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The following document, submitted by the delegation of the Netherlands, provides the results of Wageningen University and Research on “Cosmetic aspects in specific marketing standards for fruit and vegetables”. It is submitted for discussion.



Cosmetic aspects in specific marketing standards for fruit and vegetables

Removing cosmetic aspects from the EU marketing standards: implications for the market and impact on food waste

Elsje Oosterkamp, Addie Van der Sluis, Lisanne van Geffen, Lusine Aramyan, Hilke Bos-Brouwers



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Cosmetic aspects in specific marketing standards for fruit and vegetables

Removing cosmetic aspects from the EU marketing standards: implications for the market and impact on food waste

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Summary

S.1 Primary findings

The EU has established eleven specific marketing standards for fruit and vegetables with the aim of distinguishing between different quality classes in order to ensure transparency in the market and to enable fair payment for the products. The quality classes are partly based on visual aspects. These visual aspects include cosmetic ones, which are defined here as aspects that serve no additional purpose. For four products cultivated in the Netherlands that have specific marketing standards, namely apples, pears, tomatoes, and sweet peppers, requirements from the marketing standards were mapped out and their cosmetic aspects were identified. These cosmetic aspects concern shape, colour, and skin (including russetting) defects. When making allowances for these deviations, lower limits will need to be formulated for skin and shape defects to minimise losses due to peeling or cutting. [See Section 2.2.](#)

Removing or broadening these cosmetic requirements does not have a clear effect on the reduction of food waste in the chain. [See Section 4.1.](#)

S.2 Other findings

There are very few data available about the extent of waste in the different phases of the supply chain in the Dutch fruit and vegetable sector. In particular, there is no information on the proportion of products that does not reach the market or is not distributed. [See Section 3.3.](#)

Table S.1 provides an overview of the distribution of the supply in the three classes. Class Extra is hardly used in the Netherlands.

Table S.1 *Distribution of the supply to the Dutch Producer Organisations by Class I, II and industry (2017)*

Product	Volume (tonnes)	Class I (%)	Class II (%)	Industry (%)
Apples	107,000	77.0	0.5	22.5
Pears	116,000	83.1	6.2	10.7
Sweet peppers	374,000	95.3	4.6	0.1
Tomatoes	744,000	99.4	0.5	0.1

Source: Inventarisatie GroentenFruit Huis, December 2018. Volume relates to the amount based on which the distribution is calculated.

In addition, there is little literature available on the degree of defects and which combinations of different product/type defects matter to consumers. Or what influence price has on the willingness of consumers to buy imperfect fruit and vegetables. [See Section 4.2.](#)

S.3 Method

The effect on food waste of removing or broadening the standards regarding cosmetic aspects is qualitatively examined using three scenarios. [See Section 4.1.](#)

1. The cosmetic requirements for Class I (and Extra) are replaced by those of Class II.
2. The cosmetic requirements for Class II are relaxed.
3. Statutory requirements for the quality classes are made more flexible.

Ad 1. The result of this option is that consumers may select the products from the shelves themselves, leading to unsold produce and thus food waste. As a result, private parties may abandon this experiment and impose their own additional private requirements. This would likely result in a larger gap between practice and the actual requirements of the official marketing standards.

Ad 3. In the third option, the requirements could be adjusted according to market conditions. This will result in a heavy administrative burden, without any additional benefit as it is already possible to offer Class II as well as Class I, if the market conditions permit.

Ad 2. Option 2 is in line with initiatives that are already being implemented in the market, in which a Class II product is packaged and sold as a separately branded product. The additional volume in Class II can be used to provide more Class II produce alongside Class I produce in the supermarket. This is particularly true for the examined greenhouse cultivated crops and pears, as a large proportion of apples are processed industrially. However, the increase in volume for greenhouse cultivated crops of Class II will be limited as Class I is relatively extremely large. The national flow to the industry is very limited already and this could make it even less attractive to collect. This could actually increase food waste. It could also cause displacement effects for Class I products, which can put pressure on the prices in this class. These effects have to be weighed against possible higher sales volumes and prices for Class II products.

1 Introduction

The Minister of Agriculture, Nature and Food Quality (LNV) has promised the House of Representatives to examine which aspects of the specific EU marketing standards for fruit and vegetables are purely cosmetic and to address these aspects in Brussels. She did this for instance during the “Algemeen Overleg Voedsel” on 19 April 2018. This commitment is also part of the minister’s larger plan of action against food waste. These cosmetic aspects refer to the visual aspects or outward characteristics that do not have any purpose or functional purpose.

In the context of the national agenda ‘Samen tegen voedselverspilling’ (United against food waste), a round table that took place in 2019 and during which the trade requirements imposed by private parties were discussed. A number of supermarket organisations will join. At which point the minister will also clarify the points which she will emphasise in Brussels.

The Ministry of Agriculture, Nature and Food Quality (LNV) has requested a qualitative outline of the role of cosmetic aspects in the EU marketing standards and an indication of the possible consequences of the removal of these cosmetic aspects.

Research questions

1. Which aspects of the specific marketing standards for fresh fruit and vegetables concern cosmetic aspects?
2. What could the consequences be of the removal of these cosmetic aspects? Can a distinction be made between:
 - the economic consequences for producers of fruit and vegetables
 - the consequences for consumers (such as shopping habits, information requirements, etc.)
 - the expected net consequences for food waste (for instance, can we expect a displacement effect, meaning that more ‘inferior/less beautiful products’ on the shelves leads to superior product ending up in such things as soups, with no substantial decrease of food waste at the end of the day)
 - any other consequences?

Question 1 is answered in Section 2.2 and question 2 is answered in Chapter 4. Chapter 3 outlines the purposes of the specific marketing standards, including a classification that is partly based on visual aspects. The focus is on apples, pears, sweet peppers, and tomatoes as they are important Dutch products.

The following people were consulted for the analysis: Wim Rodenburg and Yannick Kraamer (GroentenFruit Huis), Rob Stokkers (Wageningen Economic Research) and Fred Jacobs (Quality Control Bureau). The review was completed by Huib Silvis (Wageningen Economic Research) and Toine Timmermans (Wageningen Food & Biobased Research).

2 Statutory framework

2.1 Regulations

The EU marketing standards for fruit and vegetables are established in the Commission Implementing Regulation (EU) No. 543/2011 of Council Regulation (EC) No. 1234/2007. Since 2014, the latter Regulation has no longer been in force as it was replaced by Council Regulation (EU) No. 1308/2013, which deals with establishing a common organisation of the agricultural product market. The EU marketing standard consists of a general marketing standard for fruit and vegetables (Appendix I of the regulation, part A) and ten product-specific marketing standards (Appendix I, part B). The marketing standards apply to products that are intended to be consumed fresh. In the Netherlands, these standards are enforced by the Quality Control Bureau (KCB) in the wholesale phase and by the NVWA in the retail phase.

