



# The Magic of Mycoprotein

April 2021 – Holly Roper  
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# Introducing Mycoprotein



## MYCOPROTEIN: A UNIQUE WHOLE FOOD

Creating a third category based on natural, nutritious fungi

Animal Based Protein  
Resource-intensive



Fungi Based Protein  
Highly Sustainable



Plant Based Protein  
Highly Sustainable



# FUNGI AS A THIRD KINGDOM

⌋ Paper Summary ⌋

Author: Dr Emma Derbyshire

WHAT'S THE PROBLEM?

THE POPULATION IS GROWING AND WE ALL NEED TO EAT WELL  
FOOD PROTEINS ARE MAINLY CATEGORISED AS ANIMAL OR PLANT-DERIVED → FUNGAL PROTEINS ARE COMPARATIVELY OVERLOOKED  
WE ALSO NEED TO PROTECT OUR PLANET AGAINST THE EFFECTS OF CLIMATE CHANGE

HOW CAN FUNGI HELP?

FUNGI CAN PRODUCE EDIBLE MYCOPROTEIN WHICH IS PRODUCED FROM *FUSARIUM VENENATUM*. THIS IS ALSO A NATURALLY OCCURRING FUNGUS WHICH IS THE KEY INGREDIENT IN ALL QUORN PRODUCTS AND HAS A MUCH LOWER ENVIRONMENTAL FOOTPRINT THAN ANIMAL PROTEIN!

HOW COULD THIS FIT WITH CURRENT FOOD-BASED DIETARY GUIDELINES?  
IS THERE SCOPE FOR A NEW FUNGAL CATEGORY OF PROTEIN?

### FUNGAL PROTEIN:

LOW IN FAT AND SATURATED FAT  
SOURCE OF VITAMIN B12, CHOLINE, ZINC AND MORE  
PROVIDES ALL 9 ESSENTIAL AMINO ACIDS  
HIGH IN PROTEIN AND A UNIQUE FIBRE COMBINATION OF BETA-GLUCANS + CHITIN  
PROMOTES POST-EXERCISE MUSCLE SYNTHESIS  
REDUCTION OF ENERGY INTAKE  
FAVOURABLE CHANGES IN BLOOD LIPID LEVELS  
IMPROVEMENTS IN MARKERS OF GLYCAEMIA AND INSULINAEMIA  
WHAT ABOUT THE HEALTH EFFECTS?

### ANIMAL PROTEIN

USEFUL SOURCE OF BIOAVAILABLE AMINO ACIDS + MICRONUTRIENTS  
CONCERNS OVER ANIMAL WELFARE IN INDUSTRIAL MEAT PRODUCTION  
CRITICISM OF THE ROLE THEY PLAY IN CHRONIC DISEASE  
RISING NUMBERS OF DISEASE OUTBREAKS LINKED TO ANIMAL PROTEINS

### PLANT PROTEIN

INCREASINGLY BEING LINKED TO HEALTH AND WELLBEING BENEFITS  
IMPROVEMENTS IN:  
LIPID PROFILE  
INFLAMMATION  
GLYCAEMIC CONTROL  
CARDIOVASCULAR DISEASE MORTALITY

