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# Identification Of *Escherichia Coli* Bacterial Contamination in Home Industry Baby Porridge In The Malang City Area

Anis Akhwan Dhafin[1]*, Elsa Mahardika Putri[2], Fendy Prasetyawan[3], Faisal Akhmal Muslikh[4], Burhan Ma'arif[5], Dewi Sinta Megawati[6].
[1,2,3]Kadiri University, [2]Bhakti Wiyata Institute of Health Sciences, [5,6]Universitas Islam Negeri Maulana Malik Ibrahim
**Corresponding Author:** Anis Akhwan Dhafin**;** Anisakhwan95@gmail.com

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A B S T R A C T

Growth and development in toddlers is very important, especially the nutritional needs of toddlers. MP-ASI is additional food to provide sufficient nutrition for babies. MP-ASI is divided into two types, namely traditional and industrial. Traditional MP-ASI is baby porridge that is prepared by yourself and sold on the side of the road. Hygiene and sanitation in roadside food can have a negative impact on consumers, especially bacterial contamination of food, one of which is Coliform bacteria, *Escherichia Coli*, etc. The method for calculating and estimating the number of E. coli bacteria found in chicken meat in this study used the Most Probable Number (MPN). The results showed that of the 4 samples tested, 3 were contaminated with *Escherichia Coli* bacteria and 1 was negative for *Escherichia Coli* bacterial contamination

## INTRODUCTION

The World Health Organization (WHO) defines street food as ready-to-eat food and drinks prepared and/or sold by vendors and hawkers on streets and other public places. This definition includes fresh fruit and vegetables sold for direct consumption outside official markets (WHO 1996, WHO 2010). In this sense, street food is also sold in outdoor locations and covered markets, where people gather to shop or engage in recreational activities (Al Mamun and Turin 2016). Therefore, street food sellers can be found clustered around public locations such as schools, colleges, hospitals, bus and train stations, factories, offices, and entertainment venues such as carnivals, fairs, and athletic events (Al Mamun and Turin 2016, Andrade *et al*, 2023).

In developing countries, malnutrition still contributes to morbidity and mortality rates and hinders neurological development in children. Approximately 200 million children fail to reach their potential growth and development. This is due to lack of nutritional intake, the influence of infectious diseases, poor environment and sanitation and social violence. Currently, the problem faced in the modern era is not only the problem of undernutrition in children, but also the problem of overnutrition. Complementary food is given to babies aged > 6 months because at that age babies need other nutrients apart from breast milk or formula milk. As the baby ages, there is also a decrease in breast milk production which results in an inadequate supply of nutrients for the baby's increasing developmental needs, so giving it in the form of complementary foods is highly recommended (Ardhianditto et al., 2013).

In the period from 6 months to 24 months there is a change in energy needs from exclusive breastfeeding to complementary foods, because this period is very sensitive to the occurrence of malnutrition in children. The nutritional value of complementary foods must meet the nutritional requirements needed by the baby for growth. As well as having a taste that babies like, a suitable shape or texture so that it is easy to swallow and is clean and is not contaminated by pathogenic bacteria (Ardhianditto et al., 2013).

Home industry baby porridge sellers usually sell their wares on the side of the main road or in busy places such as markets, where buyers can easily reach them. Even though many factories have released instant baby porridge products, this has not discouraged enthusiasts or buyers of home industry baby porridge. Affordable prices are also one of the supporting factors for people to buy home-made baby porridge.

Food contamination is something that is undesirable in food which may come from the environment or from the food production process. Types of pollution can be chemical pollution and biological pollution. Biological contamination is most often caused by anaerobic bacteria, such as Coliform, *Escherichia Coli, Salmonella, Shigella, Staphylococcus aureus, Streptococcus faecalli, Vibrio*, and so on (BPOM, 2012).

## LITERATURE REWIEW

*Escherichia Coli* is a Pathogenic Bacteria, including short rod-shaped gram-negative bacteria or coccobacilli with a size of 0.4 μm – 0.7 μm x 1.4 μm. There are pathogenic and non-pathogenic *Escherichia Coli* strains. Non-pathogenic *Escherichia Coli* is often found in the human colon as normal flora. It also plays a role in food digestion by producing vitamin K from undigested material in the large intestine. Meanwhile, one example of pathogenic *Escherichia Coli* strains is the Enteropathogenic *Escherichia Coli* type which easily contaminates food and can cause diarrhea in babies and children in developing countries (BPOM, 2012). Because there are many home industry baby porridge sellers in the city of Malang, researchers are interested in conducting research to identify bacteria e. Coli in home industry baby porridge in the Malang city area.

