in the public kitchens in 2015 have been published previously (Sørensen et
12
13 105 al., 2016a).

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16 106 Data collection was conducted during two stages. The first stage included collecting
17
18 107 official certifications of the Organic Cuisine Label among all 622 public kitchens
19
20 108 participating in the Danish Organic Action Plan 2020 from 2013 (baseline) to 2015
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22 109 (end-point), and again in 2016 (1-year follow-up). The second stage involved
23
24 110 representative samples of Organic Cuisine Label certified kitchens in one group and
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26 111 non-certified kitchens in another group, two subsamples selected from the total of 622
27
28 112 kitchens for a semi-structured telephone interview in 2016. The purpose was to gather
29
30 113 self-reported data on the actual use of organic procurement as well as qualitative data on
31
32 114 the motives behind Organic Cuisine Label certifications and future expectations towards
33
34 115 organic procurement. First, a total of 76 public kitchens not certified with the Organic
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36 116 Cuisine Label were selected to represent different kitchen conversion projects, kitchen
37
38 117 types and organic procurement levels at endpoint measurements in 2015. A total of 14
39
40 118 of the selected kitchens were excluded due to the fact that they had closed, had merged
41
42 119 with another kitchen or did not wish to participate, which left a total of 62 participants
43
44 120 to be interviewed. Subsequently, 72 public kitchen certified with the Organic Cuisine
45
46 121 Label were selected to match the non-certified group according to the same selection
47
48 122 criteria listed above, of which a total of 60 could be included in the study. The
49
50 123 combined number of public kitchens participating in the telephone interview survey was
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52 124 122.

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3 125 The study was performed in accordance with the ethical standards of the Helsinki
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5 126 Declaration of 1964, as revised in 2013 (World Medical Association, 1974).
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8 127 ***Certification with the Organic Cuisine Label***

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11 128 The development of official Organic Cuisine Label certifications among all the 622
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13 129 participating public kitchens was tracked using data from the Danish Veterinary and
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15 130 Food Administration official certification site (Danish Veterinary and Food
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17 131 Administration, 2009) and verified through personal contact with the official
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19 132 certification office. Official certifications were obtained at three points in time: at the
20
21 133 beginning of the conversion project period (baseline), at the end of the conversion
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23 134 period (end-point) and again at 1-year follow-up. The 622 public kitchens were grouped
24
25 135 into four categories in accordance with the relevant percentage intervals for the Organic
26
27 136 Cuisine Label for each measurement point: 1) non-certified and certified kitchens with
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29 137 the following levels 2) gold, 3) silver or 4) bronze.
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34 138 ***Motives behind acquiring the Organic Cuisine Label***

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36 139 Two of the authors interviewed the kitchen managers of the selected public kitchens by
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38 140 telephone using a semi-structured interview guide. Two slightly different interview
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40 141 guides were developed to target either public kitchens certified or not certified with the
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42 142 Organic Cuisine Label. This was done in an effort to allow for potential different
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44 143 reasoning behind acquiring or not acquiring the label, resulting in variations in the
45
46 144 interview guides and the following coding. Each telephone interview lasted for
47
48 145 approximately 10 to 15 minutes and addressed three main themes: 1) Current organic
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50 146 food procurement and recent developments, 2) Future ambitions for organic food
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52 147 production, 3) Organic Cuisine Label and future development.
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3 148 Notes were taken during the interviews and the responses were coded afterwards by one
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5 149 of the authors using Template Analysis in Nvivo version 10. Coding of the interviews
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7 150 and the comparative analyses were conducted separately for each group. Interview
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9 151 codes were initially generated based on the interview guides and later elaborated upon
10
11 152 following data examination as listed in Table 1, where codes from both interview guides
12
13 153 have been included and where the word “reasons” has been used to cover
14
15 154 motives/barriers.

155 ***Organic food production in the longer term***

156 Self-reported organic food percentages from the non-certified public kitchen sample
157 (n=62) and the certified public kitchen sample (n=60) were combined with previously
158 published data to calculate potential differences in actual organic procurement between
159 end-point measurements and 1-year follow-up (Sørensen et al., 2016a). Potential
160 differences in organic food percentages were calculated within each group.

