NSF Standard(s) Impacted: NSF/ANSI 18 – 2016 Manual Food and Beverage Dispensing Equipment.

Background:
Provide a brief background statement indicating the cause and nature of concern, the impacts identified relevant to public health, public understanding, etc, and any other reason why the issue should be considered by the Committee. Reference as appropriate any specific section(s) of the standard(s) that are related to the issue.

1) ANTE-FACT
Ferrero has developed an electric dispenser for NUTELLA®, for which is required the sanitation certification against the standard NSF18 for USA market. The standard requires a water-based cleaning of the machine, but given the nature of NUTELLA®, such procedure would pose greater risks than benefits.

2) PRODUCT DESCRIPTION
Nutella is suspension of solid particles in a continuous liquid medium (oil) both strictly anhydrous. Nutella is a low-aw product (0.3), low humidity content (<1.2%) therefore food safety (including microbiological issues) is not affected, if the product, during its whole shelf life, is strictly kept away from water and humidity, and from any other foreign contamination source.

Ingredients: sugar, vegetable fat (palm), hazelnuts 13%, skimmed milk powder 8.7%, fat reduced cocoa 7.4%, emulsifier: lecithin (soy and/or sunflower), vanillin.

Storage Conditions: the product unopened should be stored in a dry place at a normal ambient temperature (e.g. from 16 to 26°C).

Organoleptic Characteristic
Appearance: pasty
Color: brown
Consistency: creamy
Odor: nut, cocoa
Taste: sweet, nut, cocoa

3) EFFECTS OF WATER/HUMIDITY IN CONTACT WITH NUTELLA
Water when in contact with Nutella can cause 2 major issues:

1) ORGANOLEPTIC → Texture modifications – granules formation and overall fluidity/spreadability loss
2) MICROBIOLOGICAL → Creation of favorable environmental conditions that may increase the risk of microbial growth, depending then on temperature/time exposure
1) ORGANOLEPTIC → Texture modifications

Below an example of the effect of some water drop fallen down in Nutella. The cream becomes very viscous and start to "coagulate": some lumps start to appear and the texture is not fluid and not comparable to the standard texture requirements of Nutella. The modification of the texture can also interfere with the rheology of the use of the product inside pipes, ducts or pumping systems.
2) MICROBIOLOGICAL → creation of environment that allows microbial growth

Definition: WATER ACTIVITY

“Water activity” (aw) is a concept of food processing and preservation technologies that indicates the relationship between the vapor pressure of water in a certain material and the vapor pressure of pure water. From a purely descriptive point of view, it is an index relating to the quantity of water that, in a given product, is free from particular bonds with other components, therefore, of the quantity of water (expressed in a dimensionless value between 0 and 1) available for chemical and biological reactions.

Microbial proliferation

Microbial proliferation is one of the most important and dangerous causes of alteration (in the sense of unwanted spontaneous transformation) of food. The micro-organisms to multiply, in addition to suitable temperature conditions, acidity, presence (or absence) of oxygen, availability of nutrients, etc., absolutely require water. The presence of water, not so much in terms of quantity, as in terms of availability of water itself, can therefore determine the deterioration of a food product.

Since the aforementioned freedom translates into availability for biological and enzymatic processes that require water, the parameter water activity, although useful in a series of other various problems, enters mainly at stake when it comes to stability and safety of the foods.

<table>
<thead>
<tr>
<th>Food</th>
<th>Typical aw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh meat</td>
<td>0.98</td>
</tr>
<tr>
<td>Cheese</td>
<td>0.97</td>
</tr>
<tr>
<td>Preserves</td>
<td>0.88</td>
</tr>
<tr>
<td>Salami</td>
<td>0.83</td>
</tr>
<tr>
<td>Dried fruit</td>
<td>0.76</td>
</tr>
<tr>
<td>Honey</td>
<td>0.75</td>
</tr>
<tr>
<td>Pasta</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Nutella is an anhydrous product, with a natural aw of 0.30, and any microbial growth is inhibited.

