

Unveiling the potential of the electronic nose in the determination of *E. coli* indicator compounds

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INTRODUCTION

A bacterial species of the Enterobacteriaceae family.

The majority of facultative microflora are located in the gastrointestinal tract of most vertebrates (humans and animals).

Perfect model organism:

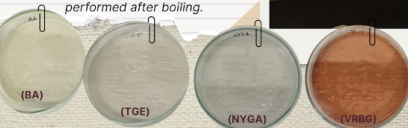
- easy to culture and manipulate in the laboratory
- rapid growth rate
- genetic traceability

including both pathogenic and nonpathogenic strains

MATERIALS & METHODS

Culture agar

All microbiological nutrient agar was prepared as described. After appropriate preheating, most of the agars were autoclaved. VRBG agar is heat sensitive; therefore, no further heat treatment was performed after boiling.



Basic agar (BA): peptone and agar.
Plate Count agar (TGE): Standard medium for the determination of total bacterial count. (Contains: casein/pepton, yeast extract, glucose, and agar).
Nutrient Yeast Glucose agar (NYGA): non-selective, general medium for the cultivation of microorganisms. (Contains: peptones, yeast extract, glucose, sodium chloride, and agar).
Violet Red Bile Glucose agar (VRBG): Glucose-containing selective and differentiating media for the detection and colony counting of the Enterobacteriaceae family.

Analysis

SAMPLES

- Samples:**
- 7 parallels of the bacteria on different agar in mixed order
 - 3 parallels of blank agar
 - Total: 42 measures each sampling day

- Incubation:**
- Time/temperature: 20 min at 37°C
 - Agitation: 1s on (250 rpm), 50 s off

METHODE

- Oven:**
- Initial temperature: 50°C
 - Initial isotherm: 2 s
 - Temperature program:

- Trap:**
- Temperature: 40°C
 - Split: 10 ml/min
 - Duration: 18 s
 - Pre-heating time: 35 s
- Injection:**
- Volume: 1000 µl
 - Speed: 125 µl/s
 - Temperature: 200°C
 - Acquisition duration (110 s)



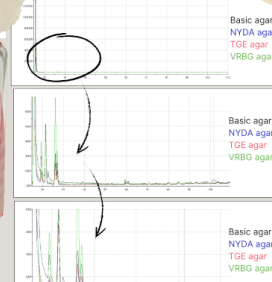
n	Rate (°C/s)	Isotherm (°C)	Time (s)
1	1	80	0
2	3	250	21

RESULTS

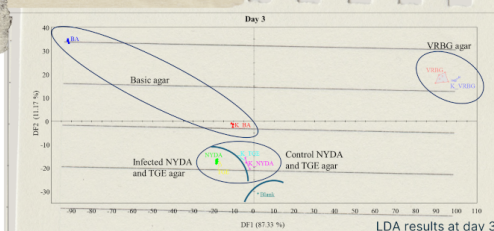
Basic agar, days:



Chromatograms at day 1



Different agars at day 3:



Cultivation in Petri dish:



Next steps:

Create a compound list based on the emitted volatile pattern changes.

CONCLUSIONS

1. *E. coli* can be successfully used as a model organism on various agar media.
2. A suitable measuring method was built.
3. The emitted volatile organic compounds can be successfully measured with an electronic nose device.
4. Separation of blank samples (not infected) from infected samples was completed.

Concerns in Hospitality

HYGIENE INDICATOR

E. coli is the best indicator of fecal contamination among the commonly used fecal-indicator organisms.

FOOD SAFETY

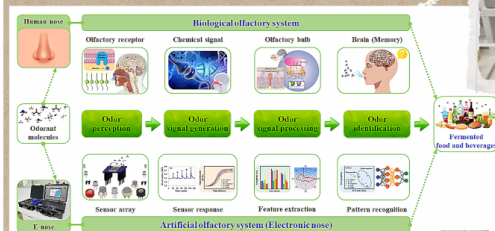
Contamination is typically spread when feces come into contact with food or water. Human carriers can spread infections when food handlers do not use proper hand washing hygiene after using the restroom.

CROSS-CONTAMINATION

Prevent cross-contamination by thoroughly washing hands, counters, cutting boards, and utensils with soap and water after they touch raw meat.

Electronic nose

How does it work?



AIMS:

- use *E. coli* as a model organism on different agar
- build a suitable measuring method
- measure the emitted volatile organic compounds with electronic nose device
- separate blank samples from infected samples

