Unified strategy for marketing kelp products
Aaron Cappelli
11 APR 2022

Summary: Domestic kelp is finding footing as a new crop in the US food market. However, it is still facing the hurdles of any new product with regard to market acceptance and scalability. Several line-grown kelp companies have arisen over the past five years and are experimenting with products to suit the American palate. Atlantic Sea Farms (ASF)[i] is the leader in the industry and has created a portfolio of award-winning kelp products like kelp kimchi and frozen kelp cubes for smoothies. As they build out and optimize their product mix, they must continue raising awareness amongst their target consumers while also appealing to a wider audience. As the market grows, ASF must also consider where to expand kelp cultivation, where competitors could start kelp operations, and which coastal areas are amendable to kelp farming in terms of both an ecological match and policy alignment. This study summarizes strategies to bring novel kelp products to market while also considering the policy implications and geographical limitations associated with the expansion of kelp farming in Maine and Massachusetts.

Target Consumers: An important first step for any new product is to identify the consumers who are most likely to adopt it. For ASF, this generally means consumers who are interested in sustainability, eat healthy foods,[ii] and shop at ASF's current retail partners like Wegmans, Whole Foods, and Sprouts. As ASF continues to expand its consumer base, there are several factors that may need particular focus to achieve success in the broader market. For example, there is a split between men and women in their perceptions of kelp which has implications for new customer acquisition. One study found that men were 18% *more* likely to purchase seaweed products than women.[iii] Furthermore, women were willing to pay $1.74 *less* than men for the seaweed product.[iv] In this particular study, the kelp product was randomly priced in a normal distribution with an average of $1.50 +/- $0.50. This means that women wanted a discount of $1.74 on a product with an average price of $1.50. Another way of phrasing this is that women wanted to be paid $0.24 to try the kelp product. This indicates that convincing women to buy kelp is typically a harder sell than convincing men to buy. ASF needs to identify the marginal consumers in male/female/family demographics and determine targeted marketing strategies based on their demographics and the specific product being marketed. The fact that ASF is a woman-owned company can actually be a point of leverage when marketing to hesitant female consumers. This puts ASF in a unique position to target the female consumer base more conscientiously than if it were a male-owned company. Since ASF's customers are currently 70% women,[v] this shows that ASF is successfully overcoming this hesitancy with its current promotion strategy. The opportunity, therefore, is to scale the current promotion strategy to continue to attract women in the broader market while also crafting promotions that attract more male consumers since they have a higher willingness to pay for kelp, are more likely to buy kelp, and may have lower customer acquisition costs when compared to females.[vi]

Product Strategy: **Fermented -** ASF's flagship products are its fermented offerings. Generally, fermented and Asian flavors are increasing in popularity in the US, especially in millennial populations.[vii] Working with influencers/chefs that trend well with millennials would showcase fermented and Asian flavors to audiences that are generally more willing to experiment and already have an affinity for this type of food.[viii] Partnering with popular restaurants that already target millennials provides a direct way to introduce this market to a product in a physical setting and in a sensory application they ostensibly

prefer. In addition, cobranding with a popular brand like Sabra would expose more target consumers and even marginal consumers to ASF since hybrid products can double the likelihood of increased purchase.[ix] ASF products could potentially pair as a dipping sauce or a flavoring agent incorporated into a typical Sabra hummus blend. Cobranding increases salience amongst consumers and can get them to lower their hesitancy to try the new product while leveraging the more established brand's reach and consumer base.

Frozen – Frozen products present another opportunity to introduce kelp to new consumers. Hedonic studies demonstrated that formulations that had a higher kelp flavor had lower scores than the formulations with less kelp flavor.[x] ASF's kelp berry cubes are a good entry product to introduce new consumers to kelp while balancing the kelp flavor with more traditional fruit flavors. As mentioned earlier, women/primary shoppers are less likely to try kelp products and could be persuaded to experiment with kelp if presented with a berry option.

