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CORRECTION

Correction to: How origin, packaging and seasonality determine the environmental impact of apples, magnified by food waste and losses

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Correction to: Int J Life Cycle Assess
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After publishing the abovementioned article in the "Online First Articles" list, an error was discovered. This error was made during the calculation of the impact of the distribution phase of New Zealand apples. More specifically, the cooling on the reefer ships during the overseas transport was counted twice. After discovering the error, all calculations have been repeated.

The trends, discussions, and conclusions of the article remain the same, but some numbers need adjustment, as listed hereunder.

Abstract: In the case of climate change, food waste and losses contribute up to 25% or *17%* for BE or NZ apples, respectively, as all lost food travels in vain through the food chain and needs to be disposed of.

The online version of the original article can be found at https://doi.org/10.1007/s11367-018-1522-0

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s11367-018-1555-4) contains supplementary material, which is available to authorized users.

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3.2.3 Distribution: In scenario A, this sub-stage contributes between *41 and 85%* to the overall impact along the chain. Due to its high contribution, it is the only hotspot *in all but one impact category* for the NZ apple chain. Looking for example at the CC impact of an average kilogram of NZ apples, the overseas refrigerated shipment is responsible for *0.65* kg CO_2 eq, which is *50%* more than the total CC impact of the BE apple chain.

3.2.4 Packaging: *Secondary packaging is* a hotspot for NZ apples *in the MD impact category and* is the second biggest contributor to the total chain impact of NZ apples in *three other* ICs assessed in scenario A (Table 5).

3.3 Food waste along the chain: For climate change, for example, *0.09* kg CO_2 eq is associated with the share of NZ apples that enters the food chain but never makes it to the consumer. Another *0.08* kg CO_2 eq is associated with the share of NZ apples that does make it to the consumer but is in the end thrown away. In total, these impacts represent about *17%* of the total chain impact of an average kilogram of NZ apples (Electronic Supplementary Material, Online Resource 2, sheet 10). […] Thus, only 75% or *83%* of the CC impact associated with BE or NZ apples, respectively, corresponds to apples that are effectively consumed.

4.1 Impact along the chain: Focusing on import produce, Mithraratne et al. (2008) concluded that total greenhouse gas emissions associated with NZ kiwifruit consumed in the UK are at 1.62 kg CO_2 eq per kg kiwi which is of the same magnitude as the NZ apples in this study (*1.00* kg CO_2 eq per kg apples) despite the differing fruit and system boundaries (exclusion of repacking in Europe; higher food loss along the supply chain). […] In the present study, the overseas shipping stage contributed to *0.65* kg CO_2 eq per kg apple, which is

Table 4

IC	Unit	Origin	Scenario						
			A	B		C		D	
				Min.	Max.	Min.	Max.	Min.	Max.
CC	10^{-2} kg CO_2 eq	BE	38.1	35.9	41.1	33.8	41.1	31.5	44.0
		NZ	100	99.6	101	93.6	102	92.8	103
PM	10^{-5} kg $PM_{2.5}$ eq	BE	21.9	21.2	23.0	19.2	23.8	18.4	24.8
IRHH	10^{-3} kBq U^{235} eq	BE	93.9	68.4	127	89.0	97.2	62.9	132
POF	10^{-4} kg NMVOC eq	NZ	105	104	105	101	106	101	106
AC	10^{-4} molc H^+ eq	BE	25.3	24.5	26.3	22.9	26.9	22.1	28.0
		NZ	144	143	144	139	145	138	146
TEU	10^{-4} molc N eq	NZ	411	409	412	399	414	398	416
FEU	10^{-5} kg P eq	BE	11.5	11.0	12.3	9.49	12.9	8.91	13.7
MEU	10^{-5} kg N eq	BE	97.6	95.5	100	92.7	101	90.6	104
		NZ	388	386	389	377	391	375	393
MD	10^{-6} kg Sb eq	BE	51.9	50.0	54.4	46.4	55.6	44.5	58.2
		NZ	129	127	131	120	131	119	133

