THE ROLE OF MAJOR RETAILERS AND SUPERMARKETS IN THE TRANSITION FROM INDUSTRIAL ANIMAL AGRICULTURE TO ALTERNATIVE PROTEINS IN LOW- AND MIDDLE-INCOME COUNTRIES: THE CASE OF BRAZIL

a Guidance Memo prepared for Tiny Beam Fund

Germano Glufke Reis
Eduardo Guedes Villar
Supermarkets can influence food purchases and consumer adoption of more sustainable products; they can either enable or limit the consumption of alternative proteins. Alternative proteins such as plant-based and cultivated meat can help mitigate the serious negative impacts of industrial animal agriculture, such as animal suffering and greenhouse gas emissions.

An important aspect of the success of alternative proteins in low- and middle-income countries (LMICs) is related to the extent to which retailers and supermarkets offer these products.

- Supermarkets can influence food purchases and consumer adoption of more sustainable products;
- They can either enable or limit the consumption of alternative proteins.

To examine how retailers have dealt with the transition to alternative proteins in LMICs, we analyzed how Brazilian supermarkets are promoting plant-based meat in comparison with animal-based products.

Our results showed that plant-based meat is less widely available in supermarkets and significantly more expensive than animal-based meat. Furthermore, animal-based products are more often promoted through price reduction and multi-buy offers than their plant-based analogues.

We also compared plant-based products from companies that also offer animal-based meat (meat processing companies) with those from companies that only produce plant-based products (plant-based "exclusive" firms). In this case, we found that plant-based exclusives had higher prices, more fragmented availability, and lower discounts compared with plant-based products from meat processor companies.

Since the product price for alternative proteins is relevant to being successful in LMICs, we also identified possible causes for the identified higher plant-based meat prices, namely: the cost of raw materials and ingredients, government subsidies for animal-based meat, more favorable taxation of animal-based products, plant-based products being a capital-intensive business, the high cost and difficulty in entering the frozen food chain, supermarket chains focusing on sales volume and the relationship between sales volume and price.
In conclusion, we propose that the following are priority areas for frontline action:
- Increasing the availability of plant-based products in supermarkets;
- Lowering plant-based meat prices;
- Increasing the presence of smaller and purely plant-based companies in retail outlets;
- Reducing the promotion of animal-based meat products.

In addition, the dual role of meat processors that also produce plant-based products should be recognized in promoting the development of the plant-based meat chain and perpetuating the negative consequences of animal production.

To address these priority areas, we propose recommendations broken down into five areas for practical initiatives:

1) Reaching out to retailers;
2) Investing in research (e.g., alternative and cheaper ingredient sources);
3) Raising consumer awareness of the benefits of plant-based products and the importance of plant-based exclusive firms;
4) Empowering smaller and plant-based exclusive firms;
5) Reaching out to policymakers.

Finally, suggestions for action and illustrative cases are also presented for these five areas.
ACKNOWLEDGMENTS

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Introduction

Results
- The availability of animal-based products in supermarkets is considerably greater than that of their plant-based analogues.
- Plant-based meat products are significantly more expensive than animal-based products.
- Animal-based products are more frequently promoted through price reduction and multi-buy offers than their plant-based analogues.
- Plant-based exclusive products have higher prices, more fragmented availability, and lower discounts when compared to plant-based products from meat-processing companies.

Practical implications and recommendations
- Reaching out to retailers.
- Investing in research.
- Raising consumer awareness.
- Empowering smaller and plant-based exclusive firms.
- Reaching out to policymakers.

References

Appendix
Major retailers and supermarket chains can make an important impact on value chain activity, influencing pricing for product development; supermarkets have consistently promoted the sales of large-scale industrial animal-based meat; supermarkets can influence food purchases and the extent to which consumers adopt more sustainable products; they can either enable or limit the consumption of alternative proteins (Gravely & Fraser, 2018); developing a consistent and reliable network of retailers has been a key factor for plant-based firms to expand, for instance.

Recent research has shown that alternative proteins (e.g., plant-based and cultivated meat) can help to mitigate the severe negative impacts of industrial animal agriculture (e.g., animal suffering and greenhouse gas emissions). In addition, a number of potential bottlenecks to the transition to alternative proteins have been discussed, such as technological aspects, consumer acceptance, and regulatory issues.

A less explored dimension is the role that retailers can play in the transition to alternative proteins, which is the focus of this study.

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- Supermarkets have consistently promoted the sales of large-scale industrial animal-based meat;
- Supermarkets can influence food purchases and the extent to which consumers adopt more sustainable products;
- They can either enable or limit the consumption of alternative proteins (Gravely & Fraser, 2018);
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Thus, the main purpose of this Guidance Memo is to address the following question:

**How can retailers and supermarkets influence the transition to alternative proteins in low- and middle-income countries (LMICs), especially in the case of countries that are major producers and consumers of animal-based proteins, such as Brazil?**

**INTRODUCTION**

Recent research has shown that alternative proteins (e.g., plant-based and cultivated meat) can help to mitigate the severe negative impacts of industrial animal agriculture (e.g., animal suffering and greenhouse gas emissions). In addition, a number of potential bottlenecks to the transition to alternative proteins have been discussed, such as technological aspects, consumer acceptance, and regulatory issues.

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Brazil is notably an important producer and consumer of industrial animal-based meat. In 2021, the annual consumption of cattle meat was over seven million metric tons (Statista, 2022); per capita consumption is 42 kg/year. Meat production in 2018 was 12.86 for chicken meat and 9.71 for cattle meat, in millions of tons (ABPA, 2019; ABIEC, 2019). Moreover, 31.9% of the chicken meat produced and 20.1% of the cattle meat produced were sold internationally, while the remaining production was consumed domestically.

The country has well-established and internationalized animal-based meat companies, such as BRF, JBS (which is the owner of Seara), Marfrig, and Minerva Foods. The greatest importers of Brazilian meat are the European and North-American markets (ABPA, 2019).

Since Brazil is a major player in the global industrial animal agriculture landscape, a transition to alternative proteins would significantly help to reduce industrial animal agriculture.

The Brazilian case is likely to deliver useful insights for other LMICs that are entering the alternative protein space.

Why plant-based meat products?

- They are already available in most supermarkets and are familiar to many consumers. Moreover, there are already plant-based meat producers of different sizes in Brazil, ranging from small to larger companies.
- Plant-based consumption has gained traction in Brazil, earning US$ 82.8 million in revenues in 2020, which represents an increase of 70% in the last five years (ABIA, 2021).
- The number of potential consumers is growing in the country (GFI Brazil, 2019). Furthermore, it has been shown that meat substitutes, such as cultivated meat (Valente et al., 2019), have the potential to be widely accepted by Brazilian consumers.
- The influence of retailers, in a worst-case scenario, may lead to delaying product introduction and visibility, increasing costs, and decreasing the overall competitiveness and sales of plant-based meat compared with animal-based meat products.
The availability of animal-based products in supermarkets is considerably greater than that of their plant-based analogues.

Plant-based meat products are significantly more expensive than animal-based products.

Animal-based products are more frequently promoted through price reductions and multi-buy offers than their plant-based analogues.

Plant-based exclusive products have higher prices, more fragmented availability, and lower discounts when compared to plant-based products of meat-processing companies.
The availability of animal-based products in supermarkets is considerably greater than that of their plant-based analogues

Overview:

A considerably larger number of animal-based meat products are found in online supermarkets compared with plant-based meat. This imbalance is even more evident in the case of animal-based sausages, hot dogs, and nuggets, followed by hamburgers and minced meat. Despite being less widely available, plant-based meat was regularly found in the supermarkets, indicating that it has succeeded in being accepted by major Brazilian retailers.
To determine the availability of animal- and plant-based meat, we considered the total frequency with which they were found in supermarkets during the five weeks of the study, as follows:

85.41% were animal-based meat products (N=7,435);

14.59% were plant-based meat products (N=1,270).

Although this difference might have been anticipated, these numbers provide a clearer picture of the extension of the imbalance regarding plant-based and animal-based meat availability in supermarkets.

