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Abstract

When it comes to making sustainable food purchasing choices, consumers trust on information provided to them by eco-labels. This article studies the labels for fresh produce available to consumers in Flanders (Belgium), concluding that the existing labelling landscape fails at enabling consumers to make adequate decisions for purchasing environmentally sound food. A consumer survey supports the need for additional information on the sustainability of fruits and vegetables. A potential intention-performance gap is found for producers, and in the wider sense, for the entire supply chain. Since current labels found on fresh produce are input or practice based labels, farmers adhering to those labels can be considered as having the intention to produce sustainably. However, this intention alone cannot guarantee good environmental performance. In order to close the potential intention-performance gap for the supply chain and provide more adequate information to consumers, we conclude that performance-based labels, covering the entire food chain of fresh produce, using the life cycle assessment approach (LCA) and including situational parameters such as time of consumption, origin and production and distribution mode, are indispensable.

Keywords: Eco-labels; Food labeling; Consumer information; Environmental performance; Sustainability

1 Introduction

Many authors stress the importance of providing consumers with adequate information on the various dimensions of food production, consumption and distribution in order to allow them to make informed food choices in line with their values and preferences (Hepting et al., 2013; Rousseau and Vranken, 2013; Vermeir and Verbeke, 2006; Vlaeminck et al., 2014). There are over 450 eco-labels worldwide (Ecolabelindex, 2014), and several studies and surveys point at the confusion among consumers about the given information (Engels et al., 2010; Hanss and Böhm, 2012; Röös and Tjärnemo, 2011; Which, 2010).

Using the region of Flanders (Belgium) as a case study, this paper assesses the current labels on environmental friendliness of fresh produce available to consumers. We examine the information provided by eco-labels, and conduct a survey focusing on environmental information provision for fresh produce. Using this case study as a starting point, we suggest a new approach for eco-labels for fruits and vegetables, applicable beyond the local context. We propose to introduce performance-based labels covering the entire food chain and including situational parameters such as time of consumption, origin and production and distribution.

2 Materials and Methods

In order to assess the existing eco-labelling landscape, we deal with the following research (sub)questions:

1. What do the existing labels refer to regarding the environmental friendliness of fresh produce?
    a. Do the labels refer to a horticultural production mode which involves environmental requirements beyond conventional practice?
    b. If yes, is it easy to deduce from the label if (and which) additional environmental requirements were taken into account during cultivation of the food?
    c. Which part of the agri-food chain is covered by the labels?
    d. To what extent do the labels take into account impacts and outcomes?
2. Do consumers express the need for more information on the environmental impact of fruits and vegetables?
3. How to improve environmental information provision on fresh produce to consumers?

The first two research questions will be addressed by our case study on fresh produce available to consumers in Flanders (Belgium), using the methodology outlined here below. For the last question, we will make use of our findings for the case-study to provide concrete recommendations for the way forward. We hereby note that “fruits and vegetables” and “fresh produce” are used interchangeably in the text.

2.1 Label assessment method

The selection of labels for fresh produce assessed within the context of this article, is based on the online database of product labels found on www.labelinfo.be, an initiative from “Netwerk Bewust Verbruiken vzw” (“Network for conscious consumption”), in cooperation with “Ecoconso”, supported by the Belgian federal government. The assessment includes the following labels for (imported) fresh produce available to Flemish consumers: EU organic farming (EU), Biogarantie (BE), EKO (NL), Demeter (DE/NL), Milieukeur (NL), AB (FR), Bio-Siegel (DE),

Naturland (DE), Bioland (DE), Soil Association Organic Standard (UK), Fairtrade Belgium (BE), Rainforest Alliance Certified (global), Flandria, integrating Responsibly Fresh (BE), PDO - Protected Designation of Origin (EU), PGI - Protected Geographical Indication (EU) and "Streekproducten" (regional products, BE). A desktop analysis was performed, using the websites of the various labels in order to find more information on the labelling standards and criteria. An overview of the online sources can be found in the References section.

2.2 Survey method

2.2.1 Research approach and sampling

In April 2014, a web-based survey entitled "To what extent can the consumer make a sustainable food choice?" was conducted in Leuven, Belgium. Invitations to (anonymously) fill in the survey were sent to both students and staff of KU Leuven University (Faculty of Bioscience engineering) and to acquaintances, resulting in 553 duly completed questionnaires. The convenience sampling technique - an inexpensive and time-efficient means – was applied (Guerrero et al., 2010) to find out if the need for more information on the environmental impact of products, as referred to in the introductory section, is applicable to the specific case of fruits and vegetables as well. The socio-demographics characteristics of the participants to the survey (Table 1) show a high share of females, of 18-25 year old participants, of students and employed people, of participants engaged in grocery shopping, and of participants with a self-reported "comfortable" income. As can be expected, our convenience sampling method leads to a different age and gender profile in comparison with the Flemish population (see Section A.1 of the supplementary materials).

102 **Table 1: Socio-demographic characteristics of the sample (n = 553)**

Characteristic		n	% of total
Age group	18-25	284	51.4
	26-35	71	12.8
	36-45	49	8.9
	46-55	88	15.9
	55-65	33	6.0
	66+	28	5.1
Gender	Male	179	32.4
	Female	374	67.6
Household situation	Student living in student house/dormitory/hall of residence	201	36.3
	Commuting student/living with parents	56	10.1
	Married/Living together, youngest child under 12	60	10.8
	Married/Living together, youngest child older than 12	74	13.4
	Married/Living together, children no longer living at home	41	7.4
	Married/Living together, without children	58	10.5
	Single without children	35	6.3
	Single with child(ren)	15	2.7
	Other	11	2.0
	No answer	2	0.4
Employment status	Student	260	47.0
	Working	237	42.9
	Unemployed	6	1.1
	Housewife/Househusband	8	1.5
	Retired	33	6.0
	Other	8	1.5
	No answer	1	0.2
Income situation	Very comfortable income	72	13.0
	Comfortable income	296	53.5
	Pay attention	95	17.2
	Difficult	3	0.5
	Not applicable	80	14.5
	No answer	7	1.3
Responsibility for grocery shopping	Yes	217	39.2
	Most of the times	137	24.8
	Sometimes	143	25.9
	No	56	10.1
Eating habits	Vegetarian	28	5.1
	Flexitarian	126	22.8
	Not vegetarian but vegetarian family member	30	5.4
	No vegetarians in family	369	66.7

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2.2.2 Questionnaire

The questionnaire consisted of three parts. In the first part, we examined the extent to which respondents (believe to) consume sustainably. Participants had to self-evaluate the extent to which they make sustainable food choices and were asked how important they value several food attributes when purchasing fruits and vegetables. Additionally, they were questioned on the frequency of and reasons for environmentally friendly purchasing. The second part of the survey focussed on environmental information provision, asking respondents if they receive sufficient information on the sustainability of fruits and vegetables, and if the more sustainable products are sufficiently advertised for. In addition, they were asked where they would like to find environmental information about products. The third and last part of the survey focussed on eco-labels in particular, asking respondents if they pay attention to eco-labels and if the given information through labelling is trustworthy. They were also asked which information the labels refer to. In addition, knowledge of five labels was tested by asking participants if they recognise the logos and know what the labels stand for. For the purpose of this paper, only the most pertinent results will be addressed in the main text. For a broader overview of the questions and detailed answers obtained through this survey, we refer to Part A of the Supplementary Materials.

