

## Functional food based on rice bran containing *Lactibacillus acidophilus*

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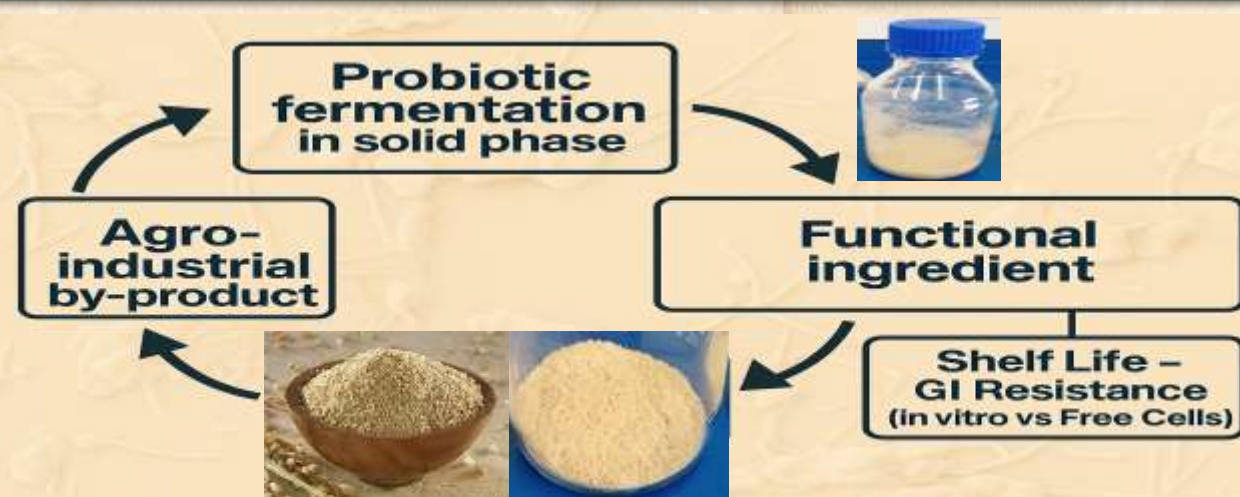


Full summary by scanning QR coder

Research Area: 3. Fermentation Foods, Drinks, and Food Safety.

