

## **Adventurous or Neophobic? A cross-country exploration of food consumers**

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### **Introduction**

By 2050 the global population is estimated to reach 9.8 billion (UN 2017). This growth will put pressure on food production worldwide as the demand for food rises, which in turn will impact the environment, as well as consumers health and well-being. One answer to reduce the environmental and societal impact of food production is to look towards sustainable diets, with literature recommending moving away from animal-based diets toward plant-based diets (Irz et al. 2018). This means moving towards more sustainable plant foods, but potentially ones that may be 'novel' or less familiar to many consumers, particularly those in western societies, such as seaweed, so requiring them to be more 'adventurous' in their eating.

### **Background**

Demand for environmentally and socially produced products is increasing across Europe, and seaweed is a plant-based protein that offers both nutritional and environmental benefits (CBI 2021). The production of seaweed worldwide more than tripled between 2000 to 2018, up from 10.6 million tons to 32.4 million tons (FAO 2020). Whilst seaweeds are widely produced and consumed in Asia, they are largely unknown in the Western world (Hotchkiss 2010; SAPEA 2017). Indeed, in the EU, seaweed is considered a 'novel' food under EU Regulation 2015/2283 (European Commission 2015).

Modern lifestyles and eating habit changes have resulted in increasing cases of obesity and chronic metabolic diseases, particularly in Western societies. Despite much research reporting a strong nutritional and environmental case for increasing consumption of aquatic plants (Askew, 2018) and the numerous therapeutic properties of seaweeds (Suhaila et al. 2012), seaweed consumption is not high in Europe, due to lack of tradition for eating this type of protein. Whilst products containing seaweed should inspire both healthy and sustainable eating habits (Vasvada 2019), consumer understanding of such benefits represents a significant hurdle. Changing consumers' acceptability of new food product alternatives and dietary patterns to incorporate such products is also challenging, as food acceptability and food choices are

influenced by many factors, and sensory preferences play an important role (de Beukelaar et al. 2019).

Food neophobia is primarily the fear of a negative sensory food experience and has been found relevant in understanding peoples' willingness to consume seaweed (Birch et al. 2019; Moons et al. 2018). This is confirmed by Losada-Lopez et al. (2021) who found food neophobia affects the intention to consume seaweed, along with Camire and Banus (2020) who reported the limited consumption of seaweed by neophobic consumers in north-eastern states of the USA. On the other hand, consumers of seaweed products tend to be adventurous with food and willing to try new products (Altintzoglou et al. 2016), with Onwezen et al. (2018) using the adjective "innovative" to typify consumers who are more in favour of edible seaweed. Indeed, there is recent evidence in Western societies that the market for algae-derived foods is growing (Birch et al. 2019), with studies reporting increased consumer interest in some European countries (Barbier et al. 2019; Lucas et al. 2019), positive attitudes towards seaweed foods in Sweden (Wendinabl & Undeland 2020) and low levels of neophobia among consumers of seaweed in Italy (Palmieri & Forleo 2020).

Given this, the aim of this current research is to identify consumer types within three different countries who generally follow 'westernised diets', and all of which have extensive coastlines with biodiversity of seaweed varieties. By segmenting these consumers based on food neophobia and innovation with food, and profiling them based on different characteristics, the potential for seaweed consumption in western diets, and its target market can be further understood.

## **Methodology & Measures**

The study employed an online survey instrument utilising commercial consumer panels that allowed for the identification and measurement of consumer types (adventurous; neophobic) and seaweed consumption behaviour (past behaviour; future intention). Data was collected from three countries (n = 1,621): Australia (n = 521); the United Kingdom (n = 526); Croatia (n = 574). Respondents were filtered to ensure compliance with the study's requirements i.e. over 18 years of age; main/shared responsibility for purchasing and cooking food in the household. Analysis of the data was conducted in SPSS v.28 and utilised exploratory factor analysis, cluster analysis, and comparative statistical tests.

Measures in this study utilised five scales taken from previous research. Food Neophobia (14 items) was measured through a combination of the 10 item Food Neophobia Scale (Pliner & Hobden 1992), and four newly developed items (I only eat foods which are familiar to me; I dislike anything that will change my eating habits; When traveling, I search for familiar foods to eat; I am quite adventurous with food) to reflect contemporary issues and behaviour.