161 ***Statistical analysis***

162 Non-parametric statistical significance testing of potential differences in specific
163 organic food percentages within the public kitchen samples was made using Wilcoxon
164 signed rank test (paired) along with 1st and 3rd quartiles, as data could not be considered
165 normally distributed. Comparisons were made using chi-squared testing where data
166 were proportions.

167 Statistical analyses were performed using RStudio statistical software package version
168 0.98.1103 (R Inc., Boston, Massachusetts, USA).

169 **Results**

170 *Development over time*

171 Official certifications of the Organic Cuisine Label among the 622 public kitchens
172 participating in the Danish Organic Action Plan 2020 from baseline to end-point and at
173 1-year follow-up according to the four categories are illustrated in Figure 1. Overall,
174 553 (89%) of the 622 public kitchens were not certified with any of the three labels at
175 baseline. This number had decreased to 279 (45%) by end-point measurements and at 1-
176 year follow-up, 240 (39%) of the public kitchens were not certified with an Organic
177 Cuisine Label. Bronze label certifications increased from 18 (3%) at baseline to 102
178 (17%) at end-point, and remained essentially unchanged at 100 (16%) at 1-year follow-
179 up. Silver label certifications among the 622 public kitchens increased from 38 (6%) at
180 baseline to 183 (29%) at end-point and finally to 221 (35%) at 1-year follow-up.
181 Similarly, gold label certifications increased from 13 (2%) at baseline to 58 (9%) at end-
182 point and reached 61 (10%) at 1-year follow-up (Figure 1). The differences in
183 proportions of Organic Cuisine Label certifications within the four categories from
184 baseline to end-point were significant at $p < 0.001$, but the differences in proportions
185 from endpoint to 1-year follow-up were not (Figure 1).

186 *Organic food production in the longer term*

187 Results of median (interquartile range) organic food percentages among the selected
188 subsamples of interviewed public kitchens from end-point measurements were 64 (55-
189 77) among the public kitchens certified with the Organic Cuisine Label and 55 (42-65)
190 among the public kitchens not certified.

191 The change in organic food percentages from endpoint to 1-year follow-up in the

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3 192 sample of public kitchens (n=60) certified with Organic Cuisine Label was significant at
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5 193 $p=0.012$, with an increase from a median (interquartile range) of 64 (55-77) to 68 (53-
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7 194 84) (Table 2). Oppositely, the median (interquartile range) organic food percentages in
8
9 195 the sample of public kitchens (n=62) not certified with Organic Cuisine Label decreased
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11 196 non-significantly from 55 (42-65) at end-point to 54 (32-76) at 1-year follow-up (Table
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13 197 2).

17 198 *Motives behind acquiring the Organic Cuisine Label*

19 199 The interviews of public kitchen workers from the subsample of public kitchens not
20
21 200 certified with the Organic Cuisine Label (n=62) and from the sample of certified public
22
23 201 kitchens (n=60) uncovered different perceptions of the label. The overall motive behind
24
25 202 acquiring the Organic Cuisine Label expressed by the majority of respondents from the
26
27 203 sample of public kitchens certified with the label focused on kitchen workers' own
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29 204 motivation for obtaining the label. As one kitchen worker elaborated, the Organic
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31 205 Cuisine Label could be considered as the reward kitchen workers receive in return for
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33 206 all of their efforts. Several respondents also mentioned the marketing value of the label,
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35 207 representing a quality mark for the public. This motive was closely followed by requests
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37 208 at the municipal level, where municipalities asked for the implementation of the label.