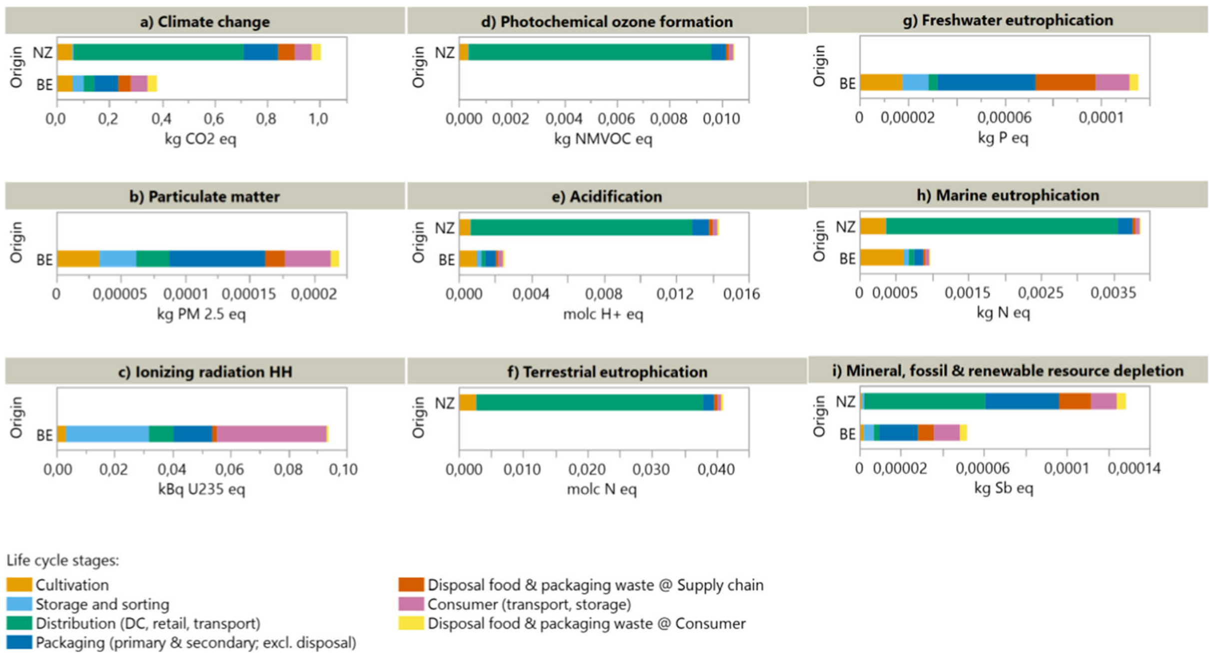
Table 5 Part 2 for the New Zealand apple