The EU has chosen these ten marketing standards based on consideration 5 in Regulation (EU) No. 543/2011, as these are the most traded products in the EU. The share in market value was approximately 75% at the time. The ten specific standards outlined in the Commission Implementing Regulation (EU) No. 543/2011 are for:

- apples
- citrus fruits
- kiwi fruit
- the lettuce product group, curly endive and broad-leaved endive
- peaches and nectarines
- pears
- strawberries
- sweet peppers
- table grapes
- tomatoes.

In addition to these ten specific marketing standards, Commission Implementing Regulation (EU) No. 1333/2011 describes the specific marketing standards for bananas. This brings the total specific marketing standards for fruit and vegetables to 11. Products from six of these marketing standards are cultivated in the Netherlands: apples, pears, sweet peppers, strawberries, tomatoes and the lettuce product group, curly endive and broad-leaved endive.

The specific marketing standards include the following sections:

- I Definition of the produce
- II Provisions concerning quality
 - Minimum requirements
 - Maturity requirements
 - Classification
- III Provisions concerning sizing (size, uniformity of produce in the package)
- IV Provisions concerning tolerances (in quality and size)
- V and VI Provisions concerning presentation and marking

The minimum and maturity requirements that are part of the provisions concerning quality (II) are actually a product-specific interpretation of the general marketing standard, which aims to ensure that fruit and vegetables for the fresh market are 'fair, sound & edible', to prevent products from failing to get to the end consumer, and to prevent unhealthy and spoiled products from reaching the market.

The specific marketing standard also imposes a classification (above the minimum). This classification aims to further define the quality. Lettuce and endive have two quality classes. The other products have three: Extra, Class I, and Class II. The criteria for the classes include requirements for

smoothness (flesh and skin), shape, development, and colour. In general, a fruit belongs to Class Extra if there are no defects, Class I if there are slight defects, and Class II if there are more defects, excluding defects that will worsen after packaging (the early stages of rotting or serious defects in the flesh).

The provisions concerning sizing (III) include a minimum size for apples and pears. The main objective is to stop unripe or undeveloped fruit entering the fresh market. There is no sizing uniformity requirement for fruit in Class II that is packed in bulk loosely, but there are uniformity requirements for Class I. The fruits in Class I are not necessarily larger than those in Class II.

Tolerances (IV) describe the extent of any allowable defects. For Class II, a total tolerance of 10%, by number or weight, can even be below the minimum quality requirements under certain circumstances.

Article 4 of the Commission Implementing Regulation (EU) No. 543/2011 describes a large number of exceptions from the obligation to implement marketing standards. Among others, there are exemptions for products:

- that are intended for processing or animal feed;
- that are transferred by the producer directly to consumers for their personal use or for sale in local markets;
- that are presented for retail sale and labelled 'product intended for processing', if Member States have granted such an exemption.

'Local for local' (the second point) provides the opportunity to bring products with defects to the market anyway. The Netherlands does not grant the exemptions referred to in the third point.

Products that are only regulated by the general marketing standard (for instance plums, pumpkins, courgettes, cauliflowers, or cucumbers) can thus be brought to the market without a compulsory classification, provided they are 'fair, sound & edible'. Since the specific marketing standards are embedded in the EU regulations, any changes must occur at the EU level.

2.2 Cosmetic aspects

This section outlines which visual aspects are purely cosmetic.

The minimum and maturity requirements of the specific standards listed under the provisions concerning quality are partly based on visual aspects, but these are not considered to be cosmetic. These requirements are an elaboration of the general marketing standard that states that fruits and vegetables that are meant to be used fresh need to be 'fair, sound & edible'.

Visual aspects play a significant role as indicators of quality for the classification of products, which is required under the specific marketing standards and relates to products that conform to the minimum requirements. It was decided to examine the visual aspects established in these standards and to determine the purpose of those aspects for four products: apples, pears (both open cultivation), tomatoes, and sweet peppers (both greenhouse cultivation). These four were chosen as they are cultivated in the Netherlands with a production volume of about 45% of the total volume of fruits and vegetables cultivated in the Netherlands (CBS, 2017). The requirements from the specific marketing standards are summarised in Appendices 1 to 4. The first column of the tables lists the quality indicators. The requirements are listed in the third, fourth, and fifth columns.

Slight bruising is permitted for tomatoes, apples, and pears in Class I and II, with larger bruising permitted in Class II. Defects in the flesh¹ of apples and pears is also permitted in Class II. These indicators describe visual aspects, but have an effect on the shelf life. Firmness is mentioned in the general quality provisions for tomatoes, in the minimum requirements for sweet peppers, and is also

¹ This defect is only visible after cutting, but was added for completeness.

an indicator of shelf life. Firmness for pears indicates that they are only permitted to have sunken necks to a limited extent². For sweet peppers, blossom end deterioration and shrivelling are indicators of shelf life. Essentially, Class II products generally have a shorter shelf life. The indicators 'slight bruising, firmness, blossom end deterioration, and shrivelling' are therefore not cosmetic.

The quality indicator 'defect in development' is related to unripe fruits or damage that can cause an abnormal taste. Therefore, this cannot be considered a cosmetic aspect.

The indicator 'defect in colouring' refers to parts of the fruit having a different colour compared to the rest of the fruit. Defect in colour is not a quality indicator for sweet peppers. Apples have colour groups for different varieties and colour is one of the indicators of maturity. However, colouring defects in fruits that are ripe and that conform to the colour of a particular variety of apple are cosmetic. Colour also indicates ripeness in tomatoes (green is not ripe). Green virus defects are hard and need to be cut out. Otherwise, colouring defects in tomatoes are cosmetic. Colouring defects in ripe pears are also cosmetic.

Russeting (in apples and pears) is partly cosmetic. Some apple varieties have russeted skin (Belle de Boskoop for instance), but russeted skin is not appreciated by consumers in other varieties of apples or in pears. Some people will not eat russeted skin and will peel it off instead. As this is a superficial requirement, it was decided to include it as a cosmetic aspect. A lower limit should be formulated for this permitted defect, because peeling means that good nutrients are lost.

Grittiness³ in pears cannot be considered cosmetic, as the gritty parts are not preferred by consumers and they will cut these out.

Shape is a cosmetic aspect, with the exception of greenback in tomatoes, as this results in hard parts that will be cut out. Deformations can also be so severe that fruits can no longer be consumed fresh. A lower limit should be formulated if shape defects are permitted.

Pears and sweet peppers must have a stem which can only be slightly damaged in Class I. This is to prevent the damaged stem of one fruit from damaging other fruits. There are no requirements for the stem in Class II. The stem can be damaged for sweet peppers in Class II. For apples in Class I, the stem can be missing, and tomatoes only require a fresh stem for trusses of tomatoes. The requirements regarding stems cannot be considered cosmetic in the case of pears and sweet peppers.

Table 2.1 summarises the above outline for the four selected products. A quality indicator or visual aspect that is not applicable for a product is marked 'n/a'. If there is an additional purpose for a quality indicator, then the visual aspect is not cosmetic and it is marked with 'no' in the table. The requirements in relation to shape, defects in colouring, peel defects (including russeting) serve no additional purpose and, therefore, these aspects are considered cosmetic and are marked with 'yes' in the table. They are all defects that are already permitted to a certain degree in Class I and Class II, albeit to varying degrees (see Appendix 1 to 4). For instance, a double tomato (defect in shape) is classified as Class II and can be brought to the market as a Class II tomato.

