



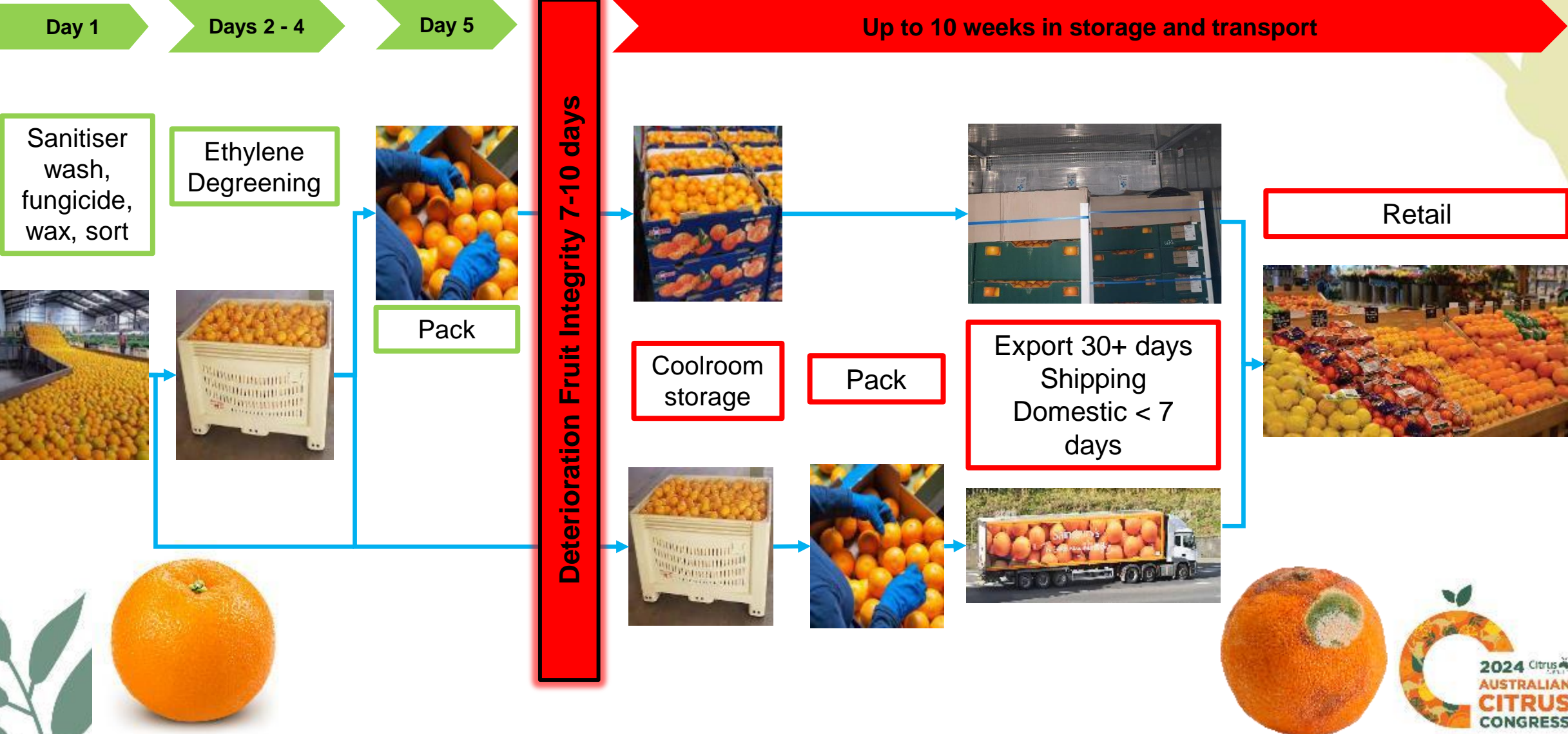
STOP THE ROT!

Improving the profitability and sustainability of citrus operations

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Citrus Supply Chain



Food safety and spoilage risks

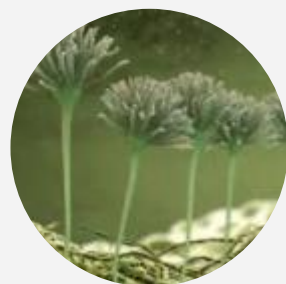


Microorganisms

Bacteria



Fungi (Mould & Yeast)



Spores



Highly evolved to survive harsh conditions, grow slowly under refrigerated conditions, spread via tough airborne spores and can be resistant to sanitisers.



