Processed vegan food packaging: influencing vegan diet and lifestyle consumption choices

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Science
in
Nutrition and Dietetics

at Massey University, Albany, New Zealand

Zoe Johnson
2024

Abstract

As the demand for plant-based meat analogues (PBMAs) continues to surge globally, understanding the marketing tools that drive consumer choice becomes imperative. This thesis presents findings of a research project that explores the design and packaging of vegan food products (specifically focusing on PBMAs) and how such designs and packaging can influence consumption choices in the context of the New Zealand vegan market. PBMA products and packaging available at New Zealand supermarkets were identified and reviewed based on the design features of their packaging. This process informed the development of an online survey. The survey gauged perceptions of, and preferences regarding vegan diets and PBMA packaging. 235 participated in the study. The primary motivation for following a vegan diet was animal welfare, followed by environmental concerns and health. Factors influencing purchase decisions for PBMAs included nutrient claims on packaging, with protein having the highest positive influence. Environmental concerns also played a significant role, with eco-friendly packaging and positive environmental claims being important. Packaging images, particularly of the final prepared product, had a significantly positive impact on purchasing decisions of PBMAs. This research provides valuable insights into what can influence vegan consumer choices when it comes to purchasing PBMAs. Further research is necessary, including looking at how the market is maturing, with buyers becoming more aware of nutrients and the processing status.

Key Words: Vegan, New Zealand, Plant-based, Food Packaging, Processed Meat

Acknowledgments

I would like to thank my incredible supervisors, Dr Rachel Batty and Prof Pam von Hurst. Rachel, thank you for your kindness, compassion, and exceptional emotional and technical support over a difficult two years. Pam, thank you for your expertise and for sharing your extensive knowledge with me.

A special thank you to my mum who has given up many, many hours to proof-read and edit this thesis over the past year, I wouldn't have been able to do it without your support.

To my sister, my partner, my dad, my friends, and my wider family, thank you for always believing in me.

Lastly, I would like to thank my friends who have been on this dietetic journey with me, I would not have been able to do these past 2 years without your endless support, words of encouragement, coffee dates and beach walks.

Dedication

In loving memory of cherished brother Jack, whose laughter, zest for life, and enduring spirit have remained a guiding light throughout my Masters journey.

Table of contents

List of tables and figures

Tables

Figures

Frequently used abbreviations

PBMAs	Plant-based meat analogues
PBDAs	Plant-based dairy analogues
PBYAs	Plant-based yoghurt analogues
NIP	Nutrient Information Panel
NCD	Non-communicable disease

Chapter 1: Introduction

1.1 Background

Veganism, once on the fringes of society, is now a worldwide movement concerned with compassion, environmental awareness, and personal health (Gheihman, 2021; Lundahl, 2020). Data analysis spanning from 2015 to 2019 demonstrated a notable 105% increase in the presence of vegan claims among food and beverage products (Nunes, 2020). The leading product categories adopting these claims encompassed meat alternatives, meal replacements, snacks, cereals and energy bars (Nunes, 2020).

The history of veganism is an interesting blend of ethical, philosophical, and cultural influences, and the motivations prompting individuals to embrace a vegan diet are as varied as the movement itself (Rosenfeld & Burrow, 2017). Veganism is largely driven by three known key motivators: ethical and animal welfare, environmental sustainability, and health awareness (Janssen et al., 2016; North et al., 2021). Nevertheless, within the vegan community, diverse perspectives exist regarding the significance of various reasons, and individuals are predominantly motivated by a blend of these factors rather than single ones (Christopher et al., 2018; Rosenfeld & Burrow, 2017).

While there may be differing opinions concerning the specific motivations, veganism is undergoing a global upswing, with an estimated one to two per cent of the adult population in the United Kingdom following a vegan diet (Bryant, 2019). Notably, the hashtags #vegan and #plantbased claimed top positions among food-related hashtags on Instagram worldwide in 2022 (Kamiński et al., 2020; Sexton et al., 2022). Marked also by the significant growth of followers, it is complimented by the expanding availability of vegan and plant-based products in both supermarkets and restaurants worldwide (Gallagher et al., 2022). Even major fast food companies have jumped on board expanding their menus to cater for plant-based consumers (Kamiński et al., 2023). Examples of this trend include McDonald's McPlant, featuring a burger built around a plant-based burger patty, and Burger King's Impossible Whopper, spotlighting a burger patty crafted to emulate the flavour and texture of traditional beef (BurgerKing, 2021; MCDonald's, 2022). Popular fast food outlets KFC, TacoBell and Pizza Hut collaborated with Beyond Meat, a company that produces plant-based meat

substitutes, to create plant-based innovations including Beyond Fried Chicken and Beyond Italian Sausage Pizza (BeyondMeat, 2021).

In New Zealand, a nation historically celebrated for its robust agricultural heritage (Milfont et al., 2021), there is an apparent alignment with the broader global trend towards plant-based lifestyles. Despite the country's traditional association with meat and dairy production, the vegan movement has gained notable traction. This shift is underscored by data from Google Trends, which positions New Zealand among the top five countries globally in terms of interest and engagement with veganism (NZ Herald, 2020). The data signals a possible departure from the country's agricultural traditions, indicating a growing awareness and acceptance of plant-based practices within the New Zealand population.

Given the increasing popularity of vegan and plant-based choices, in a fast-paced world demanding quick meals and snacks, it comes as no surprise that there has also been an increase in the availability of processed vegan food products (Gehring et al., 2021). Since 2015 there have been over 6,485 launches of new products within the PBMA space (Boukid, 2021). Meat analogues have had the greatest expansion in the market, being projected to reach a staggering 3.5 billion (US) by 2026 (Boukid, 2021).

In the Australian market, the plant-based meat analogues (PBMAs) sector experienced a remarkable surge, witnessing a five-fold increase from 2015 to 2019 (Curtain & Grafenauer, 2019). This substantial growth is indicative of a shifting consumer landscape and an increasing demand for plant-based food alternatives. As of October 2023, the alternative meat sector continues to thrive in Australasia, with the emergence of 44 companies actively participating in this space across Australia and New Zealand (Food Frontier, 2023).

Examining the marketing strategies employed for PBMAs in New Zealand is crucial for gaining insights into the ever-changing consumer landscape and preferences within the nation. With the global surge in interest in plant protein (Curtain & Grafenauer, 2019), a thorough examination of PBMAs marketing becomes a valuable avenue for understanding the factors that sway consumer choices, perceptions, and the adoption of plant-based diets.

Product packaging is now considered an essential marketing tool, not only facilitating the identification, description, differentiation, and protection of the product but also serving to

capture attention and promote it effectively (Carrillo et al., 2014). Hussain et al. (2023) emphasised the significance of packaging as a major marketing instrument and a predictor of purchase intentions, concluding that the colour, quality and design of packaging have considerable influence on consumer buying behaviour (Hussain et al., 2023).

As a country, New Zealand contributes to the global discourse on sustainable and ethical food choices. The nation plays a role in shaping international food trends, and insights gained from the markets can offer valuable lessons for other regions experiencing a similar shift towards plant-based diets. Analysing PBMAs marketing and consumer perceptions in New Zealand not only aids the local industry but also enhances the global understanding of evolving dynamics in plant-based foods.

1.2 Purpose of the study

The surge in popularity of the vegan lifestyle in New Zealand is closely tied to the growing societal awareness of how consumer choices impact health, the environment, and animal welfare (Sexton et al., 2022). A notable upward trend emerged in 2022, with 43 per cent of Kiwis expressing their commitment to sustainable living, a substantial increase from the 19 per cent report in 2011 (Kantar, 2022). This shift toward sustainability has been accompanied by a significant expansion in sustainable food options, including PBMAs, available in supermarkets and online.

In light of the crucial role played by dietitians in New Zealand, who are tasked with translating nutritional evidence into practical strategies to improve community health (Dietitians NZ, 2024) it becomes essential for them to provide guidance to individuals seeking to adopt a vegan diet in a safe and effective manner. Furthermore, considering the now widespread availability of PBMAs, it is equally significant for dietitians to gain insight into the marketing encompassing these products design and packaging. Understanding how vegan consumers perceive PMBAs and the various factors that impact their purchasing decision is of utmost importance. Consequently, this study is dedicated to an in-depth exploration of this subject.

Little research has been done in New Zealand on vegan food marketing and consumer choices, this study aims to fill this gap.

1.3 Aim

This thesis will investigate how the packaging of processed vegan food in New Zealand influences vegan consumer choices.

1.4 Objectives

The objectives that align with the above aim include:

1. To review and compile a summary of the types and range of images included on processed vegan food packaging.
2. To review and compile a summary the types and range of words included on processed vegan food packaging.
3. To investigate consumer perceptions of the words and images used on processed vegan food packaging.
4. To determine how the different design elements used on processed vegan food packaging influence consumer purchase decisions.

1.5 Structure of thesis

This thesis is organised into six chapters. Chapter One serves as an introduction, outlining the research study's background, purpose, aims, and objectives. Chapter Two offers a comprehensive literature review that examines various facets, including the history of veganism, the key motivating factors behind individuals adopting a vegan diet, global and New Zealand trends in veganism, what defines processed vegan food, and an overview of food marketing with emphasis on the promotion of PBMAs. Chapter Three presents a detailed methodology overview, encompassing the study design, methodological approaches, participant recruitment, data collection procedures, analysis methods, and ethical considerations. Chapter Four combines relevant findings derived from the two phases of this study, covering the outcomes from the product audit and survey. Chapter Five engages an in-depth discussion on the key factors arising from the study's results, providing insights and interpretations. Lastly, Chapter Six functions as the conclusion, offering a summary of the

research, highlighting its strengths and limitations, and provides recommendations for future research endeavours.

1.6 Researcher contributions

Contributors	Contribution to thesis
Zoe Johnson	Primary researcher and thesis author. This research was carried out in order to fulfil the requirements for a Master of Science in Nutrition and Dietetics.
Rachel Batty Primary Academic supervisor	Academic supervisor, School of Sport, Exercise and Nutrition, Collage of Health.
Pamela Von Hurst Co-Supervisor	Academic supervisor, School of Sport, Exercise and Nutrition, Collage of Health.

1.7 Chapter summary

In summary, this chapter has presented an overview to the background of veganism and insight into the importance of this study. It has identified the studies aims and the objectives that align with this. It has provided a structure of the thesis that will follow.

Chapter 2: Literature Review

2.1 Introduction

This literature review will provide initial background information including a brief history on veganism. It will then outline the key motivations behind individuals following a vegan diet, describe veganism trends worldwide, and discuss processed vegan foods with a focus on nutrition and processed vegan meat products. This will be followed by an overview of food marketing with a specific interest in the marketing of vegan food items. Lastly, it will investigate veganism in New Zealand, and reconfirm that the research being undertaken for this thesis will contribute to the limited literature on this topic in New Zealand context.

2.2 Defining veganism

In 1944 a UK Woodworker, Donald Watson, created The Vegan Society alongside his wife and, invented the term "vegan", derived from the word vegetarianism. (Gheihman, 2021). The Vegan Society had a mission "To seek an end to the use of animals by man for food, commodities, work, hunting, vivisection, and all other uses involving exploitation of animal life by man" (The Vegan Society, 2023).

While veganism can incorporate a broad lifestyle approach, from a food perspective, veganism is described as a dietary choice whereby individuals strictly exclude any animal-derived food items from their diet (Dagnelie & Mariotti, 2017; Hirschler, 2011; Melina et al., 2016; Olfert & Wattick, 2018). The diet excludes meat, fish, milk and milk products, eggs, gelatine and often honey from one's diet. A vegan diet focuses on plant-based foods including fruit and vegetables, legumes, nuts, seeds, and grains. From a lifestyle perspective, veganism is portrayed as more than a diet, and rather a 'lifestyle choice' where individuals refrain from purchasing and using any products made from or tested on animals (Hirschler, 2011; Miguel et al., 2020). These products can include (but aren't necessarily limited to) items such as clothing, furnishings, and cosmetics.

Veganism is not to be confused with vegetarianism. They are similar in that a strict vegetarian diet does not consist of any food products where an animal has been killed, such as meat and fish. The differentiating factor between veganism and vegetarianism is that vegetarians may still include milk and milk products, eggs, and other animal-derived ingredients into their diet including honey and gelatine (Calder, 2019; Melina et al., 2016; Olfert & Wattick, 2018). There are different approaches to being vegetarian. For example, some individuals may just exclude eggs (lactovegetarian), others exclude milk and milk products but will consume eggs (ovovegeterian), and some may consume fish and/or seafood but no other meat (pescetarian) (Dagnelie & Mariotti, 2017; Olfert & Wattick, 2018). These diets all come under the main concept of "vegetarianism". The motivating factors that drive individuals to adopt a vegetarian diet are similar to those influencing vegans. Many individuals who now practise veganism previously followed some sort of vegetarian diet (Hirschler, 2011).

Despite being once considered an extreme and marginalised cultural practise, veganism has surged in popularity in recent years, transitioning from a niche movement to a mainstream lifestyle choice, even gaining the attention of celebrities and large fast food chains worldwide (Gheihman, 2021; Lundahl, 2020).

2.3 Key motivators to following a vegan diet

There are multiple motivations behinds one's choice to follow a vegan diet. Research shows that these motives often fall under three main categories: ethical considerations, health concerns and environmental impacts (Janssen et al., 2016; North et al., 2021; Rosenfeld & Burrow, 2017). Aversions, constraints, weight loss, taste preferences, friends and family influences and budget constraints are also reasons for following a vegan diet (Hoffman et al., 2013; Rosenfeld & Burrow, 2017). Rosenfeld and Burrow (2017) suggest that some individuals may hold a combination of motives, whilst others may place greater emphasis on a specific motivation.

