Review

A Review of the State of the Art of Hot Air Frying Technology

José Alfredo Téllez-Morales *

Posted Date: 23 April 2023

doi: 10.20944/preprints202304.0766.v1

Keywords: Hot air-frying; Food; Technology; Oil intake

Review

A Review of the State of the Art of Hot Air Frying Technology

José A. Téllez-Morales

Departamento de Ingeniería Bioquímica, Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, Av. Wilfrido Massieu, Esq. Manuel L. Stampa s/n, Gustavo A. Madero, Mexico City, 07738, Mexico; jtellezm2200@alumno.ipn.mx

Abstract: Hot air frying is a new method of frying food, where the use of a small amount of oil is optional but recommended. The objective of this review was to know the state of the art of hot air frying technology, focusing on trends, and thus obtain new ideas for future work in this area of food. In conclusion, the availability of advanced devices will increase the demand for hot air fryers as demonstrated by the trend generating a great economic and social impact. This new technology not only provides health benefits, but also has environmental advantages. In addition, work focusing on food (i.e. tortilla chips, plantain chips, eggs and meats) is recommended, since there are not enough studies on the subject. Currently, research is being conducted on home fryers, so the use of fryers and their impact at the industrial level is a developing area that will require further research.

Keywords: hot air-frying; food; technology; oil intake

1. Introduction

The worldwide trend towards healthy food consumption has led to the development of novel technologies that can maintain and/or improve the quality characteristics of fried foods. Because of this, air fryers were developed, which are appliances that work in a similar way to a microwave oven that allows you to bake and roast, it is also necessary to mention that the difference is its heating elements that are placed at the top with a large fan that makes the food is fried with the characteristic crispy and crunchy texture, but most importantly with less oil because it is not necessary but advisable to use in low concentrations to obtain a similar texture to conventionally fried foods (Abd Rahman et al., 2016; Stratview Research, 2023). According to the literature reviewed, most of the research has been conducted using potatoes, highlighting mainly the study of their physicochemical characterization and sensory evaluation (Giovanelli et al., 2017; Haddarah et al., 2021; Gouyo et al., 2021; Ciccone et al., 2020; Santos et al., 2017; Verma et al., 2023; Bachir et al., 2023). The authors, Devi et al. (2021); Zaghi et al. (2019), and Dehghannya & Ngadi (2021) in their review articles explained that research on hot air frying in foods is generally limited and should receive greater focus on the precise study of the components and properties of foods, in addition to the effects it could have on human health when consumed. Thus, the objective of this review was to know the state of the art of hot air frying technology, focusing on trends, and thus to obtain new ideas for future work in this area of food.

2. How Hot Air Frying Technology Works

Hot air frying is a new method of frying food, where a small amount of oil is directly spread on the surface of the food to be fried and then uses circulating hot air to heat and cook as shown in Figure 1a. Compared to the conventional frying process, hot air fried foods give the appearance and physicochemical characteristics of conventionally fried foods to some extent (Jin et al., 2021). The objective of this type of frying (Figure 1a) is to cause uniform contact between the food to be fried and the oil droplets within the hot air stream, which significantly reduces the amount of cooking oil needed to achieve cooking, and this process takes place inside the fryer chamber, which simulates the hot oil flow of a conventional fryer. During this process, the food is heated, the water evaporates,

 doi:10.20944/preprints202304.0766.v1

and the crust progressively appears on the surface, giving it the characteristic appearance of fried food (Wang et al., 2021). It is important to mention that the availability of some advanced devices, with a touch screen panel, a temperature control knob and fast preheating, will increase the demand for hot air fryers, and this technology not only brings health benefits, but also has environmental advantages, such as reduced oil consumption and emissions.

