

# Digestibility of broad bean (faba bean) protein compared to whey protein

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<b>Registration date</b> 11/06/2025	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 06/06/2025	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Plant-rich diets are recommended for health and environmental sustainability. Recently, there has been great interest in how we can maximise land use efficiency in the United Kingdom and Ireland by growing a wider range of plant crops. One promising plant source of protein is faba beans, commonly known as broad beans. However, it is unknown if its protein is readily digested in comparison to high-quality animal proteins, such as whey protein (coming from cow's milk). It is also unknown how the digestion of faba bean protein influences things like the secretion of gut hormones that influence appetite, and the levels of glucose in the blood. This study aims to examine how well faba bean protein is digested and how this affects metabolism compared with whey protein, when they are consumed as a drink alone or in combination with glucose.

### Who can participate?

Healthy volunteers aged 18 to 40 years

### What does the study involve?

Eligible individuals who signed the consent form will be invited to attend four visits (in a fasted state) that took place in the Northern Ireland Clinical Research Facility, Belfast, at least one week apart.

At each visit, participants consumed one of the following drinks:

- Whey protein OR
- Faba bean protein OR
- Whey protein in combination with glucose (50g) OR
- Faba bean protein in combination with glucose (50g)

The drinks will be given in a random order, which is computer-generated. The protein content of the drinks is based on participants' body weight, with 0.4g of protein per Kg of body weight in every drink. All drinks will be prepared using 450ml of bottled water together with the protein powder and flavoured with a sugar-free fruit cordial for flavour.

At the first visit, participants completed a short lifestyle questionnaire with questions about gender, age, usual food and drink consumption, alcohol intake, usual level of physical activity and smoking status. Their height, weight and waist circumference will also be measured.

At each visit, a trained research nurse collects participants' blood samples (60ml in total) on five occasions: shortly before being given the drink and again after 30 minutes, 60 minutes, 90 minutes, and 120 minutes. These samples will be used to measure nutritional and metabolic markers, including gut hormones, insulin, glucose and levels of amino acids (the building blocks of proteins). Participants will also be asked to rate their hunger (each time a blood sample was collected) and to indicate what they thought of the taste and texture of the drink they had (after the last blood draw).

What are the possible benefits and risks of participating?

Benefits of participating

Participants had the opportunity to help us understand how faba bean protein is digested and how it affects metabolism compared to whey protein. This will help a range of stakeholders, including farmers, food producers and nutrition and health experts, understand more about how faba beans can support human health. They also received a token of appreciation for the time it took to participate in this research: a £100 voucher after the first two visits and a further £100 voucher after the last two visits.

Side effects

The content of both drinks (faba bean and whey protein) is available to purchase, widely consumed and well tolerated, so the risk of any adverse effects was very low. Potential hazards associated with taking blood samples include minor discomfort, fainting and bruising due to the insertion of the cannula and providing blood. However, few cases of the above are expected, thanks to the fully trained member of staff who will ensure the safe collection of the blood samples. Additionally, following completion of all measurements, all participants will be given time to relax and a snack and drink to take away with them.

Where is the study run from?

This research study is managed and run by the Centre for Public Health, Queen's University Belfast. The study visits will take place in the Northern Ireland Clinical Research Facility, U Floor, Belfast City Hospital.

When is the study starting and how long is it expected to run for?

October 2023 to July 2024

Who is funding the study?

1. The Department of Agriculture, Environment and Rural Affairs (DAERA)
2. The Department of Agriculture, Food and the Marine (DAFM)

Who is the main contact?

1. Dr Eleni Spyreli, Research Fellow, Eleni.spyreli@qub.ac.uk
2. Professor Michelle McKinley, Professor, M.mckinley@qub.ac.uk

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## Additional identifiers

**Protocol serial number**

DAFM 2019 Competitive Research Fund: CRF 19/R/702

## Study information

**Scientific Title**

Effect of faba bean protein versus whey protein on human metabolic responses: a single-blind, randomised, acute crossover study

**Acronym**

U-Protein

**Study objectives**

Hypothesis 1 – A beverage containing faba bean protein will have a similar stimulatory effect on glucagon-like peptide-1 (GLP-1) and satiety hormone secretion but will have lower amino acid availability compared to whey protein.

Hypothesis 2 – A beverage containing faba bean and glucose will attenuate the postprandial glycaemic response to a greater extent than a beverage containing the same dose of whey protein and glucose.

