WFP

Programa Mundial de Alimentos

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Incorporation of Amazonian products into food purchases

Simulation of economic, nutritional and environmental impact

October 2025

Published in 2025 by the World Food Programme Via C.G. Viola, 68-70, Rome 00148, Italy

This publication should be cited as: M. Namdar, C. Saa, R. Leao and A. Carmona. 2025. Incorporation of Amazonian products into food purchases: Simulation of economic, nutritional and environmental impact. Rome, WFP.

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Summary

This report, which has been drafted under a long-term agreement with the World Food Programme (WFP), presents an innovative methodology for simulating scenarios for incorporating Amazonian food into institutional food procurement programmes and for estimating their impacts. As part of its objective of enhancing local food systems and the development of the Amazonian territories, WFP is seeking to generate evidence on the economic, nutritional and environmental effects of replacing exogenous products with Amazonian foods.

The methodology is based on a simulation tool called ICLA, which automatically calculates and compares the impacts of different simulated substitution scenarios using 44 specific indicators. Thirty-two of these indicators assess economic aspects, such as the volume and value of local, inclusive purchases of Amazonian products; coverage in terms of cultivated area and number of farmers supplying food; income generated in the primary link of the food chains; and employment generated in the territories involved. Eight indicators are used to measure nutritional input, by assessing the amount of macronutrients in the food purchased. Finally, four indicators focus on the environmental impact, estimating the Greenhouse Gas (GHG) emissions and the Carbon Footprint associated with each scenario analysed.

The report describes in detail the methodology designed, with its impact indicators, input variables and criteria for the simulation, with consideration of factors such as nutritional input and acceptability, the capacity of small Amazonian producers and collectors to supply the institutional demand, the difficult access and work conditions in the Amazonian territories and the possible environmental risks, such as overexploitation of Amazonian resources.

It also provides the results of its application in concrete cases in Colombia and Bolivia, where the incorporation of four Amazonian foods - bitter cassava flour, chontaduro flour, Brazil nut flour and acai pulp - was simulated as substitutes for corn flour, rice, oat flour and apple juice. The results show that the inclusion of Amazonian products can economically benefit small producers and collectors, and generate more jobs in the territories, diversify the diet of the beneficiaries and reduce the Carbon Footprint, mainly by reducing transport distances.

In Colombia, for example, it is estimated that the incorporation of chontaduro flour to replace 5% of corn flour involves a 26% increase in the value of local purchases, but this increase significantly strengthens the inclusive nature of the purchases: the number of supplier producers increases by 121% and gross income at primary link level increases by 42%, allowing the generation of an average annual income per Amazonian family of USD 17.2 thousand.

The number of jobs increases by 31%. The nutritional inputs are similar to those of the baseline scenario and the Carbon Footprint is reduced by 3%.

Meanwhile, the incorporation of Bolivian Brazil nut flour to replace 5% oat flour would imply a 17% increase in the value of local purchases, but this increase strengthens the inclusive character of the purchases: the number of supplier collectors increases by 41% and gross income at the primary link level increases by 82%, allowing the generation of an average annual income per Amazonian family of USD 6,000. The number of jobs increases by 59%. Protein input increases by 9% and Carbon Footprint is reduced by 5%.

However, important challenges are also identified: some Amazonian products have nutritional limitations or acceptability problems, and there are sometimes precarious working conditions and risks of overexploitation of the Amazonian forest if not properly managed.

The report concludes that, the successful and sustainable mainstreaming of Amazonian products requires the strengthening of the capacities of local producers and associations to ensure environmental sustainability, and improve logistics. It is also recommended to design public policies that favour local and inclusive purchasing, and to establish monitoring mechanisms to avoid negative impacts on Amazonian biodiversity.

In summary, the proposed tool and approach facilitate a comprehensive and quantitative view of the economic, nutritional and environmental impacts of public food procurement, supporting informed decision-making to promote more sustainable and inclusive procurement strategies and food systems, adapted to the Amazonian situation.

Background

As part of an agreement between the Economic Commission for Latin America and the Caribbean (ECLAC) and the World Food Programme (WFP), a method was developed to estimate the economic impact of local and inclusive food purchases, with the aim of generating evidence to support institutional strategies that promote local food systems. The method designed in this first stage has a calculation tool (dynamic workbook with user manual) enabling the exercise to be replicated in other territories and food procurement programmes. The work was carried out by the partners of the consulting firm Qualitas AgroConsultores (Qualitas AC) and has already been applied in four countries (Guatemala, Honduras, Turkey, Nicaragua) [1].

Having evaluated the inputs of these studies, and under a Long-Term Agreement, the WFP regional office in Latin America and the Caribbean decided to take a new step, by asking Qualitas AC to adapt and extend the methodology to apply it to the situation of the Amazon. The challenge involved designing a methodology and associated toolbox to simulate the economic, nutritional and environmental impact of incorporating Amazonian products into institutional food procurement programmes and applying it to concrete cases.

This report presents the results of the study and is organised in five chapters. The first section contextualises the work, explaining its objectives and the conceptual framework that underpins it. The approach and methodological procedures that have been designed to meet the stated objectives are then described, with a brief presentation of the advanced dynamic workbook (ICLA), a calculation tool developed to simulate scenarios of Amazonian food incorporation and estimate their effects. The following chapter outlines the simulation exercises carried out in Colombia and Bolivia, highlighting their main results. The fourth chapter shares reflections and considerations about the method, and also about scenarios for incorporating Amazonian foods into food programmes. Finally, the report closes with a section of recommendations. It is complemented by three methodological annexes detailing: i) the input variables required to estimate the economic, nutritional and environmental effects; ii) the values of the input variables with their corresponding sources that were applied in the simulation exercises in Colombia and Bolivia; iii) the results of each of the scenarios simulated in Colombia and Bolivia.

Parallel to this document, the following is submitted:

- A zipped folder containing the following six Excel files: i) The Advanced Dynamic Workbook (ICLA), without values; ii) The Advanced Dynamic Workbook (ICLA) with the data of the selected foods in Colombia; iii) The Advanced Dynamic Workbook (ICLA) with the data of the selected foods in Bolivia; iv) A synthesis of the information collected to define the values of the input variables of the exercises in Colombia and Bolivia; v) The results of the simulated scenarios in Colombia; vi) The results of the simulated scenarios in Bolivia.
- The User's Manual which provides precise guidelines for the use of the ICLA Spreadsheet.

1 See: (i) M. Namdar and C. Saa. "Las compras locales de alimentos como posible factor de desarrollo en América Latina y el Caribe: estimación del impacto de las compras locales del Programa Mundial de Alimentos en Honduras y Guatemala", Documentos de Proyectos (LC/TS.2023/203), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2024. https://repositorio.cepal.org/server/api/core/bitstreams/d7834fcb-4874-4660-bd22-a10a918f803c/content;(ii) M. Namdar and C. Saa. "Las compras locales de alimentos como posible factor de desarrollo en América Latina y el Caribe: estimación del impacto de las compras locales del Programa Mundial de Alimentos en Honduras y Guatemala. Etapa 2: las compras inclusivas", Documentos de Proyectos (LC/TS.2024/79), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2024. https://www.agroqualitas.cl/publicaciones_2/las-compras-locales-de-alimentos-como-posible-factor-de-desarrollo-en-america-latina-y-el-caribe-etapa-2-las-compras-inclusivas/;(iii) Qualitas AC. 2025. Impact of local food procurement by the WFP in Türkiye. https://www.agroqualitas.cl/wp-content/uploads/2025/04/Turkiye-Final-report.pdf;(iv) the study in Nicaragua is underway (completion date: September 2025).

1. Objectives and conceptual framework

As part of its objective of strengthening local food systems, WFP seeks to generate evidence on the effects that the incorporation of Amazonian foods to replace exogenous products from outside the Amazon would have on institutional food programmes operating in Amazonian territories.

To this end, WFP wishes to simulate Amazonian food incorporation scenarios that allow anticipation of impacts, comparisons of alternatives - visualising both best and worst case scenarios - and informed decision-making before implementing actual mainstreaming strategies.

In line with this objective, WFP has promoted the design of a methodology with an associated calculation tool, aimed at simulating and estimating the economic, nutritional and environmental effects of different scenarios for the incorporation of Amazonian foods.

This first chapter presents the specific objectives of the methodology designed, as well as its general approach and associated definitions.

1.1. Objectives

- **General objective:**

  To develop and apply a replicable methodology with an associated calculation tool to concrete cases with the aim of simulating the effects of different scenarios of incorporating Amazonian foods as a substitute for exogenous foods in institutional food procurement programmes.

- **Specific objectives:**

  To adapt and refine a method to simulate and compare the economic effects of different scenarios of incorporating Amazonian food as a substitute for exogenous food.

  To design a method for simulating and comparing the nutritional inputs of different scenarios of incorporating Amazonian foods as a substitute for exogenous foods.

  To design a method to simulate and compare total GHG emissions and Carbon Footprint for different scenarios of incorporating Amazonian foods as a substitute for exogenous foods, considering only the final links in the value chains (transport, storage and food waste).

  To run the scenario simulation and impact estimation exercise in at least two concrete cases proposed by WFP (Bolivia and Colombia), including a minimum of eight foods (four Amazonian foods and four exogenous foods).

These objectives were achieved by defining impact indicators in the three identified dimensions (economic, nutritional and environmental), associated input variables, and by incorporating simulation functionalities. All these definitions are materialised in the Advanced Dynamic Impact Estimation Workbook for Local and Amazonian Procurement (ICLA).

1.2. General approach and definitions adopted

The simulation of scenarios for the incorporation of Amazonian foods involved specifying a set of definitions on which the conceptual framework of the work is based. The definitions agreed with WFP on the units of analysis, the types of food and producers, and the criteria to be considered for the scenario simulation, are presented below.

1.2.1. Units of analysis

- **Types of purchase:** four types of purchases can be distinguished (Figure 1)[2]:

  Local purchase [3]*:* refers to products purchased in the same beneficiary country. This involves food produced in the country where it is purchased and food previously imported by other domestic actors, either as processed products or as raw materials processed in the same country.

  Local product: refers to products purchased in the same beneficiary country, which are also produced within this country. They can be produced by small, medium or large domestic farmers.

  Inclusive product: refers to local products produced by small producers and/or their associations, which can be purchased directly or indirectly (through intermediaries or agro-industry).

  Amazonian product: refers to local Amazonian products, which are generally produced or collected by small-scale producers or collectors [4]. These products can either be endemic Amazonian or exogenous foods that have been introduced and produced in the Amazonian territories for a long time and have been adopted by the Amazonian culture.

Figure 1. Local purchase, Local Product, Inclusive Product and Amazonian Product.

Source: Author.

- **Territorial unit:** the basic unit of analysis is the country level. This makes it possible, on the one hand, to consider the heterogeneity of each national situation in terms of legal frameworks, how institutional Food Purchase Programmes are processed, the range of Amazonian products available and exogenous foodstuffs for possible replacement, among others. On the other hand, it is a valuable input for government decision-making in each country.

2 These definitions correspond to those adopted by WFP, although they may vary in other public institutions. For example, in some countries, the concept of local purchase refers to products purchased in the same region where they are distributed, or from territories located at a maximum distance of XY km^2 from the consumption location. In these cases, the terminology used may be adapted to align it with the terminology used by the programme or institution conducting the exercise.

3 Exceptionally, local purchases may be complemented by direct imports by WFP to compensate for shortfalls in domestic production or to meet emergency situations. These direct imports require the prior authorisation of the Purchasing Units of the regional office or WFP headquarters and are not considered part of local purchases and are recorded in a separate database. This procedure ensures adequate control and transparent management of international procurement, thus guaranteeing compliance with current health and trade regulations.

4 It is important to note that while Amazonian products are often inclusive, there are situations in which large producers or companies are also involved in their management and marketing.

This means that the ICLA Dynamic Workbook is designed to enter and consolidate results at the country level. It can also be used for a lower level territorial unit, such as region, department or municipality, considering that in many countries school feeding or other public food procurement programmes are implemented by sub-national governments.

- **Types of programme:** the exercise can be carried out for any institutional food procurement programme, such as school feeding programmes, emergency programmes, food programmes for vulnerable populations, etc. They may also be programmes funded and/or implemented by WFP or by other public or private institutions, or international cooperation.

1.2.2. Types of food and producers

- **Types of food:** there are four different types of food:
    a. Amazonian endogenous foods.
    b. Foods that are exogenous but have been introduced and produced in the Amazonian territories for a long time and have been adopted by the Amazonian culture.
    c. Exogenous foods produced outside the Amazonian territory, but produced within the country being analysed.
    d. Exogenous food produced outside the country concerned (imported).

Foods that can potentially be incorporated into the simulated scenarios correspond to the first two food groups (a) and (b), assuming that they refer to products produced or collected in Amazonian territories and traditionally consumed by their inhabitants. In this study, these foods are referred to as "Amazonian foods" while food groups (c) and (d) are referred to as "exogenous foods".

This option is based on the following elements: i) limiting substitution only to endogenous foods (a) is a restricted option, given the limited supply of endogenous foods that meet the required nutritional inputs and/or volumes and frequency of delivery; ii) the incorporation of exogenous products produced in the Amazonian territory also promotes the development of the Amazonian territories.

The ICLA method and tool are designed to analyse plant products, whether grown or collected. However, they do not allow for calculation of the impact of incorporating livestock products, game, seafood or aquaculture products, because these foods follow different production schemes that require specific calculation tools. This type of product cannot, therefore, be included in the scenarios simulated with the ICLA tool.

Finally, it is important to note that the method designed enables simulation of the impact of incorporating other specific types of food, such as Andean or Caribbean foods, agro-ecological or organic foods, among others.

- **Type of producer:** there are 3 different types of farmers or collectors who produce Amazonian products:
    a. Indigenous small-scale producer or collector.
    b. Non-indigenous small-scale producer or collector.
    c. Medium and large producers (indigenous and non-indigenous).

Foods which have the potential for incorporation into the simulated scenarios are Amazonian products mainly from small-scale producers or collectors, whether they are indigenous, Afro-descendant or non-indigenous (types (a) and (b)). These producers may be or may not be organised in formal or informal associations (cooperatives, voluntary organisations, etc.), depending on the existing third sector structures.

This option is based on the fact that the incorporation of food from small producers - regardless of whether or not they belong to indigenous or Afro-descendant peoples - strengthens the inclusive nature of food procurement programmes, along with their Amazonian character, thus aligning with WFP's inclusive procurement policy and promoting the development of the Amazon as a territory.

Exceptionally, Amazonian products that are also grown by larger-scale producers can be incorporated, as they can contribute to generating better supply, particularly in the period of consolidation of small producers and collectors.

1.2.3. Scenario simulation criteria

Incorporation scenarios must consider a set of conditions and criteria in order to ensure that their implementation in concrete initiatives is feasible. It is important to note that these elements - listed below and related to an appropriate alignment between supply and demand - should be considered a priori by the teams in charge of conducting simulation exercises, as they directly influence how the exercises are designed. However, they are included in the method and in the calculation tool (ICLA spreadsheet) presented in this report, which merely processes the data based on the defined scenarios and parameters.

- **Nutritional inputs:** given that Amazonian products may be deficient in some nutritional components, the first criterion to be addressed is to ensure that their incorporation does not involve a nutritional imbalance in the baskets or menus offered. Although, as will be seen below, the method is designed based on a simulation of constant energy scenarios, care must be taken to maintain reasonable inputs of the other macronutrients.
- **Acceptability:** the degree of acceptability of the Amazonian products to be incorporated must be considered in order to avoid them being rejected and consequent wasted. This point is particularly important if Amazonian products are to be included in baskets or menus for non-Amazonian beneficiaries.
- **Scale and technology:** small-scale producers and collectors generally find it difficult to supply institutional food procurement programmes. Indeed, they suffer from problems of scale in volumes and diversity of products, delivery opportunities, health and tax administrative procedures among others. Additionally, in most cases they do not meet the conditions and capacities to respond to public market regulations [5]. Amazonian producers/gatherers are not immune to these problems, which are generally exacerbated by difficulties of access and connections, and by the random nature of the collected products. This possible limitation in supply must be considered when selecting the Amazonian products to be incorporated and in definitions of their volumes and delivery frequencies.
- **Biodiversity:** in the case of collected Amazonian products, an extraction rate must also be established that does not jeopardise the biodiversity balance of the territories. It is absolutely imperative for this variable, which differs depending on the actual Amazonian products that are candidates for incorporation, to be considered in the design of substitution scenarios.
- **Carbon footprint:** although Amazonian products tend to have a lower carbon footprint in the final stages of the value chain - such as transport, storage and waste - due to their local character, it is essential to ensure that the simulated scenarios do not lead to an increase in this environmental indicator.

5 While many countries in the region have adopted legal frameworks favourable to local and inclusive food procurement, it must be recognised that their implementation has not been easy and their achievements are still limited.

This means that, when designing and evaluating simulations, there must be a particular focus on the logistics, handling and distribution of these foods, to ensure that they do not generate higher greenhouse gas emissions than current systems. While geographical proximity and fewer kilometres travelled often translate into lower transport-related emissions, it should not be automatically assumed that all impacts will be low. Variables such as type of transport, storage conditions, cold chain efficiency and waste management can influence the carbon footprint.

- **Amazonian population and logistical requirements:** Amazonian production/collection is generally located in territories that are difficult to access, which makes transport, collection and storage difficult and expensive. It is therefore advisable - also given what has been said about acceptability - to prioritise the incorporation of Amazonian products for the population living in Amazonian territories. The transport and storage conditions required by the proposed Amazonian products (temperature, humidity, impact resistance, etc.) should also be considered, with prioritisation of those with the lowest requirements.
- **Price:** The unit cost of Amazonian foods is generally higher than the cost of exogenous foods, given their lower productivity, their more limited scale of production or collection, and their collection, logistics and processing costs. This point is crucial when designing incorporation scenarios, aiming for per diem costs that remain within the budget availability ranges of institutional food programmes.

  In the case of Amazonian products mainly destined for export (e.g. Brazil nuts in Bolivia), it is also necessary to analyse the price level that will be attractive for collectors and processors to accept for sale on the domestic market instead of exporting. This requires consideration of the costs associated with export (transport, certifications, etc.).
- **Global balance:** it is essential to ensure that the benefits of incorporation of Amazonian foods for the population and territories of the region do not come at the cost of a reduction in the positive effects at national level. In other words, if the inclusion of these foods leads to a decrease in the overall favourable impacts of the simulated scenario compared to the baseline scenario, it will be necessary to reconsider the relevance of their inclusion.

In summary, the simulated incorporation scenarios should: i) guarantee and hopefully improve nutritional inputs and acceptability established in the food programmes; ii) align with the availability and timeliness of the supply of the selected Amazonian products, without jeopardising the environmental sustainability and biodiversity of the ecosystems; iii) adjust to the budgetary availability of the programmes (cost of the diet or basket); and iv) have a positive impact on the inclusiveness of the programmes analysed (more small producers, higher income for small producers) without undermining the overall favourable impacts.

2. Methodological framework and procedures

The focus of the designed methodology is to simulate the economic effects that the purchase of Amazonian food could have on territorial economic development, assessed through indicators such as employment generation, the areas and producing families involved, and the income of the farmers. Furthermore, the methodology also estimates nutritional and environmental effects - particularly Carbon Footprint - associated with this incorporation.

It is therefore important to emphasise that the proposed method does not aim to optimise food diets at the lowest price, and nor does it seek to minimise environmental effects; both functionalities are offered by other specific calculation tools used by WFP.

This chapter is organised into six sections. The first gives the general framework, describing the main stages of the scenario simulation and impact estimation process. The second presents the set of indicators that have been defined to measure the economic, nutritional and environmental impacts in the different scenarios, specifying their meaning and scope. The input variables that allow the calculation of the defined indicators are described in the third section. The criteria and rationale of the scenario simulation is are presented in the following section. The fifth section explains the type of results analysis that can be carried out. The last section presents the calculation tool - the ICLA advanced dynamic workbook - which allows for a very agile and automated development of the simulation exercises for the incorporation of Amazonian foodstuffs.