Regarding the distribution of animal-based and plant-based products per type, we found three different patterns (Figure 1):

- **Very high imbalance:** For sausages, hot dogs, and nuggets, the supply of plant-based products is very low compared with the supply of the same animal-based products, with the latter occurring over 90% of the time. In the specific case of sausages, the availability of animal-based products is significantly greater.

- **High imbalance:** For hamburgers and minced meat, animal-based products are better represented (72.30% and 75.92%, respectively) than the corresponding plant-based products (27.70% for hamburgers and 24.08% for minced meat).

- **Balanced availability:** For kibbehs and meatballs, there is a balance of animal and plant-based product availability.

Regarding the differences among supermarkets in offering plant and animal-based products, we observed that they do not show significant variations (Figure 2), with most of the products being offered by all of them. The exceptions for plant-based were the offerings of nuggets and hot dogs, which were available in only two supermarkets during the survey period.

For animal-based products, in turn, the exceptions were nuggets and kibbehs which were not offered in all supermarkets during the survey period. It is important to note that plant-based products, while less numerous, were well distributed and regularly offered in all the surveyed online supermarkets.
Figure 1 - Availability of products by type.

Figure 2 - Product distribution (%) per supermarket.
Supermarkets offer a wider variety of brands and options for animal-based products, especially sausages and hamburgers, which account for 59.39% of the products available.

Plant-based hamburgers are an entry-level product for most companies considering that they are technically easier and less costly to develop. However, retailers may be overstocked with plant-based hamburgers compared with other plant-based options.

The supply chain for some types of plant-based products is still developing and, therefore, some firms may experience difficulty in supplying major supermarkets. Overall, it seems costly and difficult for smaller companies to enter the “frozen food” chain and gain access to supermarket chains.

Major meat processing companies (e.g., JBS, BRF) have advantages in offering their plant-based products in supermarkets because they can count on pre-existing distribution systems and relationships with retailers.

Despite being less readily available, plant-based meat has succeeded in entering the most important Brazilian supermarket chains.
Plant-based meat products are significantly more expensive than animal-based products

Overview:

Price is a key factor for the transition to alternative proteins in LMICs. In the specific case of plant-based meat, it is currently more expensive than products that come from intensive animal agriculture. The most expensive are nuggets, hot dogs, and sausages (highly expensive), followed by minced meat and hamburgers (very expensive).

The issue of product price is quite sensitive for LMICs:

- **Attractive and competitive prices are essential** for the transition to alternative proteins to take root in these countries;
- **Plant-based meat has the potential to be much cheaper** than today and even cheaper than animal-based meat;
- **It is important to identify and monitor price imbalances** between plant-based and animal-based products and identify opportunities for improvement in this regard.
The prices of plant-based products offered to end consumers are on average 95.69% more expensive than animal-based products (details in Table 1), which sheds light on how extensive price disparity is in Brazil.

When analyzing average prices by product type, we found that there are important differences between animal-based products and their respective plant-based analogues (Table 2). Overall, plant-based products are significantly more expensive than animal-based. Product types may be organized in three groups:

- **Comparatively highly expensive**: For nuggets, hot dogs, and sausages, the difference was more than 100% (113%, 116%, and 144%, respectively).

- **Comparatively very expensive**: For minced meat and hamburgers, the price difference between plant-based and animal-based products was around 70%.

- **Comparatively more expensive**: For kibbehs and meatballs, the difference was smaller, 20% and 48%, respectively.

### Table 1 - Overall difference in animal-based and plant-based meat prices.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>U$/kg</th>
<th>Availability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal-based</td>
<td>$8.11</td>
<td>85.41%</td>
</tr>
<tr>
<td>Plant-based</td>
<td>$15.87</td>
<td>14.59%</td>
</tr>
<tr>
<td>Price difference (%)</td>
<td>95.69%</td>
<td></td>
</tr>
</tbody>
</table>

Note: Product Prices are in dollars (conversion rate - 5.25 R$/1.00 U$; date: September 17th, 2022) and standardized per kg.

### Table 2 - Price differences per type of product.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Hamburger</th>
<th>Kibbehs</th>
<th>Meatballs</th>
<th>Nuggets</th>
<th>Hot Dogs</th>
<th>Sausages</th>
<th>Minced Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal-based</td>
<td>$9.76</td>
<td>$10.97</td>
<td>$10.76</td>
<td>$7.51</td>
<td>$6.62</td>
<td>$7.48</td>
<td>$8.25</td>
</tr>
<tr>
<td>Price Comparison (%)</td>
<td>+70%</td>
<td>+20%</td>
<td>+48%</td>
<td>+113%</td>
<td>+116%</td>
<td>+144%</td>
<td>+72%</td>
</tr>
</tbody>
</table>

Note: Product Prices are in dollars (conversion rate - 5.25 R$/1.00 U$; date: September 17th, 2022) and standardized per kg.
Why are plant-based meat products more expensive?

The qualitative data revealed possible causes related to several stages of the production chain, representing opportunities for improvements that could be addressed in the future.

**Cost of raw materials and ingredients:**
- Several raw materials and ingredients are imported (e.g., soybeans, peas). Although Brazil is a major soy producer, most companies depend on imported non-GMO and semi-processed proteins (structured plant proteins) and ingredients that are processed abroad. The country lacks processing facilities (e.g., to process raw materials).
- Some companies use imported peas (e.g., from Canada).
- There is only a limited number of multinational ingredient suppliers, which reduces the bargaining power of manufacturers of plant-based products.

**Government subsidies for animal-based meat:**
- The Brazilian government supports meat producers through tax exemptions.

**Taxes are more favorable for animal-based products:**
- Some local taxes for industrialized products (a category that includes plant-based products) are almost twice as high as for meat.

**Plant-based is a capital-intensive business:**
- It requires investment in research and development (e.g., texture, sensory attributes, production processes).
- It requires systematic investment in marketing and branding.

**The cost and difficulty of entering the frozen food chain:**
- Meat processing companies rely on their structured distribution chains, which are difficult for smaller and new companies to access.
The expectations of supermarket chains:

- Supermarket chains pay attention to consumer loyalty and are sensitive to product turnover; they prefer products that have faster turnover (preferably with a large sales volume). Therefore, they tend to be cautious when introducing new products and food innovations. New entrants (products and companies) are likely to make continuous efforts and investments to strengthen their presence in large supermarkets.
- Preference may be given to already recognized brands and companies.
- Novel plant-based products are preferred. Some products have been over-promoted (e.g., hamburgers).
- Furthermore, the strategic positioning of products on supermarket shelves and spaces is costly.
- Some of these issues may affect sales of plant-based products in supermarkets.

The equation between volume (of sales) and price:

- Difficult entry.
- A decrease in sales (volume) reduces volume and increases costs.
- Increased prices reduce volume, which increases prices, and so on, in a "vicious circle".

Key messages:

- Plant-based products have currently been positioned as higher-priced niche products, which may justify market positioning at higher values than the average animal-based products offered.
- Plant-based meat prices should be reduced to target a broader and more inclusive consumption segment, thereby allowing the transition to alternative proteins in LMICs.
- The price difference can be explained by the costs of the production chain, among other factors. Plant-based products are, in many cases, offered by smaller companies and startups, which may have higher development, production and distribution costs than meat-processing companies.
- The price difference can also be explained by the technological development stage of the chains. Plant-based production uses evolving technology that requires high investments in research and development (e.g., new ingredients, production processes, packaging), which affects the final price of the product for the consumer.
- In segments with higher price differentials between animal-based and plant-based products (e.g., nuggets, sausages, and hot dogs), the availability and variety of brands offered are relatively low. In most cases, supermarkets offered only one option of plant-based products for each of these varieties.
Animal-based products are more frequently promoted through price reductions and multi-buy offers than their plant-based analogues

Overview:

Supermarkets stimulate sales through promotions. We found that most promotions were for animal-based products, including discounts (price reduction) and multi-buys offers. Regarding types of products, promotions were more frequent for animal-based hamburgers, nuggets, and hot dogs.
Promotions by retailers are intended to attract consumers and stimulate sales. When analyzing promotions, we collected information on discounts (direct price reductions on the product) and multi-buy promotions:

- **Price reductions**: the frequency of discounts (the number of occurrences) and the % of price reductions that were offered for each product.
- **Multi-buy offers**: the conditional purchase of more than one product or a set of products (e.g., buy 2, get 50% off the second unit).