**Ethics approval required**

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## **Ethics approval(s)**

approved 16/02/2024, Faculty of Medicine, Health and Life Sciences Research Ethics Committee, Queen's University Belfast (90 Lisburn road, Belfast, BT9 6AF, United Kingdom; +44 (0)28 9097 2529; facultyrecmhls@qub.ac.uk), ref: MHLS 24\_11

## **Study design**

Single-blind randomized acute crossover intervention trial

## **Primary study design**

Interventional

## **Study type(s)**

Other

## **Health condition(s) or problem(s) studied**

This is an acute feeding study in healthy adults

## **Interventions**

Participants will complete four acute interventions (two tests, as shown below) in a random order (randomisation was carried out using a computer programme) with at least a one-week washout between studies. At each visit, participants will consume one of the four test beverages detailed below.

Test 1

- Intervention 1: Whey protein (WP), 0.4g/kg body weight
- Intervention 2: Faba bean protein (FP), 0.4g/kg body weight

Test 2

- Intervention 3: Whey protein (WP) and glucose load, 0.4g/kg body weight WP + 50g glucose
- Intervention 4: Faba bean protein (FP) and glucose load, 0.4g/kg body weight FP + 50g glucose

Test beverages will be prepared fresh for each participant just before consumption and will be served in opaque containers. For interventions 1 and 2 (WP vs FP), beverages will be prepared using bottled water (450ml) together with protein powder equating to 0.4g/kg/d for the participant and flavoured with a sugar-free flavouring (e.g. commercially available cordial). The test beverages for interventions 3 and 4 (WPG vs FPG) will be prepared in the same way, but with the addition of 50g glucose. Participants will be asked to consume beverages within 15 minutes of serving.

## **Intervention Type**

Supplement

## **Primary outcome(s)**

Circulating concentrations of GLP-1 measured using a Mesoscale Discovery (MSD) analyser in plasma blood samples at T0 (before the drink is consumed), T30, T60, T90 and T120 (minutes)

## **Key secondary outcome(s)**

Circulating concentrations of the following molecules in plasma blood samples at T0 (before the drink is consumed), T30, T60, T90 and T120 (minutes):

1. Other satiety hormones (C-Peptide, GIP, glucagon, insulin, leptin and PYY) measured using a Mesoscale Discovery (MSD) analyser

2. Glucose measured using a glucose oxidase analyser
3. Amino acids measured using a triple-quadrupole mass spectrometer
4. Targeted metabolites measured using a commercially available metabolomics profiling kit

**Completion date**

09/07/2024

## Eligibility

**Key inclusion criteria**

1. 18-40 years old
2. Body mass index (BMI)  $\geq 18.5$  kg/m<sup>2</sup> and/or weight  $\geq 50$ kg
3. Be willing to consume a drink with whey protein and fava bean protein
4. Be available to meet the requirements of the study (i.e. attend study visit, give blood samples)

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Adult

**Lower age limit**

18 years

**Upper age limit**

40 years

**Sex**

All

**Total final enrolment**

20

**Key exclusion criteria**

1. Pregnancy or lactating
2. Any known food allergy or intolerance, including lactose intolerance or milk allergy
3. Known history of diabetes mellitus or the use of antihyperglycemic drugs or insulin to treat diabetes and related conditions
4. Medical condition or medication known to affect glucose regulation or appetite and/or digestion and absorption of nutrients
5. Major medical or surgical event requiring hospitalisation in the three months preceding the first visit
6. Use of steroids, protease inhibitors or antipsychotics
7. Donated blood to the NI Blood Transfusion Service in the last 12 weeks for men or 16 weeks for women

**Date of first enrolment**

05/03/2024

**Date of final enrolment**

10/06/2024

## Locations

**Countries of recruitment**

United Kingdom

Northern Ireland

**Study participating centre**

**Centre for Public Health, Queen's University Belfast**

Institute of Clinical Science, Block A, Royal Victoria Hospital

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## Sponsor information

**Organisation**

Queen's University Belfast

**ROR**

<https://ror.org/00hswnk62>

## Funder(s)

**Funder type**

Government

**Funder Name**

Department of Agriculture, Environment and Rural Affairs, UK Government

**Alternative Name(s)**

DAERA

**Funding Body Type**

Government organisation

**Funding Body Subtype**

National government

### Location

United Kingdom

### Funder Name

Department of Agriculture, Food and the Marine, Ireland

### Alternative Name(s)

An Roinn Talmhaíochta, Bia agus Mara, An Roinn Talmhaíochta Bia agus Mara, Department of Agriculture, Food and the Marine, agriculture\_ie, Department of Agriculture, Food and the Marine (Ireland), DAFM

### Funding Body Type

Government organisation

### Funding Body Subtype

National government

### Location

Ireland

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study will be available upon request from Dr Eleni Spyreli, [eleni.spyreli@qub.ac.uk](mailto:eleni.spyreli@qub.ac.uk).

### IPD sharing plan summary

Available on request

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Participant information sheet</a>	version 4.0	18/04/2024	06/06/2025	No	Yes
<a href="#">Protocol file</a>	version 4.0	18/04/2024	06/06/2025	No	No