2.1. Stages for estimating impacts of mainstreaming Amazonian foods

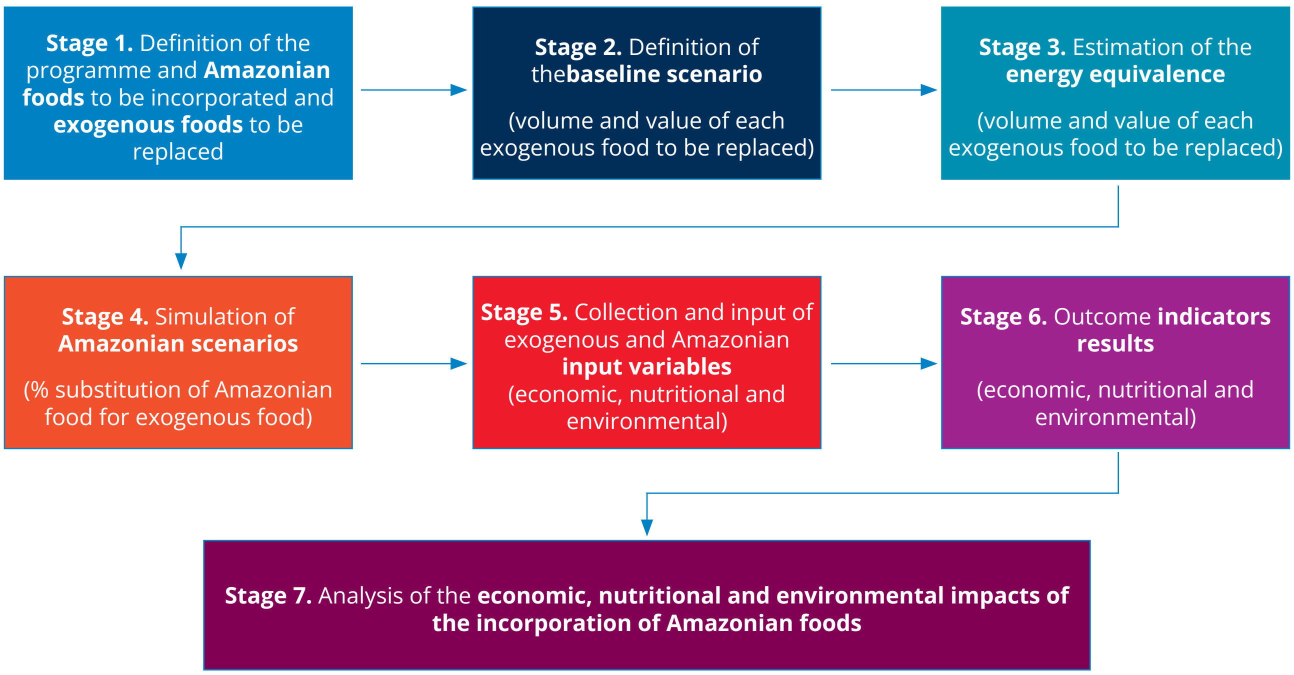
As summarised in Figure 2, the process for simulating scenarios and estimating the impacts of incorporating Amazonian foods in institutional programmes is developed according to the following stages:

- **Stage 1.** Definition of the programme and Amazonian foods to be incorporated and exogenous foods to be replaced. The first step is to select the food programme which will be used for the work. Once selected, the Amazonian foods to be incorporated and the exogenous foods to be fully or partially replaced are identified. It is at this stage that it is essential to carefully analyse the above-mentioned conditions and criteria, as it is on the basis of these that a feasible and coherent definition of the Amazonian and exogenous foods to be included in the simulations must be established.
- **Stage 2.** Definition of the baseline scenario. A baseline food purchase scenario is established, defining the volumes and purchase values of each exogenous food candidate for replacement[6]. These values can be defined according to different criteria: average annual purchase of the last 5 or 10 years; values of the most recent year; standard volume (e.g. 1,000 tonnes), etc.

6 The baseline scenario may include the foods that will not be replaced. However, as these same foods will be present in the simulated scenario, their effect will be neutralised when calculating the impact differential.

- **Stage 3.** Calculation of energy equivalence between Amazonian and exogenous foods. The energy equivalence between exogenous foods and candidate Amazonian foods is calculated based on a constant kilocalorie input. The volumes of Amazonian foods that guarantee the energy equivalence of the exogenous foods to be replaced are then calculated.
- **Stage 4.** Simulation of Amazonian scenarios. One or several Amazonian scenarios are simulated at constant energy, defining the Amazonian foods that will be incorporated and the exogenous foods that will be replaced, with the respective substitution proportions.
- **Stage 5.** Collection and input of input variables. The values of the exogenous and Amazonian candidate food input variables (economic, nutritional and environmental variables) are collected and entered.
- **Stage 6.** Results of economic, nutritional and environmental impact indicators. The ICLA calculation tool is used for automatic calculation of the values of the effect indicators in the exogenous base scenario and in the simulated Amazon scenario for each food, on a consolidated basis.
- **Stage 7.** Analysis of the economic, nutritional and environmental impact of the incorporation of Amazonian foods. The differential - in absolute value and in rate of change - between the values of the effect indicators of the simulated Amazon scenario and those of the baseline scenario is analysed. This differential corresponds to the effects of the incorporation of Amazonian foods. The contribution of Amazonian foods to the main indicators calculated for the three areas of analysis is identified. Unfeasible scenarios are discarded; more attractive scenarios are identified.

Figure 2. Main steps for estimating the impacts of incorporating Amazonian foods.



Source: Author.

2.2. Impact indicators

A set of 44 outcome indicators have been defined and are distributed as follows: 32 indicators measure economic effects, 8 reflect nutritional effects and 4 indicators measure environmental effects. The following are of note:

- These indicators are calculated for each of the foods to be incorporated and replaced and, on a consolidated basis, for each baseline and simulated scenario.
- It is assumed that the value of each indicator for each food is directly proportional to the volume of that food. In other words, the volumes of each food act as a multiplier - directly or indirectly - for each indicator.
- The ICLA Dynamic Workbook automatically calculates each of the defined indicators, based on the input variables described in section 2.3.

2.2.1. Economic effects

The estimation of the economic impact of local purchases is based on “local products” purchased, i.e. food produced in same country where it is consumed. This is because the economic effect of local purchases comes mainly from these products, assuming that the employment generated by imported products is relatively limited. To determine the volume of local products, it is then necessary to quantify and subtract from local purchases those products and raw materials imported by food programme suppliers.

Based on this premise, the economic effects of the baseline (exogenous food) and simulated (incorporation of Amazonian food) scenarios are estimated using 16 “master” indicators (indicators from 1 to 16) and 16 “derived” indicators (indicators with sub-numeration), all of which simulate evidence of impact along four broad dimensions. Within the derived indicators, 9 specifically measure Amazonian effects, and will therefore always be zero in the baseline scenario (Table 1, next page):

a. **Volume and value, gaps:** corresponds to the respective volumes, values and proportions of local purchases, local products, inclusive products and Amazonian products.
b. **Coverage:** corresponds to the areas and number of farmers or collectors supplying local and Amazonian products.
c. **Income:** corresponds to the total income, average income per producer and average gross margin per producer generated annually from the sale of local and Amazonian products. These are the incomes that “remain” at the level of the primary link.
d. **Employment:** corresponds to the generation of jobs associated with the purchase of local products and Amazonian products.

In each of these dimensions, the total values of the established indicators are calculated, based on a set of input variables, described in the following section. In addition, in the dimensions of coverage, income and employment, the unit value of the defined indicators is calculated, where unit value means the value of the indicator for the purchase of each 1,000 tonnes and each million USD.

TABLE 1. ECONOMIC IMPACT INDICATORS.

	INDICATOR NAME	UNIT
GAPS LOCAL PURCHASE, LOCAL PRODUCT, INCLUSIVE PURCHASE, AMAZONIAN PURCHASE (14 indicators)	**Indicator 1.** Volume of Local Food Purchases	TM
	Indicator 1.1. Volume of Local Products purchased	TM
	Indicator 1.2. Volume of Inclusive Local Products purchased	TM
	Indicator 1.3. Volume of Amazonian Products purchased	TM
	Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchases *	%
	Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases	%
	Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases	%
	Indicator 3. Value of Local Food Purchases *	USD
	Indicator 3.1. Value of Local Products purchased	USD
	Indicator 3.2. Value of Inclusive Local Products Purchased	USD
	Indicator 3.3. Value of Amazonian Products Purchased	USD
	Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases *	%
	Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases *	%
	Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Local Purchase Value	%
COVERAGE (8 indicators)	**Indicator 5.** Surface Area of Local Products purchased *	HA
	Indicator 5.1. Surface Area of Amazonian products purchased	HA
	Indicator 6. Surface Area of Local Products Purchased by Volume of Local Purchased Volume *	HA/ 103 TM
	Indicator 7. Surface Area of Local Products purchased by Local Purchase Value *	HA/ 106 USD
	Indicator 8. Number of Local Farmer Suppliers *	No.
	Indicator 8.1. Number of Amazonian Producer/suppliers	No.
	Indicator 9. Number of Local Farmer suppliers by Volume of Local Purchase *	No./ 103 TM
	Indicator 10. Number of Local Farmer suppliers by Local Purchase Value *	No./ 106 USD

	INDICATOR NAME	UNIT
INCOME (6 indicators)	**Indicator 11.** Total Gross Sales Revenue *	USD
	Indicator 11.1. Total Gross Income from Sales of Amazonian Products	USD
	Indicator 12. Average Income per Farmer per Sale *	USD
	Indicator 12.1. Average Income per Producer from Sale of Amazonian Products	USD
	Indicator 13. Average Gross Margin per Farmer per Sale *	USD
	Indicator 13.1. Average Gross Margin per Producer for Sales of Amazonian Products	USD
EMPLOYMENT (4 indicators)	**Indicator 14.** Number of Jobs Generated by Agricultural and Agro-industrial Sector *	No. ETE
	Indicator 14.1. Number of Jobs Generated by Amazonian Agricultural and Agro-industrial Sector	No. ETE
	Indicator 15. Unit Employment by Local Purchasing Volume	No. ETE/ 103 MT
	Indicator 16. Unit Employment by Value Local Purchase *	No. ETE/ 106 USD

Source: Author. Key: * Master Indicators

- TM = Tonne
- USD = US dollar
- HA = Hectare
- No. = Number
- ETE = Full-time equivalent worker
- 103 = 1,000 (106) - 1,000,000

The indicators defined in each dimension are briefly described below.

a. **Volume and value, gaps.** Fourteen indicators have been defined in this dimension: (i) eight measure the volume and value of the four types of purchases (local purchase, local products, inclusive products and Amazonian products), figures that constitute the multiplier coefficients from which the effects are calculated for the other three dimensions (coverage, income, employment); and (ii) six that measure the proportions of local products, inclusive products and Amazonian products in volume and value with respect to local purchase. They reflect the existing gaps between each of the three types of products and the total local purchase, showing the more or less local, inclusive and Amazonian character of the scenarios.

- **Indicator 1. Local Food Purchase Volume:** refers to the volume of food purchased in the country where it is consumed.
    - **Indicator 1.1. Volume of Local Products purchased:** refers to the volume of products purchased in the country where they are consumed and produced in the same country. To estimate this volume, products that have been imported - as finished product or raw material - by other agents must be subtracted from local purchases.
    - **Indicator 1.2. Volume of Inclusive Local Products purchased:** refers to the volume of local products purchased from small-scale producers, collectors and/or their associations.

- **Indicator 1.3. Volume of Amazonian products purchased:** refers to the volume of Amazonian products in local products purchased.

- **Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing:** refers to the proportion of local product volume in relation to the total volume of local purchases. It is an indicator that shows the gap - and therefore the opportunity to capture - of increased "truly" local purchases.
    - **Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchasing:** refers to the proportion of the volume of products from small-scale producers, collectors and/or their associations in relation to the total volume of local purchases. It is an indicator that shows the gap - and therefore the opportunity to capture - of increasing inclusive purchases. It also shows the impact (or non-impact) of the incorporation of Amazonian foods on the degree of inclusiveness of food purchase programmes.
    - **Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchase:** refers to the proportion of the volume of Amazonian products in relation to the total volume of local purchases. It is an indicator that shows the gap - and therefore the opportunity to capture - of increased Amazonian purchases.

- **Indicator 3. Local Purchase Value of food (USD):** refers to the value of food purchased in the country where it is consumed.
    - **Indicator 3.1. Value of Local Products purchased:** same as indicator 1.1, but expressed in value.
    - **Indicator 3.2. Value of Inclusive Local Products Purchased:** same as indicator 1.2, but expressed in value.
    - **Indicator 3.3. Value of Amazonian Products Purchased:** same as indicator 1.3, but expressed in value.

- **Indicator 4. Value of Local Product Purchase as a percentage of the Total Value of Local Purchase:** same as indicator 2 but expressed in value. Depending on the type - and thus the unit value - of imported products purchased locally, this proportion may be higher or lower than the proportion by volume.
    - **Indicator 4.1. Value of Inclusive Local Product Purchase as a percentage of the Total Value of Local Purchase:** same as indicator 2.1 but expressed in value.
    - **Indicator 4.2. Value of Amazonian Product Purchase as a percentage of the Total Value of Local Purchase:** same as indicator 2.2 but expressed as a value.

b. **Coverage, surface areas and universe of farmer suppliers:** 8 indicators have been defined in this dimension: (i) four estimate the surface areas associated with local and Amazonian products. They reflect the surface area of land required to supply the volumes of products purchased or to be purchased; (ii) four indicators measure the universe of producers and/or collectors (in number) required to supply the volumes of local products purchased or to be purchased.

- **Indicator 5. Purchased Local Products Surface Area:** refers to the local cultivated and/or collected surface area needed to supply the volumes of the different local products (unprocessed product and raw material) purchased or to be purchased. It is estimated based on local yields and losses for each item. In the case of cultivated products, it allows the territorial impact of purchases to be assessed. For collected products, this indicator takes on a different meaning, as the availability of product by surface area - which depends on natural and ecological factors - is generally much lower than for crops and is very heterogeneous. In spite of this, the concept of yield by surface area as an input variable and total surface area as a coverage indicator was retained for collected products, but its interpretation has a different perspective: the concept of yield by surface area is applied from a maximum extraction rate perspective and the resulting total surface area is then an important benchmark for comparison with the area of Amazonian forest available for collection management.

  - **Indicator 5.1. Surface Area of Amazonian products purchased:** refers to the local cultivated and/or collected surface area needed to supply the volumes of the different Amazonian products purchased or to be purchased.

- **Indicator 6. Area of Local Products Purchased by Volume of Local Purchase:** corresponds to a unit indicator. Refers to the local surface area needed to supply 1,000 tonnes of local purchase. This indicator facilitates projections of the surface areas that would be involved in different scenarios and the composition of local purchases.
- **Indicator 7. Area of Local Products purchased by Local Purchase Value:** corresponds to another unit indicator. Refers to the local surface area needed to provide USD 1 million of local purchase. This indicator also facilitates projections of the surface areas that would be involved in different scenarios and the composition of the shopping baskets.
- **Indicator 8. Number of Local Farmer suppliers:** refers to the number of local producers or collectors who supply local products, either directly (producers/collectors and/or their associations sell directly to the food purchase programme) or indirectly (producers/collectors sell to agro-industries or intermediaries supplying the programme). Corresponds to the total of producers supplying each of the local products purchased or to be purchased. To calculate the number of producers or collectors associated with each local product, the estimated local surface areas for each product (indicator 5) are divided by the average surface areas managed by each producer or collector in each product (input variable). It is assumed that this indicator will be overestimated when the same farmer provides more than one product (double counting).
  - **Indicator 8.1. Number of Amazonian producers/suppliers:** refers to the number of local producers who supply Amazonian products, either directly or indirectly. Corresponds to the sum of producers who supply each of the Amazonian products purchased or to be purchased. To calculate the number of producers or collectors associated with each Amazonian product, the estimated local Amazonian areas for each product (indicator 5.1) are divided by the average surface areas managed by each producer or collector in each product (input variable). It is assumed that this indicator will be overestimated when the same farmer or collector provides more than one Amazonian product (double counting).

- **Indicator 9. Number of Local Farmer suppliers by Local Purchase Volume:** corresponds to a unit indicator. Refers to the number of local producers and collectors involved - directly or indirectly - in the supply of 1,000 tonnes of local purchases. This indicator facilitates projections of the universe of producers and collectors that would be involved in different scenarios and the composition of local purchases.
- **Indicator 10. Number of Local Farmer suppliers by Local Purchase Value:** corresponds to another unit indicator. Refers to the number of local producers and/or collectors involved - directly or indirectly - in the sourcing of USD 1 million of local purchase. This indicator facilitates projections of the universe of producers and collectors that would be involved in different scenarios and the composition of local purchases.

c. **Income:** six indicators have been defined in this dimension: (i) two express the total annual income that the sale of local products generates at the primary link, i.e. farmers and collectors; (ii) four express the average annual income and gross margin per producer or collector from the sale of local products.

- **Indicator 11. Total Gross Income from Sales:** refers to the total income that local products generate at the primary link, i.e. all agricultural producers and collectors. It corresponds to the value that "remains" in the hands of this link and is calculated by multiplying the volumes of local products by the price to the producer or collector of each of these. The difference between the value of local products (indicator 3.1) and this indicator of total gross income corresponds to the value that remains in the other links of the chain (collection, processing, marketing), a value that will be more or less important depending on the logistical and processing complexity of the chain, and the bargaining power between the actors in each product chain.
  - **Indicator 11.1. Total Gross Income from Sales of Amazonian Products:** refers to the total income that Amazonian products generate at the primary link, i.e. at the level of all the producers and collectors who supply these products. It corresponds to the value that "remains" in the hands of this link and is calculated by multiplying the volumes of Amazonian products by the producer price of each of product. The difference between the value of Amazonian products (indicator 3.3) and this indicator of total gross income from the sale of Amazonian products corresponds to the value that remains in the other links of the chain (collection, processing, marketing), a value that will be more or less important depending on the logistical and processing complexity of the chain, and the existing bargaining power of the actors in each product chain.
- **Indicator 12. Average Income per Farmer per Sale:** corresponds to the average annual income per producer or collector from the sale of local products, including both those sold directly and indirectly. It is calculated by dividing the total gross income (indicator 11) by the number of local farmers (indicator 8). It should be noted that the calculation formula means that the average income per farmer turns out to be lower when the number of farmers involved is higher, which occurs to the extent that the purchase from small producers is prioritised. This means that this indicator should always be analysed together with the number of farmers involved. It is possible for average incomes per farmer to be higher in the exogenous scenarios, because they involve larger-scale producers

with fewer participants. In the Amazonian scenarios, although individual incomes are lower, a broader base of collectors and farmers benefits, generating a more significant distributional impact.

- **Indicator 12.1. Average Income per Producer from the Sale of Amazonian Products:** corresponds to the average annual income per producer or collector from the sale of Amazonian products, including both those sold directly and indirectly. It is calculated by dividing the total gross income from sales of Amazonian products (indicator 11.1) by the number of local Amazonian farmers (indicator 8.1).

- **Indicator 13. Average Gross Margin per Farmer per Sale:** corresponds to the average gross income per producer (indicator 12) minus direct production costs, such as inputs, machinery, others. Direct costs do not include family labour costs, as it assumes that this corresponds to self-employment and is therefore part of the farmer's income.

  - **Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products:** corresponds to the average gross income per producer per sale of Amazonian products (indicator 12.1) minus the direct costs of production or collection, such as inputs, machinery, miscellaneous materials, others. Direct costs do not include family labour costs, as it assumes that this corresponds to self-employment and is therefore part of the farmer's income.

d. **Employment:** 4 employment indicators have been defined: (i) two express the total employment generated by local products and Amazonian products; (ii) two are unitary items, reflecting the employment generated per unit of volume and value of local purchase.