Ethylene



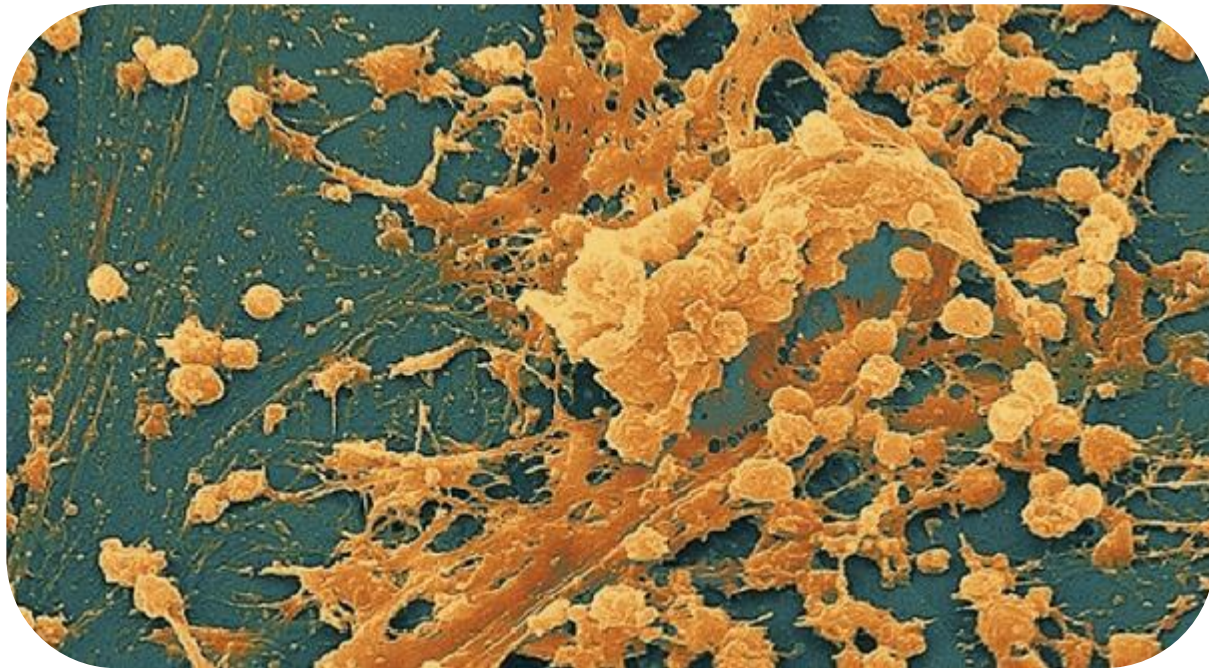
Accelerates aging causing softening, colour changes, flavour / aroma development and **increased susceptibility to microbial spoilage.**



