

# Actinidin (Kiwifruit Enzyme) & Protein Digestion - Overview

Kiwifruit contains a unique cysteine protease known as **Actinidin**

Actinidin constitutes up to **40%** of the soluble protein in NZ green kiwifruit

Actinidin strongly enhances the digestion of:

- dairy proteins - casein (the major milk protein), yoghurt and cottage cheese
- animal meat proteins (beef, chicken and fish)
- collagen
- Plant proteins including:
  - Wheat gluten
  - Pea
  - Almond
  - Soy
  - Rice
  - Hemp
  - Tofu
  - Quinoa

Actinidin is also able to reduce **bloating/gastric** discomfort

# Actinidin & Protein Digestion – Science Summary



Publication	Study Type	Study Objective	Key Result
<b>Kaur, et al., 2010</b>	In vitro	Effect of actinidin on gastric digestion of proteins.	Actinidin enhanced the digestion of caseins, soy protein, and beef muscle over and above that found with pepsin alone.
<b>Rutherford, et al., 2011</b>	In vivo (rat)	Effect of actinidin on the gastric and small intestinal digestion of six proteins.	Dietary actinidin increased gastric digestibility of beef muscle protein, gelatin, soy protein isolate and gluten.
<b>Montoya, et al., 2013</b>	In vivo (pig)	Effect of dietary actinidin on the rate of gastric digestion of beef muscle and on the rate of stomach emptying.	The rate of stomach emptying was faster and the digestion of beef muscle protein was increased when actinidin was present in the diet.
<b>Montoya, et al., 2014</b>	In vivo (rat)	Effect of dietary actinidin on stomach emptying and gastric digestion of six proteins.	Dietary actinidin increased gastric protein digestion and/or accelerated stomach emptying for several dietary protein sources, including beef muscle, gluten and soy protein.
<b>Wallace, et al., 2017</b>	Clinical	Effect of kiwifruit with actinidin on the digestion of a protein meal (400 g lean steak).	Gastric comfort and bloating were significantly reduced with consumption of the green kiwifruit with actinidin (compared to consumption of Hort16A gold kiwifruit without actinidin).
<b>Park, et al., 2020</b>	Clinical	Effect of kiwifruit with actinidin on gastric digestion of proteins and subsequent amino acid absorption.	More rapid increase in peripheral plasma amino acid concentrations following consumption of actinidin (from green kiwifruit) with a beef meal compared to Hort16A gold kiwifruit (without actinidin) consumption. Actinidin facilitates protein digestion and the absorption of amino acids.

# Actinidin & Alternative Plant Protein Digestion



Alternative sources of protein gaining popularity.

A recent (Kaur et al 2022) *in vitro* (oral-gastric-small intestinal model) study investigated the effect of actinidin from green (Hayward) and gold (Zesy002) kiwifruit on the digestion of **pea, almond, tofu and quinoa**.

## Key Findings:

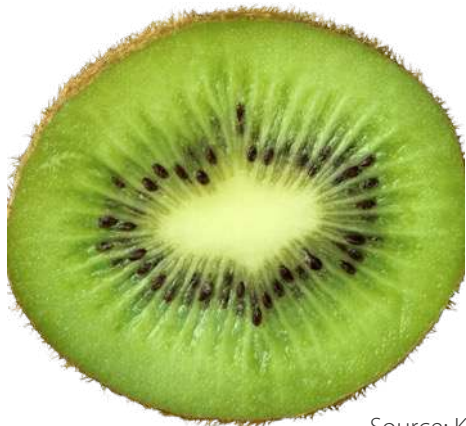
- Actinidin (from both green and gold kiwifruit) enhanced the digestion of all the proteins, particularly during the gastric phase of digestion.
- Most of the proteins disappeared within the first few minutes of gastric digestion with added kiwifruit extract.
- Green kiwifruit extract, due to its higher actinidin activity, had a higher effect on protein breakdown than the SunGold extract.
- Gold kiwifruit had approx. 25% actinidin as green kiwifruit but was still able to have a positive effect on the digestion of the proteins.