IT'S TIME FOR A THIRD CATEGORY OF PROTEIN: **FUNGAL**

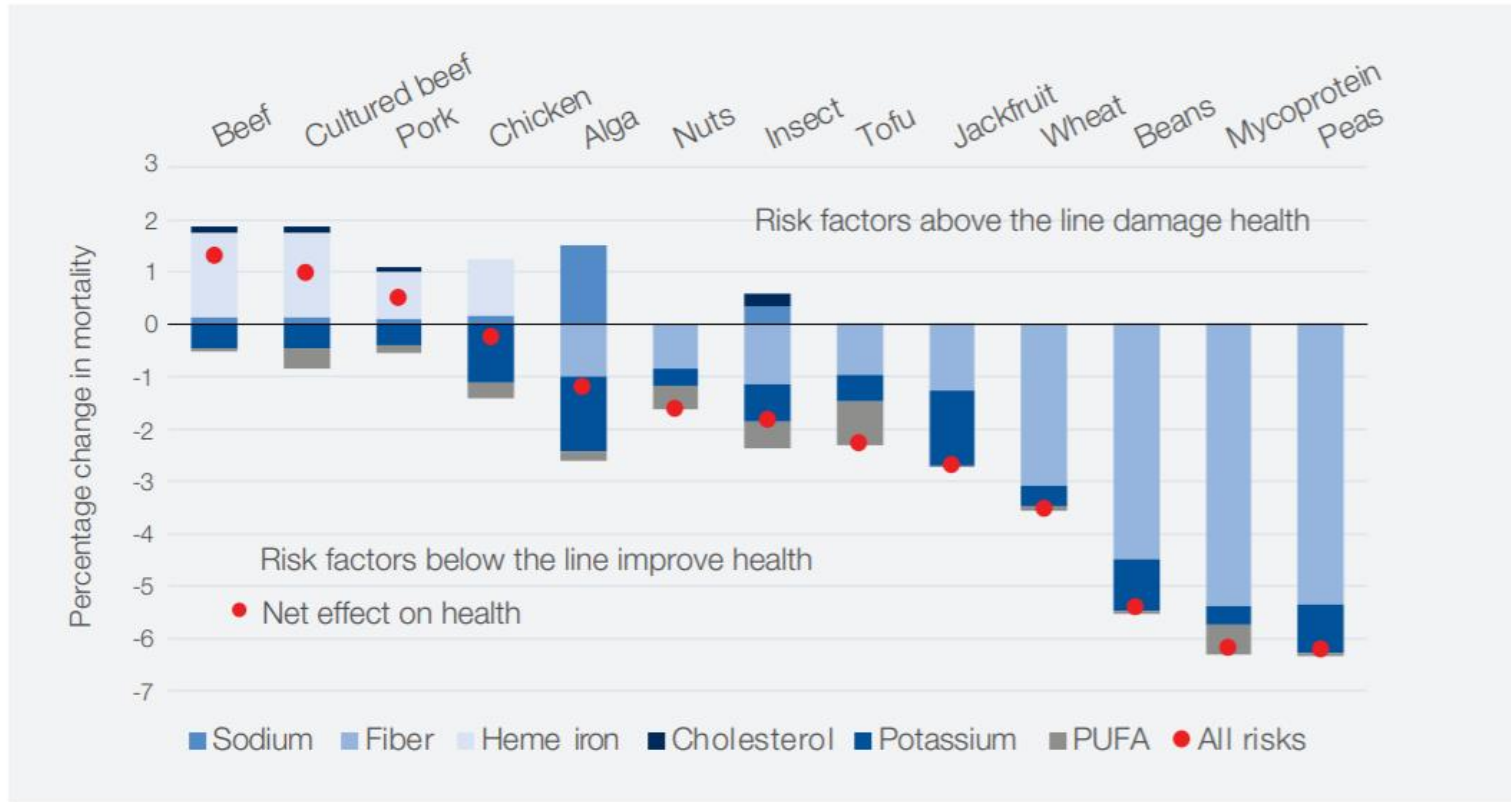


# HEALTH EFFECTS OF EATING MYCOPROTEIN: *Independent Review*



Figure 4 : Net health effects of substituting beef with different food types globally and by national income class.

Figure 3 : The health effects of consuming an additional portion of different alternative proteins



LD  
UMIC  
LM

**Mycoprotein offers the most promising benefits to human health as a substitute for red meat, particularly in high and upper-middle income countries.**

**The general benefits of mycoprotein were linked to its high fibre content in comparison to other common meat alternatives, including tofu.**

HIC: high-income country; UMIC: upper-middle-income country; LMIC: lower-middle-income country; LIC: lower-income country.



