

Carbon Dioxide

INTERVENTION SUMMARY	
Status	Currently Available
Location	Packaging
Intervention type	Gas flush of packaged product
Treatment time	During storage
Regulations	CO ₂ accepted
Effectiveness	Fair to good
Likely Cost	CO ₂ is cheap. The high pressure CO ₂ equipment is still under development but will most probably be expensive due to the product and the associated risks
Value for money	Good
Plant or process changes	Many plants already use CO ₂ in MAP retail packs to improve storage life High Pressure processing system may require space
Environmental impact	CO ₂ is naturally present in air, so little impact
OH&S	High CO ₂ levels can cause suffocation, the area would need to be well ventilated
Advantages	CO ₂ is cheap and safe
Disadvantages or Limitations	The High Pressure equipment is still under development Works well in MAP packaging but would be much harder to control in larger pack sizes (such as sides or quarters). If used in large quantities would have OH&S implications

Carbon Dioxide

Carbon dioxide (CO₂) is a colourless, odourless, tasteless and non-flammable gas. The inhibitory effect of CO₂ on spoilage microorganisms and pathogens has been well documented. At the meat surface, CO₂ penetrates the cells, inhibits bacterial enzymes and also disrupts the cell membrane. The inhibitory effect of CO₂ increases as temperature decreases, as the gas becomes more soluble, and the use of increased pressure will improve the penetration of CO₂ into the cells.

Modified atmosphere packaging (MAP) with CO₂ has been shown to be an effective storage technology, but using CO₂ as a means to inactivate microorganisms in foods still requires much research to understand the inactivation mechanisms and the critical parameters (Guan and Hoover 2005). Some authors advocate the use of a small amount of carbon monoxide, CO, in conjunction with the CO₂ which has the added benefit of preserving the red colouration. CO₂ use is permitted around the world, but CO is not permitted in Australia or in the EU.

As an intervention strategy, CO₂ combined with other non-thermal processing technologies such as high pressure and pulsed electric fields have shown some promise (Guan and Hoover 2005). High pressure carbon dioxide (up to 15MPa) has been evaluated, and found to have some success in reducing *Salmonella* numbers in liquids and semi-solid foods (Wei *et al.* 1991). The treatment, however, was applied for 2 hours, and the outcome was very variable between different foods. High pressure CO₂ shows synergistic antimicrobial effect with increasing temperature and decreasing pH (Haas *et al.* 1989).



Meat Industry Services

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References

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