

Chicken and Burger Alternatives: Taste Test Results

1 BACKGROUND

The mass production and consumption of meat raises many concerns for the environment, human health, and animal welfare. An important part of getting average people to reduce or eliminate consumption animal products is to provide them with analogues to those products that have the same taste, feel, and are priced similarly. This reduces friction in transitioning to a plant-based diet.

Millions of dollars are being spent by animal advocates to both promote research into new plant-based meats, and to advocate for diet changes that rely on these products. There are products on the market today that purport to taste and feel like chicken and hamburgers, and we were interested to know to what extent existing products mimic chicken and beef burgers across a variety of measures.

With financial support of **Animal Advocacy Research Fund** we engaged **Precision Research** to conduct a taste test of 4 chicken alternatives and 5 beef burger alternatives, including real chicken and real beef burger in the test to have as a baseline for comparison. The taste test was conducted in Chicago facility of Precision Research with subjects well distributed across demographic and ethnic groups.

All products were purchased or requested from producers in the least altered form and products were selected with least possible seasoning. They were all cooked by a professional chef on skillets according to cooking instructions. Real chicken and burgers were purchased frozen and not seasoned and were simply one of the products included in what subjects tasted. Subjects tasted products “as is” without any condiments.

The subjects were not given any detail about of the types of products they were tasting, and the order in which the products were offered was randomized across five seatings of subjects for each product type (chicken or burger). Tasting sessions were followed up by focus group discussions, three focus groups for each product type. Participants for the focus groups were selected if they gave enthusiastic responses about at least one plant-based product tasted.

It is very important to note that these products were served bare (with no dressings or condiments of any kind) which is not how they would normally be consumed. We therefore expect that ratings of taste would be lower than if the products were offering in the manner they would normally be consumed (in a burger sandwich or in a chicken salad or burrito for example). So a product not receiving the highest rating it could get in the test does not mean the consumer would not like the product in a meal or wouldn't consider purchasing it, as we learned in the focus groups.

It is also important to keep in mind that subjects were given no information about the ingredients or any health benefits of products they were testing. Additionally they had no information about price. Ingredients, health benefits, and price all affect consumer behavior so again, these taste test results should not be taken as an indication of how consumers will react to these products in the marketplace. The taste test simply revealed how the plant-based products were rated on various taste and texture questions by chicken and beef burger eaters in comparison to actual chicken and burgers, and this did not include smell during cooking or longer-term digestibility.

This report summarizes all qualitative and quantitative results obtained from the taste test. Individual brand names used in the taste test are kept anonymous and they are referred to here by their three-digit number, but most of the producers were notified of their individual results.

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3 HIGH-LEVEL QUANTITATIVE RESULTS

Subjects rated appearance, taste, and other characteristics of products on the scale 1-9. Here we report high-level results relative to animal products. More detailed results are described in the next section.