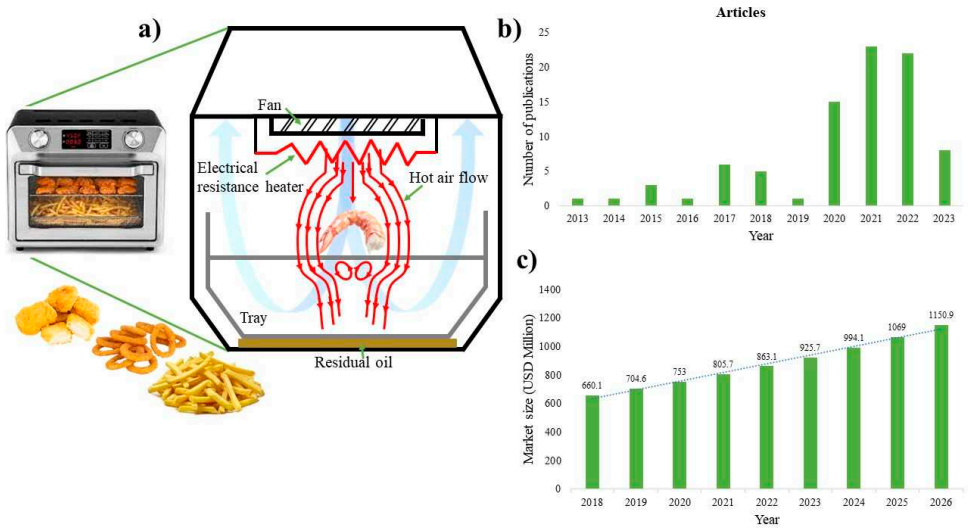

Figure 1. **a**) Simplified diagram of hot air fryer for home, **b**) Number of publications of scientific articles per year, 2013-2023, and **c**) Global air fryer market size, 2018-2026 (USD Million). Figures **b** and **c** were made with data obtained from Scopus (2023) and Stratview Research (2023), respectively.

3. Trends in Hot Air Frying Technology

At present, research on hot air frying technology is limited compared to other technologies that have been researched for decades, because air frying is relatively new, as it has been used for 10 years, as shown in Figure 1b, and it is only in 2020 that there was a significant increase in scientific articles, so an increase in the trend is expected in the coming years. It is important to note that the data for the year 2023 was reported as of the beginning of february and has already surpassed the number of documents published in its first years. According to Table 1, most of the articles are focused on the use of potato, followed by sweet potato and doughnut, although a variety of foods used are also shown, and some are characteristic of the authors' country. It is recommended that future work focus on foods such as tortilla chips, plantain chips, eggs, and meats such as beef, because there are not enough studies on the subject, in addition to being foods consumed worldwide and it is not known how the physicochemical and sensory modification of the food would be, compared to conventional frying. On the other hand, the introduction of different innovative products on the market, including some revamped designs, is the most significant factor driving the growth of hot air fryers. According to Stratview Research (2023), the global air fryer market is expected to grow from USD 753.02 million in 2020 to USD 1150.9 million by 2026. This trend can be observed in Figure 1c, as a linear increase can be seen in recent years, so it can be summarized that this frying technology is becoming of interest to the world population and in turn replacing conventional frying. Also, increasing health awareness about following a particularly healthy diet is expected to improve the demand for the product, which will support market growth, as well as offer savings in oil usage and thus lower calorie intake. Currently, research is being conducted on home fryers, so the use of fryers at the industrial level is a developing area that will require further research. However, key players in the global air fryer market are Breville, Inc., TTK Prestige Ltd., Ltd., KRUPS, NuWave Havells India Ltd., and SharkNinja Operating LLC.

Table 1. Different fried foods by hot air technology.

