

DOSSIER DE APRESENTAÇÃO DO PROJETO

# *Tiger* NUTRE

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## **1.Originality, creativity, and innovative aspects of the product**

Consumer food behavior is constantly changing, which requires the ability of food industry to predict and monitor different consumption trends, focusing on the development of new and innovative food options. The demand and consumption of plant-based food products has become a global market trend, so TigerNutre intends to respond to the modern consumer's demands. In addition, this plant-based dessert distinguished from similar ones by its presentation and disruptive sensory characteristics, by its appeal to sustainability, mirrored in the selected raw materials and idealized packaging, making it a unique product.

## **2.Marketing plan**

### **2.1 Concept Test**

In order to find out what consumers' attitudes, perceptions and preferences regarding new food products, specifically plant-based products, and the attributes they value the most, an online questionnaire was applied (Annex 1), and 24 responses were obtained.

The sample was represented mainly by females and with individuals with a higher education. The major dietary pattern was omnivorous (75,0%) follow by flexitarians (20,8%). In terms of food choice's determinants, products with higher contribute to health (79,2%) and with less environmental impact (45,8%) was preferred.

Only 54,2% of the participants reveal to know what a food by-product is. Despite that, 86,4% of sample showed willingness to buy upcycled foods.

Regard the perception towards nutritional value of plant-based food products, more than half of sample (66,7%) revealed a positive opinion. The higher fiber content (82,4%) and the high levels of vitamins and minerals (76,5%), was the main attributes identified by the participants as the reason for the positive perception.

In this sense, 62,5% individuals have plant-based food products' purchase habits, however they consider that the Portuguese market offer is limited (89,5%). Moreover, the existing offer of plant-based desserts don't correspond to the participants expectations, who consider that is monotonous (79,2%). The plant-based desserts' sensorial attributes more appreciated by the consumer was creaminess (81,8%), crunchiness (62,8%), and sweetness (63,6%).

Despite of small sample size, the results contribute to understand the current consumer's food habits in which plant-based food products are present, although its market offer don't fill the consumer's expectations. Therefore, considering the increasing demand for this type of food alternatives and the need for a greater variety of products, the development of differentiating plant-based food products is relevant. Thus, the creation of TigerNutre respond to the current consumer's requirements, with an innovative and indulgent product that stands out for its irreverent characteristics.

## **2.2 Final consumer study**

The acceptability of TigerNutre dessert was assessed through the application of an acceptability questionnaire with three dimentions: hedonic evaluation, purchase intention and consumption attitude.

A pilot study was conducted to validate the questionnaire adequacy, with 4 individuals that had experimented the TigerNutre dessert. After this stage, a sensorial prove was realized and the acceptability questionnaire was applied to 16 individuals.

Regarding the appearance of TigerNutre, 57,9% evaluated it as "pleasant" and 42,1% as "extremely pleasant". Participants assess the dessert's taste and its texture as pleasant (78,9% and 42,1%, respectively). The crunchiness (73,7%), creaminess (63,2%) and softness (47,4%) were the sensorial attributes that the individuals highlighted during their sensorial experience. Moreover, when asked if "the use of by-products in dessert, conferred negative sensory characteristics to the product?", 94,7% of participants considered that there was no negative sensory impact. In a global evaluation of the dessert, on a scale of 1 to 5 (where 1=extremely pleasant and 5=extremely unpleasant), 47,4% of subjects attributed a score of 2 (pleasant).

In relation to purchase intention, 10,5% responded that they "would definitely buy" and 68,4% that they "probably would buy", with 15,8% revealing that they would consume TigerNutre "very often", while 57,9% would eat it "occasionally".

In this sense, the presented results reveal the potential that TigerNutre can have in the plant-based products market.

## 2.3 Analysis of competitors

TigerNutre's main competitors are all the brands that operate in the plant-based market in Portugal and that actively contribute to the offer of plant-based desserts (figure 1). This plant-based food category is limited and represented by products with similar ingredients and sensory characteristics, essentially presented in the form of puddings and creams. Therefore, TigerNutre, due to its disruptive characteristics, contributes to a more diversified offer of plant-based desserts, differentiating itself from the others.



Figure 1. TigerNutre's main competitors: plant-based desserts available in the Portugal market (companies such as SONAE MC and Celeiro).

## 2.4 Assessment of market potential

The EU-funded SMART PROTEIN project report reveals that Europe's plant-based food industry grew an astonishing 49% overall in the period of 2018-2020, culminating in a 3.6 billion EUR of total sales (1). Moreover, and according to the Plant Based Foods Association, the plant-based foods' retail sales are continuous increasing, positioning the 2021 U.S. plant-based market value in a 7.4 billion dollars (2).

The agro-industrial playing field is being drive for the development of new and innovative plant-based food options along with the increase consumer interest in foods aligned with health and sustainability values (3). Brands are meeting this growing consumer demands with a continually expanding selection of plant-based food categories.

In Portugal, the plant-based food market value has not yet been quantified. At the present, although the plant-based category is still small, the growth prospects in Portugal are high. According to the

Portuguese Vegetarian Association, the number of vegetarians in the country has quadrupled in ten years (4). In addition, consumers seeking greater food flexibility (e.g., flexitarians) represent the largest share of consumers of plant-based food alternatives (1, 5). Therefore, the launch of new players in the plant-based sector contributes not only to its expansion, but to attract new consumers too. The TigerNutre intends to respond to the indulgent desires of all consumer profiles and contribute to a positive evolution of this food category in Portugal.

## **2.5 Strategy, segmentation, positioning**

TigerNutre is designed to respond to modern consumer desires and food and environmental policy demands. It is an inclusive dessert, aimed to all types of consumers and of all ages, although the main objective is to ensure equity in access to indulgent food products for the plant-based consumer. Furthermore, it is a product compatible with stricter dietary patterns as a result of clinical conditions (e.g., lactose intolerance and celiac disease).