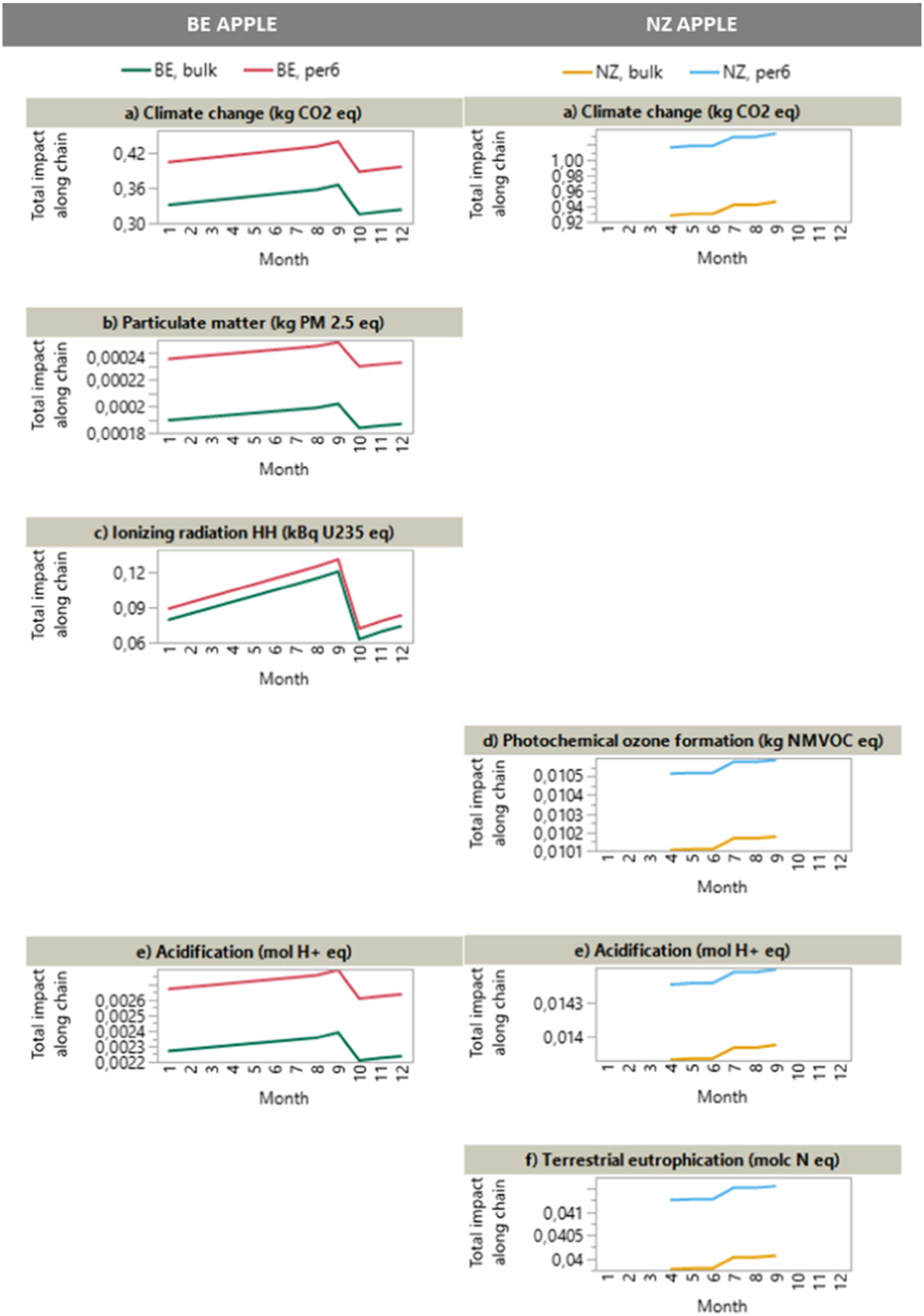
NZ apples	CC	PM	IRHH	POF	AC	TEU	FEU	MEU	MD
Cultivation	6			3	4	7		9	1
Storage and sorting									
Transport	< 1			< 1	< 1	< 1		< 1	< 1
Storage	< 1			< 1	< 1	< 1		< 1	1
Sorting	< 1			< 1	< 1	< 1		< 1	< 1
Distribution									
Storage in retail and DC	< 1			< 1	< 1	< 1		< 1	< 1
Transport truck	6			3	2	3		3	4
Overseas transport and cooling	**58**			**85**	**83**	**83**		**79**	**41**
Packaging									
Primary packaging	4			1	2	1		1	2
Secondary packaging	9			4	5	3		4	**26**
Disposal supply chain	6			1	1	1		1	12
Consumer	6			2	2	1		1	10
Disposal consumer	4			< 1	1	1		< 1	3
Total (%)	*100*			*100*	*100*	*100*		*100*	*100*

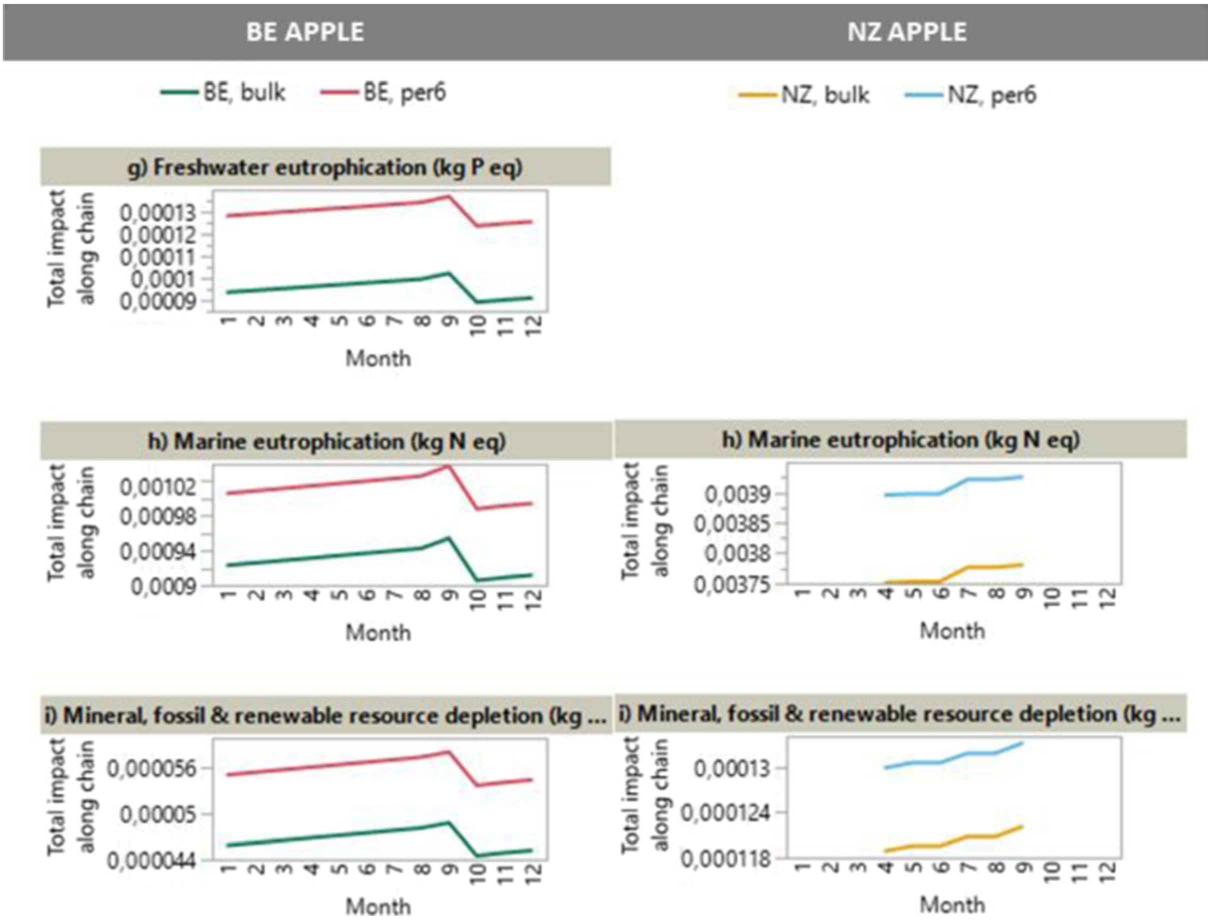
similar to the impacts found in the literature: 0.7 kg CO_2 eq per kg NZ kiwi consumed in the UK (Mithraratne et al. 2008), 0.65–0.67 kg CO_2 eq per kg NZ kiwi imported in Germany (Robertson et al. 2014), and 0.75 kg CO_2 eq per kg Costa Rican bananas shipped to Norway.