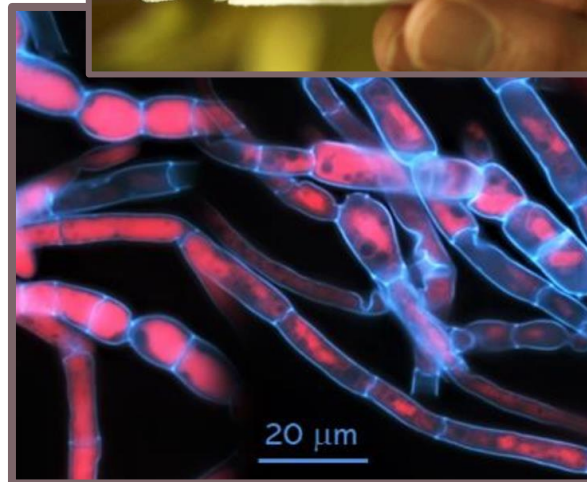
3000

Nearly 3,000 organisms were sampled from soil around the world before a suitable organism was identified



1960s

In the 1960's experts were concerned about global food shortages and started looking for food alternatives among microorganisms





**Fermentation &  
other processing  
techniques**

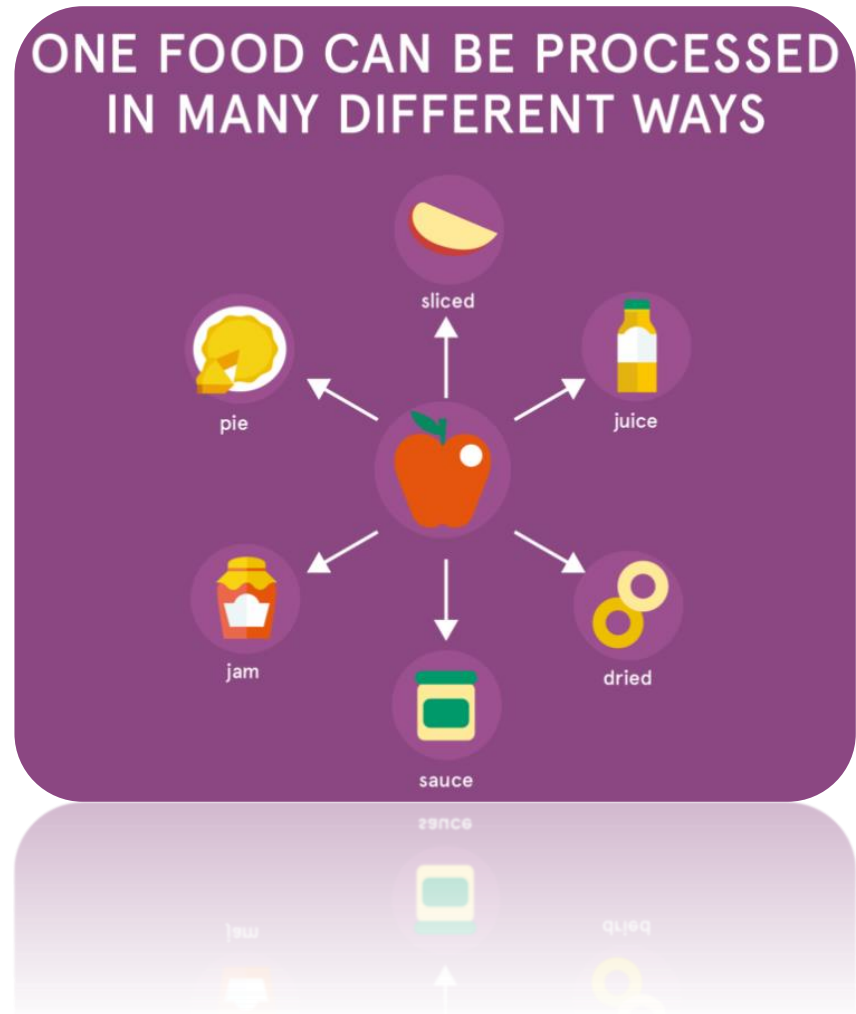
# What is food processing?