- **Indicator 14. Number of Jobs Generated by Agricultural and Agro-industrial Sector:** refers to the generation of jobs associated with primary production and/or collection, as well as post-collection (sorting, packaging) and processing of local products (flours, pulps, etc.). It does not include employment generated "upstream" (manufacture of machinery, inputs, etc.) or "downstream" (logistics, food preparation, distribution, etc.). It is calculated on the basis of labour requirements per area (primary production and collection) and per volume processed (agro-industrial processing). It is expressed as "Full Time Equivalent Worker" (FTE), a unit used to compare and standardise the working hours of employees working part-time in relation to those working full-time [7].

  - **Indicator 14.1. Number of Jobs Generated by the Amazonian Agricultural and Agro-industrial Sector:** refers to the generation of jobs associated with primary production and/or collection, as well as post-collection (selection, packaging) and transformation of Amazonian products (flours, pulps, etc.).

- **Indicator 15: Unit Employment per Volume of Local Purchase:** corresponds to a unit indicator that measures the number of jobs generated per 1,000 tonnes of local purchase. This indicator facilitates projections of the employment that would be generated in different scenarios and the composition of local purchases.

7 The specific definition of a "full-time equivalent worker" may vary according to the labour laws and practices of each country or company, but is generally calculated using a formula that takes account of the number of hours worked part-time compared to the standard working hours of a full-time employee in the same position or category.

- **Indicator 16: Unit Employment per Local Purchase Value:** corresponds to a unit indicator that measures the number of jobs generated per USD 1 million of local purchase. This indicator facilitates projections of the employment that would be generated in different scenarios and the composition of local purchases.

The information required to estimate the economic impact and calculate the effect indicators in the baseline and simulated scenario consists of trade, production and processing data for each of the analysed foods, as detailed in section 2.3.1.

2.2.2. Nutritional effects

The nutritional effects of the baseline (exogenous foods) and simulated (incorporation of Amazonian foods) scenarios are estimated using 8 indicators that measure total macronutrient inputs and, within each of these, the proportion contributed by Amazonian foods (Table 2).

TABLE 2. INDICATORS OF NUTRITIONAL EFFECTS.

INDICATOR NAME	UNIT
Indicator N1. Energy input	kilocalories
Indicator N1.1. Energy input of Amazonian foods	% of total energy
Indicator N2. Protein input	grams
Indicator N2.1. Protein input of Amazonian foods	% of total protein
Indicator N3. Fat input	grams
Indicator N3.1. Fat input of Amazonian foods	% of total fat
Indicator N4. Available carbohydrate input	grams
Indicator N4.1. Available carbohydrate input of Amazonian foods	% of total available carbohydrates

Source: Author.

- **Indicator N1. Energy input:** corresponds to the total energy inputs of each of the foods that make up the scenario analysed. The energy input of each food is calculated by multiplying its unit input (in 100 g of food) by its volume.
    - **Indicator N1.1. Energy input of Amazonian foods:** corresponds to the proportion of energy contributed by the Amazonian foods incorporated in the simulated scenario. It is calculated by dividing the energy input of Amazonian foods by the total energy input of the simulated scenario (indicator N1).
- **Indicator N2. Protein input:** is the amount of protein in each of the foods that make up the scenario analysed. The protein input of each food is calculated by multiplying its unit input (in 100 g of food) by its volume.
    - **Indicator N2.1. Protein input of Amazonian foods:** corresponds to the proportion of protein provided by the Amazonian foods incorporated in the simulated scenario. It is calculated by dividing the protein input of the Amazonian food by the total protein input of the simulated scenario (indicator N2).

- **Indicator N3. Fat input:** corresponds to the sum of the fat input of each of the foods in the scenario analysed. The fat input of each food is calculated by multiplying its unit input (present in 100 g of food) by its volume.
  - **Indicator N3.1. Fat input of Amazonian foods:** corresponds to the proportion of fat contributed by Amazonian foods incorporated in the simulated scenario. It is calculated by dividing the fat input of the Amazonian food by the total fat input of the simulated scenario (indicator N3).
- **Indicator N4. Available carbohydrate input:** corresponds to the sum of the available carbohydrate input of each of the foods in the scenario analysed. The available carbohydrate input of each food is calculated by multiplying its unit input (in 100 g of food) by its volume.
  - **Indicator N4.1. Input of available carbohydrates in Amazonian foods:** corresponds to the proportion of available carbohydrates provided by the Amazonian foods incorporated in the simulated scenario. It is calculated by dividing the available carbohydrate input of the Amazonian food by the total available carbohydrate input of the simulated scenario (indicator N4).

It is important to note that the calculation tool (ICLA spreadsheet) also allows micronutrient values to be input, and therefore it will be possible to compare the micronutrient inputs in each scenario, as long as information regarding their values is available for each of the candidate foods.

The nutritional composition of each food eligible for incorporation or replacement is the information required for the calculation of the defined nutritional indicators as detailed in section 2.3.2.

2.2.3. Environmental effects

In this methodology, WFP has chosen to limit the estimation of environmental effects to Greenhouse Gas (GHG) emissions [8] and, within this methodology, to consider only the last links in the value chain, namely the transport of food from its origin to its point of destination, its storage and the final disposal of waste resulting from the non-consumption of food by the beneficiaries of the programmes.

Four indicators were therefore defined to measure the environmental effects, which correspond to the total GHG emissions and Carbon Footprint associated with each defined scenario, and the relative participation of Amazonian food within these (Table 3).

TABLE 3. INDICATORS OF ENVIRONMENTAL EFFECTS.

INDICATOR NAME	UNIT
Indicator A1. Total GHG Emissions	tonnes CO2eq
Indicator A1.1. Share of Total GHG Emissions from Amazonian foods, in Total GHG Emissions	percentage of Total GHG Emissions
Indicator A2. Carbon Footprint	kilos CO2eq/tonne of food
Indicator A2.1. Carbon footprint of Amazonian foods	kilos CO2eq/tonne of food

Source: Author.

8 Although at the beginning of the study it was proposed also to include the impact on the water footprint, WFP has finally opted to exclude this indicator from the present methodology, as it recognises that it will not vary significantly in the different incorporation scenarios, given that the footprint of primary production and agro-industry is not considered.

GHG emissions are calculated by using the United Nations Framework Convention on Climate Change (UNFCCC) *Greenhouse Gas Emissions Calculator | 2021 Emission Factors* available at https://unfccc.int/documents/271269.

This tool is used to calculate GHG emissions generated by the transportation, storage and waste of exogenous and Amazonian foods to be analysed [9].

- **Indicator A1. Total GHG emissions:** corresponds to the sum of GHG emissions generated by each food in the transport, storage and waste links.
  - **Indicator A1.1. Share of Total GHG Emissions from Amazonian food in Total GHG Emissions:** reflects the share of Amazonian food in GHG emissions in the transport, storage and waste links. Corresponds to total GHG emissions generated by Amazonian food in the transport, storage and waste links, divided by total GHG emissions (indicator A1).
- **Indicator A2. Carbon Footprint:** corresponds to the GHG emissions generated in the transport, storage and waste links per unit of locally purchased food. To make the results easier to read, the footprint has been expressed in kilo of CO2 equivalent per tonne of local purchase.
  - **Indicator A2.1. Carbon footprint of Amazonian food:** corresponds to the GHG emissions generated in the transport, storage and waste links per unit of Amazonian food. To facilitate the reading of the results, the footprint has been expressed in kilo of CO2 equivalent per tonne of Amazonian purchase.

The information required to estimate the environmental impact and calculate the effect indicators in the baseline scenario (exogenous foods) and in the simulated scenario (with incorporation of Amazonian foods) consists of data associated with the transport, storage and waste conditions of each of the foods analysed, as detailed in section 2.3.3.

2.3. Input variables

2.3.1. Economic effects

Economic impact indicators are calculated on the basis of a set of input variables that characterise the value chain of each food that can be incorporated or substituted. As illustrated in Table 4, variables associated with the marketing, primary production and processing of each of the foods are required. It should be noted that processed foods (flours, oils, pulps, etc.) have some variables in addition to those required for unprocessed foods (corn, beans, vegetables, tubers, etc.), such as industrial yield, working hours required for processing, among others.

The sources of information for the values of these variables are mixed. Most are of a secondary nature and correspond to WFP or other programme food procurement databases, statistics, studies, cost sheets, among others. This data is supplemented with primary information, through surveys and/or semi-structured interviews with qualified informants belonging to the different links in the chains (agro-industries, intermediaries, producers and associations, technical experts, among others).

The accuracy of the information collected has a direct impact on the robustness of the results obtained. Work may be iterative, seeking first to obtain orders of magnitude of the results and, as scenarios are selected and discarded, to refine the values of the input variables.

Annex 1 details each of the required input variables, as well as possible sources of information.

9 It should be noted that, for the purposes of this methodology, emissions per 1,000 tonnes of food transported/stored/wasted are estimated allowing for subsequent scenario changes without having to re-estimate emissions in the UNFCCC tool. The rationale and calculation logic is detailed in the ICLA Spreadsheet User Manual.

TABLE 4. MAIN INPUT VARIABLES FOR ESTIMATING ECONOMIC EFFECTS.

<table>
<tr><th>INPUT VARIABLES</th><th>ECONOMIC IMPACT INDICATORS</th></tr>
<tr><td>Volume and Value of each Food purchased (Exogenous or Amazonian)</td><td rowspan="4">Volume and value, Gaps between Local Purchase, Local Product, Inclusive Product and Amazonian Product</td></tr>
<tr><td>Proportion of purchases by type of supplier (Agro-industry*, Intermediary, Small producers and associations)</td></tr>
<tr><td>Proportion of imported food or raw material</td></tr>
<tr><td>Wholesale price of purchased Food</td></tr>
<tr><td>Primary Production Yield or Collection and wastage</td><td rowspan="3">Coverage, Area and Number of Farmers and Collectors</td></tr>
<tr><td>Average food surface area per producer or collector</td></tr>
<tr><td>Industrial Performance *</td></tr>
<tr><td>Producer Price</td><td rowspan="2">Primary Link Revenues, Total, Average, Gross Margin</td></tr>
<tr><td>Ratio of Production Costs (to Gross Income)</td></tr>
<tr><td>Number of working days required per cultivated or collected ha</td><td rowspan="3">Agricultural and Agro-industrial Job Generation</td></tr>
<tr><td>No. of days required for sorting and packaging</td></tr>
<tr><td>No. of days required to process raw material *</td></tr>
</table>

Source: Author.
* For processed food only.

2.3.2. Nutritional effects

The indicators of nutritional effects are calculated using a set of input variables that correspond, as mentioned above, to the nutritional composition in macronutrients of each of the foods that may be incorporated or replaced. If the information is available, additional information such as the breakdown by type of fat, carbohydrate components or micronutrient contents can be entered, according to the profile of the beneficiaries of the food programmes analysed.

Table 5 (next page) lists the input variables for calculating the nutritional effects, distinguishing between mandatory and optional variables.

Depending on the countries and foods considered, nutrition information may come from different sources. It is recommended, as far as possible, to refer to official public sources, such as government food composition tables, nutrient profiles produced by international organisations, among others.

TABLE 5. MAIN INPUT VARIABLES FOR ESTIMATING NUTRITIONAL EFFECTS.

NUTRITIONAL COMPOSITION (PER 100 G OF FOOD)	INPUT VARIABLES	
	MANDATORY	OPTIONAL
Macronutrients		
Energy (Kcal)	✔	
Protein (grams)	✔	
Total Fat (grams)	✔	
Saturated fat		✔
Monounsaturated fat		✔
Polyunsaturated fat		✔
Trans fat		✔
Cholesterol (milligrams)		✔
Total Available Carbohydrates (g)	✔	
Total sugars		✔
Fibre		✔
Micronutrients		
Sodium (milligrams)		✔
Vitamin A (uER)		✔
Calcium (milligrams)		✔
Phosphorus (milligrams)		✔
Other 1 (unit)		✔
Other 2 (unit)		✔

Source: Author.

2.3.3. Environmental effects

GHG emissions will be calculated, as mentioned above, using the UNFCCC*Greenhouse Gas Emissions Calculator | 2021 Emission Factors* tool. To facilitate subsequent scenario simulation exercises, emissions are calculated based on of a standard volume of 1,000 tonnes of each foodstuff involved. The input variables required in this tool differ according to the link analysed, as explained below:

- **Food transport:** emissions depend on the volumes and distances travelled between the places of production and consumption, as well as on the means of transport used. GHG emissions will be calculated for both incorporated and replaced exogenous (domestic and imported) Amazonian products.

- **Food storage:** Emissions from food storage depend mainly on the energy consumed in the storage infrastructure (electricity and/or stationary combustion sources, and the type of fuel used) and the coolant gases used in the cooling equipment. By agreement with WFP, for the sake of simplicity, it was decided to consider only emissions associated with energy, excluding those associated with coolant gases [10]. In this context, it should be noted that the energy expenditure will be assumed, again for the sake of simplicity, to be directly proportional to the stored volume.
- **Food waste:** GHG emissions from anaerobic decomposition of organic waste in landfills or dumps depend mainly on the type of waste and the volumes wasted. Emissions associated with this phenomenon will be calculated as a function of the estimated proportion of waste from each exogenous replaced food and Amazonian incorporated food.

It is essential to emphasise that greenhouse gas (GHG) emissions are estimated considering the life cycle of the food along the links defined in the analysis, regardless of which specific actor is the origin of these emissions. This means that both direct emissions - under the direct control of the organisation carrying out the exercise - and indirect emissions, which come from other actors associated with the programme under analysis, are included.

Against this background, given the above definitions, the basic information needed to calculate GHG emissions using the UNFCCC*Greenhouse Gas Emissions Calculator | 2021 Emission Factors* tool is provided in Table 6. The results obtained constitute the input variables for the ICLA Spreadsheet for the estimation of environmental effects, as shown in Tables A2.9 and A2.17 in Annex 2.

This information is collected from a range of sources. Firstly, to arrive at a broad understanding of the characteristics of the logistics associated with each food, it is recommended to conduct semi-structured interviews with qualified informants such as food suppliers, food procurement programme teams, transporters, teams responsible for storage, nutrition experts, among others. Quantitative information can then be gathered from secondary sources (studies, company energy cost sheets, etc.).

TABLE 6. INFORMATION REQUIRED TO ESTIMATE ENVIRONMENTAL EFFECTS.

NECESSARY INFORMATION	GHG EMISSIONS CALCULATIONS
Transport distances of each food (exogenous and Amazonian)	Transport-related
Type of means of transport used for each journey	
Electricity consumed by storage infrastructures	Associated with Storage
Fuel consumption (mobile combustion systems) of storage infrastructures and fuel type	
Type of waste and proportion of waste of each food (exogenous and Amazonian)	Associated with Food Waste

Source: Author.

10 The identification of the type and quantity of coolants used is a highly complex task due to the multiplicity and diversity of actors involved in this chain segment, as well as the significant variability between different production chains and countries. These actors include collectors, traders, agro-industries, producer organisations, international bodies such as the World Food Programme (WFP), and various public institutions, each with different practices, technologies and volumes of coolants managed.

2.4. Simulation of scenarios

2.4.1. Starting point: energy equivalence and volumes

Assuming that the impact indicators are proportional to the volumes of each food, the scenario simulation is based on the projection of the volumes in each scenario. Accordingly, the nutritional equivalence between Amazonian foods and exogenous foods is the starting point for defining appropriate conversion factors and applying them in the scenario simulation exercise and estimating the corresponding impacts. According to WFP nutritional experts, the equivalence between the two types of food should be based on calorie input. This means that the simulated scenarios must provide the same amount of energy (energy equivalence) as the current situation (baseline scenario). In other words, the scenario simulation is at constant energy relative to the baseline scenario, and the volumes of Amazonian food incorporated are automatically calculated based on energy equivalence factors, ensuring that calorie inputs are maintained, as illustrated in Table 7.

2.4.2. Incorporation of Amazonian foods

2.4.2.1. Proportion of incorporation

Scenario simulation is carried out by defining proportions of exogenous foods (%) to be replaced by Amazonian foods. These proportions apply to the volumes of Exogenous Food. It should be noted that foods can be incorporated and replaced in multiple combinations: the same exogenous food can be totally or partially replaced by one or more Amazonian foods, in the same way that the same Amazonian food can totally or partially substitute for one or more exogenous foods. Table 8 uses a fictitious example to illustrate a simulated scenario of Amazonian food incorporation.

TABLE 7. ENERGY EQUIVALENCE BETWEEN EXOGENOUS AND AMAZONIAN FOODS AND ASSOCIATED VOLUMES (ILLUSTRATIVE EXAMPLE).

EXOGENOUS FOOD (EC)		AMAZONIAN FOODS TO BE INCLUDED (AA)		EQUIVALENCE FACTOR X (1 TONNE OF AE = X TON OF AA).
NAME	ENERGY INPUT (KCAL/100 G)	NAME	ENERGY INPUT (KCAL/100 G)	
AE.1	500	AA.1	700	0.714
AE.2	200	AA.2	100	2.000
SA.3	100	AA.3	500	0.200
SA.4	300	AA.4	400	0.750

Source: Author.

TABLE 8. SCENARIO 1 SIMULATED. PROPORTION OF REPLACEMENT OF EXOGENOUS FOOD BY AMAZONIAN FOOD (ILLUSTRATIVE EXAMPLE).

EXOGENOUS FOOD (AE)			AMAZONIAN FOOD (AA)							
			UNPROCESSED			PROCESSED				
			AA.1	AA.2	AA.3	AA.4	AA.5	AA.6	AA.7	AA.8
Unprocessed	AE.1	70%	30%							
	AE.2	90%	10%							
	SA.3	70%		30%						
Unprocessed	SA.4	50%				25%	25%			
	AE.5	100%								
	AE.6	100%								
	AE.7	100%								
	AE.8	100%								

Source: Author.

2.4.2.2. Results in volumes

Based on the energy equivalencies and the defined incorporation percentages, the volumes of each food in the simulated scenario are calculated. Table 9 shows the results obtained following the same fictitious example as in the previous sections.

TABLE 9. AMAZONIAN FOOD AND EXOGENOUS FOOD VOLUMES IN SIMULATED SCENARIO 1 (ILLUSTRATIVE EXAMPLE).

EXOGENOUS FOOD (AE) (VOLUME IN TONNES)				AMAZONIAN FOOD (AA) (VOLUME IN TONNES)							
				UNPROCESSED			PROCESSED				
				AA.1	AA.2	AA.3	AA.4	AA.5	AA.6	AA.7	AA.8
Base Scenario			Simulated scenario								
Unprocessed	AE.1	1000	700	214.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	AE.2	1000	900	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SA.3	1000	700	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0
Processed	SA.4	1000	500	0.0	0.0	0.0	187.5	200.0	0.0	0.0	0.0
	AE.5	1000	1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	AE.6	1000	1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	AE.7	1000	1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	AE.8	1000	1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Author.

2.5. Impact analysis of simulated scenarios

The ICLA calculation tool outputs the value of each of the effect indicators in the baseline scenario (exogenous food) and in the simulated scenario (incorporation of Amazonian food). These results are presented for each food item on a consolidated basis, i.e. for the whole shopping basket under analysis.

The impact of incorporating Amazonian foods is expressed as the differential between the values of the indicators of the simulated scenario and those of the baseline scenario.

2.5.1. Analysis by food

In order to arrive at a comparative analysis of the impact of each of the foods in each scenario, the values of all indicators for each of the foods under analysis are made visible as intermediate results.