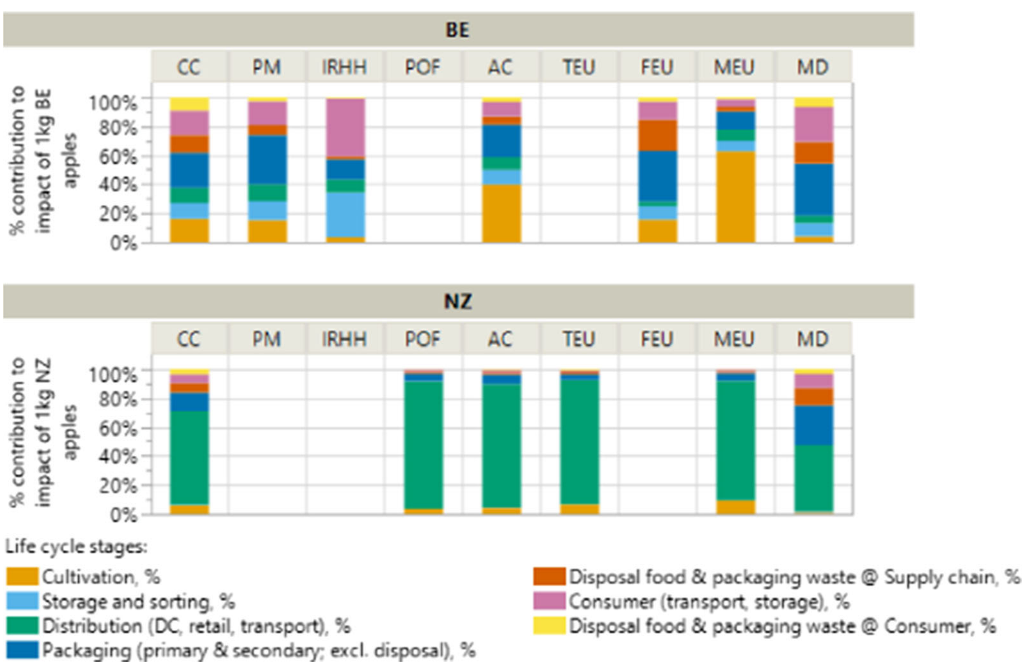
4.2 Food waste: For climate change, for example, about 15% of the impacts associated with in-house consumption in Germany are attributable to food losses whereas in our study, this share is *17%* for NZ apples consumed in Belgium and goes up to 25% for BE apples.