2.2.3 Data analysis

The survey was conducted using the open source software LimeSurvey, after which the results were analysed using the statistics software JMP Pro 11 (SAS Institute Inc., NC, USA).

3 Results and discussion

3.1 What do the existing labels refer to regarding the environmental friendliness of fresh produce?

3.1.1 Do the labels refer to a horticultural production mode which involves environmental requirements beyond conventional practice?

A great amount of environmental food labelling schemes relates to a specific **production method**. *Integrated Production* (IP) is based on Integrated Pest Management (IPM) and was initially a production mode with environmental requirements beyond conventional farming practices. As of 1 January 2014, IPM has become obligatory following Directive 2009/128/EC on the sustainable use of pesticides (EU, 2009). Consequently, one can no longer distinguish between conventional farming and IP, and this production mode will be referred to as "conventional/IP" for the remainder of this text. *Organic farming systems* strive to respect natural life cycle systems, for example by banning particular plant protection products. The criteria and standards are laid down in European legislation and have subsequently been translated into regional legislation in Flanders. Producers that live up to the obligations from the EU organic farming legislation, may label their products with the EU organic farming label. Additionally, farmers can request certification by national or private organic farming schemes which may include additional requirements to be fulfilled. An overview of relevant legislation for the different production modes applicable in Flanders can be found in Part B of the Supplementary Materials section. In 2012, the market share of organic fresh produce in Belgium was 1.9% of all fresh produce purchases (Verbeke, 2014). Next to production mode, consumers can also find labels focussing on the **social** circumstances under which the food is produced,

148 complementing the environmental requirements contained within the labelling standards. Based
149 on what consumers find on the websites of the labels, they might conclude such labels stand for
150 “environment friendly products”. Well-known examples are Fair Trade and Rainforest Alliance
151 which were found on 46% of the bananas available for sale in the major Belgian supermarkets in
152 2011 (BTC, 2011). Finally, consumers may encounter **origin and quality**-related labels to indicate
153 that products are linked to a given geographical area with certain quality characteristics or
154 produced/processed according to a recognised know-how. As local products are often believed
155 to be more environment-friendly (Van Hauwermeiren et al., 2007), these labels are also included
156 in the scope of this paper. An overview of the labels in question, together with a short
157 description, can be found in Table 2.

158 **Table 2: Overview of relevant labels for fresh produce and their attributes available to consumers in Flanders**

Label	Logo	Short description	Horticultural production mode	Other attributes, relevant for fresh produce, included in the labelling standards
EU organic farming		Mandatory EU label for products produced and labelled as "organic"; can be complemented with a national label. Typical organic farming practices include multi-annual crop rotation, very strict limits on chemical synthetic pesticides and synthetic fertiliser use, use of disease resistant plant species, and prohibited use of GMO (tolerance level: 0.9%). Certification process: separate standard setting body and certification/control organism; external accreditation.	Organic production mode	n.a.
Biogarantie		Indicates organic production following EU regulation. Additionally, only soil-based forcing of chicory allowed, no hydroculture. Moreover, farmers must set up management plans related to nature, transport and energy use, and waste . Certification process: separate standard setting body and certification/control organism; external accreditation.	Organic production mode & beyond	n.a.
EKO		Indicates organic production following EU regulation. Based on all four of the IFOAM pillars (ecology, health, fairness, care)[(a)]. Certification process: owner of the label also in charge of control and certification; external accreditation.	Organic production mode	n.a.
Demeter		Indicates organic production following EU regulation. Additional criteria relate to biodynamic agriculture (e.g. use of biodynamic preparations to enhance soil life, no use of conventional liquid manure, use of compostable cover foil, specific policy concerning residues, …). Certification process: independent control body with external accreditation; certification by Demeter which is only accredited internally, not externally.	Organic production mode & beyond	n.a.

Label	Logo	Short description	Horticultural production mode	Other attributes, relevant for fresh produce, included in the labelling standards
Agriculture Biologique (AB)		Indicates organic production following EU regulation. Certification process: separate standard setting body and certification/control organism; external accreditation.	Organic production	n.a.
Bio-Siegel		Indicates organic production following EU regulation. Certification process: separate standard setting body and certification/control organism; external accreditation.	Organic production	n.a.
Naturland		Indicates organic production following EU regulation. Moreover, stricter requirements: partial conversion not allowed; use of *Leguminosae* required in rotation; stricter fertilisation norms; prohibited use of tropical wood for support in fruit cultivation, ... Certification process: independent control body; certification by Naturland; both externally accredited	Organic production & beyond	n.a.
Bioland		Indicates organic production following EU regulation. Moreover, stricter requirements: partial conversion not allowed; stricter limit for use of copper for plant protection; stricter fertilisation norms, …. Certification process: owner of the label also in charge of control and certification; external accreditation.	Organic production & beyond	n.a.
Soil Association Organic Standard		Indicates organic production following EU regulation. Certification process: owner of the label also in charge of control and certification; external accreditation.	Organic production	n.a.

Label	Logo	Short description	Horticultural production mode	Other attributes, relevant for fresh produce, included in the labelling standards
Milieukeur		Addresses energy and water use, harmful substances, packaging and waste, raw materials, biodiversity, crop protection, minerals/fertilisers, nature and countryside, and working conditions. Possibility to calculate GHG emissions associated with cultivation. Certification process: separate standard setting body and certification/control organism; external accreditation.	Beyond conventional/IP production	Socio-economic
Rainforest Alliance Certified		Uses the Sustainable Agriculture standard based on the 10 Sustainable Agriculture Network principles related to amongst others working conditions, ecosystem conservation, wildlife protection, integrated crop management, soil, water and waste management; does not offer producers minimum/guaranteed price. Certification process: owner of the label not completely independent of the control and certification body; no external accreditation.	Beyond conventional farming [(b)]	Socio-economic
Fairtrade Belgium		Part of the global "Fairtrade International" scheme; works with small scale producer organisations; partnership between producers and traders, businesses and consumers; aims at reducing poverty. Ensures good working conditions and decent wages for farmers; does offer producers minimum/guaranteed price. Requires sustainable farming techniques (a "Prohibited Materials List" was set up); organic products receive higher prices. Certification process: separate standard setting body and certification/control organism; external accreditation.	Beyond conventional farming [(b)]	Socio-economic & fair trade
Flandria, incorporating Responsibly Fresh		Flandria stands for environmentally sound cultivation, quality and freshness, family businesses, and Belgian produce. Requirements relate to cultivation techniques, plant protection products, quality/sorting of fresh produce (e.g. product size, thickness, shape, colour), hygiene and working conditions.	Conventional/IP production	Socio-economic Origin Quality