This plant-based dessert is the cross between the spheres of nutrition and sustainability, since the ingredients used result from the valorization of by-products of the food industry, with a high nutritional value, providing a benefit to the health of the consumer and the environment. TigerNutre lives up to the true motto for promoting a plant-based lifestyle. The simplicity of ingredients makes it a clean label product, together with the irreverent sensory characteristics and fair and competitive price, which make this a differentiating product, accessible and relevant to its target audience. The idealization of TigerNutre intends not only to contribute to the increase of plant-based desserts' variety on the market, with high levels of quality, as well as to expand the offer of upcycled foods.

Thus, “A spoonful tiger-friendly” is the message that illustrates the purpose of the brand, which aims to satisfy the indulgent desires of the consumer, without compromising their health and the environment. This product aims to break monotony and enhance the contribution of nutrition and sustainability in the development of new products.

## **2.6 Marketing mix**

Product: Multilayer dessert, with a crunchy base obtained by combining the solid by-product of *Horchata de Chufa* with dates; a creamy intermediate layer, resulting from the incorporation of the liquid by-product of the *Horchata de Chufa*, lemon peel, pumpkin, cinnamon, and corn starch; a topping made by aquafaba involved with almond cream, which give TigerNutre's smoothness and velvety consistency; finishing with grated coconut for a perfect harmonization of flavors.

Ingredients: *Horchata de Chufa* by-products (liquid and solid), pumpkin, dates, almond cream, aquafaba, maize starch, lemon peels, grated coconut, and cinnamon.

The TigerNutre’s nutrition declaration is exhibit in figure 2.

Nutrition Facts: Vegan; Lactose free; Gluten free.

Nutritional Claims: High fiber source; No added sugars (contains naturally occurring sugars).

DECLARAÇÃO NUTRICIONAL - VALORES MÉDIOS NUTRITION DECLARATION - AVERAGE VALUES	100g	por porção/ per portion 125g	% DR/RI* (125g)
Energia/Energy	738 KJ 176 Kcal	922 KJ 220 Kcal	11
Lípidos/Fat (g) dos quais saturados/ of which saturates (g)	7,0 1,7	8,7 2,1	12,4 10,4
Hidratos de Carbono/ Carbohydrate (g) dos quais açúcares/ of which sugars (g)	21,6 11,6	27,0 14,6	10,4 16,1
Fibra/Fibre (g)	9,86	12,3	49,3
Proteína/Protein (g)	1,77	2,2	4,4
Sal/Salt (g)	0,02	0,02	0,4

\*DR: Dose de referência para um adulto médio (8400 kJ/2000 kcal)  
\*RI: Reference intake for an average adult (8400 kJ/2000 kcal)

Figure 2. TigerNutre nutrition declaration.

Distribution: The essence of TigerNutre justifies its positioning in food retail companies that follow the eco-innovative nature and seek to guarantee a food offer based on the principles of consumer health and environmental sustainability. Thus, TigerNutre presents as key distribution partners', companies such as *Continente Food Lab*, *Celeiro*, *Go Natural* and *Auchan* that work actively in the development and offer of innovative food products.

Price: TigerNutre will be sold in a 2x125g pack. The production costs are 2,12€ (without taxes, VAT, and profit). The selling price to the distributor is 2,76€ (without taxes, such as VAT). The profit is set for 30%.

Communication: Social platforms will be the stage for the presentation of the brand and the product as well as for the establishment of a close contact network with the consumer. This communication extends to the TigerNutre website, which will possibility to share relevant information about the product and brand values. TigerNutre's presence in scientific and food innovation events is expected,

as a promising vehicle for exposing the product to a target audience that is more receptive to purchasing eco-innovative products.

## **2.7 Communication strategy**

The brand's communication strategy is essentially based on digital media, due to its economic viability and the opportunity to establish closer contact with the consumer. In a first instance, it is intended to create suspense and curiosity through the launch of the TigerNutre brand on social platforms. Dynamics of interaction and content creation around the identity and conceptualization of the product will be promoted, ensuring an efficient positioning and greater receptivity and familiarity with the product at the time of its launch. From this, and through the QR code present on the product packaging, it is intended to maintain continuity in the communication of the brand with the consumer, allowing access to the TigerNutre website, which has information about the product, from its history to the importance of valuing the by-products integrated in its formulation. In this virtual space, it is intended to encourage the sharing of scientific knowledge, demystifying myths related to upcycled foods and the plant-based food pattern, supporting consumers in their food choices, promoting the adoption of healthy and sustainable lifestyles. In this product promotion process, it is planned to involve the scientific community, that are present on social platforms, in the person of health and food technology professionals, in order to increase the confidence and credibility of the product. It is also planned to participate in scientific events closely related to the brand's values, as well as in food innovation fairs, to promote TigerNutre's international expansion.

## **2.8 Branding and packaging**

The designation TigerNutre (derives from the name of the main raw material used - tigernut), is based on the versatility that is expected for the brand, which was conceived to allow the follow of the range products' evolution, without losing the link to the valorization of *Horchata de Chufa* by-products.

TigerNutre has a strong commitment to sustainability issues, so the product packaging (Figure 3) has been designed with a low environmental impact. In this way, the product is presented in a reusable and recyclable glass container (125g), combined with a PLA polymer lid, which is distinguished by its biodegradable properties. The secondary packaging is made exclusively of cardboard, featuring a bold graphic design that extends to the eccentric stamping applied to the lid. Moreover, and in order to enhance the reusable character of TigerNutre's glass container, the cardboard packaging include messages to promote this goal (ANNEX 1).





Figure 3. TigerNutre's packaging:

(A) recyclable glass container combined with a stamped PLA polymer lid; (B) cardboard secondary packaging.

### 3. Technical Study

#### 3.1 Formulation process and process flowchart

TigerNutre stands out for its production based on the valorization of by-products from the agro-industrial sector and the fight against food waste. The raw materials used are 100% plant-based, combined to create a pleasant, healthy plant-based dessert with a reduced environmental impact.

The product idealization was based on the goal to reuse and give new life to the by-products originated in the production of *Horchata de Chufa* (tigernut "milk") (Figure 4), a non-alcoholic drink with a milky appearance, which derives from tigernut tubers (*Cyperus esculentus lativum*)(6). The production of this drink results in two by-products, solid and liquid, rich in fiber and with prebiotic and antioxidant properties, respectively, both with recognized potential for application in food technology(7, 8).