When removing cosmetic aspects in the specific marketing standards, the initial attention should be given to the indicators marked with 'yes' in the table below. In some cases, it will be necessary to formulate new lower limits.

² This aspect is tested during the implementation of the standard (communication KCB).

³ Again, this defect is only really visible after cutting, but it is included for completeness.

Table 2.1 Do the quality indicators in the marketing standards relate to cosmetic aspects?

	Pears	Sweet peppers	Apples	Tomatoes
Type classification	n/a	n/a	3 colour groups (in addition to a group without colour requirements)	4 commercial types (round, ribbed, oblong, cherry tomatoes)
Quality indicators				
Firmness	no (implementation standard: firm necks)	no (in minimum requirements)	n/a	no (in general provisions concerning quality)
Soundness of the flesh	no, this defect leads to cutting	n/a	no, this defect leads to cutting	n/a
No greenback	n/a	n/a	n/a	no, leads to cutting
Permitted defects in fruits				
- defect in shape	yes	Yes	yes	yes
- defect in development	no, this defect might lead to an abnormal taste	n/a	no, this defect might lead to an abnormal taste	no, this defect might lead to an abnormal taste
- defects in colouring ⁴	yes	n/a	yes	yes, with the exception of green virus marks as they lead to cutting
- (rough) russeting	yes/no	n/a	yes/no	n/a
- defects in the peel	yes	- silvering or damage caused by thrips - defects in the peel, such as: pitting, scratching, sunburn, and/or pressure marks - dry superficial cracks	yes yes	yes
slight bruising	no, affects the shelf life	n/a	no, affects the shelf life	no, affects the shelf life
Stem	no, damage to stems damages other fruit	no, damage to stems damages other fruit	n/a (is allowed to be missing in Class I)	n/a (only needs to be fresh for trusses of tomatoes)
Grittiness	no	n/a	n/a	n/a
Shrivelling	n/a	No	n/a	n/a
Blossom end deterioration	n/a	No	n/a	n/a

⁴ Refers to defects after the requirements for ripeness and variety have been met (apples).

3 Current specific marketing standards, objective, and food waste

3.1 Objective of the specific marketing standards

The specific marketing standards define the quality of the product (and packaging), which ensures transparency of pricing and encourages trade. The statutory standards often form the basis on which private parties formulate additional specifications to distinguish and position themselves in the market. It also allows them to respond to actual or assumed customer demands. Therefore, it is not surprising that when the 16 specific marketing standards were abolished by EU Regulation No. 1221/2008 in 2009, the standards were adopted by private parties (Chever et al., 2010) and were established by the United Nations Economic Commission for Europe (UNECE).⁵

Fresh fruit and vegetables are assessed from harvest to the distribution centre. Classification and sorting are used to distinguish quality and use and to differentiate prices. Class I is set at a higher price, sometimes even a multiple of the price of Class II. Larger products within each class are given higher prices. It also means that producing smaller sizes and bringing them to market may no longer be viable. In organic production, the non-use of substrate cultivation, precision fertilisation, or crop protection agents means that a larger percentage of the produce falls within Class II. As this relates to relatively small volumes, there isn't always a market for this produce. As a result, it is commonly added to the volumes of Class II. In this case, the difference in production costs of organic Class II and non-organic Class II is not reflected in the market price.

This means that there is a strong incentive for the primary producers of fruit and vegetables intended for the fresh market to supply as much Class I produce as possible. This strong focus on Class I is also a motivation for renewal and innovation in the fruit and vegetable sector. Foreign buyers appreciate this quality, which means that Dutch Class I products are consumed far beyond Dutch borders.

Therefore, transparent classification will remain an important issue for Dutch growers. It was not studied how they viewed the abolishment of the cosmetic aspects defined in Section 2.2. However, another study investigated the opinion of growers in Belgium and found that 57% of respondents there do not think it is necessary to relax the visual requirements for Class I, as they anticipate that the quality will deteriorate and that it will lead to overproduction (Gellynck et al., 2017). Others think that the requirements are too strict because growers cannot fully control the appearance of produce. The numbers cannot be translated to the situation in the Netherlands as auctions play a much larger role in sales for Belgian growers.

3.2 Classes and their destination

Products that are intended to be consumed fresh are the starting point here. Class Extra is only sold abroad, but is hardly used in the Netherlands. Dutch and foreign supermarkets and their buyers usually choose their own standards, based on the standards for Class I, which deviate for certain elements and which are often less strict than the standards for Class Extra. The processing industry also buys Class I products, for instance producers who sell fresh-cut fruit. See Table 3.1.

⁵ <https://www.unece.org/trade/agr/standard/fresh/ffv-standardse.html>.

Table 3.1 Classes and primary sales channels

Class	Sales channel
Class Extra	Export
Class I	Export, supermarkets, industry (fresh-cut)
Class II	Domestic market, particularly through itinerant trade, supermarkets, the local hospitality industry, the treatment and processing industry, or the grower on his holding
'Industry'	Treatment and processing industry

The 'Industry' class does not have a statutory definition. Instead, as described in Section 2.1, there is an exemption for products that are intended for treatment or processing. Produce not intended for the fresh market does not need to be classified, for example vegetables intended to be canned or frozen. Open cultivation produce (apples, pears) intended for sale as Class I is more commonly diverted to the industry for processing (for juice, cider, or puree) or treatment (fresh-cut) than greenhouse cultivation produce, due to being partly unsound: broken, crushed or seriously damaged. Therefore, these batches are not further classified. It does mean that the streams of produce actually classified as Class II are relatively small. These small streams make the product less interesting for industrial processors, so Class II produce mostly ends up in the domestic itinerary trade.

Because of the focus on food waste, some Class II products have been sold in supermarkets since 2016, pre-packed bags, such as *Buitenbeentjes* at Albert Heijn and *Verspil-me-nietjes* at Lidl. Offering products to consumers that are intended for processing (which is conditionally permitted under the Regulation) does not occur in Dutch retail channels because no exemptions are granted.

Processors buy the Dutch stream of 'industry produce' and add it to the volumes purchased internationally. However, the production of ketchup almost exclusively uses tomatoes grown in open cultivation elsewhere in the world, as Dutch greenhouse tomatoes are too expensive as a raw material.