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39 209 Regarding the sample of public kitchens not certified with the Organic Cuisine Label,
40
41 210 four out of five reported a current organic food percentage of 30% or above and these
42
43 211 kitchens would therefore have been eligible for one of the three labels. The two main
44
45 212 barriers to acquiring an Organic Cuisine Label expressed by the majority of respondents
46
47 213 within this sample were lack of time and the burden of documentation. Most kitchen
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49 214 workers wanted to comply with the documentation requirements of the Organic Cuisine
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51 215 Label but could not find time because of staff shortages and economic supervision of
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3 216 the institutional management or the municipality. A kitchen worker in a childcare
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5 217 institution clarified that she would rather spend the extra time with the children than
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7 218 performing additional administrative work behind a computer.
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10 219 During the interview, some respondents in the non-certified sample also introduced a
11
12 220 shared perception within the public kitchen network in terms of more frequent and
13
14 221 stricter control visits by the Danish Veterinary and Food Administration as a
15
16 222 consequence of acquiring one of the Organic Cuisine Labels, which prevented them
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18 223 from applying for the label. The same perception was identified among respondents
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20 224 from the sample of public kitchens certified with the Organic Cuisine Label, where
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22 225 some respondents reported acquiring a bronze or silver label rather than gold to
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24 226 minimise the extent of inspections despite gold label eligibility within the public
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26 227 kitchen.
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31 228 *Future expectations for organic food production*

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33 229 When asked about their future expectations for organic food production in the public
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35 230 kitchen, the vast majority of respondents from both public kitchen samples stated
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37 231 intentions of maintaining the current level of organic procurement. The main barriers
38
39 232 identified preventing a further increase in the organic food percentage included
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41 233 economic restrictions, lack of time to explore new organic alternatives and organic food
42
43 234 quality limitations. One kitchen worker explained that she would rather support Danish
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45 235 conventional food production than ordering organic products from the other side of the
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47 236 world. Several kitchen workers addressed the problems with documenting organic food
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49 237 procurement from local farmers or from the institution's own organic vegetable garden.
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54 238 Respondents who expressed intentions of increasing the organic food percentage in the
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56 239 future primarily mentioned municipality requests of a higher level in the future and
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3 240 kitchen workers' own motivation for acquiring the Organic Cuisine Label as the two
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5 241 main underlying motives.
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8 242 ***Future expectations for the Organic Cuisine Label***
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11 243 In terms of future ambitions toward the Organic Cuisine Label among the certified
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13 244 public kitchen sample, a few kitchens reported plans to withdraw from the certification
14
15 245 due to missing assistance from suppliers in relation to organic food percentage
16
17 246 calculations. However, the vast majority planned to maintain their current certification.
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19 247 Among the non-certified public kitchens sample, around one-fifth expressed plans to
20
21 248 acquire the label, where the majority of the respondents dismissed plans of obtaining
22
23 249 any of the three categories of label. The main reasons stated behind this were time
24
25 250 restrictions, problems with fulfilling the perceived documentation and calculation
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27 251 requirements related to the label, along with the lack of knowledge about these
28
29 252 requirements. A few respondents also highlighted problems regarding the values
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31 253 connected to the label with one kitchen worker explaining that the organic food
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33 254 percentage in her public kitchen would be eligible for a gold label but acquiring it might
34
35 255 be considered boasting within the community.
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40 256 Regarding public kitchens from both sample sets planning to maintain or apply for one
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42 257 of the three Organic Cuisine Labels in the future, more than one-third mentioned
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44 258 positive values related to the label to explain these plans. Several respondents expressed
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46 259 views of the label such as high food quality, views which would then also be transferred
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48 260 to the public kitchen and the institution. But also potential future guidelines by the
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50 261 municipality seemed to influence the kitchen workers' plans. A kitchen worker
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52 262 specifically said that she knew of future municipality guidelines for the label and did
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54 263 not want to apply for the label before the municipality would demand it.
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3 264 **Discussion**
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5 265 By tracking official Organic Cuisine Label certifications among the 622 public kitchens
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7 266 that participated in the Danish Organic Action Plan 2020 from 2013 to 2015, results
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9 267 from this mixed-method study show an increased number of certifications from baseline
10
11 268 to end-point ($p < 0.001$). This level was sustained at the 1-year follow-up. Regarding the
12
13 269 longer term effect on the actual use of organic food, a small but significant increase
14
15 270 ($p = 0.012$) in the median organic food percentage was identified among a subgroup of
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17 271 public kitchens certified with the Organic Cuisine Label between end-point and 1-year
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19 272 follow-up, unlike public kitchens not certified with the label.
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23 273 Overall, the results illustrate a trend of increasing numbers of public kitchens acquiring
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25 274 one of the three Organic Cuisine Labels and further, certified public kitchens also wish
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27 275 to acquire higher labels over time. The results on the actual use of organic food also
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29 276 suggest that public kitchens certified with one of the three Organic Cuisine Labels are
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31 277 more likely to maintain or increase their level of organic procurement in the longer term
32
33 278 compared with public kitchens not certified with the label. However, when interpreting
34
35 279 these results, it is important to note that the median organic procurement levels
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37 280 measured at end-point within the two public kitchen samples are quite similar and both
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39 281 are above 50%. Also, according to self-reported organic food percentages for the 1-year
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41 282 follow-up measurements, more than four out of five of the non-certified public kitchens
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43 283 could be eligible for one of the three Organic Cuisine Labels, illustrating how the use of
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45 284 organic food has been largely sustained, also among kitchens not certified with the
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47 285 Organic Cuisine label.
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52 286 From the interviews, it seems clear that public kitchens are placed within social
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54 287 structures, in which resource allocations for food production are vulnerable to changes
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3 288 at several levels such as political decisions at municipal level, wishes by parents and
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5 289 other citizens outside the institution, food supply challenges or reorganisations within
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7 290 the institution. Foreseeable changes such as budget reductions or municipal requests for
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9 291 label certification levels are therefore likely to influence kitchen workers' future
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11 292 expectations for the organic food production and label certification whether they are
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13 293 currently certified or not. However, when comparing the two samples, the certified
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15 294 public kitchens expressed stronger views of maintaining their organic food procurement
16
17 295 in order to keep their label regardless of future changes, and may therefore have a more
18
19 296 stable organic procurement compared with non-certified kitchens. The very few
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21 297 certified public kitchens mentioning a potential withdrawal from the label scheme in the
22
23 298 future point to a lack of assistance from food suppliers in calculating the organic food
24
25 299 percentage as an explanation for this development.