Smoothie shops provide a great channel through which to introduce frozen kelp flavors to unaware consumers and make them more curious about ASF kelp products since people who visit smoothie shops are more likely to experiment with new fruits and flavors.[xi] Expanding ASF partnerships from local smoothie shops to regional and even national brands would expose ASF to a larger audience of consumers who are more willing to experiment with new flavors. Leveraging existing retail partnerships would be another way to promote the cubes by having smoothie product demos at Whole Foods and Sprouts. Given that men are more likely to try stronger kelp-tasting products, placing standard kelp cubes with male-targeted athletic beverages/shakes could also increase trial, while targeting fruit cubes to female-targeted athletic beverages/shakes may do the same. If possible, collecting data on which type of people ordered plain kelp cubes vs fruit blend kelp cubes could give more clarity on how kelp products of different flavors and intensities encourage or discourage purchase. Larger smoothie shop companies like Smoothie King may have more access to the consumer data of those who purchased the kelp cubes and could share it with ASF to create a better understanding of consumer preferences.

Market Growth and Product Prioritization: Getting good data on where, when, how, and to whom products are selling is crucial to scaling efficiently and targeting consumers effectively. As relationships with retailers grow, and by leveraging data from direct-to-consumer (DTC) transactions, ASF can begin creating consumer profiles and modifying its promotion tactics accordingly. ASF has a DTC, restaurant, and retail presence. While each channel can have different consumer profiles, using one to inform the other could be beneficial. The most data to which ASF has direct access are the data from the DTC online sales. Being able to associate consumer demographics with purchasing behavior and the impacts of specific promotions will help ASF better understand what resonates with consumers and give ASF the information to craft social media campaigns that efficiently target these consumers. Working with consumer panel data companies like Numerator or 8451 could provide the data aggregation which would allow for more insights into consumer behavior.

Key demographic differences in social media behavior by race, gender, and income can give good information on where ASF should spend its advertisement dollars. For example, if ASF wants to target white women making over $75K with kids, they should use Pinterest and Instagram, which lead all of the other social media companies in traffic by these demographic categories.[xii] Highlighting the nutritional benefits and presenting easy-to-cook, family-focused recipes on these social media platforms with chefs and influencers could help convince the family food purchaser to experiment with the new ingredient.

Regional and Policy Complications: As ASF considers expansion or even areas where potential competitors could start kelp operations, it must consider the state and local policies that govern the management of the near-shore areas where aquaculture operates. ASF operates in Maine, where aquaculture is governed under the centralized management of the Department of Marine Resources (DMR). This centralization allows for a unified policy that is informed by decades of productive waterfront management, allowing experimental leases and generally being favorable to kelp aquaculture expansion. Furthermore, ME is a proponent of Dillon's Law home rule governance structure in which "local government only exercises (1) powers expressly granted by the state, (2) powers necessarily and fairly implied from the grant of power, and (3) powers crucial to the existence of local government."[xiii] This essentially means that since the state of Maine/DMR has not expressly granted coastal management power to local governments, the DMR is able to exercise more centralization of aquaculture permitting. This system of governance has led to a healthy aquaculture sector in ME and has allowed ASF to establish a competitive advantage over kelp producers in other states due to its achievement of scale and beneficial regulation environment.

However, not all states share the same legislative perspective. While Massachusetts is another home rule state, it is not a proponent of Dillon's Rule, which means that local municipalities can exert more control over local charters and ordinances.[xiv] The implications for aquaculture, in general, are significant, as local municipalities have limited the number of new aquaculture leases being opened and are even complicating the renewal of current leases. This has slowed the approval of new aquaculture and the renewal process for existing plots resulting in a sluggish acreage expansion from about 1,000 to only 1,300 over the past decade.[xv] Inserting kelp into this MA aquaculture environment adds another confounding variable. Kelp is actually able to sidestep most of the municipal approval process that slows down traditional aquaculture leases since it is not regulated like a typical oyster crop.[xvi] This should theoretically alleviate the concerns caused by conservative home rule policies. However, the nearshore ecology of MA is not conducive to standalone kelp aquaculture for a number of reasons. The water in Cape Cod Bay/Massachusetts Bay is relatively shallow and extends far from the MA shore, resulting in limited access to deep and colder waters.[xvii] Furthermore, there are not many large watersheds dumping fresh water into the salt water and creating optimal water conditions for kelp.[xviii] ME, on the other hand, benefits from nearshore deep water, has a number of freshwater and nutrient inputs in the Casco Bay area, and has more genetic diversity of kelp compared to MA, which is a benefit when selectively breeding strains for commercial purposes.[xix] While these ecological differences may not be exhaustive when comparing differences in kelp yields, kelp projects in MA have not been able to match the yields of ME kelp despite large financial investments in infrastructure and kelp breeding.[xx] The only scenarios where it would make financial sense to grow kelp in MA is in conjunction with existing shellfish aquaculture where co-cropping diversifies the income stream and the shellfish infrastructure is already in place.[xxi] However, any potential gain from scaling of this symbiotic co-cropping relationship would be hobbled by the MA home rule policies that have already been discussed. Therefore, the limitations of the local ecology on kelp growth, coupled with the restrictive policies that constrain the expansion of shellfish aquaculture which could make kelp a viable co-crop, damages the ability of MA to be a desirable location for southern expansion and lowers the chance of a potential competitor expanding a successful kelp operation. Some better candidates for southern expansion could be the waters near Long Island and Connecticut since they share some similarities to ME with regard to nearshore deep water as well as freshwater inputs.[xxii] Determining if these locations have the ecological conditions and