This makes it possible to visualise, in each scenario, the volumes, purchase values, surface area, number of farmers, income and employment associated with each of the foodstuffs. It should be noted that, given that the same Amazonian food can substitute for several exogenous foods and vice versa, the concept of differential between simulated and base scenario does not make sense at the food level, except when the substitution takes place binomially, i.e. a single Amazonian food replaces (totally or partially) a single Amazonian food.

2.5.2. Consolidated analysis

The consolidated results provide: i) the absolute values of all indicators in the baseline scenario and in the simulated scenario; ii) the differential in absolute value and in rate of change between the two scenarios.

The analysis of these results is used to assess the feasibility and desirability of the simulated scenarios in advance, thus allowing those that seem unfeasible to be discarded and those most relevant to be selected. The main criteria to be considered in this analysis are as follows:

- **Economic feasibility:** the differential in the value of local or total purchases [11] between the baseline and the simulated scenario is a key aspect for consideration. Amazonian and inclusive foods are generally more expensive due to factors such as lower primary and industrial yields, logistical difficulties of access and smaller scale of production. This means that, in many cases, the incorporation of Amazonian foods will lead to an increase in the total value of purchases. However, this extra cost can sometimes be offset by adjustments in the composition of the baskets, e.g. by reducing animal proteins. Beyond these measures, any increase in the value of purchases should be analysed in terms of the additional benefits they bring, such as employment generation and social inclusion, while ensuring that it remains within acceptable margins for food procurement programmes. These margins vary from programme to programme and from country to country, but they provide a benchmark that is a key consideration in simulation exercises.

11 Generally, exercises are carried out on local purchases, defined by the World Food Programme (WFP) as products purchased within the beneficiary country, regardless of whether or not they were produced in that country. This is justified on the premise that the economic impact of imported products in the beneficiary country is generally insignificant, so they are not initially included in the analysis. However, if the simulation scenarios consider the replacement of imported food, it will be convenient to work on total purchases, including both local and imported, to reflect more accurately the economic and productive effects.

- **Nutritional feasibility:** another key element to compare is the nutritional input of each scenario. The objective is to ensure that adequate levels of the most relevant macro- and micronutrients are maintained in the simulated scenario, based on the nutritional profile of the beneficiaries of the programme under analysis.
- **Productive feasibility:** the number of producers or collectors, and the area potentially involved are also key indicators in this analysis. On the one hand, they make it possible to measure the territorial impact of the incorporation of Amazonian foods, by quantifying both the number of producers or collectors who would participate as suppliers, and the associated land area. An increase in the universe of producers or collectors involved is a positive effect, as it means that more families will receive income from the sale of food to the analysed programme. Secondly, the projected coverage is a good indicator of the productive viability of the simulated scenario: if the number of producers or collectors and the required area exceed the existing potential, there is a risk that the simulated demand cannot be met and/or that the resources will overexploited.
- **Income:** the variation of income in the primary link (producers/collectors) between the baseline and the simulated scenario requires careful analysis. The decrease in total revenues at primary level in the simulated scenarios is not necessarily an adverse effect. This apparent contradiction is explained by two common characteristics of Amazonian value chains: i) complex structure and lower industrial performance than exogenous product chains; ii) power asymmetries: trade dynamics disproportionately favour downstream actors in the chain. These factors widen the gap between the price at origin (producer) and the final price of the processed product.

  Improving this situation, as will be detailed in the recommendations, involves dual strategies consisting of improving economic retribution at the primary stage and strengthening capacities for producers or collectors to take on the processing stages.

  In terms of average revenues and gross margins per producer or collector, in many simulated scenarios these indicators will be lower than in the baseline scenario. Although this could be interpreted as a negative effect, in reality it is not. The explanation is simple: Amazonian producers and collectors tend to operate on a smaller scale than those supplying exogenous food to food programmes. Therefore, although the income per household is usually lower, a larger number of producers benefit, reflecting a better distributional impact.
- **Jobs:** the total and unit generation of jobs, both by volume and value of food, is a valuable indicator for comparing scenarios. Simulated scenarios that show larger positive variations in these indicators with respect to the baseline scenario will be considered more attractive.
- **Carbon footprint:** it is important to include an analysis of environmental impact on the final stages of the chain, to avoid any substitution or change in the purchasing and distribution systems, e.g. an increase in fragmented transport or inefficient warehousing, causing an increase in the total carbon footprint of the projected purchases. This ensures that policies or strategies based on Amazonian food consumption not only contribute to local development and food sovereignty, but are also consistent with sustainability and climate change mitigation objectives. This precaution is vital for preserving the environmental advantage that characterises local products and for ensuring that simulations reflect real rather than optimistic impacts that may mask unintended effects on the ecological footprint.

In summary, it must be emphasized that the comparative analysis of the results of the scenario simulation should be conducted systemically, with simultaneous assessment of the set of indicators.

2.6. The ICLA spreadsheet at a glance

The ICLA Dynamic Workbook contains 13 worksheets that use the information entered to estimate the economic, nutritional and environmental effects of the incorporation of Amazonian foods in institutional food purchases.

These 13 worksheets are classified into four types: (a) data entry sheets (6 sheets); (b) summary sheet of observed effects (1 sheet); (c) effects by food display sheets (3 sheets); and (d) consolidated effects display sheets (3 sheets).

The following is a brief description of each of these types of worksheets.

a. **Data entry** - sheets i., ii., iii., iv., v. and vi.: these are sheets in which the user must enter the information required for the ICLA Spreadsheet to make the calculations. While primarily data entry sheets, these sheets also contain sections with formulas for intermediate calculations; these sections and their cells are locked and coloured with orange-yellow shading for recognition.

b. **Summary of effects** - sheet 1: the sheet that shows the main results of the indicators calculated in the economic, nutritional and environmental spheres, both in the baseline scenario and in the Amazonian food incorporation scenario, facilitating rapid display and allowing quick comparison for analysis of different scenarios. This sheet includes graphs of the indicators shown, making them even easier to understand. This sheet cannot be manipulated by the user and therefore all its cells are locked.

c. **Effects per food** - sheets 2.1, 3.1 and 4.1: these are the sheets that, once the information has been entered, automatically deliver the results of the effect indicators broken down by food, in the baseline scenario and in the incorporation scenario. Sheet 2.1 provides the economic results, sheet 3.1 the nutritional results and sheet 4.1 the environmental results. These sheets cannot be manipulated by the user and therefore all their cells are locked.

d. **Consolidated effects** - sheets 2.2, 3.2 and 4.2: these sheets provide the consolidated results of the indicators, i.e. with all the analysed foods included in the calculation according to the scenario - baseline or incorporation - providing the variation between the two, both in absolute and percentage values. Like the sheets of effect per food, all their cells are locked as they are not user-editable sheets.

To facilitate navigation through the ICLA Dynamic Workbook, the 13 worksheets have links in the top right-hand corner which, when clicked, automatically direct the user to the different sheets in the workbook.

To learn more about the ICLA Workbook and how it works, the tool is accompanied by a user manual that provides practical, user-friendly support on how to use the ICLA Workbook. The manual provides the necessary elements to understand the methodological structure, the variables and analysis models that allow the calculation of the indicators, as well as the presentation of the results.

3. Simulated scenarios and their impacts

3.1. Partner countries and general simulation criteria

In order to test the designed methodology and its calculation tool, work was carried out with two WFP national offices that expressed interest in collaborating with this process: Colombia and Bolivia. Each office selected a programme within which they proposed Amazonian foods to be incorporated and exogenous foods to be replaced; in the case of Colombia, proportions of incorporations were also defined. They also supported the collection of information necessary for the estimation of impacts.

By agreement with the WFP regional counterpart, it was decided to adapt the initial scenario proposals put forward by the National Offices of Colombia and Bolivia, without them losing their essential components, by making the following adjustments [12]:

- **Binomial" scenarios:** "binomial" scenarios are simulated, i.e. the incorporation of an Amazonian food as a substitute (total or partial) for an exogenous food, with the aim of being able to evaluate the behaviour of each food in isolation. This involves a change in relation to the proposal and initial exercises, where the simultaneous incorporation of two Amazonian foods as substitutes for two exogenous foods was proposed [13].
- **Standard volumes:** for each exogenous food, we work with "standard" purchase volumes (1,000 tonnes), thus obtaining indicators that are easily applicable to other situations, with a greater impact in terms of magnitude, and which prevent actors from interpreting these simulations as real modifications to be made to their programmes. This involves a change in relation to the initial exercises, where work was done with specific purchase volumes and values, associated with the specific programmes and territories selected.
- **Gradual sensitisation:** for each food binomial, different simulations are carried out with increasing proportions of incorporation (e.g. 5%, 10%, 20%, 50%, etc.), according to the results obtained.

It should be emphasised that the main objective in carrying out the simulation of "concrete" scenarios was to have a practical mechanism to validate the method and the template in the conceptualisation phase, following a "design by doing" approach. This approach allowed both the tool and the methodology to be adjusted and refined through direct application, rather than solely based on a static theory or design.

Accordingly, given the limited and exploratory scope of the study, the simulated scenarios were not previously subjected to a thorough analysis to ensure their strict compliance with the conditions and criteria set out in sections 1.2.3 and 2.5.2 of this report. Therefore, while these scenarios serve as functional tests and provide valuable information for the evolution of the method, they should not be considered to be definitive results or fully validated proposals.

12 For more details on the initially simulated scenarios, please refer to the Progress Report, Version 2 (May 20 2025) of this study.

13 Note that the ICLA workbook allows the simulation of "multinomial" scenarios for future exercises, i.e. the simultaneous incorporation of several Amazonian foods as substitutes for several exogenous foods.

3.2. Input variables and limitations

Information for the input variables was mainly collected from secondary sources, such as statistics and studies, supplemented to a lesser extent by interviews with qualified informants, as detailed in Annex 2. It should be noted that accessing the required information proved a complex process, requiring, in several cases, the use of approximate data and the formulation of assumptions. This situation is explained by several factors: i) the selected foods do not always have chain studies or specific quantitative data; ii) WFP does not maintain contact with food suppliers that are not part of its regular purchases, which is aggravated by the fact that WFP in Bolivia does not purchase food and, in Colombia, the suppliers contacted responded only partially to consultations; iii) the main focus of the study was methodological design, which meant limited scope for the analysis of specific cases and the collection of specific information. The results presented below should therefore be interpreted as rough estimates, subject to improvement as information on certain input variables becomes more precise.

3.3. Colombia: incorporation of bitter cassava flour and chontaduro flour

3.3.1. Overview

The WFP National Office in Colombia proposed to carry out a simulation exercise on the incorporation of Amazonian foods, taking the following concrete case:

- **Programme:** WFP Emergency Programme [14].
- **Population and territories:** population located in Amazonian territories (departments of Amazonas, Caquetá and Putumayo).
- **Selected foods:** incorporate bitter cassava flour and chontaduro flour to replace corn and rice flour.
    - Bitter cassava is a traditional tuber cultivated by indigenous communities, with a long cycle (8 to 12 months). It is assumed that 80% of the production comes from small-scale producers.
    - The chontaduro is an edible fruit of a palm tree, usually cultivated, a very nutritious food with a high protein and micronutrient content. It is assumed that 90% of the production comes from small-scale producers.
    -

14 It was decided to simulate scenarios as part of the WFP emergency programme, given the restrictions on the availability of information on the school feeding programme in Colombia. However, as pointed out by the emergency programme manager and the regional nutrition expert, the incorporation of Amazonian food into emergency programmes is not necessarily feasible because: i) emergency programmes must follow pre-established dietary patterns; ii) the demand for food is not predictable in advance and is of an emergency nature; iii) the availability of Amazonian food is limited and difficult to access; iv) the acceptability of Amazonian food to non-Amazonian populations may be low.

- A significant proportion of corn for processing into flour is imported (38%), and it is assumed that domestic production purchased by WFP comes mainly from medium and large producers.
- A small proportion of rice is imported (7%), and it is assumed that domestic production procured by WFP comes mainly from medium and large producers.

3.3.2. Simulated scenarios

Eight scenarios were simulated, four with the incorporation of bitter cassava flour replacing corn or rice flour, and four with the incorporation of chontaduro flour replacing corn or rice flour, as shown in Table 10.

TABLE 10. SIMULATED SCENARIOS IN COLOMBIA.

SCENARIOS	INCORPORATION OF BITTER CASSAVA FLOUR IN PLACE OF:		INCORPORATION OF CHONTADURO FLOUR IN PLACE OF:	
	CORN FLOUR	RICE	CORN FLOUR	RICE
Scenario 1	20%			
Scenario 2	50%			
Scenario 3		20%		
Scenario 4		50%		
Scenario 5			5%	
Scenario 6			20%	
Scenario 7				5%
Scenario 8				20%

Source: Author.

3.3.3. Results and comparative analysis of the scenarios

The analysis takes place in two stages. First, scenarios whose implementation is not feasible are identified. Subsequently, among the scenarios considered feasible, those that could generate the greatest impact are selected, and their effects on the different dimensions are described. The behaviour of the 44 effect indicators for each of the eight simulated scenarios is presented in Annex 3.

3.3.3.1. Unfeasible scenarios

In general terms, scenarios with a substantial increase in food procurement costs and/or a significant reduction in nutritional input are considered unfeasible. As shown in Table 11 (next page), four of the eight simulated scenarios meet these criteria:

- **The two scenarios with the incorporation of bitter cassava flour replacing 50% of the exogenous food (Scenarios 2 and 4):** the increase in the value of food purchases might be acceptable (11% with rice, 21% with corn), but the 40% reduction in protein input is critical and compromises the nutritional balance.
- **The two scenarios with the incorporation of chontaduro flour replacing 20% of the exogenous food (Scenarios 6 and 8):** the food purchase cost doubles (88% with rice, 105% with corn flour). While protein input remains at similar levels, the rising cost of purchase is incompatible with institutional budgets and makes it operationally unfeasible.

All four alternatives have structural disadvantages: the first two because of their nutritional inadequacy and the last two because of their budgetary impact. These four scenarios should therefore be discarded as practical options for implementation.

TABLE 11. UNFEASIBLE SCENARIOS.

SCENARIOS	RATE OF CHANGE BETWEEN SIMULATED AND BASELINE SCENARIO *(BASED ON 1,000 MT OF EXOGENOUS FOOD)*	
	INDICATOR 3. VALUE OF LOCAL FOOD PURCHASES	INDICATOR N2. PROTEIN INPUT
Scenario 2. 50% bitter cassava flour as a substitute for corn flour	+ 21%	- 40%
Scenario 4. 50% Bitter Cassava Flour to replace Rice	+ 11%	- 37%
Scenario 6. 20% of chontaduro flour in place of corn flour	+ 105%	- 6%
Scenario 8. 20% of chontaduro flour in place of rice	+ 88%	- 2%

Source: Author.

3.3.3.2. Scenarios with the greatest impact

When analysing the other 4 scenarios, two stand out as having relatively balanced positive effects in all three dimensions (economic, nutritional and environmental). In both cases, 20% of corn flour is replaced by bitter cassava flour (scenario 1) and 5% by chontaduro flour (scenario 5). As can be seen in Table 12, in general terms, scenario 1 has more conservative economic effects than scenario 5, the nutritional effects of scenario 1 are rather negative while scenario 5 maintains similar nutritional inputs to the base scenario; however, in terms of environmental effects, scenario 1 shows a greater reduction of the Carbon Footprint than scenario 5.

TABLE 12. EFFECTS OF THE TWO HIGHEST IMPACT SCENARIOS.

	SCENARIO 1. INCORPORATION OF BITTER CASSAVA FLOUR REPLACING 20% OF CORN FLOUR		SCENARIO 5. INCORPORATION OF CHONTADURO FLOUR TO REPLACE 5% CORN FLOUR	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes)	14.1	1.4%	0.7	0.1%
Indicator 1.1. Volume of Local Products purchased (tonnes)	90.1	15%	19.7	3%
Indicator 1.2. Volume of purchased Inclusive Local Products (tonnes)	171.3		45.6	
Indicator 1.3. Volume of Amazonian Products purchased (tonnes)	214		51	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%)	8%		2%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases (%)	17%		5%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%)	21%		5%	
Indicator 3. Value of Local Food Purchases (USD)	62,245	8%	195.307	26%
Indicator 3.1. Value of Local Products purchased (USD)	118,561	26%	209,386	46%

	SCENARIO 1. INCORPORATION OF BITTER CASSAVA FLOUR REPLACING 20% OF CORN FLOUR		SCENARIO 5. INCORPORATION OF CHONTADURO FLOUR TO REPLACE 5% CORN FLOUR	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)
Indicator 3.2. Value of Inclusive Local Products Purchased (USD)	168,356		209,122	
Indicator 3.3. Value of Amazonian Products Purchased (USD)	210,445		232,357	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%)	10%		9%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%)	21%		22	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Local Purchase Value (%)	26%		25%	
Indicator 5. Surface Area of Local Products purchased (hectares)	-11.87	-7%	42.06	24%
Indicator 5.1. Surface Area of Amazon Products purchased (hectares)	23		51	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase (hectares)	-14.1	-8%	41.9	24%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase (hectares)	32.8	-14%	-3.6	-2%
Indicator 8. Number of Local Farmer suppliers:	2.12	37%	6.95	121%
Indicator 8.1. Number of Amazonian Producer suppliers	3.27		7.24	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase	2.0	35%	6.9	121%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase	2.0	26%	6	75%

	SCENARIO 1. INCORPORATION OF BITTER CASSAVA FLOUR REPLACING 20% OF CORN FLOUR		SCENARIO 5. INCORPORATION OF CHONTADURO FLOUR TO REPLACE 5% CORN FLOUR	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)
Indicator 11. Total Gross Revenue per Sale (USD)	-1,746	-1%	111,212	42%
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD)	50,954		124,387	
Indicator 12. Average Income per Farmer per Sale (USD):	-12,614	-27%	-16,376	-36%
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD)	15,577		17,185	
Indicator 13. Average Gross Margin per Farmer per Sale (USD)	-3.650	-24%	-1.667	-11%
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD)	6,418		12,270	
Indicator 14. Number of Jobs Generated by the Agriculture and Agro-industry Sector (full-time equivalent worker)	4.1	14%	9.2	31%
Indicator 14.1. Number of Jobs Generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker)	10.0		10.6	
Indicator 15: Unit Employment per Local Purchase Volume (number of full time equivalent workers per 1,000 tonnes of Local Purchase)	3.7	12%	9.1	31%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	2.1	5%	1.5	4%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%

	SCENARIO 1. INCORPORATION OF BITTER CASSAVA FLOUR REPLACING 20% OF CORN FLOUR		SCENARIO 5. INCORPORATION OF CHONTADURO FLOUR TO REPLACE 5% CORN FLOUR	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	20%		5%	
Indicator N2. Protein input (grams):	-14,560,563	-16.0%	-1,307,333	-1.4%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein)	5%		4%	
Indicator N3. Fat input (grams):	-6,971,831	-18.8%	-1,546,000	-4.2%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fat):	1%		1%	
Indicator N4. Available carbohydrate input (grams):	31,830,986	5%	7,181,333	1%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	24%		6%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-17.0	-12%	-4.5	-3%
Indicator A1.1. Total GHG emissions from Amazonian foods (percentage of total emissions):	8.7%		1.8%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-18.7	-14%	-4.6	-3%
Indicator A2.1. Carbon footprint of Amazonian foods (kilos of CO2eq/tonne of food):	49.2		46.7	

Source: Author

Key: XY : positive impact
XY : negative impact

(*) In the baseline scenario, the value of all inclusive indicators is zero as it is assumed that the corn for flour purchased by WFP comes mainly from medium and large producers. The value of all Amazonian indicators is also zero as it does not incorporate Amazonian foods.

The effects in each scenario are detailed below; note that the calculations have been made on the basis of 1,000 tonnes of corn flour[15].