The results regarding the frequency of promotions (i.e., the number of promotion occurrences) showed that:

- **Most of the promotions were for animal-based products**: 8.40% of all animal-based offers were sold at discounted prices, and 6.10% were offered in multi-buy promotions.

- **Discounted plant-based products accounted for only 0.96% of the total offers, while their multi-buy offers accounted for only 0.76% of the total.**

- **Most products did not have promotions**: 83.79% of all offers (70.89% animal-based and 12.90% plant-based).

When analyzing the **percentage of discounts offered** in each promotion, we found that **there was no pronounced difference between animal and plant-based products** when all categories were considered:

- On average, a discount of 20.50% was offered for animal-based products on sale;
- On average, a discount of 20.23% was offered for plant products.

However, when the promotions for each type of product were examined, we found that (Table 3):

- **Promotions for animal-based hamburgers, nuggets, and hot dogs were comparatively higher than their plant-based counterparts**, both in terms of discounts and multibuy promotions.
- Plant-based kibbeh, meatballs, and minced meat had comparatively more discounts and multibuy promotions than their animal-based analogues.
- Sausages were very similar in terms of discounts, but only animal-based sausages were promoted through multi-buy promotions (around 7%).

In terms of the percentage of discounts offered, we found that **some plant-based products**, such as hamburgers, kibbeh, meatballs, sausages, and minced meat, **had greater discounts than their animal-based equivalents**. Only plant-based nuggets and hot dogs had no promotional offers during the five weeks of data collection.
The promotions seemed to follow a specific dynamic for each supermarket and did not seem to be related to the type of products offered. Thus, retailers have a certain amount of leeway when it comes to setting strategies to attract consumers (The comparison of the supermarkets is detailed in Appendix B).

Table 3 - Product promotions.

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</tr>
</thead>
<tbody>
<tr>
<td>Occurrences of price discounts</td>
<td>9.03%</td>
<td>5.62%</td>
<td>0.00%</td>
<td>9.66%</td>
<td>2.98%</td>
<td>5.82%</td>
<td>11.26%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Average % of discount offered</td>
<td>18.04%</td>
<td>25.14%</td>
<td>0.00%</td>
<td>5.00%</td>
<td>5.00%</td>
<td>17.59%</td>
<td>18.38%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Occurrences of multi-buy promotions</td>
<td>8.18%</td>
<td>6.66%</td>
<td>4.32%</td>
<td>5.52%</td>
<td>1.19%</td>
<td>3.70%</td>
<td>9.09%</td>
<td>0.00%</td>
</tr>
</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>Occurrences of price discounts</td>
<td>15.17%</td>
<td>0.00%</td>
<td>10.01%</td>
<td>11.32%</td>
<td>3.88%</td>
<td>14.29%</td>
</tr>
<tr>
<td>Average % of discount offered</td>
<td>17.94%</td>
<td>0.00%</td>
<td>23.54%</td>
<td>33.14%</td>
<td>14.78%</td>
<td>18.66%</td>
</tr>
<tr>
<td>Occurrences of multi-buy promotions</td>
<td>7.03%</td>
<td>0.00%</td>
<td>7.02%</td>
<td>0.00%</td>
<td>1.62%</td>
<td>6.12%</td>
</tr>
</tbody>
</table>

Key messages:

- There is a higher frequency of promotions for the consumption of products of animal origin, which have the greatest negative impact on the environment and in terms of animal suffering.
- Although some major supermarket chains argue in their sustainability reports that they have invested in sustainability-related initiatives, they have promoted the consumption of animal-based meat products, which are related to GHG emissions (and other environmental impacts).
- Most special offers are price reductions, both for animal and plant-based products.
- No promotions were found for plant-based nuggets and hot dogs. For these products, there is a limited range of brands and options, which could indicate low competitiveness in these segments.
- Despite being less frequent, there have been plant-based meat promotions in supermarkets, suggesting that retailers are engaged in increasing their consumption. However, this is done on a small scale and with a much smaller price reduction than for animal-based products, which stimulates more consistently the consumption of the latter.
Further insights into the plant-based meat retail market

Retailers are, in some cases, reluctant to introduce novel products because their primary focus is on sales volume and rapid product turnover, and some novel plant-based products and firms may cause uncertainty in this respect.

Loyalty programs allow retailers to calculate consumer behavior per person; it is possible to identify consumer repurchases. Thus, it has been observed that most consumers currently show modest loyalty to plant-based products. While no numbers have yet been published, consumers have basically explored and tested multiple products and brands at this stage.

The introduction of plant-based meats has led to the increased promotion of some products such as hamburgers, kibbeh, meatballs, sausages, hot dogs, nuggets, and minced meat. However, there is an oversupply of some products, such as hamburgers.
Products from plant-based exclusive firms have higher prices, more fragmented availability, and lower discounts when compared to plant-based products of meat-processing companies

Overview:

We compared the plant-based products of plant-based exclusive firms and meat-processing firms. Plant-based exclusives are likely to result in the greatest environmental and animal welfare benefits. However, their products are more expensive and less promoted. Moreover, the availability of products is mostly dispersed among several smaller companies.
Large meat-processing companies may have an advantage over smaller companies that have entered the plant-based segment:

- They have the greatest infrastructure and a well-established distribution network;
- They can leverage the frozen chain structure they already have in place to supply supermarkets with plant-based products.

We compared the prices of plant-based products from plant-based exclusive firms and meat-processing firms. On average, plant-based exclusive products cost U$16.53, while meat processors charge U$14.58 per kilogram, a difference of 13.39% (see Table 4).

When these differences are analyzed by product type, it can be seen that:

- Plant-based hamburgers, kibbehs, meatballs, and nuggets produced by meat processors have lower prices than products from plant-based exclusive firms.
- It was not possible to compare plant-based hot dogs and sausages because the former are offered only by traditional animal-based manufacturers, while the latter are only offered by plant-based exclusive firms.
- Exceptionally, the prices of plant-based minced meat offered by a plant-based exclusive firm (Future Farm/Fazenda Futuro) were lower than the prices of animal-based companies.

There were only two meat-processing firms selling plant-based products in the supermarkets. These two meat-processing companies alone accounted for 30.73% (N=429) of all the products available (Table 5). The plant-based exclusive segment, in turn, is composed of several companies that have multiple products and brands. The eleven plant-based exclusive firms offered the other 69.19% of the products.

Table 5 shows that although plant-based exclusive firms have overall greater product availability, this segment is mostly fragmented, encompassing several companies with low product availability. The exception is Future Farm (Fazenda Futuro) a plant-based exclusive that accounts for 19.19% of the product offerings. The company is one of the leaders in the Brazilian plant-based market and has also invested in foreign markets.

Regarding promotions (Table 6), animal-based processors offered a slightly lower number of discounts but had overall greater amounts of discounts per offer. On the other hand, the average discount for plant-based products of meat-processing firms was 28.41%, while it was 21.47% for plant-based meat-exclusive firms. Thus, plant-based exclusives companies offered a lower percentage of price discounts.
Table 4 - Price (U$/kg) comparison of plant-based products by type of producer.

<table>
<thead>
<tr>
<th></th>
<th>Hamburgers</th>
<th>Kibbehs</th>
<th>Meatballs</th>
<th>Nuggets</th>
<th>Hot Dogs</th>
<th>Sausages</th>
<th>Minced Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal-based meat processors’ plant-based</td>
<td>15.06</td>
<td>12.91</td>
<td>14.93</td>
<td>12.18</td>
<td>21.23</td>
<td>0.00</td>
<td>17.05</td>
</tr>
<tr>
<td>Plant-based exclusive</td>
<td>17.57</td>
<td>14.21</td>
<td>16.25</td>
<td>20.30</td>
<td>0.00</td>
<td>18.24</td>
<td>13.80</td>
</tr>
<tr>
<td>Variation %</td>
<td>16.67%</td>
<td>10.08%</td>
<td>8.88%</td>
<td>66.71%</td>
<td>x</td>
<td>x</td>
<td>-19.06%</td>
</tr>
</tbody>
</table>

Note: Prices are in dollars (conversion rate - 5.25 R$/1.00 U$) and standardized per kg.