Biofouling

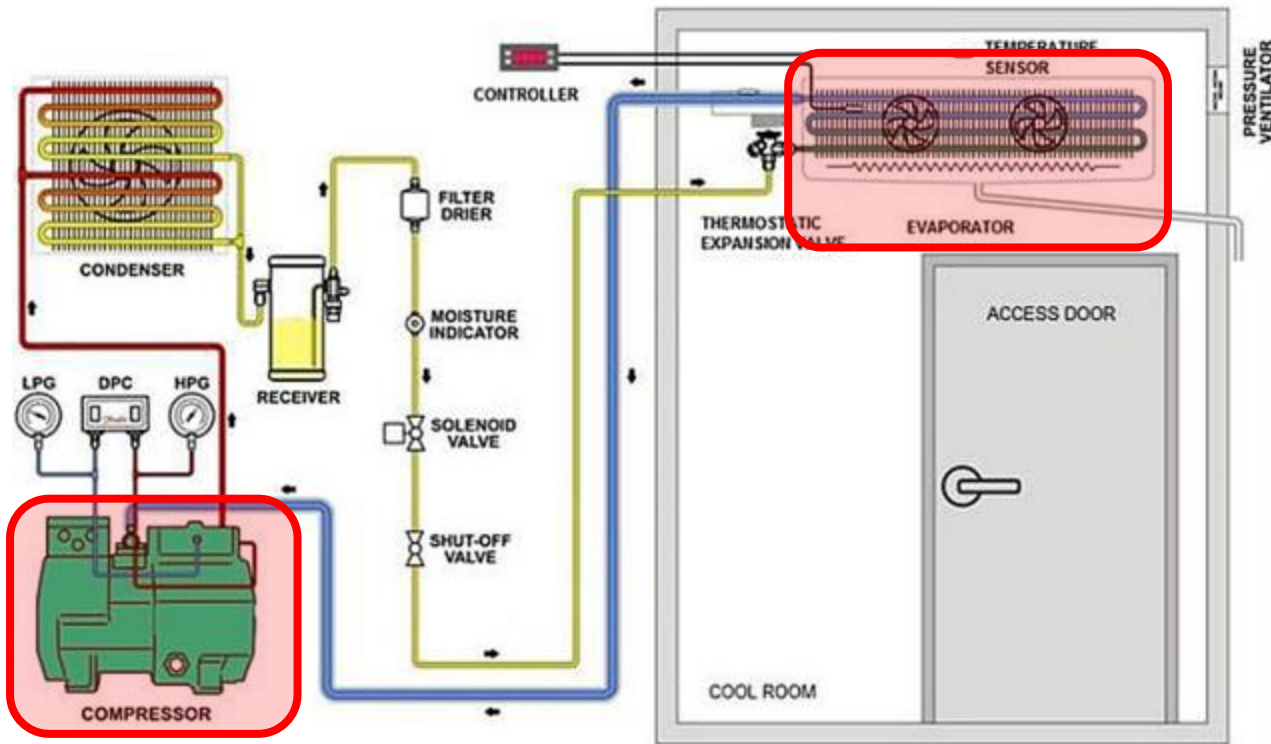
Caused by biofilm a key driver of food safety risks and produce spoilage losses.

Biofilm is a sticky, protective matrix formed by bacteria and fungi on produce and storage surfaces, hard to clean, resistant to sanitisers and is a source of cross-contamination.



Refrigeration Biofouling

Builds up over time increasing microbial growth, cross-contamination and reducing cooling system performance leading to product spoilage, microbial risk and increased costs.



Reduces Asset Life

- Fans motors work harder
- Insulates coils so compressors work harder
- Biocorrosion damages evaporator fins

Increases Costs

- Increased electricity to maintain temperature
- More frequent breakdowns and repairs
- More intensive routine cleaning

Ultra Low Dose Hydrogen Peroxide (ULD-HPV)