2.3.1 Ethical Considerations

Animal agriculture leads to mass breeding and slaughter of animals, billions of animals are bred and killed each year for food worldwide. Over 90 per cent of these farmed animals live in inhumane conditions where they are often kept in cages and painfully killed (Bryant, 2019). SAFE NZ indicated on their website that in 2019 alone, approximately 4.7 million cows and 120 million chickens were killed for human consumption (SAFE NZ, 2023).

People have become increasingly aware of the poor treatment many animals receive which has contributed to the shift towards a vegan diet for some individuals (Ploll & Stern, 2020). There are certain religions, cultures and followings that have always addressed some of these concerns, for example, the Halal blessing before slaughter but it is only in more recent times that food behaviours, once personal decisions, have transformed worldwide into morally laden decisions (Henchion & Zimmermann, 2021).

Vegans believe no animals should be slaughtered for human consumption, but this is not their only concern. In addition to the eating of meat, vegans also express concerns for animal breeding, treatment during their lifetime, animal testing and the slaughter process itself (Ploll & Stern, 2020).

Multiple studies show that animal related motives play an important role in the decision for many when deciding to follow a vegan diet. A German study in 2016 found that the most common motivator for following the vegan diet was animal welfare, with 90 per cent of the study's participants reporting this (Janssen et al., 2016). Animal welfare has also been a common motive reported in other, more recent studies on vegan diets (North et al., 2021; Rosenfeld & Burrow, 2017).

2.3.2 Health Concerns

Another strong motivation behind one's choice to follow a vegan diet is personal health, as noted in several studies (Dyett et al., 2013; Janssen et al., 2016; North et al., 2021). Traditionally, a vegan diet consists of a wide variety of fruits, vegetables, whole grains, soy products and nut, providing an abundance of dietary fibre, carbohydrates, antioxidants, folic

acid, vitamins, magnesium, phytochemicals, protein, and polyunsaturated fats which are all essential for disease prevention and ideal health and wellbeing. Compared to omnivorous diets, plant-based diets typically contribute less saturated fat, cholesterol and less complications related to microbial or parasitic infestation and contamination (Dyett et al., 2013). Numerous studies have shown that a well-planned vegan diet can lower the risk of chronic diseases such as cardiovascular disease, hypertension, obesity, and type 2 diabetes (Olfert & Wattick, 2018; Tonstad et al., 2009; Trapp & Barnard, 2010). Olfert and Wattick (2018) confirm that this is likely due to the vegan diet being high in wholegrains, fruits, vegetables, nuts, legumes and unsaturated fats, all foods which contain functional components known to reduce diabetes symptoms.

Plant-based dietary patterns have also been found to positively support mental health including mood disorders such as depression. A study on dietary quality and depressive symptoms found that high quality plant-based diets were associated with a lower risk of depression in those who were either vegan or vegetarian (Lee et al., 2021).

There is often concern that a diet lacking in animal-based products may not meet certain dietary recommendations due to the nutrients like iron and vitamin B12 contained in meat and animal products. However, an appropriately planned vegan diet meets the recommendations for protein intake, iron, vitamin B12, calcium, zinc, vitamin D and omega-3 fats and is well supported and deemed appropriate for all lifecycle stages by international organisations and health professionals including the Academy of Nutrition and Dietetics (American Dietetic Association, 2003; Melina et al., 2016). Similarly, the World Health Organisation, the World Cancer Research Fund and EAT-Lancet commission all recommend limiting red meat intake due to evidence of risk to human health (Lescinsky et al., 2022). However, it is important that a reduction of meat in the diet is not replaced by highly processed vegan foods (Macdiarmid, 2022).

NZ is one of the highest meat-eating countries in the world with an estimated consumption of 72kg per capita in 2014 (Tucker, 2018). In general, dietary habits have been found too low in fruit and vegetables, wholegrains, legumes, nuts, and seeds and high in foods with added sodium and sugars (Afshin et al., 2019). This is a significant issue in New Zealand due to the current health crisis with non-Communicable diseases (NCDs) (including heart disease, stroke, cancer, diabetes, and chronic lung disease) being the leading cause of death in adults

(Cammock et al., 2021). Diet plays a critical role in the development and management of these NCDs.

In the context of health, it is important to note that not all plant-based diets are equal. Some vegans rely heavily on processed foods such as meat alternatives, which are considered ultra-processed. For example the most common dietary pattern found in a vegan study in the UK, was a diet of processed vegan foods (Gallagher et al., 2022). Many of these PBMAs are marketed as being a healthy option for a meat substitute, however, may provide undesirable nutrition and health benefits (Gehring et al., 2021). Further research into the nutritional properties and long-term health effects of consuming these plant-based meat alternatives has been recommended by various studies (Harnack et al., 2021; Toh et al., 2022; Tyndall et al., 2022).

2.3.3 Environmental Impacts

In the context of increasing global collaboration to address climate change, there is growing unity in reducing the consumption of animal products while increasing the consumption of plant-based foods. This may hold significant potential in mitigating the critical environmental challenges confronting our planet.

Animal farming has been linked to deforestation, elevated levels of greenhouse gas emissions, water pollution and biodiversity loss (Scarborough et al., 2023; Springmann et al., 2018). Research shows that agriculture uses a larger amount of freshwater than any other human activity, and meat generates higher emissions per unit of energy compared to plant-based foods (Godfray et al., 2018).

In 2019, EAT- Lancet commission published a paper on healthy diets in relation to sustainable food systems. Their recommendation was a diet that is high in vegetables, legumes, whole grains, fruit, and plant sources of protein, and low in animal sources of protein, is recommended for health gains and reduced environmental impacts (Willett et al., 2019). However, a follow up of this study in 2023 raised concerns regarding the nutritional adequacy of the original diet suggestions in the EAT- Lancet report. In March 2023 these were updated to address the micronutrient shortfalls for woman, including the suggestion of

increasing some animal sources of foods and reducing foods high in phytate in order to meet iron, Vitamin B12, zinc and calcium requirements (Beal et al., 2023).

The growing awareness of these environmental issues has resulted in more individuals seeking alternatives to traditional animal-based foods that promote more sustainable food systems. Many studies now show environmental factors ranking highly as a motivator behind the vegan dietary choice (Hoffman et al., 2013; Janssen et al., 2016). (Lentz et al., 2018; Realini et al., 2023).

According to Knaapila et al. (2022) Finnish millennials are the primary generation contributing to the rise in demand for plant-based meat alternatives, with environmental considerations being a crucial motivating factor behind these dietary choices. This has been displayed in multiple studies showing that with the global concerns about sustainability many have led to adopt a vegan diet in order to try reduce the environmental effects associated with meat production and consumption (Hoffman et al., 2013; Saari et al., 2021).

2.4 Veganism trends worldwide

There has been a global increase in the number of individuals following a plant-based diet, especially in the past few years. One to ten percent of the western populations (United Kingdom, America and Europe) have adopted some form of a vegetarian diet (Gehring et al., 2021). In the United Kingdom alone, over a half a million people follow a vegan diet, with the percentage quadrupling between 2014 and 2019 (Gallagher et al., 2022). Veganism was the most frequently searched diet in a global study done on Google search trends from 2004-2019, supporting the idea that popularity for veganism is rising around the world (Kamiński et al., 2020). According to the UK Vegan Society, it is evident that the younger generation is playing a significant role in propelling the vegan movement (The Vegan Society, 2023).

2.4.1 Gender differences

It is interesting to note that women are more likely than males to report following a meat-free diet, as supported by multiple studies (Knaapila et al., 2022; Milfont et al., 2021; Ruby, 2012). Possible reasons for this are that women tend to be more interested and focused on their health than males, have stronger moral ethics regarding animal welfare and environmental concerns, view a meat-free diet in a positive light and tend to be less interested

in being a part of a meat-eating culture compared to men (Ruby, 2012). The association between meat and masculinity has been entrenched in society for generations and is often reflected in pop-culture and advertising (Salmen & Dhont, 2023). Due to this gender bias, men find it difficult to change to a vegan diet or stick to one, with studies showing that omnivorous men commonly demonstrate negative attitudes towards vegan diets and lifestyle choices (Judge & Wilson, 2019).

2.5 The Rise of Processed Vegan foods

The term 'vegan food' refers to food products free of any animal-based ingredients. For the purpose of this study, processed vegan food refers to food that has been modified from a fresh or whole state and has not been derived from any animal product. Meat alternatives such as tofu and soy protein, have been present in the Western World for decades (Elzerman et al., 2013), however, in recent years there has been a significant transition from a niche market to a more mainstream focus with the development of products tailored to meet the preferences of meat eaters. Meat free alternatives such as burger patties, minced meat, sausages, chicken, and bacon are readily available and often placed with traditional meat products in the refrigerated sections of local food stores. A common theme of these products is their imitation of meat, from the texture to the ultimate imitation by including fake 'blood' (Curtain & Grafenauer, 2019). Although these products may seem like a healthier alternative to meat, they are typically a highly processed product.

The NOVA system is a widely used system to define food processing, its popularity resulting from being so specific and comprehensive (Moubarac et al., 2014). The NOVA classification for ultra-processed foods is foods that contain little or no whole foods and have added sugar, salt, fats, additives, and preservatives. The NOVA system suggests that when such products are consumed in large quantities, they have negative health impacts (Moubarac et al., 2014).

Processed vegan meat falls into this category of ultra-processed foods. This includes plant-based meat alternatives (PBMA), plant-based dairy alternatives (PBDA), plant-based yoghurt alternatives (PBYA), animal-free egg replacements and other processed items, for example sweet or savoury processed snacks. These foods often contain minimal whole foods, and large numbers of ingredients such as preservatives, stabilisers, sweeteners, sensory

enhancers, colours, additives, and flavours (Moubarac et al., 2014). Many are also fortified with micronutrients. PBMAs and PBDAs are often promoted as sustainable, ethical and health-conscious alternatives to traditional meat and dairy items, whilst also being positioned as similar to these conventional products in terms of shape, taste, usage and nutritional value (Fuentes & Fuentes, 2017).

The PBMA products market has significantly increased in the past years and is expected to keep gaining popularity. A report from Food Frontier Australia reported that in 2018-19, Australians spent $150- million on PBMAs and it is projected that sales will surge to $3 billion by 2030 (Frontier, 2020). Since 2015, the plant-based meat market has increased 5-fold, with over 60 per cent of products being made in Australia (Curtain & Grafenauer, 2019). The Union Bank of Switzerland estimates that the alternative-meat market will be worth $85 billion by 2030 (Gastaldello et al., 2022). Major food companies are jumping on this increasingly popular trend and expanding their products to cater for vegans (Henchion & Zimmermann, 2021). There is a growing trend towards innovative production of vegan food that has the same sensory profile as traditional animal-based foods.

2.6 Marketing Packaged Foods

In consumer-packaged goods, packaging plays a critical role, serving not only for transportation and storage but also for distinguishing products in the marketplace (Steenis et al., 2017). Packaging plays a key role in marketing and branding, and in today's highly competitive food industry, effectively captivating consumers and understanding their perceptions is imperative for success. As the most accessible marketing tool, packaging plays a significant role in attracting consumer attention as it is the first point of contact between a consumer and food product (Carrillo et al., 2014). A study conducted in 2020 revealed that packaging characteristics such as material, colour and information all influenced consumer perception of the product. Specifically, the quality, safety, and health of that product (Bou-Mitri et al., 2020). It has also been well investigated that the visual design of packing can alter consumer perception and preference, so knowing what consumers want to see is crucial (Karnal et al., 2016).

Multiple studies have looked into visual elements on the packaging of food products and have all reported similar findings. Overduin (2016) found that showing a healthy image of a product on packaging significantly increased people's perception of its healthiness and credibility compared to showing a less healthy image. Although the impact of different cognitive processing styles on visual stimuli was inconclusive, the results indicate that product imagery has a strong influence regardless of processing style. Wang (2013) study also concluded that packaging design significantly influenced positive evaluations of both product and brand. Dens (2011) reported that extensive research had examined the efficacy of visual elements in marketing, establishing a strong connection between imagery depicted on packaging and the actual product. Visual food cues serve as a fundamental sensory input, enabling individuals to make predictions about the edibility and palatability of food products because of imagery on packages (Dens et al., 2011). The significance of these cues in human information processing has been extensively investigated through much research utilising food images (Blechert et al., 2014). Blechert et al. (2014) determined that colours, such as green are particularly influential in food packaging design as green is indicative of lower calories, thereby suggesting greater healthiness.

In terms of written packaging cues, the same study from Overduin (2016) confirmed that using a health claim instead of a nutrition claim significantly improved people's perception of healthiness and understanding without decreasing the product's creditability. Other studies have also found that health related cues on packing can lead to positive attitudes towards the brand and product (Theben et al., 2020).

2.7 Vegan food marketing

In today's fast-paced world, dominated by convenience and processed foods, grasping the intricate marketing dynamics driving the rise in PBMAs is imperative within the context of a global shift towards climate-conscious, health-focused, and ethical dietary choices. The huge growth of the vegan food market in recent years has been propelled by a surge in individuals opting for vegan diets to minimise their use of animal products (Brooker et al., 2022). This surge stems from a myriad of motivations, encompassing ethical considerations, environmental consciousness, and health-related benefits. Consequently, there is heightened

demand for vegan food products such as PBMA, PBDA, egg replacements, and other innovative alternatives (Curtain & Grafenauer, 2019; Kumari et al., 2023).