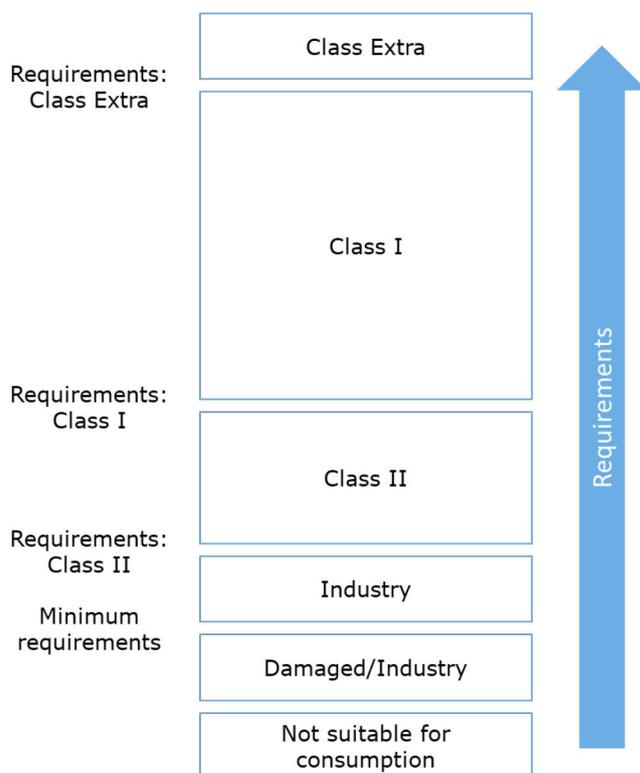


Figure 3.1 The classification of production into three quality classes, minimum requirements, destination industry, and not suitable for consumption

Remaining produce after this from farmers or horticulturists or further down the supply chain are not suitable for consumption, even after treatment or processing (see Figure 3.1).

Table 3.2 shows the distribution of the supply to Class I and Class II and industry products of the Dutch producers organisations who jointly trade more than 80% of the Dutch fruit and vegetable production. Horticulturists and farmers have an obligation to supply, so deliveries to the processing industry are usually routed through the producers organisation.

When it comes to apples and pears from open cultivation, a larger proportion is sent to the industry. The proportion of Class II produce is generally low, but is higher for pears (over 6%) and sweet peppers (nearly 5%) than for tomatoes and apples. The small share of Class II apples is because some growers only sort out Class I apples and sell the rest for processing. The supply varies between the seasons. The share of Class II sweet peppers is generally larger after the summer months. For instance, the exceptional heatwave in 2018 resulted in one sweet pepper grower having a share of Class II produce of 20% in August 2018, compared to 5% in the previous months (Groenten & Fruit, 28 September 2018). However, the message is that the current share of Class II produce in the market is small on average, as is the proportion of products from covered cultivation that is routed to the industry.

Table 3.2 Distribution of the supply to the Dutch producers organisations by Class I, II, and the industry (2017)

Product	Volume (tonne)	Class I (%)	Class II (%)	Industry (%)
Apples	107,000	77.0	0.5	22.5
Pears	116,000	83.1	6.2	10.7
Sweet peppers	374,000	95.3	4.6	0.1
Tomatoes	744,000	99.4	0.5	0.1

Source: Inventarisatie GroentenFruit Huis, December 2018. Volume relates to the amount based on which the distribution is calculated.

3.3 Food waste and the marketing standards

The Ministry of Agriculture, Nature and Food Quality (LNV) defines food waste as the edible fraction of fruit or vegetables that is not consumed. By-products relate to the fraction that is not suitable for consumption. Food waste can occur in different parts of the chain, even before harvesting.

Open cultivation has the greatest risk of surplus (due to favourable weather conditions) and/or shortage (due to disease/pests or unfavourable weather). Given that these conditions cannot be influenced, the grower can use his know-how to ensure that a maximum amount of the product is harvestable (the 'yes' beside the first box in Figure 3.2).

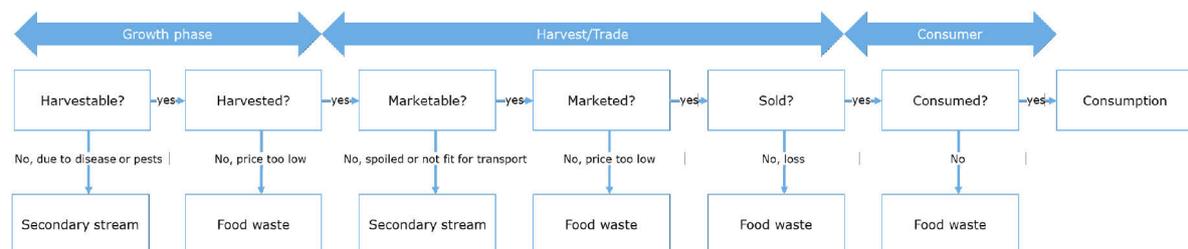


Figure 3.2 Food waste, by-products, and consumption

In the growth phase, before the harvest, market prices for open cultivation produce can be so low that they outweigh the costs of harvesting and trading. For instance, in the case of low prices for Class I and/or for a relatively large proportion of fruit designated as Class II or for industry. In those

circumstances, the production will not be harvested or will be ploughed. This means marketing standards play a role in the classification even before harvesting and the pricing of each class has an impact on what will be harvested. This part of food waste (second box in Figure 3.2) is often not visible as these products never reach the auction or producers organisation.

The third box in the figure refers to the harvested product that is discarded because it is not suitable for consumption (spoiled) or too soft for transport. This is not food waste, but a by-product that can be fermented.

One example regarding the fourth box is the long and dry summer of 2018. There were fewer apples with more (cosmetic) defects. This resulted in a smaller volume of apples in Class I (with higher prices). Buyers relaxed their own requirements on top of the statutory Class I to create more volume. On the other hand, the supply of Class II apples was considerably larger. Although Class II apples are usually sold through auctions, one grower remarked that the price was so low, also due to big harvests in Poland, that it did not outweigh the costs of handling (Groenten & Fruit, 28 September 2018). In this case, even fermentation (which incurs costs) was not an option. It was an exceptional situation that led to this food waste. The cause was a combination of extreme weather conditions and the ongoing demand for Class I produce. For example, retailers could have abolished more of their private requirements to offer more products to consumers.

Surpluses also occur in covered cultivation. The best quality is sorted out. If the remaining produce is not used for food, it is considered food waste. Some grower organisations have started small-scale processing of these residual streams. For instance, since 2009, Prominent has made soup and dried tomatoes from rejected Class I produce (www.agf.nl, 2009 and 2014). Food waste is also avoided when volunteers pick up these residual streams and distribute them through food banks. For instance, this is done by the 30 growers that cooperate in *De Groente en Fruit Brigade* initiative in the Westland region (www.gfactueel.nl, 2018).

Of the auctioned products that enter the supply chain as Class I intended for the supermarket, a fraction does not reach supermarket consumers as there are losses further down the chain, or because part of it is not sold (fifth box).

Gellynck et al. (2017) conducted research to quantify the impact of cosmetic aspects on food waste in Belgium. They categorise all visual aspects as cosmetic aspects. They indicate that lost sales amount to an average of 10% for the 20 researched products, but that there can be significant differences between crops and growers. In this study, lost sales are defined as products that cannot be sold through the intended sales channel because they do not fulfil the requirements of Class I with potential additional private requirements. Lost sales result in an economic loss, but not necessarily food waste.

As reasons for these lost sales, Belgian growers most often cite climate (80%) and diseases and pests (35%). With respect to all fruit and vegetables in Belgium, this translates to annual lost sales of 240,000 tonnes (Gellynck et al., 2017). A third of the lost sales are still destined for human consumption (Class II, treatment or processing, and food bank). According to the researchers, about half of the lost sales, 120,000 tonnes, is food waste.⁶ Table 3.3 shows the breakdown into Class I, human consumption, and food waste for the four product groups. The proportion of Class II is largest for open cultivation. Relative food waste is also highest for apples and pears.