It is, therefore, a food not to be included among the “potentially hazardous foods”, as described in NSF/ANSI 170 - GLOSSARY OF FOOD EQUIPMENT TERMINOLOGY - Edition 2015 – point 3.148:

“3) Potentially hazardous food does not include:
   ....
   – a food having water activity (aw) value of 0.85 or less;”.

Addition of water in the system (even if aimed to “clean”) could cause the increase of moisture and aw, hence increasing the possibility of a microbial growth.
4) FERRERO EXPERIENCE

Since the creation of Nutella, Ferrero has always had the aim of producing a safe product adopting the best technology and practices available.

In all of Ferrero plants producing Nutella, all the pipelines are securely closed and cleaned (e.g. after a stop, even of a few days) through “FLUSHING”: fresh product is pumped in the system, removing residues of the old one.

The first output is destroyed (only for organoleptic reason), and only when all the fresh product has filled the system, the production (e.g. jars filling) can start.

This practice has been effective during over 50 years of Nutella production.

Similarly, the dispenser cleaning can be obtained by pumping fresh Nutella through the system, removing leftovers from previous use, again, only with the aim to remove product that from a sensorial point of view is not “excellent” anymore, so to protect the trademark “sensorial excellence” of our product.

The dispenser is designed as a closed and sealed system, with no dead-spaces in order to avoid any accumulation exactly like our industrial lines. (as required by NSF 18 - § 5.2)

See figures 1-2-3

Figure 1 - dispenser design – INLET
Figure 2 - dispenser design - PUMP/ENGINE

Figure 3 - dispenser design - OUTLET
5) CONCLUSIONS

For all the reasons mentioned above, it is strongly recommended to avoid the use of water in the cleaning/hygiene of Nutella processing equipment so that the environment can be kept as free as possible from moisture. The use of water during cleaning can make it possible to reach levels of $a_w$ that promote the growth of micro-organisms. The only "cleaning" of the internal parts of the dispenser (food zone) may require is just a flush with fresh product.

Recommendation:
Clearly state what action is needed: e.g., recommended changes to the standard(s) including the current text of the relevant section(s) indicating deletions by use of strike-out and additions by highlighting or underlining; e.g., reference of the issue to a Task Group for detailed consideration; etc.

Ferrero requests that Nutella spread is associated to the already existing exception mentioned in the standard NSF18 Chapter 5.1.4

Recommended changes to the standard NSF18 Chapter 5.1.4

NOTE – In-place cleaning procedures are not required and must not be carried out in order to protect the product under food safety aspects:
- for oil distribution systems that only circulate fresh, edible oil throughout the fixed system
- for spreadable creams cacao and hazelnut based (suspension of solid particles in a continuous liquid medium (oil) both strictly anhydrous) with such characteristics [aw <0.5, sugar > 40% and fat> 20%] that do not support the growth of any microorganism, circulating in fixed systems, in which introduction of water or water-based substances is not recommended

---

**EXTRACT FROM NUTELLA DISPENSER USER MANUAL section 7 “CLEANING” (draft)**

**NUTELLA DISPENSER FLUSHING PROCEDURE**

Given that the whole system from INLET to OUTLET hold ca. 30g of Nutella the suggested cleaning procedure is the following:

**CLEANING of internal part of dispenser (procedure to be followed after every stop longer than 1 week of the machine):**
1. connect the power, wait 5-10 minutes in order to allow the system to reach the ideal temperature
2. flush 2 pumping of the preset “15g” dosing button (total of 30 g of Nutella to be disposed of)
3. start use of the machine

Reference:
ICMSF – MICRO-ORGANISMS IN FOODS 6 – Microbial ecology of food commodities
Supplementary Materials (photographs, diagrams, reports, etc.):
If not provided electronically, the submitter will be responsible to have sufficient copies to distribute to committee members.

I hereby grant NSF International the non-exclusive, royalty free rights, including non-exclusive, royalty free rights in copyright; in this item and I understand that I acquire no rights in any publication of NSF International in which this item in this or another similar or analogous form is used.