Little research has been done on the word choices of the naming of PBMAs. There is controversy around the labeling of vegan meat products, with many companies now marketing their meat alternatives using words like “meat” despite the product being meat-free in the typical sense (Tyndall et al., 2022). The usage of names for meat substitutions such as a burger, steak and sausage has been deemed misleading by the Dutch Food and Consumer Product Safety Authority. They argued that these names create confusion and hinder the ability to distinguish between actual meat and meat analogues (Croll, 2021).

A number of studies have taken place that focus on the marketing of PBMAs (Brooker et al., 2022; Curtain & Grafenauer, 2019; Rosenfeld, et al. (2022). The key focus and findings from these studies are noted below.

- A study conducted in Australia explored the marketing strategies of alternative protein products over a period of 3 non-consecutive years (Brooker et al., 2022). They noticed plenty of growth and innovation from 2014-2021 with a large variety of different plant-based meats now being available. Their findings included many interesting points such as most of the packaging including an image of what the product looks like once prepared. Findings also included most products having clear packaging to allow consumers to see what they were purchasing, and well over half the products including protein-related claims on their packaging. Many included positive nutrient claims about iron, vitamin B12, zinc and fatty acids (Brooker et al., 2022). Claims related to the environment were featured on one fifth of the products. According to this study, marketing plays a significant role in shaping consumer perceptions, promoting acceptance of the product, and influencing purchase decisions regarding new food products (Brooker et al., 2022). The study reported a lack of research on protein-alternatives to meat and concluded that there was little in the way of mandatory framework around meat replacement products but that this was a growing market and monitoring of the marketing of these products would be needed.
- A study comparing plant-based meat substitutes with equivalent meat products in Australian supermarkets reported consistent marketing claims on the plant-based products. The predominant claims, featured on over 80 per cent of all products,

included ‘vegetarian, vegan, plant-based or meat-free' and 60 per cent of products made claims on protein relating to the nutrition content such as ‘high in protein” (Curtain & Grafenauer, 2019). For a product to be able to make a nutrition related protein claim they had to have over five grams of protein per serve (Curtain & Grafenauer, 2019).

- In the United States, a study found that items on a menu were 24 per cent more likely to be purchased when they were labeled as vegan compared to being labeled as plant-based (Rosenfeld et al., 2022). This was a surprising finding as they had predicted meals labeled as plant-based would appeal more to consumers than “vegan” meals.

2.8 Veganism in New Zealand

New Zealand ranks as one of the highest meat eating countries in the world, with an estimated consumption of 72kgs per capita in 2014 (Tucker, 2018). Dietary habits in the country tend to be low in essential elements like fruits, vegetables, whole grains, legumes, nuts and seeds, while being high in foods with added sodium and sugars (Afshin et al., 2019). This poses a significant issue, given that New Zealand is currently grappling with a health crisis, with non-communicable disease (NCDs) such as diabetes, heart disease, stroke, cancer, and chronic lung disease being the leading causes of death in adults (Cammock et al., 2021). Diet plays a critical role in the development and management of these NCDs.

Veganism is gradually gaining popularity in New Zealand. A growing following of the vegan diet was reported by the New Zealand Herald in 2020 and in 2022 it was with an estimated that one to three percent of the population identified as vegan (NZ Herald, 2020, 2022). Colmar Brunton (2019) research revealed that Auckland has a higher percentage of vegans (specific figures were not provided) compared to other cities in New Zealand citing motivations like health, environmental concerns, and animal welfare as driving factors for this dietary shift. Colmar Brunton (2019) also noted that millennials (born between 1981 and 1996) in New Zealand are most likely to be vegan than other generations. This may be due to the sense of responsibility this generation has to protect the environment and their open minded attitudes towards meat alternatives (Knaapila et al., 2022). In February 2021 Countdown merchandise General Manager Steve Mills reported to Stuff New Zealand that the frozen meat alternatives category had grown almost 20 per cent, and the chilled vegan food, like cheese and yoghurt analogues increased by more than 30 per cent due to a greater

consumer interest in these products (Flaws, 2021). Colmar Brunton (2019) reports that one in three people in New Zealand is actively reducing their animal product intake.

The New Zealand Attitudes and Values Study (NZAVS) involved a 20-year longitudinal study with over 47,000 respondents. Published in 2021, results found that only 1.6 per cent of participants identified as vegan, 4.6 per cent identified as vegetarian with the majority of participants consuming meat (Milfont et al., 2021). Despite these low numbers the authors anticipated a rise in individuals transitioning from a meat-based to a plant-based diet in the coming years.

A separate New Zealand study discovered that the climate impact of animal-based produce was significantly higher than that of plant-based foods (Drew et al., 2020). Particularly, the farming and processing of meat products, especially beef and lamb, were identified as having the highest levels of greenhouse gas emissions. In 2019, the agricultural sector contributed to 48 per cent of greenhouse gas emissions in New Zealand (Kidd et al., 2021). Interestingly, those reducing meat intake in New Zealand do not cite environmental concerns as the primary factor, instead claiming factors such as the cost of meat and health considerations as more important (Realini et al., 2023).

2.9 Highlighting the significance of this study

There is research on growing trends for adopting a vegan diet, and the motivations behind this. There is also research available on the health implications of a diet consisting of highly processed food products. However, little can be found on the influence that marketing has on vegans purchasing highly processed vegan food products, and no research to be found in New Zealand on this topic. The risk being that through marketing, New Zealand vegans may be influenced to replace meat products with products that are not healthy or sustainable due to their highly processed nature. Effectively, having the opposite result of motivating factors for adopting a vegan diet.

To date, most research studies on processed vegan food products have been undertaken outside of New Zealand. Although Australia offers more findings, there is still limited research available, and enormous scope for more. Although there are similar cultural factors

between Australia and New Zealand, and some of the products on the market are the same, it cannot be assumed that the perceptions and feedback of the NZ population will be the same as Australians. Other studies conducted overseas have looked into product marketing for alternative protein products, but not many have touched on how these influence consumer purchase decisions.

A recent study conducted in New Zealand found that individuals are aware that PBMAs exist, however consumption of these products is currently much lower than those in other countries (Realini et al., 2023). This study takes those findings further by exploring New Zealand vegan consumer perceptions and purchase decisions when it comes to processed vegan food products, such as PBMAs.

By way of a supermarket product audit and an online survey, this study contributes towards filling some of the identified gaps in the existing literature relating to vegan processed food packaging, and how these influence consumer purchase decisions. The following chapter will detail the methods utilised for this study.

Chapter 3: Methods

In order to address the research objectives outlined in Chapter One of this thesis, a two-phased research study was designed. The first phase of the study involved a review of processed vegan food packaging, focussing on PBMAs available within New Zealand supermarkets. The results of this first phase informed the development of the second phase of the study, involving an online survey ascertaining consumer perceptions of the packaging designs of PMBAs from vegan consumers in New Zealand. The approaches to and justification of these two study phases are detailed below.

During the study design phase, it was decided this study would specifically investigate the packaging of PMBAs rather than investigate a varied range of processed vegan food product packaging. This was due to the number of new products available on the market and the gained popularity of these vegan/plant-based meats in major New Zealand supermarkets and the lack of research to date.

Prior to any data collection taking place, an ethics application was lodged with the Massey University Human Ethics Committee. The study was deemed low-risk. A statement from the University's Human Ethics Committee follows.

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

3.1 Data Collection: Phase One

In the first phase of data collection, a comprehensive review of physical supermarket shelves in Auckland, New Zealand was undertaken. A recognised approach was used to conduct this review (Curtain & Grafenauer, 2019; Grafenauer & Curtain, 2018). This approach included visiting physically visiting local supermarkets, identifying PBMAs and photographing packaging to review. This phase involved visiting three supermarket chains and a vegan food store (The Vegan Shop). A total of ten food stores were visited: four Countdown stores, three New World supermarkets, two PakN'Saves, one Four Square and The Vegan Shop. The stores were located across a range of suburbs within the Auckland region, this included central Auckland, Albany, Milford, Browns Bay, Ponsonby, Matakana, and Newmarket.

Three of these supermarkets are owned by the Foodstuff Group; New World, Pak'nSave and Four Square. The fourth supermarket, Countdown (with stores more recently rebranded as Woolworths) is owned by Woolworths New Zealand. The Foodstuffs Group and Woolworths New Zealand were chosen as they are noted as the two major grocery chains dominating the grocery sector in New Zealand (Flux, 2023). Vegan Store is an independently owned small specialty store. Combined, the chosen supermarkets reflect the choices of PBMA products available to most vegan New Zealand consumers.

During the supermarket visits the researcher used a smartphone to take photographs of all products identified as PBMAs. These images captured all sides of the packaging to ensure that the ingredients, nutrition information panel (NIP), any health and nutrition claims, and Health Star Rating were identified. Products in the review included those designed to mimic meat but were vegan friendly. Products excluded from consideration were plant-based food items such as tofu, tempeh and falafel that are not intended to directly mimic meat products. In order to complete a comprehensive review of relevant products, an additional online investigation was carried out using supermarket websites (New World, Pak N Save and Countdown), along with the official websites of established PBMA manufacturer in New Zealand. A total of 54 PBMA products were identified in store and an additional 11 PBMA products were identified as being available online only (or not stocked in the supermarkets visited by the researcher).

From conducting the review, a total of 65 processed PBMAs were identified. The information acquired via the photographs was entered into a Microsoft Excel spreadsheet (Microsoft Excel for Office, version 16.71). Information recorded included nutrient or health claims, dietary pattern (for example, vegan), packaging features (for example, images), free-from ingredient statements (for example, soy free), other common statements (for example, positive for the environment) and other claims (such as, "New Zealand Made").

3.2 Data Collection: Phase Two

The second phase of the research subsisted of an online survey, designed using Qualtrics XM software, and distributed via an email invitation. An online survey was deemed the most appropriate for this research project based on multiple different factors. They allow for flexibility for the researcher when creating the survey such as the use of different design

elements, question formatting and having different response categories (Evans & Mathur, 2018). Online surveys have also been found to be short, cost and time effective (Nayak & Narayan, 2019). They are also convenient in that they allow participants to complete them from virtually any location or mobile device (Evans & Mathur, 2018).

3.2.1 Survey design

The online survey comprised of seven demographic questions to collect information on the participants gender, age, ethnicity, duration following vegan diet, motivations for following a vegan diet and how often they consumed processed PMBAs. This allowed the researchers to gain a better understanding of the participants' background characteristics. There were 11 survey questions relating to the vegan diet and processed PBMAs packaging (common claims, images, ingredients). Many of the questions were rating based, utilising a Likert Scale. The benefits of this type of questioning is the ability to gather data quickly from a large number of respondents (Nemoto & Beglar, 2014). A number of questions asked respondents to comment on displayed images. These images were sourced from the supermarket audit conducted in Phase One. The full list of survey questions can be found in Appendix 3.

3.2.2 Survey respondent identification recruitment

Survey respondents were identified using the 'Nutritional Research Respondents' database, complied as part of the larger vegan diet and lifestyle project being undertaken at Massey University. Participants linked with the wider study had formally agreed to being contacted for additional studies relating to the larger project. The database is officially managed by the School of Sport, Exercise and Nutrition, within the College of Health at Massey University. Research respondents listed within the database are all over the age of 18 and have previously confirmed they follow a vegan diet. Email invitations were sent to 211 individuals. This initial email invitation provided background to the research, an anonymous link to the survey and the contact details of the researcher and primary supervising researcher (a copy of this email is provided in the Appendix 1). Respondents were advised that their responses were anonymous and that their participation in the survey was voluntary. They were also advised that the survey would take approximately five minutes to complete. The survey opened on 21st August 2023. A reminder email was sent to the initial 211 individuals ten days later (a

copy of this email is provided in the Appendix 2). The survey officially closed on 6th September 2023.

3.2.3 Data and analysis

Data collected for Phase One of the study was purely descriptive in nature. This allowed the researcher to identify the characteristics and trends on the packaging of PBMA and report these findings in a descriptive manner. Data was entered into Excel (Microsoft Excel for Office, version 16.71) for recording purposes and later analysis.

Analysis of results from Phase Two of this study have been reported using the results summary data generated from Qualtrics XM software which reports the data using means, standard deviations, and percentages. Excel (Microsoft Excel for Office, version 16.71) was also used to identify respondent number.

Descriptive statistics were used to describe the participants. Numbers (n) and percentages (%) were used to describe the categorical variables including gender, ethnicity, age, vegan diet duration, motivation behind veganism and consumption of processed vegan meats.
This chapter covers in detail the approach and justification of the two study phases completed in this thesis. The following chapter will go into the results of this study.

3.3 Chapter Summary

This chapter has provided a detailed explanation of the methods of Phase One and Phase Two of the research project. Phase One involved a review of PBMA packaging available within New Zealand supermarkets. The results of this first phase informed the development of Phase Two of the study, an online survey distributed to New Zealand individuals who identify as following a vegan diet in order to gain insight into consumer perceptions of the packaging of PMBA. The following chapter will present the results from the Phase One and Phase Two of the research project.