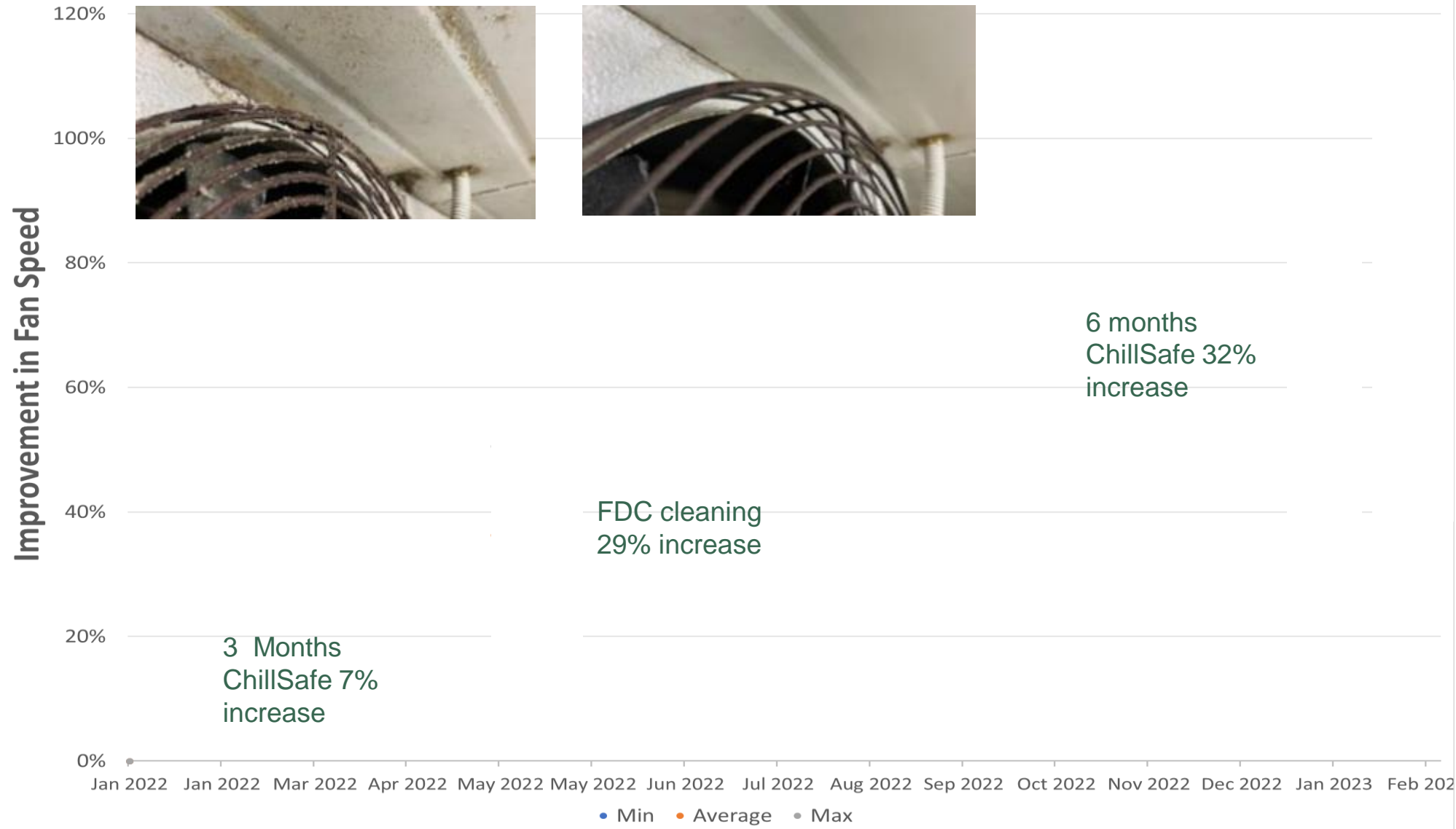
Absorbs moisture from the air producing ULD-HPV continually damaging microbes and reducing ethylene in any storage space.



