

## Paper-strip-based biosensor for rapid detection of *Listeria monocytogenes* in milk

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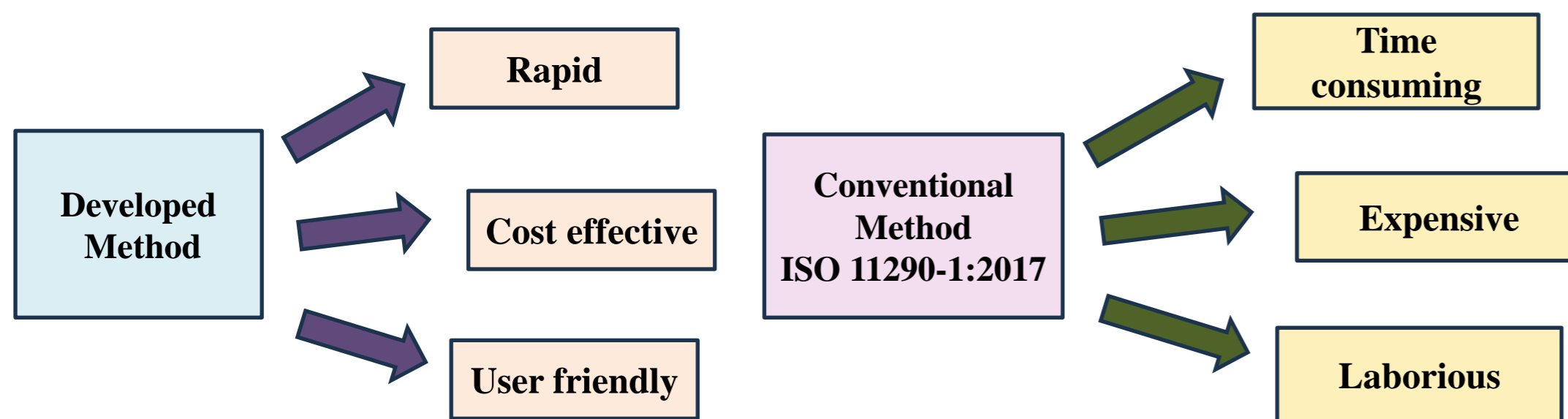
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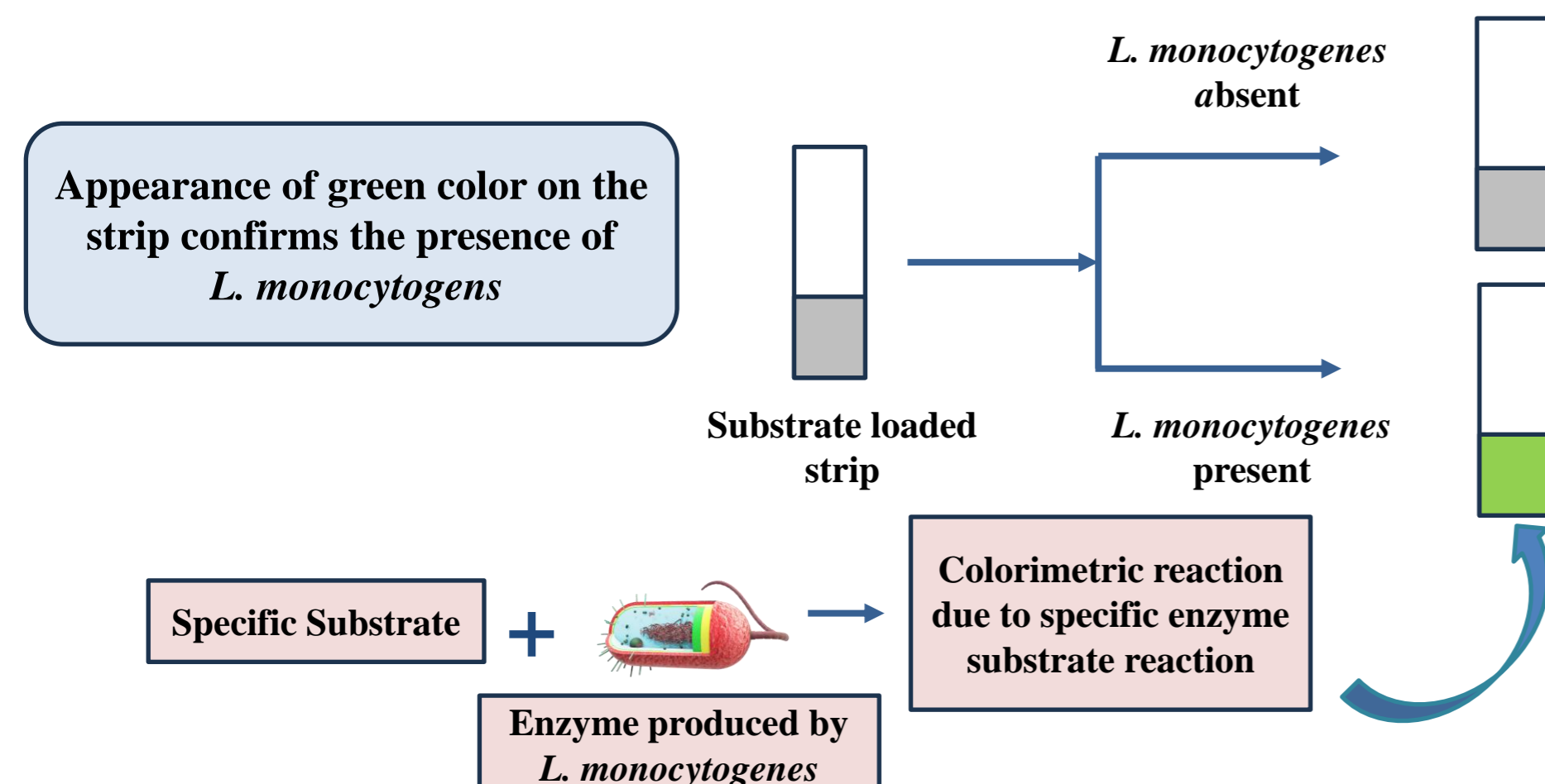
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### INTRODUCTION & AIM