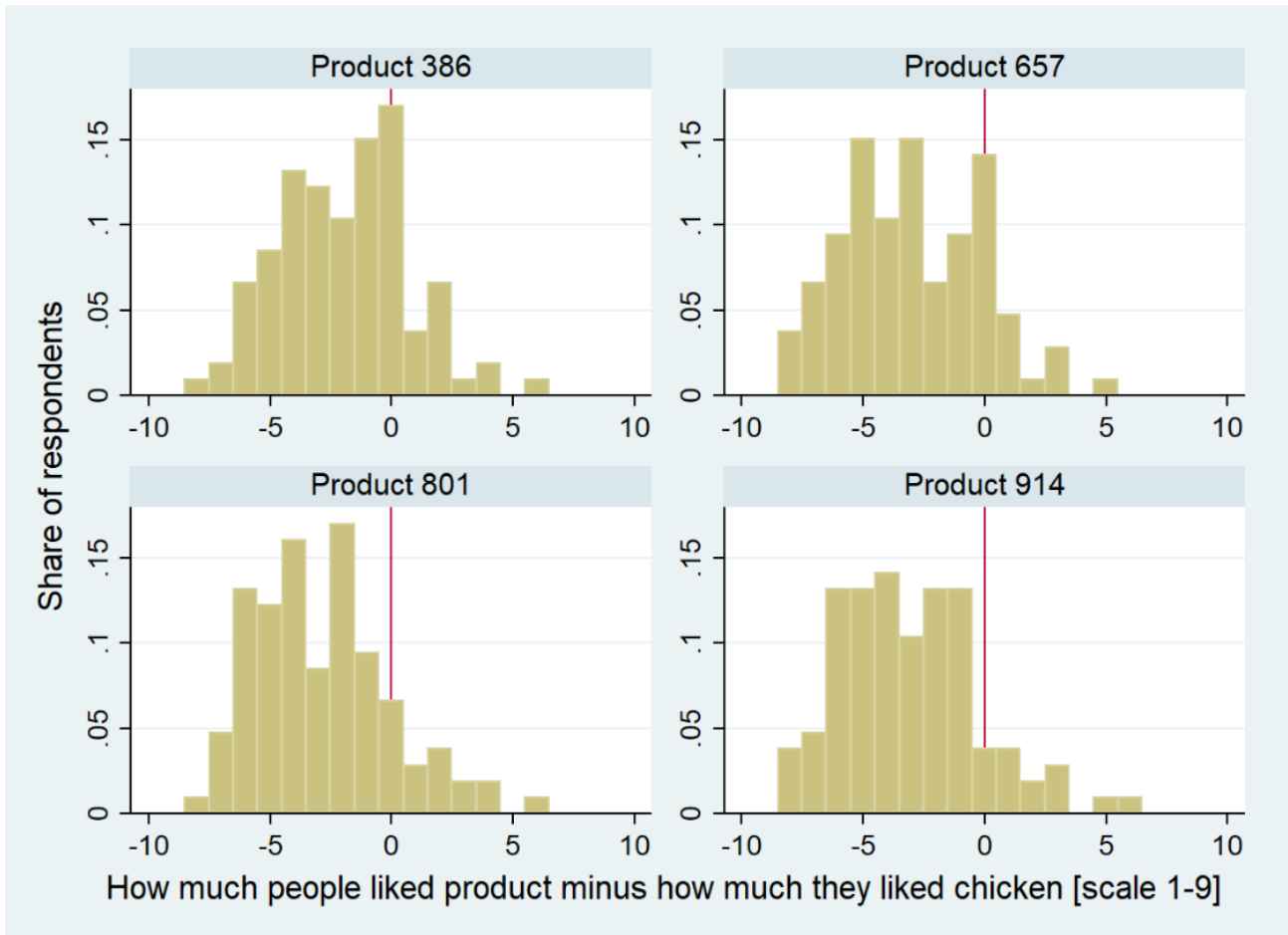
3.1 CHICKEN

106 subjects rated chicken.

- On average plant-based chicken (PBC) was rated *overall* 2.7 points lower (on a scale of 1-9) than real chicken (2 points lower for product 386, 3 points lower for other three PBC products). The standard deviation of real chicken's overall rating was 1.6, suggesting statistically significant underperformance of all but one PBC products (confirmed with t-test). Similar results are found for the product *appearance* and *texture*. Figure 1 shows a histogram of PBC's overall "like" score relative to real chicken, with 0 indicating no difference.
- About 46% of the subjects indicated that they liked product 386. For other PBC products this measure ranged from 30 to 34%, which is still considered a success in terms of product appeal in general for foods. For comparison, however, 85% of subjects indicated that they liked the real chicken they tasted (which was not identified as such).
- Subjects on average found PBC products somewhat rubbery, insufficiently juicy, and having light slightly unpleasant aftertaste.

Conclusion: Results indicate that the PBC products tested do not match well the attributes of real chicken. *That said, focus group participants, once made aware the products were plant-based, understood the health benefits and said they would consider buying some of what they tasted to be used as an ingredient in dishes. Focus group discussions however revealed little awareness of the PBC products and where to find them. Most participants did indicate that they are more likely to purchase these products now that they have tasted them. One of the strongest focus group messages was that **product sampling** might be necessary for promoting PBC in retail.*

Figure 1. PBC overall “like” score relative to real chicken on a scale of 1-9. Above 0 ratings indicate superiority to real chicken and below 0 ratings indicate inferiority to real chicken.



3.2 BURGER

107 subjects rated burgers.

- On average, plant-based burgers (PBBs) were rated 1.7 points lower (on a scale of 1-9) in terms of the overall “like” score than beef burger, with the exception of product 871, which was rated nearly the same as the beef burger. That said, none of the differences were statistically significant. Figure 2 shows a histogram of PBBs overall “like” score relative to the beef burger, with 0 indicating no difference. The results for *appearance* and *texture* for PBBs were similar, with product 871 rating identically to the beef burger in terms of appearance on average.
- Nearly 63% of the subjects indicated that they liked product 871. For other PBC products this measure ranged from 30 to 38%, which is still considered a success in terms of product appeal for food in general. For comparison, however, 69% of subjects indicated that they liked the beef burger.
- Subjects found PBBs on average to have a somewhat too strong of a flavor (the beef burger flavor was found either “just right” or “too weak”), insufficiently juicy, and having a somewhat slight unpleasant aftertaste.

Conclusion: Product 871 is seen by burger eaters as generally analogous to a real beef burger with other products needing improvement. *As was the case with PBC, focus group participants, once made aware the products were plant-based, understood the health benefits and said they would consider buying some of what they. Focus group discussions however revealed little awareness of the PBC products and where to find them. As with PBC, many participants did indicated that they are more likely to purchase these burger products now that they have tasted them. Again, one of the strongest focus group messages was that **product sampling** might be necessary for promoting PBBs in retail.*

Figure 2. PBBs overall “like” score relative to a real on a scale of 1-9. Above 0 ratings indicate superiority to real ground beef burger and below 0 ratings indicate inferiority to real ground beef burger.



4 DETAILED ANALYSIS OF PRODUCT ATTRIBUTES

Respondents were questioned on the variety of product attributes. Appendix 1 provides exact questions that the respondents were asked with response options they were given. This section provides main findings from quantitative analysis and supplements it with information from qualitative analysis.

4.1 CHICKEN

We combined all responses to the questions of like and dislike into three categories: like (regardless of degree), dislike (regardless of degree), and neither like nor dislike. The following charts show the share of the respondents in the like or dislike categories, omitting the responses “neither like nor dislike”.