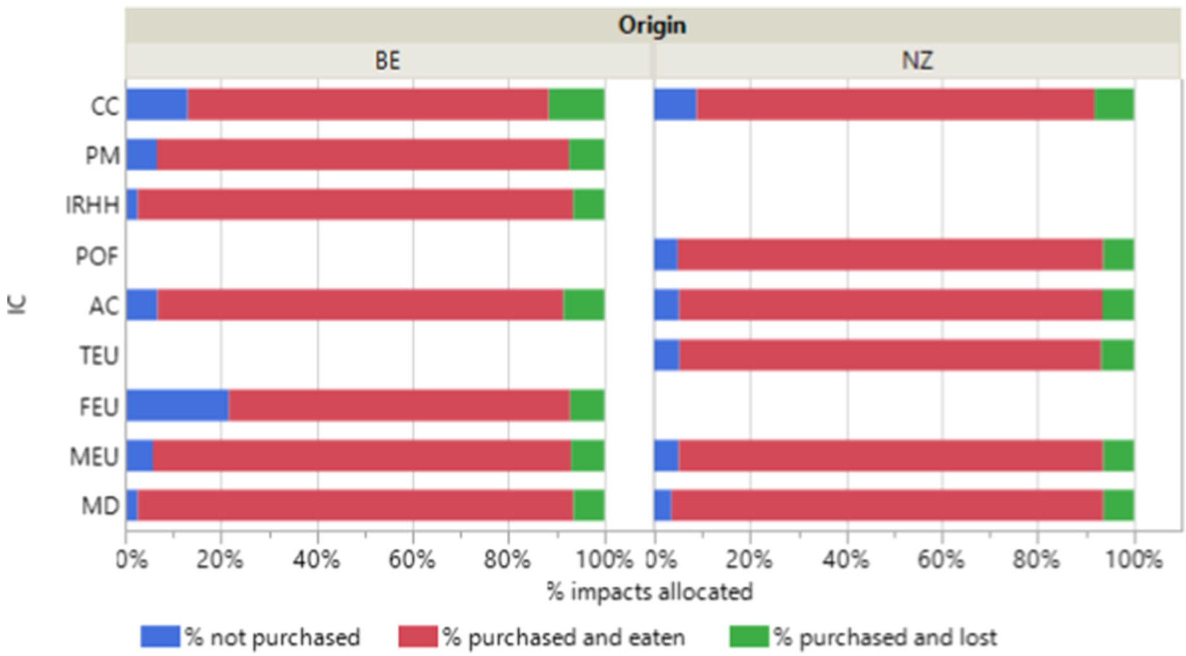
This has led to the corrected Figs. 3 through 7. Corrected supplementary materials ESM 1 and ESM 2 are available.




BE APPLE
NZ APPLE
BE, bulk
BE, per6
NZ, bulk
NZ, per6
a) Climate change (kg CO2 eq)
Total impact along chain
0,42
0,36
0,30
Month
a) Climate change (kg CO2 eq)
1,00
0,98
0,96
0,94
0,92
b) Particulate matter (kg PM 2.5 eq)
0,00024
0,00022
0,0002
0,00018
c) Ionizing radiation HH (kBq U235 eq)
0,12
0,09
0,06
d) Photochemical ozone formation (kg NMVOC eq)
0,0105
0,0104
0,0103
0,0102
0,0101
e) Acidification (mol H+ eq)
0,0026
0,0025
0,0024
0,0023
0,0022
e) Acidification (mol H+ eq)
0,0143
0,014
f) Terrestrial eutrophication (molc N eq)
0,041
0,0405
0,04
1 2 3 4 5 6 7 8 9 10 11 12


BE APPLE
NZ APPLE
BE, bulk
BE, per6
NZ, bulk
NZ, per6
g) Freshwater eutrophication (kg P eq)
Total impact along chain
Month
h) Marine eutrophication (kg N eq)
Total impact along chain
Month
h) Marine eutrophication (kg N eq)
Total impact along chain
Month
i) Mineral, fossil & renewable resource depletion (kg ...
Total impact along chain
Month
i) Mineral, fossil & renewable resource depletion (kg ...
Total impact along chain
Month


BE
CC
PM
IRHH
POF
AC
TEU
FEU
MEU
MD
% contribution to impact of 1kg BE apples
NZ
% contribution to impact of 1kg NZ apples
Life cycle stages:
Cultivation, %
Storage and sorting, %
Distribution (DC, retail, transport), %
Packaging (primary & secondary; excl. disposal), %
Disposal food & packaging waste @ Supply chain, %
Consumer (transport, storage), %
Disposal food & packaging waste @ Consumer, %



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