Food	Reference	Food	Reference
Sweet potato	Abd Rahman et al. (2016); Ulus & Allen (2020); Mokhtar & Thow (2022)	Red-skinned onion	Cattivelli et al. (2023)
Doughnut	Ghaitaranpour et al. (2018a, 2018b); Ghaitaranpour et al. (2020)	Scallop adductor muscle	Wang et al. (2023)
Surimi	Yu et al. (2020)	Chicken wing and pork belly	Kwon et al. (2023)
Malaysian fish sausage	Tamsir et al. (2021)	Broccoli stem; Broccoli floret	Hong et al. (2022a); Hong et al. (2022b)
Brazilian sardine fillets	Ferreira et al. (2017)	Omelets	de Oliveira et al. (2022)
Tilapia skin; Tilapia fillets; Tilapia skin	Fang et al. (2021); Li et al. (2022); Wang et al. (2022)	Hairtail	Ding et al. (2022)
Orange carrots	Schmiedeskamp et al. (2022)	Squid	Luo et al. (2022)
Pre-fried chicken Nuggets; Chicken nuggets	Cao et al. (2020); Castro-López et al. (2023)	Biscuits	Fang et al. (2022)
Sturgeon steaks	Liu et al. (2022)	Giant salamander meatballs	Jin et al. (2021)
Chicken thigh, wing, and breast	Lee et al. (2020)	Samosa	Pande Snehal et al. (2018)
Falafel	Fikry et al. (2021)	Arapaima meat	Vieira et al. (2018)
Prawns	Song et al. (2020)	Black eggplants	Salamatullah et al. (2021)
Pink perch fillets	Joshy et al. (2020)	Fillet mackerel	Negara et al. (2021)
Potatoes	Heredia et al. (2014); Teruel et al. (2015); Gouyo et al. (2020); Tian et al. (2017); Shaker (2014); Basuny & Oatibi (2016); Sansano et al. (2015); Andrés et al. (2013)	Potatoes	Giovanelli et al. (2017); Haddarah et al. (2021); Gouyo et al. (2021); Ciccone et al. (2020); Santos et al. (2017); Verma et al. (2023); Bachir et al. (2023)

4. Conclusions and Suggestions for Further Research

In summary, the availability of advanced devices will increase the demand for hot air fryers as demonstrated by the trend generating a great social and economic impact, in addition this technology not only brings health benefits, but also has environmental advantages. Most of the articles are focused on the use of potato, sweet potato and doughnut, so we recommend papers that focus on other foods (i.e. tortilla chips, plantain chips, eggs and meats), since there are not enough studies on

this subject. Currently, research is being conducted on home fryers, so the use of fryers and their impact at the industrial level is a developing area that will require further research.

Declaration of Competing Interest: The author declares no conflict of interest.

References

Abd Rahman, N. A., Abdul Razak, S. Z., Lokmanalhakim, L. A., Taip, F. S., & Mustapa Kamal, S. M. (2016). Response surface optimization for hot air-frying technique and its effects on the quality of sweet potato snack. *Journal of Food Process Engineering*, *40*(4). https://doi.org/10.1111/jfpe.12507

Andrés, A., Arguelles, Á., Castelló, M. L., & Heredia, A. (2013). Mass transfer and volume changes in french fries during air frying. *Food and Bioprocess Technology*, *6*(8), 1917–1924. https://doi.org/10.1007/s11947-012-0861-2

Bachir, N., Haddarah, A., Sepulcre, F., & Pujola, M. (2023). Study the interaction of amino acids, sugars, thermal treatment and cooking technique on the formation of acrylamide in potato models. *Food Chemistry*, *408*, 135235. https://doi.org/10.1016/j.foodchem.2022.135235

Basuny, A. M. M., & Oatibi, H. H. A. (2016). Effect of a novel technology (air and vacuum frying) on sensory evaluation and acrylamide generation in fried potato chips. *Banat's Journal of Biotechnology*, *7*(14), 101–112. https://doi.org/10.7904/2068-4738-vii(14)-101

Cao, Y., Wu, G., Zhang, F., Xu, L., Jin, Q., Huang, J., & Wang, X. (2020). A comparative study of physicochemical and flavor characteristics of chicken nuggets during air frying and deep frying. *Journal of the American Oil Chemists' Society*, *97*(8), 901–913. https://doi.org/10.1002/aocs.12376

