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## Obtaining a functional food ingredient based on oat bran and fermented by Lacticaseibacillus casei.

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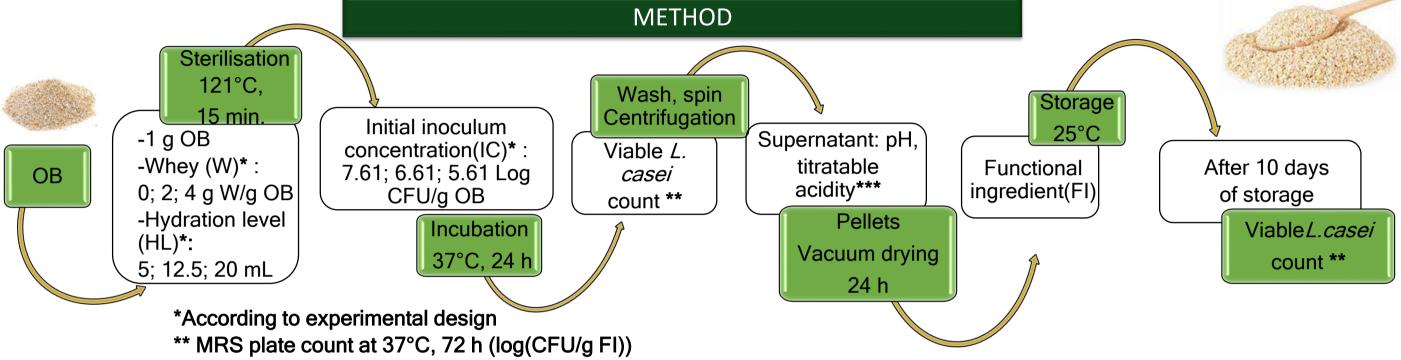
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## **INTRODUCTION & AIM**

Using agro-industrial by-products as a substrate for the growth of probiotic strains is a sustainable alternative for increasing their added value. In particular, oat bran (OB) has a high content of soluble and insoluble fibers with a positive effect on the metabolism of lactic acid bacteria.

This study aimed to design and optimize the production of a functional ingredient (FI) with *Lacticaseibacillus casei* (ATCC 393) immobilized in OB.



\*\*\* 0.01 N NaOH and phenolphthalein as an indicator (g of lactic acid/L supernatant)

The effects of W, HL, and IC supplementation were analyzed using a three-level Box-Behnken experimental design with the center point measured in triplicate. The analyzed response variables were cell count and growth, pH and titratable acidity of the supernatants after incubation, FI yield, and cell count after dehydration and 10 days of storage. For the experimental design, the correlation study was performed using the Statgraphics Centurion XV version 6.0 program (StatSoft Inc., USA).

## **RESULTS & DISCUSSION**

Table 1. Regression coefficients of the studied effects on the response variables.

Coefficient	Dependent variables					
						Post -
						dehydrati
		Cell		Titratable		on cell
	Cell count	growth	рН	acidity	Yield	count
constant	8.41	-0,80	4.45	11.74	0.47	8.50
A: HL	0.10	0.14	-0.02	-0.36	0.01	-0.03
B: W	5.01	6.78	-2.17	9.19	0.90	0.80
C: IC	-0.01	-0.95	-0.27	3.79	-0.02	0.65
					_	
AA	-0.0034	-0.0034	0.0016	0.0022	0.0002	0,0008
AB	-0.009	-0.125	-0.01	0.736	-0.003	0.024
					_	
AC	0,0004	-0.0002	0.0053	-0.1457	0.0017	-0.0009
BB	-6.79	-6.89	3.03	-14.34	-0.89	4.53
ВС	-0.09	0.08	-0.29	-1.31	0.13	0.84
CC	-0.007	0.008	-0.039	0.137	-0.013	0.15
$\mathbb{R}^2$	95.00	97.72	93.05	94.82	83.32	87.25
R <sup>2</sup> adj	85.99	93.61	80.55	85.49	53.31	64.29
Lack of fit	0.13	0.14	0.35	0.14	0.86	0.26

The regression coefficients highlighted in bold have a significant effect (p < 0.05) on the response variable.

- ➤ All response variables fitted to the proposed model, except cell count after 10 days at 25°C.
- ➤ Significant Pearson correlations were observed between cell count and pH, titratable acidity, and IF yield (-0.5941, p = 0.0251; 0.7699, p = 0.0013; 0.6202, p = 0.0180 respectively).

The independent variables were optimized to maximize cell count and growth during the fermentation process and to maximize cell count after dehydration. The optimal conditions found were: for HL: 15 mL of water/g OB; for whey: 0.3 g/g OB; and for the IC: 5.79 log(CFU/g OB).

Table 2. Estimated statistical and experimental values for the different responses variables of the optimal system.

	Statistical estimate			
Responses	for the optimal			
Variables	system	<b>Experimental value</b>		
Post fermentattion				
cell count				
log(UFC/gIF)	10.04	10.11 ± 0.10		
post fermentation				
cell growth logN-				
$logN_0$	4.07	$4.43 \pm 0.06$		
Post -dehydration				
cell count				
log(UFC/gIF)	8.20	8.36 ± 0.09		

## CONCLUSION

This result demonstrates the feasibility of optimizing the production of a dried FI based on OB as a substrate for *L. casei*. The obtained FI has potential for new food development.



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