# Actinidin & Pea Protein

The digestibility of pea proteins has been reported to be lower than that of soy and animal proteins due to their compact structure.

Convicilin subunits were found to be more resistant to gastric digestion and complete gastric digestion occurred only after **60 min** in the samples hydrolysed by pepsin alone.

Both Hayward and SunGold kiwifruit extracts alone (with no added pepsin) were able to almost completely digest convicilin subunits, with their disappearance after the **first few seconds** of gastric digestion.



## Actinidin vs Pepsin On Pea Protein

Actinidin has a broader specificity than pepsin, which is possibly the reason that green or SunGold kiwifruit extract (with or without any added pepsin) digested all the other major proteins present in PPI significantly during the gastric incubation phase over and above than pepsin alone.

Source: Kaur, L.; Mao, B.; Bailly, J.; Oladeji, O.; Blatchford, P.; McNabb, W.C. Actinidin in Green and SunGold Kiwifruit Improves Digestion of Alternative Proteins—An In Vitro Investigation. *Foods* 2022, 11, 2739.

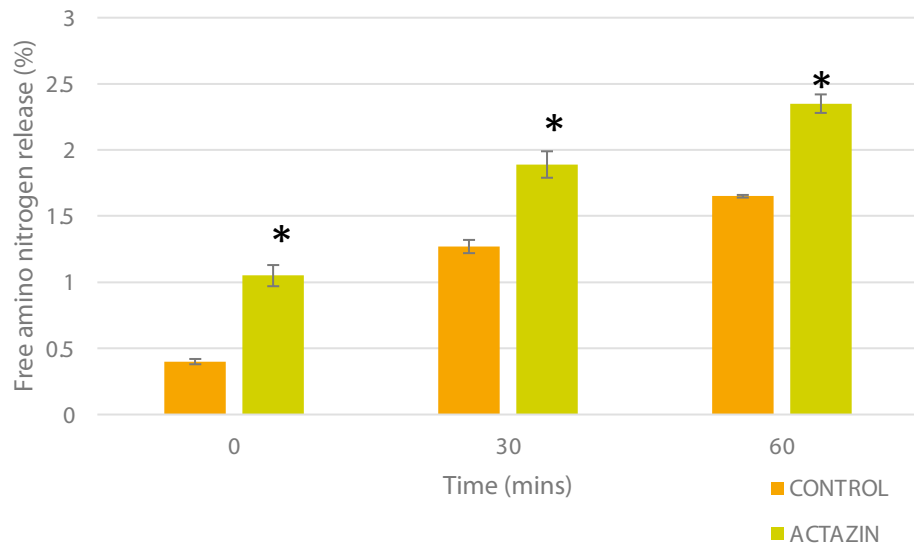
# Actazin improves digestion of plant proteins

Various plant proteins (pea, hemp, soy and rice) were subjected to simulated oral-gastric digestion with and without the addition of Actazin.