Table 5: Plant-based products: availability per brand of meat-processing and plant-based exclusive firms.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Number of offers</th>
<th>% Plant-based offers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat-processing firms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incrivel; Seara (JBS)</td>
<td>312</td>
<td>22.35%</td>
</tr>
<tr>
<td>Veg &amp; Tal; Sadia</td>
<td>117</td>
<td>8.38%</td>
</tr>
<tr>
<td><strong>Plant-based exclusive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fazenda Futuro</td>
<td>310</td>
<td>22.21%</td>
</tr>
<tr>
<td>Mr Veggie</td>
<td>161</td>
<td>11.53%</td>
</tr>
<tr>
<td>NotCo</td>
<td>143</td>
<td>10.24%</td>
</tr>
<tr>
<td>sAmazonika Mundli</td>
<td>126</td>
<td>9.03%</td>
</tr>
<tr>
<td>D+ Vegan Food</td>
<td>56</td>
<td>4.01%</td>
</tr>
<tr>
<td>Superbom</td>
<td>45</td>
<td>3.22%</td>
</tr>
<tr>
<td>The New Butchers</td>
<td>31</td>
<td>2.22%</td>
</tr>
<tr>
<td>Ecobras</td>
<td>30</td>
<td>2.15%</td>
</tr>
<tr>
<td>Soja Mania</td>
<td>30</td>
<td>2.15%</td>
</tr>
<tr>
<td>Plant Plus Foods</td>
<td>29</td>
<td>2.08%</td>
</tr>
<tr>
<td>Sora</td>
<td>6</td>
<td>0.43%</td>
</tr>
</tbody>
</table>

Table 6 – Frequency of promotions of plant-based products of meat-processors and plant-based exclusive firms.

<table>
<thead>
<tr>
<th></th>
<th>Animal-based processors that sell plant-based products</th>
<th>Plant-based exclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Promotion</td>
<td>382 (89.04%)</td>
<td>858 (88.43%)</td>
</tr>
<tr>
<td>Price discount occurrences</td>
<td>23 (5.36%)</td>
<td>60 (6.52%)</td>
</tr>
<tr>
<td>Average % of discount offered</td>
<td>28.41%</td>
<td>21.47%</td>
</tr>
</tbody>
</table>
Animal meat processors sell large quantities of chicken meat at very low prices, while they can simultaneously sell plant-based nuggets at the lowest prices as well. This could be due to the advantages of their infrastructure, available production facilities, and structured frozen food chains. Their competitive price may be a barrier to the entry of smaller plant-based competitors in the segment.

Due to the small number of companies dominating a larger portion of the market, the potential for plant-based market concentration, as already seen in the animal-based meat market, should be considered in the mid- or long-term.

Concentration of the market for plant-based products may represent a problem for smaller companies, as it leads to those companies having lower sales volumes (and revenue), dependence on a limited number of products, and less efficiency in the distribution chain. Therefore, it is necessary to support smaller and plant-only companies to help them to grow and increase their business and sales.

The unique case of the less expensive plant-based minced meat, illustrates that it is possible for plant-based exclusives to practice lower prices than meat-processing firms. Likewise, the case of Future Farm indicates that plant-based exclusives can be more widely available in supermarkets.

Based on the promotional comparison, meat-processing firms may have greater market power and are therefore better able to lower the prices of plant-based products as well to be more attractive to consumers.

As noted, meat-processing firms have an advantage over plant-based exclusive and smaller firms. In the medium or long term, this could lead to plant-based exclusive firms finding it difficult to enter the retail market and, in the worst-case scenario, the industry becoming concentrated in the hands of a limited number of players who also practice intensive animal farming activities. For the transition to alternative proteins to occur, the increasing presence of companies offering exclusively plant-based products would be desirable.

Key messages:

- Animal meat processors sell large quantities of chicken meat at very low prices, while they can simultaneously sell plant-based nuggets at the lowest prices as well. This could be due to the advantages of their infrastructure, available production facilities, and structured frozen food chains. Their competitive price may be a barrier to the entry of smaller plant-based competitors in the segment.
- Due to the small number of companies dominating a larger portion of the market, the potential for plant-based market concentration, as already seen in the animal-based meat market, should be considered in the mid- or long-term.
- Concentration of the market for plant-based products may represent a problem for smaller companies, as it leads to those companies having lower sales volumes (and revenue), dependence on a limited number of products, and less efficiency in the distribution chain. Therefore, it is necessary to support smaller and plant-only companies to help them to grow and increase their business and sales.
- The unique case of the less expensive plant-based minced meat, illustrates that it is possible for plant-based exclusives to practice lower prices than meat-processing firms. Likewise, the case of Future Farm indicates that plant-based exclusives can be more widely available in supermarkets.
- Based on the promotional comparison, meat-processing firms may have greater market power and are therefore better able to lower the prices of plant-based products as well to be more attractive to consumers.
- As noted, meat-processing firms have an advantage over plant-based exclusive and smaller firms. In the medium or long term, this could lead to plant-based exclusive firms finding it difficult to enter the retail market and, in the worst-case scenario, the industry becoming concentrated in the hands of a limited number of players who also practice intensive animal farming activities. For the transition to alternative proteins to occur, the increasing presence of companies offering exclusively plant-based products would be desirable.
We expect that the results of this study will be helpful to people on the front lines, such as those working in nongovernmental organizations, activists, and institutions that advocate for alternatives to industrial animal agriculture. Therefore, in this section, we have made a number of suggestions that could help with the key issues that were identified to support the transition to alternative proteins.

In this context, we see the following domains as priorities:
- Increasing the availability of plant-based products in supermarkets;
- Lowering prices;
- Increasing the presence of smaller and purely plant-based companies in retail outlets;
- Decrease the promotion of intensive animal farming products (as these products are associated with serious negative environmental impacts and animal suffering).

Meat processing companies are leaders in the plant-based market, have well-established chains, and have a strong presence in supermarkets, but paradoxically promote intensive animal agriculture at the same time. Therefore, despite the important role that they play in the development of the plant-based meat chain, they also play a role in perpetuating the negative consequences of animal production which should be considered.

Based on these priorities, our proposals explore five possible areas for practical initiatives:
- Reaching out to retailers;
- Investing in research;
- Raising consumer awareness;
- Empowering smaller and plant-based exclusive firms;
- Reaching out to policymakers.
Reaching out to retailers

**Why this is important**

It can improve product availability and visibility, thereby increasing sales of plant-based meats. It can also help retailers to improve their practices as they strive to achieve their sustainability goals.

There is room for improvement in the **affordability, availability, and visibility of plant-based foods in retail outlets**. Therefore, we propose a series of recommendations that apply not only to online supermarkets, but also to physical stores. These initiatives can be implemented either directly or indirectly by frontline people.

- In the first case, **major retailers can be approached directly** for advice and guidance.
- In the second case, **frontline people can turn to actors who can mediate such initiatives with retailers**, such as universities, nonprofit organizations, government agencies, and private companies (e.g., plant-based producers and startups).

**Key arguments:**

Frontline people can make some important arguments to retailers when proposing improvement initiatives:

- These actions are **consistent with supermarket sustainability strategies** described in annual reports;
- They **contribute to society** as a whole by **promoting the sale of healthier products** that have less of an impact on the environment and animal welfare;
- These actions can **increase sales of plant-based products**.
Suggestions to frontline people when reaching out to retailers:

Propose plant-based meat campaigns:
- Conduct temporary campaigns with temporary price reduction promotions, and allocate products to more visible aisle areas to increase sales (Trewern et al., 2022). The increase in sales is likely to stimulate the interest of retailers in improving the availability of plant-based products.
- Placing plant-based products in the same areas (shelves, aisles, online sections) as other meats is also advisable (Gravely & Fraser, 2018) since it can increase sales, which may be sustained over time (Piernas et al., 2021).
- Offer product samples to consumers so that they and their families can try several plant-based meat products and brands before purchasing (Gravely & Fraser, 2018).
- Introduce marketing initiatives that show how plant-based products can be added to consumers’ habitual meals (Gravely & Fraser, 2018; Trewern et al., 2022) and incorporated into their families’ diets.
- Emphasize the retailer’s commitment to reducing environmental footprints and animal suffering.
- Retailers should be sensitized to address more promotions for products that have a less negative environmental impact, such as alternative proteins. Products with greater negative impacts should be promoted less.

