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Reefer container: Damage to seafood

A shipment of containerised boxed shrimps transported from Argentina to China was found to be badly frosted. The shrimps inside the boxes were also beginning to blacken due to melanosis.

Melanosis

Shrimps and crustacea undergo melanosis (an enzyme catalysed oxidation) when they are kept at incorrect temperatures and/or past their shelf life. Melanosis is also related to the freshness of the product at the time of freezing and whether it has been treated with any preservatives. While melanosis is not dangerous for consumption, it is a quality control indicator, and renders the shrimps unsightly and unsaleable.

Frosting

The frosting is a second indicator that the product had suffered temperature abuse. Frosting appears when a product is thawed and then partially refrozen. Usually, the boxes are tightly packed into the containers, restricting airflow through the cargo and effectively insulating the cartons inside the stow compared to the ones in the outside. The product on the inside of the stow would be insulated against the worst damage by the cargo around it. It is then expected to observe a gradient of damage as the condition of the cartons is poorest nearest the

door and the external edges of the stow, with the damage lessening towards the rear of the container.

Fluctuating temperatures

The container logs showed erratic temperature changes. Seven days after the start of the voyage, the temperature started to rise slowly but steadily from -25°C to a range between -10°C to -2°C on arrival, which is indicative of a refrigeration system malfunction. These temperatures are sufficient for melanosis and frosting to occur. The Master and the crew should have been warned of the malfunction and attempted to repair the container; however, the corresponding alarms were not relayed to the vessel, suggesting a secondary malfunction in the system.

What can we learn?

- The crew should check that the container set temperature complies with the shipper's specified carriage instructions.
- The crew should keep clear and accurate records. Document each stage of the voyage from loading through to discharge as well as obtaining date-stamped photographs of incidents which occur during the voyage.
- When carrying frozen cargo, the fresh air ventilation ducts should always be closed.
- The cargo should always be kept below the load line of the container, away from the container walls and not beyond the 'T' bars to allow the refrigerated air to flow freely around the whole of the stow.