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# Dish Washing Techniques on Colony Count of Cutleries in Food (Coto) Stall in Ternate

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**Abstract**. *There were two food poisoning incidences in 2023 in Ternate City. The presence of germs, can cause illness and even poisoning. Microbial load on cutleries could be caused by improper dish washing. This study looked into the food maker's dishwashing practice and the microbiological load in the cutlery in the food stall that offers Coto, a specialty dish from South Sulawesi, Indonesia. This was a descriptive study, a total of nine cutleries including spoons, glasses and bowls were collected from 3 food stalls. Microbial load was measured by using Total Plate Count (TPC) method and washing utensils practice were collected by doing observation on food stall. The study resulted that the average of colony in bowls of the food stall 1 was 4362, food stall 2 was 4014 and food stall 3 was 1683. In food stall 1, the average colony of the glasses was 4014; in food stall 2, it was 4666; and in food stall 3, it was 1683. The mean colony of the spoons was 2615 at food stall 1, 4056 in food stall 2, and 1853 in food stall 3. The food stall staff was not present to demonstrate the correct technique for cleaning utensils. It can be concluded that the microbial count in all samples above the threshold level, which is 100 colonies/cm2, and that inadequately cleaned utensils are the cause of microbial existence.*
***Keywords:*** *Cutleries, dishwashing, microbial load, total plate count*

## 1. INTRODUCTION

Researchers from Badan Pengawasan Obat dan Makanan (BPOM) conducted a study about poisoning cases related food and drugs between 2021 and 2023, it suggested that there were about 6402 poisoning cases from 2021 to 2023. It was 1110 of the cases was caused by food contamination (1). The study's findings demonstrate that certain microorganisms might cause people's discomfort and even pose a threat to social health (2). In Ternate, there were two food poisoning cases in 2023 (3,4).

The cooking utensils tested positive for *Salmonella typhi*, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Klebsiella species*, *Bacillus species*, and *Shigella species* (5). Average levels of bacterial contamination found in Surakarta City's angkringan food stalls: 10230 colonies/$cm^2$ for plates, 9560 colonies/$cm^2$ for glasses, and 3960 colonies/$cm^2$ for spoons (6).

Inadequate washing stage and poor washing water microbiological quality are two factors contributing to the dangers associated with utensil management. The recognized Critical Control Points can be subjected to the appropriate control procedures, which include scraping, washing, rinsing, sanitizing, and drying phases (7). The results of a study demonstrated the excessive microbiological load and inadequate cleaning and washing services in Addis Ababa's hotels and restaurants (8). Seventy percent of the appliances under investigation had microfungi present. Water drains, detergent

dispensers, and rubber seals were the parts that were colonized the most frequently. In this investigation, thirty-five yeast strains were recovered, twenty-seven of which came from dishwashers and eight from tap water. The strains were classified into six species and six genera: *Rhodotorula mucilaginosa*, *Meyerozyma guilliermondii*, *Dipodascus capitatus*, *Exophiala dermatitidis*, *Clavispora lusitaniae*, and *Candida parapsilosis*. Rubber seals caused the majority of the strains (9). Dishwasher rubber seal colonization most likely stems from bacterial infiltration from soiled containers, with tap water germs playing a considerably less role. The dishwasher rubber seal bacterial isolates do not pose a significant risk for the spread of antibiotic resistance within the home, according to statistics on antibiotic resistance. Dishwashers, however, should not be disregarded as possible human infection sources, especially for those with weakened immune systems (10).

The popular Coto dish, which consists of grilled beef served with a spiced broth, originated in the Indonesian province of South Sulawesi. Another significant Indonesian region where Coto is well-liked is Ternate. It was shown through field observations that insufficient protocols existed for cleaning dishes. Certain activities were omitted, and the materials used were improper. This served as the basis for the researchers' assessment of the cleanliness requirements of food booths offering coto and the microbial load in the silverware.

## 2. LITERATURE REVIEW

Bacteria and viruses, commonly referred to as germs, can live on surfaces, such as table tops, kitchen countertops, picnic tables, and desktops, and in turn, can spread from table tops, utensils, and food upon contact to a person’s hand and mouth. These same germs can cause colds, the flu, foodborne illnesses, and other infections. Among the variety of microorganisms that play a role in the creation of food borne illnesses, bacteria cause the highest rate of illnesses (11).

Microbial load on cutleries could be caused by improper dish washing. The results demonstrated the excessive microbiological load and inadequate cleaning and washing services in Addis Ababa's hotels and restaurants. The greatest median count of log total coliform was found on utensils (tray, spoon and dipper) among hotel and restaurant (8).

Improper dishwashing can occur when processes are not followed correctly or when tools or materials are dirty. Brushes and sponges shared a common collection of bacteria, with *Acinetobacter*, *Chryseobacterium*, *Enhydrobacter*, *Pseudomonas* and *Enterobacteriaceae* being the most frequent species. After four weeks of use, no differences were seen in TVC or bacterial diversity between conventional and antimicrobial sponges containing silver (12).