- **Effects of Scenario 1. Incorporation of bitter cassava flour replacing 20% corn flour:**
    - **Local, inclusive and Amazonian purchases:** the increase in the value of local purchases is relatively modest (+8%), and enhances the inclusive and Amazonian nature of local purchases: the proportion of inclusive purchases in relation to local purchases rises from 0% to 21% and Amazonian purchases from 0% to 26%.
    - **Coverage:** the number of supplying producers increases significantly (+37% in total and +26% per USD 1 million of purchases), but the surface area decreases, which is explained by the superior performance of cassava compared to corn.
    - **Income:** the total gross income (that remains with the producer) is similar in the baseline and simulated scenarios. This means that the delta of the value of purchases in the simulated scenario remains in the other links of the chain. Income and gross margin per producer decrease (- 27% and - 24% respectively), but as explained above, this decrease is due to the smaller size of the Amazonian producers and is offset by the greater number involved. The average annual income per Amazonian producer is 0 in the baseline scenario and increases to USD 15.7 thousand in the simulated scenario.
    - **Jobs:** total jobs increases by 14% and unit jobs (per USD 1 million of local purchases) increase by 5%.
    - **Nutritional input:** protein decreases by 16% and fat by 18.8%; available carbohydrate inputs increase by 5%.
    - **Carbon footprint:** the footprint is reduced by 14%, because a significant proportion of the replaced corn is imported.

- **Effects Scenario 5. Incorporation of chontaduro flour to replace 5% of corn flour:**
    - **Local, inclusive and Amazonian purchases:** the increase in the value of local purchases is significant (+26%), but enhances the inclusive and Amazonian character of local purchases: the proportion in value of inclusive purchases in relation to local purchases increases from 0% to 22% and Amazonian purchases from 0% to 25%.
    - **Coverage:** the number of supplying producers increases very significantly (+121% in total and +75% per USD 1 million of purchases) and the surface area also increases by 24%.
    - **Income:** total gross income (remaining with the producer) increases very positively, by 42%. It is of note that 57% of the increase in the value of local purchases remains in the primary link. Similarly and for the same reason as in the previous scenario, income and gross margin per producer decrease (-36% and -11% respectively), but as explained above, the decrease is due to the smaller size of the Amazonian producers and is offset by the larger number involved. The average annual income per Amazonian producer is 0 in the baseline scenario and increases to USD 17.2 thousand in the simulated scenario.

15 As a reference, the WFP office in Colombia purchased an annual average of 759 tonnes of corn flour and 2,854 tonnes of rice in the last five years.

- **Jobs:** total jobs increase by 31% and unit jobs (per USD 1 million of local purchases) increase by 4%.
- **Nutritional inputs:** the nutritional inputs are quite similar between the two scenarios. Protein decreases slightly by 1.4% and fat by 4.2% and available carbohydrate inputs increase by 1%.
- **Carbon footprint:** reduces by only 3%, due to the low volume of incorporation of chontaduro flour as a replacement for corn flour. Recall that a considerable proportion of corn for flour comes from imports.

3.3.4. Conclusions

It is evident that the replacement of rice by cassava flour or chontaduro flour is not very convenient. Likewise, the incorporation of cassava flour generates discrete and negative economic effects from a nutritional perspective and, therefore, although it means a significant reduction of the Carbon Footprint, the incorporation of cassava flour does not appear to be very attractive.

The incorporation of chontaduro flour - even in small quantities - shows significant impacts at the level of coverage, producer income and employment, thus maintaining very reasonable nutritional inputs and generating a reduction in the Carbon Footprint. In this context, as long as it is verified that the level of acceptability of chontaduro flour is reasonable, it is recommended that new simulation exercises be developed, with incorporation of chontaduro flour with other Amazonian foods.

The incorporation of chontaduro flour to replace 5% of corn flour entails an increase of 26% in the value of local purchases, but this increase enhances the inclusive character of the purchases: the number of small producers/suppliers increases by 121% and the gross income at primary level increases by 42%, generating an average annual income per Amazonian family of USD 17.2 thousand. The number of jobs increases by 31%. Nutritional inputs are similar to those of the baseline scenario and the Carbon Footprint is reduced by 3%.

Given the above and based on an analysis of the incorporation of 100 tonnes of chontaduro flour, we can add to the above message with the following approach:

The incorporation of chontaduro flour to replace corn flour enhances the inclusive nature of the purchases: every 100 tonnes of product generates 21 direct jobs and involves 14 families of small Amazonian producers with an average annual income per family of USD 17.2 thousand. Gross income at the primary link level increases by 83%, and the number of jobs increases by 62%. Nutritional inputs are similar to those of the baseline scenario and the Carbon Footprint is reduced by 6.6%.

Note that buying 100 tonnes of chontaduro flour instead of corn flour increases the total budget by USD 385.5 thousand. However, this additional cost brings redistributive benefits: each additional USD 1 involves an increase of USD 1.07 in inclusive purchases and USD 1.19 in Amazonian purchases.

3.4. Bolivia: simulated scenarios and their impacts

3.4.1. Overview

WFP does not purchase food in Bolivia, but focuses one of its lines of action on advising the government about its public food procurement programmes, in particular the Complementary School Feeding (ACE) programme.

Hence, given that the ACE is promoting initiatives to incorporate Amazonian foods in certain territories, the WFP National Office in Bolivia proposed to carry out the simulation exercise, taking the following concrete case:

- **Programme:** Complementary School Feeding Programme (ACE).
- **Population and territories:** schools located in the municipalities of Porvenir and Cobija in the department of Pando.
- **Foods and scenarios:** incorporate Brazil nut flour to replace oat flour and acai juice to replace apple juice.
    - The Brazil nut comes from a native Amazonian tree and is fruit for collection. 98% of the country's total production is destined for export; the country is the leading world producer and exporter of shelled Brazil nuts, with figures in recent years ranging from USD 125 to 218 million in value and 13 to 25 thousand tonnes in volume. The fruit is mainly collected by small-scale pickers and their families.
    - Açaí is a fruit for collection that is picked from a native Amazonian palm tree. It is considered a superfood, an excellent energiser with high nutritional input and a noteworthy amount of proteins, carbohydrates and lipids. Small quantities are exported, mainly as freeze-dried products (USD 495,000 to 750,000 per year with volumes ranging from 17 to 26 tonnes). It is estimated that demand for acaí in the Bolivian domestic market varies between 106.3 thousand and 460 thousand tonnes of pulp (CIPCA-NA; 2019). The fruit is mainly collected by small-scale pickers and their families.
    - Production of oats for human consumption is low in Bolivia. It is estimated that 70% of the raw material for flour production is imported. The remaining 30% comes from small domestic producers.
    - Domestic apple production is very limited and destined for consumption of fresh fruit or premium juices. It is estimated that 100% of the juice concentrate used in food programmes is imported.

3.4.2. Simulated scenarios

Five scenarios were simulated, two with the incorporation of Brazil nut flour replacing oat flour and three with the incorporation of acai pulp replacing apple juice concentrate, as shown in Table 13 (next page).

TABLE 13. SIMULATED SCENARIOS IN BOLIVIA.

	INCORPORATION OF BRAZIL NUT FLOUR TO REPLACE OAT FLOUR:	INCORPORATION OF AÇAÍ PULP TO REPLACE OF APPLE JUICE CONCENTRATE:
Scenario 1	5%	
Scenario 2	20%	
Scenario 3		5%
Scenario 4		10%
Scenario 5		20%

Source: Author.

3.4.3. Results and comparative analysis of the scenarios

Following the same scheme as in Colombia, the analysis was in two stages. First, scenarios whose implementation is not feasible are identified. Subsequently, among the scenarios considered feasible, those that could generate the greatest impact are selected, and their effects on the different dimensions are described. Annex 3 presents the behaviour of the 44 effect indicators for each of the five simulated scenarios in Bolivia.

3.4.3.1. Unfeasible scenarios

In general terms, scenarios with a substantial increase in food procurement costs and/or a significant reduction in nutritional input are considered unfeasible. Of the five scenarios analysed, only one meets these criteria: the scenario that incorporates Brazil nut flour to replace 20% of oat flour (scenario 2), where the value of local purchases increases by 69% compared to the baseline scenario, making it incompatible with institutional budgets. Nutritionally and environmentally, all five scenarios have positive or very positive effects.

3.4.3.2. Higher impact scenarios

When analysing the other 4 scenarios, two stand out as having relatively balanced positive effects in all three dimensions (economic, nutritional and environmental). This involves replacing 5% of the oat flour with Brazil Nut flour (scenario 1) and 10% of the apple juice concentrate with acai pulp (scenario 4) [16].

Table 14 shows that both scenarios present very positive economic effects. Scenario 4 (acai) presents much more attractive nutritional and environmental effects than scenario 1 (Brazil nut), showing superior nutritional inputs and a greater reduction of the Carbon Footprint.

16 These two scenarios are not mutually exclusive and can, of course, be simulated together. In this exercise, the results are presented separately in order to be able to assess the effects of each addition in isolation.

TABLE 14. EFFECTS OF THE TWO HIGHEST IMPACT SCENARIOS.

	SCENARIO 1. INCORPORATION OF BRAZIL NUT FLOUR TO REPLACE 5% OAT FLOUR		SCENARIO 4. INCORPORATION OF AÇAÍ PULP REPLACING 10% OF APPLE JUICE CONCENTRATE	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)(**)	RATE OF CHANGE (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes)	2.9	0.3%	22.7	2.3%
Indicator 1.1. Volume of Local Products purchased (tonnes)	37.9	13%	122.7	
Indicator 1.2. Volume of purchased Inclusive Local Products (tonnes)	37.9	13%	122.7	
Indicator 1.3. Volume of Amazonian Products purchased (tonnes)	53		122.7	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%)	4%		12%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases (%)	4%		12%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%)	5%		12%	
Indicator 3. Value of Local Food Purchases (USD):	207,805	17%	173,634	11%
Indicator 3.1. Value of Local Products purchased (USD)	249,770	69%	337,554	
Indicator 3.2. Value of Inclusive Local Products Purchased (USD)	249,770	69%	337,554	
Indicator 3.3. Value of Amazonian Products Purchased (USD)	267,755		337,554	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%)	13%		19%	

	SCENARIO 1. INCORPORATION OF BRAZIL NUT FLOUR TO REPLACE 5% OAT FLOUR		SCENARIO 4. INCORPORATION OF AÇAÍ PULP REPLACING 10% OF APPLE JUICE CONCENTRATE	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)(**)	RATE OF CHANGE (%)
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%)	13%		19%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Local Purchase Value (%)	19%		19%	
Indicator 5. Surface Area of Local Products purchased (hectares)	2,457	688%	1,474	
Indicator 5.1. Surface Area of Amazon Products purchased (hectares)	2,474		1,474	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase (hectares)	2,449	686%	1,442	
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase (hectares)	1,702	571%	813	
Indicator 8. Number of Local Farmer suppliers	29.42	41%	16.8	
Indicator 8.1. Number of Amazonian Producer suppliers	32.99		16.8	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase	29.1	41%	16.5	
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase	12	20%	9	
Indicator 11. Total Gross Revenue per Sale (USD)	186,627	82%	106,897	
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD)	197,952		106,897	
Indicator 12. Average Income per Farmer per Sale (USD):	925	29%	6,329	

	SCENARIO 1. INCORPORATION OF BRAZIL NUT FLOUR TO REPLACE 5% OAT FLOUR		SCENARIO 4. INCORPORATION OF AÇAÍ PULP REPLACING 10% OF APPLE JUICE CONCENTRATE	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)(**)	RATE OF CHANGE (%)
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD)	6,000		6,329	
Indicator 13. Average Gross Margin per Farmer per Sale (USD)	1,374	97%	5,671	
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD)	5,610		5,671	
Indicator 14. Number of Jobs Generated by the Agriculture and Agro-industry Sector (full-time equivalent worker)	31.5	59%	50.0	
Indicator 14.1. Number of Jobs Generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker)	34.1		50.0	
Indicator 15. Unit Employment per Local Purchase Volume (number of full time equivalent workers per 1,000 tonnes of Local Purchase)	31.2	58%	48.9	
Indicator 16. Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase)	15.8	35%	27.6	
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal)	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy)	5%		10%	
Indicator N2. Protein input (grams)	15,333,967	9.1%	37,251,502	465.6%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein)	13%		84%	
Indicator N3. Fat input (grams)	3,685,190	5.3%	14,729,614	

	SCENARIO 1. INCORPORATION OF BRAZIL NUT FLOUR TO REPLACE 5% OAT FLOUR		SCENARIO 4. INCORPORATION OF AÇAÍ PULP REPLACING 10% OF APPLE JUICE CONCENTRATE	
	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)	RATE OF CHANGE (%)	DIFFERENTIAL BETWEEN SIMULATED AND BASELINE SCENARIOS (*)(**)	RATE OF CHANGE (%)
Indicator N3.1. Fat input of Amazonian foods (percentage of total fats)	10%		100%	
Indicator N4. Available carbohydrate inputs (grams):	29,767,391	-4%	6,776,395	-1%
Indicator N4.1. Available carbohydrate inputs of Amazonian foods (percentage of total available carbohydrates)	1%		9%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG Emissions (tonnes of CO2eq)	-25.8	-5%	-74.5	-10%
Indicator A1.1. Total GHG emissions from Amazonian foods (percentage of total emissions)	0.1%		0.3%	
Indicator A2. Carbon footprint (kilos CO2eq/tonne of food)	-27.2	-5%	-89.8	-12%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food)	14.3		14.3	

Source: Author.

Key: XY : positive impact
XY : negative impact

(*) In the baseline scenario, all Amazon indicators have a value of zero, since the baseline does not incorporate Amazonian food.

(**) In the baseline scenario, the value of all local, inclusive and Amazonian indicators is zero since it is assumed that the apple juice purchased by the school feeding programme is imported in its entirety.

The effects in each scenario are detailed below. Note that the calculations have been made based on 1,000 tonnes of each exogenous food.

- **Effects of Scenario 1. Incorporation of Braz nut flour to replace 5% oat flour:**
  - **Local, inclusive and Amazonian purchases:** the increase in the value of local purchases is relatively significant (+17%), but enhances the inclusive and Amazonian character of local purchases: the proportion in value of inclusive purchases in relation to local purchases rises from 0% to 13% and Amazonian purchases from 0% to 19%.
  - **Coverage:** the number of supplying producers increases significantly (+ 41% in total and + 20% per USD 1 million of local purchases). The area increases enormously (+ 688%) but this jump is not significant, as it compares a cultivated food (oats) with a collected food (Brazil nut).
  - **Income:** the total gross income (remaining with producers and collectors) is much higher in the simulated scenario, with an increase of 82%. This is very important because it shows that most of the increase in the value of local purchases (90%) remains at the primary level. Revenue and gross margin per producer also increase very significantly (+ 29% and + 97% respectively). The average annual income per Amazonian producer is 0 in the baseline scenario and increases to USD 6.000 thousand in the simulated scenario.
  - **Jobs:** total jobs increase by 59% and unit jobs (per USD 1 million of local purchases) increase by 35%.
  - **Nutritional inputs:** proteins increase by 9%, fats by 5% and available carbohydrates decrease by 4%.
  - **Carbon footprint:** the carbon footprint is reduced by 5%, because although a significant proportion of the oats replaced are imported, the total replacement percentage is relatively low at only 5% of total consumption. This means that the positive environmental impact generated by the reduction of emissions associated with the import of that food is limited by the modest scale of the substitution implemented.

- **Effects of Scenario 4. Incorporation of acai pulp replacing 10% of apple juice concentrate.**

  All the economic effects of this scenario are a net benefit, as the baseline scenario has almost no effect on the domestic economy because of imported products. Likewise, the results cannot be expressed as a rate of change as the economic indicators of the baseline scenario have a value of 0. Although the scenario simulating 20% replacement of apple juice concentrate (scenario 5) shows better economic effects than the scenario with 10% replacement, the required surface area of acaí is high (almost 3,000 ha), which is why a slightly less ambitious scenario has been selected.

  - **Local, inclusive and Amazonian purchases:** the increase in the value of local purchases is reasonable (+11%), and enhances the inclusive and Amazonian character of local purchases: the proportion in value of inclusive and Amazonian purchases in relation to local purchases increases, in both cases, from 0% to 19%.
  - **Coverage:** for every USD 1 million of local purchases, the surface area and number of local collectors involved in sourcing increases significantly from 0 to 813 ha and from 0 to 9 collectors in the simulated scenario.

- **Revenue:** the total gross revenue (remaining at the collector level) amounts to USD 106.9 thousand, which represents 62% of the increase in the value of local purchases in the simulated scenario. The average annual income per Amazonian producer is 0 in the baseline scenario and increases to USD 6,330 in the simulated scenario.
- **Jobs:** the total of jobs generated in the simulated scenario is 50 and the unit jobs (per USD 1 million of local purchases) amount to 27.6.
- **Nutritional input:** as expected, the protein input increases very significantly (+ 466%) and the available carbohydrate input decreases by 1%.
- **Carbon Footprint:** shows a significant reduction of 12%, resulting from the partial replacement of an imported product (apple juice) by a local product.

3.4.4. Conclusions

It is evident that the incorporation of both Amazonian products (Brazil nut and acai pulp) have very positive effects in the three dimensions analysed: economic, nutritional and environmental. This supports existing initiatives to incorporate these products into the school feeding programme. The only counterfactual to be considered is the increased value of purchases, which is why a fair balance must be struck between the increased cost of the diet and the local development and nutritional benefits. In this context, it is recommended that new simulation exercises be developed, simultaneously incorporating Brazil nut flour and acai pulp.

The incorporation of Brazil nut flour to replace 5% of oat flour triggers a 17% increase in the value of local purchases, but this increase enhances the inclusive character of the purchases: the number of supplier collectors increases by 41% and the gross income at the primary link level increases by 82%, generating an average annual income per Amazonian family of USD 6,000. The number of jobs increases by 59%. Protein input increases by 9% and carbon footprint is reduced by 5%.

The incorporation of acai pulp to replace 10% of apple juice concentrate entails an 11% increase in the value of local purchases, but this increase strengthens the inclusive character of the purchases: Amazonian families involved in the sale of acai receive an average annual income of USD 6.3 thousand and 506 additional jobs are generated in the territory. Protein input increases by 466% and Carbon Footprint is reduced by 12%.

Given the above and based on an analysis of the incorporation of 100 tonnes of Brazil nut flour and 100 tonnes of acai pulp, we can add to the above messages with the following statements:

The incorporation of Brazil nut flour to replace oat flour strengthens the inclusive nature of the purchases: every 100 tonnes of product incorporated generates 65 direct jobs and involves 62 families of small Amazonian producers with an average annual income per family of USD 6,000. Gross income at the primary link level increases by 156%, and the number of jobs increases by 111%. Protein input increases by 17% and carbon footprint is reduced by 9.7%.

Note that buying 100 tonnes of Brazil nut flour instead of oat flour increases the total budget by USD 393.2 thousand. However, this additional cost brings redistributive benefits: each additional USD 1 entails an increase of USD 1.20 in inclusive purchases and USD 1.29 in Amazonian purchases.

The incorporation of acai pulp to replace apple juice concentrate strengthens the inclusive nature of the purchases: every 100 tonnes of product incorporated generates 41 additional jobs in the territory and involves 14 small Amazonian producer families with an average income of USD 6.3 thousand. Protein input increases by 380% and Carbon Footprint is reduced by 9.6%.

It is important to note that buying 100 tons of acai pulp as a replacement for apple concentrate increases the total budget by USD 141.5 thousand. However, this additional cost brings redistributive benefits: each additional USD 1 entails an increase of USD 1.94 in inclusive and Amazonian purchases.