Label	Logo	Short description	Horticultural production mode	Other attributes, relevant for fresh produce, included in the labelling standards
		Sustainability label "Responsibly Fresh" aims at making progress in terms of prosperity, well-being and the environment ("profit, people, planet"); focus on four themes: low impact, biodiversity, proximity, food thrift. Certification process: separate standard setting body and certification/control organism; external accreditation.		
Protected Designation of Origin (PDO)		Based on EU regulation No 1151/2012 on quality schemes for agricultural products and foodstuffs. Aims at promoting and protecting names of quality agricultural products and foodstuffs that are produced, processed *and* prepared in a given geographical area; quality and characteristics *essentially due* to that area. Certification process: separate standard setting body and certification/control organism; external accreditation.	Conventional/IP production	Origin Quality
Protected Geographical Indication (PGI)		Based on EU regulation No 1151/2012 on quality schemes for agricultural products and foodstuffs. Aims at promoting and protecting names of quality agricultural products and foodstuffs that are produced, processed *or* prepared in a given geographical area; quality and characteristics *attributable* to that area. Certification process: separate standard setting body and certification/control organism; external accreditation.	Conventional/IP production	Origin Quality
"Streekproduct" (= regional product)		Food prepared with regional resources; commonly accepted as traditional and peculiar to the region; artisanal production according to regional traditions; processing in region of origin; long/historically known as regional specialty. Certification process: separate standard setting body and certification/control organism; external accreditation.	Conventional/IP production	Origin Quality

[(a)] *In the standards, we could not find explicit socio-economic criteria as referred to by the IFOAM pillars, hence no listing in the column "other attributes".*

[(b)] *Environmental requirements beyond conventional practices in the countries of production, but not necessarily beyond conventional/IP practices in Flanders.*

Labelling standards are based on mandatory criteria, often complemented with optional criteria, recommendations, guidelines, or commitments (such as sustainability charters or plans). The nine organic farming labels are based on EU legislation for organic farming, containing mandatory environmental criteria. The **EU organic farming, AB standard, EKO**, the **Bio-Siegel** and the **Soil Association Organic Standard** contain no additional environmental criteria on top of the EU legislation on organic farming applicable to the cultivation of fruits and vegetables, while **Biogarantie, Demeter, Naturland** and **Bioland** have laid down additional mandatory criteria. Furthermore, Biogarantie requires farmers and other players along the food chain to sign an ecological sustainability charter with commitments related to more sustainable water and energy use, and waste and nature management; while Demeter provides its farmers with a range of optional criteria and non-compulsory guidelines to help them further develop as a biodynamic farm[1].

The Dutch **Milieukeur** label requires integrated production, and lists optional measures for farmers to apply. Milieukeur works with a bonus-malus system whereby farmers receive penalty points for applying environmentally harmful pesticides which have to be compensated by crop protection measures. In addition, a minimum number of points must be scored on, amongst others, climate, nature and landscape related measures, making Milieukeur going beyond conventional/IP practices.

Both **Fairtrade Belgium** and **Rainforest Alliance Certified** include mandatory environmental and socio-economic criteria. The Fairtrade Belgium standard obliges the small producer organisations to provide training on IPM to their members, but does not require IP. The standards of Rainforest

[1] Biodynamic farming is developed by a group of anthroposophical farmers, following guidelines presented in 1924 by Rudolph Steiner who considered the farm as a living whole, applying a holistic human-nature-universe approach (Lockeretz, 2007).

Alliance Certified are based on different compliance thresholds, leaving a lot of flexibility to the farmers, for example regarding IPM. As such, IP might be applied but is not guaranteed. However, both standards prohibit for example the use of pesticides that are not allowed in the EU, guaranteeing a minimum level of environmental protection as these labels tend to occur on exotic fresh produce originating from countries where the legal framework (or the enforcement procedures) on pesticide use might be less stringent. The labels thus refer to a production mode with more stringent environmental requirements compared to conventional farming practices in these countries but not necessarily compared to conventional/IP practices in Flanders.

Flandria (incorporating **Responsibly Fresh**), the **PDO** and **PGI label**, and "**Streekproduct**" all emphasize quality aspects. Additionally, their standards include requirements related to the locality of resources. Although this surely results in lower transportation distances and thus less "food miles", better environmental performances cannot be guaranteed per se as other factors such as production, transport and distribution modes and practices need to be taken into account as well (Coley et al., 2011; Edwards-Jones et al., 2008; Mundler and Rumpus, 2012; Röös and Karlsson, 2013; Van Hauwermeiren et al., 2007; Van Passel, 2013). Locality of resources should thus not be considered as equivalent to environment-friendly.

The Flandria label explicitly requires IP but sets no other environmental requirements. The sustainability label "Responsibly Fresh", which has been incorporated into the quality Flandria label since 2012, further includes non-mandatory environmental criteria (e.g. horticultural producer cooperatives must set up a four-year sustainability plan containing collective accomplishments and prospects, and sign a Sustainable Business Charter), but there are no mandatory criteria. Neither for the three other quality labels.

Following the mandatory criteria contained in the labelling standards applicable to fruits and vegetables, it can be concluded that only the nine organic farming labels and the Milieukeur label stand for a production mode with environmental requirements beyond conventional/IP farming practices in Flanders, while Fairtrade Belgium and Rainforest Alliance Certified stand for a production mode with environmental requirements that go beyond conventional farming practices in the respective countries of production. As Flandria, PGO, PDI and "Streekproduct" do not guarantee a production mode with environmental requirements beyond conventional/IP farming practices, these labels will not be discussed in the remainder of the text.

3.1.2 Is it easy to deduce from the label if (and which) additional environmental requirements were taken into account during cultivation of the food?

Some critical reflections can be made on what consumers can deduce from the label related to the production mode of the fruits and vegetables. By merely looking at labels, consumers cannot always conclude that the products are made following "beyond conventional/IP" production methods, let alone, which labels relate to organic farming, as not all label logos include text. In their literature review, Yiridoe et al. (2005) point at studies where consumers reported of being aware of the existing organic farming labels, while some of them failed to recognise the relevant symbols and logos used in their country. In a study by Hoogland et al. (2007), adding text to labels proofed beneficial, as products carrying the organic farming logo accompanied with some information and details, got higher ratings of positive attributes by Dutch consumers, and were even considered more expensive than those carrying just the organic logo. All labels discussed in this article include some kind of text, except for the EU organic farming label.