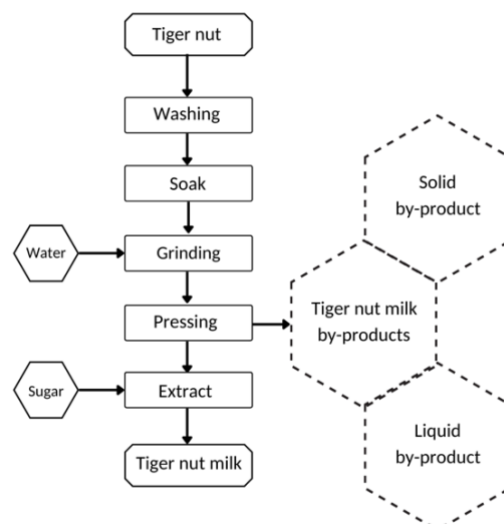


Figure 4. Flowchart of tiger nut milk ("horchata de chufa") manufacture and its by-products (solid and liquid). Adapted from Sánchez-Zapata, E. et al. (2012). Tiger Nut (*Cyperus esculentus*) Commercialization: Health Aspects, Composition, Properties, and Food Applications. *Compr. Rev. Food Sci. Food Saf.* 11(4), 366-377.

The formulation of this plant-based dessert (figure 5) combines the use of solid and liquid by-products derived from *Horchata de chufa*, with vegetable raw materials of high nutritional quality.

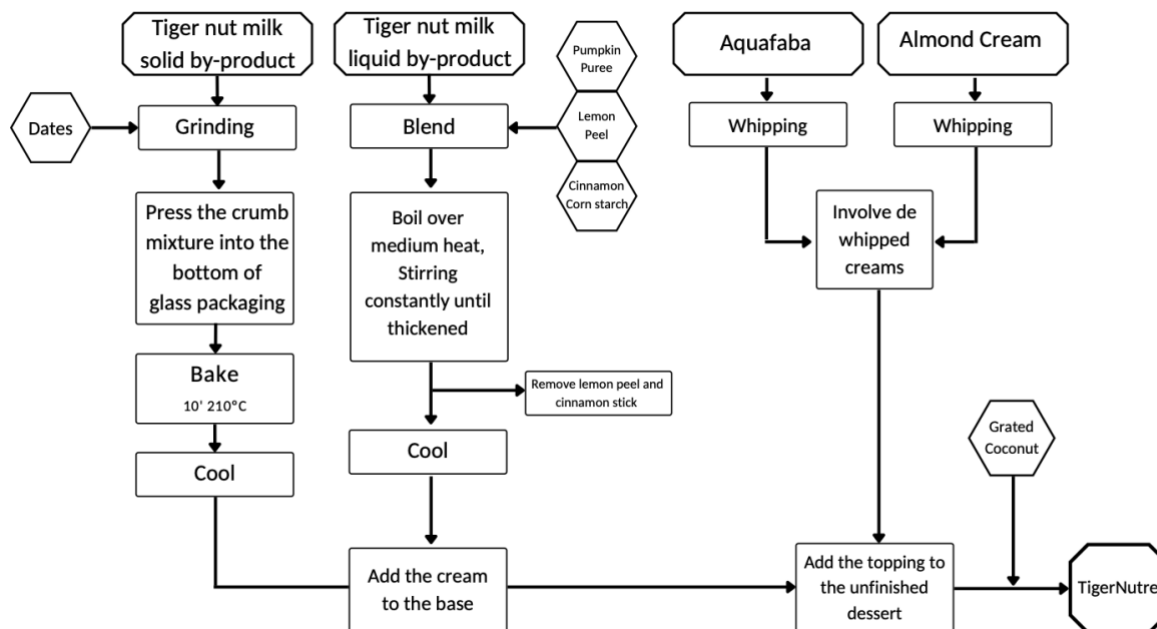


Figure 5. Flowchart of TigerNutre production process.

### 3.2 Sensory analysis, validation of the microbiological quality of the product (shelf life)

TigerNutre, with its soft sweet taste, presents a combination of distinct textures (crunchiness, creaminess, and softness), expressed in its layers which with an undeniable consistency, ensure their differentiation.

The TigerNutre's ingredients are very perishable, due to their high water content, limiting the product's shelf life. Thus, and considering, still at an early stage, a predominantly homemade production, the shelf life of TigerNutre is reduced, due to the high risk of microbiological growth and sensory changes. This limitation requires that this plant-based dessert display the designation "consume by...". To extending the product shelf life and ensure greater consumer safety, the inclusion at an industrial scale of a final step of pasteurization is intended.

### **3.3 Packaging technical characteristics for product conservation**

The use of hermetically sealed glass container, due to their inert nature, makes it possible to protect the product from different hazards: physical, chemical, and microbiological. Additionally, and although some caution is necessary in its handling (e.g., storage, distribution), it is a material that, being non-deformable, presents mechanical resistance. The secondary packaging, although with less mechanical protection, has low thermal conductivity and it is a physical barrier to light.

### **3.4 Nutritional properties and health benefits**

The main nutritional benefit of TigerNutre is their high fiber content (9,86g/100g), in virtue of the nutritional properties of Horchata's solid by-product (7). It is recognized the role of dietary fiber in chronic disease prevention (e.g., coronary heart disease, stroke, hypertension, diabetes, obesity, and certain gastrointestinal disorders)(9) and the total TigerNutre's dietary fiber is composed mainly of insoluble dietary fiber, which is associated with increased satiety (7). Moreover, this plant-based dessert has prebiotic and antioxidant properties due to the use of Horchata's liquid by-product (7). This antioxidant power is boosted by pumpkin, which also contributes to an appreciable content of vitamins and minerals. Furthermore, it is important to note that TigerNutre has no added sugars (contains naturally occurring sugars), and therefore is suitable to diabetic consumers as well as to consumers that seeks to have a complete and balance diet, without compromising their indulgent desires.

