



CASE STUDY

Cleaning and sanitizing in the Costa Rican food and beverage sector

1. Background information

Cleaning and sanitization are essential processes in the food and beverage processing industry. Detailed guidelines for both must be applied to all surfaces that come into direct contact with food (i.e. equipment, utensils) as well as for surfaces that do not come into direct contact with food but could impact food safety (i.e. overhead structures, shields, walls, ceilings, lighting devices). While cleaning refers to the removal of food or beverage soil using appropriate detergent chemicals, sanitization is related to the reduction of microorganism to defined levels considered safe from a public health perspective. Different types of detergents are used for cleaning and sanitization; latter distinguishes between thermal sanitization (high temperature) and chemical sanitization processes.

2. Introduction

One of the leading companies in the global consumer product industry, Unilever, was seeking ways to optimize its cleaning in place (CIP) operations in Costa Rica, where the company is processing ground beans and also produces other food products. The company contacted a chemical supplier, Ecolab, one of the global leaders in the field of hygiene technologies in the food and beverage sector. Both companies teamed up to find an improved solution for the cleaning and sanitization of equipment and eventually started a cooperation based on Chemical Leasing principles.

3. Key changes and results:

Before Chemical Leasing, the company used 45 kg of heavy duty detergent (based on sodium compounds) and sanitizing agents (based on peracetic acid) for a single cleaning and sanitizing cycle. The high concentration of chemicals required a large amount of water for rinsing, which surpassed the capacity of the existing waste water treatment plant. After Chemical Leasing, the consumption of chemicals was reduced to 28.2 kg per cycle. In addition, water and energy consumption declined significantly and discharges were reduced.

3.1 Unit of payment applied

Before Chemical Leasing:	US \$ per liter of chemical purchased
After Chemical Leasing:	US \$ per m ³ of cleaned tank

3.2 Technical measures tested and implemented

In order to optimize the use of chemicals, the temperature was decreased, the detergent and sanitizing chemicals were substituted by lower concentrated ones, and the dosage of the newly used chemicals was decreased. Waste water was reused.

3.3 Description of the cleaning process

Cans (1) are charged with a certain ratio of water and detergent. This fluid moves further in the lung tank (2) and the boula (3) under specific contact times. After the contact period in the boula, the chemical solution is transferred to the lung tank (4) and finally discarded by the nozzles of the filling machine. The sanitization/disinfection process is approached in the same installation, using different types of detergent, ratios and process parameters.

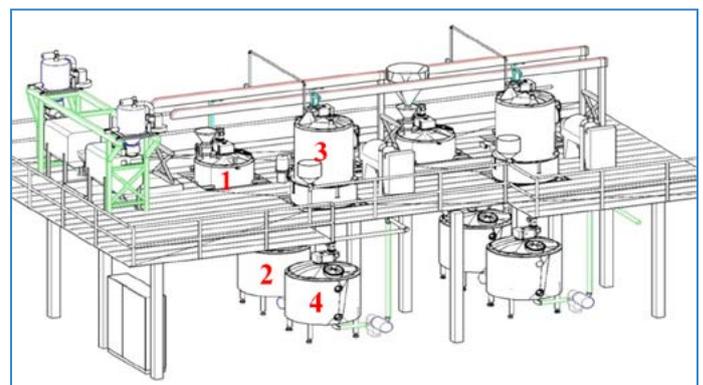


Figure 1: Cleaning and sanitization process

3.4 Results achieved

Before Chemical Leasing	After Chemical Leasing (2010 onwards)
<ul style="list-style-type: none">• High chemicals consumption of 45 kg per cleaning cycle resulting in annual chemicals consumption of 13,000 liters• Detergent concentration was 1.5-2% and disinfectant concentration was 5,000 ppm)• Washing temperature ranged from 80-85° C• Consumption of water that had to be treated was 1900 m³ per year	<p data-bbox="807 465 1078 495">Environmental benefits:</p> <ul style="list-style-type: none">• Chemical consumption reduced to 28.2 kg per cleaning cycle, resulting in annual chemicals consumption of 8,100 liters per year• Decrease in detergent concentration to 0.5-1% and sanitizer concentration to 500 ppm• Amount of chemicals used per cleaning and sanitizing cycle almost six times lower than before (calculation based on active ingredients content)• Washing temperature ranges from 50-55° C obtained• Energy consumption reduced, respective carbon dioxide (CO₂) emissions reduced by 38,330 kg per year• Water consumption decreased by 2m³ per cleaning/ sanitizing cycle - 40%, in total 580 m³• Less consumption of chemicals for waste water treatment <p data-bbox="807 1227 1023 1256">Economic benefits:</p> <ul style="list-style-type: none">• Savings of about 19,000 US \$ per year• Cleaning and disinfection operations 15 minutes shorter• Enhanced partnership based on mutual trust and long-term commitment established <p data-bbox="807 1547 983 1576">Social benefits:</p> <ul style="list-style-type: none">• Cleaning staff had no more contact with chemicals, which significantly reduced the risk of chemical burns