Even if consumers would be able to deduce from the label that a "beyond conventional/IP" production mode was applied, they might not always know in which way this production mode actually differs from conventional/IP farming, in particular the degree of its environmental

friendliness. Yiridoe et al. (2005) conclude that although a general awareness about organic food products can be observed, consumers have inconsistent interpretations about what is really meant with "organic". More recent studies confirm the lack of knowledge on organic production methods and certification (Aertsens et al., 2009; Gerrard et al., 2013; Hoogland et al., 2007; Janssen and Hamm, 2012). According to Janssen and Hamm (2014) the different organic labels can provide a type of market differentiation if consumers understand the differences between them.

The website www.labelinfo.be provides valuable information on the existing food labels in Belgium, facilitating consumers to understand what lies behind. The website even allows for comparing labels, by scoring them in the categories "environment", "social" and "control", based on the criteria enclosed in the scheme. As put forward by van Amstel et al. (2008), governments could play a role here in standardising the terminologies and themes covered within a label.

3.1.3 Which part of the agri-food chain is covered by the labels?

As a next step, we look at the agri-food chain coverage of the labelling schemes. Besides on-farm operations, limited attention is given to post-harvest stages for fresh produce; only few labels include criteria related to storage, transport and waste (Table 3). Storage requirements related to postharvest treatments (e.g. prohibition to use synthetic growth or ripening regulators) are included in the EU organic farming standard. The transport phase is rarely included: only Biogarantie and Naturland refer to transport, (e.g. "minimise the environmental impact from transport"). Waste is quite frequently included: Biogarantie, Demeter, Naturland, Bioland, Soil Association Organic Standard, and Milieukeur include environment-related packaging standards; Demeter and Naturland include requirements related to foil use; and the Biogarantie

sustainability charter calls for mapping and improving waste streams. “End-of-life” waste, such as household waste, and other aspects related to the consumer stage, are excluded.

Table 3: Agri-food chain coverage of environmental requirements included in the labelling standards

Label	Cultivation	Storage	Transport[a]	Packaging
EU organic farming	x	x		
Biogarantie	x	x	(x)	x
EKO	x	x		
Demeter	x	x		x
Agriculture Biologique	x	x		
Bio-Siegel	x	x		
Naturland	x	x	(x)	x
Bioland	x	x		x
Soil Association Organic Standard	x	x		x
Milieukeur	x			x
Rainforest Alliance Certified	x			
Fairtrade Belgium	x			

[a] *(x) refers to non-compulsory criteria, intentions or commitments*

The results confirm findings in literature, as Sengstschmid et al. (2011) examined the European food labelling landscape and found that only 15% of the labels reviewed cover the post-farm lifecycle stages (processing, transport, packaging, retail, consumption). The labels thus inform consumers on only a selected part of the agri-food chain, leaving out most post-harvest stages and their environmental impacts.

3.1.4 To what extent do the labels take into account impacts and outcomes?

Eco-labels tend to narrow the environmental friendliness or sustainability of products to the inputs used and/or practices applied along the food chain. The standards are often based on best practice criteria; however, the linkage between the definitions of best practice and what is delivered by those practices is missing (Lewis et al., 2008). In a study on effective approaches to environmental labelling of food products, Lewis (2010) concludes that evidence on the environmental effects of eco-labels and farming standards is inconclusive, which illustrates the

surrounding complexities as there are so many variables that could influence environmental quality. The absence of output-based criteria in label standards does not tell the consumer that these products would necessarily have a bad environmental performance; it merely says that the outcome has not been measured. Here again, van Amstel et al. (2008) see a role for governments in requiring the inclusion of the output stage in eco-labelling schemes.

A noteworthy label is Milieukeur, which provides for a climate calculator ("klimaatlat") to calculate the greenhouse gas emissions related to the company, based on inputs and measures applied. Although the Milieukeur standard requires fruit and vegetables cultivators to calculate their emissions performance, no criteria are set for what the outcome should be. With the help of the calculator, farmers are able to calculate their performance and analyse how they can reduce their emissions.

3.2 Do consumers express the need for more information on the environmental impact of fruits and vegetables?

Despite the current proliferation of eco-labels, only 55% of respondents to the 2013 Eurobarometer survey say they know about the environmental impact of the food and non-food products they buy and use. Only 7% of respondents believe that current product labels provide enough information about the products' environmental impact (Eurobarometer, 2013). Similarly, when looking at voluntary labelling schemes for food in particular, another consumer survey commissioned by the European Commission revealed that 39% of the respondents find food labelling schemes difficult to understand and 35% find labelling logos and symbols confusing (Ipsos and London Economics Consortium, 2013). Against this background, this section will examine, through the results of our survey, if there is also a need for more information on the environmental friendliness of fresh produce in particular.

Questionnaire Part 1: Sustainable food consumption

Asking respondents to self-evaluate the extent to which they make sustainable food choices, 48% reported to make "(very) sustainable" food choices, which may indicate a bias for social desirability. We found that the younger age groups consider themselves as not very sustainable in their shopping behaviour, while older respondents tend to believe they behave sustainably. Also, 75% of the vegetarians believe they make a "(very) sustainable" food choice, while for non-vegetarians, the share of positive and negative answers is rather similar. Next, respondents were asked for the frequency of buying sustainable fruits and vegetables, referred to as "local produce, in season produce, or eco-labels". Only 1% "always" buys sustainable fruits and vegetables, 24% "most of the time/often", 52% "sometimes", and 5% "never", while 17% say they do not pay attention to this. When it comes to the reasons for sustainable purchasing (multiple options possible), the main reason is that "it is more environment-friendly" (58%), followed by "healthier" (27%), "better quality" (19%), "safer" (12%) and lastly "better taste" (10%).

Questionnaire Part 2: Environmental information provision

The majority of respondents feel they do not get sufficient information on sustainable fruit and vegetables, with 64% say they get "not a lot" of information and 15% say they get "not a lot at all". We however note that there was some ambiguity in the question as "sufficient information" could refer to both "sufficient information to actually assess sustainability" or "sufficient because you do not care about sustainability".

Asking respondents if sustainable fruits and vegetables draw enough attention and are clearly advertised, 67% of participants (tend to) disagree.. When asking if there is a need for sustainable

311 fresh produce to draw more attention and to be advertised more, 92% of all participants (tend
312 to) agree.

313 Participants were consecutively presented options for where sustainability related information
314 could be placed (multiple options possible). The most frequently chosen location was “on the
315 shelf where the product is placed” (82%), followed by “on the product itself” (73%), “in
316 TV/radio/newspaper advertisements” (34%), “on the internet” (21%), “on a leaflet in the shop”
317 (20%), and “on a barcode/QR code” (13%); 6% said they did not want additional information.