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29 300 The main motives expressed behind acquiring one of the Organic Cuisine Label relate
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31 301 to kitchen workers' own motivation and requests by the municipality, where the main
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33 302 barriers include time restrictions, heavy documentation requirements and lack of
34
35 303 knowledge about the Organic Cuisine Label. The majority of respondents from both
36
37 304 samples seem to express willingness towards the label but they seem to differ in how
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39 305 they perceive the workload related to obtaining and maintaining the label. One
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41 306 interpretation might be that the non-certified public kitchens lack knowledge on the
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43 307 details of earning the label and therefore have a tendency to perceive the certification
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45 308 process as too time and resource demanding.

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49 309 Another interpretation involves potential differences in experience with organic food
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51 310 production between the two samples. Expressed views from respondents in both groups
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53 311 indicate that more certified public kitchens had been using organic food before the
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3 312 Organic Cuisine Label had been introduced compared with the non-certified public
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5 313 kitchens. This additional experience with organic food production may have enabled
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7 314 these kitchens to manage organic food production alongside documentation
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9 315 requirements better. An overall finding from the interviews also relate to the quite
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11 316 different interpretations conveyed by the kitchen workers in terms of the values
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13 317 connected to the Organic Cuisine Labels. Where positive associations regarding
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15 318 signalling the level of food quality and awareness seemed to be agreed upon by the
16
17 319 majority, a few respondents also mentioned 'boasting' in a negative way to describe the
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19 320 label and others specified local and seasonal food products to be of top priority over the
20
21 321 label and organic food. These views seem to support the need for improved cooperation
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23 322 with food suppliers and information targeting kitchen workers to address the problems
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25 323 faced by many non-certified public kitchens, and thereby to achieve the full potential of
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27 324 the label.
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32 325 Previous research in this area is sparse, but one qualitative study on motives towards
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34 326 organic procurement, including interviews with public kitchen workers from 10
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36 327 different kitchens, also found motives such as kitchen workers' own motivation and
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38 328 political agendas to be important (NIRAS, 2014). This study did not focus on motives
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40 329 behind acquiring the Organic Cuisine Label, but comments from the respondents also
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42 330 compared the label to an award, which is similar to the results from the present study.
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44 331 The previous qualitative study also highlighted the importance of food supplier
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46 332 cooperation and active knowledge sharing about the Organic Cuisine Label to ensure
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48 333 successful implementation of organic procurement, which also relates to the concerns
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50 334 expressed here. Another quantitative study that used an online questionnaire included
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52 335 more than 1000 respondents, which were representative of the Danish population based
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54 336 on gender, age, geography and education, to research population awareness of the
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3 337 Organic Cuisine Label (Mørk, Tsalis & Grunert, 2014). The study found overall little
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5 338 awareness of the labels with around 60% of the respondents having never seen the
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7 339 Organic Cuisine Labels before (Mørk, Tsalis & Grunert, 2014). Both of these findings
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9 340 call for more information about the labels and the application process targeting public
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11 341 kitchen workers.