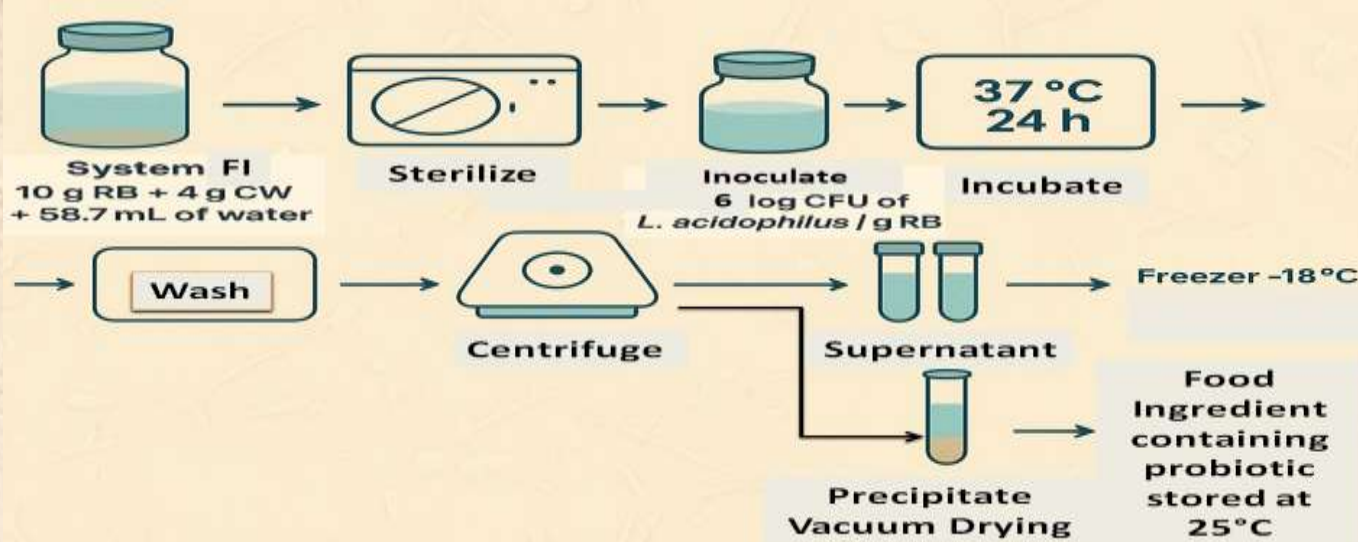
### INTRODUCTION & AIM

Rice bran (RB) was used as substrate for preparing food ingredients (FI) containing *Lactobacillus acidophilus*. The fermentation systems were formulated using rice bran (RB), cheese whey (CW), and water, followed by the inoculation of *L. acidophilus* according to the proportions established in previous experimental design.