## **4 Technological study: simulation of industrial scale production**

### **4.1 Identification of potential suppliers for industrial production**

The by-products of *Horchata de Chufa* will be obtained through a partnership with *The Original Chufa Company*, the main producer of this drink. To supply the lemon peels, a collaboration will be established with the fruit and vegetable processing industry, such as *Compal*. Regarding the supply of aquafaba, close contact with food and catering companies (e.g. *Gertal*, *Itau*, *Eurest*, *UniSelf*), with centralized production processes, will be essential to ensure a fixed supply. In order to contribute to the fight against food retail waste, *Fruta Feia* and *Sonae MC*, will be two entities that will provide the *Bolina* pumpkin, which would otherwise be rejected.

With regard to the different elements that make up the TigerNutre packaging, the supply of the glass containers will be of Verallia's responsibility. The design of the PLA lid will be ensured by United Biopolymers.

## **4.2 Industrial production scale implementation**

Considering TigerNutre's evolution to an industrial production scale, an industrial production line (ANNEX 2), production flowchart (ANNEX 3) was designed and the respective HACCP plan (ANNEX 4).

The production flowchart must follow a forward circuit as predefined for TigerNutre's development. In this sense, the raw materials are received in nº 9 followed to cold or dry storage (nº 10 and 11) depending on the conservation conditions of the ingredients. Note that an initial pasteurization (room nº8) should be apply to the *Horchata de chufa* liquid by-product. After the storage, the preparation and confection of TigerNutre's dessert occurs in the kitchen (nº12). In order to ensure food safety and increase the shelf life of the product, a pasteurization is contemplated (nº 13). In the rooms nº 14 and 15, the dessert is storage at refrigeration conditions and packaged, respectively. The last stage of TigerNutre's production line is the product expedition (room nº 17) to the commercial surfaces.

The analysis and identification of hazards followed the Codex Alimentarius guidelines (Regulation (EC) nº 852/2004; Commission Communication 2016/C278/01), and through the application of the decision tree for each TigerNutre's preparation stage, necessary for the risk assessment, two critical points in the process were identified, raising the need to implement strict monitoring and control measures.

### **4.2.1 Management of potential allergens at production level**

The only allergen present in TigerNutre is almond, which compose the topping cream, incorporated in the last stage of this plant-based dessert production. In this sense and considering the existence of potential "hidden" allergens and the possible occurrence of cross-contamination, the adoption of good practices regard food safety is essential to ensure consumer protection.

Thus, as action measures are included: operators training; strict control of raw materials received; storage of raw materials with allergenic potential in sections correctly marked for that purpose; disinfection points in strategic locations on the production line (e.g. at the entry to the kitchen, pasteurization and product packaging area); correct cleaning and disinfection of production support equipment and utensils;

## 5 Regulatory study

In order to ensure the compliance of the current legislation, Regulation (EU) N.º 1169/2011 was used to guarantee the correct food labeling of the TigerNutre, ensuring a high level of safety for the consumer. In this process, and through transparent communication, nutrition claims were established, respecting Regulation (EC) N.º 1924/2006. These claims, in addition to enabling informed food choices, create a equitable playing field in the food industry sector. Thus, and based on the analysis of the nutritional profile of the vegetable dessert produced, the possibility of applying nutritional claims was attended, based on compliance with the established requirements. In this regard, and since TigerNutre exceeds the minimum threshold of 6g of fiber per 100g of product, the application of the “high fiber content” claim is appropriate. Furthermore, and given that the product does not include added sugar, the claim “no added sugars” is applicable, with the product label stating, “contains naturally occurring sugars”.

The presence of allergens, as established by Annex II of Regulation (EU) N.º 1169/2011, requires their identification in the list of ingredients, when present. Thus, and considering that TigerNutre includes almonds in its composition, these must be highlighted in the list of ingredients, to protect the consumer.

## 6. Development of sustainable aspects

The valorization of agri-food by-products is urgent to achieve a desirably sustainable food system, allowing the development of new value-added products and contributing to the circular economy of the agro-industrial sector.

In line with this vision, the TigerNutre's idealization came from the strong desire to value the by-products of *Horchata de Chufa*, widely produced in the Valencia region (Spain), whose market value is around 60 million euros per year (8). From this production, 1.8 million kg of by-products are generated annually (8). The prejudicial impact that this waste represents on the food system justifies its reintegration into new production processes, with a view to the development of eco-innovative products. Furthermore, the emerging character of *chufa* (tigernut) as a vegetable food source may contribute to a greater demand and use of this tuber in agri-food production and, consequently, an increase in the by-products generated. These in turn have high quality functional properties for application in food technology.

The introduction of upcycled foods, an emerging trend of sustainable consumption, in the Portuguese market, is a great challenge, particularly when its original raw material (*chufa*) is unknown to the large

majority. Still, and considering the benefits that the use of agro-industrial by-products provides, TigerNutre aims to satisfy the indulgent desires of the consumer, encouraging them to live new consumption experiences, without compromising health and the environment.

As the management of food by-products is a transversal problem across several sectors of agro-industrial production, this plant-based dessert is made up of three layers resulting from the use of by-products. In addition to the by-products of *Horchata de chufa*, lemon peel, aquafaba and bolina pumpkin are integrated too, which have an expression in the food waste of the Portuguese food industry and retail.

Regarding the packaging idealized for TigerNutre and considering the high environmental impact that most food product packaging presents, the guarantee of a more ecological alternative, in line with the brand's vision of sustainability, could not be undervalued.

Thus, considering that one of the biggest problems in the world today is the huge amounts of plastic waste that pollute the environment (10, 11), the European Parliament released a directive (Directive (EU) 2019/904) that pretends to reduce the consumption of disposable plastic products (12). Therefore, the conventional plastics (Petroleum-based) are being replaced, especially in the packing sector, by a new generation of sustainability materials (13).

In line with these environment friendly materials solutions, TigerNutre wants to reduce his footprint and contribute to the green transition, using Polylactide (PLA) lids. PLA is a biobased and biodegradable polymer that can be an excellent option to replace the polymers from petrochemical sources, as such, Polyethylene terephthalate (PET) and Polypropylene (PP) (14, 15). The main reasons are their good properties (mechanical, barrier and optical) when compared to the most used polymers, and the ability to be processed as the conventional thermoplastics (rotational moulding, compression moulding) (16, 17). In terms of end-of-life, the biodegradable nature of PLA allows his degradation under compost conditions, the recycle of PLA is also possible and when compared to other polymers has the lowest environmental impact (18, 19).