## METHODOLOGY

The sample used in this research was home industry baby porridge from outlets spread across the Malang city area. The samples consisted of 4 samples of home industrial baby porridge which had been processed so that it did not last long. This home industry baby porridge will be tested using the Most Probable Number (MPN) method.

MPN testing was performed with sample every dilutions $10^{-1}$, $10^{-2}$, $10^{-3}$ from Buffered Peptone Water (BPW) media, 1 ml each was taken, poured to in 5 tubes containing Durham tube and 9 ml Brilliant Green Bile Broth (BGBB). Tubes the Then incubated for 24-48 hours at a temperature of 35$^{o}$C. Gas formed in the tubes This is results positive in the estimation test For E. coli bacteria next confirmation test is carried out with take 1 culture loop from positive and distreak BGBB tube onto Eosin Methylene Blue Agar (EMBA) media and Then incubated at 35°C for 24 hours. Colony color *Escherichia Coli* bacteria that appeared in the EMBA media after incubation that is green metallic which means show exists *Escherichia Coli* bacteria.

## RESEARCH RESULT

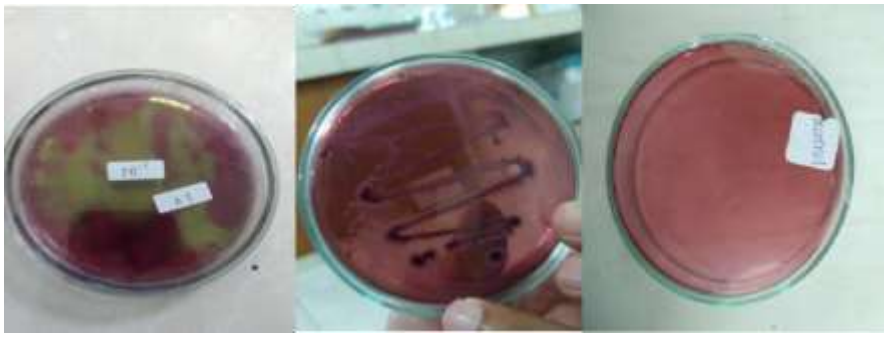
The MPN method is used to count and estimate the number *of Escherichia Coli* bacteria found in home industry baby porridge. MPN is carried out through 3 test stages, namely presumptive test, confirmed test and complete test. Presumptive tests and confirmed tests are carried out For inspect existence lactose fermenter bacteria that can produces gas like *Coliform* bacteria. Change color on BGBB media is caused Because there is a fermentation process from coliform bacteria that produce sour so that tube changed become yellow cloudy. Positive results from BGBB media (Figure 1) can be seen from changes in color and turbidity of the tube and gas in the Durham tube (Merck, 1996)

A complete test is used to further confirm that the bacteria tested is *Escherichia Coli*. EMBA media is used as a differential selective medium to ensure that the bacteria contained in the sample are *Escherichia Coli*. EMBA media contains lactose, sucrose, peptone, eosin Y and methylene blue, the presence of methylene blue can inhibit the growth of Gram positive bacteria. Lactose and sucrose are substances that can be fermented by Gram-negative bacteria such as

*Escherichia Coli* bacteria to become acid and gas. The acid formed will react with the Eosin Y indicator and change the color of the media to shiny dark purple

(Figure 2). Positive results can be seen from the growth of *Escherichia Coli* bacterial colonies which are metallic green in color and have a dark spot in the middle of the colony (Lal and Cheepthman, 2007).

Picture 1. Negative Results (left) And Positive (right) Tube BGBB test Affirmation



Picture 2. EMB Agar media positive for E. coli (left), Negative (middle) and Control Media (right) Complementary Test

From results test complement Which positive done Again coloring grams. Gram stain serves to determine whether the bacteria are real in the group of gram-negative or gram-positive bacteria, and *Escherichia Coli* is gram-negative bacteria so that researchers can be confident in their results obtained. Of the 4 samples, 3 samples were positive for *Escherichia Coli* bacteria, 1 sample showed negative results for *Escherichia Coli* bacteria.

The results obtained in this study are in accordance with those carried out by Irma Riani, (2021) who showed positive results as many as 9 out of 10 positive samples contained *Escherichia Coli* bacteria in home industry baby porridge samples in the Tulung Agung area, East Java, Indonesia.