Chapter 4: Results

This chapter begins by presenting the findings from the first phase of the research project, the audit of PBMAs available within supermarkets located within the Auckland region. These supermarkets included New World, PakN'Save, and Four Square (owned by the Foodstuff Group), Countdown (owned by the Woolworths Group) and The Vegan Shop (an independently owned vegan food store). Results from the on-line audit of PBMA products available on the websites of the same supermarkets are also presented. This chapter then turns to presenting the results from Phase Two of the research project – the findings from the online survey ascertaining consumer perceptions on the packaging designs of PMBAs.

4.1 Phase One: Processed plant-based meat analogues audit results

Four supermarkets and a vegan food store were visited by the researcher. Identified PBMAs were noted as being placed in various locations throughout the stores. In all three of the New World's, both the PakN'Save stores, the one Four Square, and two of the Countdowns visited PBMAs were found alongside traditional animal meat products in the chilled meat section. In the other two Countdowns and The Vegan Shop PBMAs were located in a separate 'vegan' chilled section. In such cases, the PBMAs were positioned alongside other vegan items (such as plant-based cheeses and yoghurts). Additional PMBAs were also located in the freezers at Countdown alongside the frozen meals. Other PBMA products such as pâté and ham which were found at New World and The Vegan Store were located in the deli section. With regard to the online audit, PBMA products were also advertised under various categories including 'meat and poultry', 'fridge', 'deli' and 'frozen'.

A total of 65 PBMAs were identified during the Phase One Audit. This included 16 chicken PBMA products, 12 bacon PBMA products, 11 mince PBMA products, 7 PBMA sausages products and 6 different types of PBMA burger patties. An additional 13 other PBMA products were also identified and grouped into a separate category which was classified as 'other'. Products in this category included a range of different PMBAs such as jerky, pepperoni, pâté, chorizo, ham, pastrami, and turkey.

Following the identification of PBMA products, attention then turned to analysing the packaging design and content of each PBMA product. This included making note of the

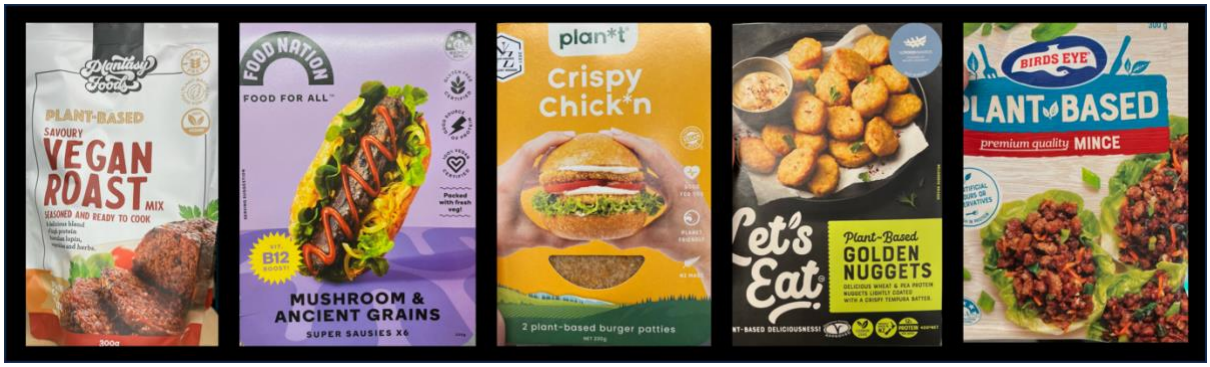
different images used on the packaging, types of packaging used, and written statements/claims found on the packaging.

4.1.1 Images used on Plant Based Meat Analog packaging

A general observation noted that frequent images included nature themes (such as leaves and trees or vegetables), or the image of a heart when there was a health claim such as "cholesterol free". Some PBMA packaging included images of fern leaves or kiwi to show it was NZ made.

Approximately two thirds of the PMBAs displayed an image of the prepared product on the packaging (n=43, 66%) either as a standalone item or part of a meal examples are illustrated in Figure 4.1. These images provided consumers with realistic visuals of the products they have an intention to purchase. Often these images were displayed as serving suggestions of how consumers could incorporate the PBMA product into a meal. As expected, majority of these images mimicked traditional meat meals and if it was unknown to individuals that they were plant-based products by looking at the images alone it could be thought they were made from animal meat. For example, images included hot dogs, burgers, nuggets, roasts, and mince and were all prepared as the traditional meat product they are replicating would be.

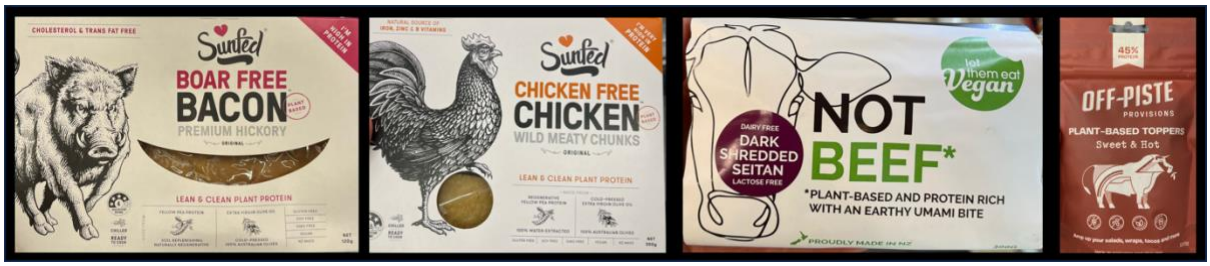
Figure 4.1 Examples of prepared products on Plant Based Meat Analogues packaging



Less than a quarter (n=15, 23%) of identified PBMAs displayed an image of animal on the packaging. Interestingly none of these animal images featured were images of real-life animals but rather, outlines or drawings of an animal. The animal shown on the packaging tended to be the animal that the PBMA product was replicating of traditional animal meat product. For example, a PBMA replicating bacon had an image of a boar on the packet.

One brand featured an animal drawing on every one of their products and these were rather detailed images however other brands chose to display images that were more of an outline of an animal. All the images tended to be displayed in black or white as opposed to a colour. Examples of such packaging are presented in Figure 4.2.

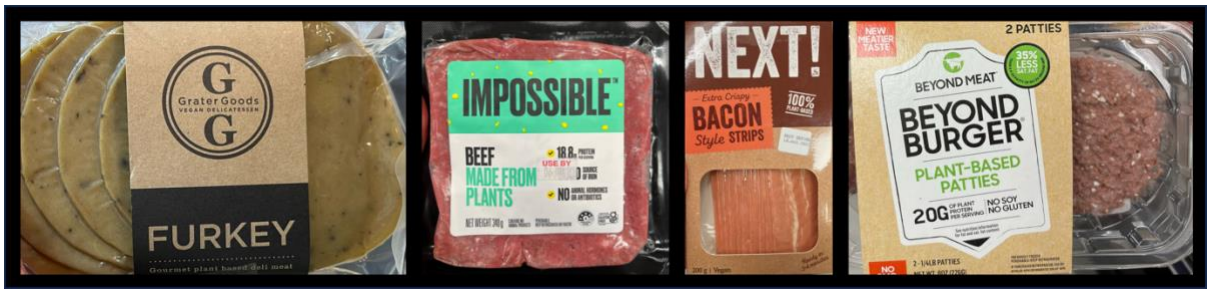
Figure 4.2 Example images of animals on PBMAs packaging



4.1.2 Types of packaging used for PBMA products

Just under half of the identified PBMA products incorporated transparent packaging (or a transparent window allowing consumers to see the product inside into their design (n=31, 48%). In these cases, the use of a transparent plastic ranged from a window (allowing consumers to view the product inside), to fully transparent packaging. PBMA products that featured transparent packing, tended not to include any other packaging elements (such as an image of an animal or prepared product). In turn, PBMA products with non-transparent packaging displayed photos or artistic images of animals or the prepared product instead. Examples of such transparent packaging are presented in Figure 4.3.

Figure 4.3 Examples of transparent packaging (or a transparent window) on PBMA packaging



4.1.3 Written statements and claims on PBMA packaging

Written statements and claims were recorded across all identified PBMA products. These are detailed in Table 4.1. Written statements included nutrient content claims such as 'high in protein', dietary pattern claims such as 'vegan', "free from" statements such as 'gluten free', and 'other' claims such as 'meat free'. These statements were categorised under four different statement and claim contexts

Table 4.1 Plant Based Meat Analogues written statements and claims

Statement and Claim Context	**Example Details**
Nutrient content claims	78% of all PMBAs made at least one nutrient claim on the packaging. Overall, protein-related claims were the most common nutrient claim (n=50, 77%) followed by fibre (n= 19, 29%), iron (n= 18, 28%) and Vitamin B12 (n=8, 12%).
Dietary Pattern claims	The majority of the products mentioned a dietary pattern, or a combination of dietary patterns on their packaging (n= 56, 86%). "Plant-based" was the most common dietary pattern (n= 56, 86%), very closely followed by "vegan" (n=55, 85%).
Free-from statement	"No antibiotics/hormones/chemicals" was the most common 'free-from statement" which featured on over a third of the products (n=23, 35%), followed by gluten-free (n=22, 34%) then soy-free (n=17, 26%). Cholesterol-free was the least common free-from statement (n=9, 14%). GMO-free was another common but less frequent 'free-from statement'.
Miscellaneous Claims	"Made from plants" was a common statement found on the packaging of PMBAs (n=47, 72%), followed by a positive environmental statement (n= 30, 46%) and "meat free" (n= 16, 25%). Claims relating to animal cruelty were featured less frequently (Table 1). New Zealand-made was highlighted on the packaging of almost half the PBMAs (n=31, 48%). Approximately one third of the products featured the Health Star rating (n=21, 32%). Environmentally friendly packaging claims were also common but less frequent than other claims.

4.2 Phase Two: Survey results

This section presents the results of the online survey, disseminated to potential consumers of processed vegan meat products. A total of 235 participants attempted the survey, with 198 individuals completing the survey in its entirety.

4.2.1 Demographics

The majority of participants identified as female (n=156, 74%). The rest of the participants identified as either male (n=49, 23%), non-binary (n=6, 3%) or preferred not to say (n=1, 0%). Participants were largely of New Zealand European descent (n=159, 71%) followed by Māori (n=12, 5%), Pacific People (n=1, 0%), Asian (n=12, 5%), Middle Eastern (n=6, 3%) and Other (n=34, 15%). Ages ranged from 18 years old to 76 years old, with an average age of 37.8 years old.

4.2.2 Vegan background (including motivators)

Participants were asked to select the length of time they had been following a vegan diet for. The majority of participants had been following a vegan diet for 5 to 10 years (n=87, 42%), followed by 3 to 5 years (n=51, 25%), then more than 10 years (n=41, 20%), followed with 1 to 3 years (n=26, 13%) and least common, less than a year (n=2, 1%).

A very small number of participants reported that they never consumed processed vegan meat (n=6, 3%). A small percentage reported consuming processed vegan meat alternatives once a month or less (n=32, 15%). Less than half of the participants indicated that they consumed processed vegan meat alternatives between 2 to 4 times a month (n=83, 40%), followed by those who reported consuming them more than once a week (n=66, 32%). A small group reported consuming processed vegan meat alternatives more than 4 times a week (n=20, 10%).

Animal welfare was the highest reported primary motivator for following a vegan diet (n=146), with health reasons (n=45) and environmental concerns as a primary motive (n=43) next, showing similar results. Environmental concerns were most reported as being a secondary motivator (n=111) and health reasons were most common for a third motivator (n=78).

4.2.3 Survey questions

Survey questions specifically relating to the packaging design of PBMAs were broken down into the following categories:

- Nutrient claims
- Common terms and statements
- Images and packaging features
- Environmental concerns
- Nutrient and ingredient information panels

These categories are detailed further below. With an additional section including comments from participants.

4.2.4 Nutrient claims

Survey respondents were asked to rate the extent to which four common nutrient claims (protein, iron, vitamin B12 or fibre) found on the packaging of PMBAs influenced their purchase decision. Their rating utilised a 1-5 Likert scale, with 1 representing ‘a negative influence’ and 5 representing ‘a positive influence’.

A clear protein statement on the packaging of processed vegan meat was confirmed as having the highest positive influence on consumer purchase decisions (M=4, SD=0.96). This is not surprising as consumers of PBMA are likely to be directly replacing animal meat products with plant-based meat products, so it comes as no surprise that consumers are looking for high protein options. Following protein was Vitamin B12 (M=3.77, SD=1) which was closely followed by Iron (M=3.7, SD=0.86). PBMA are often fortified with Vitamin B12 and Iron therefore being a good source of this mineral and vitamin for vegans so as expected consumers are positively influenced by these statements. Lasty a fibre claim on the packaging of PMBA had a rather neutral influence on consumer purchase decisions (M=3.25, SD=0.86).

4.2.5 Common terms and statements

Participants rated how important common terms and statements on packaging were in relation to their purchasing of the product. Their rating utilised a 1-3 Likert scale, with 1 representing ‘important’ and 3 representing ‘not important’.

"Lean and clean" and "sustainable meat alternative" were rated as the most important terms or statements on packaging in relation to individuals purchasing products. Surprisingly the terms and statements "vegan" or "vegan friendly" were rated to be the least important in relation to purchase decisions. Further details are shown in Table 4.2.