On the question of “**like overall**” the respondents showed clear preference for real chicken, with over 80% liking it. The best performing PBC was product 386, in which 46% of respondents liked it and the same share disliked it overall. All other products received nearly twice as many “dislike” ratings as “like” ratings.

Keep in mind the products were tested in their “naked” form and not the way they would normally be consumed. Once subjects were made aware the products were plant-based, they indicated a willingness in many cases to use them in dishes.

In terms of **appearance** all PBC products were liked less than real chicken, but product 386 was liked nearly as much with only a small share of respondents disliking the appearance. Next best was product 801 with more respondents liking its appearance than disliking it. The remaining two products had more “dislike” than “like” responses. These two products came in the form of “shredded chicken” and were served in a little plastic cup (as opposed to on a toothpick), so it is no surprise that respondents were not impressed with their appearance.

One characteristic of appearance that we asked about explicitly was the **color**. Over 80% of respondents found that the color of real chicken was “just right,” and nearly the same number felt the same way about product 386, largely explaining its overall high appearance “like” rating. The remaining 20% felt that product 386 was “too light.” Over 50% of respondents felt that product 914 color was “just right,” with most of the rest seeing it as too light. For the remaining two products nearly as many people found it too dark as “just right.”

Focus group discussions revealed that not all respondents thought they were tasting chicken or chicken alternatives. Some thought they are tasting pork or some form of tofu. Most focus group participants

Figure 3.

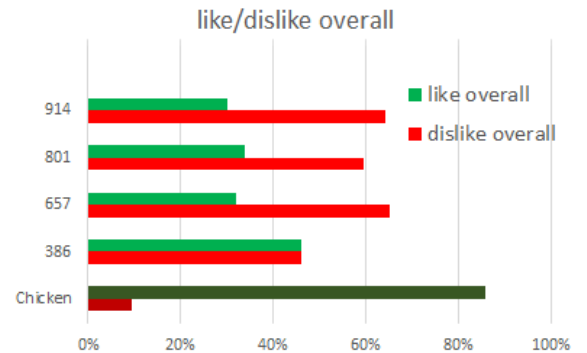


Figure 4.

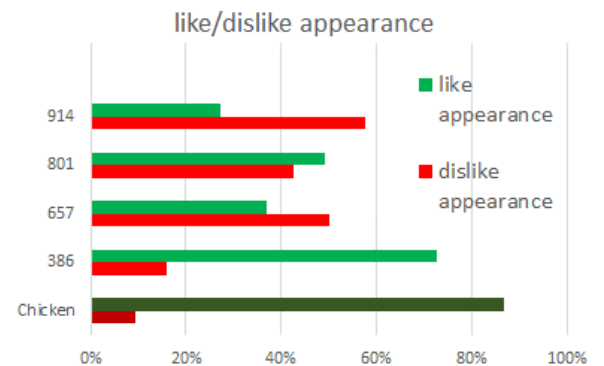
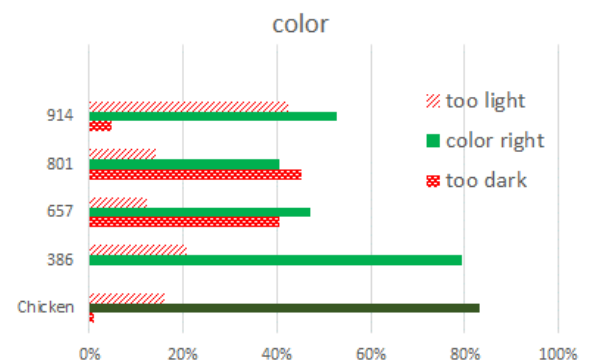


Figure 5.



did feel that the PBC products were processed and not real chicken – this mostly resulted from the form of these products rather than taste: respondents were not accustomed to buying real chicken in that form.

Texture seems to be an important factor in respondents disliking most of the PBC products and the fact that product 386 outperformed the rest. For all tested PBC products, only between 20 and 40% of respondents liked the texture.

Figure 7 shows the details of what people disliked about the textures and consistency of different products. Except for product 386, the respondents found PBC products to be too dry and with texture that is either too soft and mushy or too firm and rubbery, especially when compared to real chicken.

These same concerns were raised in the focus group discussions. Participants felt that they need to mask taste and texture of the products within dishes if they were to use them at all. With regard to shredded products, participants were concerned how one would deal with them if they came frozen in shredded form.

Figure 6.