318 **Questionnaire Part 3: Eco-labels**

319 Only 2% of participants state to “always” pay attention to eco-labels, 14% do it “most of the
320 time/often”, 29% “sometimes”, 36% “barely”, and 20% “never”. In a survey to Belgian consumers
321 on consumption and biodiversity, 59% of respondents claim to regularly or always pay attention
322 to environmental and “ethical” labels on food products in general (Dedicated, 2013). The
323 majority of our respondents seem to trust that what is imposed by the labels, is also being
324 complied for by the producers (55% tend to trust and 5% completely trust). We further found
325 that, out of the 19 respondents that say they do not trust labels at all, 15 respondents (or 79%)
326 say they barely or never pay attention to eco-labels, while for those respondents that completely
327 trust labels, this is only the case for 12 out of the 25 respondents (or thus 48%).

328 Respondents were asked which aspects the labels refer to (multiple options possible): 42%
329 believes the eco-labels relate to fair trade, 36% to origin, 26% to pesticides, 19% to sustainable
330 packaging, 9% to greenhouse gas emissions (such as CO_2), and 7% to water use efficiency during
331 production. Strikingly, 35% admit they recognise eco-labels, but have no idea which
332 environmental aspects are behind the label; and 19% say they do not know any eco-labels.
333 Looking at those 194 respondents that say they recognise the labels but do not know what they

stand for and at the attention these respondents paid to eco-labels, we found that 62 respondents (32%) said they "sometimes" pay attention to eco-labels, 79 respondents (41%) "barely" pays attention, and 31 respondents (16%) "never" pays attention.

Looking at which of these aspects are actually included in the eco-labels assessed in this study, we find that all of them are to some extent taken up by the labels. Nevertheless, only Milieukeur contains mandatory standards regarding water use efficiency (complemented by 3 labels with non-obligatory standards or intentions), and only Milieukeur makes explicit reference to CO_2 emissions, be it in a non-obligatory way.

We further tested knowledge of five specific labels: AB, Biogarantie, EU organic farming, Fairtrade Max Havelaar (recently renamed "Fairtrade Belgium") and Flandria. The most well-known is Fairtrade Max Havelaar, while the least known is the EU organic farming label (Table 4). The relatively low level of recognition of organic labels confirms earlier findings in literature (Yiridoe et al., 2005), as described above in section 3.1.2. Additionally, in line with the study by Hoogland et al. (2007), we observed higher knowledge rates (both in terms of recognising as in terms of knowing the meaning of the labels) for labels containing text in their logo: Fairtrade Max Havelaar and Flandria have the highest knowledge rates, while for the organic labels, Biogarantie and AB score better than the EU organic farming label which does not contain any text.

Table 4: Stated knowledge of each of the five environmental labels (% of total sample)

	Fairtrade Max Havelaar	Flandria	Biogarantie	AB	EU organic farming
Recognise label	90	76	51	49	43
Know (more or less) meaning of label	81	48	29	27	14

3.3 How to improve environmental information provision on fresh produce to consumers?

The analysis of the current labelling landscape and the survey to Flemish consumers show that the current food labels found on fresh produce in Flanders fail at giving the consumer an adequate indication of the environmental friendliness of the products for sale. A potential intention-performance gap can thus be found for producers, and in the wider sense, for the entire supply chain. Since current labels found on fresh produce are input or practice based labels, farmers adhering to those labels can be considered as having the intention to produce sustainably, which allows them to label their products indicating this intention. However, it is clear that this intention alone cannot guarantee good environmental performance. In order to close the potential intention-performance gap for the supply chain and provide more adequate information to consumers, performance-based labels covering the environmental impact of the entire agri-food chain, are needed. This requires a life cycle assessment (LCA) approach as is being done for the EU Ecolabel, which currently only exists for non-food products (Sengstschmid et al., 2011). Key here is translating the complex life cycle based information into information understandable to consumers (Edwards-Jones et al., 2008; Ridoutt and Pfister, 2013; Vlaeminck et al., 2014). Important drawbacks, however, are the high costs and complexities associated with developing and using performance-based labels (Sengstschmid et al., 2011). Additionally, LCAs have certain limitations when used for comparing agricultural production modes, as research is still ongoing on how to capture biodiversity related elements (Milà i Canals et al., 2014; Teixeira et al., 2015).

At this moment, following retail initiatives, several performance-based eco-labels for processed foods do actually exist in neighbouring countries, such as the Casino Carbon Index and Casino

376 Environmental Index in France, and the Carbon Trust CO_2 Reduction label and the Carbon Trust
377 CO_2 Measured label in the UK. These labels are based on a life cycle approach whereby the
378 Casino Carbon index takes into account all phases up until the point of sale, while the Casino
379 Environmental Index and the two Carbon Trust labels include the production and distribution
380 process, as well as how the consumer uses the product and how the packaging and food waste is
381 disposed of. The Casino Carbon Index and the two Carbon Trust labels are carbon (footprint)
382 labels, focussing on greenhouse gas emissions, and expressing impacts in terms of kg CO_2(eq).
383 However, several authors suggest a multi-criteria approach, focussing on several environmental
384 aspects (Hartikainen et al., 2014; Lewis, 2010; Ridoutt et al., 2011; Vlaeminck et al., 2014). The
385 Casino Environmental Index already includes water consumption and eutrophication next to CO_2.

386 Looking at how consumers feel about carbon labelling, contrasting views and paradoxes can be
387 observed. On the one hand, in several surveys, when providing consumers with a list of possible
388 environmental attributes to be included on a product label, “carbon” or the total amount of
389 greenhouse gas emissions created by the product was the least popular (Eurobarometer, 2009;
390 Gadema and Oglethorpe, 2011; Guenther et al., 2012; Saunders et al., 2011). On the other hand,
391 when asking them if labels should indicate the product’s carbon footprint, the majority of
392 respondents is actually in favour of carbon labelling (Eurobarometer, 2009; Gadema and
393 Oglethorpe, 2011). It further seems that many consumers feel confused and have difficulties in
394 understanding carbon footprint information (Fletcher and Downing, 2011; Gadema and
395 Oglethorpe, 2011; Hartikainen et al., 2014). In addition, several studies indicate the need for
396 providing a context, as consumers find it hard to quantify the numbers on the label, and for
397 allowing consumers to compare and rank products, both within a food product category as
398 between different food product categories (Hartikainen et al., 2014; Saunders et al., 2011;
399 Upham and Bleda, 2009; Upham et al., 2011; Vlaeminck et al., 2014). Both the Casino Carbon

Index, the Casino Environmental Index and the Carbon Trust Carbon Reduction label already go in that direction: the Casino Carbon Index shows the relative position of the product on a graduated scale, the Carbon Trust Carbon Reduction label appears for example on several orange juice cartons from the Tesco brand, mentioning which one scores better and why, and the Casino Environmental Index uses the Guideline Daily Amounts (GDA) approach from the nutritional world by expressing the environmental impact of 100 g of a product compared to the environmental impact of the total daily consumption of food of a French citizen (visualised with colours).