4. Final considerations and reflections

4.1. The simulated scenarios

- **The heterogeneity of the impacts obtained:** the first point to highlight is that the estimated impacts are highly heterogeneous according to the types and proportions of Amazonian foods incorporated. This confirms the usefulness of scenario simulation as a decision support tool.
- **The achievement of positive impacts:** the second point is that the incorporation of foods can indeed have significant positive impacts on income distribution with producers and collectors, and on employment generation.
- **Budgetary feasibility of the simulated scenarios:** Amazonian food is generally more expensive than exogenous food. The well-known trade-off between the higher cost of inclusive/amazon food and the social objective of delivering food to the greatest number of beneficiaries remains a challenge that can be addressed through different, non-exclusive mechanisms:
    - Incentives for inclusion, which means accepting paying a higher price for Amazonian food, based on its positive impacts on local development and the environment.
    - Reducing unit costs of Amazonian food by supporting production and collection, and processing and logistics.
    - Replacement of animal proteins with vegetable proteins from high-protein Amazonian foods.
    - Participation of producers and collectors in the Amazonian food processing links, through capacity building and incentives for investment in producer and collector associations.
- **The productive feasibility of the simulated scenarios:** Although the economic impact results obtained are very encouraging in terms of local development (job creation, greater inclusion, higher income for small-scale Amazonian collectors and producers), at least two elements need to be considered in the implementation of strategies for incorporating Amazonian foods:
    - **The conditions of the employment generated:** working conditions in the collection of Amazonian products such as Brazil nuts and açaí are extremely demanding and sometimes precarious: serious accidents, such as coconuts falling from heights of over 40 metres, bites from poisonous snakes and tropical diseases such as dengue and malaria, physically strenuous and dangerous work, lack of infrastructure and basic services in the collection areas, such as electricity, drinking water and telecommunications, etc. [17]

17 See Quiroz Claros. G. 2016. Castaña, condiciones laborales y medio ambiente: propuestas de incidencia pública desde el sector zafrero de la Amazonía boliviana / Quiroz Claros, G., V.A. Vos, L.A. Moreno Arze, and E.F. Cárdenas Benítez -- Santa Cruz: Centro de Investigación y Promoción del Campesinado. Available here.

- **The risk of overexploitation of the Amazon forest: The** risk of overexploitation of the Amazon forest for Brazil nut and acai collection is a growing concern, as the high international demand for these products is generating significant environmental impacts in the region and can lead to degradation of the Amazon forest, loss of biodiversity and decreased productive capacity in the long term. A possible increase in domestic demand to supply public food procurement programmes could aggravate this trend.

- **Reduction in carbon footprint:** it is relevant that, in all simulated scenarios, a reduction in carbon footprint is observed, with reductions ranging from 3% to 14%. This outcome confirms the significant contribution of the local character of Amazonian products to lower greenhouse gas (GHG) emissions linked to transport, as distances travelled are shortened and access to local markets is facilitated. However, in the case of storage, the situation presents certain challenges. Considering that access to electricity in Amazonian areas is often limited and must often be supplied by the use of fossil fuels, the carbon footprint generated by this item would tend to be slightly higher than in urban settings with consolidated electricity infrastructure. Regarding waste management, it is important to note that current estimates need to be refined, as there is a lack of specific studies on the acceptability and consumption of Amazonian products. Further research in this area will make it possible for more accurate data to be obtained and projections of the environmental impact of these production systems to be more rigorously adjusted.

- **The nutritional feasibility of the simulated scenarios:** bitter cassava, although a good source of energy, mainly due to its high carbohydrate content, its protein input is limited and is insufficient for daily protein requirements on its own. This means that its incorporation must be supplemented by another food. Chontaduro, meanwhile, could have acceptability problems outside the regions where it is traditionally consumed. Both Brazil nuts and acai are widely recognised for their nutritional input.

- **The scope of the simulated scenarios:** it should be emphasised that the main objective of the simulation of "concrete" scenarios was to have a practical mechanism to validate the method and template in the conceptualisation phase, based on a "design by doing" approach. This approach allowed both the tool and the methodology to be adjusted and refined through direct application, rather than solely based on a static theory or design. Accordingly, given the limited and exploratory scope of the study, the simulated scenarios were not previously subjected to a thorough analysis to ensure their strict compliance with the conditions and criteria set out in the report. Therefore, while these scenarios serve as functional tests and provide valuable information for the evolution of the method, they should not be considered to be definitive results or fully validated proposals. This distinction is relevant for understanding the limitations of the study and the need for additional, more rigorous analysis at later stages, before applying the simulations for decision-making or policy formulation. In summary, the design and implementation of these early scenarios are part of a pilot phase that favours learning and iteration in order to strengthen the accuracy, relevance and robustness of the analytical tool on which the study is based.

4.2. The methodology

- **Utility:** the methodology designed is a valuable for anticipating the possible effects of the incorporation of Amazonian foods. Based on the simulation of different scenarios, their feasibility and relevance can be assessed ex ante, simultaneously considering economic, nutritional and environmental dimensions. This can then be used to make informed decisions.

  It can be applied to the incorporation of any type of food that has a certain specificity (Andean, indigenous, agro-ecological, local, etc.).

- **Practicality:** the calculation tool (ICLA spreadsheet) performs automatic calculations to facilitate the simulation and subsequent comparison of several simulation scenarios.

- **Versatility:** the ICLA spreadsheet is used to simulate scenarios with the incorporation of up to eight Amazonian foods versus the same number of exogenous foods, in all possible combinations (1 to 1, 1 to 2, 2 to 1, etc.). This versatility opens up the possibility of simulating a wide range of successive scenarios.

- **Improvement:** the collection of information on input variables is the most effort-intensive step, particularly when dealing with foods with low availability of information from secondary sources. In this context, it is important to note that simulation exercises can be conducted in different stages: working first with assumptions and approximate values that provide orders of magnitude to identify the most feasible scenarios, and, once this first selection has been made, going deeper and seeking a higher degree of accuracy and robustness of the data.

5. Recommendations

5.1. At the level of scenario implementation

- **Analyse and propose measures to reduce the costs of Amazonian foods and/or increase the participation of producers and collectors in value chains:** for each of the Amazonian foods proposed for incorporation, it will be necessary to identify and design lines of action aimed at reducing their unit costs and/or strengthening producer and collector organisations. These measures may include improved production, collection, added value and marketing processes, optimisation of logistics, access to appropriate inputs and technology, as well as training and organisational capacity building. The objective is for producers and collectors to achieve greater participation and obtain a more significant margin in the formation of the final price, thus promoting their inclusion and the sustainable development of Amazonian chains.
- **Guarantee decent, dignified and safe work:** together with the incorporation of Amazonian food into institutional food programmes, it is essential to implement a comprehensive approach that prioritises both the protection of labour rights and the improvement of the living conditions of collectors and producers. This involves ensuring access to formal contracts, fair wages and safe working conditions, providing personal protective equipment and training in safe practices. At the same time, mechanisms must be established to monitor and enforce labour legislation, to promote the inclusion of women and young people, and to eradicate child labour. Finally, the provision of basic services, such as health, education and access to infrastructure, together with the promotion of sustainable resource management practices, contributes to creating a dignified and sustainable working environment for those who depend on collection in the Amazon.
- **Avoid overexploitation of Amazonian forests:** it is essential to establish and adhere to sustainable management criteria in the collection of forest products. This entails defining extraction rates that respect the regeneration capacity of the species and ensuring that institutional demand does not exceed the ecological limits of the ecosystem. In addition, it is essential to strengthen the organisation and training of collectors in sustainable practices, and to implement monitoring and traceability systems to assess the status of the resource and adjust collection quotas as necessary. Additionally, diversification of collected products and promotion of agroforestry production can reduce pressure on key species and contribute to biodiversity conservation. Finally, articulation between local communities, authorities and institutional buyers is essential for ensuring that purchasing and management decisions respond to both economic needs and the long-term protection of the Amazon forest.
- **Generate knowledge and implement measures to reduce the carbon footprint of Amazonian products in the storage and waste links:** it is useful to study and promote the use of renewable energies for product storage, thus reducing dependence on fossil fuels and local carbon footprint. It is also recommended to investigate the

optimisation of waste management adapted to Amazonian conditions, through cooperation with local actors, and to promote studies on the acceptability and consumption of Amazonian products in order to refine environmental impact estimates and adjust projections.

5.2. Methodology

- **Successive approximations:** given that the collection of information on input variables is the stage that requires the most effort, it is recommended to work first with assumptions and approximate values that provide orders of magnitude to identify the most feasible scenarios, and, once candidate scenarios have been selected, to go deeper and work with more precise and robust data.
- **Studies of Amazonian food chains:** it is recommended to develop studies of Amazonian food chains that are candidates for incorporation into institutional food procurement programmes. This will provide more reliable data for input variables and identify potential bottlenecks and gaps that could be faced by larger scale demand.
- **Capacity building in the use of the ICLA Spreadsheet:** Although the ICLA Spreadsheet has a user manual, it is recommended to develop a training session on its use for teams interested in simulating incorporation scenarios.
- **Capacity building in the use of the UNFCCC*Greenhouse Gas Emissions Calculator | 2021 Emission Factors* tool for the calculation of GHG emissions:** It is also recommended to build the capacity of the teams in the use of the UNFCCC tool.

Annex 1. Input variables to estimate the effects of Amazonian food incorporation

TABLE A1-1. VARIABLES FOR ESTIMATING ECONOMIC EFFECTS.

	UNIT	SOURCE
General		
Total annual volume of Exogenous Food purchased	Tonnes per year per food	Database of purchasing units
Total annual value of Exogenous Feed purchased (a)	Annual USD per food	Database of purchasing units
Marketing		
Wholesale price of Exogenous/Amazon Food (a)	USD per Tonne	National Statistics; Surveys; Interviews with suppliers of food purchase programmes
Proportion of Volume of Exogenous/ Amazonian Food purchased from Small Producers and Local Associations	Percentage of Total Purchase Volume	Databases of public procurement units; Interviews with qualified informants; Interviews with qualified informants
Proportion of Volume of Exogenous/ Amazon Foods purchased from Intermediaries	Percentage of Total Purchase Volume	Databases of public procurement units; Interviews with qualified informants; Interviews with qualified informants
Share of Exogenous/Amazon Food Volume purchased from Agro-industry	Percentage of Total Purchase Volume	Databases of public procurement units; Interviews with qualified informants; Interviews with qualified informants
Proportion of Raw Material Volume imported by Agro-industry	Percentage of Volume of raw material purchased by Agroindustry	Agribusiness survey / interview
Share of the Volume of Exogenous Foods Imported by Traders	Percentage of volume purchased by traders	Marketer survey / interview
Primary production or collection		
Average national cultivated area per producer or collector	Hectares	National agricultural statistics (agricultural census, intercensal surveys, etc.)

	UNIT	SOURCE
Productive performance	Tonnes/hectare	Surveys/Interviews of Qualified informants; Chain studies; National agricultural statistics; Producer associations
Productivity decline	Percentage (%)	Surveys/Interviews Qualified informants; Chain studies; Producer associations
Labour requirement per hectare (primary production or collection)	days/hectare	Surveys/Interviews Qualified informants; Chain studies; Producer associations
Post-collection labour requirement (cleaning + drying + bagging)	days/tonne	Surveys/Interviews Qualified informants; Chain studies; Producer associations
Price paid to producer or collector	USD/tonne	National statistics; Chain studies; Qualified informants
Cost of production (excluding family employment) as a percentage of gross income	Percentage (%)	Qualified informants; Chain studies
Number of working days Annual full-time equivalent employment	number	National legislation
Processing		
Industrial Performance	Percentage (%) of raw material production	Surveys/ Interviews Qualified agro-industry informants; Chain studies
Labour requirement transformation	Days / tonne processed	Surveys / Interviews Qualified agribusiness informants; Chain studies

Source: Author.

(a) Where this information is not available, it is estimated by multiplying the volume by the purchase price of the feed.

TABLE A1-2. VARIABLES FOR ESTIMATING NUTRITIONAL EFFECTS.

VARIABLE	UNIT	SOURCE
Energy input from exogenous/amazonian foods	kilocalories	- Food labelling - National Compendiums of Food Composition - Nutritional studies - Other
Protein input from exogenous/amazonian foods	grams	
Carbohydrate input available from exogenous/amazonian foods	grams	
Micronutrient input from exogenous/amazon foods	% of total available carbohydrates	

Source: Author.

TABLE A1-3. VARIABLES FOR ESTIMATING ENVIRONMENTAL EFFECTS.

VARIABLE	UNIT	SOURCE
GHG emissions from the transport of exogenous/amazon foods	tonnes CO2eq	*"Greenhouse Gas Emissions Calculator | 2021 Emission Factors"* *United Nations Framework Convention on Climate Change (UNFCCC. Secretariat)* *Available at:*https://unfccc.int/documents/271269
GHG emissions from electricity use in exogenous/amazon food storage	tonnes CO2eq	
GHG emissions from the use of fossil fuels in the storage of exogenous/amazon foodstuffs	tonnes CO2eq	
GHG emissions from exogenous/amazon food waste	tonnes CO2eq	

Annex 2. Values and sources of input variables in the simulated scenarios [18]

a. Colombia

TABLE A2-1. AMAZONIAN PRODUCTS. CHONTADURO FLOUR. COLOMBIA SCENARIOS.

CHONTADURO FLOUR		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
Total Local Purchase Volume (metric tonnes):	1,000 MT	
39. Purchase Volume Small Producers and Local Associations - Inclusive Direct/ Indirect Purchasing (percentage of Total Purchasing Volume):	90%	R. Ruíz, personal communication, May 20, 2025.
40. Price Paid per Processed Product (USD/tonne):	4,586 USD/MT	C. Delgado, personal communication, May 06, 2025.
Total Purchase Value (USD):	4,586,000	
TRANSFORMATION LINK VARIABLES		
41. Industrial yield (percentage of raw material production):	20%	R. Ruíz, personal communication, May 20, 2025.
42. Days Required for Processing (days per tonne processed):	6 J/TM	C. Delgado, personal communication, May 06, 2025.
43. Full Time Equivalent Day (number):	229	Colombian labour legislation

18 The compiled Excel folder contains a file where the information collected and the justification of the selected values are detailed in greater depth.

CHONTADURO FLOUR		
VARIABLES	**VALUE**	**SOURCE**
PRIMARY PRODUCTION VARIABLES		
44. National Average Productive Yield (metric tonnes per Hectare):	5 MT/ha	C. Delgado, personal communication, May 06, 2025.
45. National Average Productive Decline (percentage of Average Productive Yield):	0%	Author.
46. National Average Area Managed per Producer (Hectares):	7 ha	C. Delgado, personal communication, May 06, 2025.
47. National Average Working Day Requirement (days per hectare per year):	42 J/ha	C. Delgado, personal communication, May 06, 2025.
48. Cost of production (percentage of gross income):	28.6%	C. Delgado, personal communication, May 06, 2025.
xxxi*. Full Time Equivalent Worker (days):	229	General data Colombia.
49. Price Paid to Producer Raw Material (USD/tonne):	491.1 USD/MT	R. Ruíz, personal communication, May 20, 2025.

Source: Author.

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TABLE A2-2. AMAZONIAN PRODUCTS. BITTER CASSAVA FLOUR. COLOMBIA SCENARIOS.

BITTER CASSAVA FLOUR		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
Total Local Purchase Volume (metric tonnes):	1,000 MT	
39. Purchase Volume Small Producers and Local Associations - Inclusive Direct/Indirect Purchasing (percentage of Total Purchasing Volume):	80%	R. Ruíz, personal communication, May 20, 2025.
40. Price Paid per Processed Product (USD/tonne):	983 USD/MT	R. Ruíz, personal communication, May 20, 2025.
Total Purchase Value (USD):	983,000	
TRANSFORMATION LINK VARIABLES		
41. Industrial yield (percentage of raw material production):	54.2%	Gamarra, 2002.
42. Days Required for Processing (days per tonne processed):	8 J/TM	R. Ruíz, personal communication, May 20, 2025.
43. Full Time Equivalent Day (number):	229	Colombian labour legislation
PRIMARY PRODUCTION VARIABLES		
44. National Average Productive Yield (metric tonnes per Hectare):	17.5 MT/ha	Agronet (2025).
45. National Average Productive Decline (percentage of Average Productive Yield):	0%	Author.
46. National Average Area Managed per Producer (Hectares):	6.9 ha	DANE. 2004.
47. National Average Working Day Requirement (days per hectare per year):	25.4 J/ha	CLAYUCA. 2000.
48. Cost of production (percentage of gross income):	58,8%	Finagro. 2022.
xxxi*. Full Time Equivalent Worker (days):	229	Colombian labour legislation
49. Price Paid to Producer Raw Material (USD/tonne):	129 USD/MT	(1) R. Ruíz, personal communication, May 20, 2025.

Source: Author.

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TABLE A2-3. EXOGENOUS PRODUCTS. CORN FLOUR. COLOMBIA SCENARIOS.

CORN FLOUR		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
13. Total Volume Purchased from Local Agro-Industry (percentage of Total Volume Purchased from Local Agro-Industry):	100%	(1) BB.DD WFP Colombia 2020-2024
14. Proportion of Imported Raw Materials (percentage of Total Volume Purchased from Local Agro-industry):	38%	Bolsa Mercantil de Colombia. 2023. Product Analysis. Corn. pp. 5.
15. Proportion of Raw Material Purchases from Small Producers and Local Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchases from Local Agro-industry):	0%	Assumption.
16. Proportion of Imported Product (percentage of Total Volume Purchased from Local Intermediaries):	0%	BB.DD WFP Colombia.
17. Proportion of Product Purchased from Local Agro-industry (percentage of Total Volume Purchased from Local Intermediaries):	0%	WFP
18. Proportion of Product Purchased from Local Producers (percentage of Total Volume Purchased from Local Intermediaries):	0%	WFP
19. Proportion of Local Produce Purchased from Small Producers and Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchased from Local Producers):	0%	WFP
Price Paid per Processed Product (USD/tonne):	741 USD/MT	BB.DD WFP.2025.
TRANSFORMATION LINK VARIABLES		
20. Industrial yield (percentage of Raw Material production):	60%	MAGYP. 2007.
21. Days Required for Processing (days per tonne processed):	0.04 J/MT	D. Minota, personal communication, May 23, 2025.
22. Full Time Equivalent Day (number):	229	Colombian labour legislation
PRIMARY PRODUCTION VARIABLES		
23. National Average Productive Yield (tonnes per Hectare):	6 MT/ha	FENALCE. 2025.

CORN FLOUR		
VARIABLES	**VALUE**	**SOURCE**
24. National Average Productive Decline (percentage of National Average Productive Yield):	0%	Author.
25. National Average Surface Area Sown per Farmer (Hectares):	30 ha	Agro-inputs. 2018.
26. National Average Working Day Requirement (days per hectare per year):	39 J/ha	UPRA. 2025.
27. Cost of Production over Gross Income (percentage):	66.9%	Fenalce. 2021.
xxii*. Full Time Equivalent Worker (days):	229	Colombian labour legislation
28. Price Paid to Producer for Raw Material (USD/tonne):	255 USD/MT	FWFP, 2025.

Source: Author.

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TABLE A2-4. EXOGENOUS PRODUCTS. WHITE RICE. COLOMBIA SCENARIOS.