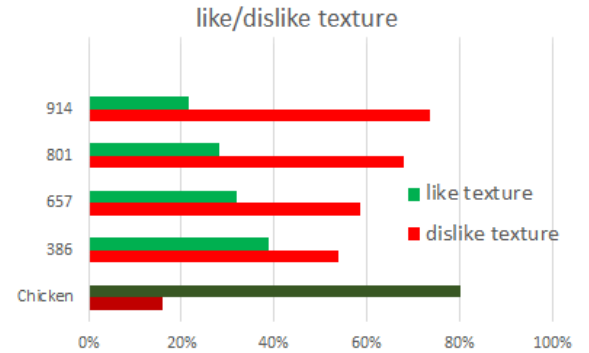
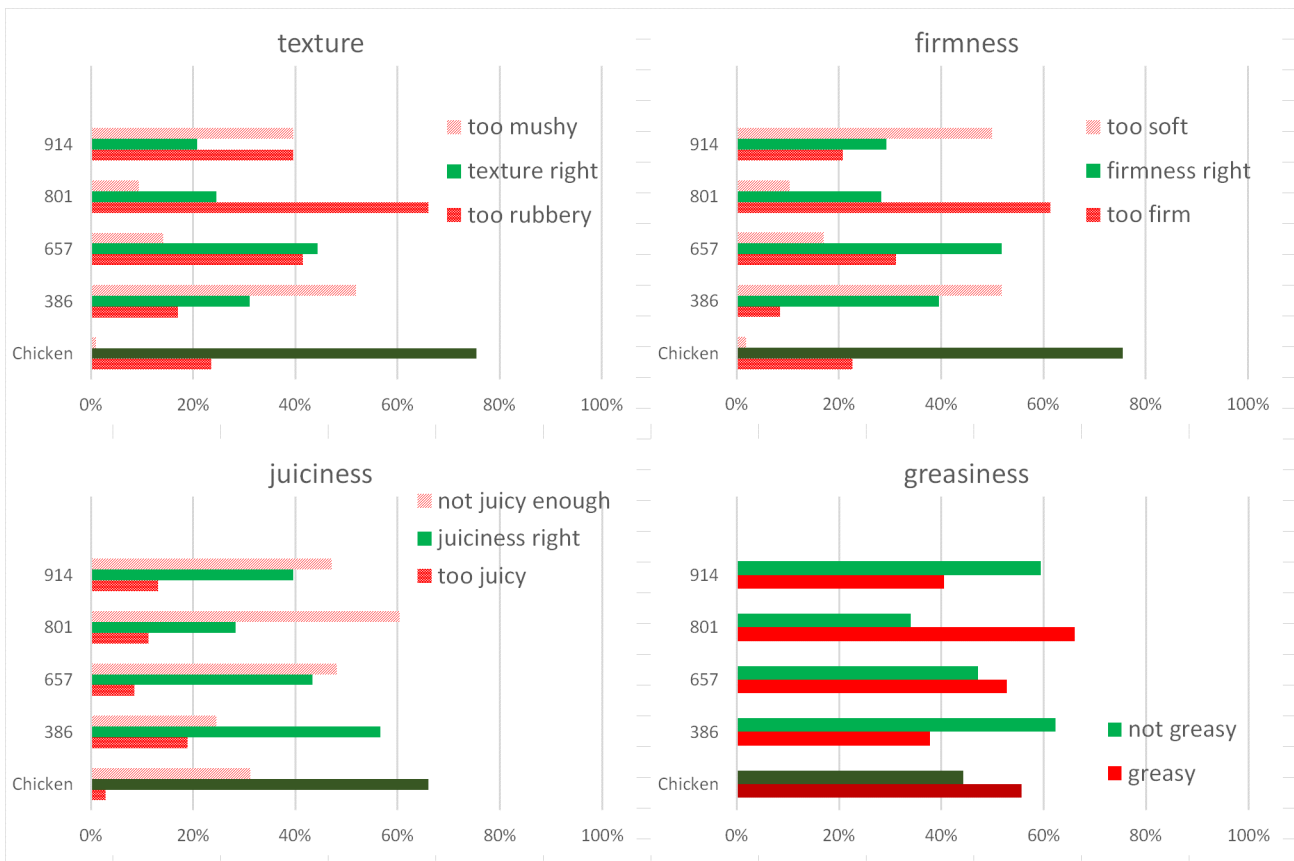


Figure 7. Texture and consistency of chicken alternatives.



Most respondents found the **flavor** of PBC products to be unsatisfactory. For product 657 and, to a lesser extent, 801, the respondents found the favor to be too strong. At the same time, they found flavor of 386 to be too weak. Interestingly, despite the fact that real chicken was not seasoned in any way (except it was washed in brine by the manufacturer prior to being frozen), more than 50% of the respondents found its flavor to be just right.

It is important to point out that all PBC varieties had some seasoning in them from the manufacturer. This explains why for each product a substantial number of respondents found the flavor too strong, while nearly none reported this for real chicken.

Most respondents also found PBC products to have strong **aftertaste** or some unpleasant aftertaste. Product 386, again, did better than other PBC products with more people reporting small pleasant or no aftertaste. None of the PBC products, however, matched real chicken in terms of very limited aftertaste.

The final question asked respondents was how would they **use**, if at all, each product. Figure 10 shows the results. Note that the scale goes beyond 100% because respondents could indicate more than one use, unless they indicated that they would not use it at all. Over 50% of the respondents indicated that they would not use products 914, 801, 657. In focus groups it became clear that for products 914 and 657 this was partly due to the unusual form – people did not really know what they would do with shredded chicken. Reasons were different for product 801 - most focus group participants were put off by the texture and the “over processed” appearance of the products.

For those participants that indicated they would use the PBC products in some way, most common use was as salad topping.

In general, focus group participants were pleasantly surprised when they learned that all but one product was plant-based. Most of the focus group participants (who were selected based on liking at least one PBC), said they would use at least one of the products at home. Almost none seemed to be aware of availability of such products in stores. Some expressed concerns about how processed the products were and wanted to know more about ingredients and nutritional values, but generally agreed that plant-based products are likely to be healthier than real chicken.

