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Microcalorimetric Study of Extruded Dog Food Containing Probiotic Micro-Organisms

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ABSTRACT

Extruded dry dog food products claimed to have a probiotic ingredient of *Enterococcus faecium* (NCIMB10415) in the commercial available formulations under the brand name of ProBiotic LIVE (Bacterfield S.A., Luxembourg) were studied in the present work using a multichannel thermal activity monitor TAM III. Maximum specific growth rate, heat produced during different growth phases, and lag-phase duration were determined. The length of the lag-phase that can be used to determine the time necessary for the probiotic ingredient to restore its activity after consumption of probiotic containing extruded products was also measured. The calorimetric data confirmed the ability of the *Enterococcus faecium* to grow at the acidic pH conditions, modeling conditions of gastro-intestinal tract of dogs, and preserve its metabolic activity (viability) at the same level as at the neutral pH. The results obtained indicated that microcalorimetry was a precise and convenient tool for monitoring probiotic activity in complicated solid-state matrices.

KEYWORDS

Enterococcus faecium; Probiotic Dog Food; Microcalorimetry

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References

- [1] S. D. Forssten, C. W. Sindelar and A. C. Ouwehand, " Probiotics from an Industrial Perspective," *Anaerobe*, Vol. 17, No. 6, 2011, pp. 410-413. doi:10.1016/j.anaerobe.2011.04.014
- [2] A. C. Ouwehand, " Recent Advances in Probiotic Research: A Conference Update," *Future Microbiology*, Vol. 6, No. 9, 2011, pp. 981-984. doi:10.2217/fmb.11.76
- [3] W. Kneifel and S. Salminen, " Probiotics and Health Claims," Wiley-Blackwell, London, 2011. doi:10.1002/9781444329384
- [4] L. Yi, L. Xi, Q. Songsheng and S. J. Ping, " Microcalorimetric Investigation of the Toxic Action of Cd²⁺ on *Rhizopus nigricans* Growth," *Journal of Biochemical and Biophysical Methods*, Vol. 45, No. 2, 2000, pp. 231-239. doi:10.1016/S0165-022X(00)00115-9
- [5] L. Gustafsson, " Microbiological Calorimetry," *Thermochimica Acta*, Vol. 193, 1991, pp. 145-171. doi:10.1016/0040-6031(91)80181-H
- [6] H. Vandenhove, " Microcalorimetric Characterization of Bacterial Inocula," *Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes*, Vol. 25, 1998, pp.121-158.
- [7] I. Lamprecht, " Calorimetry and Thermodynamics of Living Systems," *Thermochimica Acta*, Vol. 405, No. 1, 2003, pp. 1-13. doi:10.1016/S0040-6031(03)00123-0
- [8] L. Wadso and F. G. Galindo, " Isothermal Calorimetry for Biological Applications in Food Science and Technology," *Food Control*, Vol. 20, 2009, pp. 956-961. doi:10.1016/j.foodcont.2008.11.008