Inform and educate retailers:
- Courses, workshops, and presentations to retailers could also help to increase plant-based meat sales.
- Educational efforts could address subjects such as:
  - What plant-based proteins are and why they are important;
  - How to approach flexitarian/vegetarian/vegan consumers;
  - The importance of sensory attributes and product quality in the plant-based segment;
  - How to promote meatless products in the store and online.

Support plant-based companies:
- Approach plant-based firms to offer advice and courses regarding:
  - How to approach retailers;
  - Negotiation strategies;
  - How to enter the frozen food chain;
  - Possibilities for increasing their visibility in retail outlets.
- Courses may be offered directly by frontliners or their partners (e.g., universities, NGOs, and private companies).
Illustrative cases

Case 1: A recent study (Trewern et al., 2022) analyzed the impacts of an intervention that occurred in a major UK retailer, for four weeks, aiming to stimulate the consumption of plant-based products.
- Overall, the initiative involved: improving the visibility and accessibility of products, using attractive visual signals, products placed in strategic and more visible locations, showing plant-based recipes and dishes usually cooked by families, and price reduction promotions.
- The initiative resulted in a significant improvement in plant-based sales (by 57%), which continued after the intervention.
- The case illustrates that creative interventions in retailers can improve plant-based meat sales. The case may also be used as an argument to be used by frontline people when they approach retailers, showing that such initiatives can increase sales volumes.

Case 2: Piernas et al. (2021) analyzed the results of an intervention that took place in several stores of a major supermarket chain in the UK.
- Meat-free products were basically positioned in the animal-based meat aisle. Sales were continuously monitored.
- The result was that sales of animal-free products increased significantly (31%) – especially hamburgers, minced meat, and sausages - after being moved to the meat area; furthermore, the effect persisted in the long term.
- In turn, the sales of animal-based meat were not impacted.

Case 3: Verdali is a Brazilian plant-based exclusive firm and recently formed a partnership with Carrefour Brazil to develop a new vegan butcher section in a physical store.
- The “vegan butcher” sells plant-based products and is next to the animal-based meat counters.
- A colorful poster emphasizes the nutritional attributes (fibers, B12, iron, proteins). This case illustrates a creative approach to generating product visibility and stimulating the consumption of plant-based meat.
- It illustrates an initiative that positioned plant-based meat in the supermarket’s meat area.

Figure 3 – Example of a retailer and plant-based firm partnering to increase plant-based sales (the “vegan butcher” in Brazil).

Source: Provided by the organization. Used with permission.
Investing in research

**Why this is important**

Investment in research can aid the development of new protein sources and products. These aspects can reduce costs and increase product diversification. Another reason is that research can improve product quality and innovative product development. In addition, it can lead to a better understanding of consumer expectations.

**Price is an important prerequisite for plant-based meat products to thrive in LMICs.** However, it depends on a variety of factors, such as the cost of imported ingredients. It was also found that there is a concentration of some products (e.g., hamburgers). Therefore, it is also necessary to develop innovative products. These aspects can be addressed through further investment in research.

**Frontline individuals need to identify key stakeholders in LMICs that drive research initiatives.**

- Public agencies: CNPQ (National Council for Scientific and Technological Development), and CAPES (Higher Education Personnel Development Coordination), in Brazil;
- Universities that research alternative proteins: e.g., The Federal University of Paraná;
- State agencies: Araucaria Foundation and FAPESP (Research Foundation of the State of Sao Paulo);
- Public bodies that conduct research for the agriculture sector: e.g., EMBRAPA (Brazilian Agricultural Research Organization);
- Nonprofit organizations that advocate the transition to alternative protein: e.g., The Good Food Institute;
- Organizations whose mission is to invest in alternative protein research;
- Private companies that operate in or are entering the plant-based meat industry in order to advise them on areas that are a priority for research.
Key arguments:

Key arguments for more investment in plant-based research include:

- Identifying **new sources of protein** can reduce dependence on foreign suppliers;
- More research can put **the country at the forefront of the innovation landscape** for alternative proteins;
- It will create **new opportunities for the agricultural industry**;
- It will **move the country (state, region) into a leading position** as a major producer of proteins and ingredients;
- These initiatives will attract foreign investment;
- Advancing the transition to alternative proteins will stimulate regional development and attract private sector companies.

**Possible topics to address by investing in research include:**

**Researching novel ingredients:**

- The development of novel raw materials: domestically produced ingredients would reduce dependence on imported ingredients and production costs. Research is needed on the best extraction approach for these proteins and how to improve their functionalities (Ambiel et al., 2021).
- The development of ingredients with better technological functionalities: ingredients to improve the sensory properties of plant-based products (e.g., taste and texture) and their similarity to animal-based products. These are considered key aspects for attracting consumers and achieving greater acceptance.

**Expanding the portfolio of plant-based products:**

- Developing a broader range of products that are alternatives to those already in existence. It was noted that there are already too many choices of hamburgers, for example.

**Understanding consumer behavior:**

- There is also a need to invest in research on consumers:
  - What their expectations are in terms of product attributes (e.g., sensory attributes, nutritional attributes, health, perceived quality);
  - How consumers perceive plant-only products compared with plant-based products from meat processors;
  - The extent to which consumers are aware of the environmental and animal welfare benefits of plant-based products;
  - How consumers respond to retailers’ advertising and marketing strategies for plant-based meat products. These studies will help those on the front lines determine strategies to support the transition to alternative proteins.
Illustrative cases

Case 1: Embrapa and the use of cashew fiber to make hamburgers.
Embrapa (Brazilian Organization for Agricultural Research), in collaboration with other institutions, has developed a technological solution for the use of cashew fibers in the composition of plant-based products.

- Cashew fibers have **neutral taste and odor properties**.
- In particular, these fibers contribute to the **texture** and **improve the nutritional value** of products.

Figure 4 – Researching novel ingredients: cashew fiber burger developed by Embrapa, Brazil.

Source: [https://www.embrapa.br/busca-de-solucoes-tecnologicas/-/produto-servico/2844/elaboracao-de-hamburguer-de-fibra-de-caju-e-proteinas-vegetais](https://www.embrapa.br/busca-de-solucoes-tecnologicas/-/produto-servico/2844/elaboracao-de-hamburguer-de-fibra-de-caju-e-proteinas-vegetais) (on 10.09.2022). Credit: SIDRIM, Ana Elisa Galvão

Case 2: The Biomas project
The program was created by the Good Food Institute Brazil (Ambiel et al., 2021) and aims to provide financial support for research on how native Brazilian species can be used.

- Brazilian bio-plants (e.g., cupuaçu, baru, babaçu) could be used to develop the plant-based meat chain, particularly by **identifying and improving innovative ingredients and protein sources**.
- The program also aims to support environmental protection and the development of local communities.
- The case illustrates how nonprofit organizations can lead research initiatives.

Case 3: BRF developed plant-based products using “carioca bean” (feijão carioca).
In its search for local protein sources, BRF - under the Veg & Tal brand - has developed plant-based products that use proteins derived from carioca beans.

- In addition to the possibility of **reducing costs**, this ingredient is also attractive to consumers because it is widely consumed in Brazil.
- This experience shows how the industry has researched and developed alternative sources of protein.
**Raising consumer awareness**

**Why this is important**

- The growing number of flexitarians and consumers willing to try alternative proteins is related to the desire to consume responsible products that leave less of an environmental footprint and do not cause animal suffering;
- To make more informed purchasing decisions, it is important for consumers to be aware of the benefits of plant-based meats and that some companies offering plant-based products also invest in animal-intensive farming practices;
- Consumer awareness can help increase sales of smaller and plant-based-only companies, promote their availability in supermarkets, and lower prices.