Improve restaurant hygiene to reduce food poisoning. This can be accomplished by properly washing, drying, storing, and sterilizing kitchen tools (5). There are six steps in dishwashing as follows:

1. Scrapping
   At this point, the leftover cutlery was thrown in the trash.
2. Flushing/Soaking
   Mist water over the objects that require cleaning to make sure that all stains on the equipment's surface are gone. By soaking, any hardened or crusted food residue will have an opportunity to seep through and become easier to clean off or remove from the tool's surface.
3. Washing
   Scrub the silverware and use cleaning solutions, like liquid detergent, to dissolve any food residue.
4. Rinsing
   Rinse clean water off of equipment that has been washed and cleaned with detergent. Water needs to be utilized heavily at this point, flowing constantly, and replenished.
5. Sanitizing
   Sanitary procedures to sanitize the equipment following cleaning. It is imperative to thoroughly clean equipment to ensure its safety against germs using sanitation or established disinfection techniques.
6. Towelling/Drying
   To remove any residual dirt—such as detergent or chlorine stains—that might have remained after the washing process, dry using a cloth or towel (7).

## 3. RESEARCH METHODS

This was a descriptive study that explore about microbial contamination in cutleries and its relation to the dish washing technique. The total plate count test was used to determine the microbial count. Three food stands that sell coto (coto is a special culinary from South Sulawesi, Indonesia) as part of their menu had bowls, glasses, and spoons brought to the laboratory so that the bacteria count could be determined. The components used in the total plate count (TPC) test were Plate Count Agar, aquadest, and sodium chloride. Dishwashing techniques were observed while food workers were cleaning their cutlery. There were no specific statistical used in this study.

In this investigation, no particular statistics were employed. The entire colony must first be counted and compared to the standard (no more than 100/cm$^2$) in order to ascertain whether the microbial load is acceptable. Meanwhile, the eligibility of the dishwashing practice was ascertained by comparing it to the six procedures in dishwashing.

**Table 1. Operational Definition**

| No | Variables | Definition | Category |
|---|---|---|---|
| 1 | Microbial load | Microbial load is the microbes count in the cutleries which identified by using TPC test | 1. Eligible if the microbe colony no more than 100/$cm^2$<br>2. Not eligible if the microbe colony more than 100/$cm^2$ |
| 2 | Dishwashing technique | Dishwashing technique is a practice in cleaning the utensil that consist of six steps (scrapping, flushing, washing, rinsing, sanitizing and drying) | 1. Eligible if all steps were done<br>2. Not eligible if there one or more steps was skipped |

## 4. RESULTS AND DISCUSSION

### RESULT

Three food stalls that sell Coto have been the subject of a study. A sample of utensils was tested for microbiological parameters, and proper dishwashing techniques were also noted. The information is displayed in tables 2, 3, 4, and 5.

**Table 2. Dish Washing Technique**

| No | Activities | Coto Stall 1 | Coto Stall 2 | Coto Stall 3 |
|---|---|---|---|---|
| 1 | Scrapping | 1 | 1 | 1 |
| 2 | Trash bin | 1 | 0 | 1 |
| 3 | Put trashes to the bin | 1 | 0 | 0 |
| 4 | Trash bin condition | 1 | 0 | 0 |
| 5 | Flushing | 0 | 1 | 1 |
| 6 | Flushing coverage | 0 | 0 | 1 |
| 7 | Washing | 1 | 1 | 0 |
| 8 | Washing coverage | 0 | 1 | 0 |
| 9 | Washing materials | 0 | 0 | 0 |
| 10 | Repetition of water usage | 0 | 0 | 0 |
| 11 | Rinsing properly | 0 | 0 | 0 |
| 12 | Sanitizing | 0 | 0 | 0 |
| 13 | Towelling | 0 | 0 | 0 |
| 14 | Linen cleanliness | 0 | 0 | 0 |
| 15 | Directly usage | 0 | 0 | 0 |
| 16 | Storing | 0 | 1 | 0 |
| **Score** | | 6 | 6 | 4 |

Notes:
0 = indicates score resulted on the poor practice
1 = indicates score resulted on that good practice

Table 2 displays the findings from the observation of dishwashing practices. It includes specifics and information on six major phases. Not every food booth followed the dishwashing instructions to the letter. All food stand employees have neglected to sanitize and dry; just the scraping process has been completed.

**Table 3. Dish Washing Technique Score**

| No | Coto Stall | Steps | Category |
|---|---|---|---|
| 1 | Coto Stall 1 | Flushing, rinsing, sanitizing and drying were not performed | Not eligible |
| 2 | Coto Stall 2 | Rinsing, sanitizing and drying were not performed | Not eligible |
| 3 | Coto Stall 3 | Rinsing, sanitizing and drying were not performed | Not eligible |

Table 3 shows how each food stand cleans its dishes. The only step that is completed is the scrapping stage; the others are skipped. All food stands' dishwashing is therefore categorized as ineligible.