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- [9] N. Kabanova, A. Kazarjan, I. Stulova and R. Vilu, " Microcalorimetric Study of Growth of *Lactococcus lactis* IL1403 at Different Glucose Concentrations in Broth," *Thermochimica Acta*, Vol. 496, No. 1-2, 2009, pp. 87-92. doi:10.1016/j.tca.2009.07.003
- [10] N. Kabanova, I. Stulova and R. Vilu, " Microcalorimetric Study of the Growth of Bacterial Colonies of *Lactococcus lactis* IL1403 in Agar Gels," *Food Microbiology*, Vol. 29, No. 1, 2012, pp. 67-79. doi:10.1016/j.fm.2011.08.018
- [11] D. A. Mitchell, O. F. von Meien, N. Krieger and F. D. H. Dalsenter, " A Review of Recent Developments in Modeling of Microbial Growth Kinetics and Intraparticle Phenomena in Solid-State Fermentation," *Biochemical Engineering Journal*, Vol. 17, No. 1, 2004, pp. 15-26. doi:10.1016/S1369-703X(03)00120-7
- [12] I. Stulova, N. Kabanova, T. Kriivanaite, T.-M. Laht and R. Vilu, " The Effect of Milk Heat Treatment on the Growth Characteristics of Lactic Acid Bacteria," *Agronomy Research*, Vol. 9, 2011, pp. 473-478.
- [13] A. Mihhalevski, I. Sarand, E. Viilard, A. Salumets and T. Paalme, " Growth Characterization of Individual Rye Sourdough Bacteria by Isothermal Microcalorimetry," *Journal of Applied Microbiology*, Vol. 110, No. 2, 2011, pp. 529-540. doi:10.1111/j.1365-2672.2010.04904.x
- [14] M. Riva, D. Fessas and A. Schiraldi, " Isothermal Calorimetry Approach to Evaluate Shelf Life of Foods," *Thermochimica Acta*, Vol. 370, 2001, pp. 73-81. doi:10.1016/S0040-6031(00)00782-6
- [15] C. Alklint, L. Wadso and I. Sjöholm, " Accelerated Storage and Isothermal Microcalorimetry as Methods of Predicting Carrot Juice Shelf-Life," *Journal of the Science of Food and Agriculture*, Vol. 85, No. 2, 2005, pp. 281-285. doi:10.1002/jsfa.1942
- [16] U. von Stockar and L. A. M. van der Wieler, " Thermodynamics in Biochemical Engineering," *Journal of Biotechnology*, Vol. 59, No. 1-2, 1997, pp. 25-37. doi:10.1016/S0168-1656(97)00167-3
- [17] M. Antwi, K. Barnaerts, J. F. Van Impe and A. H. Geeraerd, " Modelling the Combined Effects of Structured Food Model System and Lactic Acid on *Listeria innocua* and *Lactococcus lactis* Growth in Mono- and Coculture," *International Journal of Food Microbiology*, Vol. 120, 2007, No. 1-2, pp. 71-84. doi:10.1016/j.ijfoodmicro.2007.04.015
- [18] P. D. G. Wilson, T. F. Brocklehurst, S. Arino, D. Thuault, M. Jakobsen, M. Lange, J. Farkas, J. W. T. Wimpenny and J. F. Van Impe, " Modelling Microbial Growth in Structured Foods: Towards a Unified Approach," *International Journal of Food Microbiology*, Vol. 73, No. 2-3, 2002, pp. 275-289. doi:10.1016/S0168-1605(01)00660-2
- [19] M. Akimoto, N. Nagahata, A. Furuya, K. Fukushima, S. Higuchi and T. Suwa, " Gastric pH Profiles of Beagle Dogs and Their Use as an Alternative to Human Testing," *European Journal of Pharmaceutics and Biopharmaceutics*, Vol. 49, 2000, pp. 99-102. doi:10.1016/S0939-6411(99)00070-3
- [20] D. G. Carlson and J. M. Griffin, " Dog Owner' s Home Veterinary Handbook," Howell, New York, 1992.
- [21] T. Kimura and K. Takahashi, " Calorimetric Studies of Soil Microbes: Quantitative Relation between Heat Evolution during Microbial Degradation of Glucose and Changes in Microbial Activity in Soil," *Journal of General Microbiology*, Vol. 131, No. 11, 1985, pp. 3083-3089. doi:10.1099/00221287-131-11-3083
- [22] S. Bayne-Jones and H. S. Rhees, " Relationship of Heat Production to Phases of Growth of Bacteria," *Journal of Bacteriology*, Vol. 17, No. 2, 1929, pp. 123-140.
- [23] The European Food Safety Authority, " Opinion of the Scientific Panel on Additives and Products or Substances Used in Animal Feed on the Safety of Product Oralin for Dogs," *The European Food Safety Authority Journal*, Vol. 51, 2004, pp. 1-6.