Table 4.2 Consumer Preference of Wording on Plant Based Meat Analogues

Statement	Mean score	Standard Deviation
Lean and Clean	2.61	0.62
Sustainable meat alternative	2.29	0.64
Sustainable nutrition	2.25	0.67
Meat free	2.08	0.77
Made from plants	2.06	0.59
No animals harmed	1.97	0.76
Cruelty free	1.83	0.76
Plant-based	1.77	0.63
Vegan friendly	1.62	0.69
Vegan	1.44	0.73

4.2.6 Environmental concerns

Utilising a 1-5 Likert scale, with 1 representing 'a negative influence' and 5 representing 'a positive influence' participants were asked to indicate to what level they agreed or disagreed with two statements regarding environmental concerns.

The majority of participants strongly agreed that it is important to them that the packaging of processed PBMAs is eco-friendly when making a purchase decision (M=4.32, SD=0.78). Participants were not as concerned with there being a positive environmental claim on the packing with the mean falling between "Neither agree nor disagree" and "Somewhat agree" (M= 3.41, SD=1).

4.2.7 Images and packaging features

Survey respondents were asked to rate the influence the images shown above (Figures 1, 2 & 3) had on their purchasing decision. Their rating utilised a 1-5 Likert scale, with 1 representing 'a negative influence' and 5 representing 'a positive influence'.

Results found that an image of the prepared product was most likely to positively influence participants purchase decision (M=4.12, SD=0.78). Participants were less likely to be influenced by transparent packaging (or a transparent window) of a PBMA product with the mean falling between "no influence" and "slight positive influence" (M=3.66, SD=0.97). Lastly, participants were not positively influenced by an animal image on the packaging but slightly negatively influenced by the image (M=2.74, SD=0.97).

4.2.8 Nutrient information and ingredient panel

Just under half of the participants reported looking at the nutrient information panel (NIP) on PBMA before making a decision to purchase (n=91, 46%). Other survey participants sometimes looked (n= 76, 39%) or never looked (n=30, 15%) at the nutrient and ingredient information provided on the packaging. Further details are shown in Table 4.3 regarding what participants look for on the NIP if they selected 'yes' to looking at the nutrient information panel on PBMA packaging before making a decision to purchase.

Table 4.3 Plant Based Meat Analogue Nutrition Information Panel Preferences

Nutrient	n	Participant Preference
Energy	92	19%
Protein	126	26%
Iron	60	13%
Vitamin B12	63	13%
Fibre	40	8%
Fat	98	20%

In addition to identifying nutrient preferences, five of survey respondents commented that sodium was also something they looked for on the NIP. For example, respondent number 18 said that "Sodium and saturated fat content are things I consider if purchasing such products."

Other respondents commented on the nutrient value of these types of products, for example, one respondent stated

> I don't eat processed vegan meat to meet my nutritional daily needs as it is not an everyday or every meal consumption as part of my family's meals, our meals are based on fruit and veg, processed vegan meats are more of the irregular or treat meals. If they were part of every single meal then the nutritional value would probably have more influence on choice. Just because these meats are labelled vegan does not mean that we consider them as healthy, just as all the processed non vegan meats and foods out there (respondent 21)

Nearly two thirds of respondents answered yes to always looking at the ingredients on the packaging (N= 125, 64%). Other respondents selected 'sometimes looking at the ingredients' (N=66, 34%) and a small number responded to 'never checking the ingredients' (N= 5, 3%). Some survey respondents also commented on their reasons for checking the ingredients. For example, to check for the number of ingredients and if the ingredients contain any animal products, "Anything with long ingredient lists are unappealing" and "I read labels to avoid animal products not for nutritional info, there are lots of issues with the use of terms like plant based on products that contain meat, this has caused people to accidentally buy them."

Lastly the survey asked participants to select the statements that applied to them regarding the processing status of PBMA and their classification of being an ultra-processed food on the NOVA scale. These statements can be found in detail in Table 4.4.

Table 4.4 Plant Based Meat Analogue Ingredient and Processing Status Preferences

Statement	Count	Percentage
I am more likely to choose processed vegan meat products that only contain ingredients that I know of	87	18%
I am not concerned about the number of ingredients that processed vegan meat products contain as they are plant-based and meet my dietary preferences.	68	14%
I am concerned about the nutrient value of processed vegan meat products.	94	20%
I am NOT concerned about the nutrient value of processed vegan meat products.	34	7%
I am more likely to choose a processed vegan meat product that contains a health-star rating on the packaging.	44	9%

I was aware that processed vegan meat products are classified as 'ultra-processed foods'.	91	19%
Processed vegan meat products being classified as 'ultra-processed foods' has a negative influence on my consumption	62	13%

4.2.9 Additional comments from survey participants

In addition to answering the survey questions participants were able to provide additional thoughts, opinions, and suggestions at the end of the survey if they wished to. Many survey respondents opted to provide further insight into their decision-making processes and opinions of PBMA. This feedback was highly valuable to the study as it allowed participants to expand on questions asked in the survey and provide any additional thoughts, they had on PBMAs which allowed for a deeper understanding of consumer choices in this study.

For example, one respondent noted that they

> do not support eating ultra processed foods. I would rather eat whole organic foods. Or use fermented products like tempeh as my meat alternatives. I think it would be useful to provide evidence-based research around healthy consumption of foods. Market foods that have no numbers/additives or undergo ultra processing. Invest the marketing in education . . . (Respondent 3)

In addition to the comments from respondents relating to the questions above, many respondents had additional comments to add regarding these products replicating animal meat. They discussed how they do not find these products necessary for a vegan diet

> I feel like the assumption that vegans have to find meat alternatives and alternatives in general is false. Why are we trying to replace something just for the sake of eating like meat eaters? There are so many other things to eat, and eating meat alternatives just because it has protein is more of a trend than a proper, nutritional lifestyle (Respondent 80)

They also commented on their dislike of products attempting to replicate animal flesh

> After being vegan for over 5 years, I find I prefer vegan meat products which are quite obviously made from vegetables. I find products that are trying to mimic meat too closely (e.g. Beyond burger) quite repulsive and I struggle to eat them even though I know they are plant based. I don't

> miss eating meat, so I don't really find the meat replacements appetizing. I do however eat vegan meat products from time to time which seem to be clearly made from a few main plant products, i.e. mushroom sausages or Kumara burger patties. (Respondent 87)

One respondent commented on when these products may be helpful to people trying to transition to a vegan diet,

> I never really ate meat so I don't need to replace it in my diet. If I happen to like the taste of a product (and the more realistic it is, the less likely I am to like it to be honest) I might eat it occasionally as a treat food. But these are not regularly part of my diet. I do understand that if people like eating meat, but are trying to reduce their consumption, they may find them useful. But they are certainly not a whole food to be consumed regularly as part of a healthy diet! (Respondent 32)

4.4 Chapter Summary

This chapter has presented results from the Phase One and Phase Two of the research project. These findings offer an initial picture of the types of PBMAs available within New Zealand, and the preferences of vegan consumers purchasing these products. The following chapter reviews and discusses these results in further detail, bringing the research findings in line with the aims and objectives of the study.

Chapter 5: Discussion

Marketing through packaging plays an important role in shaping consumer perception of a product. The purpose of this study was to explore the marketing tools used for packaging of PBMAs in New Zealand and investigate vegan consumer perceptions of these. This was achieved through a review of processed vegan food packaging, focusing on PBMAs available in the main New Zealand supermarkets. The results of this review informed the development of an online survey to gain consumer perceptions of the packaging designs of PMBAs from vegan consumers in New Zealand. In this chapter, the results of this two-phased study are explored in greater detail, beginning with the types and ranges of images on PMBAs and consumer perceptions, followed by the types and ranges of words on PMBAs and consumer perceptions. Following this, the consumer perceptions of design elements on PBMAs and how they influence consumer purchase decisions are explored. Lastly, consumer perceptions of the processed status are explored.

5.1 Types and ranges of imagery on PBMA packaging and consumer perceptions

The first and third objectives of this research are addressed together for the purpose of this section. The first objective of this study was to examine the variety and scope of imagery featured on packaging for processed PBMAs. The third objective was to investigate the consumer perception of this imagery.

The inclusion of images on packaging, and transparent packaging, plays a crucial role in marketing products, providing consumers with a visual representation that positively influences their purchasing decisions (Simmonds & Spence, 2019). This study focused on two prominent images commonly found on PBMA packaging. These were (1) images of animals, and (2) images of the prepared product as a standalone item or as part of a serving suggestion. It also investigated the packaging feature of transparent packaging (or a transparent window). The findings revealed that about two-thirds of the PBMA packages analysed (n=43, 66%) featured an image of the prepared product, either as a standalone item or as part of a meal. Brooker et al. (2022) obtained similar results in their study on PBMA packaging in Australia, where the majority of packages included an image depicting the prepared product. Overduin (2016) found that a healthy image of a product on packaging

significantly increased individuals perception of how healthy the product was ,and Blechert et al. (2014) found that colours such as green also indicated healthiness. Interestingly, many of the images identified on the front of the packaging in this study (see Figure 4.1) included fresh green lettuce as part of the meal which could suggest that manufacturers are trying to market these products as 'healthy'. Results from this study also found that an image of the final product on packaging was most likely to positively influence consumer purchase decisions, suggesting that consumers are drawn to images when deciding on what product to buy.

Less than a quarter of the reviewed products displayed an image of an animal (n=15, 23%), and notably, these animal images were not realistic but rather, outlines or drawings. This study found animal welfare to be a significant motivator for following a vegan diet suggesting a relationship between animal welfare as a motivator and negative perception of animal images on packaging. As noted from a participant in this study these images can be a negative reminder to consumers of the relationship between animals, animal welfare, and food products. However, there are very few other studies that have explored the inclusion of animal images on PBMA packaging to support this theory. In this study, animal images on packaging were further investigated with findings suggesting that individuals motivated by animal welfare to be vegan, do view animal images negatively on foods products.

This study found that transparent packaging (or a transparent window) had "no influence" or only a "slight positive influence". Further research is needed in this area to better understand this. Brooker et al. (2022) observed that one in four PBMAs sold in Australia featured clear packaging or a see-through section, allowing consumers to visually inspect the product before purchase. In contrast, our study found that less than half of the products had transparent packaging or a transparent window. Curtain and Grafenauer (2019) suggested that clear packaging or a transparent window is designed to enable these products to mimic the appearance of meat when placed in the chilled meat section. These types of products may be more suited to those choosing to eat less meat for health or environmental reasons and are therefore looking for their PBMAs to mimic meat (Brooker et al., 2022; Tyndall et al., 2022). Simmonds and Spence (2019) reported that transparent food packaging may increase consumer perceptions of expected healthfulness and freshness of a product.

5.2 Types and range of words used on PBMA packaging and consumer perceptions

The second and third objectives of this research are discussed here. Objective two was to examine words used on PBMAs packaging, and as noted above, objective three was to investigate consumer perceptions of these.

Overall, protein-related claims emerged as the dominant nutrient claim on the packaging of PBMAs, a pattern consistent with findings in several other studies (Brooker et al., 2022; Curtain & Grafenauer, 2019; Lacy-Nichols et al., 2021). The prevalence of such claims is not unexpected. PBMAs are largely marketed as meat substitutes, often sharing shelf space with traditional meat products in supermarkets, as discovered in phase one of this study and other studies (Curtain & Grafenauer, 2019). Consequently, there is a notable emphasis on protein-related statements in the marketing of these products, creating an association with meat alternatives rich in protein. Protein is a key part of every diet providing essential amino acids for muscle repair and growth and many other bodily functions (Daniel, 2024). PBMAs are often marketed as a high protein food option due to their meat replication. This marketing strategy seems to be having a positive influence as this study found that that a protein statement on the packaging had the most substantial positive influence on purchase decisions out of the four nutrient claims identified on packaging (protein, iron, Vitamin B12 and fibre).

Following protein, fibre emerged as the second most prevalent nutrient claim on the packaging of PBMA, constituting 77% of the sample (n=50). These finding align with the results reported by Brooker et al. (2022) and Lacy-Nichols et al. (2021). Interestingly, only 8% of participants in this study reported looking at fibre content on the NIP. The high fibre claim of PBMAs is unsurprising, given that these products are generally derived from plant-based ingredients inherently rich in fibre.

Other common nutrient content claims identified in this study, and US and Australian studies included many positive nutrient claims about iron, vitamin B12, zinc and fatty acids (Brooker et al., 2022; Lacy-Nichols et al., 2021). Two nutrients, iron and Vitamin B12, are commonly criticised as lacking in a vegan diet due to minimal natural plant sources and the portion sizes needed to achieve requirements being much larger than meat portions (Leroy et al., 2022; Mota-Rojas et al., 2023). Conversely, meat is often portrayed as the main source of these

essential nutrients. The updated Eat-Lancet report in March 2023 stated that a diet high in vegetables, legumes, whole grains, fruit, plant sources of protein, and low in animal sources of protein, may not be meeting the micronutrient recommendations for iron, Vitamin B12, zinc and calcium. Eat-Lancet suggested increasing some animal food sources (Beal et al., 2023). Participants in this study rated Vitamin B12 claims on packaging as having the second highest positive influence on their purchase decision, after a protein claim. Vitamin B12 is an essential vitamin for humans and is primarily found in animal derived foods, putting individuals following plant-based diet at higher risk of deficiency than those who are non-vegetarian (Marques de Brito et al., 2023). This has led to many companies creating PBMAs that are fortified with Vitamin B12 and similarly iron (Curtain & Grafenauer, 2019). By shedding light on the significant influence of factors such as iron and Vitamin B12 fortification on consumer choices, this research underscores the importance of addressing nutritional concerns in vegan products to meet consumer demand. Future research endeavours could delve deeper into the effectiveness of different fortification strategies, explore consumer perceptions of other nutrient content claims, and investigate the impact of varying nutritional information formats on consumer decision-making processes. Such studies have the potential to further enhance our understanding of consumer behaviour in the context for vegan food products and inform targeted marketing strategies and product development efforts within the industry.