the aquaculture policies and infrastructure in place that are conducive to commercial kelp operations is beyond the scope of this paper but is an interesting topic for future study.

Summary and Next Steps: ASF is well-positioned to continue bringing kelp into the American mainstream with its innovative products and retail partnerships. Investing in the data capabilities to develop actionable consumer insights and targeting will increase the reach of ASF brands. In the longer term, ecological conditions could be a limiting factor if ASF expands south since the right mix of salt water, fresh water, water depth, water nutrients, and local kelp genetics may not be optimal in every potential location. State-by-state aquaculture management policies are still catching up to the expanding interest in kelp and pose uncertainties with regard to how easy it will be to adapt ASF's successful kelp model in ME to the rest of the US coast. Working with scientists to determine the right mix of ecological conditions that support commercial-scale kelp aquaculture, while also considering the state-specific policies which may either support or hinder kelp aquaculture operations, will help ASF expand in a targeted way while avoiding unsuccessful projects in unfriendly states and unproductive waters.

Exhibits:

Exhibit A: Kelp formulations and Sensory Ratings[xxiii]

Table 4.5 Consumer acceptance of bread containing seaweed [a]

Mean 9-Point Hedonic Attribute Ratings [b]					
Attribute	**Flake**	**Meal**	**Powder**	**Probability**	**Significance [c]**
Appearance	6.9 ± 1.5 ab	7.5 ± 1.1 a	6.5 ± 2.0 b	0.0001	***
Color	6.9 ± 1.5 ab	7.3 ± 1.2 a	6.6 ± 1.9 b	0.0157	*
Aroma	6.6 ± 1.5 a	6.7 ± 1.5 a	5.6 ± 1.8 b	0.0001	***
Taste	6.7 ± 1.5 a	7.0 ± 1.4 a	5.3 ± 2.0 b	0.0001	***
Texture	6.7 ± 1.7 ab	7.1 ± 1.6 a	6.4 ± 1.8 b	0.0124	*
Overall	6.7 ± 1.5 a	7.1 ± 1.3 a	5.6 ± 2.1 b	0.0001	***

[a] Means ± standard deviation (n=65) followed by a different letter within the same row are significantly different from each other (Tukey's HSD, $p \leq 0.05$).

[b] 9-point hedonic scale: 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, 9 = like extremely (Peryam & Pilgrim, 1957).

[c] One-Way Analysis of Variance between sample groups: * < 0.05, ** < 0.01, *** < 0.001, NS = No significance.

Exhibit B: Demographic Influences on seaweed flavor acceptability in bread[xxiv]

Table 4.13 Two-way analysis of variance (ANOVA) of demographic influences on bread acceptability [a]

