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# MEDIUM FILTH (*NAJS MUTAWASSITAH*) INDICATORS IN HALAL FOOD

## HALAL FOOD AND NAJS MUTAWASSITAH (MEDIUM FILTH)

**H**alal food is defined as any food, drink and/or their ingredients that are permitted under the *Shari'ah* law (*Malaysia Halal Standard, MS1500:2009*). Halal food should fulfill several conditions including free from ingredients that are *najs* according to *Shari'ah* law, has not been prepared, processed or manufactured using equipment that is contaminated with things that are *najs* according to *Shari'ah* law and is physically separated from any other food or things that have been decreed as *najs* by *Shari'ah* law.

*Najs* (an Arabic term) is anything that is unclean or filth. Islamic teaching has classified *najs* into three categories; (1) *najsmughallazah* (severe filth),

(2) *najsmutawassitah* (medium filth) and (3) *najsmukhaffafah* (light filth). *Najsmughallazah* specifically refers to dogs and pigs including any liquid and object discharge from their orifices, descendants and derivatives.

*Najsmutawassitah* is considered as medium filth which is filth/unclean that does not fall under severe or light *najs* such as feces, urine, vomit, blood, pus, carrion, alcoholic drink and other liquid and objects discharged from human or animal's orifices.

*Najsmukhaffafah* only consists of urine from male infant upto 2 years of age and who has not consumed any other food except his mother's milk.

Even though *najsmutawassitah* is a lighter *najs* compare to *najsmughallazah*, *najsmutawassitah* may come from wide variety of sources, indirectly contaminating food and is more difficult to control. It may come from unhygienic raw materials, unclean or unhealthy food handlers, improper practices in preparing food or it may come from environmental contaminations. The *najs* may also be carried by animals or pests in food premises.

The contamination of *najsmutawassitah* in/on food or on equipment is quite difficult to confirm using human senses. The smell, taste and colour of the *najs* could not be easily identified especially if its amount is relatively minute. Microbiological analysis could be used to verify the contamination of *najsmutawassitah* in halal food handling, preparation and storage facilities.

## MICROORGANISMS IN NAJS MUTAWASSITAH

Since *najsmutawassitah* originally comes from unclean or filthy matters, it contains considerable amount and many types of microorganisms. For example, bacteria that are present in human feces include

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Organism	Coliforms	Strep	Clostridium	Bacteroides	Lactobacilli
Human	13,000,000	3,000,000	1,580	5,000,000,000	630,000,000
Cow	230,000	1,300,000	200	< 1	250
Sheep	16,000,000	38,000,000	199,000	< 1	79,000
Pig	3,300,000	84,000,000	3,980	500,000	251,000,000
Chicken	1,300,000	3,400,000	250	< 1	316,000,000
Dog	23,000,000	980,000,000	251,000,000	500,000,000	39,600
Cat	7,900,000	27,000,000	25,100,000	795,000,000	630,000,000

**Table 1:** Estimation of Microbial Pathogens in Manure (per gram) of Human and Several Type of Animals

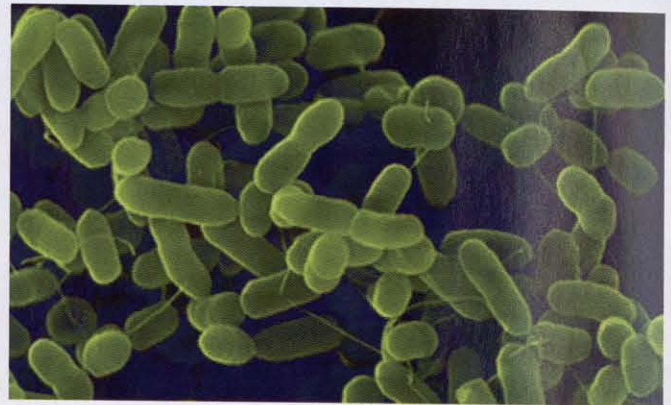
*Bacteroides fragilis, Bacteroides melaninogenicus, Bacteroides oralis, Lactobacillus, Clostridium perfringens, Clostridium septicum, Clostridium tetani, Bifidobacterium bifidum, Staphylococcus aureus, Enterococcus faecalis, Escherichia coli, Salmonella enteritidis, Salmonella typhi, Klebsiella sp., Enterobacter sp., Proteus mirabilis, Pseudomonas aeruginosa, Peptostreptococcus sp., Peptococcus sp. and Methanogens.*

There could be about 400 billion of bacteria present in 1 gram of human feces. An estimate of microbial pathogens that are present in manure of human and several animals are shown in Table

1. Other types of *najsmutawassitah* like urine, blood, vomit and pus also have many pathogens.

### MICROBIOLOGICAL INDICATOR OF NAJS MUTAWASSITAH

Routinely measuring all of the pathogens that exist in food for determining their presence, absence or at acceptable concentration is not possible. Thus, some researchers suggested the examination of