The coliform bacteria that are often found contaminating meat are *Escherichia Coli* bacteria which are normal flora bacteria in the digestive tract of humans and animals (Wibisono et al., 2020). If E. coli bacteria contaminate food and are consumed by humans, it will cause acute diarrhea (gastroenteritis), so it needs to be a concern (Javadi and Safarmashaei, 2011). Contamination levels that

are high or exceed the threshold can cause a decrease in quality, shelf life, unpleasant odor and cause health problems (Djaafar and Rahayu, 2007). The presence of *Escherichia Coli* bacteria in food can also be an indicator of the presence of other pathogenic microbes (Ishii and Sadowsky, 2008). High levels of bacterial contamination can also be caused by sales places located on the side of the road and open so that home industry baby porridge is easily contaminated by dust and air (Selfiana et al., 2017).

## CONCLUSIONS AND RECOMMENDATIONS

The results of the home industry baby porridge sold on the roadside in the Malang city area were a total of 4 samples, of which 3 samples were positive for *Escherichia Coli* bacteria and 1 sample was negative for *Escherichia Coli* contamination.

## REFERENCES

Al Mamun M., Turin TC. (2016). Bab 2 - keamanan makanan jalanan. Di: Kotzekidou P (ed.), Higiene Makanan dan Toksikologi dalam Makanan Siap Saji. Amerika Serikat: Academic Press, 15–29.

Andrade AA, Paiva AD, Machado ABF. (2023). Microbiology of street food: understanding risks to improve safety. J Appl Microbiol. 2023 Aug 1;134(8):lxad167. doi: 10.1093/jambio/lxad167. PMID: 37516449.

Ardhianditto, D., Anandito, B. K., Prananto, N. H., & Rahmawati, D. (2013). Kajian Karakteristik Bubur Bayi Instan Berbahan Dasar Tepung Millet Kuning (Panicum Sp) Dan Tepung Beras Merah (Oryza nivara) dengan flavor alami pisang ambon (Musa X paradisiaca L) Sebagai Makanan Pendamping Asi (MP-ASI). Jurnal Teknosains Pangan, 2(1), 88–96.

BPOM. (2012). Pedoman Kriteria Cemaran pada Pangan Siap Saji dan Pangan Industri Rumah Tangga

Cusick, S and Georgieff, M.K. The First 1000 Days of Life: The Brain's Window of Opportunity, (Online). 2017 (www.unicefirc.org/article/958/, diakses 09 Desember 2023

Djaafar, T. F., & Rahayu, S. (2007). Cemaran mikroba pada produk pertanian, penyakit yang ditimbulkan dan pencegahannya. Jurnal Litbang Pertanian, 26(2).

Ishii, S., & Sadowsky, M. J. (2008). *Escherichia Coli* in the environment: implications for water quality and human health. Microbes and Environments, 23(2), 101-108

Javadi, A., & Safarmashaei, S. (2011). Microbial profile of marketed broiler meat. Middle East Journal of Scientific Research, 9(5), 652–656

Lal, A., & Cheeptham, N. (2007). Eosin Methylen Blue Agar Protocol. ML Library American Society for Microbiology

Merck. (1996). Microbiology Manual. Merck KGaA, Darmstadt, Germany.

Selfiana, D. R., Rastina, R., Ismail, I., Thasmi, C. N., Darniati, D., & Muttaqien, M. (2017). Jumlah cemaran *Escherichia Coli* pada daging ayam broiler di pasar Rukoh, Banda Aceh. Jurnal Ilmiah Mahasiswa Veteriner, 1(2)

WHO (Organisasi Kesehatan Dunia). (2010). Langkah-langkah dasar untuk meningkatkan keamanan makanan jalanan. Jaringan Otoritas Keamanan Pangan Internasional (INFOSAN). 2010. Catatan Informasi No.3/2010 - Keamanan makanan jalanan.

WHO (Organisasi Kesehatan Dunia). (1996). Persyaratan Keamanan Penting untuk Makanan Jalanan. Masalah Keamanan Pangan. SIAPA/FNU/FOS/96.7. Jenewa: Organisasi Kesehatan Dunia.

Wibisono, F. J., Sumiarto, B., Untari, T., Effendi, M. H., Permatasari, D. A., & Witaningrum, A. M. (2020). Prevalensi dan Analisis Faktor Risiko Multidrug Resistance Bakteri *Escherichia Coli* pada Ayam Komersial di Kabupaten Blitar. Jurnal Ilmu Peternakan dan Veteriner Tropis, 10(1), 15.