**Table 4. Colony Count of Cutleries**

| No | Category | Coto Stall 1 | Coto Stall 2 | Coto Stall 3 |
|---|---|---|---|---|
| 1 | Bowl 1 | 1717 | 1221 | 1495 |
| 2 | Bowl 2 | 2752 | 3603 | 1371 |
| 3 | Bowl 3 | 9426 | 1232 | 1190 |
| **Total Colony** | | 13895 | 6056 | 4056 |
| **Average** | | 4632 | 2019 | 1352 |
| **Category** | | Not Eligible | Not Eligible | Not Eligible |

| | | | | |
|---|---|---|---|---|
| 4 | Glass 1 | 6727 | 6400 | 2124 |
| 5 | Glass 2 | 3520 | 1822 | 1414 |
| 6 | Glass 3 | 1796 | 5775 | 1510 |
| **Total Colony** | | 12043 | 13997 | 5048 |
| **Average** | | 4014 | 4666 | 1683 |
| **Category** | | Not Eligible | Not Eligible | Not Eligible |
| 7 | Spoon 1 | 4474 | 1264 | 2373 |
| 8 | Spoon 2 | 2360 | 1110 | 1658 |
| 9 | Spoon 3 | 1010 | 9793 | 1528 |
| **Total Colony** | | 7844 | 12167 | 5559 |
| **Average** | | 2615 | 4056 | 1853 |
| **Category** | | Not Eligible | Not Eligible | Not Eligible |

The three types of utensils (bowl, glass, and spoon) are displayed in Table 4. Each type of cutlery has three samples available. Dishes from every food stall were not eligible due to their colony counts. Colony count of the bowl was 4632, 2019 and 1352 from Food stall 1, 2, 3, respectively. The glass's colony counts from Food stalls 1, 2, and 3 were 4014, 4666, and 1683, respectively. The colony counts of the spoons from Food stalls 1, 2, and 3 were, in order, 2615, 4056, and 1853.

**Table 5. Colony Count Based on Dish Washing Technique**

| No | Dish Washing Technique | Colony Count | | | | Total | |
|---|---|---|---|---|---|---|---|
| | | Eligible | | Not Eligible | | | |
| 1 | Bowl | n | % | n | % | n | % |
| | Coto Stall 1 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 2 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 3 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Glass | n | % | n | % | n | % |
| | Coto Stall 1 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 2 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 3 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | Spoon | n | % | n | % | n | % |
| | Coto Stall 1 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 2 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |
| | Coto Stall 3 | | | | | | |
| | Not Eligible | 3 | 100 | 0 | 0 | 3 | 100 |
| | Eligible | 0 | 0 | 0 | 0 | 0 | 0 |

Table 5 proposed a cross-tabulation of the colony count of bowls, glasses, and spoons along with the dishwashing process. Not only are dishwashing practices ineligible, but so was the colony count. Inadequate dishwashing technique in conjunction with a low-quality microbiological load on the utensil.

**DISCUSSION**

This study found that colony count was likewise ineligible, as is the practice of dishwashing. The utensils (tray, spoon, and dipper) from hotels and restaurants had the highest median count of log total coliform (8). The improper dishwashing, which was followed by utensil's microbiological load was of low quality. This study is comparable to the one that discovered that inadequate washing intervals and the microbiological quality of the water are the two primary variables raising the risk of bacterial infection on silverware (7). Inadequate dishwashing can happen when procedures are not followed precisely or when materials or tools are unclean. *Acinetobacter*, *Chryseobacterium*, *Enhydrobacter*, Pseudomonas, and Enterobacteriaceae were the most common types of bacteria found in both brush and sponge collections (12).

Cutlery cleaned under running water has less germs on it than when it is immersed in water (13). It is essential to understand the basic purpose of cleaning and washing equipment. Proper cleaning of the equipment will result in clean and healthy food processing equipment. The restaurant Tikala Baru's food equipment still doesn't fulfill regulations and has E. Coli due to improper washing practices (14). There was found the relationship between the level of knowledge with the number of germs in the tableware of Blawong I Bantul sub-village (15). There was 77.3% of respondents who had a good level of understanding reported cleaning utensils in an effective manner (16). Based on the research findings from the journal under study, attempts can be made to focus more on cleanliness and to follow recommended washing methods, such as flushing, rinsing, and sanitizing, in order to prevent bacterial counts that are higher than usual (17).

In order to effectively reduce the spread of illnesses, it can be helpful to inform and warn individuals about the negative effects that can result from failing to properly disinfect equipment such as plates, pans, pots, spoons, and forks (2).

## 5. CONCLUSION

All samples had a microbial count that is higher than the cut-off point of 100 colonies/cm2, indicating that the presence of microorganisms is a result of improperly cleaned utensils. It can be beneficial to educate people about the potential consequences of improper equipment disinfection in order to successfully stop the spread of illness.

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