⁶ The destination of the remaining 1/6 fraction is unclear. It is also unclear what year the harvest figures refer to or whether the produce that was not harvested during the growth phase was included in the food waste figures.

Table 3.3 Percentage of production by class and food waste (for growers in Belgium)

Product	Class I (%)	Class II/industry/other human consumption (%)	Food waste (%)
Apples	81.1	13.9	5.0
Pears	88.3	8.2	3.5
Sweet peppers	98.6	0.0	1.4
Tomatoes	97.5	0.1	2.4

Source: calculated from Gellynck et al. (2017). Own conversion (from Figure 6 and Figure 9 of that study).

One similarity to that of the Netherlands (Table 3.2) is that Class II and sales to industry are larger for open cultivation than for covered cultivation. The level of food waste is not quantified for the Netherlands and the Belgian figures cannot simply be translated to the Netherlands.

3.4 Summary

The classification (Extra, I, and II), which establishes specific marketing standards for 10 products and one product group, provides uniformity in quality to enable pricing. This means that buyers know exactly what they can expect, including the shelf life, which contributes to prevention of loss later in the chain, thus preventing food waste.

However, the point is that the demand from the market is stable, meaning there is a large demand for Class I produce (with additional private requirements) in the fresh market. But the conditions impacting production vary (due to drought, hail, frost, disease, and pests), especially for open cultivation. This means that the volumes of the classes can vary depending on the conditions, leading to varying prices. Growers attribute lost sales, the portion of the harvest that falls outside Class I, primarily to those conditions (Gellynck et al., 2017).

Because visual aspects play a big role in the classification, there is a direct relationship between the classification and the visual aspects. However, there is an indirect relationship between the visual aspects, including the cosmetic ones, and food waste. Of course, products that do not reach Class I can be brought to the market as Class II or to the industry for processing. Even a portion of the products that do not meet the minimum standard ('fair, sound & edible') for the fresh market can be processed into food. For open cultivation (apples and pears), these streams already exist and are relatively large. Nevertheless, figures from Belgian growers show that the percentage of food waste is largest in the initial phases of the supply chain for apples and pears. Whether this is also true for the Netherlands must be examined. The cause of this is also unclear. Is it caused by an exceptional situation to which the market did not respond (a particularly hot summer) or is the root cause more structural?

Most of the covered cultivation crops are destined for Class I. Sales to the industry are unusual. For products that do not meet Class I, there is a good chance that they are not intended for human consumption. Perhaps the streams are too small or too irregular for regular trade (but they can be routed to food banks by volunteers or processed on a small scale). However, in the Netherlands, a market has developed for Class II sweet peppers.

When there is shortage of Class I products, it is primarily private parties who can relax their standards to maximise the volume in Class I.

Food waste in the Dutch fruit and vegetable sector has not been quantified, nor has an analysis been carried out of the causes of food waste and the barriers to prevent it. Additionally, food waste that occurs during the growth phase is harder to discover, as there are often no figures available.

4 Impact of removing cosmetic aspects

This chapter examines the impact of removing the cosmetic aspects, as identified in Section 2.2, from the specific marketing standards. It does not include size requirements, as these are not a quality indicator. The minimum quality requirements are also retained, as they can be compared to the general standard ('fair, sound & edible').

That leaves a number of options for removing the cosmetic aspects from the specific marketing standards. These are the obvious options:

1. The cosmetic requirements for Class Extra and Class I are aligned with Class II. Therefore, the classification system remains, but it is based more on shelf life instead.
2. All visual and cosmetic requirements for Class I and Class Extra are retained, but the cosmetic requirements for Class II are lowered.
3. The cosmetic requirements are made more flexible depending on the market conditions.

The impact of these options is described below.

4.1 Economic impact and food waste

Option 1: Align the purely cosmetic requirements for Class Extra and Class I with those of Class II

Within the classification system, this option permits greater variation regarding shape, skin defects and colour defects, as the new Class Extra and Class I will be mixed with products that deviate on these points and which were previously sorted into Class II. This means that Class Extra, with the perfectly shaped fruits and vegetables, will essentially be abolished. Colour types for apple varieties and trade types for tomatoes will remain in place. Classification will still occur based on such aspects as the soundness of the flesh and slight bruising, as these aspects are not considered cosmetic and are still valid. These requirements (still) guarantee better shelf life, ripeness, and freshness of Class I products.

In the previous chapter, an example was provided which described the specific circumstance in which the volume of apples in Class I was low due to a very dry summer, resulting in a price increase. If the purely cosmetic defects of Class II are allowed in Class I, then Class I will contain more products on average, resulting in a higher volume. How much higher is not known at this time. It is expected that the price of Class I will decrease due to the greater supply.

Class I products find their way to consumers through supermarkets, nationally and internationally. If supermarkets and exporters do not set additional requirements, they will have the risk that consumers will take time to become accustomed to the new products in Class I as the product will look slightly different. In the original situation, consumers seem to link the shelf life to the now-abolished cosmetic aspects, among other things. Although little is known about how consumers accept colour, shape, or skin defects (see next section), it is likely that consumers will assume a lower quality and expect a lower price as a result. It is not possible to estimate the degree to which the lower price expected by consumers will relate to the assumed lower quality. If loose products are offered, there is a chance that consumers will only pick out the best looking products from the shelves. This may actually lead to food waste at the retailer.

The volume that will be classified as Class II, which was shown to be relatively small compared to Class I, will decrease on average. For apples, the industry may even be able to absorb the full Class II volume. Will there be a Class II for tomatoes? How big of an impact will this have on the volume of Class II sweet peppers, for which there is currently a market? Class II will also consist of relatively more products with a shorter shelf life, as more products with shape, colour, and skin defects but without the

slight bruising will be added to Class I. Class II apples and pears are already considered to be unsuitable for long-term storage (3 months or more). Therefore, they will need to reach the consumer quickly after harvest. It is possible that limited shelf life will lead to more food waste during trade or in consumers' homes. Traders will also want lower prices for Class II products. It cannot be determined whether this impact will be compensated by the smaller supply.

The possible lower prices for Class I products will negatively impact growers and may cause pressure on the quality in Class I in the long term.

However, in practice, exporters, brokers, and supermarkets will impose additional cosmetic requirements to supplement the new standards in order to maintain either the old Class I standards or their own private requirements. They will likely do this in response to assumed customer expectations and to prevent customers from picking out products on the shelves themselves. This option may lead to a situation in which traders or buyers who initially did not impose additional requirements receive Class I products with, for instance, skin defects and colour defects from exporters, brokers, and supermarkets who did start imposing additional requirements. This will persuade these buyers to also impose private additional requirements. They could also sort and package the products again, but this will result in additional costs and the additional handling could contribute to spoilage. Since, in current practice, an additional set of requirements are already imposed on top of the Class I standards, the ultimate result of this option will be that the distance between the regulatory standards and practice will increase. Because of these privately imposed cosmetic requirements, all price effects that were described above will be negated. Ultimately, it will not have a significant impact on the volume and quality of Class II either.

