

Final report

Project code: P.PSH.0186
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Date published: August 2011

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Otway Fresh Pty Ltd – Industrial Carbon Dioxide Refrigeration Project

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

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1 Project Background

CRF (Colac Otway) Pty Ltd, located in western Victoria, is a lamb and veal processing facility with approximately 300 employees processing an average of 6000 head per day. Previously CRF products that required freezing were delivered to cold stores in Melbourne, but this process proved to be costly and inefficient. CRF has recently invested more than \$7 million to build a local cold storage facility at Colac, Otway Fresh Pty Ltd, to provide a more robust supply chain and to reduce freight and storage costs.

The facility is Australia's first industrial refrigeration system utilizing Carbon Dioxide (CO₂) refrigerant for freezing cartoned meat in a fully automatic mechanised carton freezing tunnel, as well as the associated frozen and chilled storage and sorting and loading areas.

In this application requiring 24 hour air blast freezing, CO₂ presented significant advantages over traditional refrigerants such as ammonia or fluorocarbon chemicals. These advantages included lower capital cost, higher efficiency, reduced energy consumption, reduced occupational health and safety risks, reduced product contamination risks and a 90% lower primary ammonia refrigerant charge.

2 Project Description

Realcold Milmech Pty Ltd working with meat industry consultant and project manager Meateng designed, installed and commissioned this ambitious, innovative and energy efficient system utilizing a CO₂ ammonia cascade refrigeration system and a Realcold automatic air blast carton freezing tunnel. Bendigo-based KAV Consulting also assisted in the development of the refrigeration system.

The 3000 carton per 24 hour automatic air blast carton freezing tunnel was chosen over plate freezing due to the large variation in carton sizes.

A most significant feature of the chosen system is that all refrigerated areas are cooled using CO₂, meaning the primary ammonia system is confined to the plant room with a 90% reduction in ammonia charge compared to a conventional system.

With phasing out of fluorocarbon chemical refrigerants (CFC, HCFC) due to their detrimental effects on the environment; ammonia is currently the dominant refrigerant for industrial refrigeration in Australia. The application of CO₂ refrigeration within the cold storage, freezing, and supermarkets is becoming widely used in Europe.

3 Expected Outcomes

Engineering evaluation indicates significant energy savings can be achieved using carbon dioxide over ammonia for 24 hour air blast freezing applications.

Also, there is a reduction in occupational health and safety risks as the ammonia charge is 90% lower than in conventional systems and is confined to the unmanned, automatically controlled engine room.

Carbon Dioxide (CO₂) is a readily available low cost natural substance with significantly reduced toxicity, flammability, and environmentally detrimental effects compared to many other refrigerants.

The construction cost in this instance was more than 10% lower than a conventional automatic blast freezing system due to smaller tunnel size, much smaller sizing of the pipe work and compressors necessary to achieve the required refrigeration effect.