Castro-López, R., Mba, O. I., Gómez-Salazar, J. A., Cerón-García, A., Ngadi, M. O., & Sosa-Morales, M. E. (2023). Evaluation of chicken nuggets during air frying and deep-fat frying at different temperatures. *International Journal of Gastronomy and Food Science*, *31*, 100631. https://doi.org/10.1016/j.ijgfs.2022.100631

Cattivelli, A., Di Lorenzo, A., Conte, A., Martini, S., & Tagliazucchi, D. (2023). Red-skinned onion phenolic compounds stability and bioaccessibility: A comparative study between deep-frying and air-frying. *Journal of Food Composition and Analysis*, *115*, 105024. https://doi.org/10.1016/j.jfca.2022.105024

Ciccone, M., Chambers, D., Chambers IV, E., & Talavera, M. (2020). Determining which cooking method provides the best sensory differentiation of potatoes. *Foods*, *9*(4), 451-466. https://doi.org/10.3390/foods9040451

de Oliveira, V. S., Chávez, D. W. H., Paiva, P. R. F., Gamallo, O. D., Castro, R. N., Sawaya, A. C. H. F., ... & Saldanha, T. (2022). Parsley (*Petroselinum crispum* Mill.): A source of bioactive compounds as a domestic strategy to minimize cholesterol oxidation during the thermal preparation of omelets. *Food Research International*, *156*, 111199. https://doi.org/10.1016/j.foodres.2022.111199

Dehghannya, J., & Ngadi, M. (2021). Recent advances in microstructure characterization of fried foods: Different frying techniques and process modeling. *Trends in Food Science & Technology*, *116*, 786–801. https://doi.org/10.1016/j.tifs.2021.03.033

Devi, S., Zhang, M., Ju, R., & Bhandari, B. (2021). Recent development of innovative methods for efficient frying technology. *Critical Reviews in Food Science and Nutrition*, *61*(22), 3709–3724. https://doi.org/10.1080/10408398.2020.1804319

Ding, Y., Zhou, T., Liao, Y., Lin, H., Deng, S., & Zhang, B. (2022). Comparative Studies on the Physicochemical and Volatile Flavour Properties of Traditional Deep Fried and Circulating-Air Fried Hairtail (*Trichiurus lepturus*). *Foods*, *11*(17), 2710. https://doi.org/10.3390/foods11172710

Fang, M., Huang, G. J., & Sung, W. C. (2021). Mass transfer and texture characteristics of fish skin during deep-fat frying, electrostatic frying, air frying and vacuum frying. *LWT*, *137*, 110494. https://doi.org/10.1016/j.lwt.2020.110494

Fang, M., Ting, Y. S., & Sung, W. C. (2022). Effects of Sodium Alginate, Pectin and Chitosan Addition on the Physicochemical Properties, Acrylamide Formation and Hydroxymethylfurfural Generation of Air Fried Biscuits. *Polymers*, *14*(19), 3961. https://doi.org/10.3390/polym14193961

Ferreira, F. S., Sampaio, G. R., Keller, L. M., Sawaya, A. C. H. F., Chávez, D. W. H., Torres, E. A. F. S., & Saldanha, T. (2017). Impact of air frying on cholesterol and fatty acids oxidation in sardines: Protective effects of aromatic herbs. *Journal of Food Science*, *82*(12), 2823–2831. https://doi.org/10.1111/1750-3841.13967

Fikry, M., Khalifa, I., Sami, R., Khojah, E., Ismail, K. A., & Dabbour, M. (2021). Optimization of the frying temperature and time for preparation of healthy falafel using air frying technology. *Foods*, *10*(11), 2567–2582. https://doi.org/10.3390/foods10112567

Ghaitaranpour, A., Koocheki, A., Mohebbi, M., & Ngadi, M. O. (2018a). Effect of deep fat and hot air frying on doughnuts physical properties and kinetic of crust formation. *Journal of Cereal Science*, *83*, 25–31. https://doi.org/10.1016/j.jcs.2018.07.006

Ghaitaranpour, A., Mohebbi, M., & Koocheki, A. (2018b). Characterizing the cellular structure of air and deep fat fried doughnut using image analysis techniques. *Journal of Food Engineering*, *237*, 231–239. https://doi.org/10.1016/j.jfoodeng.2018.06.006