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People on the front lines can identify key players (retailers, nonprofits, private companies, plant-based producers):

- Who are involved in educating consumers about the link between meat consumption and environmental impacts and animal suffering, to provide advice and guidance on important issues that could be addressed regarding plant-based meat.
- Who may be involved in discussing and defining policies related to intensive animal-based agriculture, innovation in the agriculture sector, and entrepreneurship.

Although information on the benefits of alternative proteins has been available for some time, consumers still lack knowledge. Therefore, there are opportunities to develop campaigns that highlight these benefits:

- For retailers: we did not observe any online communications addressing these benefits during our data collection. These are initiatives that could be explored.
- For plant-based firms: The same was observed for most plant-based products, as messages on their packaging in many cases focused only on attributes such as meat-like, GMO-free, and nutritional information (B12, iron). Campaigns could address the environmental and animal welfare benefits of plant-based meat as well.
Linking plant-based products to the **conscious consumption movement**, in which consumers emphasize their power over the market through their own consumption choices, can help accelerate the food system change.

- Frontline individuals can work with governments, nongovernmental organizations, and activists to educate consumers about products and their **individual, environmental, and social benefits** (Kopplin & Rausch, 2021).
- Raising public awareness that plant-based products come from different and more **sustainable production systems** may encourage some consumers to support plant-based production and consumption (Martin, Lange & Marette, 2021).
- Brazilian consumers are sensitive to **animal welfare** issues (Anderson & Tyler, 2018), but less sensitive to issues related to the environmental impacts of meat production (Hötzel & Vandresen, 2022). Consequently, the first aspect is indeed one that should be emphasized in this country.

Frontliners should also note that the market for plant-based products can increase its purchasing volume if products are **not only targeted at vegetarians**.

- **Plant-based products may be attractive to meat reducers** who want to reduce their consumption of animal meat, flexitarians who eat a semi-vegetarian diet, or even omnivores who do not have a special diet or focus on eating animal meat (Szejda et al., 2020; Zhao, Wang, Hu, & Zheng, 2022).
- **Flexitarians, who adopt a semi-vegetarian diet, are an important segment** driving the boom in plant-based meat substitutes, as they seek a more sustainable and healthier meat substitute (Boukid, 2021).
- In the U.S., for example, vegans and vegetarians make up 3% of the population, while flexitarians constitute approximately one-third (Choudhury et al., 2020).

**Key arguments:**

Arguments for increasing consumer awareness include:

- The more consumers are aware, the more sales of plant-based products will increase;
- This initiative is in line with and will strengthen the company's sustainability strategy;
- This is an opportunity to differentiate and add value to plant-based products;
- Flexitarians are the target market, but need to learn more about the benefits of plant-based meat;
- This is an opportunity to increase Brazilian consumers' willingness to pay for plant-based products;
- It is an opportunity to increase the company's benefits to society, the environment and animal welfare.
Suggestions to frontline persons to increase consumers' awareness:

**Decouple plant-based products from vegan or vegetarian products:**
- This can attract the interest of a much broader range of consumers (e.g., flexitarians, meat reducers, omnivores).
- Brazil has a higher percentage of omnivorous consumers (75.5% of the total sample in large urban centers), and is more open to trying plant-based products compared with other Latin American countries (e.g., Argentina, Uruguay) (IICA, 2022).
- This can be done by positioning plant-based meats in areas that are different from those for vegan/vegetarian products; for example, as mentioned earlier, by positioning plant-based products near the meat sector.

**Educate consumers:**
- Consumers still know little about the impact of what they consume (e.g., individually, socially, environmentally).
- Frontline individuals can help retailers educate consumers in the buying process (online and at the point of sale), through campaigns and promotional periods focused on green products and signal the benefits of plant-based products (online and in-store).
- Plant-based companies can also highlight these aspects through their sales channels, packaging and advertisements.

**Promote advertising campaigns:**
- Frontline people can promote government or nongovernmental advertising campaigns to inform consumers of the impact of their meat consumption on their health, the environment, and animal welfare.
- In these initiatives, it is important to emphasize that there are plant-based exclusive firms that are likely to have the greatest benefits since they do not sell animal-based products.
- In terms of Brazilian consumer behavior, providing information about animal welfare may generate greater willingness to pay for plant-based products than information about environmental impacts. Again, this can be done by retailers and plant-based firms to reinforce the social and environmental benefits of plant-based products.
- Frontliners may advocate in favor of intensifying promotions for plant-based products. Brazilians are very price sensitive when it comes to meat consumption (Hötzel, & Vandresen, 2022), so the use of promotions (as well as price reductions) can encourage the transition to plant-based products.
- Plant-based exclusive firms could be advised to differentiate themselves as being producers of plant-based alternatives only (and, therefore, not associated with animal-based meat production). This could be a way to add
value to their products and improve their availability and sales. Such differentiation may be signaled on firms’ websites and in their campaigns, packaging, and advertainments.

**Conduct research on consumer purchase decisions and behavior:**
- Frontline people could approach universities, research institutes, firms, and nonprofits on the alternative protein landscape, emphasizing the need for further research on consumer awareness attitudes in Brazil (and other LMICs).
- Some possible subjects for research in this regard could be:
  - How aware are consumers of the benefits of plant-based alternatives?
  - How aware are they of the differences between plant and animal-based production processes?
  - How aware are consumers of the differences between plant-based exclusive firms and the firms that produce both animal and plant-based meat?

**Illustrative cases**

**Case 1: Providing further information may lead to purchases.**
Martin, Lange & Marette (2021) aimed to test how consumers' awareness of sausage production and its effects changes their purchase preference and willingness to pay.
- In the experiment, information on environmental and health impacts alone was not sufficient to equalize purchase preference and willingness to pay between plant-based and animal-based (pork) sausages. However, in the second round, information on the health impacts of eating meat of animal origin led to parity in willingness to pay between the products in the experiment.
- The study shows the importance of sales in raising consumer awareness by disseminating information on the consequences of eating meat or plant-based products.
- It also shows that providing information can actually increase sales.

**Case 2: Benchmarks from Veganuary campaigns.**
The following publicly available materials may support the initiatives of frontliners by providing ideas and references regarding how to use Veganuary campaigns to increase consumer awareness.

https://defaultveg.org/#!/fortheplanet
Empowering smaller and plant-based exclusive firms

Why this is important

- This initiative will increase the availability of products that are animal-free or not indirectly related to intensive animal-based agriculture (e.g., meat processors’ plant-based products).
- Moreover, it will lead to cost and price reductions (e.g., due to sales volume increases, or less dependency on traditional ingredient suppliers).

Individuals working on the front lines with plant-based companies, whether in technology development or product portfolio launches, should:
  - be on the lookout for product segments that have not been sufficiently explored in the plant-based market. They could constitute greater hurdles to retail commercialization.
  - invest in improving quality and sensory attributes.

In addition, it may be difficult for companies to enter the retail and distribution chains if they do not have the necessary knowledge.

Key arguments:

When reaching out to firms, frontliners may emphasize that the proposed initiatives are aiming at:
  - Increasing consumer acceptance;
  - Differentiating their products with better quality and sensory attributes;
  - Exploring underexplored market segments;
  - Increasing scale and sales volume;
  - Facilitating product entry to retailers.
- Increasing the firm's overall competitiveness;
- Strengthening the economic sustainability of the business in the mid and long term;
- Adding environmental and social value to their products.

**Suggestions to frontline persons to increase consumers' awareness:**

**Act cooperatively to increase competitiveness:**
- Cooperative actions to develop products, improve quality, purchase imported inputs or distribute products to retail chains, for example, could **reduce transaction costs** and help these firms **reduce prices** and become more competitive.
- Develop joint initiatives to improve consumer awareness of the benefits of plant-based meat and the differential of plant-based exclusive products (as not being related to intensive animal agriculture).
- Plant-based firms could partner with retailers to offer their products with exclusivity, such as the “vegan butcher” sector developed by Carrefour and the plant-based exclusive firm Verdali, as shown above.