Category	Seaweed Bread Formulations [b,c]			Mean values
	Flake	Meal	Powder	
Gender (n=65)				
Male (n=25)	6.8 ± 0.3 a	7.2 ± 0.3 a	6.0 ± 0.3 ab	6.6 ± 0.2
Female (n=40)	6.7 ± 0.3 a	7.1 ± 0.3 a	5.4 ± 0.3 b	6.4 ± 0.2
Age (n=65)				
18 - 24 years (n=3)	6.0 ± 0.9 a	6.3 ± 0.9 a	5.3 ± 0.9 a	5.9 ± 0.5
25 - 34 years (n=14)	6.9 ± 0.4 a	7.1 ± 0.4 a	4.7 ± 0.4 a	6.2 ± 0.3
35 - 44 years (n=6)	7.0 ± 0.7 a	7.8 ± 0.7 a	6.5 ± 0.7 a	7.1 ± 0.4
45 - 54 years (n=5)	7.4 ± 0.7 a	6.6 ± 0.7 a	5.8 ± 0.7 a	6.6 ± 0.4
55 - 64 years (n=14)	6.5 ± 0.4 a	6.9 ± 0.4 a	4.9 ± 0.4 a	6.1 ± 0.3
65 - 74 years (n=20)	6.7 ± 0.4 a	7.3 ± 0.4 a	6.3 ± 0.4 a	6.7 ± 0.2
75 years or older (n=3)	7.0 ± 0.9 a	7.7 ± 0.9 a	7.0 ± 0.9 a	7.2 ± 0.5
Income (n=61)				
Less than $25,000 (n=6)	6.8 ± 0.7 a	7.3 ± 0.7 a	6.0 ± 0.7 a	6.7 ± 0.4
$26,000 - $50,000 (n=16)	6.6 ± 0.4 a	6.9 ± 0.4 a	5.3 ± 0.4 a	6.3 ± 0.2
$51,000 - $75,000 (n=15)	6.9 ± 0.4 a	7.0 ± 0.4 a	5.2 ± 0.4 a	6.4 ± 0.3
$76,000 - $100,000 (n=11)	7.0 ± 0.5 a	7.3 ± 0.5 a	5.6 ± 0.5 a	6.6 ± 0.3
$101,000 - $125,000 (n=4)	7.0 ± 0.8 a	7.0 ± 0.8 a	7.0 ± 0.8 a	7.0 ± 0.5
$126,000 - $150,000 (n=2)	4.0 ± 1.2 a	7.5 ± 1.2 a	5.5 ± 1.2 a	5.7 ± 0.7
More than $150,000 (n=7)	6.4 ± 0.6 a	7.6 ± 0.6 a	6.4 ± 0.6 a	6.7 ± 0.4

[a] The independent variables consist of each demographic trait, dried seaweed particle size, and their interaction.
[b] 9-point hedonic scale: 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, 9 = like extremely (Peryam & Pilgrim, 1957).
[c] Means ± standard deviation followed by a different letter within the same row are significantly different from each other (Tukey's HSD, $p \leq 0.05$).

Exhibit C: Reasons for buying marginally more seaweed[xxv]

What would make you consume seaweed bread more often [c]	
More availability	854 (23.6%)
Natural preservatives	589 (16.2%)
More seaweed flavor	237 (6.5%)
Sustainably-grown	429 (11.8%)
Minimally processed	600 (16.5%)
Lower calories	850 (23.4%)
Good source of iodine	496 (13.7%)
Less seaweed flavor	582 (16.1%)
Vegan source of vitamin B_{12}	392 (10.8%)
Organic	561 (15.5%)
Local	351 (9.7%)
Grown in Maine	232 (6.4%)
Source of antioxidants	760 (21%)
Good source of calcium	665 (18.3%)
I have no interest in purchasing	619 (17.1%)
None of the above motivates me	832 (22.9%)

Exhibit D: Willingness to Pay demographic differences[xxvi]

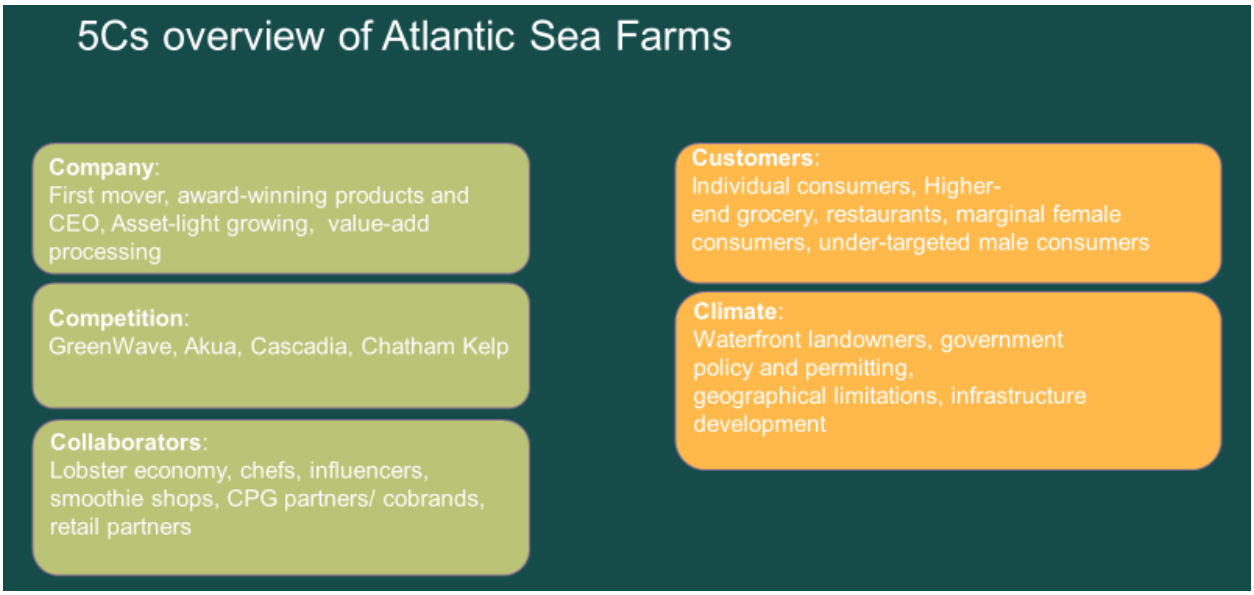
Table 5: WTP estimates associated with the variables and confidence intervals for the seaweed products