E. coli



Salmonella

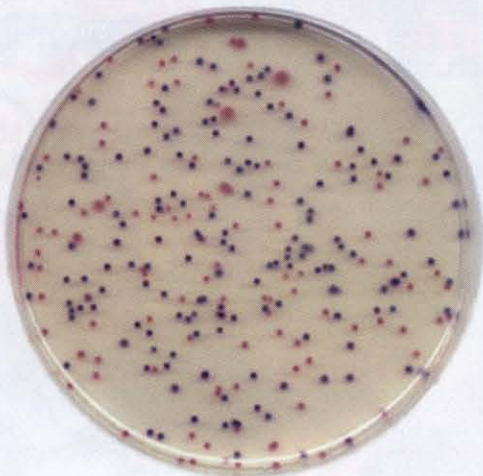
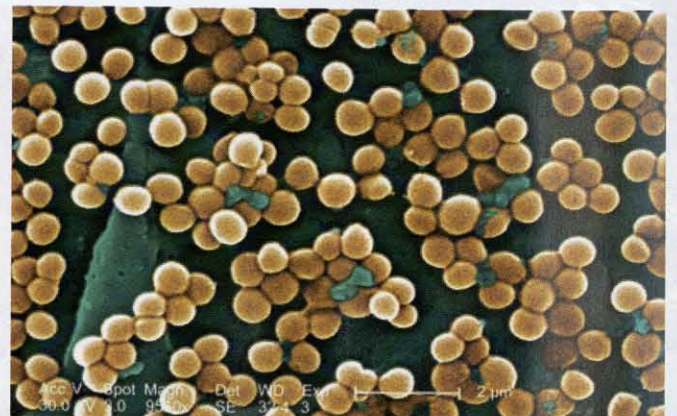


Plate of Coliform



S. aureus

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microbial indicators to indicate the contamination, predict the presence of pathogens and estimates human health risks.

In halal food handling, preparation and storage, the same microbial indicators could be used to indicate the contamination of *najsmutawassitah*. Below are some examples of microbial indicators:

### 1. Coliforms

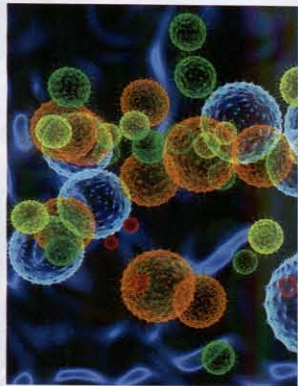
The enumeration of total coliform bacteria indicates general sanitary quality of foods and water. This is because coliforms may come from human/ animal feces or from environmental sources. Coliforms are rod-shaped, gram-negative, non-spore forming bacteria which can ferment lactose with the production of acid and gas when incubated at 35-37°C.

### 2. Fecal coliforms

Fecal coliforms examination normally indicates the fecal contamination even though it may also detect non-fecal microorganisms (e.g. *Enterobacter*, *Klebsiella*, and *Citrobacter*). Bacteria of fecal coliforms are facultative anaerobic, rod shaped, gram negative and non-spore forming bacteria. They can grow in the presence of bile salts or similar surface agents, are oxidase negative, and produce acid and gas from lactose within 48 hours at  $44 \pm 0.5^\circ\text{C}$ .

### 3. Escherichia coli

The detection of *E. coli* indicates fecal contamination. It could be distinguished from total coliform and fecal coliform by beta-glucuronidase enzyme activity. *E. coli* is a gram-negative, rod shaped bacterium that is commonly found in the lower intestine of warm-blooded organisms (especially in tropical environment). *Escherichia* is from *Enterobacteriaceae* family and



originally come from gastrointestinal tract of human and animals. Because of this, it is usually used as indicator of feces contamination in food sample.

Most *E. coli* strains are harmless but some such as serotype O157:H7 can cause serious food poisoning in humans. *E. coli* are not always confined to the intestine and their ability to survive for brief periods outside the body makes them an ideal indicator organism to test environmental samples for fecal contamination.

### 4. Salmonella spp.

*Salmonella* is a genus of rod shaped bacterium. It also comes from *Enterobacteriaceae* family which originally comes from gastrointestinal tract of human and animals. Because of that, it also been used as indicator of feces contamination. *Salmonella* is a major cause of bacterial enteric illness in both humans and animals. Most commonly, *Salmonella* is the cause of food poisoning and typhoid fever and the microbe lives in the intestine of mammals, birds and reptiles.

The types of *Salmonella* that is health hazard is usually contracted by touching raw meat, raw eggs, raw shellfishes or unpasteurized animals

products such as milk and cheese. In food industry, *Salmonella* bacterium can be acquired by human that have the bacteria on their hands. However, *Salmonella* is not a threat until it is ingested.

### 5. Staphylococcus aureus

The original habitats of *S. aureus* are on human skin and in human and animal mucus. It also could be found in pus. Thus, it indicates the contamination that may come from human or more specifically from food handlers. *S. aureus* is very small (0.5-1  $\mu\text{m}$ ), has coccus shape (like grape fruit), gram negative and static. It also has facultative aerobic characteristic. There is quite a number of *Staphylococcus* species but *S. aureus* is the most pathogenic that can affect human health.

In Malaysia, the contamination of *najsmutawassitah* in food sample is verified using microbial indicators mainly according to the Microbiological Standard as stated in Schedule 15, Regulation 39 of Food Act 1983 and Food Regulation 1985.

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