This will only leave the disadvantage of the increased gap between the statutory requirements for Class I and the requirements imposed by the market. However, if shortages in Class I develop, like they did in the summer of 2018, there will be more room to relax private requirements in order to increase the supply of Class I.

Option 2: Retain the cosmetic requirements for Class I and Extra, but lower the cosmetic requirements for Class II

In this option, the existing cosmetic requirements for Class I and Extra are retained and the requirements for Class II are lowered to allow for products with greater shape, skin, and colour defects to be made available to the fresh market. The visual aspects with additional purposes are not removed for Class II with this option. The volume to which this relates is unknown, but the volume of Class II products can grow at the expense of the volume of fruit and vegetables that are currently routed to the industry for processing.

The impact will also vary per product. The volume of Class II produced is relatively larger for apples and pears than it is for covered cultivation. Therefore, the growth in volume is relatively smaller. Additionally, many Class II apples and pears are currently already routed for processing, as well as fruit that does not meet the minimum standards for the fresh market. A larger volume of Class II (at the expense of 'industry' apples and pears) does not change the situation much and will not have much impact on food waste either.

For tomatoes and sweet peppers, the volume effect for Class II will be relatively larger. This raises the question of what will happen with this additional volume. However, there has started to be some demand in retail, as is clear from the introduction of Class II products in the supermarkets. The products are packaged per kilogram to prevent customers from picking out products. In cases in which a match can be made with a market demand, the growth in volume should not have a negative impact on the price. But this should also be examined further. Besides, the volumes of Class II tomatoes and sweet peppers will still be insufficient to supply all supermarkets with Class II products in the future. The larger volume in Class II will be at the expense of the industry stream, which is already quite small, and will also result in this stream consisting of lesser quality products (as the products with only cosmetic defects will be included in Class II). This stream will become less interesting for the industry and may no longer be purchased. After all, fruit and vegetables for treatment or processing can be bought internationally instead. This could have a negative impact on food waste in the Netherlands.

However, if Class II products become more accepted by consumers, they may begin to replace Class I products. Like the option above, this could negatively impact growers by putting pressure on the prices for Class I products. This possible impact should be weighed against the additional volumes of Class II which will be sold at better prices.

Familiarising the customer with Class II products as an alternative to Class I products is something that private parties can take on, particularly supermarket organisations, by offering both classes side by side on the shelf.

Option 3: Make the cosmetic requirements dependent on market conditions

Inspired by supermarket organisations who, in the summer of 2018, made agreements with their regular suppliers to accept fruit of a slightly lower quality and of a smaller size, it could be suggested that the statutory (cosmetic) standards for Class I can be made more flexible. Depending on the market conditions, defects would be permitted temporarily. The goal is to fill Class I as much as possible during times of scarcity. A flexible standard requires a European platform that determines how the standards will be temporarily adjusted. This means an increased administrative burden, not only because of the platform and the decision-making support, but also due to translating every change into practice, whereby the regulatory body will need to maintain flexible standards. And if standards are made more flexible for each country or region, this could mean that, for instance, the norm for skin defects for Italian apples can be 3 cm², but 8 cm² for French apples due to them having had more hail. The question is how the regulators will be able to distinguish between all the defects. It could possibly also result in additional transaction costs for private parties, as they have to deal with changing regulatory standards. Essentially, offering more Class I products with fewer private requirements or Class II products more often is also a solution in this situation, without all the administrative burden.

4.2 Consumer demands

Consumer demands have an impact in two ways. On the one hand, it is presumed that consumers only buy fruit and vegetables that comply with high visual standards and that they will not buy fruit from a lower class if the classes are presented next to each other on the shelf (which will lead to losses for the retailer). On the other hand, several actors (such as growers and retailers) use the appearance of fruit and vegetables as a way to distinguish themselves in a competitive market in order to attract customers. In both cases, it is presumed that consumers care about the appearance of fruit and vegetables. The question is whether this presumption is correct, and if so, whether these preferences can be changed.

Research seems to indicate that consumers do indeed have a preference for fruit and vegetables with a good appearance in relation to size, colour, weight, and shape (De Hooze et al., 2017; Loebnitz, Schuitema and Grunert, 2015; Loebnitz and Grunert, 2018; Göbel et al., 2015; Stenmarck et al., 2011). This preference seems to stem from a demand for safe, quality products in terms of taste and shelf life. Consumers use the appearance of fruit and vegetables to determine whether the products will be safe and delicious (Jongen et al., 1998; Loebnitz and Grunert, 2018). Therefore, consumer *expectations* in relation to food safety and quality are important.

Introduction of fruits and vegetables with lower standards for appearance, but with the same safety and quality requirements will only be successful if consumers will actually perceive these products as safe and good quality. The introduction of products such as *Buitenbeentjes* (Albert Heijn) shows that consumers are prepared to buy less perfect fruit and vegetables. These Class II products are packaged and sold to prevent customers from picking out products available on the shelf.

Research suggests that there is a difference between consumers' acceptance of the different external defects of fruit and vegetables:

- The extent of the defect appears to have a strong effect. A small defect is accepted easier than a large defect.
- The type of defect is also important. The little research that has been conducted seems to imply that consumers are more willing to buy products that have a *different shape* (for instance curved cucumbers), but are less willing to buy products with *damage* (for instance a slightly bruised apple). The expected safety and quality may play a role here. Another effect is the value that consumers place on convenience (Aschermann-Witzel, Giménez and Ares, 2018), in which the acceptance of other shapes diminishes in relation to how difficult it will be to clean or process the product during cooking. The price of a product can influence consumer preference for less imperfect products, but only to a certain extent (same research).
- Lastly, consumers seem to respond differently to imperfect fruits and vegetables that are offered in the supermarkets compared to imperfect fruits and vegetables that have already been brought into the household. More imperfections are accepted in the latter case (De Hooge et al., 2018).

From this very brief literature review, it seems that there is not a great deal of insight into when consumers will accept less perfect fruit and vegetables or what extent or combination of defects for various products matter to them. It is also currently unknown what the influence of price is on the willingness of consumers to buy imperfect fruit and vegetables. Furthermore, it is unknown whether the imperfect fruit and vegetables will be consumed in the household or whether they will still go to waste.

Another unanswered question is whether consumers will adjust their expectations about the safety and quality of fruit and vegetables after they have been exposed to them more often and have gained some positive experiences. Literature about the introduction of new products to the market provide optimism that consumers will indeed adjust their expectations after having more positive experiences with the product. Once again, the market would benefit from more insight into how the process of acceptance can be accelerated.

5 Conclusions and recommendations

Conclusions

There are eleven specific marketing standards for fruit and vegetables. Six of those relate to products that are cultivated in the Netherlands. The standards for four products, namely apples, pears (both open cultivation), tomatoes, and sweet peppers (both covered cultivation) were discussed in greater detail in this memorandum. Conclusions relate to the Dutch situation.