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14 342 Regarding the initiatives to improve cooperation between food suppliers and public
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16 343 kitchens, a project on smart procurement has been implemented from 2013 to 2016
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18 344 (Madkulturen, 2016). The aim of the project has been to provide guidance, counselling,
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20 345 tools and case-stories to inspire and promote organic and local food products, targeting
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22 346 all actors within public procurement including politicians, municipalities, kitchens,
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24 347 suppliers and producers (Pedersen & Jensen, 2016). A qualitative interview study
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26 348 among nine municipal representatives of public procurement evaluated the experienced
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28 349 user satisfaction with the project and found overall support and an ongoing need for it,
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30 350 but also identified barriers to organic and local procurement in terms of political support
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32 351 at higher levels (Pedersen & Jensen, 2016). In light of the findings from the present
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34 352 study, it may be relevant to recommend implementing renewed efforts in line with this
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36 353 project to ensure wide collaboration across all stakeholders involved in public
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38 354 procurement. This might also enable more efficient and transparent strategies for
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40 355 documenting the level of organic procurement for the Organic Cuisine Label by
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42 356 dividing the specific calculation responsibilities between the stakeholders where
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44 357 appropriate. However, it will be important to ensure that any potential future
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46 358 improvements to the current official documentation and certification process will not
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48 359 carry negative consequences to the label credibility. The Organic Cuisine Label is
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50 360 closely related to the Danish 'Red Ø' which is one of the most recognisable and credible
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52 361 labels in Denmark according to Danish consumers (Danish Competition and Consumer
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3 362 Authority, 2013; Danish Agricultural and Food Council, 2017), a status worth guarding.
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6 363 A limitation of the study includes the reporting of the level of organic food percentages
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8 364 collected at the 1-year follow-up, due to the fact that is is based on self-reported
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10 365 information, opening up for potential recall bias especially among the non-certified
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12 366 kitchens. A previous study has shown how self-reported estimations of the organic food
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14 367 percentage by public kitchens who do not apply the calculation method behind the
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16 368 Organic Cuisine Label tend to be overestimated (Sørensen et al., 2015). Certified public
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18 369 kitchens may also have an easier time recalling their exact current organic food
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20 370 percentage compared with non-certified public kitchens due to the calculation sheet
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22 371 exercises they complete on a regular basis to fulfil Organic Cuisine Label requirements.
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24 372 The difference in organic food percentages between the two groups (i.e. certified and
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26 373 non-certified) might therefore have been higher than indicated by the present study. In
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28 374 addition, control kitchens that did not participate in the Danish Organic Action Plan
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30 375 2020 were not included, which limits the possibility to infer causality regarding the
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32 376 effect of the Organic Cuisine Label on organic procurement in the longer term. In
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34 377 relation to the semi-structured interviews, it would have been ideal to include all 622
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36 378 public kitchens in order to collect indications of the specific organic food percentage
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38 379 within each kitchen.
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43 380 With that said, the population sample included for the quantitative analysis was 622
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45 381 public kitchens and 122 for qualitative analysis, which can be considered a sufficient
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47 382 sample size to explore motives and barriers behind acquiring the Organic Cuisine Label.
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49 383 Further, a strength of the study relates to the matching procedure conducted for the
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51 384 sample selection of the qualitative analysis, which was introduced in an effort to sample
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53 385 as similar populations as possible for the two groups. The overall design, including both
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3 386 quantitative and qualitative methods, is in addition a strength of the study. The
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5 387 quantitative evaluation uncovered a trend in Organic Cuisine Label development and
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7 388 important results on longer term effects on specific organic food percentages, where the
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9 389 qualitative analysis revealed equally important motives and barriers behind the use of
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11 390 the label. These motives and barriers will be central to address in future initiatives
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13 391 aiming to promote further label certifications by all stakeholders involved in
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15 392 procurement.