Figure 8.

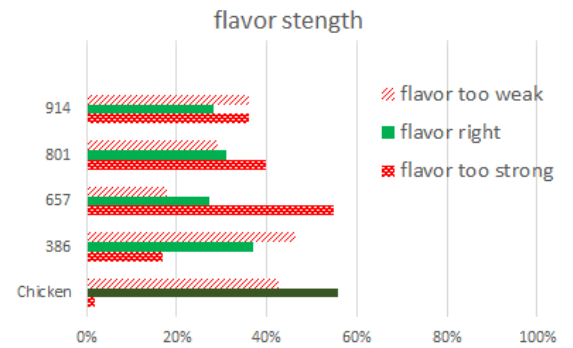


Figure 9.

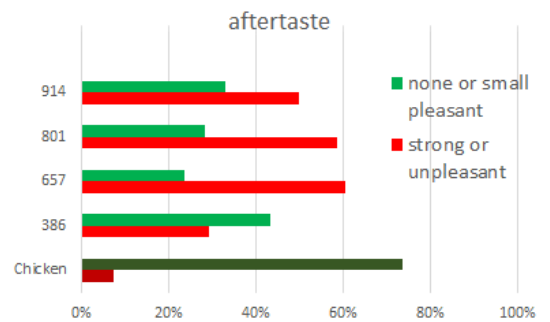
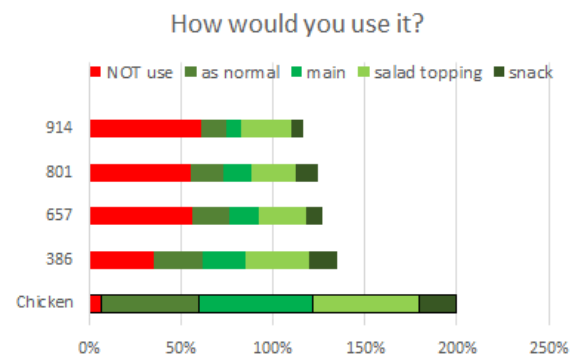


Figure 10. How would you use it?



4.2 BURGER

We combined all responses to the questions of like and dislike into three categories: like (regardless of degree), dislike (regardless of degree), and neither like nor dislike. The following charts show the share of the respondents in the like or dislike categories, omitting the responses “neither like nor dislike”.

On the question of “**like overall**” the respondents showed similar preference for a real beef burger and product 871, with over 60% liking these products. All other products received substantially more “dislike” ratings than “like” ratings, with products 754 and 343 performing slightly better than products 241 and 614.

As with PBC, PBB products were tested in their “naked” form, without additional seasoning, condiments, or anything else that normally accompanies a burger.

In focus group discussions a number of people indicated that they would give higher ratings to PBB products if they knew these were plant based, because of different expectations. The expectations were partially set by the burger patty form of PBB products.

Over 60% of respondents like the **appearance** of product 871 and of the real beef burger. Nearly 45% of respondents liked the appearance of product 754. For other PBB the “dislike” responses substantially exceeded the “like” responses.

One characteristic of appearance that we asked about explicitly was the **color**. For all but one product, the majority of respondents felt that the color was about right. The one exception was product 614 that majority of the respondents found to be too light, although 26% found it too dark. It is possible that some of the variability was due to different degree the product was cooked for different seatings.

The appearance did not come up much in focus group discussions, apart from the shape in which PBB products were served (quarter of a patty). Most people did not think of a patty-shaped products as ground beef alternative, but just as burger.

Figure 11.

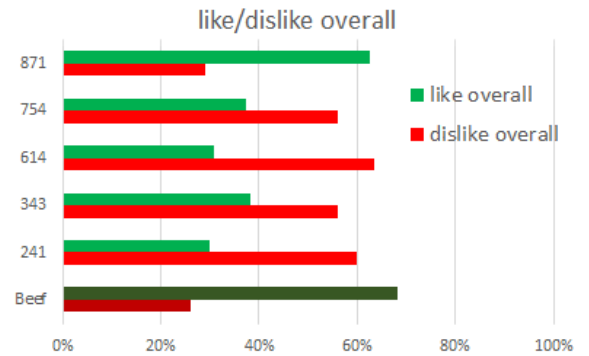


Figure 12.

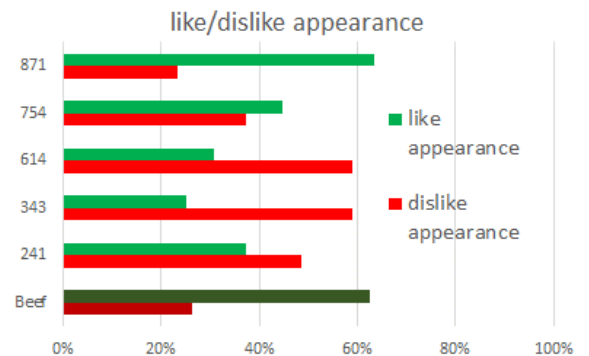
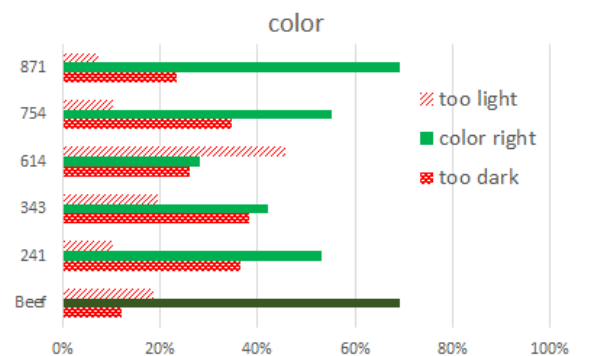


Figure 13.