**Differentiation as a business strategy:**
- Due to the logistics and distribution costs of the frozen meat chain, plant-based meat firms are at a **competitive disadvantage** compared with animal meat processors that sell plant-based products.
- Plant-based firms should look for product segments not offered by larger companies (meat processors) or develop products that are truly different from those offered by these companies (e.g., ingredients, texture, taste).
- Examples are Brazilian companies such as Amazonika Mundi, which produces exclusively plant-based products with typical Brazilian ingredients, and Future Farm (Fazenda Futuro), which developed innovative products, such as plant-based minced meat, which requires investments in R & D (see illustrative cases below).
**Focus on innovation:**
- Small businesses and startups can act in disruptive ways to break from the standards for providing products on the market, but have difficulty raising capital for research and development.
- Frontline people who work have connections with the government and its funding agencies and should seek exclusive funding and support for small plant-based companies.
- In addition, these firms should be encouraged to form development and technology transfer partnerships with universities and research centers.

**Develop courses and education programs:**
- Frontliners could also organize courses (in partnerships with universities and nonprofits) for these firms. Subjects that could be addressed include:
  - Technical courses and coaching focusing on improving the sensory properties and quality of products;
  - How to market and develop consumers awareness;
  - Developing brands and differentiating plant-based exclusive firms;
  - How to enter the frozen food chain and distributions channels;
  - Negotiation with stakeholders (retailers, suppliers);
  - Building strong relationships with retailers;
  - Positioning plant-based meat in supermarkets (online and in-store);
  - How and where to obtain funding and investments to expand the firm.

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**Illustrative cases**

**Case 1: Amazonika Mundi and the use of Brazilian ingredients.**
Amazonika Mundi works exclusively with Brazilian ingredients, differentiating itself from other plant-based companies that depend mostly on imported raw materials. Furthermore, the company positions its brand as a "clean label", with all products presented in clear language, without technical terms, in a list of ingredients that consumers are familiar with.
Case 2: Innovative product: Future Farm’s minced meat

Future Farm, a Brazilian company that produces exclusively plant-based products, has developed mincemeat and promises to be the only one on the market that offers the same taste characteristics as animal meat, but with much more sustainability.


Case 3 – Research for product innovation

Embrapa is a Brazilian research agency that focuses on the agriculture sector. It has supported the development of novel types of products, in some cases in partnerships with plant-based firms. The picture shows the innovative Plant-based kofta. The experiment shows that public agencies can support the research and development of new types of products that can be explored by smaller and plant-based exclusive firms.

Source: provided by Embrapa Agroindústria Tropical Lab. Multiusuário de Química de Produtos Naturais. Used with permission.

Case 4 – Ideas, lots of ideas for startups

The following website provides several ideas and resources that can be used by frontliners to make suggestions to startups (or to organizations that support them) on how to promote plant-based meat.

https://gfi.org/resource/promoting-plant-based-items-on-menus/
Why this is important

- These initiatives will help to develop the institutional environment required for the plant-based meat sector to expand and will support the previously discussed strategies.
- Government support is necessary for the transition to alternative proteins (McClements & Grossman, 2022).
- Approaching policymakers will help to lower plant-based meat prices and increase its availability.

Frontline people could identify key actors that can be involved in discussing and drafting policies regarding intensive animal-based agriculture, innovation in the agriculture sector, and entrepreneurship, such as:

- The public sector: e.g., the Brazilian Ministry for Agriculture, Livestock, and Supplies, which sets policies for the agribusiness sector and implements innovation initiatives in the sector; the Ministry of Science, Technology, and Innovation, which sets policies for science and technology in the country.
- Brazilian research funding agencies: e.g., CNPQ (National Council for Scientific and Technological Development), and Brazilian states’ research funding agencies (e.g., the Araucaria Foundation, in Parana State).
- Universities and research centers: e.g., the Federal University of Parana, Sustainable Food Value Chain Laboratory, Animal Sciences Laboratory, and the Biotechnology department.
- NGOs that are active in the transition to alternative proteins: e.g., The Good Food Institute).

Although research agencies, universities, and NGOs may not be directly involved in setting policies, they have consistent networks and initiatives that can be used as a source for indirectly influencing policymakers.
Key arguments:

Frontline people could emphasize the benefits of improving the plant-based meat industry:

- Alternative proteins may create several opportunities for the agribusiness sector in the near future, such as in the supply of raw materials and value-added ingredients, if the increasing engagement of the public and private sectors can be achieved (Morais-da-Silva et al., 2022);
- There are opportunities for exports and international trade of plant-based ingredients, and such initiatives would reinforce the commitment (of the public sector) to sustainability and animal welfare improvement;
- There are opportunities for local development, such as in the case of developing vegetal protein from sources in specific areas, such as the Amazon (Ambiel, et al., 2021), which require research and government support.

Possible topics to be explored when approaching policymakers could be:

Ensure financial support for research:
- The possible research focus could be on new sources of vegetable protein, product innovation, and improving product sensory characteristics (similarity to animal meat) and quality.

Transfer government subsidy policies:
- Frontline people can address in their arguments the negative impacts on the environment that are stimulated by subsidizing animal-based meat.
- They may suggest positioning the country in a green subsidy policy that promotes businesses that protect the environment and public health.

Stimulate the sales of products with a lighter environmental footprint:
- Frontliners could suggest the adoption of regulations that inhibit the promotion of products with greater environmental footprints in retail outlets since promotions encourage the consumption of these products and can, therefore, contribute to the negative environmental effects of intensive animal agriculture.
- This measure has already been discussed in other countries, such as the UK (Haan et al., 2022).

Strengthen the entrepreneurial ecosystem for alternative proteins:
- Improving conditions for the development of startups and smaller firms through financial support, access to incubators and accelerators, and access to universities and courses.
**Illustrative case**

**Novel Research and Innovation Arrangements in Paraná State, Brazil.**

The Araucaria Foundation is the research funding agency of the State of Parana, in Brazil. It has developed several Novel Research and Innovation Arrangements, NAPIs (https://www.iaraucaria.pr.gov.br/#napis), which broadly aim to develop the state with the support of the state government.

- The NAPIs’ objective is the “Articulation of Academia, Companies, Government and Organized Civil Society for the co-production of knowledge and innovation”.
- In 2021, a NAPI was created to foster the alternative proteins landscape. It aims to develop the alternative protein chain in the state, coordinating the private and public sectors and academia. Resources have been invested in the project (e.g., novel product development).
- The NAPI for alternative protein was created after several initiatives of professors at the Federal University of Parana (e.g., the Animal Welfare Laboratory) and actors in the state government were approached, with some of the arguments presented above which were actually in tune with initiatives such as the NAPIs.
- This illustrative case shows that approaching policymakers can succeed, create new forms of action, and contribute to the transition to alternative proteins.
References


Appendix A - How the study was conducted

We collected product information that was available from the online stores of major Brazilian supermarkets. In doing so, we adopted the approach used in research on meat advertising in British supermarkets (Haan et al., 2022), which focused exclusively on animal-based meat.

We first selected four Brazilian supermarket chains with the largest sales, which also operate in the cities with the highest GDP (São Paulo and Rio de Janeiro): Carrefour Brazil, Pão de Açúcar, Extra and Big. During the selection process, we found that these four supermarkets are owned by only two groups: Carrefour and Grupo Pão de Açúcar (GPA). Therefore, to compensate for this concentration and increase the heterogeneity of the sample, we included a fifth supermarket, which is controlled by another group: Muffato (Table 7).

We collected information from supermarkets three times per week for five weeks, from August 5 to September 8, 2022. The selection of supermarkets and the tests of the data collection framework and its categories (product, price, promotion, product types, etc.) preceded this period. The product types were: hamburgers, sausages, minced meat, hot dogs (frankfurters), meatballs, kibbehs, and chicken nuggets.

The data collection processes and procedures were also tested in advance. We did not include in-natura meat, cuts of meat, and other products that do not allow comparisons between plant-based and animal-based products. We collected information on protein source (animal-based/plant-based), product type, company and brand, price, promotion (price reduction or multibuy), product weight, and whether the company produced items that were animal-based, plant-based, or both. A total of 8,690 cases were included in the dataset. Table 8 shows the companies identified during data collection: eleven produce plant-based products (plant-based exclusive), two produce both animal and plant-based products, and twenty-one produce only animal-based meat.