PLA monomer, lactide acid, is obtained from a regenerative feedstock that contain starches and sugars, such as corn through biological fermentation, thereafter, polylactide is chemically produced from the lactide acid monomer (20, 21). The production of PLA in comparison to conventional polymers has numerous advantages, such as, lower emissions of human toxicity gases (PET bottles production generates emissions of terephthalic acid and ethylene glycol), lower fossil energy requirements and lower emission of greenhouse gases (22).

Regarding the possibility of setting up a company, the incorporation of sustainable management practices is a priority, namely in terms of water resources, organic energy.

Considering all these sustainable elements, TigerNutre fits into current European policies (Green Deal)(23) focused on the concept of circular economy, contributing to a sustainable food system.

### 7 Financial study: 3-year simulation

The TigerNutre’s business plan aims to establish short and long-term goals to the brand. In this sense, for the first semester of 2023 the promotion of TigerNutre’s dessert is primordial to achieve a high consumer visibility. In addition, the dessert commercialization in niche stores (“FoodLab Continente”, “Go Natural” and “Celeiro”) it is idealized as well as to ensure fixed partners as food and catering companies (e.g. *Gertal, Itau, Eurest, UniSelf*). In the second semester, it is perspective the launch of new TigerNutre’s flavours, which is expected to contribute to the increase brand sales. Moreover, it is intended to establish new contacts with suppliers, distributors, and customers. In 2024, with expansion of the brand presence in bigger commercial surfaces (“Continente”, “Auchan”, “Pingo Doce”, “Lidl”), the brand expects a sales increase of 30%. In order to promote the continuous growing of TigerNutre brand (sales increase 20%), the innovation and development of new products, keeping the *Horchata de chufa* by-products as the main ingredients is an ambitious for 2025.

Table 1. TigerNutre’s business plan. Seven months of 2023 sales were considered, followed by 30% and 20% increase sales in 2024 and 2025, respectively.

	2023	2024	2025
<b>SALES* (€)</b>			
TigerNutre	95 634,00	213 127,20	255 752,64
Average production per day (pack 2x125g)	225	293	351
RRP (€) <small>(recommended retail price)</small>	2,76		

### 8 Project consistency

TigerNutre's production essentially involves simple cooking procedures, without the need for robust equipment, except for the necessary pasteurization steps. Thus, its technical feasibility on an industrial scale can be implemented proficiently, without major investments at the level of process units.

The semiotics idealized for the brand is presented consistently, from the selected raw materials to the differentiating packaging used and the positioning built for it.

In this sense, the protection of the identity of this plant-based dessert is fundamental, so the creation of a patent, exclusive contracts with suppliers and partners' fidelity will be strategies to apply.

We believe in the TigerNutre's potential as a plant-based alternative that contributes to the transition for a sustainable agrifood system without compromising the indulgent consumer's desires.

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10.ANNEXS

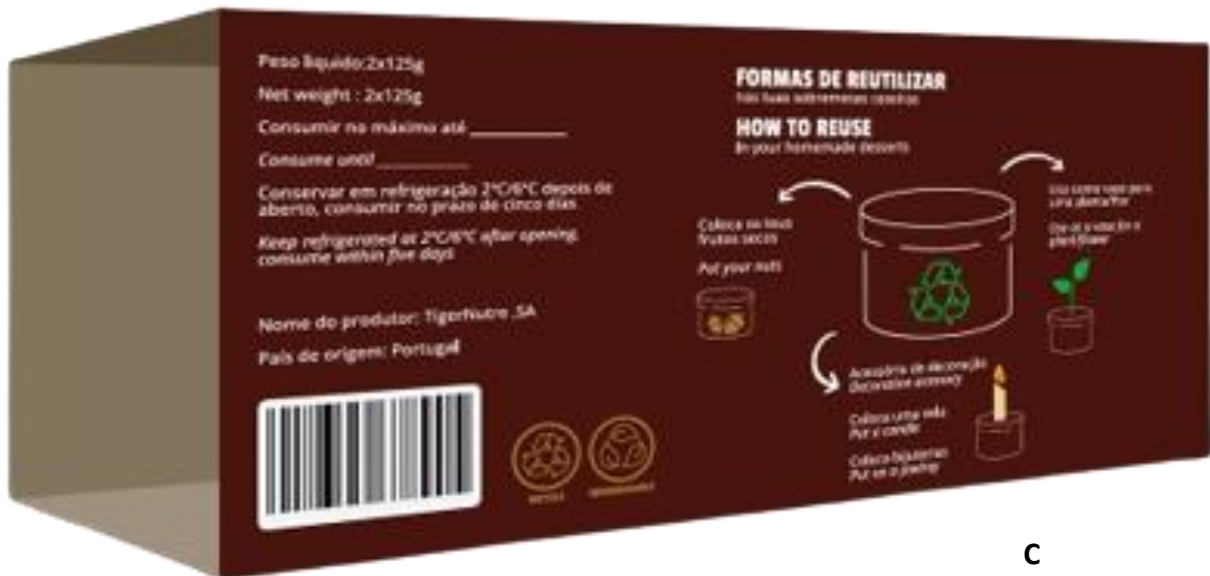
ANNEX 1. TigerNutre's packaging mockup: (A) front part (B) back of package; (C) bottom.