Looking at diet related claims, the majority of products reviewed in this study either mentioned “plant-based” or “vegan” or a combination of both. Similarly, Curtain and Grafenauer (2019) found that over 80 per cent of all products reviewed in their study included ‘vegetarian, vegan, plant-based or meat-free' terms on the packaging. Brooker et al. (2022) found that the term “plant-based” was first mentioned on the labels of vegan products in 2021, the last year of three years over 2019-2021 that they looked at the marketing strategies in their study. Surprisingly vegan consumers in this study reported the terms ‘vegan’, ‘vegan friendly’ and ‘plant-based’ as being the least important in relation to purchase decisions. Participants in this study were more interested in environmental terms like ‘sustainable’ and health terms like ‘lean and clean’.

5.3 Design elements of PBMAs and their influence on consumer purchase decisions

Objective four of this research is discussed below. Objective four was to investigate how the different design elements used on PMBAs influence consumer purchase decisions.

This study also looked at how design elements of packaging influenced consumer purchase decisions. Design elements included environmental sustainability claims about the packaging, NIP, and ingredient list. A majority of participants strongly agreed that eco-friendly packaging was important to them and somewhat agreed that positive environmental claims on packaging was important, indicating a high level of environmental consciousness among this group. This is opposite to the findings of Steenis et al. (2017) who found that although packaging sustainability is important, it is not a highly significant factor in shaping consumer attitudes, unlike the findings of this study. When further investigated, all 23 individuals who selected “Environmental concerns” as their primary motivation for being vegan also selected “somewhat agree” or “strongly agree” to the two questions relating to environmental concerns when purchasing a product. This was a key finding and has great potential for creation and marketing of future PBMA products.

Additionally, this study examined participants’ habits regarding examination of nutrient information panels and ingredient lists. Results found that under half of participants always looked at the NIP before purchasing and 39 per cent sometimes looked. The ingredients list was more commonly looked at before purchasing with 64 per cent of participants reporting they always check the ingredients. A study done in the US, which investigated nutrient label reading habits (Storz, 2023) found that individuals who frequently read the NIP were more likely to be female, older in age and more likely to meet dietary fibre intake recommendations. The gender findings in this study were similar with 71 females reporting they always look at the NIP before purchasing a PBMA compared to only 18 males. Similar results were found with age, with those born before 2000 being more likely to look at a NIP compared to those born after 2000. These findings suggest that nutritional content does play a role in decision-making especially for those who identify as female and are over the age of 23 years old, but it may not be the sole determinant. Additionally, these findings are similar to participants ingredient-checking habits, with females being more likely than males to read the ingredients on PBMAs. However, the findings may not be an accurate representation of the

vegan population in New Zealand due to this study containing more female participants and the average being over 35 years old.

5.4 Consumer perceptions on the processing status of PBMAs

With the third objective of this study being to investigate consumer perceptions of the words and phrases used on PBMAs, survey respondents were encouraged to also consider the degree to which PBMAs are processed (and whether or not this was of any concern). The last section of the survey asked participants some questions regarding the processing status of PMBAs and the degree to which vegan meat products replicating animal meat influences their choices. This is highly relevant due to the heightened awareness of how processed PBMAs can be, with many having long ingredient lists containing additives, colours, flavours and preservatives (Tyndall et al., 2022). This study results found a number of respondents were aware that processed vegan meat products are classified as 'ultra-processed foods' according to the NOVA classification system. This classification negatively influenced consumption for some participants who preferred whole and less processed foods. Upon further investigation, 34 participants who selected health reasons as their primary motive for following a vegan diet were also concerned about the nutrient value of processed vegan meat products and that processed vegan meat products being classified as 'ultra-processed foods' had a negative influence on consumption. These are valuable findings especially to product developers, who should consider the amount of ingredients and types of ingredients when creating future PBMAs, especially since the long-term health effects of these are yet to be discovered.

5.5 Chapter Summary

Overall, the findings from this study provide valuable insights into the packaging of PBMAs in New Zealand, along with vegan consumer perceptions of such products. The following chapter will conclude this thesis, by summarising the strengths and limitations of this study. The concluding chapter will also provide recommendations for future research within the New Zealand vegan scope.

Chapter 6: Conclusion

6.1 Achievement of Study Aim and Objectives

This study recognises the surge in veganism and the increasing availability of PMBAs, with an identified 65 PMBA products available in the New Zealand market. As the demand for convenient vegan options rise, this study has delved into assessing the packaging of PBMA products, aiming to fill a gap in existing research in New Zealand. To our knowledge, it is the first study in New Zealand to examine PBMAs exclusively, with a focus on marketing and vegan consumer perceptions. The study successfully achieved its objectives by reviewing the imagery and language used on packaging, investigating consumer perceptions, and assessing the influence marketing has on purchase decisions. While participant sampling limitations were acknowledged, the study provides valuable insights for manufacturers and consumers, with implications for product development, academic research, and policy discussions surrounding sustainable and ethical consumption practices.

6.2 Research impact

To the researcher's knowledge, as one of the first of its kind in New Zealand, the findings of this study could have several significant impacts on future research, the understanding of vegan opinions, and the development of future vegan products. Firstly, the insights gathered could guide manufacturers and marketers in tailoring their vegan product offerings to align with consumer preference and concerns. This informed product development could enhance the market appeal and cater to the evolving needs of the expanding vegan demographic. The findings of this study could be applicable to the design of other processed vegan food packaging. Moreover, the study may empower consumers by nurturing a better understanding of how packaging influences their choices, enabling them to make more conscious and informed decisions. It may also hold implications for regulatory bodies, influence discussions around labelling standards and consumer protection, ensuring transparent and accurate representation on packaging claims.

In addition to its commercial applications, this study contributes to academic discourse within the realm of vegan food consumption. Researchers may be inspired to explore various aspects of veganism, the impact of cultural influences, regional variations, and the role of social

media in shaping opinions. The research could also raise social awareness regarding the broader implications of consumer choices on the environment, health and ethical considerations. This heightened awareness may fuel advocacy efforts, contributing to more extensive conversations on sustainable and ethical consumption practices.

Overall, the study not only informs product development and consumer decisions but also holds potential for shaping policy discussions, further academic research, and foster a wider social understanding of the implications of vegan choices.

6.3 Limitations

Several research limitations were identified, the first relating to the sample of participants. As these participants were recruited through the 'Nutritional Research Respondents' database, complied as part of the larger vegan diet and lifestyle project being undertaken at Massey University. Participants linked with the wider study had formally agreed to being contacted for additional studies relating to the larger project**.** It is acknowledged that this population may have exhibited a heightened interest in research and personal health outcomes. Consequently, participants in this study may have been more likely to hold stronger opinions on PBMAs and less inclined to consume these types of product compared to a more diverse and representative sample.

A second limitation of this study additionally relating to the sample of participants was the lack of cultural and regional diversity identified in the sample population. The participants were largely of New Zealand European descent which does not reflect the ethnic diversity of the population. Understanding cultural and regional variances in attitudes towards PMBAs is crucial due to the ethnic diversity of individuals living in New Zealand.

6.4 Strengths

The strength of this study lies in its comprehensive focus on PBMA products available on the physical shelves of primary supermarket chains in Auckland, New Zealand and additional products available online from these supermarkets. It provides valuable insights for manufacturers to align their messaging with consumer concerns and influences. The study's objectives included reviewing the types and ranges of images and words on processed vegan food packaging, investigating consumer perceptions, and determining how marketing these

products may influence purchase decisions, ultimately benefiting both manufacturers of PBMAs in New Zealand and the vegan population in New Zealand who may purchase these products

6.5 Recommendations for future research

Future research endeavours within the realm of vegan opinions on PBMAs could extend across New Zealand and involve diversified participant pools. A more comprehensive understanding could be achieved by expanding recruitment methods to encompass a broader spectrum of the vegan population in New Zealand, ensuring a more representative sample that captures a range of attitudes and behaviours.

Additionally, recommendations include research regarding the frequency of PBMAs in the diet of vegans to determine any possible macro or micro nutrients deficiencies or other health outcomes. Lastly, an assessment of speciality vegan stores across the country may assist in highlighting the changing consumption patterns of New Zealanders and highlight the demand for speciality PBMAs (and other) vegan products.

6.6 Conclusion

In conclusion, this research offers valuable insights into the packaging of PBMAs in New Zealand and aids in determining the factors that influence vegan consumer choices when it comes to purchasing PBMAs. It has identified that further research is necessary and should consider a wider range of demographics and regional distinction. Including looking at how the market is maturing, with buyers becoming more aware of nutrients and the processing status, which can impact the sustainable food choices individuals make.

References

Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., Mullany, E. C., Abate, K. H., Abbafati, C., & Abebe, Z. (2019). Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *393*(10184), 1958-1972. https://doi.org/10.1016/S0140-6736(19)30041-8

American Dietetic Association. (2003). Position of the American Dietetic Association and Dietitians of Canada: Vegetarian Diets. *Journal of the Academy of Nutrition and Dietetics*, *103*(6), 748. https://doi.org/10.1053/jada.2003.50142

Beal, T., Ortenzi, F., & Fanzo, J. (2023). Estimated micronutrient shortfalls of the EAT–Lancet planetary health diet. *The Lancet Planetary Health*, *7*(3), e233-e237.

BeyondMeat. (2021). KFC, PIZZA HUT AND TACO BELL GO BEYOND GLOBALLY. https://www.beyondmeat.com/fr-FR/whats-new/kfc-pizza-hut-and-taco-bell-go-beyond-globally

Blechert, J., Meule, A., Busch, N. A., & Ohla, K. (2014). Food-pics: an image database for experimental research on eating and appetite. *Frontiers in psychology*, *5*, 617. https://doi.org/10.3389/fpsyg.2014.00617

Bou-Mitri, C., Abdessater, M., Zgheib, H., & Akiki, Z. (2020). Food packaging design and consumer perception of the product quality, safety, healthiness and preference. *Nutrition & Food Science*, *51*(1), 71-86. https://doi.org/10.1108/NFS-02-2020-0039

Boukid, F. (2021). Plant-based meat analogues: From niche to mainstream. *European Food Research and Technology*, *247*(2), 297-308.

Brooker, P. G., Hendrie, G. A., Anastasiou, K., Woodhouse, R., Pham, T., & Colgrave, M. L. (2022). Marketing strategies used for alternative protein products sold in Australian supermarkets in 2014, 2017, and 2021. *Frontiers in Nutrition*, *9*, 3164. https://doi.org/10.3389/fnut.2022.1087194

Bryant, C. J. (2019). We can't keep meating like this: Attitudes towards vegetarian and vegan diets in the United Kingdom. *Sustainability*, *11*(23), 6844.

BurgerKing. (2021). *Impossible™ Whopper*. https://www.burgerking.ca/impossible-whopper

Calder, P. (2019). Plenary Lecture 3 n-3 PUFA and health: fact, fi ction and the future Very long-chain n-3 fatty acids and human health: fact, fiction and the future. *Proceedings of the Nutrition Society*, *77*, 52-72. https://doi.org/10.3390/biom9090485

Cammock, R., Tonumaipe'a, D., Conn, C., Sa'uLilo, L., Tautolo, E.-S., & Nayar, S. (2021). From individual behaviour strategies to sustainable food systems: countering the obesity and non communicable diseases epidemic in New Zealand. *Health Policy*, *125*(2), 229-238. https://doi.org/10.1016/j.healthpol.2020.12.001

Carrillo, E., Fiszman, S., Lähteenmäki, L., & Varela, P. (2014). Consumers' perception of symbols and health claims as health-related label messages. A cross-cultural study. *Food Research International*, *62*, 653-661.

Christopher, A., Bartkowski, J. P., & Haverda, T. (2018). Portraits of veganism: A comparative discourse analysis of a second-order subculture. *Societies*, *8*(3), 55.

Colmar Brunton. (2019). *Better Futures*. Kantar Millward Brown Company.

Croll, C. (2021). *Vegetarian or Meatless, does it matter?: To what extent do word choice and motivation type on the packaging of meat substitutes influence the buying behaviour of the consumer* University of Twente].

Curtain, F., & Grafenauer, S. (2019). Plant-based meat substitutes in the flexitarian age: an audit of products on supermarket shelves. *Nutrients*, *11*(11), 2603. https://doi.org/10.3390/nu11112603

Dagnelie, P. C., & Mariotti, F. (2017). Vegetarian diets: Definitions and pitfalls in interpreting literature on health effects of vegetarianism. In *Vegetarian and Plant-based Diets in Health and Disease Prevention* (pp. 3-10). Elsevier. https://doi.org/10.1016/B978-0-12-803968-7.00001-0

Daniel, H. (2024). Dietary proteins: From evolution to engineering. *Frontiers in Nutrition*, *11*, 1366174.