## Convert to goodness

Food processing is any method used to turn fresh foods into food products. This can involve one or a combination of the following: washing, chopping, pasteurising, freezing, fermenting, packaging and many more.

Food processing also includes adding components to food, for example to extend shelf life, or adding vitamins and minerals to improve the nutritional quality of the food (fortification).

The term 'processed foods' is used by many with certain disdain, suggesting that processed foods are in some way inferior to their non-processed counterparts. However, it is important to remember that food processing has been used for centuries in order to preserve foods, or simply to make foods edible. In fact, processing spans the whole food chain from harvesting on the farm to different forms of culinary preparation in the home, and it greatly facilitates provision of safe food to populations around the globe.



# Why is it important?

**INCREASING AVAILABILITY**

**ALTERING ANTIOXIDANT LEVELS**

**MAKING IT CONVENIENT**

**CHANGING FLAVOUR & TEXTURE**

**ALLOWING FORTIFICATION & ENRICHMENT**

**DECREASING PRICE**

**TAILORING TO SPECIFIC NEEDS**

**ENSURING FOOD SAFETY**

**INCREASING DIVERSITY**

**REDUCING FOOD WASTE**

**PRESERVING NUTRITIONAL QUALITY**



# The history of food processing

Table 1. Chronological development of food processing techniques

Traditional processing	More modern processes (circa 1900 onwards)	Most modern techniques (post 1960)
Canning	Extrusion cooking	Freeze drying
<u>Fermentation</u>	Freezing and chilling	Infrared processing
Freezing	Pasteurisation	<u>Irradiation</u>
Oven drying	<u>Sterilisation</u>	Magnetic fields
Pickling	Ultra-High Temperature (UHT)	Microwave processing
Salting		<u>Modified atmosphere packaging</u>
Smoking		Ohmic heating
Sun drying		Pulsed electric fields
		Spray drying
		Ultra-sonification

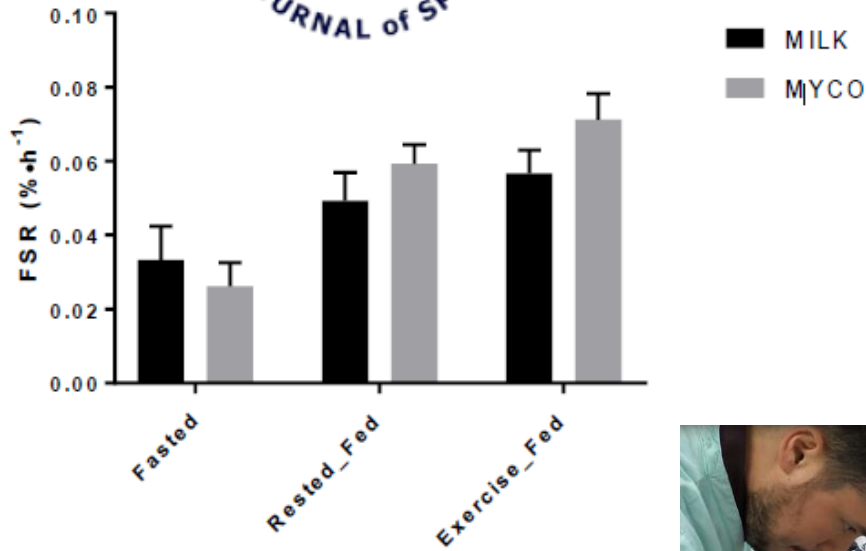
# Let's take a look at mycoprotein in action...