Ghaitaranpour, A., Mohebbi, M., Koocheki, A., & Ngadi, M. O. (2020). An agent-based coupled heat and water transfer model for air frying of doughnut as a heterogeneous multiscale porous material. *Innovative Food Science & Emerging Technologies*, *61*, 102335. https://doi.org/10.1016/j.ifset.2020.102335

Giovanelli, G., Torri, L., Sinelli, N., & Buratti, S. (2017). Comparative study of physico-chemical and sensory characteristics of French fries prepared from frozen potatoes using different cooking systems. *European Food Research and Technology*, *243*(9), 1619–1631. https://doi.org/10.1007/s00217-017-2870-x

Gouyo, T., Mestres, C., Maraval, I., Fontez, B., Hofleitner, C., & Bohuon, P. (2020). Assessment of acoustic-mechanical measurements for texture of French fries: Comparison of deep-fat frying and air frying. *Food Research International*, *131*, 108947. https://doi.org/10.1016/j.foodres.2019.108947

Gouyo, T., Rondet, É., Mestres, C., Hofleitner, C., & Bohuon, P. (2021). Microstructure analysis of crust during deep-fat or hot-air frying to understand French fry texture. *Journal of Food Engineering*, *298*, 110484. https://doi.org/10.1016/j.jfoodeng.2021.110484

Haddarah, A., Naim, E., Dankar, I., Sepulcre, F., Pujolà, M., & Chkeir, M. (2021). The effect of borage, ginger and fennel extracts on acrylamide formation in French fries in deep and electric air frying. *Food Chemistry*, *350*, 129060. https://doi.org/10.1016/j.foodchem.2021.129060

Heredia, A., Castelló, M. L., Argüelles, A., & Andrés, A. (2014). Evolution of mechanical and optical properties of French fries obtained by hot air-frying. *LWT*, *57*(2), 755–760. https://doi.org/10.1016/j.lwt.2014.02.038

Hong, S. J., Jeong, H., Yoon, S., Jo, S. M., Lee, Y., Park, S. S., & Shin, E. C. (2022a). A comprehensive study for taste and odor compounds using electronic tongue and nose in broccoli stem with different thermal processing. *Food Science and Biotechnology*, *31*(2), 191-201. https://doi.org/10.1007/s10068-021-01029-0

Hong, S. J., Yoon, S., Lee, J., Jo, S. M., Jeong, H., Lee, Y., ... & Shin, E. C. (2022b). A comprehensive study for taste and odor characteristics using electronic sensors in broccoli floret with different methods of thermal processing. *Journal of Food Processing and Preservation*, *46*(4), e16435. https://doi.org/10.1111/jfpp.16435

Jin, W., Pei, J., Chen, X., Geng, J., Chen, D., & Gao, R. (2021). Influence of frying methods on quality characteristics and volatile flavor compounds of giant salamander (*Andrias Davidianus*) meatballs. *Journal of Food Quality*, *2021*, 1-10. https://doi.org/10.1155/2021/8450072

Joshy, C. G., Ratheesh, G., Ninan, G., Ashok Kumar, K., & Ravishankar, C. N. (2020). Optimizing air-frying process conditions for the development of healthy fish snack using response surface methodology under correlated observations. *Journal of Food Science and Technology*, *57*(7), 2651–2658. https://doi.org/10.1007/s13197-020-04301-z

Kwon, J., Kim, I., Moon, B., Lee, K. W., Jung, M., & Lee, J. (2023). The effects of different cooking methods and spices on the formation of 11 HCAs in chicken wing and pork belly. *Food Control*, *147*, 109572. https://doi.org/10.1016/j.foodcont.2022.109572

Lee, J. S., Han, J. W., Jung, M., Lee, K. W., & Chung, M. S. (2020). Effects of thawing and frying methods on the formation of acrylamide and polycyclic aromatic hydrocarbons in chicken meat. *Foods*, *9*(5), 573–586. https://doi.org/10.3390/foods9050573