The European Commission recently developed methodologies for a Product Environmental Footprint (PEF) to assess the life cycle environmental performance of products as a basis for providing reliable information to consumers, taking into account a wide range of impact categories. These methodologies are currently being tested and refined through pilot studies, including (processed) food, feed and drink products (European Commission, 2013a, 2013b).

In the context of fresh produce, as a highly perishable food product group, it would be wrong to consider the environmental impact as a static element. Some perishable foods allow for (long term) cold storage under controlled atmosphere, which is an energy consuming process. The longer an apple for example has been stored (and the more time there is between harvest and consumption), the higher the related impact. The existing labelling schemes, whether or not based on a life cycle analysis, are based on static situations and are not able to inform consumers about the evolving impact over time, for instance, how the impact is affected by the time of consumption. In addition, the existing labels, although referring to a certain production mode (e.g. organic production), do not account for variations within these production modes (e.g. open field vs. heated greenhouses; use of renewable energies, …), nor do they account for the origin of

423 the product and how it was transported to the selling point. The following examples taken from
424 literature illustrate this. Milà i Canals et al. (2007) compared apples from different origins at four
425 different moments in the year, concluding that, from a primary energy use perspective, it is
426 preferable to eat apples produced and stored in the country of consumption when they are in
427 season. Outside of the season, great variability of production practices, storage wastages, and
428 transportation distances exist, and it is difficult to make a general recommendation. Van
429 Hauwermeiren et al. (2007) and Mundler and Rumpus (2012) looked into the energy
430 performance of local (short) and mainstream (long) supply chains, stressing the influence of both
431 the distances travelled and the transport modes used by the supply chain and the consumer.
432 Röös and Karlsson (2013) further examined how eating seasonal influences the carbon footprint
433 of Swedish vegetables. Some ambiguity - and thus possibly confusion amongst consumers –
434 seems to surround the concept of "seasonality" as it has been interpreted in different ways,
435 depending on whether or not it should be associated with locally produced food, and whether or
436 not it relates to growing fruits and vegetables in their "natural growing season", without the
437 need for heating or artificial lighting. However, next to locality and seasonality, the authors stress
438 the importance of considering the energy sources used for heating greenhouses, as using
439 renewables instead of fossil fuels greatly reduces the carbon footprint. Based on their case study,
440 it was found that in the Netherlands, local tomato production in greenhouses based on natural
441 gas would be less climate-friendly than importing them from Sweden where greenhouses
442 operate on renewables.

443 Building on the harmonisation efforts done within the context of the PEF project, scenario-based
444 information on the environmental performance of fruits and vegetables, taking into account
445 variability related to time of consumption, origin, and production and distribution mode, is
446 valuable for the concerned consumer.

447 Finally, whether the provision of more and better information would indeed be sufficient to close
448 the consumer intention-behaviour gap, as also discussed by Vermeir & Verbeke (2006), was not
449 within the scope of our study. We therefore stress the importance of applying a holistic
450 approach, including other aspects such as perceived consumer effectiveness and involvement
451 with sustainability, when investigating sustainable consumer behaviour and the importance of
452 information provision in attaining the long-term goal of making sustainable purchasing choices.

453 # 4 Conclusions

454 Based on the analysis of the current labelling landscape, we conclude that the current food labels
455 found on fresh produce in Flanders fail at giving the consumer an adequate indication of the
456 environmental friendliness of the products for sale. The current labels tend to focus on on-farm
457 measures, leaving out some (elements of) post-harvest stages and the actual environmental
458 performance associated with fresh produce. Through our survey, we observed the need for more
459 information on the sustainability of fruits and vegetables in particular, making it crucial that
460 consumers receive such adequate information. Performance-based labels, although associated
461 with high costs and complexities, are valuable tools for informing consumers on the
462 environmental impacts of their food purchases, taking into account a wide range of impact
463 categories and covering the entire agri-food chain up until arrival at the point of sale (or beyond,
464 including the consumer stage) and using the life cycle approach. Several life cycle based
465 initiatives are ongoing in order to provide consumers with performance-based information. In
466 order to adequately inform consumers on the environmental impact of perishable foods, a static
467 life cycle analysis will not be sufficient. We believe a dynamic approach in which various

consumption scenarios, with varying parameters related to for example time of consumption, origin, production mode and distribution mode are included, is the way forward.

Although 73% of respondents to our survey suggest placing environmental information on the food products itself, thus on labels, developing a whole range of new labels is no option as the proliferation of eco-labels has already brought consumers into a state of confusion. In our opinion, priority should be given to two aspects: (i) harmonisation of the information provided to consumers, as is being aimed at through the EU PEF project, and (ii) improvement of this information, in terms of including dynamic aspects as stated above. We believe that developments in both fields will contribute to the ongoing efforts on developing communication vehicles to convey environmental information.

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SUPPLEMENTARY MATERIALS

Qualitative assessment of eco-labels on fresh produce in Flanders (Belgium) highlights a potential intention-performance gap for the supply chain

A. Survey on sustainable consumption: Detailed results – full report

This section provides for a comparison of the age and gender composition of the Flemish population with the survey sample (section A.1) and includes an overview of the significant results of all questions (sections A.2-A.5), as the article itself focusses on only a subset of the questions.

A.1 Representativeness of the survey sample

The representativeness of the data was checked based on data from the National institute of Statistics (NIS, http://statbel.fgov.be/nl/statistieken/cijfers/bevolking/structuur/leeftijdgeslacht/vlaanderen/).

The following tables compare age and gender composition of the Flemish population with the survey sample (note that the age class categories slightly differ). Unfortunately, no data could be found to compare the other demographic variables.

Population in Flanders	n	% of total	Survey sample	n	% of total
18-24	501380	10.1	**18-25**	284	51.4
25-34	764722	15.5	**26-35**	71	12.8
35-44	915035	18.5	**36-45**	49	8.9
45-54	914513	18.5	**46-55**	88	15.9
55-64	748965	15.1	**55-65**	33	6
65+	1100194	22.2	**66+**	28	5.1

Population in Flanders	n	% of total	Survey sample	n	% of total
male	2418135	48.9	**male**	179	32.4
female	2526674	51.1	**female**	374	67.6

A.2 Sustainable food consumption

Q - Where do you usually buy your fruit and vegetables? (multiple answers possible)

	% of Total	n
Supermarket	93%	512
Market	14%	79
Fruit-vegetable shop	14%	34
Local grocery	6%	80

Q - To what extent do you believe you are making sustainable food choices? (self-evaluation)

Sustainable food choice	% of Total	n
Very sustainable	3%	16
Sustainable	45%	247
Not very sustainable	46%	257
Not sustainable	6%	33

Q - How important are the following aspects for you when purchasing fruit and vegetables?