The specific marketing standards are used to distinguish quality, which allows for transparent trade and fair pricing of the product. There is a direct relationship between visual aspects and the quality classification. These visual aspects include cosmetic aspects. However, there is no direct relationship between the classification/visual aspects and food waste (Section 3.5). After all, if a product does not achieve Class I, it can still be sold as Class II, sent for further processing, or end up in a food bank. In those cases the produce is not wasted.

There is a large demand for Class I produce while the supply fluctuates, especially for produce from open cultivation. The amount of produce that is sold as Class II on the market or that is processed is larger for open cultivation than it is for covered cultivation. Because the supply for open cultivation fluctuates and the demand is fairly stable, there is a challenge to valorise Class II products, in particular when there is a large supply. The challenge for covered cultivation lies predominantly in the valorisation of the products that fall outside Class I (and any additional private requirements).

There are few figures available regarding the extent of waste in the different phases of the chain in the Dutch fruit and vegetable sector. There is a particular lack of information about the proportion of products that does not reach the market or is not distributed.

For apples, pears, tomatoes, and sweet peppers, visual requirements from the marketing standards were mapped out and their cosmetic aspects were identified (Section 2.2). These cosmetic requirements concern shape, colour, and skin (including russetting) defects.

To examine whether lowering these cosmetic requirements leads to a reduction in food waste, three options were explored (Chapter 4). In the first option, the cosmetic requirements for Class I (and Extra) are replaced with those of Class II. In the second option, the cosmetic requirements for Class II are relaxed. The third option describes a situation with flexible statutory requirements. The effects were interpreted qualitatively.

The outcome of option 1 is that consumers will assume that the new Class I will be of a lower quality and, as a result, will want to pay a lower price for this product, although not much is known yet about consumer acceptance regarding defects in colour, shape, or skin. Consumers might select the products from the shelves themselves (if they are offered separately), which leads to unsold produce and thus food waste. As a result, private parties may abandon this experiment and impose their own additional private requirements. This would only result in a larger gap between practice and the specific marketing standards.

Option 2 is in line with initiatives already being implemented in the market, in which the additional volume in Class II can be used to offer Class II produce alongside that of Class I in the supermarket. This is particularly true for pears and covered crops included here, as a large proportion of Class II apples are processed industrially. However, the increase in volume for Class II will be limited as the size of Class I is extremely large for covered crops. The domestic flow to the industry is very small already and could become even less attractive to collect. This could actually increase food waste. It could also result in displacement effects for Class I products, which may put pressure on the prices in this class. These effects have to be weighed against the possible higher volumes and prices for Class II products.

A third option is to introduce flexible standards for Class I. These standards could be adjusted according to market conditions. This will result in a significant administrative burden, without any additional benefits. After all, it is already possible to offer Class II as well as Class I, if the market conditions permit. Whether this happens depends on market operators.

Recommendations

Option 2, relaxing the cosmetic requirements for Class II, provides the most potential:

- Consumers will be able to further familiarise themselves with alternative quality classes;
- Class I is the major focus for the sector and this will remain unchanged. The option provides the time necessary to determine how the market will develop further and how cultivators will adapt;
- These opportunities can be further developed with the sector. Removing all visual aspects, resulting in abolishing the classification system is a step too far, but relaxing the requirements in relation to cosmetic aspects (shape, skin, and colour defects as well as russeting, as described in Section 2.2) can be discussed (communication GroentenFruithuis).

For this option, the impact of the adjustment of cosmetic aspects (shape, colour, skin including russeting) need to be mapped out in relation to changes in volumes, the possible negative impact of food waste on the smaller flows to the industry, the extent to which market operators will offer Class II produce, and the possible replacement effects in the market for Class I produce.

The current extent of food waste in the different phases of the fresh fruit and vegetable supply chain is unknown, nor is it clear what causes it. However, the causes will include the way in which private parties implement their classification as well as any barriers preventing streams from being sold or processed outside the main stream. As a result, the impact of the proposed options cannot be weighed against other measures.

For that reason, further understanding is required of the underlying (business economic) decisions of market operators in relation to classification. Additional information is also required in relation to the extent of consumer acceptance regarding different colours, shapes, and sizes of produce in the supermarket, as well as regarding how consumer acceptance will be affected as these products become commonplace.

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Appendix 1 Provisions concerning quality for apples

Summary of Part B specific marketing standards, Part 1: marketing standards for apples of the Commission Implementing Regulation (EU) No. 543/2011.

Apples are classified by colour group and by russetting.

A. Minimum requirements for all quality classes, after preparation and packaging:

- intact;
- sound, products affected by rotting or deterioration such as to make it unfit for consumption are excluded;
- clean, practically free of any visible foreign matter;
- practically free from pests;
- free from damage caused by pests affecting the flesh;
- free from serious watercore, with the exception of the Fuji variety and its mutants;
- free of abnormal external moisture;
- free of any foreign smells and/or tastes.

The development and condition of the apples must be such as to enable them to withstand transportation and handling and to arrive in satisfactory condition at the place of destination.

B. Maturity requirements:

The apples must be sufficiently developed and display satisfactory ripeness.

The development and state of maturity of the apples must be such as to enable them to continue their ripening process and to reach the degree of ripeness required in relation to the varietal characteristics. In order to verify the minimum maturity requirements, several parameters may be considered (e.g. morphological aspect, taste, firmness and refractometric index).

C. Classification:

Apples are classified in three classes, as defined below.

	Extra	I	II
Quality	superior, characteristic of the variety	good, characteristic of the variety	apples which do not qualify for inclusion in the higher classes but satisfy the minimum requirements
Colour requirements	per colour group	per colour group	none
Flesh	perfectly sound	perfectly sound	free from serious defects
Permitted defects in fruits:		slight, provided these do not affect the general appearance of the produce, the quality, the shelf life, and the presentation in the package:	provided the apples retain their essential characteristics as regards the quality, the shelf life, and the presentation:
- defects in shape	none	slight	allowed
- defects in development	none	slight	allowed
- defects in colouring	none	slight	allowed
- russetting	very slight (such as brown patches that may not go outside the stem cavity, slight isolated traces of russetting)	slight (such as brown patches that may go slightly beyond the stem or pistil cavities but may not be rough, thin net-like russetting not exceeding 1/5 of the total fruit surface, dense russetting not exceeding 1/20 of the total fruit surface)	slight (such as brown patches that may go beyond the stem or pistil cavities and may be slightly rough, thin net-like russetting not exceeding 1/2 of the total fruit surface, dense russetting not exceeding 1/3 of the total fruit surface)
- skin defects	very slight	slight, but must not extend over more than: <ul style="list-style-type: none"> - 2 cm in length for defects of elongated shape - 1 cm² of total surface area for other defects, with the exception of scab, which must not extend over more than 0.25 cm², cumulative, in area 	allowed, but must not extend over more than: <ul style="list-style-type: none"> - 4 cm in length for defects of elongated shape - 2.5 cm² of total surface area for other defects, with the exception of scab (<i>Venturia inaequalis</i>), which must not extend over more than 1 cm², cumulative, in area
- slight bruising not exceeding	n/a	1 cm ² of total surface area and not discoloured	1.5 cm ² in area which may be slightly discoloured
Stem	intact	may be missing, provided the break is clean and the adjacent skin is not damaged	

Appendix 2 Provisions concerning quality for pears

Summary of Part B specific marketing standards, Part 6: marketing standards for pears of the Commission Implementing Regulation (EU) No. 543/2011.