Texture was rated substantially lower for all PBB relative to the real beef burger. For product 871 more respondents like the texture than disliked it, but the difference between those two groups was not very large. For other products “dislike” texture was nearly twice as common a response than “like” texture.

Figure 15 shows the details of what people disliked about the textures and consistency of different products. Respondents found product 343 to be too dry, while products 871, 754, and 614 were found too greasy. Product 241 was rated similar on greasiness to the real beef burger but was found too rubbery or too firm by many respondents. Product 614 was found to be too mushy or soft. Overall, it seems that the respondents who disliked the texture could not quite define why not, or perhaps the questions did not cover their particular concerns.

Focus group discussions revealed really negative reaction to products that seemed mushy. At the same time people liked when products were cooked so that they had crispy crust.

Figure 14.

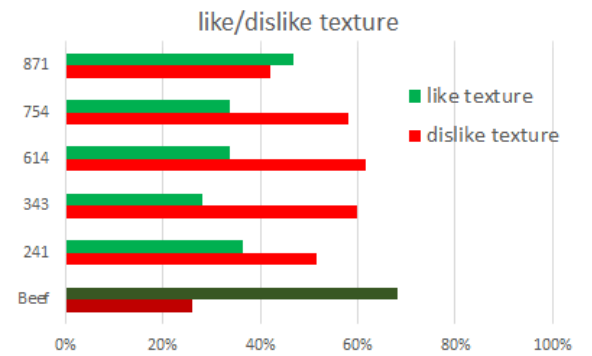
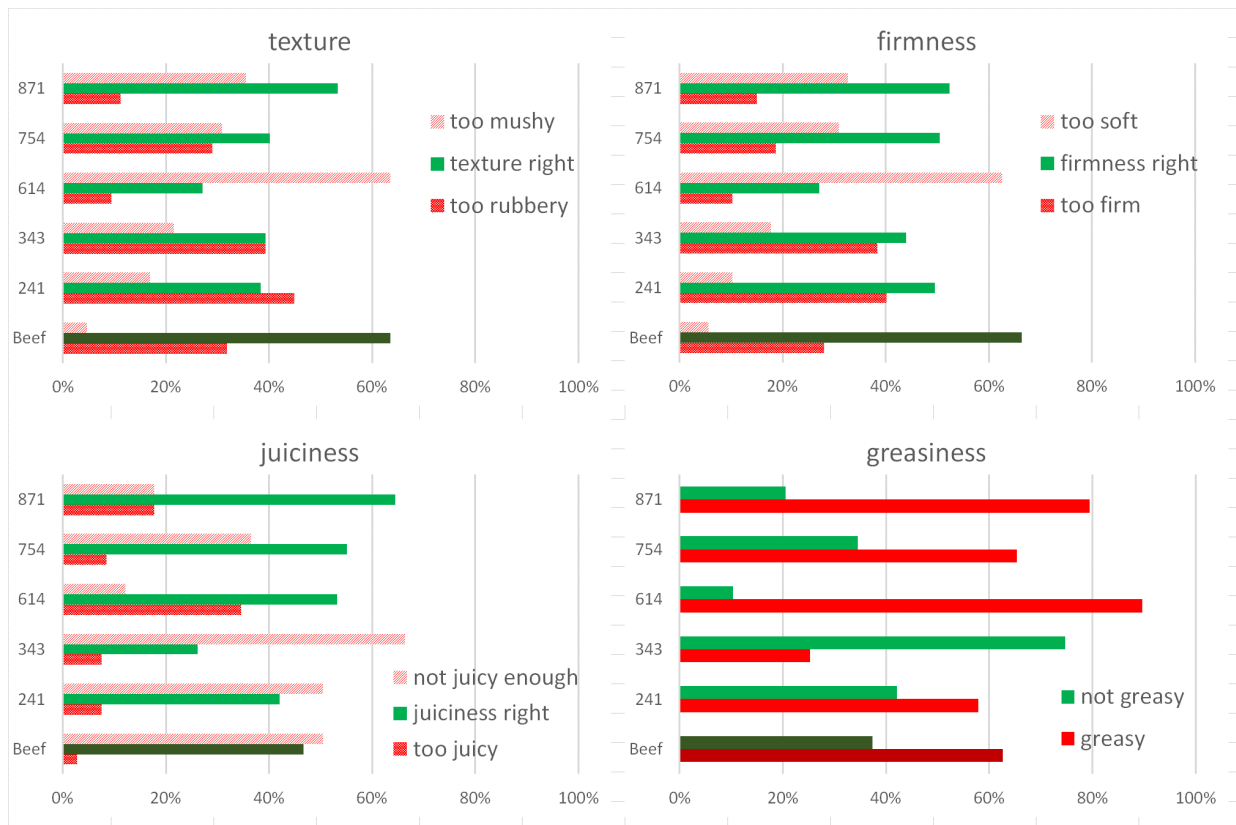


Figure 15. Texture and consistency of burger alternatives.