WHITE RICE		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
13. Total Volume Purchased from Local Agro-Industry (percentage of Total Volume Purchased from Local Agro-Industry):	96%	BB.DD WFP (2020-2024).
14. Proportion of Imported Raw Materials (percentage of Total Volume Purchased from Local Agro-industry):	7.2%	Members of the Colombian Congress. 2025.
15. Proportion of Raw Material Purchases from Small Producers and Local Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchases from Local Agro-industry):	0%	Assumption.
xiv*. Total Volume Purchased from Local Intermediaries (percentage of Total Local Volume Purchased):	4%	BB.DD WFP (2020-2024).
16. Proportion of Imported Product (percentage of Total Volume Purchased from Local Intermediaries):	100%	Assumption.
17. Proportion of Product Purchased from Local Agro-industry (percentage of Total Volume Purchased from Local Intermediaries):	0%	Assumption.
18. Proportion of Product Purchased from Local Producers (percentage of Total Volume Purchased from Local Intermediaries):	0%	Assumption.
19. Proportion of Local Produce Purchased from Small Producers and Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchased from Local Producers):	0%	Assumption.
Price Paid per Processed Product (USD/tonne):	797 USD/MT	BB.DD. of WFP. 2020-2024
TRANSFORMATION LINK VARIABLES		
20. Industrial yield (percentage of Raw Material production):	71%	UGRA, 2020.
21. Days Required for Processing (days per tonne processed):	0.72 J/MT	Nobles. 2004.
22. Full Time Equivalent Day (number):	229	Colombian labour legislation

WHITE RICE		
VARIABLES	VALUE	SOURCE
PRIMARY PRODUCTION VARIABLES		
23. National Average Productive Yield (tonnes per Hectare):	5.7 MT/ha	FNA.2025.
24. National Average Productive Decline (percentage of National Average Productive Yield):	0%	Author.
25. National Average Surface Area Sown per Farmer (Hectares):	19.2 ha	UPRA, 2020.
26. National Average Working Day Requirement (days per hectare per year):	48 J/ha	UPRA, 2020.
27. Cost of Production over Gross Income (percentage):	64.2%	De Pombo. 2022.
xxii*. Full Time Equivalent Worker (days):	229	Colombian labour legislation
28. Price Paid to Producer for Raw Material (USD/tonne):	346.9 USD/MT	FNA, 2025.

Source: Author.

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TABLE A2-5. NUTRITIONAL COMPOSITION OF EXOGENOUS AND AMAZONIAN FOODS SELECTED FOR THE SIMULATION. COLOMBIA SCENARIOS.

FOOD	Energy (Kcal)	Protein (grams)	Fat (grams)					Cholesterol (milligrams)	Available Carbohydrates (grams)			Micronutrients			
			Saturated	Monounsaturated	Polyunsaturated	Trans	Totals		Total sugars	Fibre	Totals	Sodium (milligrams)	Vitamin A (uER)	Calcium (milligrams)	Phosphorus (milligrams)
RICE (Processed food)	353	6.7					0.4			1	79	2	0	9	140
CORN FLOUR (processed feed)	380	9.1					3.7			7.5	66.4	1	0	4	248
CHONTADURO FLOUR (processed)	375	6.4					0.6			4.2	79.7	s.i	s.i	s.i	s.i
FARIÑA FLOUR (processed)	355	1.7					0.2			6.4	76.9	1	17	40	42

Source: Colombian Institute of Family Welfare. 2018. Colombian Food Composition Table (TCAC) 2018.

TABLE A2-6. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE TRANSPORT LINK THROUGH THE UNFCCC CALCULATION TOOL. COLOMBIA SCENARIOS.

<table>
<tr><th>Food and volume</th><th>Origin</th><th>Destination</th><th>Means of transport and distances</th></tr>
<tr><td rowspan="2">Corn flour:
1,000 tonnes</td><td>Tolima, Colombia</td><td rowspan="6">Mocoa, Putumayo, Colombia</td><td>Cargo truck: 490 km</td></tr>
<tr><td>Iowa, United States</td><td>River cargo ship: 1,600 km
Ocean-going cargo ship: 4,630 km
Cargo truck: 515 km</td></tr>
<tr><td rowspan="2">Rice:
1,000 tonnes</td><td>Villavicencio, Colombia</td><td>Cargo truck: 710 km</td></tr>
<tr><td>Arkansas, United States</td><td>Goods train: 700 km
Ocean-going cargo ship: 4,450 km
Cargo truck: 515 km</td></tr>
<tr><td>Chontaduro flour:
1,000 tonnes</td><td>Villagarzón (ASOCHON Plant), Colombia</td><td>Cargo truck: 100 km</td></tr>
<tr><td>Bitter cassava flour:
1,000 tonnes</td><td>Puerto Asis (CORPOCAMPO plant), Colombia</td><td>Cargo truck: 200 km</td></tr>
</table>

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-7. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE STORAGE LINK THROUGH THE UNFCCC CALCULATION TOOL. COLOMBIA SCENARIOS.

FOOD	ENERGY SOURCE	VALUES	ASSUMPTIONS
Amazonian	Electric	7,500 Kw/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 50% of the energy required to store Amazon food comes from the public electricity grid. - Electricity consumption of 15 kW per tonne of stored feed per year is assumed.
	Mobile combustion engine	1,875 litres of diesel/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 50% of the energy required to store Amazon food comes from mobile combustion engines. - It is assumed that to generate 1 kW of electricity with an efficient engine, 0.25 litres of diesel are required.
Exogenous	Electric	15,000 Kw/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 100% of the energy required to store exogenous food comes from the public electricity grid. - Electricity consumption of 15 kW per tonne of stored feed per year is assumed.

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-8. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE WASTE LINK THROUGH THE UNFCCC CALCULATION TOOL. COLOMBIA SCENARIOS.

FOOD	TYPE OF WASTE	PERCENTAGE OF WASTE	ASSUMPTIONS
Corn flour	Organic: food and drink	2%	- Emissions are calculated for a volume of 1,000 tonnes of food for one year.
Rice		10%	
Bitter cassava flour		1%	
Chontaduro flour		4%	

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-9. GHG EMISSIONS PER 1,000 TONNES OF FOOD, BY PRODUCTION LINK (TRANSPORT, STORAGE AND WASTE). COLOMBIA.

TYPE OF FOOD	FOOD	GHG emissions (tonnes of CO2 equivalent) per 1,000 tonnes of food, by link in the production chain				
		TRANSPORT		STORAGE		FOOD WASTE
		National food	Imported food	Electricity	Stationary combustion sources	Dumps/landfill sites
Amazonian	*Chontaduro flour*	18.14	-	1.56	5.07	627
	Bitter cassava flour	36.28	-	1.56	5.07	627
Exogenous	*Corn flour*	89	176	3.13	-	627
	White rice	129	172	3.13	-	627

Source: Emission calculation tool "*Greenhouse Gas Emissions Calculator | 2021 Emission Factors*" of the United Nations Framework Convention on Climate Change (UNFCCC). Secretariat), available at: https://unfccc.int/documents/271269.

b. Bolivia

TABLE A2-9. AMAZONIAN PRODUCTS. BRAZIL NUT FLOUR. BOLIVIA SCENARIOS.

BRAZIL NUT FLOUR		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
39. Purchasing Volume Small Producers and Local Associations - Inclusive Direct/Indirect Purchasing (percentage of Total Purchasing Volume):	100%	Assumed
40. Price Paid per Processed Product (USD/tonne):	5,066 USD/TM (1)	M. Peñaranda, personal communication, May 19, 2025.
TRANSFORMATION LINK VARIABLES		
41. Industrial yield (percentage of raw material production):	26.7%	EBA, 2023.
42. Days Required for Processing (days per tonne processed):	12 J/TM	Quiroz C, G. et al, (2016, p. 33).
43. Full Time Equivalent Day (number)	236	Bolivian labour legislation
PRIMARY PRODUCTION VARIABLES		
44. National Average Productive Yield (metric tonnes per Hectare):	0.08 MT/ha	Vidarurre et al. (2023) and Coria (2018).
45. National Average Productive Decline (percentage of Average Productive Yield):	0%	Author.
46. National Average Area Managed per Producer (Hectares):	75 ha/family	Coria O., Mendoza R., 2022. pp. 83.
47. National Average Working Day Requirement (days per hectare per year):	3 J/ha	Based on: Vidaurre (2023)
48. Cost of production (percentage of gross income):	6.5%	Coria O. 2022. pp.88.
xxxi*. Full Time Equivalent Worker (days):	236	Bolivian labour legislation
49. Price Paid to Producer Raw Material (USD/tonne):	1,000 USD/TM (1)	Vidaurre M. 2023 (IBIF).

Source: Author.

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TABLE A2-10. AMAZONIAN PRODUCTS. AÇAÍ PULP. BOLIVIA SCENARIOS.

ACAI PULP		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
Total Local Purchase Volume (metric tonnes):	1,000 MT	
39. Purchase Volume Small Producers and Local Associations - Inclusive Direct/ Indirect Purchasing (percentage of Total Purchasing Volume):	100%	Assumption.
40. Price Paid per Processed Product (USD/tonne):	2,749.6 USD/MT	Vidaurre M. 2023.
Total Purchase Value (USD):	2,749,600	
TRANSFORMATION LINK VARIABLES		
41. Industrial yield (percentage of raw material production):	33.3%	Lorini H. 2017.
42. Days Required for Processing (days per tonne processed):	12 J/TM	USAID, 2015.
43. Full Time Equivalent Day (number):	236	Bolivian labour legislation
PRIMARY PRODUCTION VARIABLES		
Estimated Total Volume of Raw Materials Purchased (metric tonnes):		
45. National Average Productive Decline (percentage of Average Productive Yield):	0.25 MT/ha	Tonore et al., 2019. pp. 19.
45. National Average Productive Decline (percentage of Average Productive Yield):	0%	Author.
46. National Average Area Managed per Producer (Hectares):	87.3 ha	INE, 2013.
47. National Average Working Day Requirement (days per hectare per year):	7 J/ha	Based on PICFA (2021) and Lorini (2017).
48. Cost of production (percentage of gross income):	10.4%	Tonore et al., 2019. pp. 42.
xxxi*. Full Time Equivalent Worker (days):	236	Bolivian labour legislation
49. Price Paid to Producer Raw Material (USD/tonne):	290 USD/MT	Vidaurre M. 2023. pp. 41.

Source: Author.

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TABLE A2-11. EXOGENOUS PRODUCTS. OAT FLOUR. BOLIVIA SCENARIOS.

OAT FLOUR		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
13. Total Volume Purchased from Local Agro-Industry (percentage of Total Volume Purchased):	100%	
14. Proportion of Imported Raw Materials (percentage of Total Volume Purchased from Local Agro-industry):	70%	Assumption.
15. Proportion of Raw Material Purchases from Small Producers and Local Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchases from Local Agro-industry):	100%	C. Chávez. Personal communication, May 27, 2025.
16. Proportion of Imported Product (percentage of Total Volume Purchased from Local Intermediaries):	0%	Assumption.
17. Proportion of Product Purchased from Local Agro-industry (percentage of Total Volume Purchased from Local Intermediaries):	0%	Assumption.
18. Proportion of Product Purchased from Local Producers (percentage of Total Volume Purchased from Local Intermediaries):	0%	Assumption.
19. Proportion of Local Produce Purchased from Small Producers and Associations - Indirect Inclusive Purchasing (percentage of Total Volume Purchased from Local Producers):	0%	Assumption.
Price Paid per Processed Product (USD/tonne):	1,199 USD/MT	Namdar M. and C. Saa. 2024.
TRANSFORMATION LINK VARIABLES		
20. Industrial yield (percentage of Raw Material production):	60%	C. Chávez. Personal communication, May 27, 2025.
21. Days Required for Processing (days per tonne processed):	4.9 J/MT	C. Chávez. Personal communication, May 27, 2025.
22. Full Time Equivalent Day (number):	236	Bolivian labour legislation

OAT FLOUR		
VARIABLES	**VALUE**	**SOURCE**
PRIMARY PRODUCTION VARIABLES		
23. National Average Productive Yield (tonnes per Hectare):	1.4 MT/ha	INE. 2023.
24. National Average Productive Decline (percentage of National Average Productive Yield):	0%	Author.
25. National Average Surface Area Sown per Farmer (Hectares):	5 ha	C. Chávez. Personal communication, May 27, 2025.
26. National Average Working Day Requirement (days per hectare per year):	35.4 J/ha	Agro-environmental and Productive Observatory of Bolivia. 2021.
27. Cost of Production over Gross Income (percentage):	55.5%	PASO, 2021.
xxii*. Full Time Equivalent Worker (days):	236	General data Bolivia.
28. Price Paid to Producer for Raw Material (USD/tonne):	453 USD/MT	Based on C. Chávez. Personal communication, May 27, 2025.

Source: Author.

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TABLE A2-12. EXOGENOUS PRODUCTS. APPLE JUICE. BOLIVIA SCENARIOS [19].

APPLE JUICE CONCENTRATE		
VARIABLES	**VALUE**	**SOURCE**
COMMERCIAL VARIABLES		
13. Total Volume Purchased from Local Agro-Industry (percentage of Total Volume Purchased from Local Agro-Industry):	100%	
14. Proportion of Imported Raw Materials (percentage of Total Volume Purchased from Local Agro-industry):	100%	Assumption.
Price Paid per Processed Product (USD/tonne):	1,639 USD/MT	MRECIC. 2022.
TRANSFORMATION LINK VARIABLES		
20. Industrial yield (percentage of Raw Material production):	14%	Based on Bruzone, (2005) and Carozzi (2018).
21. Days Required for Processing (days per tonne processed):	0.25 J/MT	K. Castellón. Personal communication, May 21, 2025.
22. Full Time Equivalent Day (number):	236	Bolivian labour legislation
PRIMARY PRODUCTION VARIABLES		
23. National Average Productive Yield (tonnes per Hectare):	3.8 MT/ha	OAP. 2025.
24. National Average Productive Decline (percentage of National Average Productive Yield):	0%	Author.
25. National Average Surface Area Sown per Farmer (Hectares):	2 ha	MACIA, 2003.
26. National Average Working Day Requirement (days per hectare per year):	81.2 J/ha	MDR&T. 2021.
27. Cost of Production over Gross Income (percentage):	61.3%	MDR&T. 2021.
xxii*. Full Time Equivalent Worker (days):	236	Bolivian labour legislation
28. Price Paid to Producer for Raw Material (USD/tonne):	579 USD/MT	K. Castellón. Personal communication, May 21, 2025.

Source: Author.

19 Although for this analysis it is assumed that 100% of the product comes from imported juice concentrate, information on domestic apple production has been collected. This information, although not relevant to this report, is kept available for future consultation or analysis that the WFP may require.

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TABLE A2-13. NUTRITIONAL COMPOSITION OF EXOGENOUS AND AMAZONIAN FOODS SELECTED FOR THE SIMULATION. BOLIVIA SCENARIOS.

FOOD	Energy (Kcal)	Protein (grams)	Fat (grams)					Cholesterol (milligrams)	Available Carbohydrates (grams)			Micronutrients			
			Saturated	Monounsaturated	Polyunsaturated	Trans	Totals		Total sugars	Fibre	Totals	Sodium (milligrams)	Vitamin A (uER)	Calcium (milligrams)	Phosphorus (milligrams)
OAT FLOUR (Processed food)	389	16.9	1.2	2.3	2.5	0	6.9	0	0	11	66.3	2			
APPLE JUICE CONCENTRATE	286	0.8					0	0	71.2	0.8	69.5	53		110	
BRAZIL NUT FLOUR (processed)	368	45	3.25				13.5		6.4		6.4	9.7			
ACAI PULP (processed)	233	31					12			3.08	51.15		0.159 mg	86.99	32.24

TABLE A2-14. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE TRANSPORT LINK THROUGH THE UNFCCC CALCULATION TOOL. BOLIVIA SCENARIOS.

<table>
<tr><th>FOOD AND VOLUME</th><th>ORIGIN</th><th>DESTINATION</th><th>MEANS OF TRANSPORT AND DISTANCES</th></tr>
<tr><td rowspan="2">Oat flour: 1,000 tonnes</td><td>Province of Aroma, Dept. of La Paz, Bolivia</td><td rowspan="5">Cobija, Bolivia</td><td>Cargo truck: 1,198 km</td></tr>
<tr><td>Prairie Region (Saskatchewan and Manitoba), Canada</td><td>Bulk train: 1,800 km
Ocean-going cargo ship: 8,000 km
Cargo truck: 2,513 km</td></tr>
<tr><td>Apple juice concentrate: 1,000 tonnes</td><td>Alto Valle del Río Negro, Argentina</td><td>Refrigerated cargo truck: 1,300 km
Ocean-going cargo ship: 6,000 km
Cargo truck: 2,363 km</td></tr>
<tr><td>Brazil nut flour: 1,000 tonnes</td><td rowspan="2">Department of Pando, Bolivia</td><td rowspan="2">Cargo truck: 0 km (negligible distance)</td></tr>
<tr><td>Açaí pulp: 1,000 tonnes</td></tr>
</table>

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-15. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE STORAGE LINK THROUGH THE UNFCCC CALCULATION TOOL. BOLIVIA SCENARIOS.

FOOD	ENERGY SOURCE	VALUES	ASSUMPTIONS
Amazonian	Electric	7,500 Kw/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 50% of the energy required to store Amazon food comes from the public electricity grid. - Electricity consumption of 15 kW per tonne of stored feed per year is assumed.
	Mobile combustion engine	1,875 litres of diesel/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 50% of the energy required to store Amazon food comes from mobile combustion engines. - It is assumed that to generate 1 kW of electricity with an efficient engine, 0.25 litres of diesel are required.
Exogenous	Electric	15,000 Kw/year	- Emissions are calculated for a volume of 1,000 tonnes of stored food for one year. - It is assumed that 100% of the energy required to store exogenous food comes from the public electricity grid. - Electricity consumption of 15 kW per tonne of stored feed per year is assumed.

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-16. ENVIRONMENTAL VARIABLES FOR THE ESTIMATION OF GHG EMISSIONS OF THE WASTE LINK THROUGH THE UNFCCC CALCULATION TOOL. SCENARIOS BOLIVIA.

FOOD	TYPE OF WASTE	PERCENTAGE OF WASTE	ASSUMPTIONS
Oat flour	Organic: food and drink	5%	- Emissions are calculated for a volume of 1,000 tonnes of food for one year.
Apple juice concentrate		2%	
Brazil nut flour		1%	
Açaí pulp		1%	

Source: Diverse sources consolidated in an artificial intelligence search engine.

TABLE A2-17. GHG EMISSIONS PER 1,000 TONNES OF FOOD, BY PRODUCTION LINK (TRANSPORT, STORAGE AND WASTE). BOLIVIA.

TYPE OF FOOD	FOOD	GHG emissions (tonnes of CO2 equivalent) per 1,000 tonnes of food, by link in the production chain				
		TRANSPORT		STORAGE		FOOD WASTE
		National food	Imported food	Electricity	Stationary combustion sources	Dumps/landfill sites
Amazonian	*Brazil nut flour*	0	-	2.95	5.07	627
	Açaí pulp	0	-	2.95	5.07	627
Exogenous	*Oat flour*	217	612	5.89	-	627
	Apple juice concentrate	-	744	5.89	-	627

Source: Emission calculation tool "*Greenhouse Gas Emissions Calculator | 2021 Emission Factors*" of the United Nations Framework Convention on Climate Change (UNFCCC). Secretariat), available at: https://unfccc.int/documents/271269.

Annex 3. Results of the simulated scenarios

a. Colombia (simulated scenarios based on 1,000 tonnes of exogenous food)

TABLE A3-1. COLOMBIA. INDICATORS OF EFFECTS IN SCENARIOS 1 AND 2.

