USE OF THE MICROBIAL GROWTH PREDICTOR TO INDICATE CHANGES IN THE SAUSAGE'S APPEARANCE AFFECTING THE SALE FLUX IN MARKETS

Carlos A. Guerra[1*], Lucas M. Costa[1], Letícia G. O. Alves[2], Isabella R. Viviani[2], André F. Guerra[2]

[1] BRC Ingredientes Ltda. 13505-600 Rio Claro, São Paulo, Brazil

[2] Centro Federal de Educação Tecnológica Celso Suckow da Fonseca (CEFET/RJ), Brazil

*Corresponding author email: carlos@brcingredientes.com.br

I. INTRODUCTION

The growth of ropy slime producing bacteria is a common defect impairing superficial color of vacuum-packaged meat products. Thus, the visual aspect created by the formation of ropy slime impacts the consumer appraisal and may cause the product rejection before the expiry date prescribed by the manufacturer [1]. The food industry requires a relatively short time to obtain the information needed to determine the shelf-life of food products. For practical reasons, when the actual product shelf-life is long, the industry usually uses accelerated tests that considerably shorten the time spent to obtain relevant experimental data [2]. The microbial growth predictor, named *MicroLab_ShelfLife*, was developed to perform a durability study by an *in vitro* and an *in silico* trial, under a dynamic temperature profile, and preserving the intrinsic features of the products. The entrance of the natural microbiota of vacuum-packaged cooked sausage into the stationary phase is a suitable borderline to indicate the retention of the original attribute related to the product appearance [3]. This study aimed to evaluate the reliability of the microbial growth predictor to indicate when most consumers will refuse the product in markets.

II. MATERIALS AND METHODS

Vacuum-packaged cooked sausages were manufactured by two different meat industries, located in the states of Rio de Janeiro (A) and Minas Gerais (B), Brazil. A durability study was performed according to the *MicroLab_ShelfLife* protocol. In brief, the sample group was composed by five packages. One package was analysed soon after being received in the laboratory to count the initial microbial load (time zero). Natural microbiota was stimulated to grow by pair incubation of the packages at lower (7 °C) and higher (36 °C) temperatures. The method ISO 4833-1 (2013) was used to enumerate the microorganisms in samples [4]. Results related to the colony counting were entered in the computational predictive modelling package to obtain the microbial growth curve at a dynamic temperature profile. An electronic device (QII343, XpressPDF Logger, Emerson, USA) was used to elucidate the temperatures to which the products were exposed during sale in the market. The results were compared with the data reported by the seller corresponding to the decline of more than 50 % in the normal sale flux in the market.

III. RESULTS AND DISCUSSION

The microbial growth predictor estimated retention of the original properties of the products until 28 (A) and 57 days (B). In market, a decline of more than 50 % on the normal sale flux was observed after 29 (A) and 55 days (B) (Figure 1).

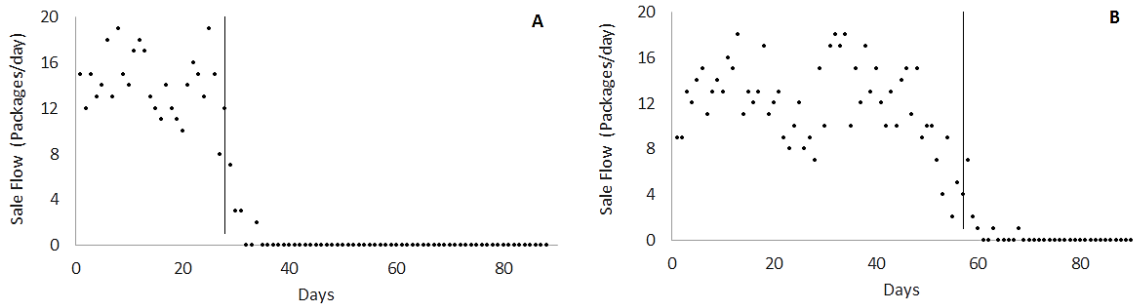

Figure 1. Daily sale flow in the market. Vacuum-packaged cooked sausages were produced in the states of Rio de Janeiro (A) and Minas Gerais (B), Brazil.

The establishment of criteria linking microbial growth to alterations in product appearance remains subject to ongoing debate [5]. While consumer acceptance or rejection of sausages in markets varies based on individual assessments, establishing a threshold aligned with the entry of natural microbiota into the stationary phase appears promising for indicating changes in the original properties, particularly the superficial color, of vacuum-packaged cooked sausages.

IV. CONCLUSION

The *MicroLab_ShelfLife* microbial growth predictor demonstrated robustness and accuracy in detecting alterations in the inherent properties, particularly the superficial color, of vacuum-packaged cooked sausages. Its efficacy suggests it can serve as a valuable tool for signalling when the product may reach a state unacceptable to most consumers in the market.

ACKNOWLEDGEMENTS

The authors are grateful to BRC Ingredients Ltda (Rio Claro, São Paulo).

REFERENCES

1. Iulietto, M. F., Sechi, P., Borgogni, E., & Cenci-Goga, B. T. (2015). Meat spoilage: a critical review of a neglected alteration due to ropy slime producing bacteria. Italian Journal of Animal Science 14(3): 4011.
2. Phimolsiripol, Y., & Suppakul, P. (2016). Techniques in shelf life evaluation of food products. Reference Module in Food Science. Amsterdam: Elsevier.
3. Guerra, C. A., Costa, L. M., Oliveira, V. S., Paula, B. P., Lemos Junior, W. J. F., Luchese, R. H., Corich, V., Giacomini, A., Guerra, A. F. (2023). Correlation between natural microbial load and formation of ropy slime affecting the superficial color of vacuum-packaged cooked sausage. Meat Science 201: 109197
4. ISO 4833-1. (2013). Microbiology of the food chain — Horizontal method for the enumeration of microorganisms — Part 1: Colony count at 30 degrees C by the pour plate technique. Retrieved from. Accessed https://www.iso.org/standard/53728.html. January 9, 2023
5. Li, T., Messer, K. D., & Kaiser, H. M. (2020). The impact of expiration dates labels on hedonic markets for perishable products. Food Policy 93: 101894.