Most respondents found the **flavor** of PBB products, with the exception of 871, to be too strong. Just over 50% found product 871 and the real beef burger to have the right amount of flavor.

It is important to point out that all PBB varieties had some seasoning in them from the manufacturer while real beef burger did not. This explains why for each product a substantial number of respondents found the flavor too strong, while very few respondents reported this for the real beef burger.

Most respondents also found PBB products, again with the exception of product 871, to have a strong **aftertaste** or some unpleasant aftertaste. More responders reported a none or small pleasant aftertaste for product 871 than a strong or unpleasant aftertaste. None of the PBB products, however, matched the real beef burger in terms of very limited aftertaste.

The final question asked respondents how would they **use**, if at all, each product. Figure 18 shows the results. Note that the scale goes beyond 100% because respondents could indicate more than one use, unless they indicated that they would not use it at all. 36% of responders indicated they would not use product 871. For other PBB this response was recorded by over 50% of responders. For the real beef burger only 20% indicated that they would not use it.

For those participants that indicated they would use the PBB products in some way, most common use was as normal or as a main course.

Some focus group participants indicated likely convenience of the PBB products with fast cooking time. Convenience in preparation as well as health benefits seem to be selling points for PBB.

Some focus group participants suspected that some of the products they were tasting were made of beans, vegetables or both. Many participants expressed interest in the products after they learned they were plant-based, provided they have better nutritional qualities than real beef, in order to reduce the amount of red meat in their diet.

Figure 16.

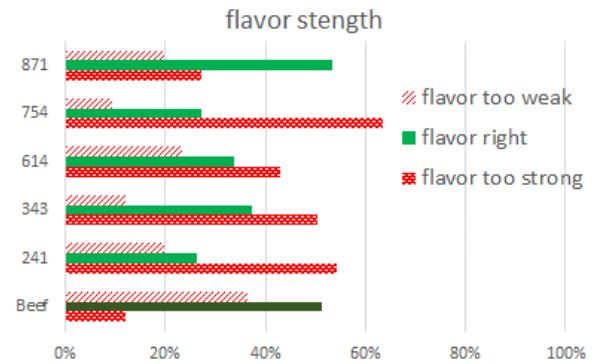


Figure 17.

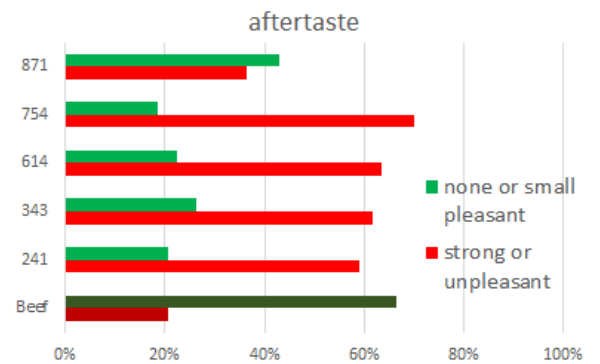
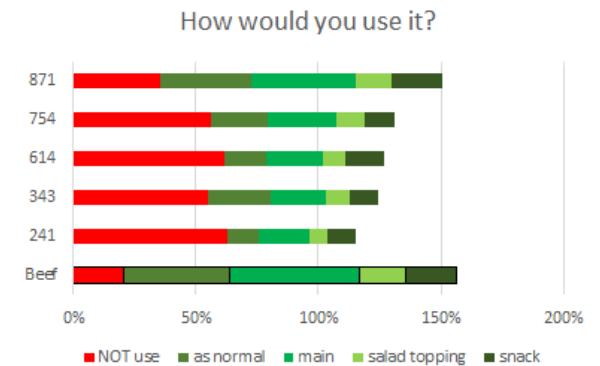


Figure 18. How would you use it?



For both the chicken and burger focus groups, health concerns were brought up as the only reason to potentially use the products. Concerns for the environment, animal welfare, or resources were not mentioned by participants.

Price was not explicitly discussed, but it came up in connection with needed to taste the product before buying. Participants seemed to be OK paying a little more for PBB products, but only if they knew what to expect.

Like PBC, participants said that product sampling would be an important way for them to be introduced to these products.

5 CONCLUSIONS

This taste test suggests that there were no plant based chicken products in the test that, when tasted bare and without condiments, seemed analogous to chicken by chicken eaters. There were however products that once revealed as plant-based, sparked an interest in purchase to be used in dishes, provided the products did not seem to have too many ingredients or be overly processed.

This taste test suggests that there was one plant based burger product in the test that, when tasted bare and without condiments, seemed analogous to a beef burger by burger eaters. Like plant-based chicken, there were however products that once revealed as plant-based, sparked an interest in purchase to be used in dishes, provided the products did not seem to have too many ingredients or be overly processed.

These findings are most significant for brands that are purchased in grocery, where the consumer might taste them outside of a prepared dish or with condiments. For brands that always reach consumers in a prepared dish (for example served prepared in restaurants or food service,) it may be less significant that the core plant-based product does not rate as well as the actual animal product.