- ❖ *Listeria monocytogenes* causes listeriosis with a 20-30% fatality rate; conventional detection (ISO 11290-1:2017) takes 5-7 days.
- ❖ FSSAI mandates zero tolerance due to risks, with outbreaks from contaminated milk.
- ❖ The aim was to develop a strip-based assay for rapid and cost-effective detection, ensuring enhanced food safety.

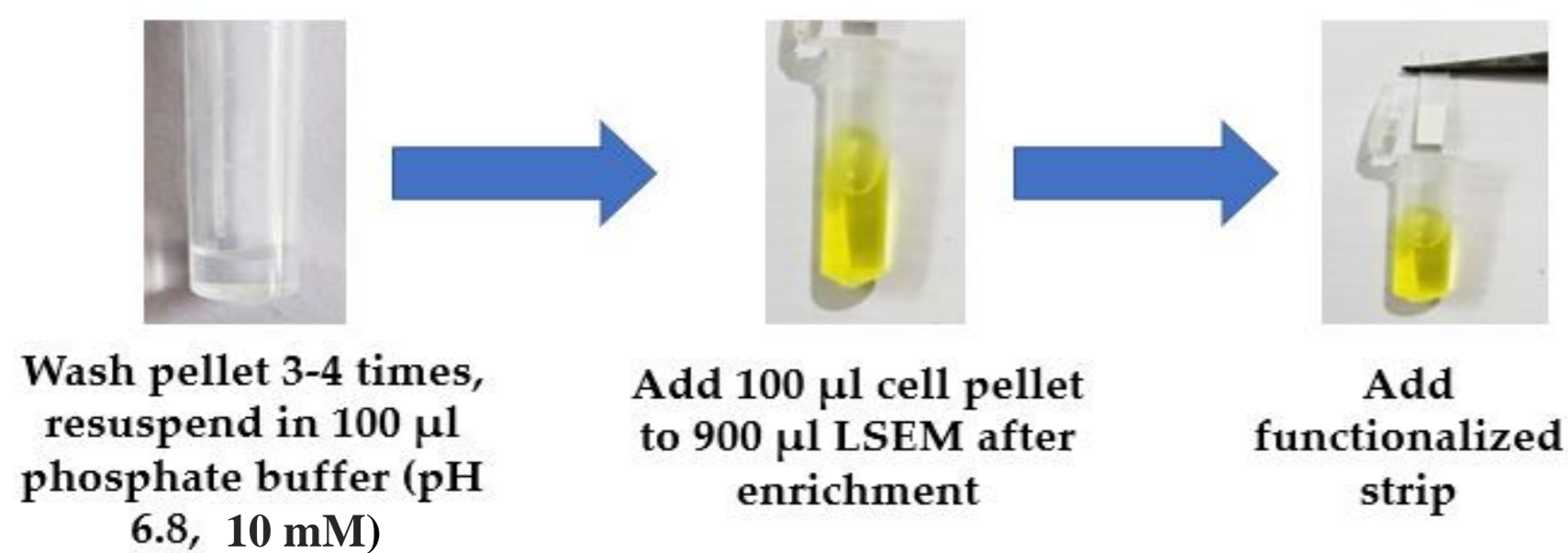


### Principle of developed strip-based assay

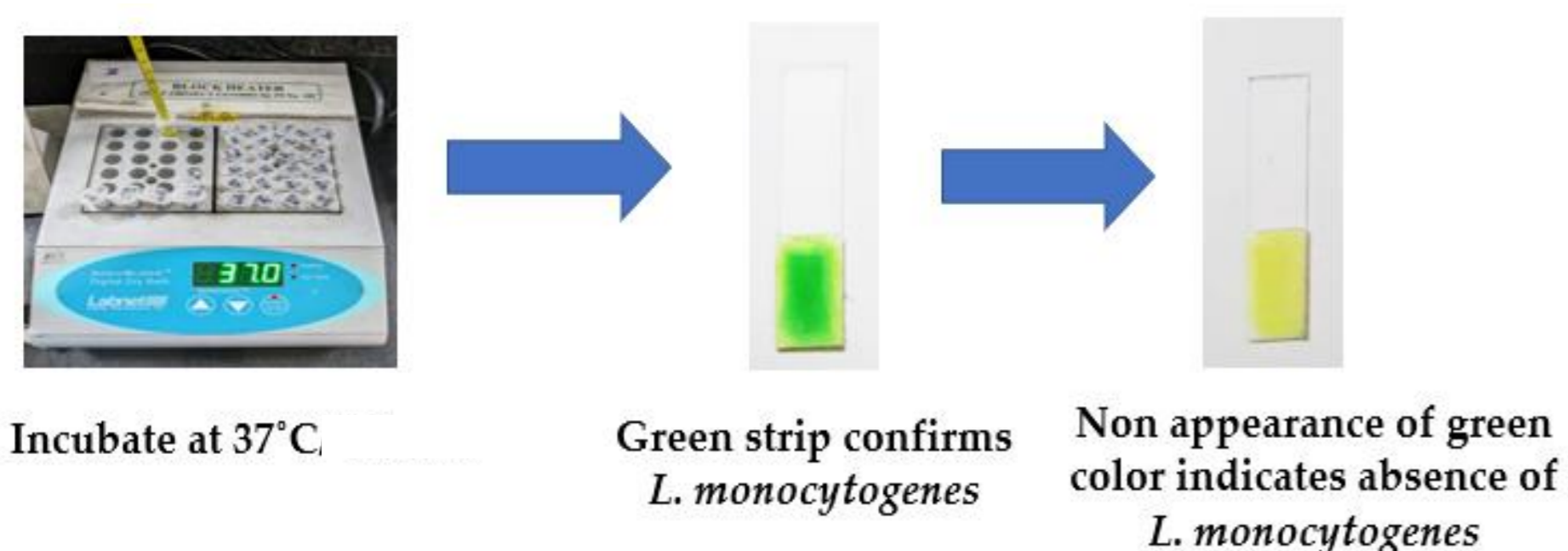


### METHOD

#### Selective enrichment

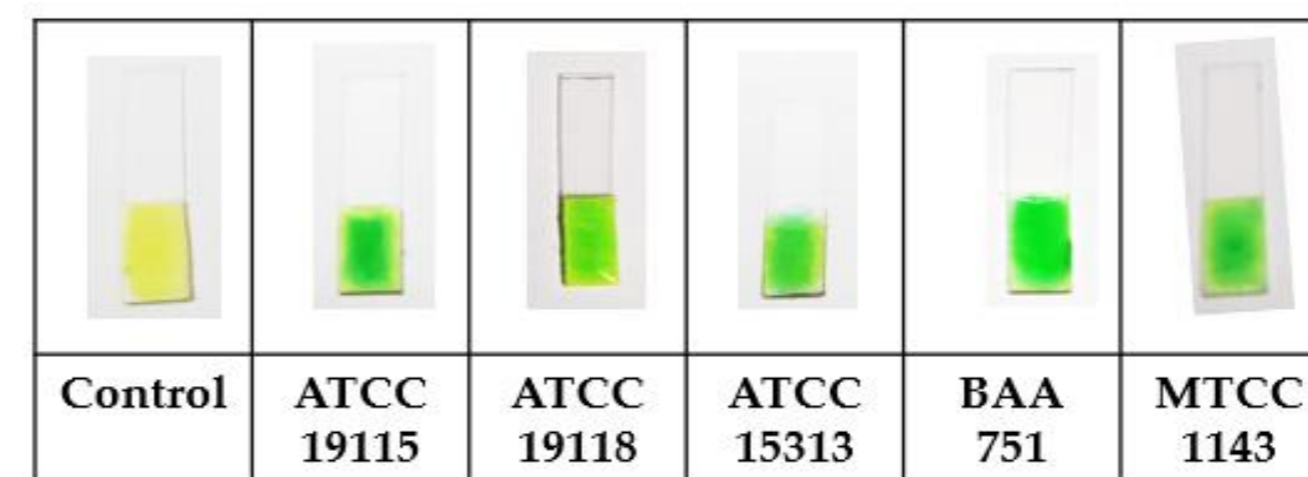


#### Detection of *L. monocytogenes* using developed strip biosensor



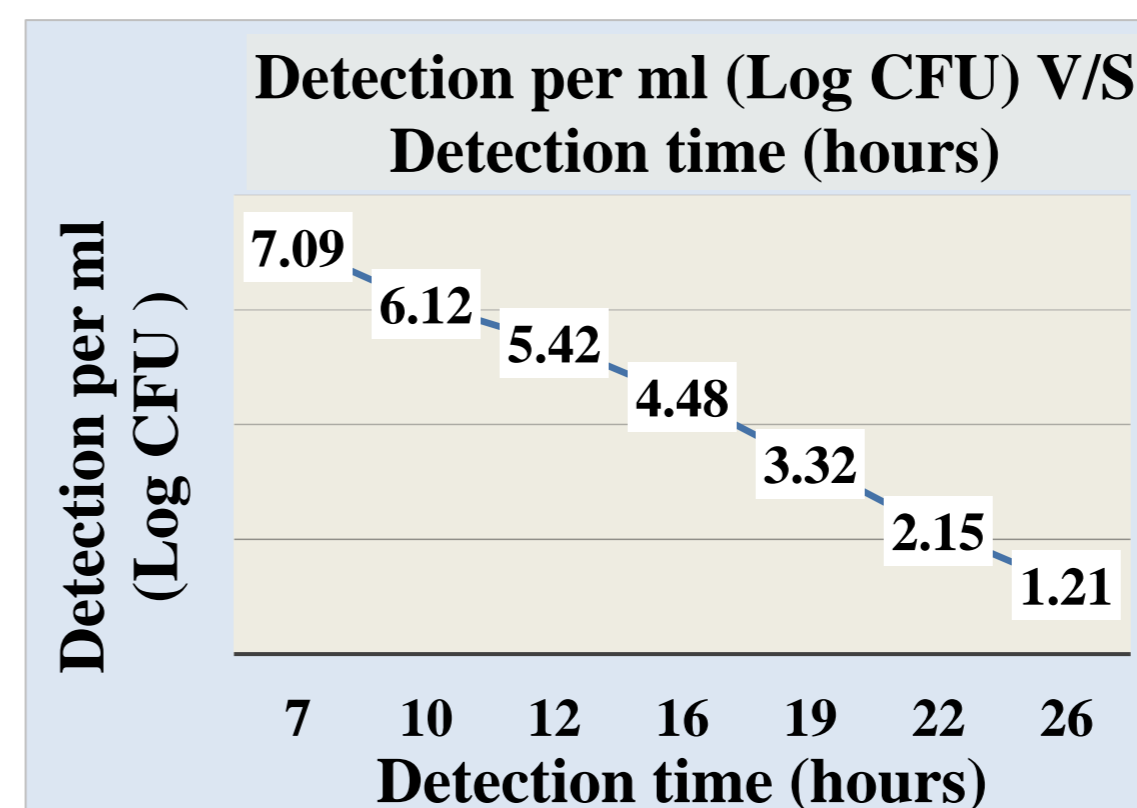
