

## Summary

- ✓ Strawberries packed in microperforated top sealed punnets in a controlled chilled chain have a longer shelf life. The quality improves and in store waste is being reduced by 33%. The experimental data with the Perfotec system, comprising of a Perfotec Fast Respiration Meter, AMAP website and Perfotec laser with automatic OTR control, confirmed this.
- ✓ Strawberries packed in microperforated film had no weight loss.
- ✓ Optimal CO<sub>2</sub> concentration for storage of Virtue strawberries at maximum 9 °C is less then 15%. In a 5 week distribution centre trial with M&S the shelf life was extended with 2 days.
- ✓ Optimal O<sub>2</sub> and CO<sub>2</sub> conditions vary per cultivar.
- ✓ Regular measurement of respiration rate is needed to allow the right response to large variations in respiration rate of cultivars. Fact based adjustment of the laser microperforations per package works in practice.
- ✓ The potential of the Perfotec system on shelf life improvement of strawberries has been proven by internal trials and a pilot M&S distribution centre trial.

### Want to know more?

If you are interested into more details like the list of references please feel free to contact us at [amap@top-bv.nl](mailto:amap@top-bv.nl)  
 More information on the technology can be found at: [www.topwiki.nl](http://www.topwiki.nl)

## Strawberries

### Perfotec empirical evidence

Literature data optimal storage condition and empirical evidence of the Perfotec system



## Literature data

### Benefits and issues of MAP packed strawberries

Main advantages reported by literature of packing strawberries in closed packagings are reduced loss weight and improved appearance compared to strawberries packed in open containers [6]. Cultivars respond differently to modified atmosphere storage in allowed maximum CO<sub>2</sub> concentrations. In certain cases aroma development is affected [4,6,7]. Identified CO<sub>2</sub> sensitive cultivars are *Kent*, *Jewel*, *Honeoye* and *Gov. Simcoe*. Identified insensitive ones are *Annapolis*, *Cavendish* and *Earliglow*. The CO<sub>2</sub> tolerance is different for whole (25%) and fresh cut strawberry's (12%) [7].

### Shelf life as function of storage conditions

Keeping quality days of various varieties packed at various O<sub>2</sub> & CO<sub>2</sub> conditions were found (see table). *Botrytis* growth is linear related to ripeness during harvest (4).

Cultivar, origin	O <sub>2</sub> [%]	CO <sub>2</sub> [%]	T [°C]	Shelf life [days]	Note	Ref.*
Unknown, USA	5-10	15-20	0-1	n.d.	10-15% CO <sub>2</sub> inhibits development of <i>Botrytis</i> rot	1
Unknown, Israel	3-5	5-10	7	5	Overall score	2
Camarosa, Turkey	5-8	2-5	4	14	Overall score	3
Elsanta, the Netherlands	5	15	8	11	5% spoilage by <i>Botrytis</i>	4
Elsanta, the Netherlands	10	12	10	4.5-6	5% spoilage by <i>Botrytis</i> ; 2 batches	4
Camarosa, Turkey	5	2	4	14	Overall score	5
Honeoye, Sweden	11-14	9-12	5	7+	Experiment stopped at day 7	6
Korona, Sweden	11-14	9-12	5	7+	Experiment stopped at day 7	6

\*Available via TOP at amapl@top-bv.nl

### Respiration rate

Reported rates show the impact of cultivar as well as seasonal influence.

Cultivar, origin	RR (C)O <sub>2</sub> value in ml air/kg.24hr	T[°C]	Ref.*
Unknown, USA	250-500	5	1
<i>Elsanta</i> , the Netherlands	520 - 2500	4	4, 11
<i>Premier</i> , UK	1300	9	12
<i>Triumph</i> , UK	1250	9	13
<i>Virtue</i> , Spain	1000 - 1200	9	8
<i>Splendor</i> , Spain	1200 - 1800	9	9

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## Experimental data

### Experimental set up

Cultivar: *Virtue*

Storage conditions: 3 & 9 °C

Flexible film with anti-fog

Evaluation criteria and methods: sensory

Per type 32 packagings were being made first.

Subsequently a 5 week M&S distribution centre trial was carried out.

Packaging	Target O <sub>2</sub> [%]	Target CO <sub>2</sub> [%]	Extra shelf life days	Quality judgement
Macroperforated	-	-	-	Fermentation starts
Microperforated	10-15	< 15	2 to 4	OK