	Excludes Demographic Variables			Includes Demographic Variables		
Variable	MEWTP	Lower	Upper	MEWTP	Lower	Upper
Age (years)				-0.02	-0.05	0.02
Gender (1 = Female; 0 otherwise)				-1.74	-3.65	0.17
Primary shopper				-1.85	-3.79	0.09
Education level				0.56	-0.07	1.20
Income level				-0.05	-0.31	0.22
Minor in house				-0.66	-2.20	0.87
White				-0.82	-2.47	0.84
Need to include more healthy food				-0.53	-1.25	0.20
Need change to healthier diet				0.98	-0.02	1.98
Willing to try scientifically proven healthy food				0.26	-0.48	1.01
Snack	1.06	-0.22	2.34	1.03	-0.23	2.29
Salad	0.37	-0.69	1.42	0.16	-0.92	1.24
WTP at means	-0.02	-0.57	0.53	0.15	-0.42	0.73

Note: The delta method was used to construct the 95% confidence intervals of corresponding WTP estimated using equation 6.

Exhibit E: 5C analysis of ASF

Green: areas of relative strength. Orange: areas of potential difficulty. Red: serious threats.



Sources:

Amick, Brian. “Dining Occasion Impacts Consumer Willingness to Try New Flavors.” *Bake Magazine RSS*, Bake Magazine, 4 Nov. 2019, https://www.bakemag.com/articles/12693-dining-occasion-impacts-consumer-willingness-to-try-new-flavors.

“Athletic Greens® - Ingredients and Benefits.” *Athletic Greens*, https://athleticgreens.com/ingredients/en?gclid=CjwKCAjwsNiIBhBdEiwAJK4khqOiAwD1REvYDWhy242ZMPg-p35ZLhj0MqRuZ4LVG2u2Yuh1LjYi_hoCaHMQAvD_BwE.

Berman, Barry. “Planning and Implementing Effective Mobile Marketing Programs.” *Business Horizons*, vol. 59, no. 4, 2016, pp. 431–439., https://doi.org/10.1016/j.bushor.2016.03.006. Accessed 2 Apr. 2022.

Cappelli, Aaron, and Christopher Schillaci. “Interview with Chris Schillaci: NOAA Regional Aquaculture Coordinator in the Greater Atlantic Regions.” 24 Mar. 2022.

Carman, Tim. “For Sweetgreen, 2020 Is the Year Kelp Becomes Cool.” *The Washington Post*, WP Company, 28 Oct. 2021, https://www.washingtonpost.com/news/voraciously/wp/2020/02/11/for-sweetgreen-2020-is-the-year-kelp-becomes-cool/.

Dillon Formatted - Brookings Institution. https://www.brookings.edu/wp-content/uploads/2016/06/dillonsrule.pdf.

Home Rule | Mass.gov. https://www.mass.gov/doc/home-rule-0/download.

Hill, Sam. “Atlantic Sea Farms Doubles Its Harvest in 2020, Shifts to Retail Focus.” *SeafoodSource Official Media*, Aug. 2020, https://www.seafoodsource.com/news/aquaculture/atlantic-sea-farms-doubled-its-harvest-in-2020-shifts-to-retail-focus.