		Very important	Important	Not very important	Not important
Price	Freq	100	333	108	12
	Share	18%	60%	20%	2%
Quality	Freq	304	237	12	0
	Share	55%	43%	2%	0%
Season	Freq	86	268	162	37
	Share	16%	48%	29%	7%
Brand	Freq	4	80	287	182
	Share	1%	14%	52%	33%
Eco-label(s)	Freq	26	138	275	114
	Share	5%	25%	50%	21%
Fair trade	Freq	35	139	271	108
	Share	6%	25%	49%	20%
Environment-friendly production	Freq	54	198	225	76
	Share	10%	36%	41%	14%

Q – Are you aware of the following aspects of fruit and vegetables, and does it influence your purchases?

		Aware, influence on purchases	Aware, no influence on purchases	Not aware
Price	Freq	378	146	29
	Share	68%	26%	5%
Quality	Freq	414	130	9
	Share	75%	24%	2%
Season	Freq	303	166	84
	Share	55%	30%	15%
Brand	Freq	160	226	167
	Share	29%	41%	30%
Eco-label(s)	Freq	167	175	211
	Share	30%	32%	38%
Fair trade	Freq	179	188	186
	Share	32%	34%	34%
Environment-friendly production	Freq	166	145	242
	Share	30%	26%	44%

Q - How often do you buy sustainable fruit and vegetables (locally produced, in-season produce, eco-labels)?

Frequency sustainable purchases	% of Total	n
Always	1%	7
Most of the time/often	24%	134
Sometimes	52%	290
Never	5%	26
I do not pay attention to this	17%	96

Q - Why do you buy sustainable/ecological/biological/… fruit and vegetables? (multiple answers possible)

	% of Total	n
Healthier	27%	150
Safer	12%	64
More environment-friendly	58%	320
Better quality	19%	106
Better taste	10%	55

A.3 Environmental information provision

Q - Do you think that you get enough information about sustainable fruit and vegetables?

Sufficient information provision	% of Total	n
Yes definitely	2%	11
Quite some	19%	105
Actually not a lot	64%	354
Not a lot at all	15%	83

Looking at how the responses differ across the age groups:

Age group		Yes definitely	Quite some	Actually not a lot	Not a lot at all	Total Responses
18-25	Freq	4	40	194	46	284
	Share	1%	14%	68%	16%	
26-35	Freq	1	8	46	16	71
	Share	1%	11%	65%	23%	
36-45	Freq	0	13	30	6	49
	Share	0%	27%	61%	12%	
46-55	Freq	3	21	51	13	88
	Share	3%	24%	58%	15%	
56-65	Freq	1	13	17	2	33
	Share	3%	39%	52%	6%	
65+	Freq	2	10	16	0	28
	Share	7%	36%	57%	0%	
-All-	Freq	11	105	354	83	553
	Share	2%	19%	64%	15%	

Q - Sustainable fruit and vegetables draw enough attention and are clearly being advertised

Sufficient attention/advertisement?	% of Total	n
I agree	4%	22
I tend to agree	22%	121
I tend to disagree	46%	254
I disagree	21%	117
No idea	7%	39

Looking at how the responses differ across the age groups:

Age group		I agree	I tend to agree	I tend to disagree	I disagree	No idea	Total Responses
18-25	Freq	10	52	140	67	15	284
	Share	4%	18%	49%	24%	5%	
26-35	Freq	4	11	29	21	6	71
	Share	6%	15%	41%	30%	8%	
36-45	Freq	2	9	23	11	4	49
	Share	4%	18%	47%	22%	8%	
46-55	Freq	3	27	41	8	9	88
	Share	3%	31%	47%	9%	10%	
56-65	Freq	0	11	13	5	4	33
	Share	0%	33%	39%	15%	12%	
65+	Freq	3	11	8	5	1	28
	Share	11%	39%	29%	18%	4%	
-All-	Freq	22	121	254	117	39	553
	Share	4%	22%	46%	21%	7%	

Q - Sustainable fruit and vegetables should draw more attention and should be advertised more

Need for more attention/advertisement?	% of Total	n
I agree	46%	
I tend to agree	46%	
I tend to disagree	5%	
I disagree	2%	

Q - Where would you like to find environmental and/or social information about your product? (multiple answers possible)

	% of Total	n
Shelves	82%	452
Tv/radio/paper adverts	34%	190
Internet	21%	115
Flyer in shop	20%	108
QR code	13%	71
Product label	73%	406
No need for additional information	6%	32

Q - Indicate who you think has the biggest responsibility to promote sustainable fruit and vegetables.

		Most important	Middle	Least important
Government	Freq.	244	226	83
	Share	44%	41%	15%
Manufacturers	Freq.	317	177	59
	Share	57%	32%	11%
Retailers	Freq.	128	227	198
	Share	23%	41%	36%

Q - In which way do you think that the government should promote sustainable fruit and vegetables? (multiple answers possible)

	% of Total	n
By informing and raising awareness about the subject among the population	72%	399
By encouraging sustainable shopping (for example by giving grants to manufacturers)	59%	326
By promoting and selling more sustainable alternative products	37%	203
By discouraging non-sustainable behaviour (for example by raising taxes on non-sustainable behaviour)	33%	181
Other	1%	6
No need for government promotion	6%	34

A.4 Eco-labels

Q - Do you pay attention to eco-labels?

Pay attention to ecolabels	% of Total	n
Always	2%	11
Most of the time/often	14%	76
Sometimes	29%	159
Barely	36%	198
Never	20%	109

The two tables below show how participants report the sustainability of their purchasing decisions based on the extent to which they pay attention to eco-labels, and vice-versa .

Pay attention to ecolabels		Sustainable food choice				Total Responses
		Very sustainable	Sustainable	Not very sustainable	Not sustainable	
Always	Freq	3	4	4	0	11
	Share	27%	36%	36%	0%	
Most of the time/often	Freq	8	54	12	2	76
	Share	11%	71%	16%	3%	
Sometimes	Freq	2	88	67	2	159
	Share	1%	55%	42%	1%	
Barely	Freq	2	69	122	5	198
	Share	1%	35%	62%	3%	
Never	Freq	1	32	52	24	109
	Share	1%	29%	48%	22%	
-All-	Freq	16	247	257	33	553
	Share	3%	45%	46%	6%	

Sustainable food choice		Pay attention to ecolabels					Total Responses
		Always	Most of the time/often	Sometimes	Barely	Never	
Very sustainable	Freq	3	8	2	2	1	16
	Share	19%	50%	13%	13%	6%	
Sustainable	Freq	4	54	88	69	32	247
	Share	2%	22%	36%	28%	13%	
Not very sustainable	Freq	4	12	67	122	52	257
	Share	2%	5%	26%	47%	20%	
Not sustainable	Freq	0	2	2	5	24	33
	Share	0%	6%	6%	15%	73%	
-All-	Freq	11	76	159	198	109	553
	Share	2%	14%	29%	36%	20%	

Q - In general, to what extent do you trust that the terms imposed by the eco-label are respected by the producers?