A



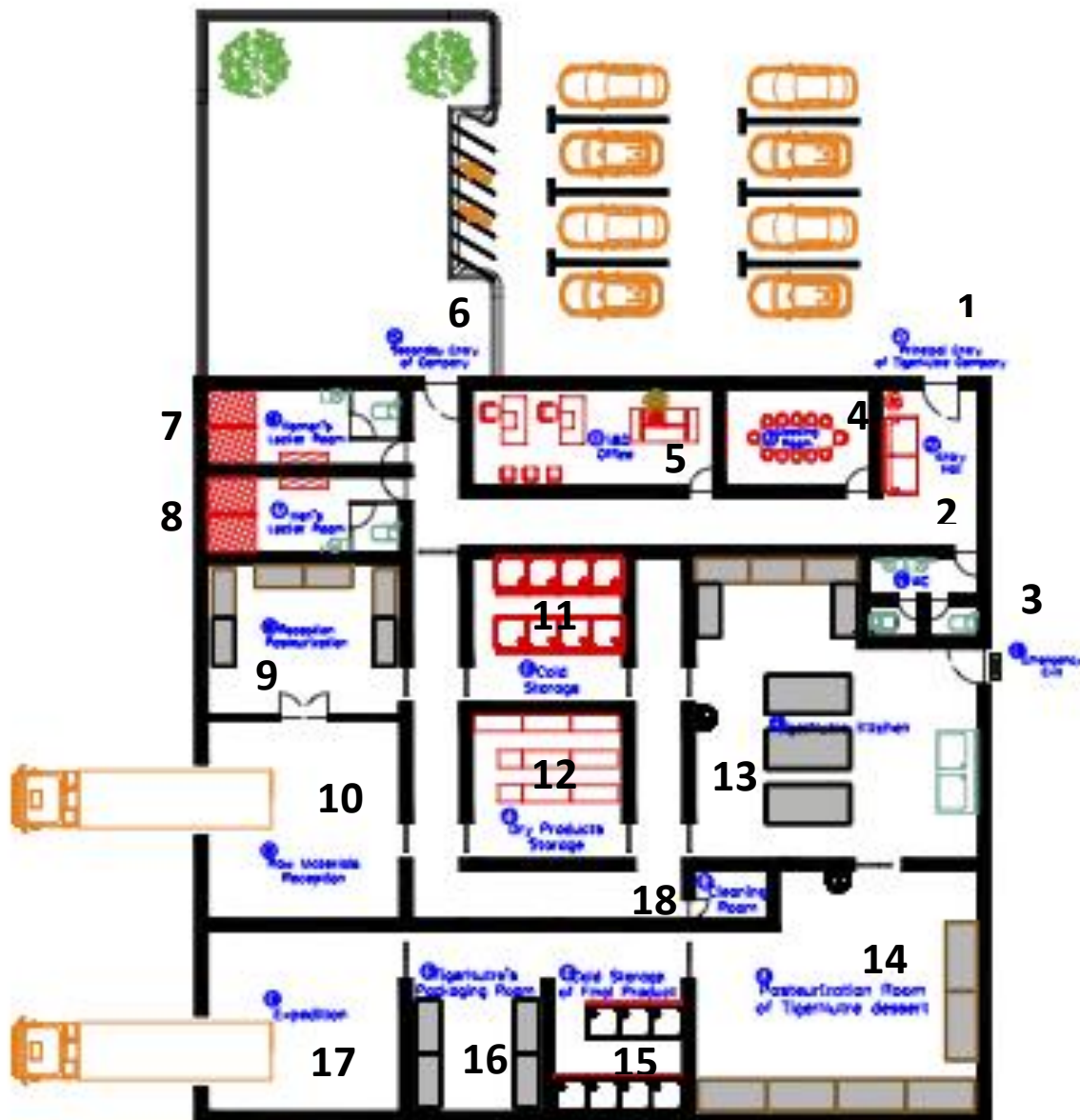
B



C



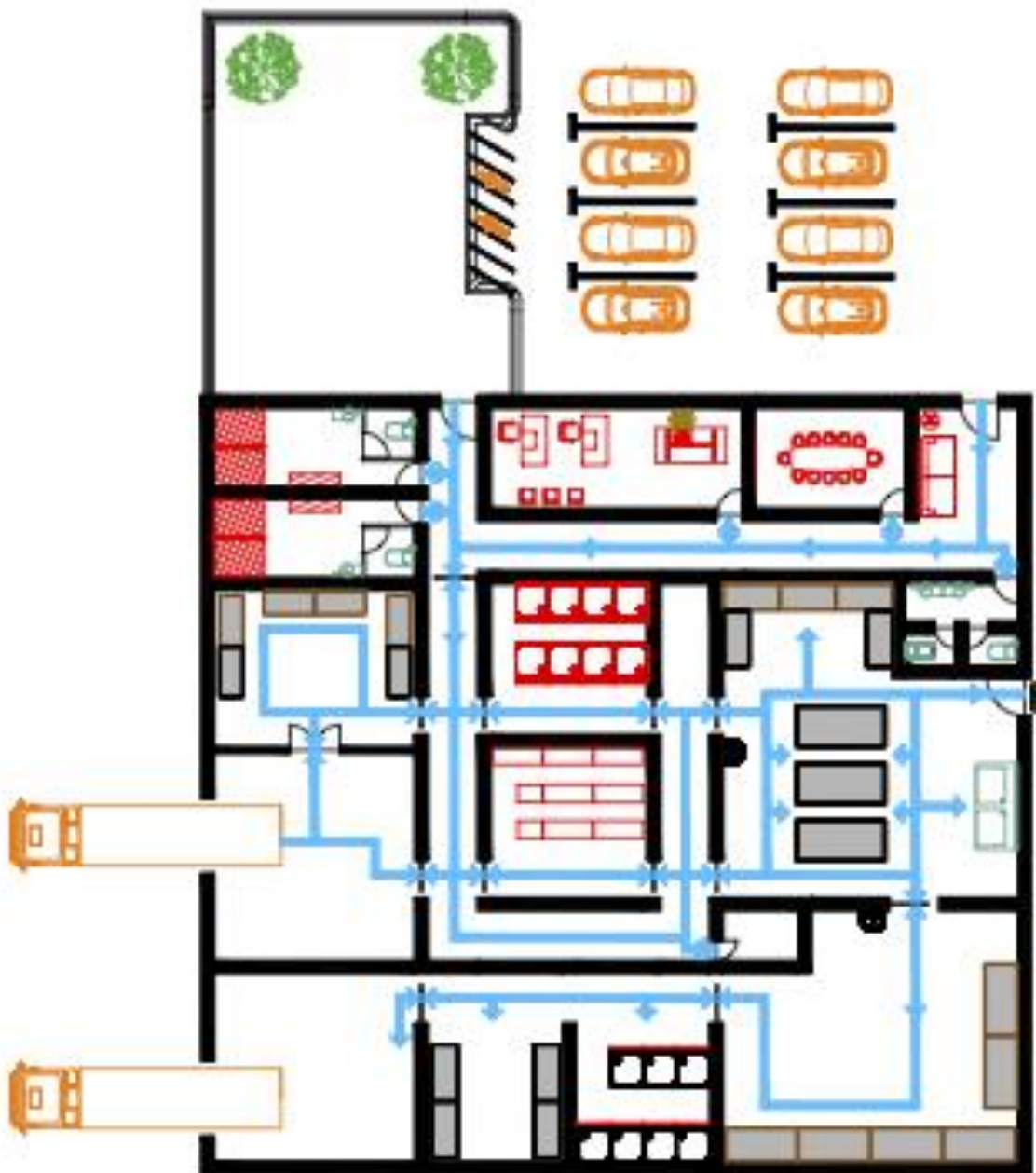
ANNEX 2. (A) TigerNutre industrial production line mockup.