19 393 **Conclusion**

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22 394 To conclude, the present study found an increased number of certifications with the
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24 395 Organic Cuisine Label among the total 622 public kitchens from baseline to end-point
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26 396 ($p < 0.001$) and this level was sustained at 1-year follow-up. A significant increase in
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28 397 median organic food percentages was found in the certified public kitchen sample
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30 398 ($n=60$), but a small non-significant decrease ($p=0.053$) was found in the sample of non-
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32 399 certified public kitchens ($n=62$) at the 1-year follow-up. Hence, the results indicate a
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34 400 longer term effect of the Organic Cuisine Label in terms of contributing to a maintained
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36 401 or increased organic food percentage within the public kitchens. Regarding motives
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38 402 behind acquiring the Organic Cuisine Label, kitchen workers' own motivation and
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40 403 requests by the municipality were expressed by the majority of the respondents, where
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42 404 common barriers were time and resource restrictions along with laborious label
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44 405 documentation requirements. Central recommendations for future initiatives promoting
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46 406 further certification of the Organic Cuisine Label are therefore to provide more
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48 407 information about the label and application process, facilitating stronger collaboration
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50 408 with food suppliers and adjusting documentation requirements to minimise the effort
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52 409 where possible.

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5 411 Please see separate file for tables and figure.
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For Peer Review Only

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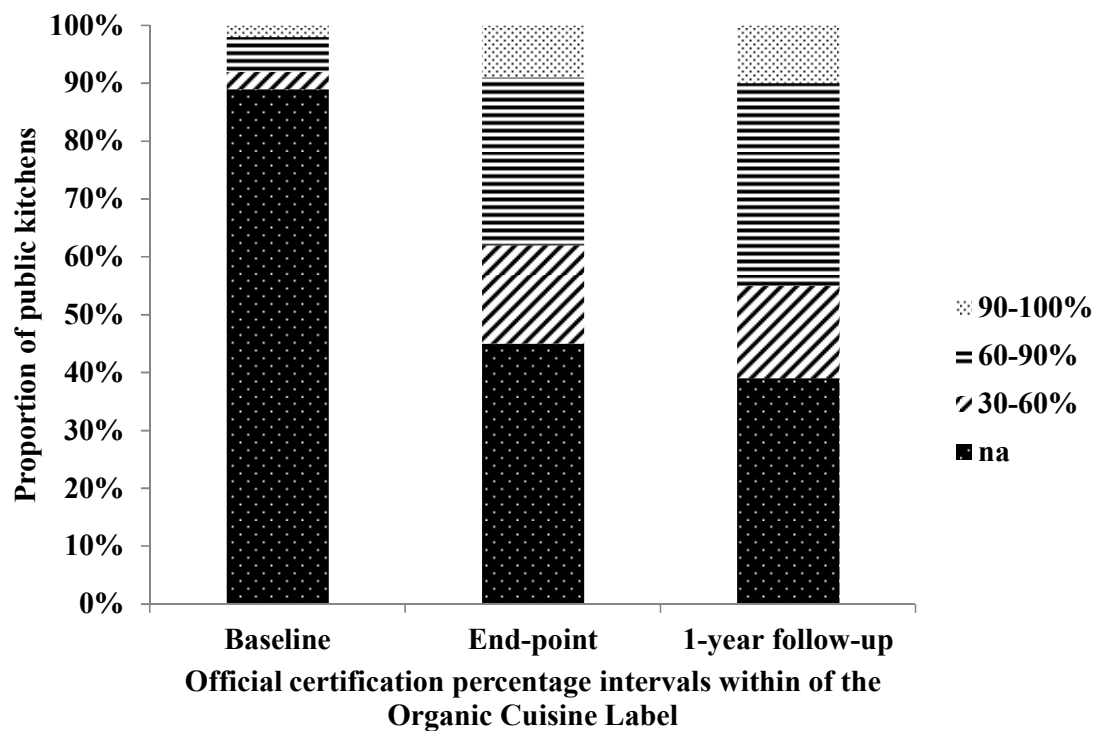