Improved Fan Speed Commercial Bakery



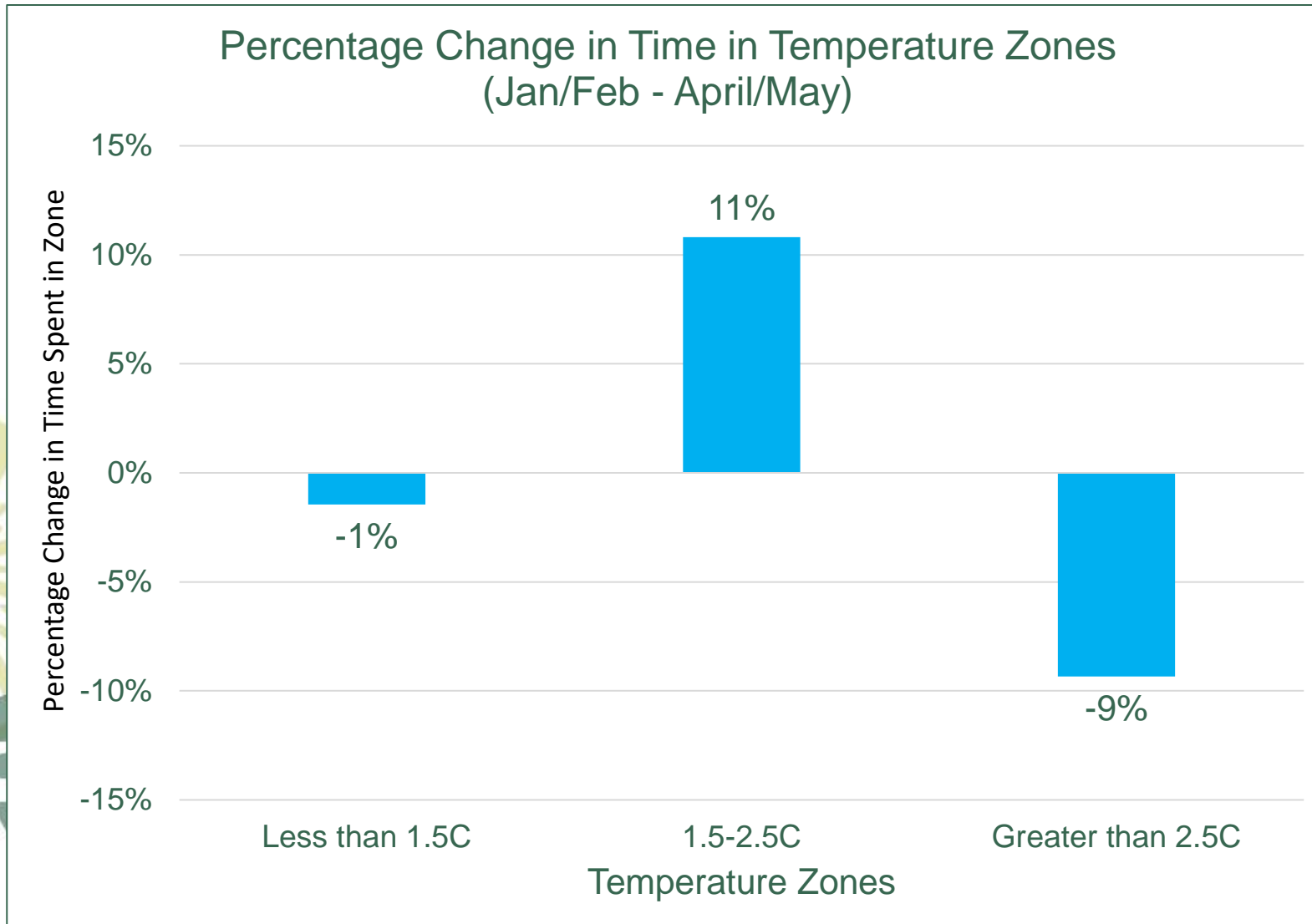
FAN SPEEDS POST TREATMENTS



FDC clean
11% increase

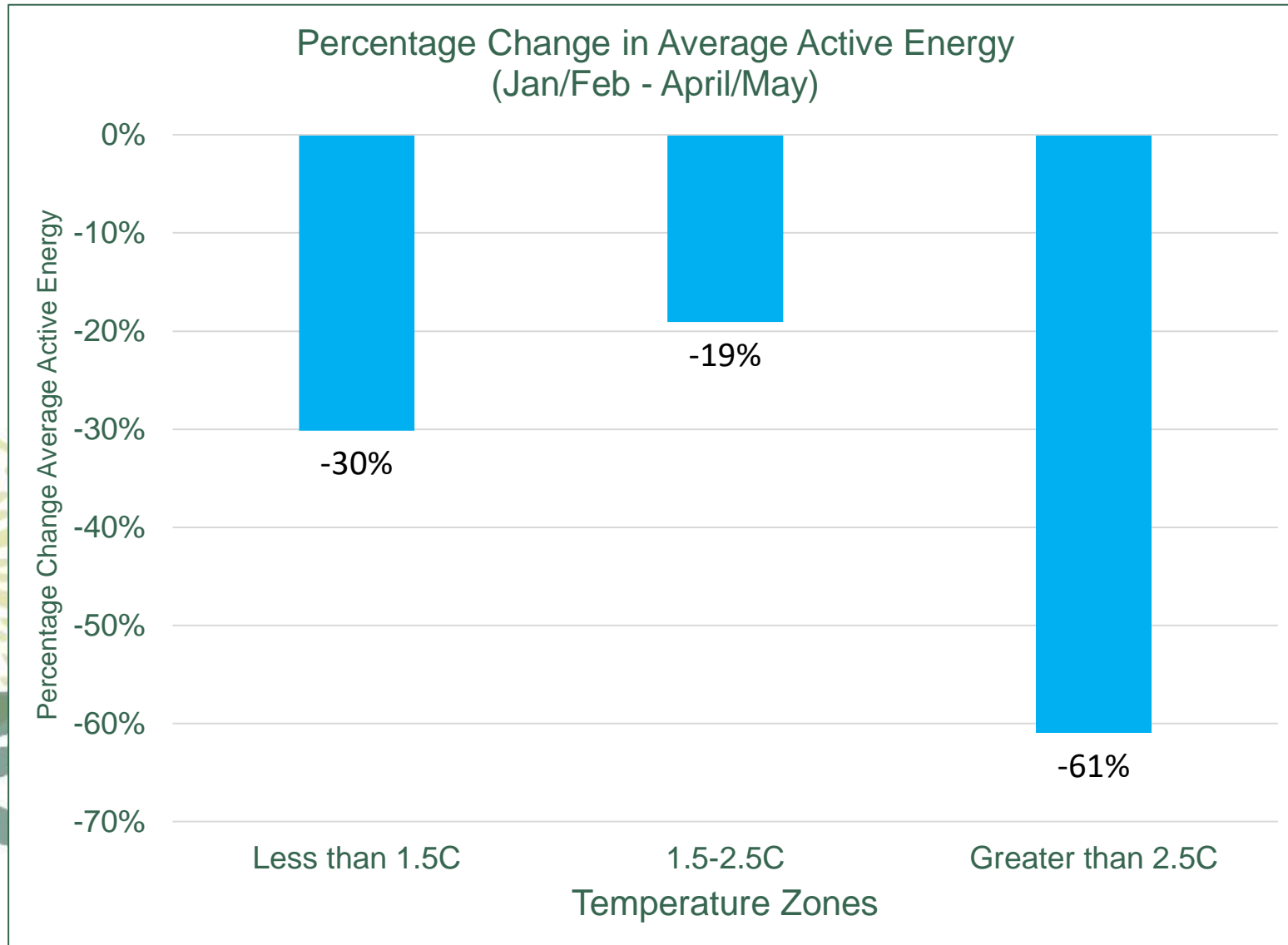


Improved Temperature Control



- Temperature logs prior to and 3 months post ChillSafe installation.
- No significant difference in facility temperature between test points.
- Time spent in the set 1.5°C – 2.5°C operating range **improved by 11%**.

Reduced Electricity Usage



- Power logs 1.5°C– 2.5°C range compared three months apart