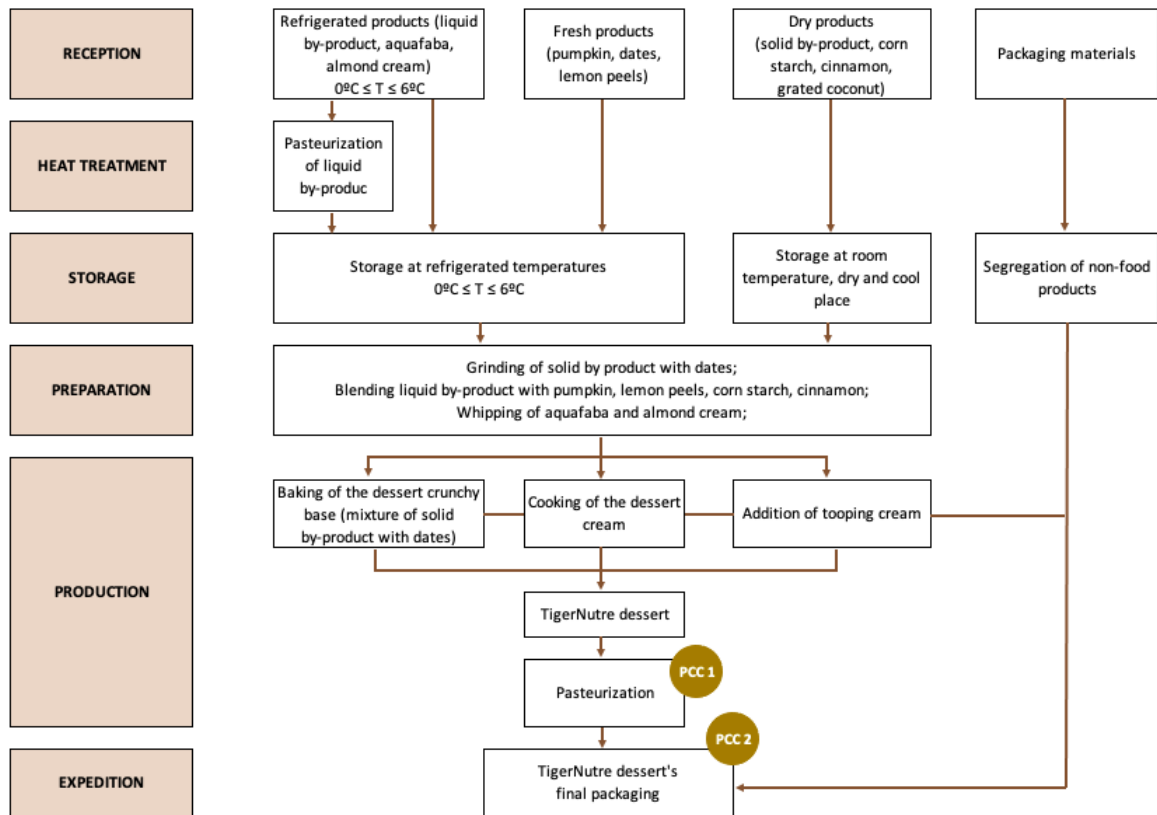
**Legend**

- |   |  |
|---|--|
| 1. Principal entry of TigerNutre company. | 10. Raw materials reception.                   |
| 2. Entry Hall                             | 11. Cold storage.                              |
| 3. Toilet                                 | 12. Dry products storage.                      |
| 4. Meeting Room.                          | 13. TigerNutre kitchen.                        |
| 5. I&D office.                            | 14. Pasteurization room of TigerNutre dessert. |
| 6. Secondary entry of company.            | 15. Cold storage of final product.             |
| 7. Women's locker room.                   | 16. TigerNutre's packaging room.               |
| 8. Men's locker room.                     | 17. Expedition.                                |
| 9. Reception pasteurization.              | 18. Cleaning room.                             |

ANNEX 2. (B) TigerNutre industrial production line route.



ANNEX 3. TigerNutre manufacturing flowchart for which HACCP is implemented.



ANNEX 4. HACCP plan - Identification and analysis of hazards, critical points and respective preventive and control measures.