Dens, N., De Pelsmacker, P., & Puttemans, B. (2011). Text or pictures? Effectiveness of verbal information and visual cues in advertisements for new brands versus extensions. *Advances in Advertising Research 2*, 341-355. https://doi.org/10.1007/978-3-8349-6854-8_22

Dietitians NZ. (2024). *How a Dietitian can help you*. https://dietitians.org.nz/Web/Web/Find-a-Dietitian/How-a-dietitian-can-help-you.aspx?hkey=4d48fcf7-9eee-4cad-991c-f8cb8bd5643b

Drew, J., Cleghorn, C., Macmillan, A., & Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*, *128*(1), 017007. https://doi.org/10.1289/EHP5996

Dyett, P. A., Sabaté, J., Haddad, E., Rajaram, S., & Shavlik, D. (2013). Vegan lifestyle behaviors. An exploration of congruence with health-related beliefs and assessed health indices. *Appetite*, *67*, 119-124. https://doi.org/10.1016/j.appet.2013.03.015

Elzerman, J. E., Van Boekel, M. A., & Luning, P. A. (2013). Exploring meat substitutes: Consumer experiences and contextual factors. *British Food Journal*. https://doi.org/10.1108/00070701311331490

Evans, J. R., & Mathur, A. (2018). The value of online surveys: A look back and a look ahead. *Internet research*, *28*(4), 854-887.

Flaws, B. (2021). Plant-based vs meat: the new battleground for health, ethics and sustainability. *Stuff*. https://www.stuff.co.nz/business/123994169/plantbased-vs-meat-the-new-battleground-for-health-ethics-and-sustainability

Food Frontier. (2023). *Companies in alternative proteins map: Australia and New Zealand*. Food Frontier. https://www.foodfrontier.org/resource/companies-in-alternative-proteins-map/

Frontier, F. (2020). *Plant-Based Meat: A Healthier Choice* https://www.foodfrontier.org/wp-content/uploads/2022/10/Plant-Based_Meat_A_Healthier_Choice-1.pdf

Fuentes, C., & Fuentes, M. (2017). Making a market for alternatives: marketing devices and the qualification of a vegan milk substitute. *Journal of Marketing Management*, *33*(7-8), 529-555. https://doi.org/10.1080/0267257X.2017.1328456

Gallagher, C. T., Hanley, P., & Lane, K. E. (2022). Pattern analysis of vegan eating reveals healthy and unhealthy patterns within the vegan diet. *Public health nutrition*, *25*(5), 1310-1320. https://doi.org/10.1017/S136898002100197X

Gastaldello, A., Giampieri, F., De Giuseppe, R., Grosso, G., Baroni, L., & Battino, M. (2022). The rise of processed meat alternatives: A narrative review of the manufacturing, composition, nutritional profile and health effects of newer sources of protein, and their place in healthier diets. *Trends in Food Science & Technology*.

Gehring, J., Touvier, M., Baudry, J., Julia, C., Buscail, C., Srour, B., Hercberg, S., Péneau, S., Kesse-Guyot, E., & Allès, B. (2021). Consumption of ultra-processed foods by pesco-

vegetarians, vegetarians, and vegans: associations with duration and age at diet initiation. *The Journal of nutrition*, *151*(1), 120-131.
Gheihman, N. (2021). Veganism as a lifestyle movement. *Sociology compass*, *15*(5), e12877. https://doi.org/10.1111/soc4.12877
Godfray, H. C. J., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., Pierrehumbert, R. T., Scarborough, P., Springmann, M., & Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science*, *361*(6399), 5324. https://doi.org/10.1126/science.aam5324
Grafenauer, S., & Curtain, F. (2018). An audit of Australian bread with a focus on loaf breads and whole grain. *Nutrients*, *10*(8), 1106.
Harnack, L., Mork, S., Valluri, S., Weber, C., Schmitz, K., Stevenson, J., & Pettit, J. (2021). Nutrient composition of a selection of plant-based ground beef alternative products available in the United States. *Journal of the Academy of Nutrition and Dietetics*, *121*(12), 2401-2408. e2412. https://doi.org/10.1016/j.jand.2021.05.002
Henchion, M., & Zimmermann, J. (2021). Animal food products: policy, market and social issues and their influence on demand and supply of meat. *Proceedings of the Nutrition Society*, *80*(2), 252-263.
Hirschler, C. A. (2011). "What pushed me over the edge was a deer hunter": Being vegan in North America. *Society & Animals*, *19*(2), 156-174. https://doi.org/10.1163/156853011X562999
Hoffman, S. R., Stallings, S. F., Bessinger, R. C., & Brooks, G. T. (2013). Differences between health and ethical vegetarians. Strength of conviction, nutrition knowledge, dietary restriction, and duration of adherence. *Appetite*, *65*, 139-144. https://doi.org/10.1016/j.appet.2013.02.009
Hussain, S., Nizam, K., Haq, F. U., & Mujeeb, S. (2023). Product packaging and consumer intentions.
Janssen, M., Busch, C., Rödiger, M., & Hamm, U. (2016). Motives of consumers following a vegan diet and their attitudes towards animal agriculture. *Appetite*, *105*, 643-651. https://doi.org/10.1016/j.appet.2016.06.039
Judge, M., & Wilson, M. S. (2019). A dual-process motivational model of attitudes towards vegetarians and vegans. *European Journal of Social Psychology*, *49*(1), 169-178. https://doi.org/10.1002/ejsp.2386
Kamiński, M., Juskowiak, M., Kowalewska, N., Barszczewska, L., Kręgielska-Narożna, M., & Bogdański, P. (2023). Nutrient composition of plant-based fast food meals and their omnivore counterparts: a cross-sectional analysis of e-menus. *Nutrition*, 112323.
Kamiński, M., Skonieczna-Żydecka, K., Nowak, J. K., & Stachowska, E. (2020). Global and local diet popularity rankings, their secular trends, and seasonal variation in Google Trends data. *Nutrition*, *79*, 110759. https://doi.org/10.1016/j.nut.2020.110759
Kantar. (2022). *Better Futures* S. B. Council. https://sbc.org.nz/resources/better-futures-2022-report/#:~:text=Kantar's%20(formerly%20Colmar%20Brunton)%202022,immediate%20issues%20they%20are%20facing.
Karnal, N., Machiels, C. J., Orth, U. R., & Mai, R. (2016). Healthy by design, but only when in focus: Communicating non-verbal health cues through symbolic meaning in packaging. *Food Quality and Preference*, *52*, 106-119.
Kidd, B., Mackay, S., Vandevijvere, S., & Swinburn, B. (2021). Cost and greenhouse gas emissions of current, healthy, flexitarian and vegan diets in Aotearoa (New Zealand).

BMJ Nutrition, Prevention & Health, *4*(1), 275. https://doi.org/10.1136/bmjnph-2021-000262

Knaapila, A., Michel, F., Jouppila, K., Sontag-Strohm, T., & Piironen, V. (2022). Millennials' Consumption of and Attitudes toward Meat and Plant-Based Meat Alternatives by Consumer Segment in Finland. *Foods*, *11*(3), 456. https://doi.org/10.3390/foods11030456

Kumari, S., Alam, A. N., Hossain, M. J., Lee, E.-Y., Hwang, Y.-H., & Joo, S.-T. (2023). Sensory Evaluation of Plant-Based Meat: Bridging the Gap with Animal Meat, Challenges and Future Prospects. *Foods*, *13*(1), 108.

Lacy-Nichols, J., Hattersley, L., & Scrinis, G. (2021). Nutritional marketing of plant-based meat-analogue products: an exploratory study of front-of-pack and website claims in the USA. *Public health nutrition*, *24*(14), 4430-4441.

Lee, M. F., Eather, R., & Best, T. (2021). Plant-based dietary quality and depressive symptoms in Australian vegans and vegetarians: a cross-sectional study. *BMJ Nutrition, Prevention & Health*, *4*(2), 479. https://doi.org/10.1136/bmjnph-2021-000332

Lentz, G., Connelly, S., Mirosa, M., & Jowett, T. (2018). Gauging attitudes and behaviours: Meat consumption and potential reduction. *Appetite*, *127*, 230-241. https://doi.org/10.1016/j.appet.2018.04.015

Leroy, F., Abraini, F., Beal, T., Dominguez-Salas, P., Gregorini, P., Manzano, P., Rowntree, J., & Van Vliet, S. (2022). Animal board invited review: Animal source foods in healthy, sustainable, and ethical diets–An argument against drastic limitation of livestock in the food system. *Animal*, *16*(3), 100457.

Lescinsky, H., Afshin, A., Ashbaugh, C., Bisignano, C., Brauer, M., Ferrara, G., Hay, S. I., He, J., Iannucci, V., & Marczak, L. B. (2022). Health effects associated with consumption of unprocessed red meat: a Burden of Proof study. *Nature Medicine*, *28*(10), 2075-2082. https://doi.org/10.1038/s41591-022-01968-z

Lundahl, O. (2020). Dynamics of positive deviance in destigmatisation: celebrities and the media in the rise of veganism. *Consumption Markets & Culture*, *23*(3), 241-271.

Macdiarmid, J. (2022). The food system and climate change: are plant-based diets becoming unhealthy and less environmentally sustainable? *Proceedings of the Nutrition Society*, *81*(2), 162-167. https://doi.org/10.1017/S0029665121003712

Marques de Brito, B., Campos, V. d. M., Neves, F. J., Ramos, L. R., & Tomita, L. Y. (2023). Vitamin B12 sources in non-animal foods: a systematic review. *Critical Reviews in Food Science and Nutrition*, *63*(26), 7853-7867.

MCDonald's. (2022). McPlant™. https://www.mcdonalds.com/us/en-us/product/mcplant.html

Melina, V., Craig, W., & Levin, S. (2016). Position of the Academy of Nutrition and Dietetics: vegetarian diets. *Journal of the Academy of Nutrition and Dietetics*, *116*(12), 1970-1980. https://doi.org/10.1016/j.jand.2016.09.025

Miguel, I., Coelho, A., & Bairrada, C. M. (2020). Modelling attitude towards consumption of vegan products. *Sustainability*, *13*(1), 9. https://doi.org/10.3390/su13010009

Milfont, T. L., Satherley, N., Osborne, D., Wilson, M. S., & Sibley, C. G. (2021). To meat, or not to meat: A longitudinal investigation of transitioning to and from plant-based diets. *Appetite*, *166*, 105584. https://doi.org/10.1016/j.appet.2021.105584

Mota-Rojas, D., Whittaker, A. L., de la Vega, L. T., Ghezzi, M., Lezama-García, K., Domínguez-Oliva, A., Falcón, I., Casas-Alvarado, A., & Alonso-Spilsbury, M. (2023). Veganism and animal welfare, scientific, ethical, and philosophical arguments.

Moubarac, J.-C., Parra, D. C., Cannon, G., & Monteiro, C. A. (2014). Food classification systems based on food processing: significance and implications for policies and actions: a systematic literature review and assessment. *Current Obesity Reports*, *3*, 256-272. https://doi.org/10.1007/s13679-014-0092-0

Nayak, M., & Narayan, K. (2019). Strengths and weaknesses of online surveys. *technology*, *6*(7), 0837-2405053138.

Nemoto, T., & Beglar, D. (2014). Likert-scale questionnaires. JALT 2013 conference proceedings,

North, M., Klas, A., Ling, M., & Kothe, E. (2021). A qualitative examination of the motivations behind vegan, vegetarian, and omnivore diets in an Australian population. *Appetite*, *167*, 105614. https://doi.org/10.1016/j.appet.2021.105614

Nunes, K. (2020). Vegan claims on the upswing as plant-based innovation accelerates. *Food Business News* https://www.foodbusinessnews.net/articles/15251-vegan-claims-on-the-upswing-as-plant-based-innovation-accelerates

NZ Herald. (2020). New Zealand ranks fifth in the world for veganism. *New Zealand Herald*. https://www.nzherald.co.nz/lifestyle/new-zealand-ranks-fifth-in-the-world-for-veganism/2KLKTB4UHNBFQPITTSNXNEO56U/#:~:text=According%20to%20Chef's%20Pencil%2C%20meat,in%20Wellington%2C%20Nelson%20and%20Dunedin.

NZ Herald. (2022). 'Veganism' for the here and now? *New Zealand Herald*. https://www.nzherald.co.nz/northland-age/news/veganism-for-the-here-and-now/U5SZBWFB6N3RFILTLHE5GBC4SQ/

Olfert, M. D., & Wattick, R. A. (2018). Vegetarian diets and the risk of diabetes. *Current Diabetes Reports*, *18*, 1-6. https://doi.org/10.1007/s11892-018-1070-9

Overduin, M. (2016). *The Effect of Visual and Verbal Packaging Elements on Consumers' Healthiness Perception, Understanding, and Trust in a Product* Wageningen University and Research Centre]. Utrecht. https://edepot.wur.nl/370827

Ploll, U., & Stern, T. (2020). From diet to behaviour: exploring environmental-and animal-conscious behaviour among Austrian vegetarians and vegans. *British Food Journal*, *122*(11), 3249-3265.

Realini, C., Driver, T., Zhang, R., Guenther, M., Duff, S., Craigie, C., Saunders, C., & Farouk, M. (2023). Survey of New Zealand consumer attitudes to consumption of meat and meat alternatives. *Meat Science*, 109232. https://doi.org/10.1016/j.meatsci.2023.109232

Rosenfeld, D. L., Bartolotto, C., & Tomiyama, A. J. (2022). Promoting plant-based food choices: Findings from a field experiment with over 150,000 consumer decisions. *Journal of Environmental Psychology*, *81*, 101825. https://doi.org/10.1016/j.jenvp.2022.101825

Rosenfeld, D. L., & Burrow, A. L. (2017). Vegetarian on purpose: Understanding the motivations of plant-based dieters. *Appetite*, *116*, 456-463. https://doi.org/10.1016/j.appet.2017.05.039

Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite*, *58*(1), 141-150. https://doi.org/10.1016/j.appet.2011.09.019

Saari, U. A., Herstatt, C., Tiwari, R., Dedehayir, O., & Mäkinen, S. J. (2021). The vegan trend and the microfoundations of institutional change: A commentary on food producers' sustainable innovation journeys in Europe. *Trends in Food science & Technology*, *107*, 161-167.