We also conducted four interviews to identify possible explanations for the study findings and to seek additional insights that might be useful when making practical recommendations that could support the transition to alternative proteins. In addition, insights from eight interviews previously conducted by the first author were used as a starting point to understand issues related to plant-based product pricing. For example, entrepreneurs, strategic managers of the plant-based industry, and experts advocating for the transition to alternative proteins were interviewed about potential causes and effects of prices and promotions identified for plant-based and animal-based meats.
Table 7 – Supermarkets.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Supermarkets</th>
<th>Total annual revenue in 2021</th>
<th>Ranking position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrefour Comércio e Indústria Ltda.</td>
<td>Carrefour BIG</td>
<td>R$ 81.1 billion</td>
<td>1st</td>
</tr>
<tr>
<td>Grupo pão de açúcar (GPA)</td>
<td>Extra Pão de Açúcar</td>
<td>R$ 29.0 billion</td>
<td>3rd.</td>
</tr>
<tr>
<td>Irmãos Muffato S/A</td>
<td>Muffatto</td>
<td>R$ 10.5 billion</td>
<td>6th.</td>
</tr>
</tbody>
</table>

Notes: The Assai Group (2nd in the ranking) was not included in the survey because it only operates wholesale. The Mateus Supermercado group (4th in the ranking) was not included because it does not operate in cities in southeastern Brazil. TSupermercados BH Comércio de Alimentos Ltda group (5th in the ranking) was not included because it does not offer its products in an online store. Source: ABRAS (2022).

Table 8 – Companies and product examples.

<table>
<thead>
<tr>
<th>Plant-based exclusive companies</th>
<th>Examples of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazonika Mundí</td>
<td>Cashew fiber meatball; Cashew Fiber Burger</td>
</tr>
<tr>
<td>D+ Vegan Food</td>
<td>Vegan Ground Beef; Vegan Beef Strips; Vegan chicken</td>
</tr>
<tr>
<td>Ecobras (Sparta)</td>
<td>Organic Soy Burger with Garlic and Olive Flavoring; Tofu Burger Sunflower and Vegetable Flavor.</td>
</tr>
<tr>
<td>Future Farm</td>
<td>Frozen Vegetable Sausage; Ground beef; Meatball; Vegetable Chicken Strips.</td>
</tr>
<tr>
<td>Mr. Veggy</td>
<td>Veggie Burgers; Chickpea burgers; Pumpkin Kibbehs.</td>
</tr>
<tr>
<td>NotCo</td>
<td>Vegetable chicken; Meat veggie burger; Vegan meat</td>
</tr>
<tr>
<td>Plant Plus Food</td>
<td>Vegetable Kibbehs; Vegetable Meatballs.</td>
</tr>
<tr>
<td>Sora</td>
<td>Multigrain Veggie Burger.</td>
</tr>
<tr>
<td>Soja Mania</td>
<td>Breaded Soy Burgers with Parsley and Garlic Soy; Soy Burgers Breaded with Fine Herbs.</td>
</tr>
<tr>
<td>Superbom</td>
<td>Veggie Burger; Smoked Vegetable Sausage; Vegetable Sausage.</td>
</tr>
<tr>
<td>The New Butchers</td>
<td>Plant Burger; Chicken Burguer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animal-based meat processors that also produce plant-based products</th>
<th>Examples of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRF</td>
<td>Veg &amp; Tal Frozen Vegetable Kibbehs; Veg &amp; Tal Vegetable Meatballs.</td>
</tr>
<tr>
<td>Seara/ JBS</td>
<td>Incrível Beef-flavored soy burgers; Incrível Chicken cubes; Beef strips</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animal-based meat companies</th>
<th>Examples of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora Foods</td>
<td>Chicken Sausages; Beef Meatballs; Smoked Thin Sausage; Tuscan Sausages; Hot Dog Sausages.</td>
</tr>
<tr>
<td>BRF (Perdigão)</td>
<td>Chicken Sausages; Smoked Pepperoni Sausages; Tuscan Sausages; Ham Sausages; Beef Meatballs; Frozen Kibbehs; Chicken Hamburgers; Beef Burgers; Breaded Chicken; Ground Beef; Hot Dog Sausages.</td>
</tr>
<tr>
<td>Carrefour (Carrefour, Veroa)</td>
<td>Beef Burger; Frozen Angus Beef Burger.</td>
</tr>
<tr>
<td>Copacol</td>
<td>Chicken sausage with cheese and bacon; Frozen Chicken Sausage; Frozen Chicken Ground Beef.</td>
</tr>
<tr>
<td>Esfíbias Dozza (Dozza)</td>
<td>Kibbehs; Fried Frozen Kibbehs.</td>
</tr>
<tr>
<td>Frimesa</td>
<td>Pork Burger; Beef Burger; Chicken Fillet; Chicken Strips; Tuscan Pork Sausage; Ham Sausage; Thin Pepperoni Sausage.</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Products</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Gran Corte Foods</td>
<td>Pork Sausage Pepper Pout; Sausage with Olive; Pork Sausage with Sun-Dried Tomato, Parmesan and Arugula; Pork Sausage with Cottage Cheese, Bacon and Beer; Chimichurri Pork Sausage; Pork Sausage with Provolone.</td>
</tr>
<tr>
<td>Hormel Foods (Ceratti)</td>
<td>Paio Sausage; Vienna Sausage with Chilled Garlic; Vienna Sausage with Seasoned Tomato; Vienna Sausage with Mustard Seeds; Silica Lemon Flavored Sausage.</td>
</tr>
<tr>
<td>JBS (Seara, Friboi, Swift, Rezende)</td>
<td>Frozen Ground Beef; Chilled Beef Minced Meat; Ham Sausage with Provolone; Pork Sausage with Garlic; Chicken Sausage; Ham Sausage with Cheese; Chicken Breaded; Beef Burger; Pork Burger; Hot Dog Sausage.</td>
</tr>
<tr>
<td>Korin Foods (Korin)</td>
<td>Frozen Chicken; Ground Beef.</td>
</tr>
<tr>
<td>Marfrig</td>
<td>Angus Beef Burger; Chicken and Beef Mix Burger; Beef Rib Burger;</td>
</tr>
<tr>
<td>Muffato</td>
<td>Beef Burger; Ground Beef; Ground Pork.</td>
</tr>
<tr>
<td>Pão de Açúcar (Taeq, Qualità)</td>
<td>Pepperoni Sausages; Tuscan Sausages; Ham Sausages; Beef Meatballs; Beef Burgers; Pre-Fried Frozen Beef Mini Kibbehs.</td>
</tr>
<tr>
<td>Prieto Foods</td>
<td>Spicy Pork Shank Sausages; Pepperoni Sausages; Ham Sausages with Herbs.</td>
</tr>
<tr>
<td>VPJ Foods (VPJ)</td>
<td>Angus Beef Burgers; Angus Prime Beef Burgers.</td>
</tr>
</tbody>
</table>
Appendix B – Promotions analysis of supermarkets

We analyzed the number and type of promotions of each of the five supermarkets during the five weeks of data collection (see Figure 8).

- Supermarket 1 promoted **animal-based products** most frequently through **discounts** (60.89%) and **plant-based products** through **multi-buy promotions** (54.10%).
- Supermarkets 2 and 3 promoted both **animal-based** and **plant-based** products most frequently through **price reductions**.
- In contrast, Supermarket 4 and Supermarket 5 had a **higher percentage of multi-buy promotions** for their **animal-based** and **plant-based products**.
- Supermarket 5 had no **price reduction promotions for plant-based products** during the five weeks of the study.

We also analyzed the percentage of price reductions in promotions for each of the five supermarkets during the five weeks of data collection (details in Figure 9).

- In Supermarkets 1 and 4, **plant-based products** had a **higher average discount** than animal-based products.
- In Supermarket 3, the discount value of animal-based (21.85%) and plant-based (21.96%) products was very close.
- In Supermarket 2, the average value of price reduction for **animal-based products** (29.60%) was **relatively higher** than the value of price reduction for **plant-based products** (22.79%).
- Supermarket 5 did not reduce prices for plant-based products, so only **animal-based products** were **promoted by price reduction** with an average percentage of 18.53%.
Figure 8 - Promotion frequencies at each of the five supermarkets.

Figure 9 – % of price reduction at each of the five supermarkets.
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