### RESULTS & DISCUSSION

#### For Detection of *L. monocytogenes* in milk Detection time : 9 hours



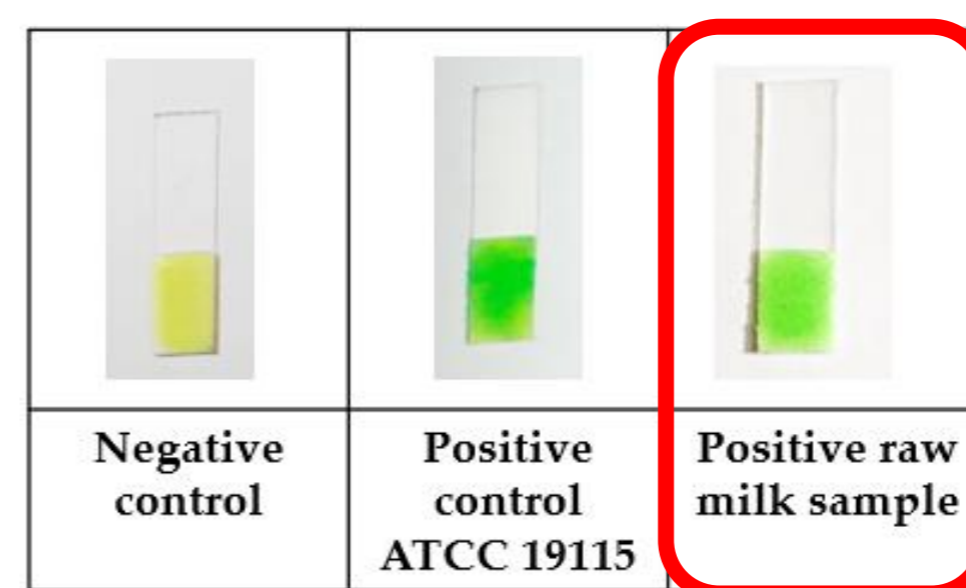
Limit of detection (LOD):  
1 log CFU/ml

#### For milk samples without enrichment



Log CFU/ml	Time (hrs)
7.09	7
6.12	10
5.42	12
4.48	16
3.32	19
2.15	22
1.21	26

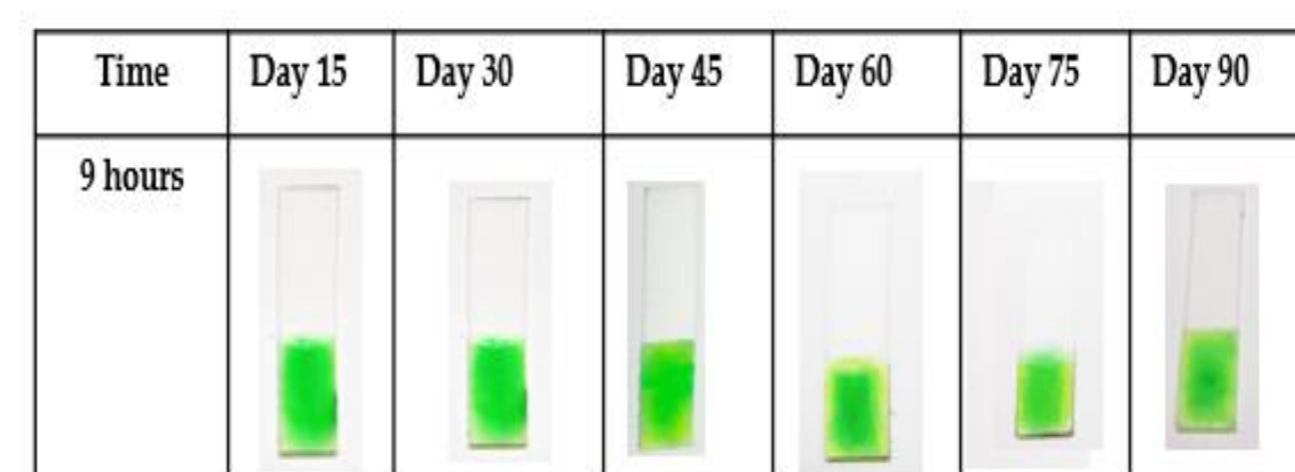
#### Evaluation of developed paper strip-based biosensor



Out of total 70 samples of milk (35 raw and 35 pasteurized), one of the raw milk sample was tested to be positive for *L. monocytogenes* using strip-based assay and the results were validated by conventional method (ISO 11290-1:2017) and both methods showed identical results, confirming the strip's accuracy.

#### Positive milk sample

#### Shelf-life study



Stable for 3 months at refrigeration temperature

### CONCLUSION

- ❖ Detection of *L. monocytogenes* in milk within 9 hours after primary enrichment in *Listeria* selective enrichment medium (LSEM) for 24±1 hours.
- ❖ The developed biosensor is a translation of our validated and patented technology (Indian Patent No. 410633) and can be employed for use over the conventional methods that are tedious and labor intensive.
- ❖ Developed assay is cost effective (₹ 50/- test as against ₹ 762/- in conventional method).
- ❖ It is a quick, accurate, economical and user friendly technology that can readily serve the industry.

### FUTURE WORK / REFERENCES

- ❖ The developed strip-based method can be further optimized for use in various other milk products for the rapid detection of *L. monocytogenes*.
- ❖ Kumar N; Balhara, M; Thakur G; HV Raghu; Kumar V; Lawaniya R; Khan, A. and Shabnam. (2022). Two Stage Enzyme Assay for Detection of *Listeria monocytogenes* in Milk Products. *Indian Patent No. 410633*.