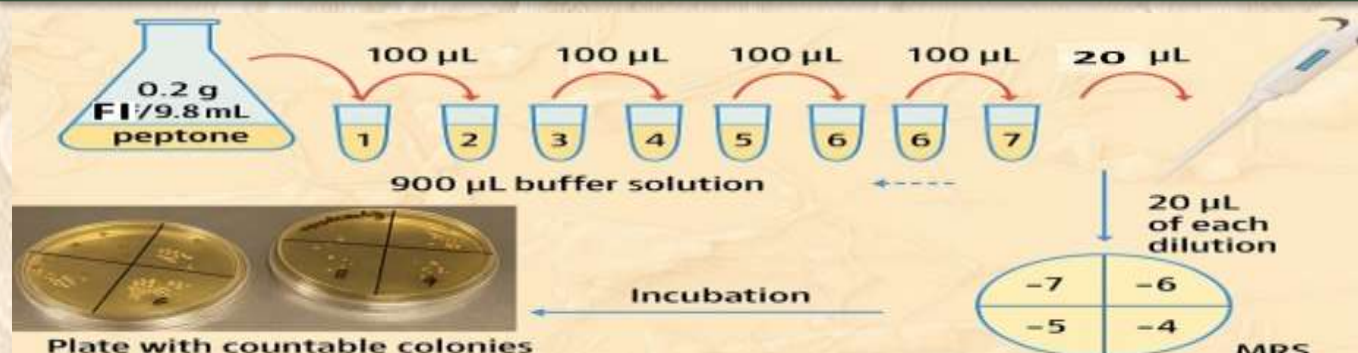


**Figure 1.** Solid-state fermentation in the creation of a functional ingredient.

### METHOD



**Figure 2.** The creation of a functional ingredient. Note: control system is similar but without inoculation.



**Figure 3.** Determination of shelf-life, Cell counts were measured on MRS agar for 102 days.

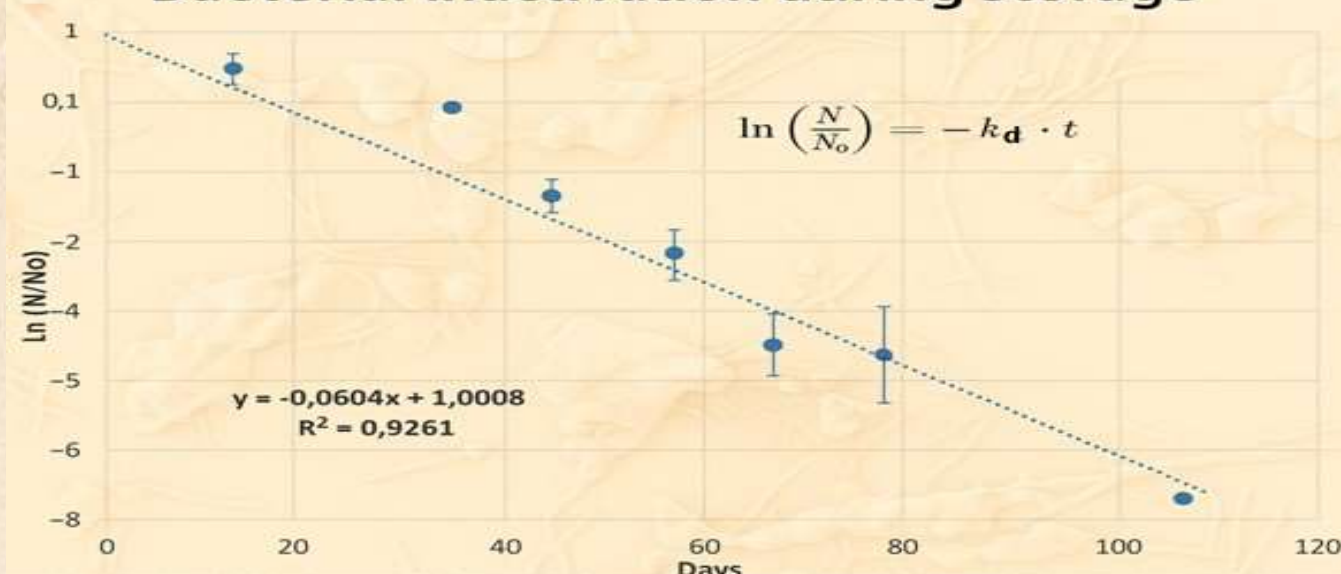


**Figure 4.** Gastric and intestinal digestion was simulated *in vitro* on different days of storage and were compared to free cells digestion.

### RESULTS & DISCUSSION

The shelf-life results were adjusted to first-order kinetics:  $\ln(N/N_0) = -k_d \cdot t$ , where  $k_d$  represents the death rate of *L. acidophilus* supported in the FI under the conditions tested;  $N$  corresponds to the cell count at different periods (days), and  $N_0$  is the count at  $t=0$  d.

#### Bacterial inactivation during storage



**Graphic 1.** Viability decreased according to first-order kinetics ( $R^2=0.9261$ ), with a death-rate of  $k=0.0604 \text{ d}^{-1}$ , showing a progressive loss of viable cells during storage. The proposed process achieved a yield of  $\sim 0.75 \text{ g FI/g RB}$ .

Note: Values are expressed as mean  $\pm$  SD ( $n = 3$ ). \* indicates significant difference ( $p < 0.05$ ) compared with free cells.

| Day | Treatment  | %GR (Gastric Resistance) | %IR (Intestinal Resistance) |
|-----|------------|--------------------------|-----------------------------|
| –   | Free cells | $86.7 \pm 6.7$           | $88.2 \pm 4.2$              |
| 1   | System     | $51.3 \pm 7.2^*$         | $65.4 \pm 3.8^*$            |
| 15  | System     | $79.4 \pm 0.2$           | $77.7 \pm 0.2$              |
| 34  | System     | $90.0 \pm 0.1$           | $87.8 \pm 0.4$              |
| 47  | System     | $95.9 \pm 1.9$           | $93.5 \pm 1.3$              |
| 60  | System     | $83.2 \pm 0.5$           | $80.3 \pm 2.2$              |
| 70  | System     | $90.1 \pm 2.8$           | $83.8 \pm 9.6$              |
| 83  | System     | $87.2 \pm 2.1$           | $71.7 \pm 0.6^*$            |
| 102 | System     | $76.9 \pm 1.4$           | $93.2 \pm 0.1$              |

**Table 1.** Gastric and intestinal resistance (%GR, %IR) of probiotics contained in the FI and as free cells during storage. For free cells, an inoculum of  $8.41 \pm 0.09 \text{ log UFC/mL}$  was used.

Note: Values are expressed as mean  $\pm$  SD ( $n = 3$ ). (\*) indicates significant difference ( $p < 0.05$ ) between FI and free cells.

### CONCLUSION

RB demonstrate to be an excellent substrate for *L. acidophilus*, showing a high population ( $>7.6 \pm 0.1 \text{ Log UFC/g FI}$ ) after drying and during 102 d storage at 25 °C. In general, the GR and IR were relevant suggesting an important viability of the probiotic after digestion simulated conditions.

The use of RB can be recommended as a sustainable option for FI production.

showed good growth and interaction with the rice bran (RB) matrix. Vacuum drying preserved RB's nutritional properties and extended probiotic viability. Despite an initial cell reduction, viable counts remained higher than  $\sim 7.6 \pm 0.1 \text{ Log UFC/g FI}$  for 100 days, keeping a good %GR and %IR Overall.

### Acknowledgement

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