Innovation with Food utilised 4 items taken from Brunsø et al. (2021). Seaweed consumption behaviour employed single item measures for both past behaviour (How often have you eaten seaweed products in the past 12 months?) and future intention (How likely is it that you will eat seaweed products in the next 12 months?). Past behaviour was measured on 10 items: an 8-point scale from 'Daily' to 'Less than once in the past 12 months' and the options of 'I have never eaten seaweed products' and 'I don't know if I have eaten seaweed or not'. Future intention was measured on a 7-point scale from 1 = not at all likely to 7 = highly likely.

## **Analysis & Preliminary Findings**

### ***Sample characteristics***

Females dominated the sample in all three countries (Australia: n=315 (60.5%); UK: n=355 (68.4%); Croatia: n=358 (62.4%)) and is likely reflective of the requirement that participants were the person with the main/shared responsibility for purchasing and cooking food in the household. All age ranges were reflected in the data collected, however those aged 30-44 years were the dominant age range in all three countries (Australia: n=153 (29.4%); UK: n=242 (46.6%); Croatia: n=223 (38.9%)) followed by 45-49 years, under 30 years, and 60+ years respectively. In terms of the highest level of education achieved, this varied by country with Australia finding the highest number of respondents had obtained a trade or technical certificate (n=171 (32.8%)), whilst in the UK it was secondary school (n = 186 (35.8%)), and in Croatia an undergraduate degree (n=201 (35.0%)). However, despite this difference, the majority of respondents had one of these three levels of education, with just a small number only having finished primary school (Australia: n=2 (0.4%); UK: n=5 (1.0%); Croatia: n=4 (0.7%)). Croatian respondents were more likely to have a postgraduate degree (n=131 (22.8%)) than either respondents in Australia (n=65 (12.5%)) or the UK (n=61 (11.8%)).

### ***Identifying food neophobia and innovation with food factors***

Exploratory factor analysis (EFA) was conducted on the 14 food neophobia items and 4 innovation with food items using principal components extraction with varimax rotation as the estimation procedure (Kline 2000). Parameters were organised to assess solutions with eigenvalues in excess of  $\pm 0.5$ , as if loadings are  $\pm 0.5$  or greater they are considered practically significant (Hair et al. 2009). A forced 2-factor solution was utilised. Following this procedure, one unsatisfactory item (I will eat almost anything) was removed due to cross loading (i.e.  $>0.50$ ) (Hair et al. 2009). The EFA was re-run and the resultant rotated components matrix (Table 1) reveals a clear and substantively explainable pair of factors (Nunnally & Bernstein 1994).

**Table 1. Exploratory factor analysis.**

	Australia		UK		Croatia	
	Adventurous	Neophobic	Adventurous	Neophobic	Adventurous	Neophobic
I am constantly sampling new and different foods	.826		.762		.749	
I like to try out new recipes	.822		.795		.822	
I like to try new ethnic restaurants	.818		.715		.796	
I am quite adventurous with food	.806		.762		.780	
Recipes and articles on food from other culinary traditions encourage me to experiment in the kitchen	.801		.794		.808	
I like to try new foods that I have never tasted before	.781		.732		.730	
At dinner parties, I will try a new food	.750		.724		.546	
I look for ways to prepare unusual meals	.729		.755		.844	
I like foods from different countries	.715		6.76		.665	
I only eat foods which are familiar to me		.804		.797		.710
I am afraid to eat things I have never had before		.750		.689		.642
Food from other cultures looks too weird to eat		.732		.693		.671
I don't trust new foods		.721		.667		.646
I dislike anything that will change my eating habits		.712		.700		.708
When travelling, I search for familiar foods to eat		.697		.674		.712
If I don't know what is in the food, I won't try it		.679		.637		.588
I am very particular about foods I will eat		.656		.638		.542

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 3 iterations.

### ***Distinguishing Consumer Types***

To identify the different types of consumer with regard to seaweed consumption a two-stage clustering process was conducted (Hair et al. 2009). Firstly, a hierarchical cluster analysis was performed to define the number of clusters (2). Then a k-means cluster procedure was used to actually form the clusters.