SAFE NZ. (2023). *Animals in Aotearoa*. https://safe.org.nz/our-work/animals-in-aotearoa/

Salmen, A., & Dhont, K. (2023). Animalizing women and feminizing (vegan) men: The psychological intersections of sexism, speciesism, meat, and masculinity. *Social and Personality Psychology Compass*, *17*(2), e12717. https://doi.org/10.1111/spc3.12717

Scarborough, P., Clark, M., Cobiac, L., Papier, K., Knuppel, A., Lynch, J., Harrington, R., Key, T., & Springmann, M. (2023). Vegans, vegetarians, fish-eaters and meat-eaters in the UK show discrepant environmental impacts. *Nature Food*, 1-10. https://doi.org/10.1038/s43016-023-00795-w

Sexton, A. E., Garnett, T., & Lorimer, J. (2022). Vegan food geographies and the rise of Big Veganism. *Progress in Human Geography*, *46*(2), 605-628.

Simmonds, G., & Spence, C. (2019). Food imagery and transparency in product packaging. *Multisensory Packaging: Designing New Product Experiences*, 49-77.

Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., De Vries, W., Vermeulen, S. J., Herrero, M., & Carlson, K. M. (2018). Options for keeping the food system within environmental limits. *Nature*, *562*(7728), 519-525. https://doi.org/10.1038/s41586-018-0594-0

Steenis, N. D., Van Herpen, E., Van Der Lans, I. A., Ligthart, T. N., & Van Trijp, H. C. (2017). Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production*, *162*, 286-298. https://doi.org/10.1016/j.jclepro.2017.06.036

Storz, M. A. (2023). Nutrition facts labels: who is actually reading them and does it help in meeting intake recommendations for nutrients of public health concern? *BMC Public Health*, *23*(1), 1947.

The Vegan Society. (2023). *The Vegan Society: One world. Many lives. Our choice.* . The Vegan Society. https://www.vegansociety.com/

Theben, A., Gerards, M., & Folkvord, F. (2020). The effect of packaging color and health claims on product attitude and buying intention. *International Journal of Environmental Research and Public Health*, *17*(6), 1991.

Toh, D. W. K., Srv, A., & Henry, C. J. (2022). Unknown impacts of plant-based meat alternatives on long-term health. *Nature Food*, *3*(2), 90-91. https://doi.org/10.1038/s43016-022-00463-5

Tonstad, S., Butler, T., Yan, R., & Fraser, G. E. (2009). Type of vegetarian diet, body weight, and prevalence of type 2 diabetes. *Diabetes Care*, *32*(5), 791-796. https://doi.org/10.2337/dc08-1886

Trapp, C. B., & Barnard, N. D. (2010). Usefulness of vegetarian and vegan diets for treating type 2 diabetes. *Current Diabetes Reports*, *10*, 152-158. https://doi.org/10.1007/s11892-010-0093-7

Tucker, C. (2018). Using environmental imperatives to reduce meat consumption: Perspectives from New Zealand. *Kōtuitui: New Zealand Journal of Social Sciences Online*, *13*(1), 99-110. https://doi.org/10.1080/1177083X.2018.1452763

Tyndall, S. M., Maloney, G. R., Cole, M. B., Hazell, N. G., & Augustin, M. A. (2022). Critical food and nutrition science challenges for plant-based meat alternative products.

Critical Reviews in Food Science and Nutrition, 1-16. https://doi.org/10.1080/10408398.2022.2107994

Wang, E. S. (2013). The influence of visual packaging design on perceived food product quality, value, and brand preference. *International journal of retail & distribution management*.

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., & Wood, A. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, *393*(10170), 447-492. https://doi.org/10.1016/S0140-6736(18)31788-4

Appendices

Appendix 1: Email one sent to participants

Good Afternoon

My name is Zoe Johnson. I am currently completing a Master of Science in Nutrition and Dietetics within the College of Health at Massey University.

I am reaching out to you with an opportunity to contribute to research that explores the influence that packaging can have on consumer choice of processed vegan meat in New Zealand. You are receiving this email having previously participated in vegan research conducted by Massey University.

As the popularity of vegan products continues to rise, I am interested in understanding how packaging plays a role in your consumption preferences and purchase decisions. Your participation is entirely voluntary, and all responses are anonymous.

To access the survey please click the link below. N.B. The survey focuses on the packaging of processed vegan meats (plant-based food products manufactured to mimic traditional animal derived meat).

Questionnaire link: https://massey.au1.qualtrics.com/jfe/form/SV_82eXpbj31puV5TE

Estimated completion time: Approximately 5 minutes

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact the Research Ethics Office, email humanethics@massey.ac.nz.
Should you have any questions about the survey or its purpose, please feel free to contact me via this email address z.johnson@massey.ac.nz . Alternatively, you are welcome to contact my primary supervisor, Dr Rachel Batty (r.batty@massey.ac.nz).

Thank you for taking the time to contribute to this study.

Zoe Johnson
MSc Nutrition and Dietetics student
School of Sport, Exercise and Nutrition | College of Health
Private Bag 102904 | North Shore 0745 | Auckland | New Zealand
Phone: (64+) 22 410 2782 | Student no. 22006322 | Email: zjohnson@massey.ac.nz

Appendix 2: Email two sent to participants

Good morning

I wanted to express my sincere thanks if you've already taken the time to complete my survey on processed vegan meat packaging.

If you haven't had the chance to participate yet, I kindly ask for a few minutes of your time to share your valuable insights. Your feedback is highly appreciated and I will be closing the survey soon.

Questionnaire link: https://massey.au1.qualtrics.com/jfe/form/SV_82eXpbj31puV5TE

Estimated completion time: Approximately 5 minutes

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact the Research Ethics Office, email humanethics@massey.ac.nz.
Should you have any questions about the survey or its purpose, please feel free to contact me via this email address z.johnson@massey.ac.nz . Alternatively, you are welcome to contact my primary supervisor, Dr Rachel Batty (r.batty@massey.ac.nz).

Thank you for taking the time to contribute to this study.

Zoe Johnson | Student Dietitian
School of Sport, Exercise and Nutrition | College of Health
Private Bag 102904 | North Shore 0745 | Auckland | New Zealand
Phone: (64+) 22 410 2782 | Student no. 22006322 | Email: zjohnson@massey.ac.nz

Appendix 3: 'Processed Vegan Meat Packaging' Survey

Processed Vegan Meats

Welcome to the 'Processed Vegan Meat Packaging' Survey.

This survey is being conducted as a part of an MSc Nutrition and Dietetics research project and focusses on the packaging of processed vegan meats (plant-based food products manufactured to mimic traditional animal derived meat).

There are a short number of demographic questions, followed by 11 questions relating to the vegan diet and processed vegan meat packaging options. The survey should take approximately 5 minutes of your time.

Start of Block: Demographic

These first questions ask for a little more information about you.

Q1 What gender do you identify with?

- Male (1)
- Female (2)
- Non-binary (3)
- Prefer not to say (4)

Q2 What ethnic group do you belong to?

- [ ] NZ European (1)
- [ ] Māori (2)
- [ ] Pacific Peoples (3)
- [ ] Asian (4)
- [ ] Middle Eastern/Latin American/African (5)
- [ ] Other (6)

Q3 Year of birth (e.g. 1996)

_____

End of Block: Demographic

Start of Block: General questions relating to veganism

These questions ask how long you have been vegan, your motivations behind a vegan diet, and details about your consumption of processed vegan meat.

Q4 How long have you been following a vegan diet?

- ○ Less than a year (1)
- ○ 1-3 years (2)
- ○ 3-5 years (3)
- ○ 5-10 years (4)
- ○ More than 10 years (5)

Q5 Please select the reason(s) you follow a vegan diet:

	Primary Reason (1)	Secondary Reason (2)	Third Reason (3)	Fourth Reason (4)	Not Applicable (5)
Ethical reasons e.g. animal welfare (1)	○	○	○	○	○
Environmental concerns e.g. climate change (2)	○	○	○	○	○
Health reasons (3)	○	○	○	○	○
Other (4)	○	○	○	○	○

Q6 How often do you consume processed vegan meat alternatives?

- ○ Never (1)
- ○ Once a month or less (2)
- ○ 2-4 times a month (3)
- ○ More than once a week (4)
- ○ More than 4 times a week (5)

End of Block: General questions relating to veganism

Start of Block: Questions relating to Nutrient claims

This section asks you about nutrient claims on the packaging of processed vegan meat.

Q7 Protein, iron, and Vitamin B12 are important nutrients found in meat that are essential for maintaining a healthy body. Processed vegan meats try to recreate meat products containing these nutrients, to provide a healthy alternative. They use plant-based protein sources like soy and beans, and often add iron and Vitamin B12 through plant sources or fortification. This allows individuals to choose a vegan diet without missing out on essential nutrients.

Fibre is found in plant-based foods meaning these processed vegan meats are often high in fibre.

Below are several statements regarding nutrient claims on packaging of processed vegan meat products. Please rate the extent to which the following nutrient claims on the packaging of processed vegan meat products influences your purchase decisions.

	Negatively influences	Slight negative influence	No influence	Slight positive influence	Postively influences
	1	2	3	4	5

Protein (e.g. "high in protein” or “good source of protein”) ()	
Iron (e.g. “high in iron” or “good source of iron”) ()	
Vitamin B12 (e.g. “source of vitamin B12") ()	
Fibre (e.g. “1/2 your daily fibre intake” or “high in fibre”) ()	

End of Block: Questions relating to Nutrient claims

Start of Block: Terms and statements

This section asks you about common terms and statements found on the packaging.

Q8 Below are common terms and statements found on the packaging of processed vegan meat products.
Please confirm if you think these statements are important or not in relation to you purchasing the product.

	Important	Somewhat important	Not important
	1	2	3

Meat free ()	
Vegan ()	
Vegan friendly ()	
Plant-based ()	
Made from plants ()	
Sustainable nutrition ()	
Sustainable meat alternative ()	
Cruelty free ()	
No animals harmed ()	
Lean and clean ()	

End of Block: Terms and statements

Start of Block: Environmental questions

This section asks for information about your environmental concerns regarding packaging.

Q9 Below are two statements regarding environmental concerns when purchasing a processed vegan meat product. Please indicate to what level you agree or disagree with the statement.

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
	1	2	3	4	5
It is important that the packaging is eco-friendly (e.g. home-compostable, biodegradable, recyclable) ()					
It is important that there is a positive environmental claim on the product (e.g. “good for the planet”, “planet friendly”, “sustainable”) ()					

This section asks for information about images on packaging.

Q10 Please rate the extent to which the following images on the packaging of a processed vegan meat product influences your purchase decision.

	Negatively influences	Slight negative influence	No influence	Slight positive influence	Postively influences
	1	2	3	4	5
Image of the final product (e.g., the prepared meat substitute) ()					

Q11 Please rate the extent to which the following images on the packaging of a processed vegan meat product influences your purchase decision.

	Negatively influences	Slight negative influence	No influence	Slight positive influence	Positively influences
	1	2	3	4	5
Image of an animal (e.g. imagery related to animals or farm scenes) ()					

Q12 Please rate the extent to which clear packaging of a processed vegan meat product influences your purchase decision.

	Negatively influences	Slight negative influence	No influence	Slight positive influence	Positively influences
	1	2	3	4	5
Clear packaging allowing you to see the product inside ()					

End of Block: Environmental questions

This section asks for information about the nutrition panel and ingredients on packaging.

Q13 Do you look at the nutrition information panel of a processed vegan meat product before purchasing? (An example is included below).

- No, never (1)
- Sometimes (2)
- Yes, always (3)

Q14 If you answered yes or sometimes to the above question, what do you look for on the nutrition information panel?

- [ ] Energy (1)
- [ ] Protein (2)
- [ ] Iron (3)
- [ ] Vitamin B12 (4)
- [ ] Fibre (5)
- [ ] Fat (6)

Q15 Do you look at the ingredients on the packaging of processed vegan meat products? (An example is included below)

- ○ No, never (1)
- ○ Sometimes (2)
- ○ Yes, always (3)

For the purpose of this question, we have used the NOVA classification for ultra-processed foods – foods that contain little or no whole foods, and have added sugar, salt, fats,

additives and preservatives. Processed vegan meat falls into this category.

Please select as many of the statements below that apply to you

- [ ] I am more likely to choose processed vegan meat products that only contain ingredients that I know of. (1)
- [ ] I am not concerned about the number of ingredients that processed vegan meat products contain as they are plant-based and meet my dietary preferences. (2)
- [ ] I am concerned about the nutrient value of processed vegan meat products. (3)
- [ ] I am NOT concerned about the nutrient value of processed vegan meat products. (4)
- [ ] I am more likely to choose a processed vegan meat product that contains a health-star rating on the packaging. (5)
- [ ] I was aware that processed vegan meat products are classified as 'ultra-processed foods'. (6)
- [ ] Processed vegan meat products being classified as 'ultra-processed foods' has a negative influence on my consumption. (7)

Do you have any further comments about the questions in this survey or about processed vegan meat products?

_____

_____

_____

_____

_____