	SCENARIO A			
	INCORPORATION OF BITTER CASSAVA FLOUR AS A REPLACEMENT FOR CORN FLOUR			
	Scenario 1.		Scenario 2.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes):	14.1	1.4%	35.2	3.5%
Indicator 1.1. Volume of Local Products purchased (tonnes):	90.1	15%	225.2	36%
Indicator 1.2. Volume of Inclusive Local Products purchased (tonnes):	171.3		428.2	
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	214		535	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	8%		20%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	17%		41%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	21%		52%	
Indicator 3. Value of Local Food Purchases (USD):	62,245	8%	155,613	21%
Indicator 3.1. Value of Local Products purchased (USD):	118,561	26%	296,403	65%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	168,356		420,890	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	210,445		526,113	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	10%		22%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	21%		47%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	26%		59%	
Indicator 5. Surface Area of Local Products purchased (hectares):	-11.87	-7%	-29.68	-17%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	23		56	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	-14.1	-8%	-34.5	-20%
Indicator 3. Value of Local Food Purchases (USD):	62,245	8%	155,613	21%

	SCENARIO A			
	INCORPORATION OF BITTER CASSAVA FLOUR AS A REPLACEMENT FOR CORN FLOUR			
	Scenario 1.		Scenario 2.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator 3.1. Value of Local Products purchased (USD):	118,561	26%	296,403	65%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	168,356		420,890	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	210,445		526,113	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	10%		22%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	21%		47%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	26%		59%	
Indicator 5. Surface Area of Local Products purchased (hectares):	-11.87	-7%	-29.68	-17%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	23		56	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	-14.1	-8%	-34.5	-20%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	-32.8	-14%	-73.4	-32%
Indicator 8. Number of local farmer suppliers:	2.12	37%	5.31	92%
Indicator 8.1. Number of Amazonian producers/suppliers:	3.27		8.18	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	2.0	35%	4.9	86%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	2.0	26%	5	59%
Indicator 11. Total Gross Revenue per Sale (USD):	-1.746	-1%	-4.366	-2%
Indicator 11.1. Total Gross Revenue from Sales of Amazonian Products (USD):	50,954		127,384	
Indicator 12. Average Income per Farmer per Sale (USD):	-12,614	-27%	-22,445	-49%
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	-15,577		-15,577	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	-3,650	-24%	-6,495	-43%
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	6,418		6,418	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	4.1	14%	10.3	35%
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	10.0		25.0	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	3.7	12%	8.9	30%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	2.1	5%	4.6	12%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	20%		50%	
Indicator N2. Protein input (grams):	-14,560,563	-16.0%	-36,401,408	-40.0%

	SCENARIO A INCORPORATION OF BITTER CASSAVA FLOUR AS A REPLACEMENT FOR CORN FLOUR			
	Scenario 1.		Scenario 2.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	5%		17%	
Indicator N3. Fat input (grams):	-6,971,831	18.8%	-17,429,577	-47.1%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fat):	1%		5%	
Indicator N4. Available carbohydrate inputs (grams):	-31,830,986	5%	-79,577,465	12%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	24%		55%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-17.0	-12%	-42.5	-31%
Indicator A1.1. Share of total GHG emissions from Amazonian foods in total GHG emissions (percentage of total GHGs):	8.7%		27.7%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-18.7	-14%	-45.7	-33%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food):	49.2		49.2	

TABLE A3-2. COLOMBIA. INDICATORS OF EFFECTS IN SCENARIOS 3 AND 4.

	SCENARIO B			
	INCORPORATION OF BITTER CASSAVA FLOUR AS A REPLACEMENT FOR RICE			
	Scenario 3.		Scenario 4.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes):	-1.1	0.1%	-2.8	-0.39
Indicator 1.1. Volume of Local Products purchased (tonnes):	-20.7	2%	51.7	6%
Indicator 1.2. Volume of Inclusive Local Products purchased (tonnes):	159.1		397.7	
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	199		497	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	2%		5%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	16%		40%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	20%		50%	
Indicator 3. Value of Local Food Purchases (USD):	36,092	5%	90,231	11%
Indicator 3.1. Value of Local Products purchased (USD):	53,486	8%	133,715	19%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	156,394		390,985	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	195,492		488,731	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	3%		6%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	19%		44%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	23%		55%	
Indicator 5. Surface Area of Local Products purchased (hectares):	23.06	-10%	-57.65	-26%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	21		52	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	-22.8	-10%	-57.2	-26%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	-39.6	-14%	-93.1	-34%
Indicator 8. Number of Local Farmer suppliers:	0.75	7%	1.86	16%
Indicator 8.1. Number of Amazonian producers/suppliers:	3.04		7.60	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	0.8	7%	1.9	17%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	0	2%	1	4%
Indicator 11. Total Gross Revenue per Sale (USD):	-39,722	-9%	-99,305	-23%
Indicator 11.1. Total Gross Revenue from Sales of Amazonian Products (USD):	-47,333		-118,333	
Indicator 12. Average Income per Farmer per Sale (USD):	-5,571	-15%	-12,759	-34%
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	-15,577		-15,577	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	-1,785	-13%	-4,089	-30%

	SCENARIO B			
	INCORPORATION OF BITTER CASSAVA FLOUR AS A REPLACEMENT FOR RICE			
	Scenario 3.		Scenario 4.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	6,418		6,418	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	0.0	0.1%	0.1	0.2
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	9.3		23.2	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	0.1	0%	0.2	1%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	-2.5	-4%	-5.8	-10%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	20%		50%	
Indicator N2. Protein input (grams):	-10,019,155	-15.0%	-25,047,887	-37.4%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	6%		20%	
Indicator N3. Fat input (grams):	-402,254	-10.1%	-1,005,634	-25.1%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fat):	11%		33%	
Indicator N4. Available carbohydrate inputs (grams):	-5,066,479	-1%	-12,666,197	-2%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	19%		49%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-30.1	-15.1%	-75.2	-38%
Indicator A1.1. Share of Total GHG Emissions from Amazonian foods in Total GHG Emissions (percentage of total GHGs):	5.8%		19.7%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-29.9	-15.0%	-74.9	-38%
Indicator A2.1. Carbon footprint of Amazonian foods (kilos of CO2eq/tonne of food):	49.2		49.2	

TABLE A3-3. COLOMBIA. INDICATORS OF EFFECTS IN SCENARIOS 5 AND 6.

	SCENARIO C			
	INCORPORATION OF CHONTADURO FLOUR AS A REPLACEMENT FOR CORN FLOUR			
	Scenario 5.		Scenario 6.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes):	0.7	0.1%	2.7	0.3%
Indicator 1.1. Volume of Local Products purchased (tonnes):	19.7	3%	78.7	13%
Indicator 1.2. Volume of purchased Local Inclusive Products (tonnes):	45.6		182.4	
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	51		203	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	2%		8%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	5%		18%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	5%		20%	
Indicator 3. Value of Local Food Purchases (USD):	195,307	26%	781,229	105%
Indicator 3.1. Value of Local Products purchased (USD):	209,386	46%	837,545	182%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	209,122		836,486	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	232,357		929,429	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	9%		23%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	22%		55%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	25%		61%	
Indicator 5. Surface Area of Local Products purchased (hectares):	42.06	24%	168.22	98%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	51		203	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	41.9	24%	167.3	97%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	3.6	-2%	-8.8	-4%
Indicator 8. Number of local farmer suppliers:	6.95	121%	27.80	484%
Indicator 8.1. Number of Amazonian producers/suppliers:	7.24		28.95	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	6.9	121%	27.7	483%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	6	75%	14	184%
Indicator 11. Total Gross Revenue per Sale (USD):	111,212	42%	444,847	169%
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD):	124,387		497,547	
Indicator 12. Average Income per Farmer per Sale (USD):	-16.376	-36%	-24.78	-54%

	SCENARIO C INCORPORATION OF CHONTADURO FLOUR AS A REPLACEMENT FOR CORN FLOUR			
	Scenario 5.		Scenario 6.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	17,185		17,185	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	-1.667	-11%	-2.523	-17%
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	12,270		12,270	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	9.2	31%	36.6	125%
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	10.6		42.5	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	9.1	31%	36.4	124%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	1.5	4%	3.7	9%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	5%		20%	
Indicator N2. Protein input (grams):	- 1,307,333	-1.4%	5,229,333	-5.7%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	4%		15%	
Indicator N3. Fat input (grams):	- 1,546,000	-4.2%	-6,184,000	-16.7%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fats):	1%		4%	
Indicator N4. Available carbohydrate inputs (grams):	7,181,333	1%	28,725,333	4%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	6%		23%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-4.5	-3%	-18.1	-13%
Indicator A1.1. Share of total GHG emissions from Amazonian foods in total GHG emissions (percentage of total GHGs):	1.8%		7.9%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-4.6	-3%	-18.4	-13%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food):	46.7		46.7	

TABLE A3-4. COLOMBIA. INDICATORS OF EFFECTS IN SCENARIOS 7 AND 8.

	SCENARIO D			
	INCORPORATION OF CHONTADURO FLOUR AS A REPLACEMENT FOR RICE			
	Scenario 7.		Scenario 8.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes):	-2.9	0.3%	-11.7	-1.2%
Indicator 1.1. Volume of Local Products purchased (tonnes):	2.5	0%	10.1	1%
Indicator 1.2. Volume of purchased Local Inclusive Products (tonnes):	42.4		169.4	
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	47		188	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	1%		2%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	4%		17%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	5%		19%	
Indicator 3. Value of Local Food Purchases (USD):	175,998	22%	703,991	88%
Indicator 3.1. Value of Local Products purchased (USD):	180,346	25%	721,385	102%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	194,263		777,052	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	215,848		863,391	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	2%		6%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	20%		52%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	22%		58%	
Indicator 5. Surface Area of Local Products purchased (hectares):	36.06	16%	144.24	66%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	47		188	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	36.8	17%	148.6	67%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	-12.9	-5%	-33.4	-12%
Indicator 8. Number of local farmer suppliers:	-6.15	54%	24.60	215%
Indicator 8.1. Number of Amazonian producers/suppliers:	6.72		26.90	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	6.2	54%	25.0	218%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	4	26%	10	67%
Indicator 11. Total Gross Revenue per Sale (USD):	93,785	22%	375,139	86%
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD):	115,549		462,195	
Indicator 12. Average Income per Farmer per Sale (USD):	-7,931	-21%	-15,495	-41%
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	17,185		17,185	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	-504	-4%	-985	-7%

	SCENARIO D INCORPORATION OF CHONTADURO FLOUR AS A REPLACEMENT FOR RICE			
	Scenario 7.		Scenario 8.	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	12,270		12,270	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	7.6	16%	30.2	66%
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	9.9		39.5	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	7.7	17%	31.1	67%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	-2.7	-5%	-7.0	-12%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	5%		20%	
Indicator N2. Protein input (grams):	-337,733	-0.5%	-1,350,933	-2.0%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	5%		18%	
Indicator N3. Fat input (grams):	82,400	2.1%	329,600	8.2%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fats):	7%		26%	
Indicator N4. Available carbohydrate inputs (grams):	-1,987,867	0%	-7,951,467	-1%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	5%		19%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-7.8	-4%	-31.1	-16%
Indicator A1.1. Share of total GHG emissions from Amazonian foods in total GHG emissions (percentage of total GHGs):	1.1%		5.2%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	7.2	-4%	-29.1	-15%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food):	46.7		46.7	

b. Bolivia (simulated scenarios based on 1,000 tonnes of exogenous food)

TABLE A3-5. BOLIVIA. INDICATORS OF EFFECTS IN SCENARIOS 1 AND 2.

	SCENARIO A			
	INCORPORATION OF BRAZIL NUT FLOUR AS A REPLACEMENT FOR OAT FLOUR			
	Scenario 1. 5% Incorporation		Scenario 2. 20% Incorporation	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS				
Indicator 1. Volume of Local Food Purchases (tonnes):	2.9	0.3%	11.4	1.1
Indicator 1.1. Volume of Local Products purchased (tonnes):	37.9	13%	151.4	50%
Indicator 1.2. Volume of purchased Local Inclusive Products (tonnes):	37.9	13%	151.4	50%
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	53		211	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	4%		15%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	4%		15%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	5%		21%	
Indicator 3. Value of Local Food Purchases (USD):	207,805	17%	831,218	69%
Indicator 3.1. Value of Local Products purchased (USD):	249,770	69%	999,078	278%
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	249,770	69%	999,078	278%
Indicator 3.3. Value of Amazonian Products Purchased (USD):	267,755		1,071,018	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	13%		37%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	13%		37%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	19%		53%	
Indicator 5. Surface Area of Local Products purchased (hectares):	2,456.55	688%	-9,826.19	2751%
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	2,474		9,898	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	2,448.5	686%	9,711.3	2719%
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	1,702.2	571%	4,718.0	1584%
Indicator 8. Number of local farmer suppliers:	29.42	41%	117.68	165%
Indicator 8.1. Number of Amazonian producers/suppliers:	32.99		131.97	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	29.1	41%	115.5	162%
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	12	20%	34	56%
Indicator 11. Total Gross Revenue per Sale (USD):	186,627	82%	746,509	330%

	SCENARIO A INCORPORATION OF BRAZIL NUT FLOUR AS A REPLACEMENT FOR OAT FLOUR			
	Scenario 1. 5% Incorporation		Scenario 2. 20% Incorporation	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD):	197,952		791,809	
Indicator 12. Average Income per Farmer per Sale (USD):	925	29%	1,974	62%
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	6,000		6,000	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	1,374	97%	2,930	208%
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	5,610		5,610	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	31.5	59%	125.8	235%
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	34.1		136.6	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	31.2	58%	123.8	231%
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	15.8	35%	43.7	98%
NUTRITIONAL EFFECTS				
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	5%		20%	
Indicator N2. Protein input (grams):	15,333,967	9.1%	61,335,870	36,3%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	13%		41%	
Indicator N3. Fat input (grams):	3,685,190	5.3%	14,740,761	21.4%
Indicator N3.1. Fat input of Amazonian foods (percentage of total fats):	10%		34%	
Indicator N4. Available carbohydrate inputs (grams):	29,767,391	-4%	-119,069,565	-18%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	1%		2%	
ENVIRONMENTAL EFFECTS				
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-25.8	-5%	-103.1	-19%
Indicator A1.1. Share of total GHG emissions from Amazonian foods in total GHG emissions (percentage of total GHGs):	0.1%		0.7%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-27.2	-5%	-107.9	-20%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food):	14.3		14.3	

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TABLE A3-6. BOLIVIA. INDICATORS OF EFFECTS IN SCENARIOS 3, 4 AND 5.

	SCENARIO B					
	INCORPORATION OF ACAI PULP AS A REPLACEMENT FOR APPLE JUICE CONCENTRATE					
	Scenario 3. 5% Incorporation		Scenario 4. 10% Incorporation		Scenario 5. 20% Incorporation	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)	Scenario differential	Rate of change (%)
ECONOMIC EFFECTS						
Indicator 1. Volume of Local Food Purchases (tonnes):	11.4	1.1%	22.7	2.3%	45.5	4.5%
Indicator 1.1. Volume of Local Products purchased (tonnes):	61.4		122.7		245.5	
Indicator 1.2. Volume of purchased Local Inclusive Products (tonnes):	61.4		122.7		245.5	
Indicator 1.3. Volume of Amazonian products purchased (tonnes):	61		123		245	
Indicator 2. Local Product Purchase Volume as a percentage of Total Local Purchasing (%):	6%		12%		23%	
Indicator 2.1. Inclusive Local Product Purchase Volume as a percentage of Total Local Purchases:	6%		12%		23%	
Indicator 2.2. Amazonian Product Purchase Volume as a percentage of Total Local Purchases (%):	6%		12%		23%	
Indicator 3. Value of Local Food Purchases (USD):	86.817	5%	173,634	11%	347,267	21%
Indicator 3.1. Value of Local Products purchased (USD):	168,777		337,554		675,107	
Indicator 3.2. Value of Inclusive Local Products Purchased (USD):	168,777		337,554		675,107	
Indicator 3.3. Value of Amazonian Products Purchased (USD):	168,777		337,554		675,107	
Indicator 4. Value of Local Product Purchases as a percentage of Total Value of Local Purchases (%):	10%		19%		34%	
Indicator 4.1. Value of Inclusive Local Product Purchases as a percentage of Total Value of Local Purchases (%):	10%		19%		34%	
Indicator 4.2. Amazonian Product Purchase Value as a percentage of Total Purchase Value:	10%		19%		34%	
Indicator 5. Surface Area of Local Products purchased (hectares):	737.22		1,474.44		2,948.87	
Indicator 5.1. Surface Area of Amazonian products purchased (hectares):	737		1,474		2.949	
Indicator 6. Surface Area of Local Products Purchased per 1,000 tonnes of Local Purchase:	728.9		1,441.6		2,820.6	
Indicator 7. Surface Area of Local Products purchased per USD 1 million of Local Purchase:	427.1		813.3		1,484,5	
Indicator 8. Number of local farmer suppliers:	8.44		16.89		33.78	
Indicator 8.1. Number of Amazonian producers/suppliers:	8.44		16.89		33.78	
Indicator 9. Number of Local Farmer suppliers per 1,000 tonnes of Local Purchase:	8.3		16.5		32.3	
Indicator 10. Number of Local Farmer suppliers per 1 million USD of Local Purchase:	5		9		17	

	SCENARIO B					
	INCORPORATION OF ACAI PULP AS A REPLACEMENT FOR APPLE JUICE CONCENTRATE					
	Scenario 3. 5% Incorporation		Scenario 4. 10% Incorporation		Scenario 5. 20% Incorporation	
	Differen-tial between scenarios	Rate of change (%)	Scenario differen-tial	Rate of change (%)	Scenario differen-tial	Rate of change (%)
Indicator 11. Total Gross Revenue per Sale (USD):	53,448		106,897		213,793	
Indicator 11.1. Total Gross Revenue per Sale of Amazonian Products (USD):	53,448		106,897		213,793	
Indicator 12. Average Income per Farmer per Sale (USD):	6,329		6,329		6,329	
Indicator 12.1. Average Income per Producer per Sale of Amazonian Products (USD):	6,329		6,329		6,329	
Indicator 13. Average Gross Margin per Farmer per Sale (USD):	5,671		5,671		5,671	
Indicator 13.1. Average Gross Margin per Producer per Sale of Amazonian Products (USD):	5,671		5,671		5,671	
Indicator 14. Number of Jobs Generated by the Agricultural and Agro-industrial Sector (full-time equivalent worker):	25.0		50.0		99.9	
Indicator 14.1. Number of jobs generated by the Amazonian Agricultural and Agro-industrial Sector (full-time equivalent worker):	25.0		50.0		99.9	
Indicator 15: Unit Employment per Local Purchase Volume (number of full-time equivalent workers per 1,000 tonnes of Local Purchase):	24.7		48.9		95.6	
Indicator 16: Unit Employment per Local Purchase Value (number of full-time equivalent workers per USD 1 million of Local Purchase):	14.5		27.6		50.3	
NUTRITIONAL EFFECTS						
Indicator N1. Energy input (Kcal):	0	0.0%	0	0.0%	0	0.0%
Indicator N1.1. Energy input from Amazonian foods (percentage of total energy):	5%		10%		20%	
Indicator N2. Protein input (grams):	18,625,751	232.8%	37,251,502	465.6%	74,503,004	931.3%
Indicator N2.1. Protein input of Amazonian foods (percentage of total protein):	71%		84%		92%	
Indicator N3. Fat input (grams):	-7,364,807		14,729,614		29,459,227	
Indicator N3.1. Fat input of Amazonian foods (percentage of total fats):	100%		100%		100%	
Indicator N4. Available carbohydrate inputs (grams):	-3,388,197	0%	6,776,395	-1%	-13,552,790	-2%
Indicator N4.1. Available carbohydrate inputs from Amazonian foods (percentage of total available carbohydrates):	5%		9%		18%	

	SCENARIO B					
	INCORPORATION OF ACAI PULP AS A REPLACEMENT FOR APPLE JUICE CONCENTRATE					
	Scenario 3. 5% Incorporation		Scenario 4. 10% Incorporation		Scenario 5. 20% Incorporation	
	Differential between scenarios	Rate of change (%)	Scenario differential	Rate of change (%)	Scenario differential	Rate of change (%)
ENVIRONMENTAL EFFECTS						
Indicator A1. Total GHG emissions (tonnes of CO2eq):	-37.2	-5%	-74.5	-10%	-149.0	-20%
Indicator A1.1. Share of total GHG emissions from Amazonian foods in total GHG emissions (percentage of total GHGs):	0.1%		0.3%		0.6%	
Indicator A2. Carbon footprint (kilos of CO2eq/tonne of food):	-45.4	-6%	-89.8	-12%	-175.7	-23%
Indicator A2.1. Carbon footprint of Amazonian food (kilos of CO2eq/tonne of food):	14.3		14.3		14.3	

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