Li, R., Sun, Z., Zhao, Y., Li, L., Yang, X., Chen, S., ... & Wang, Y. (2022). Effect of different thermal processing methods on water-soluble taste substances of tilapia fillets. *Journal of Food Composition and Analysis*, *106*, 104298. https://doi.org/10.1016/j.jfca.2021.104298

Liu, L., Huang, P., Xie, W., Wang, J., Li, Y., Wang, H., Xu, H., Bai, F., Zhou, X., Gao, R., & Zhao, Y. (2022). Effect of air fryer frying temperature on the quality attributes of sturgeon steak and comparison of its performance with traditional deep fat frying. *Food Science & Nutrition*, *10*(2), 342–353. https://doi.org/10.1002/fsn3.2472

Luo, X., Hu, S., Xu, X., Du, M., Wu, C., Dong, L., & Wang, Z. (2022). Improving air-fried squid quality using high internal phase emulsion coating. *Journal of Food Measurement and Characterization*, *16*(5), 3844-3854. https://doi.org/10.1007/s11694-022-01459-2

Mokhtar, W. M. F. W., & Thow, Z. Y. (2022). Effect of osmotic dehydration as a pre-treatment on air fried sweet potato (*Ipomoea batatas*) chips. *Journal Of Agrobiotechnology*, *13*(1S), 64-73. https://doi.org/10.37231/jab.2022.13.1S.311

Negara, B. F. S. P., Lee, M. J., Tirtawijaya, G., Cho, W. H., Sohn, J. H., Kim, J. S., & Choi, J. S. (2021). Application of deep, vacuum, and air frying methods to fry chub mackerel (Scomber japonicus). *Processes*, *9*(7), 1225–1239. https://doi.org/10.3390/pr9071225

Pande Snehal, D., Deo Shrutika, K., Bhope Pritish, S., & Pande Sayali, D. (2018). Comparative study of deep fat fried samosa and oxyair fried samosa. *International Journal of Science, Engineering and Management*, *3*(4), 146–148.

Salamatullah, A. M., Ahmed, M. A., Alkaltham, M. S., Hayat, K., Aloumi, N. S., Al-Dossari, A. M., Al-Harbi, L. N., & Arzoo, S. (2021). Effect of air-frying on the bioactive properties of eggplant (Solanum melongena L.). *Processes*, *9*(3), 435–446. https://doi.org/10.3390/pr9030435

Sansano, M., Juan-Borrás, M., Escriche, I., Andrés, A., & Heredia, A. (2015). Effect of pretreatments and air-frying, a novel technology, on acrylamide generation in fried potatoes. *Journal of Food Science*, *80*(5), T1120–T1128. https://doi.org/10.1111/1750-3841.12843

Santos, C. S. P., Cunha, S. C., & Casal, S. (2017). Deep or air frying? A comparative study with different vegetable oils. *European Journal of Lipid Science and Technology*, *119*(6). https://doi.org/10.1002/ejlt.201600375

Schmiedeskamp, A., Schreiner, M., & Baldermann, S. (2022). Impact of cultivar selection and thermal processing by air drying, air frying, and deep frying on the carotenoid content and stability and antioxidant capacity in carrots (Daucus carota L.). *Journal of Agricultural and Food Chemistry*, *70*(5), 1629–1639. https://doi.org/10.1021/acs.jafc.1c05718

Scopus. (2023). Retrieved February 11, 2023, from https://www.scopus.com/search/form.uri?display=basic#basic

Shaker, M. A. (2014). Air frying a new technique for produce of healthy fried potato Strips. *Journal of Food and Nutrition Sciences*, *2*(4), 200–206. https://doi.org/10.11648/j.jfns.20140204.26

Song, G., Li, L., Wang, H., Zhang, M., Yu, X., Wang, J., Xue, J., & Shen, Q. (2020). Real-time assessing the lipid oxidation of prawn (*Litopenaeus vannamei*) during air-frying by iKnife coupling rapid evaporative ionization mass spectrometry. *Food Control*, *111*, 107066. https://doi.org/10.1016/j.foodcont.2019.107066