Figure 1. Official Organic Cuisine Label certifications in public kitchens from the Danish Organic Action Plan 2020 measured at baseline, end-point and 1-year follow-up (n=622)

*Chi-squared significance test of proportions between measurements at baseline and end-point: $p < 0.001$

*Chi-squared significance test of proportions between measurements at end-point and 1-year follow-up: $p = 0.549$

Table 1. Telephone interview coding of interviews among selected subsamples of public kitchens certified and not certified with the Organic Cuisine Label

Level 1	Level 2	Level 3
(1) Current organic food procurement and recent developments	<p>(1.1) Primary reasons for increase in organic food procurement</p> <p>(1.2) Primary reasons for decrease in organic food procurement</p>	<p>(1.1.1) Request from the municipality</p> <p>(1.1.2) Kitchen workers' own motivation</p> <p>(1.1.3) Request from institution or others outside the institution</p> <p>(1.1.4) Kitchen network</p> <p>(1.1.5) Organic Cuisine Label</p> <p>(1.2.1) Kitchen workers lack of motivation</p> <p>(1.2.2) Not requested from institution or others outside the institution</p> <p>(1.2.3) Organic Cuisine Label</p>
(2) Future ambitions for organic food production	<p>(2.1) More organic food</p> <p>(2.2) No change</p> <p>(2.3) Less organic food</p>	<p>(2.1.1) Request from the municipality</p> <p>(2.1.2) Aim at higher label</p> <p>(2.2.1) Financial situation</p> <p>(2.2.2) Supply of organic products</p> <p>(2.2.3) No documentation for local organic product</p> <p>(2.3.1) Structural changes</p> <p>(2.3.2) Financial situation</p>
(3) Organic Cuisine Label and future development	<p>(3.1) Primary reasons for acquiring the label</p> <p>(3.2) Primary reasons for not acquiring the label</p> <p>(3.3) Future ambitions for the Organic Cuisine Label</p>	<p>(3.1.1) Request from the municipality</p> <p>(3.1.2) Request from the kitchen workers</p> <p>(3.1.3) Request from institution or others outside the institution</p> <p>(3.2.1) Insufficient organic food procurement</p> <p>(3.2.2) Lack of time to apply</p> <p>(3.2.3) Heavy documentation load</p> <p>(3.2.4) Lack of knowledge about the label</p> <p>(3.3.1) No desire for the label</p> <p>(3.3.2) Keeping the label</p>

Table 2. Changes in reported organic food percentages between end-point measurements and 1-year follow-up in the two interviewed subsamples of public kitchens either certified with the official Organic Cuisine Label (n=60) or not certified with the label (n=62)

Quartiles	End-point ^a		1-year follow-up		Difference		P-value ^b
	Median	(IQR)	Median	(IQR)	Median	(IQR)	
Registered	64	55-77	68	53-84	2	-1-8	0.012
Non-registered	55	42-65	54	32-76	0	-3-12	0.053

^aData obtained from previous certifications published in Sørensen et al. 2016

^bWilcoxon signed rank test, paired (RStudio)