HACCP PLAN									TigerNutre : plant-based dessert								
STAGE	PRODUCT/OPERATION	HAZARD	CAUSE	PCC N.º	CONTROL PARAMETER	CRITICAL LIMIT	MONITORING		CORRECTIVE ACTION								
							FREQ.	RESP.									
RECEPTION	Refrigerated products (liquid by-product, aquafaba, almond cream)	Biological - potential growth of microorganisms due to temperature fluctuations in transport	Contamination at origin and/or transport		Temperature (T°C)	0°C ≤ T ≤ 6°C	Permanent	Reception operator	Supplier control; Temperature control at reception; Collection of samples and physical-chemical and microbiological analysis; Rejection of contaminated batches;								
		Chemical - additives, toxins, pesticides, phytosanitary residues			Certificate/Declaration of absence of chemical substances	Absence											
		Physical - fragments of glass, metal, plastic or wood, stones, needles, bones, bark, sand, ornaments, or other foreign materials			Identification of foreign materials that may cause harm to the consumer.	Absence											
	Dry products (solid by-product, corn starch, cinnamon, grated coconut)	Biological - potential presence of microorganisms	Contamination at origin and/or transport		Production date	Absence of deterioration signs			Supplier control; Shelf life control; Visual inspection;								
		Chemical - additives, pesticides			Certificate/Declaration of absence of chemical substances	Absence											
		Physical - fragments of glass, metal, plastic or wood, stones, needles, bones, bark, sand, ornaments, or other foreign materials			Identification of foreign materials that may cause harm to the consumer.	Absence											
	Fresh products (pumpkin, dates, lemon peels)	Biological - growth of mold and spoilage bacteria	Contamination at origin and/or transport		Production date Reception Temperature	Absence of deterioration signs 0°C ≤ T ≤ 6°C			Supplier control; Temperature control at reception; Shelf life control; Visual inspection;								
		Chemical - pesticides			Certificate/Declaration of absence of chemical substances	Absence											
		Physical - presence of land, sand			Identification of foreign materials that may cause harm to the consumer.	Absence											
	Packaging materials	Physical - presence of deformities and/or foreign materials	Contamination at origin and/or transport		Materials' conservation state	Absence			On all supplies.	Supplier control; Control of the physical state of packaging materials and rejection of damaged lots;							

HACCP PLAN									TigerNutre : plant-based dessert								
STAGE	PRODUCT/OPERATION	HAZARD	CAUSE	PCC N.º	CONTROL PARAMETER	CRITICAL LIMIT	MONITORING		CORRECTIVE ACTION								
							FREQ.	RESP.									
HEAT TREATMENT	Pasteurization of liquid by-product	Biological - potential presence of microorganisms	Inappropriate time/temperature binomial		Time (min) and temperature (T°C)	T°C ≥ 72°C	Permanent	Processing operator	Time/temperature control; Immediate repair of equipment; Reprocessing of the liquid by-product.								
STORAGE	Refrigerated products (INCLUDING FRESH PRODUCTS)	Biological - potential growth of microorganisms	Temperature fluctuation of refrigeration equipment		Temperature (T°C) of refrigeration equipment	0°C ≤ T ≤ 6°C	Permanent	Storage operator	Storage at controlled temperatures; Adequate hygienization of refrigeration equipment; Compliance of storage conditions;								
		Biological - potential growth of microorganisms	Contamination at origin or storage location		Temperature and light of storage location	Storage at room temperature and absence of light			Compliance of storage conditions; Adequate space storage hygienization;								
	Dry products	Chemical - contamination by cleaning detergents	Non-separation of food and non-food products / poor hygiene of the storage area		Audit certificate	Absence			Segregation of non-food products; Adequate cleaning of surfaces; When not protected, place products inside boxes or packages;								
		Physical - presence of parasites	Poor cleaning and disinfection of facilities						Compliance of hygienization and disinfection program; Pest control measures; Adequate maintenance of infrastructure;								
PREPARATION	Grinding of solid by product with dates; Blending liquid by-product with other ingredients; Whipping of aquafaba and almond cream;	Biological - potential growth of microorganisms	Exposure to inappropriate temperatures. Cross contamination.		Temperature and hygiene practices of utensils and manipulators	0°C ≤ T ≤ 6°C	Permanent	Preparation operator	Adequate hygienization of equipment and utensils; Implementation of color systems; Ensure good handling and sanitation practices.								
		Chemical - contamination by cleaning detergents	Poor cleaning and disinfection of utensils and equipment		Regulation of the equipment state and of handlers' hygiene practices	Absence			Appropriate maintenance of equipment and utensils. Good handling practices;								
		Physical - fragments of glass, metal, plastic, ornaments, or other foreign materials	Utensils and equipment in poor condition. Bad handling practices.														

HACCP PLAN												
TigerNutre : plant-based dessert												
STAGE	PRODUCT/OPERATION	HAZARD	CAUSE	PCC N.º	CONTROL PARAMETER	CRITICAL LIMIT	MONITORING		CORRECTIVE ACTION			
							FREQ.	RESP.				
PRODUCTION	Baking of the dessert crunchy base (mixture of solid by-product with dates)  Cooking of the dessert cream	Biological - potential growth of microorganisms	Minimum temperature of 65°C not guaranteed		Temperature (T°C)	T°C ≥ 65°C	Permanent	Production Operator	Ensure temperatures above 65°C. Compliance of handlers' hygiene practices.			
		Chemical - chemical reactions and formation of undesirable compounds	Inappropriate time/temperature binomial		Identification of sensorial changes	Absence			Control of production temperatures;			
		Physical - presence of fragments of metal, plastic, hair or adornments	Utensils and equipment in poor condition. Bad handling practices.		Regulation of the equipment state and of handlers' hygiene practices	Absence			Appropriate maintenance of equipment and utensils. Good handling practices;			
	Addition of tooping cream	Biological - potential growth of microorganisms	Exposure to inappropriate temperatures. Cross contamination.		Temperature control and hygiene practices of utensils and manipulators	0°C ≤ T ≤ 6°C			Temperature control; Adequate hygienization of equipment and utensils; Good handling practices;			
		Chemical - contamination by cleaning detergents	Poor cleaning and disinfection of utensils and equipment		Regulation of the equipment state and of handlers' hygiene practices	Absence			Adequate hygienization of equipment and utensils;			
		Physical - presence of fragments of metal, plastic, hair or adornments	Utensils and equipment in poor condition. Bad handling practices.						Appropriate maintenance of equipment and utensils; Good handling practices;			
	Pasteurization of TigerNutre dessert	Biological - potential presence of microorganisms	Inappropriate time/temperature binomial	1	Time (min) and temperature (T°C)	T°C ≥ 72°C			Time/temperature control; Immediate repair of equipment; Product reprocessing.			
	EXPEDITION		Biological - potential presence of microorganisms	Exposure to inappropriate temperatures. Packaging deformations.	2	Temperature (T°C)			0°C ≤ T ≤ 6°C	Permanent	Expedition operator	Adequate temperature control; Assessment of packaging conservation state assessment; Product rejection;