- Measurements after close of business day.
- A minimum **19%** reduction in Average Active Energy use.

Post Harvest Citrus Coolroom Hygiene Assessment

Visual detection of catalase producing microorganisms on surfaces in 30 secs



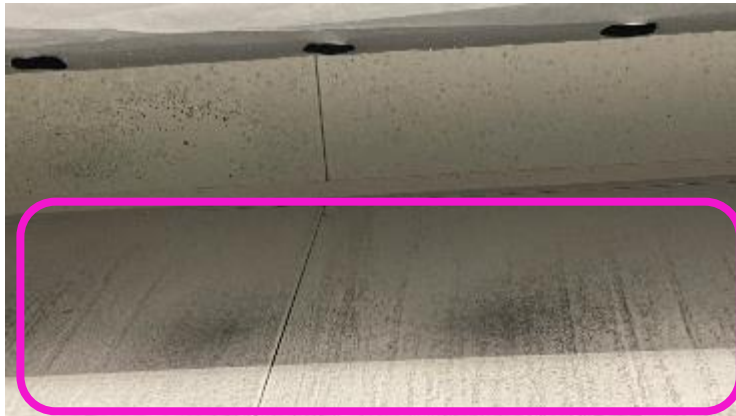
Visual detection of biofilm EPS matrix on surfaces in 5 minutes



Visible Biofouling Citrus Coolroom

3,000 m³ citrus coolrooms with annual cleans 8 months earlier and routine cleaning.
ChillSafe Coolroom was treated with **only 50% of the recommended dose** for 3 months.