A. Minimum requirements for all quality classes, after preparation and packaging:

- intact;
- sound, products affected by rotting or deterioration such as to make it unfit for consumption are excluded;
- clean, practically free of any visible foreign matter;
- practically free from pests;
- free from damage caused by pests affecting the flesh;
- free of abnormal external moisture;
- free of any foreign smells and/or tastes.

The development and condition of the pears must be such as to enable them to withstand transportation and handling and to arrive in satisfactory condition at the place of destination.

B. Maturity requirements:

The development and maturity of the pears must be such as to enable them to continue their ripening process and to reach the degree of ripeness required.

C. Classification:

Pears are classified in three classes, as defined below.

	Extra	I	II
Quality	superior, characteristic of the variety	good, characteristic of the variety	pears which do not qualify for inclusion in the higher classes but satisfy the minimum requirements
Flesh	perfectly sound	perfectly sound	free from serious defects
Permitted defects in fruits:		slight, provided these do not affect the general appearance of the produce, the quality, the shelf life, and the presentation in the package:	provided the pears retain their essential characteristics as regards the quality, the shelf life and the presentation
- defects in shape	none	slight	allowed
- defects in development	none	slight	allowed
- defects in colouring	none	slight	allowed
- rough russeting	free from	very slight	slight
- skin defects	very slight	slight, but must not extend over more than: - 2 cm in length for defects of elongated shape - 1 cm ² of total surface area for other defects, with the exception of scab, which must not extend over more than 0.25 cm ² , cumulative, in area	allowed, but must not extend over more than: - 4 cm in length for defects of elongated shape - 2.5 cm ² of total surface area for other defects, with the exception of scab (<i>Venturia pirina</i> and <i>V. inaequalis</i>), which must not extend over more than 1 cm ² cumulative in area
- slight bruising not exceeding	n/a	1 cm ²	2 cm ²
Stem	intact	may be slightly damaged	
Pears may be gritty	no	no	

Appendix 3 Provisions concerning quality for sweet peppers

Summary of Part B specific marketing standards, Part 8: marketing standards for sweet peppers of the Commission Implementing Regulation (EU) No. 543/2011.

A. Minimum requirements for all quality classes, after preparation and packaging:

- intact;
- sound, products affected by rotting or deterioration such as to make it unfit for consumption are excluded;
- clean, practically free of any visible foreign matter;
- fresh in appearance;
- firm;
- practically free from pests;
- free from damage caused by pests affecting the flesh;
- free of damage caused by low temperature or frost;
- with peduncles attached, the peduncle must be neatly cut and the calyx must be intact;
- free of abnormal external moisture;
- free of any foreign smells and/or tastes.

The development and condition of the sweet peppers must be such as to enable them to withstand transportation and handling and to arrive in satisfactory condition at the place of destination.

B. Classification:

Sweet peppers are classified in three classes, as defined below.

	Extra	I	Class II
Quality	superior, characteristic of the variety and/or the commercial type	good, characteristic of the variety and/or the commercial type	sweet peppers which do not qualify for inclusion in the higher classes but satisfy the minimum requirements
Permitted defects in fruits:	none, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the shelf life and the presentation in the package	the following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the shelf life and the presentation in the package:	the following defects may be allowed provided the sweet peppers retain their essential characteristics as regards the quality, the shelf life and the presentation:
- defects in shape		slight	allowed
- slight silvering or damage caused by thrips		covering not more than 1/3 of the total surface area	covering not more than 2/3 of the total surface area
- defects in the skin, such as:		slight	allowed
- pitting, scratching, sunburn, pressure marks and/or healed injuries		defects of elongated shape: not more than 2 cm in length other defects: not more than 1 cm ² in total	defects of elongated shape: not more than 4 cm in length other defects: not exceeding 2.5 cm ² of the total area
- dry superficial cracks		covering in total not more than 1/8 of the total surface area	covering in total not more than 1/4 of the total surface area
- blossom end deterioration			not more than 1 cm ² in total
- shrivelling			not exceeding 1/3 of the surface
- damaged peduncle		slightly damaged peduncle	damaged peduncle and calyx, provided the surrounding flesh remains intact

Appendix 4 Provisions concerning quality for tomatoes

Summary of Part B specific marketing standards, Part 10: marketing standards for tomatoes of the Commission Implementing Regulation (EU) No. 543/2011.

Tomatoes may be classified into four commercial types:

- 'round' tomatoes
- 'ribbed' tomatoes
- 'oblong' or 'elongated' tomatoes
- 'cherry' tomatoes (including 'cocktail' tomatoes).

A. Minimum requirements for all quality classes, after preparation and packaging:

- intact;
- sound, products affected by rotting or deterioration such as to make it unfit for consumption are excluded;
- clean, practically free of any visible foreign matter;
- fresh in appearance;
- practically free from pests;
- free from damage caused by pests affecting the flesh;
- free of abnormal external moisture;
- free of any foreign smells and/or tastes.

In the case of trusses of tomatoes, the stems must be fresh, healthy, clean, and free from all leaves and any visible foreign matter.

The development and condition of the tomatoes must be such as to enable them:

- to withstand transportation and handling;
- to arrive in satisfactory condition at the place of destination.

B. Classification:

Tomatoes are classified in three classes, as defined below.

	Extra	I	II
Quality	superior, firm and characteristic of the variety and/or commercial type	good, firm and characteristic of the variety and/or commercial type	tomatoes which do not qualify for inclusion in the higher classes but satisfy the minimum requirements reasonably firm
Colour	indicates their state of ripeness		
Greenbacks	none	none	
Permitted defects in fruits:	very slight superficial defects, provided these do not affect the general appearance, the quality, the shelf life and the presentation in the package:	slight, provided these do not affect the general appearance of the produce, the quality, the shelf life, and the presentation in the package:	provided the tomatoes retain their essential characteristics as regards the quality, the shelf life and the presentation:
- defects in shape and development	none	slight	allowed
- defects in colouring	none	slight	allowed
- skin defects	none	slight	- allowed, provided they do not seriously affect the flesh - healed cracks not more than 1 cm long
- bruises	none	very slight	allowed, provided they do not seriously affect the flesh
Defects in ribbed tomatoes	none	- healed cracks not more than 1 cm long - no excessive protuberances - small umbilicus, but no suberisation - suberisation of the stigma up to 1 cm ² - fine blossom scar in elongated form (like a seam), but not longer than 2/3 of the greatest diameter of the fruit	- more pronounced protuberances than allowed under Class I, but without being misshapen - an umbilicus - suberisation of the stigma up to 2 cm ² - fine blossom scar in elongated form (like a seam)

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Wageningen University & Research
MEMORANDUM
2019-014

The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.



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