The almost complete absence of plant-based chicken and burgers that rate equivalent to the animal products they seek to replace suggests that more research is needed to create and bring to market at least one plant based chicken that seems to chicken eaters to be analogous to real chicken. And even for beef burgers, it would probably be good to have more than one brand that burger eaters rate as analogous to a beef burger.

This does not however mean that existing plant-based chicken and burgers do not have a potential consumer base among meat eaters. But it does suggest that these products should be marketed to be consumed in prepared dishes or with condiments.

The focus groups revealed that consumers are aware of the health benefits of plant-based chicken and burgers, and they value those health benefits, while environmental or animal benefits are not part of their consideration. Participants indicated a willingness to purchase some of these products if they understood the ingredients, and if the pricing was acceptable.

A major finding of the focus groups is that average chicken and burger eaters are not seeking out plant-based analogues, and so being offered free samples is a prime way to introduce them to these types of products.

Based upon these findings, we recommend more research into plant-based chicken alternatives with a goal to create products that share the same basic properties as chicken, and more research into the potential ROI for plant-based meat companies and advocates to offer product sampling of plant-based meats.

APPENDIX 1. QUESTIONNAIRE (DEMOGRAPHIC AND SCREENING QUESTIONS OMITTED)

As you go through this questionnaire, please use only the "next" button at the bottom of each page. Please do not use your browser's back button.

Today you will be tasting several samples. Note you may not be tasting what someone next to you is tasting. Please eat enough of each sample to form an opinion.

Remember we want your honest opinions. There are no right or wrong answers, we are simply interested in what you think.

If you have any questions at any time, please raise your hand and speak with your server. Thank you for participating.

You will now be trying a sample of **NUM**. Please talk to the attendant and make sure you have product code number: While you are waiting, please take a bite of a cracker and a drink of water to cleanse your mouth. When you receive the sample, please **DO NOT EAT THE SAMPLE UNTIL YOU ARE INSTRUCTED TO DO SO**. The first question is focused **ONLY** on the appearance. You will then be instructed to eat the sample to form an opinion before answering more questions. Please click "Next" to continue.

Q10 How much do you **LIKE** or **DISLIKE** the **APPEARANCE** of this 871 OVERALL?

- Dislike extremely (1)
- Dislike very much (2)
- Dislike moderately (3)
- Dislike slightly (4)
- Neither like nor dislike (5)
- Like slightly (6)
- Like moderately (7)
- Like very much (8)
- Like extremely (9)

Q131 Now please try the sample.

Q11 How much do you **LIKE** or **DISLIKE** this **871** **OVERALL**?

- Dislike extremely (1)
- Dislike very much (2)
- Dislike moderately (3)
- Dislike slightly (4)
- Neither like nor dislike (5)
- Like slightly (6)
- Like moderately (7)
- Like very much (8)
- Like extremely (9)

Q12 What, if anything, do you **LIKE** about this **871**?

Q14 What, if anything, do you **DISLIKE** about this **871**?

Q15 How would you describe the **strength of the FLAVOR** of the product?

- Much too weak (1)
- Somewhat too weak (2)
- Just about right (3)
- Somewhat too strong (4)
- Much too strong (5)

Q17 How much do you **LIKE or DISLIKE** the **OVERALL TEXTURE** of the product?

- Dislike extremely (1)
- Dislike very much (2)
- Dislike moderately (3)
- Dislike slightly (4)
- Neither like nor dislike (5)
- Like slightly (6)
- Like moderately (7)
- Like very much (8)
- Like extremely (9)

Q18 How would you describe the **TEXTURE** OVERALL?

- Much too soft/mushy (1)
- Somewhat too soft/mushy (2)
- Just about right (3)
- Somewhat too firm/rubbery (4)
- Much too firm/rubbery (5)

Q19 How would you describe the OVERALL **GREASINESS** of the product?

- Not at all greasy (1)
- Somewhat greasy (2)
- Moderately greasy (3)
- Very greasy (4)
- Extremely greasy (5)

Q20 How would you describe the OVERALL **COLOR** of the product in terms of lightness/darkness? Is it...?

- Much too light (1)
- Somewhat too light (2)
- Just about right (3)
- Somewhat too dark (4)
- Much too dark (5)

Q21 How would you describe the **FIRMNESS** of product **871**?

- Much too soft (1)
- Somewhat too soft (2)
- Just about right (3)
- Somewhat too firm (4)
- Much too firm (5)

Q22 How would you describe the **JUICINESS** of product **871**?

- Not moist/juicy enough (1)
- Not nearly moist/juicy enough (2)
- Just about right (3)
- Somewhat too moist/juicy (4)
- Much too moist/juicy (5)

Q23 Thinking about **AFTERTASTE**, would you say this product has...?

- No aftertaste (1)
- A slight aftertaste (2)
- A moderate aftertaste (3)
- A strong aftertaste (4)
- A very strong aftertaste (5)

Q24 Is the **AFTERTASTE**...?

- Very unpleasant (1)
- Slightly unpleasant (2)
- Neither pleasant nor unpleasant (3)
- Slightly pleasant (4)
- Very pleasant (5)

Q26 How would you see yourself using this product. *Please select all that apply.*

- As an ingredient in a dish you normally prepare (1)
- As a main course, either seasoned or topped with a sauce (2)
- As a salad topping (3)
- As a snack (4)
- I would not eat this product (5)