



"The Chlorine Dioxide People"

Application Note #30

Chlorine Dioxide Gas Decontamination of Dairy Plants US/NZ/AU

Food processors around the world are increasingly demanding tighter ingredient specifications and consistent ingredient performance to meet new product developments as well as facility and equipment upgrades—not to mention withstand challenging distribution and storage conditions.

Milk powder specifications and specifically spore contamination levels have been barriers to expanding trade in certain application segments. That was particularly the case in Southeast Asia, where end users cited inconsistencies and lax specifications in some U.S. products. Spores—which can significantly affect product quality and lead to taste, texture and appearance defects—were at the center of those criticisms.

There is no silver bullet when it comes to spore control. It takes an all-inclusive approach that includes three key steps:

1. Minimizing spore ingress at the farm.
2. Keeping the levels as low as possible during processing.
3. Implementing an effective cleaning system to remove residual product, fouling and microbes, including spore-formers from processing facilities. This will minimize re-contamination from run to run.

In the US, exports of milk powders, cheese, butterfat, whey and lactose totaled 161,882 metric tons, equivalent to 14.9 percent of U.S. milk production in June (2016), according to the U.S. Dairy Export Council.

Australia exports nearly half of the milk that it produces. This makes it the third largest exporter behind the EU and New Zealand, Australia accounts for 10% of the global export market.

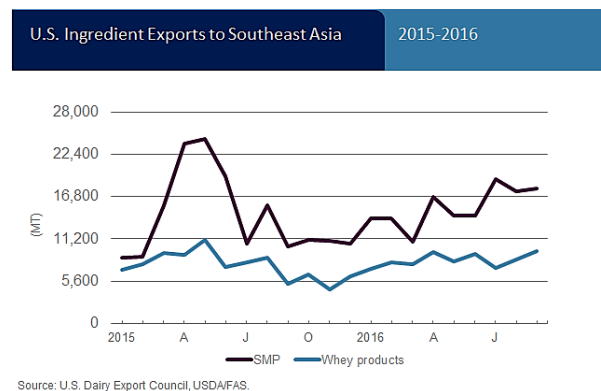
<http://www.pwc.com.au/industry/agribusiness/assets/australian-dairy-industry-nov11.pdf>.

New Zealand exports about 95% of its dairy production. New Zealand's top four dairy export products are: whole milk powder (37%), cheese (12%), skim milk powder (10%), and butter (9%) according to the DCANZ – Dairy Companies Association of New Zealand.

Historically, the US dairy market has been a local market with most used internally or regionally exported (Mexico). An increasing amount of dairy production is now being exported from the US. The US has seen an increase of non-fat dry milk exports of 54% and dry whey increase of 55% according to US Dairy Export Council. While Mexico remains the largest export market for US dairy products, shipments to Asia and other emerging markets are increasing.

With each dairy producing country (US/NZ/AU) increasing its exports, contaminations can significantly impact the bottom line. ClorDiSys Solutions, Inc and its partners are positioned around the world to help eliminate these contamination and ensure product quality and safety.

ClorDiSys Solutions, Inc is the world's largest manufacturer of chlorine dioxide decontamination equipment and services. Founded in 2001, we utilize the highest purity generation method of chlorine dioxide to thoroughly decontaminate spaces like nothing else can. The power of a gas is utilized to ensure complete



coverage of the decontaminating agent like no other process (liquid fogging or manual cleaning) can achieve. Decontamination of a facility using chlorine dioxide gas can be completed in 1 to 3 days depending on the facility's size and complexity.

Some facilities have implemented procedures to execute fumigations of their facilities on a yearly, bi-yearly, or other routine basis. This supplements the regular wash-down procedures which are currently employed by facilities. By utilizing chlorine dioxide gas, the chances of a contamination drastically decline as the gas is able to reach all surfaces and eliminate all organisms everywhere.

Companies are also improving their Contamination Prevention Activities (CPA's) in order to further reduce the possibility of contaminations. In order for a sanitization / decontamination method to work, it must reach all surfaces at the correct concentration for a sufficient amount of time. Scheduling more wash-downs and surface cleanings can help, but are limited by the personnel doing the work and their ability to reach and access all surfaces. Additionally, liquids have trouble reaching organisms residing in cracks and crevices. A gaseous decontaminant such as chlorine dioxide gas eliminates the possibility of human error and reaches all areas including cracks and crevices.

Below are just some of the Dairy related facilities that have been decontaminated by ClorDiSys Solutions with the power of a gas.

Creamery Facility

This 1,000,000 ft³ (28,000m³) facility consisted of New Powder Warehouse, Old Powder Warehouse, Tote Packaging, Stork Dryer, Delaval Dryer, MCC and Bin room. The Dryer areas both consisted of ceiling heights greater than 90 ft (27m) with various equipment and access platforms.

Protein Powder Refining and Packaging Facility

This 300,000 ft³ (8,500 m³) facility consisted of a small packaging room, a mixing room, and a Dryer Room. The Dryer Room was 70ft (21m) in height and consisted of various processing equipment with access platforms. Even after thorough cleaning and liquid decontamination, a persistent salmonella problem could not be eradicated until gaseous chlorine dioxide was used.

Butter Facility

This facility required decontaminations of an aseptic room of approximately 9,000 ft³ (255 m³), 2 processing vessels (Tank #8V, and Tank #9V) and all piping leading to and from the area of approximately 8,500 ft³ (241 m³) and an additional room of approximately 10,000 ft³ (283 m³).

Butter Facility (Large Dairy Co-op)

This 600,000 ft³ (17,000 m³) area consisted of Process & Dryer Area, Pump Alcove, Tank Alcoves, Powder Room, and Recon Room. The rooms contained of various processing equipment and conveyors.

Ice Cream Facility

This 1,300,000 ft³ (36,812 m³) facility consisted of Several Production Areas (4), Sandwich Mezzanine, Re Run Room, Old Kitchen, Kitchen 1st and 2nd floor, Old 40 Degree Room, New 40 Degree Room, 40 Degree Room, several Tank Alley's, and CIP room.

Ice Cream Facility (Large Dairy Co-op)

This 260,000 ft³ (7,362 m³) consisted of Ice Cream Filling, Ice Cream Packaging, and Pasteurized Tank Alley with various equipment and conveyors.

Milk Powder Facility (Large Dairy Co-op)

This 578,000 ft³ (16,367 m³) facility consisted of Niro Room, Bin Room, Recon Room, Packaging Room and Control room.