Untreated



ChillSafe Treated



Wall & Floor Biofilm & Microbial Contamination

Untreated



ChillSafe Treated



Equipment Biofilm & Microbial Contamination

Untreated

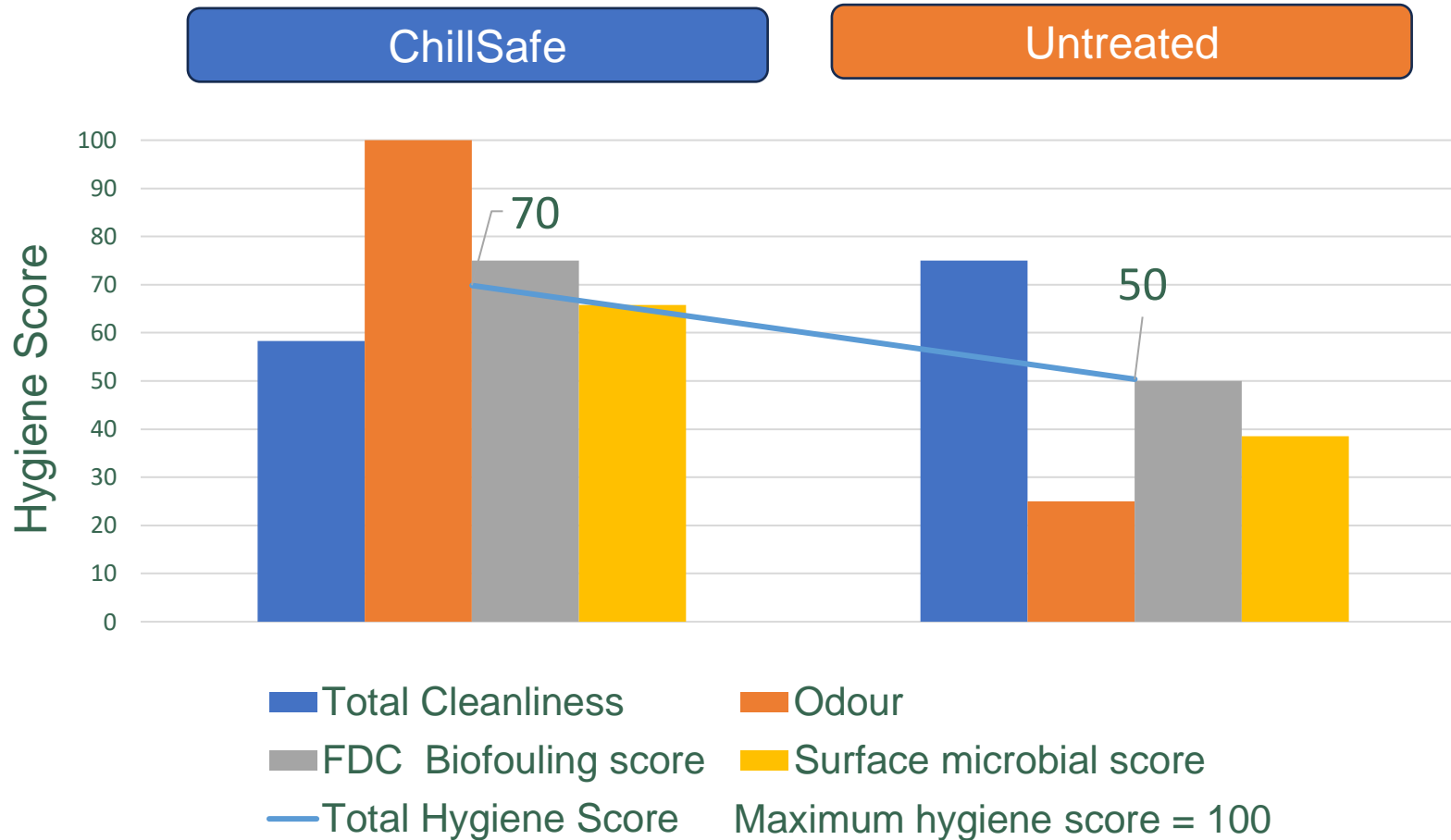


ChillSafe Treated



Coolroom Hygiene Score

Assessment by odour, visible cleanliness, visible biofouling, condensation, surface microbial and biofilm contamination.



Treated vs Untreated



Observations

- Increased biofouling in untreated coolrooms especially on hard to clean surfaces
- No odour evident in ChillSafe treated coolrooms
- Contamination and biofilm in all coolrooms on porous surfaces (floors, wooden pallets) and uncleaned food spills with greater intensity in untreated coolrooms.

Recommendations

- Conduct annual cleaning and fogging of coolrooms
- Avoid porous wooden pallets and unsealed floors which harbour microbial contamination
- Consider sealing floors to improve effectiveness of routine cleaning
- Use ChillSafe to improve cooling system performance, reduce microbial risk and maintain produce quality in coolrooms and reefers.



Coolroom Case Study



Venus Citrus

- Treat Coolrooms for 5-6 months
- Store fruit for up to 10 weeks
- Reduced loss from 8% to 3%
- 20 – 25 tonnes / 1,000 bins more premium fruit sold at premium prices

ChillSafe cost

- 10 week Coolroom storage ~\$15 /tonne
- 4 weeks 40' reefer ~\$6 /tonne

Return on Investment > 4:1



One Bad Orange Doesn't Have To Spoil The Lot!

Damaged fruit after 8 weeks storage in a ChillSafe treated coolroom.



Trusted by Australian Brands