Stratview Research. (2023). Global air fryer market, dynamics, trends, and market analysis. Retrieved February 12, 2023, from https://www.stratviewresearch.com/1864/air-fryer-market.html

Tamsir, M. M., Shazini Ramli, N., Nor-Khaizura, M. A. R., Shukri, R., & Ismail-Fitry, M. R. (2021). Comparison of boiling, steaming, air frying, deep-frying, microwaving and oven-cooking on quality characteristics of Keropok lekor (Malaysian fish sausage). *Malaysian Applied Biology*, *50*(3), 77–85.

Teruel, M. del R., Gordon, M., Linares, M. B., Garrido, M. D., Ahromrit, A., & Niranjan, K. (2015). A comparative study of the characteristics of french fries produced by deep fat frying and air frying. *Journal of Food Science*, *80*(2), E349–E358. https://doi.org/10.1111/1750-3841.12753

Tian, J., Chen, S., Shi, J., Chen, J., Liu, D., Cai, Y., Ogawa, Y., & Ye, X. (2017). Microstructure and digestibility of potato strips produced by conventional frying and air-frying: An in vitro study. *Food Structure*, *14*, 30–35. https://doi.org/10.1016/j.foostr.2017.06.001

Ulus, H., & Allen, J. (2020). Nutrient degradation in baked or air-fried sweet potato chips. *Current Developments in Nutrition*, *4*(2), 783. https://doi.org/10.1093/cdn/nzaa052_052

Verma, V., Singh, V., Chauhan, O. P., & Yadav, N. (2023). Comparative evaluation of conventional and advanced frying methods on hydroxymethylfurfural and acrylamide formation in French fries. *Innovative Food Science & Emerging Technologies*, *83*, 103233. https://doi.org/10.1016/j.ifset.2022.103233

Vieira, E. C. S., Mársico, E. T., Conte-Junior, C. A., Damiani, C., Canto, A. C. V. da C. S., Monteiro, M. L. G., & Silva, F. A. da. (2018). Effects of different frying techniques on the color, fatty acid profile, and lipid oxidation of Arapaima gigas. *Journal of Food Processing and Preservation*, *42*(11), e13820. https://doi.org/10.1111/jfpp.13820

Wang, L., Chen, W., Zhou, R., Ren, Y., Wang, K., Jiang, N., & Gao, R. (2022). Physicochemical and sensory properties of a tilapia skin-based ready-to-eat snack prepared by infrared drying and air frying. *Applied Food Research*, *2*(2), 100155. https://doi.org/10.1016/j.afres.2022.100155

Wang, Y., Wu, X., McClements, D. J., Chen, L., Miao, M., & Jin, Z. (2021). Effect of new frying technology on starchy food quality. *Foods*, *10*(8), 1852–1871. https://doi.org/10.3390/foods10081852

Wang, Z. Y., Wu, Z. X., Zhao, G. H., Li, D. Y., Liu, Y. X., Qin, L., ... & Zhou, D. Y. (2023). Effect of air frying and baking on physicochemical properties and digestive properties of scallop (*Patinopecten yessoensis*) adductor muscle. *Food Bioscience, 52*, 102460. https://doi.org/10.1016/j.fbio.2023.102460

Yu, X., Li, L., Xue, J., Wang, J., Song, G., Zhang, Y., & Shen, Q. (2020). Effect of air-frying conditions on the quality attributes and lipidomic characteristics of surimi during processing. *Innovative Food Science and Emerging Technologies*, *60*, 102305. https://doi.org/10.1016/j.ifset.2020.102305

Zaghi, A. N., Barbalho, S. M., Guiguer, E. L., & Otoboni, A. M. (2019). Frying process: From conventional to air frying technology. *Food Reviews International*, *35*(8), 763–777. https://doi.org/10.1080/87559129.2019.1600541