# Our extensive research goes back 30 years!



# OUR GROUND-BREAKING PROTEIN RESEARCH STREAM



Press releases

**QUORN PROTEIN BUILDS MUSCLE BETTER THAN MILK PROTEIN - STUDY PUBLISHED IN THE AJCN**

## MailOnline

**Meat replacement QUORN builds muscle 'twice as fast as whey protein powder because it contains fat, carbs and other vital nutrients which aid growth'**

- Scientists tracked how quickly muscle was rebuilt by different proteins
- The men were given either mycoprotein or dairy-based protein after a workout
- Mycoprotein, which is used in Quorn foods, was found to be faster-acting

By SAM BLANCHARD SENIOR HEALTH REPORTER FOR MAILONLINE  
 PUBLISHED: 15:00, 3 July 2019 | UPDATED: 19:31, 3 July 2019

**Quorn 'builds muscle twice as fast as milk protein', study claims**

QUORN protein can help the body to build muscle. And according to one study, it can be even better for bulking than milk protein.



# FIBRE AND GUT HEALTH



Breakfast Symposium delivered by Quorn

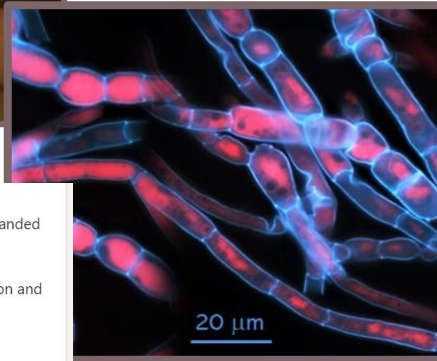
8.30 Understanding the impact of Quorn beta-glucan on the gut microbiota  
Dr Jose Munoz, Senior Fellow, Northumbria University, Newcastle, UK



Spring Conference 2021: Gut microbiome and health

United Kingdom

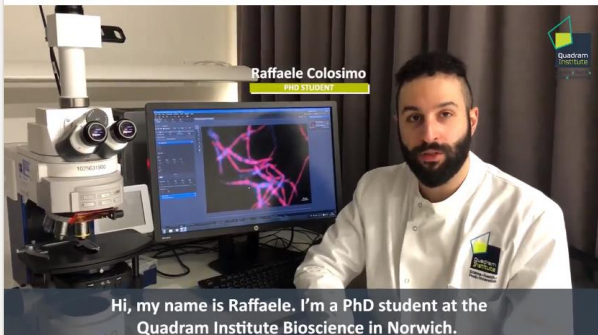
29 March 2021 to 30 March 2021



Meet PhD student Raffaele 🍌 Raffaele is researching the health benefits of mycoprotein, a food ingredient used in all the meat replacement products branded as Quorn™.

In our brand new blog, Raffaele explains how mycoprotein influences digestion and promotes health effects: <http://ow.ly/xxYj50CyhyP>

#Blog #Science #Nutrition #Food #Vegan #Vegetarian



Raffaele Colosimo  
PhD student

Hi, my name is Raffaele. I'm a PhD student at the Quadram Institute Bioscience in Norwich.



# CARDIOMETABOLIC HEALTH

Imperial College London



10%

A study published in the British Journal of Nutrition describes a randomised controlled trial which found that a macronutrient-matched meal containing mycoprotein decreased total energy intake during a free eating task, and again 24 hours later, by up to 10% compared with chicken.



## Quorn protein found to lower cholesterol levels in healthy adults

A study from the University of Exeter has found that mycoprotein, the protein-rich food source that is unique to Quorn products, lowers the post absorptive levels of low-density lipoproteins (LDL), commonly known as "bad" cholesterol, more than meat and fish.

Comparison of dietary fibre in mycoprotein vs other fibre-containing foods

Food	Approximate fibre per 100g
Mycoprotein	6.0g
Baked beans in tomato sauce	3.7g
Boiled potatoes	1.2g
Brown bread	3.6g
Brown rice	0.8g

Data source for Mycoprotein, Marlow Foods  
Data source for other foods, MeReC Bulletin Vol. 14 No. 6, 2004



Article  
**Short Chain Fatty Acid Production from Mycoprotein and Mycoprotein Fibre in an In Vitro Fermentation Model**

Hannah C. Harris<sup>1,2</sup>, Christine A. Edwards<sup>1</sup> and Douglas J. Morrison<sup>2</sup>✉

<sup>1</sup> School of Medicine, Dentistry and Nursing, College of Medical Veterinary and Life Sciences, University of Glasgow, Glasgow G3 7ER, UK; hannahc.harris1@gmail.com (H.C.H.); Christine.Edwards@glasgow.ac.uk (C.A.E.)