Trust_compliance ecolabel standards	% of Total	n
Trust completely	5%	25
Tend to trust	55%	303
Tend not to trust	23%	129
No trust at all	3%	19
No idea	14%	77

The table below shows the extent to which participants pay attention to eco-labels, based on the level of trust they give to compliance of the labels.

Trust_compliance ecolabel standards		Pay attention to ecolabels					Total Responses
		Always	Most of the time/often	Sometimes	Barely	Never	
Trust completely	Freq	1	4	8	6	6	25
	Share	4%	16%	32%	24%	24%	
Tend to trust	Freq	9	60	97	97	40	303
	Share	3%	20%	32%	32%	13%	
Tend not to trust	Freq	0	9	38	63	19	129
	Share	0%	7%	29%	49%	15%	
No trust at all	Freq	1	0	3	3	12	19
	Share	5%	0%	16%	16%	63%	
No idea	Freq	0	3	13	29	32	77
	Share	0%	4%	17%	38%	42%	
-All-	Freq	11	76	159	198	109	553
	Share	2%	14%	29%	36%	20%	

Q - The eco-labels you know provide information about: (multiple answers possible)

	% of Total	**n**
Origin	36%	201
Emission of greenhouse gasses (e.g. CO2)	9%	50
Water use efficiency during production	7%	37
Sustainability of packaging	19%	105
Use of pesticides	25%	141
Fair trade	42%	232
I recognize eco-labels, but I do not know what they stand for	35%	194
I do not know any eco-labels	19%	106

77 Looking at those 194 respondents that say they recognise the labels but do not know what they stand for and
78 at the attention these respondents paid to eco-labels, we found that 62 respondents (32%) said they
79 "sometimes" pay attention to eco-labels, 79 respondents (41%) "barely" pays attention, and 31 respondents
80 (16%) "never" pays attention. Comparing what the respondents believe is claimed by the eco-labels with
81 what is actually included in the standards of those labels on fresh produce available to Belgian consumers
82 (see Article section on Examining the existing labelling landscape). Looking at the entire set of eco-labels
83 assessed, all of the aspects the respondents could choose from, are actually taken up by the eco-labels:

Label	**Fair trade**	**Origin**	**Pesticide use**	**Sustainable packaging**	**GHG emissions (e.g. CO_2)**	**Water use efficiency during production**
EU organic farming			x			
Biogarantie			x	x		(x)
EKO			x			
Demeter			x	x		
Agriculture Biologique			x			
Bio-Siegel			x			
Naturland			x	x		
Bioland			x	x		
Soil Association Organic Standard			x	x		
Milieukeur			x	x	(x)	x
Rainforest Alliance Certified			x			(x)
Fairtrade Belgium	x		x			
Flandria, incorporating Responsibly Fresh		x	x			(x)
PDO		x				
PGI		x				
Streekproducten		x				
Total number of labels incorporating this element	**1**	**4**	**13**	**6**	**(1)**	**1 + (3)**
% of respondents who believes eco-labels include information on this aspect (%)	**42**	**36**	**26**	**19**	**9**	**7**

84 *(x) refers to non-compulsory criteria, intentions or commitments*

85

Q - Do you recognize this label?

Note that 10 respondents (or 2% of total) indicated that the label was not visible and thus could not answer the question.

		Yes, and I know what it stands for	Yes, and I know more or less what it stands for	I recognize the label, but I do not know what it stands for	I do not recognize the label
(AB)	Freq	39	108	122	274
	Share	7%	20%	22%	50%
(Biogarantie)	Freq	48	111	122	262
	Share	9%	20%	22%	47%
(EU organic farming)	Freq	21	57	158	307
	Share	4%	10%	29%	56%
(Fairtrade Max Havelaar)	Freq	246	204	51	42
	Share	44%	37%	9%	8%
(Flandria)	Freq	104	160	155	124
	Share	19%	29%	28%	22%

Through our survey, we also intended to assess consumer interpretations of these five labels. Unfortunately, a high share of people claiming to know the meaning of a label, did not explain what they actually believe is meant by the label. Additionally, as mentioned above, 10 participants encountered problems with the visibility of the labels. As such, we cannot analyse if the perceived awareness of the participants, corresponds with what the labels stand for.

A.5 Closing question

Q – Having participated in the survey, to what extent do you believe you are making sustainable food choices? (self-evaluation)

Sustainable food choice_evolved?	% of Total	n
More sustainable than initially thought	6%	34
No change	69%	380
Less sustainable than initially thought	25%	139

B. Legislation applicable in Flanders regarding cultivation of fresh produce

The Belgian Federal Agency for the Safety of the Food Chain requires all farmers to respect the "Self Checking Guide for Primary Production G-040". Following EU environmental legislation, federal and regional norms were set up concerning amongst others fertilisation, plant protection, water use, waste water, and species management. As of 1st January 2014, legislation on plant protection follows the integrated production principles. Farmers that wish to go beyond these norms, could choose to apply the organic farming principles for which regional legislation has been established in Flanders.

Cultivation mode	**Applicable legislation/standards** *(unofficial translation into English)*
Conventional farming / Integrated production	Wide range of norms set at the federal and regional level concerning amongst others fertilization, plant protection (including IPM), water use and waste water, and species management https://nnavigator.emis.vito.be/mijn-navigator Practical quide on Integrated Pest Management (IPM): http://lv.vlaanderen.be/nl/voorlichting-info/publicaties/praktijkgidsen/praktijkgids-gewasbescherming
	At federal level: Self Checking Guide for Primary Production G-040 http://www.primaryproduction.be/index.php?id=404http://www.primaryproduction.be/index.php?id=305
Organic farming	European legislation: – Council Regulation (EC) No 834/2007 on organic production and labelling of organic products – Implementing Commission Regulation (EC) No 889/2008, later amended by Commission regulation (EC) No 271/2010 http://ec.europa.eu/agriculture/organic/eu-policy/eu-legislation/brief-overview/index_en.htm
	Regional legislation (Flanders): – Decision of the Flemish Government of 12 December 2008 specifying the Flemish application of the EU regulations on organic production and labelling – Ministerial order of 22 June 2009 laying down the rules for implementation of the Decision of the Flemish Government of 12 December 2008 on organic production and labelling – Ministerial order of 27 May 2011 laying down the rules for organic production http://lv.vlaanderen.be/nlapps/docs/default.asp?id=157