The results of the cluster analysis are presented in Table 2. Two clusters were identified in all countries, namely 'adventurous' consumers and 'neophobic' consumers. Results show that Australian consumers are significantly more food neophobic compared with UK and Croatian consumers (60.7% versus 42.8% and 43.2%).

*Cluster 1 - 'Adventurous'*. This segment has low levels of food neophobia and high levels of food innovation. Consumers in this cluster have more experience with seaweed consumption and have eaten seaweed products more often in the last 12 months. They are also significantly more likely to consume seaweed in the next 12 months. There is a significantly higher share of younger adventurous consumers in Croatia and the UK. Furthermore, adventurous consumers in the UK are more educated, while in Croatia there is a significantly higher share of females in this segment.

*Cluster 2 - 'Neophobic'*. Consumers in this cluster have high levels of food neophobia and low levels of food innovation. There is a significantly lower share of neophobic consumers who have eaten seaweed previously, and a significant amount being unlikely to consumer seaweed in the next 12 months. In Croatia and the UK, this segment is significantly older, and in Croatia more composed of males. Regarding education level, neophobic consumers in the UK have a lower level of education.

**Table 2: Cluster Profiles**

		Australia (N=521)			UK (N=519)			Croatia (N=574)		
		Adventurous (n=205; 39.3%)	Neophobic (n=316; 60.7%)	P**	Adventurous (n=297; 57.2%)	Neophobic (n=222; 42.8%)	P**	Adventurous (n=326; 56.8%)	Neophobic (n=248; 43.2%)	P**
<b>Gender</b>	Male	35.6%	40.8%	n.s.	31.0%	32.4%	n.s.	32.8%	42.7%	0.00
	Female	63.9%	58.2%		69.0%	67.6%		66.6%	56.9%	
	Prefer not to say	0.5%	0.9%		0.0%	0.0%		0.0%	0.0%	
<b>Age</b>	<30 years	18.5%	27.2%	n.s.	25.9%	20.3%	0.00	18.7%	12.9%	0.00
	30-44 years	28.8%	29.7%		51.5%	40.1%		42.0%	34.7%	
	45-59 years	29.3%	23.7%		18.2%	32.0%		30.1%	33.5%	
	60+ years	23.4%	19.3%		4.4%	7.7%		9.2%	19.0%	
<b>Highest educational level</b>	Primary School	0.5%	0.3%	n.s.	0.3%	1.8%	0.00	1.2%	0.3%	n.s.
	Secondary School	24.9%	33.5%		28.6%	45.5%		29.8%	23.9%	
	Trade/Technical certificate	36.1%	30.7%		25.6%	20.7%		14.1%	15.6%	
	Undergraduate degree	24.9%	27.7%		32.3%	22.1%		32.3%	37.1%	
	Postgraduate degree	13.7%	11.7%		13.1%	9.9%		22.6%	23.0%	
<b>How often have you eaten seaweed products in the past 12 months?</b>	Once or more in the past month	52.2%	27.8%	0.00	20.2%	11.7%	0.00	27.0%	5.2%	0.00
	Once or more in the past 6 months	21.5%	13.0%		27.6%	14.0%		20.2%	8.1%	
	Once or less in the past 12 months	17.1%	20.6%		32.7%	29.3%		24.8%	28.6%	
	I have never eaten seaweed products	5.9%	25.6%		11.8%	35.6%		27.9%	58.1%	
	I don't know if I have eaten seaweed or not	3.4%	13.0%		7.7%	9.5%		0.0%	0.0%	
	Unlikely	15.3%	43.0%	0.00	26.9%	50.0%	0.00	37.4%	74.2%	0.00

<b>How likely is it that you will eat seaweed products in the next 12 months?</b>	Neither likely nor unlikely	10.8%	18.4%		16.8%	24.8%		11.3%	8.9%	
	Likely	73.9%	38.6%		56.2%	25.2%		51.2%	16.9%	

\*\*Chi-square test

## Future Research

Whilst this study looks at profiling adventurous and neophobic consumers across three westernised countries, future research could go further to identify what factors may lie behind these types. Future investigations may look to include measures of psychological determinants (e.g., food involvement; health consciousness; symbolic value) to assess their contribution to such behaviour.

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