<sup>2</sup> Scottish Universities Environmental Research Centre, University of Glasgow, Glasgow G75 0QE, UK



**Our health professional  
engagement programme**

# A taste of Quorn Nutrition...



**BDA British Dietetic Association** @BDA\_Dietitians · Oct 2  
 #Ad There's nothing like a hearty chilli in Autumn. Our Veggie Rebel version tastes great & reduces the meal's carbon footprint and sat fat!

If you don't believe us, be a Veggie Rebel and try it out for yourself  
[buff.ly/2GhSYWA](https://buff.ly/2GhSYWA)

#BDASustainableSeptember @Quorn\_Nutrition

Recipe # 4  
 Classic Chilli

**Sustainable Eats**  
 VEGGIE REBEL

- ▼ Carbon footprint 84%
- ▼ Saturated fats 73%
- ▲ Fibre 71%

BDA The Association of Dietitians | ONE BLUE DOT | Quorn

## Select a meal



## Tikka Masala with Basmati Rice

Make it your way: next select what proportion of meat/mycoprotein you prefer. Our handy tool lets you see what the environmental and nutritional impacts of your choices are.

100% Meat      50% meat / 50% Quorn™      100% Quorn      Leftover Recipe Ideas

**THE MEATY ONE**      **50/50**      **VEGGIE REBEL**      **THE REINVENTION TEST**

Carbon Footprint      Nutrition per serving

Main meal      Side dish

**0.73** kg CO<sub>2</sub>e per portion      **0.09** kg CO<sub>2</sub>e per portion

Average daily CO<sub>2</sub> 2.8 kg CO<sub>2</sub>e per day

Calories	Fat	Sat. Fat	Sugars	Salt	Five a day
665 Kcal	17	4.5	15	1.0	
	LOW	LOW	LOW	LOW	

▼ Sat. Fats    ▼ Sugar    ▼ Salt    ▲ Fibre    + Source of protein

**About Mycoprotein**

What is mycoprotein?

Why is mycoprotein better than other protein sources?

How is mycoprotein produced?

**Micronutrient Profile**

What are micronutrients, and why are they important for your health?

13 vitamins



## Recipes

The range of Quorn® products make it easy for you to incorporate meat-free alternatives into quick and easy homemade meals with a source of protein and fibres. Our recipes will give you everything you need to make great tasting meals in no time.

Arancini Balls      Classic Quorn Spaghetti Bolognese      Loaded Sweet Potatoes



quorn\_nutrition

Are you ready to take on the Reinvention Test? Did you know one third of all food produced goes to waste? It's time to find out if food waste were a country, it would be the 3rd biggest emitter of carbon emissions after China & the USA. So here at Quorn, we've produced 5 reinvention recipes that use up the leftovers of family favourites like this Quorn Spag Bol into Loaded Sweet Potato Jackets. Over the next couple of days we'll be releasing exclusive recipe clips.

Liked by *Reskelly* and 19 others

**We believe in change**  
 A SERIES ABOUT FOOD AND CLIMATE

My name's Louise Needham and I'm a sustainability manager at Quorn Foods.

quorn\_nutrition

Last year, Quorn's Health & Sustainability team attended the EAT Food Forum in Stockholm. This was the sixth annual EAT Forum which gathered 1000 food system leaders from science, politics, business, civil society and beyond! Watch this video to see what Louise, our Sustainability Manager, had to say about how Quorn Foods fits into the wider debate about food systems and the climate. Watch this space as we will be releasing more clips in our mini series about food and climate.

110 views



**THANK YOU**