Li, Tongzhe, et al. “Is There a Potential US Market for Seaweed-Based Products? A Framed Field Experiment on Consumer Acceptance.” *Marine Resource Economics*, vol. 36, no. 3, 2021, pp. 255–268., https://doi.org/10.1086/714422.

Mayer, Marina. “Items Tagged with 'Frozen Fruit Trends'.” *Refrigerated Frozen Foods RSS*, 16 Sept. 2020, https://www.refrigeratedfrozenfood.com/keywords/frozen%20fruit%20trends.

Mayer, Marina. “State of the Industry 2017: DIPS Reign as Powerhouse Products.” *Refrigerated Frozen Foods RSS*, Refrigerated & Frozen Foods, 13 July 2017, http://www.refrigeratedfrozenfood.com/articles/93177-state-of-the-industry-2017-dips-reign-as-powerhouse-products.

“Researchandmarkets.com Adds Report: Frozen Fruit Market.” *Food & Beverage Close-Up*, 6 Jan. 2021. *Gale General OneFile*, https://link.gale.com/apps/doc/A647546084/ITOF?u=duke_perkins&sid=summon&xid=34bbf405. Accessed 2 Apr. 2022.

Rudominer, Ryan. “Corporate Social Responsibility Matters: Ignore Millennials at Your Peril.” *Center for Social Impact Communication*, https://csic.georgetown.edu/magazine/corporate-social-responsibility-matters-ignore-millennials-peril/.

Simone, Laurel. “Consumer Acceptability of Gulf of Maine Sugar Kelp Seaweed in Baked Bread.” *Electronic Theses and Dissertations. 3221.*, Aug. 2020. *Digitalcommons@UMaine*, https://digitalcommons.library.umaine.edu/etd/3221. Accessed 2021.

Sloan, A. “A New Wave of Asian Cuisine.” *IFT*, May 2019, https://www.ift.org/news-and-publications/food-technology-magazine/issues/2019/may/columns/consumer-trends-asian-cuisine.

Smoothie King Franchises, Inc. “Smoothie King Announces Shift to Cleaner Blending.” *Smoothie King Announces Shift To Cleaner Blending*, 27 June 2018, https://www.prnewswire.com/news-releases/smoothie-king-announces-shift-to-cleaner-blending-300514230.html.

“Smoothie King Franchises, Inc..” *Smoothie King Franchising*, https://www.Smoothiekingfranchise.com/why-us/faq/.

“Social Media Fact Sheet.” *Pew Research Center: Internet, Science & Tech*, Pew Research Center, 11 Jan. 2022, https://www.pewresearch.org/internet/fact-sheet/social-media/?menuItem=b14b718d-7ab6-46f4-b447-0abd510f4180.

Thomas, Brigette. “Juice and Smoothie Bars.” *IBISWorld*, May 2021, https://my-ibisworld-com.proxy.lib.duke.edu/us/en/industry-specialized/od4325/industry-at-a-glance . Accessed 2021.

Warner, Bri. Received by Aaron Cappelli, *Unified Strategy and Luke's Lobster*, Apr. 2022.

---

[i] Exhibit E
[ii] Exhibit C
[iii] Li, 14
[iv] Li, 15, 28
[v] Warner
[vi] Exhibit B
[vii] https://www.ift.org/news-and-publications/food-technology-magazine/issues/2019/may/columns/consumer-trends-asian-cuisine
[viii] www.ift.org/news-and-publications/food-technology-magazine/issues/2019/november/columns/favoring-fermented
[ix] www.refrigeratedfrozenfood.com/articles/93177-state-of-the-industry-2017-dips-reign-as-powerhouse-products
[x] Exhibit A
[xi] IBISWorld, https://my-ibisworld-com.proxy.lib.duke.edu/us/en/industry-specialized/od4325/industry-at-a-glance
[xii] https://www.pewresearch.org/internet/fact-sheet/social-media/?menuItem=b14b718d-7ab6-46f4-b447-0abd510f4180
[xiii] [xiii] https://www.brookings.edu/wp-content/uploads/2016/06/dillonsrule.pdf
[xiv] https://www.mass.gov/doc/home-rule-0/download
[xv] Schillaci interview
[xvi] Schillaci interview
[xvii] Schillaci interview
[xviii] Schillaci interview
[xix] Schillaci interview
[xx] Schillaci interview
[xxi] Schillaci interview
[xxii] Schillaci interview

[xxiii] Simone, 48
[xxiv] Simone, 59
[xxv] Simone, 28
[xxvi] Li, 38