Signature*:  _SALVATORE RANCHETTI_ - (Head of Ferrero Group Quality)
(prepared by Riccardo Bergamini – Foodservice Quality Manager)

Company:  _FERRERO_
Telephone Number: +39 344 2951964 E-mail: riccardo.bergamini@ferrero.com

Submission Date:  __________  July 19th 2019__________

Please submit to:  _Al Rose, arose@nsf.org_

*Type written name will suffice as signature
MICROORGANISMS IN FOODS

MICROBIAL ECOLOGY OF FOOD COMMODITIES

ICMSF

AN ASPEN PUBLICATION
MICROORGANISMS IN FOODS 6

MICROBIAL ECOLOGY OF FOOD COMMODITIES

International Commission on Microbiological Specifications for Foods (ICMSF)

Since the publication of Microorganisms in Foods 3 (Volume 2) technological changes in food production and processing, increases in convenience and ready-to-eat foods, the globalization of the food industry and the recognition of new pathogenic microorganisms have necessitated an updated examination of the spoilage and safety aspects of foods. The recent escalation of media interest and public concern about food poisoning has highlighted the need for thorough and coherent information to be provided to food microbiologists working in industry, government, and education.

Microorganisms in Foods 6 provides such an updated and complete assessment of the microbial properties of every major food commodity, written by acknowledged experts in the field. Each chapter examines the specific properties that affect the microbial content of different food items and the subsequent effects of harvest, transport, processing, and storage. Necessarily the means of controlling microbial content are also assessed.

The information has been prepared by the International Commission on Microbiological Specifications for Foods (ICMSF). The ICMSF was formed in response to the need for internationally acceptable and authoritative decisions on microbiological limits for foods moving in international commerce. Currently the membership consists of nineteen food microbiologists from eleven countries, drawn from governmental laboratories in public health, agriculture, and food technology, from universities and from the food industry.
B  Spoilage

Chocolate. Due to its low water activity of 0.4–0.5 (Richardson, 1987) microbial spoilage of chocolate is not possible. Development of moulds on the interface of product and packaging material at very high relative humidities and for chocolate prepared with different types of sugars, thus modifying the characteristics of the product, have been reported by Ogunmoyela and Birch (1984).

‘Soapiness’ is a defect of unsweetened or ‘white’ chocolate (Table 10.1) and is most common in products containing coconut and palm oil, which are rich in short- and medium-chain fatty acids. High

C  Pathogens

In 1982/1983 an outbreak involving 245 people in the UK, again mostly children, was quickly traced to two types of chocolate bars produced in Italy and contaminated with S. napoli (Gill et al., 1983). Contaminated water was identified as a possible source of contamination. Two outbreaks of salmonel-

D  Control

Since raw beans are further processed, no microbiological analyses are performed. Mouldy beans are detected by visual inspection.


The only identified health hazard of cocoa and chocolate is linked to contamination with Salmonella. Beans are a permanent but mostly unavoidable source of salmonellae, a fact confirmed by their regular detection in environmental samples (dust and residues) from raw bean storage and handling areas. Roasting represents the only barrier for Salmonella (CCP1; Simonsen et al., 1987). In the case of cocoa powder, alkalization or dusting also represents a barrier (CCP1).

The environment can be classified as CCP and the raw beans and processing equipment can be classified as CCP.

In chocolate factories, water plays an important role in maintaining the temperature of liquid chocolate masses in pipes and storage tanks as well as for tempering and cooling. Microleaks may lead to contamination of the product. The use of water for cleaning should be restricted to a minimum. If wet cleaning is necessary, careful drying is then essential to avoid multiplication of bacteria.
absence of such a procedure, selected ingredients should be examined regularly for Salmonella as a further check on the adequacy of prior treatment.

Nuts and dried fruits should be examined visually for the presence of moulds. Modern nut processors use photometric equipment to sort out abnormal nuts and fruits and to perform mycotoxin analyses (Finoli et al., 1994).

A safe _a,_ level to prevent mould growth under temperate conditions may not be possible in products to be shipped to or processed in the tropics.

Additional controls such as reduction of airborne moulds (Dragoni et al., 1989), personal hygiene (Kleinert-Zollinger, 1988), separation of raw from processed product, and scheduled examination for microbial content are more or less important, depending on process or product (IOCCC, 1991, 1993).

References


Rohn, T.A. (1967) Processing of raw cocoa for the market. FAO Agriculture Study no. 60.