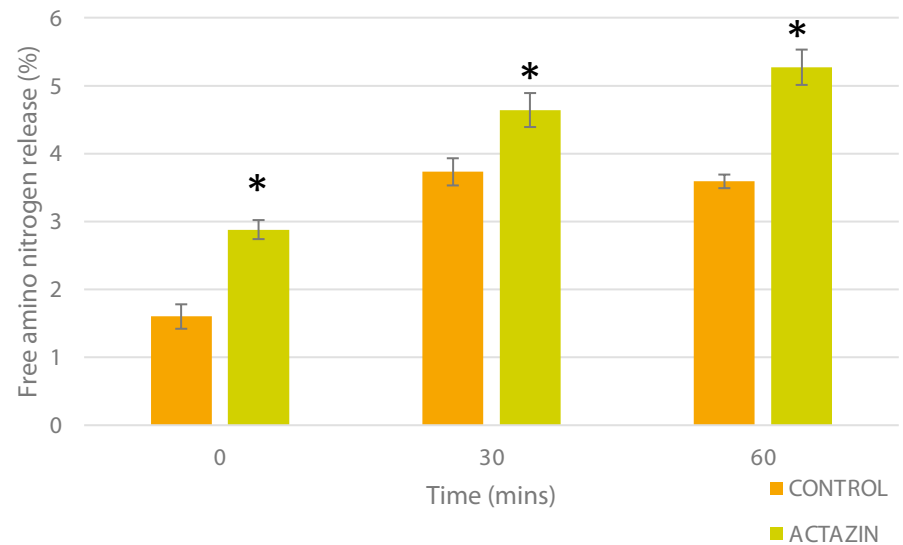
Rice and soy proteins showed significantly higher digestibility with added Actazin



Rice Protein



Soy Protein Isolate



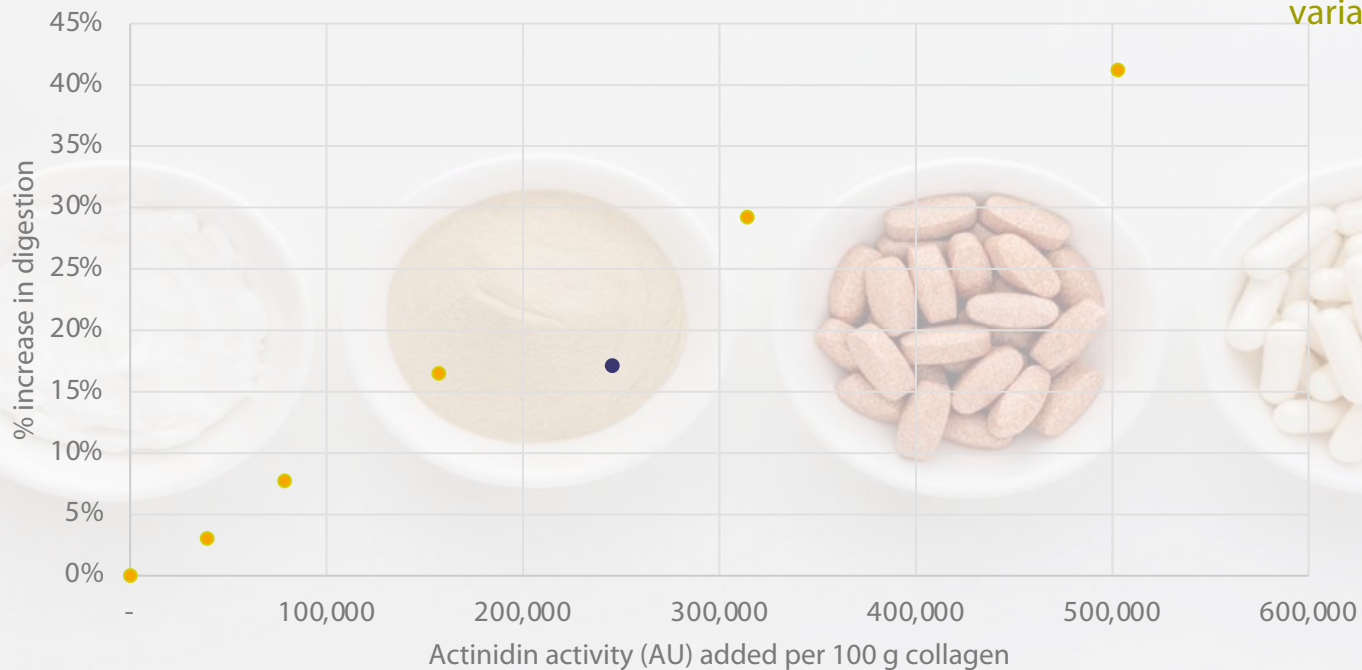
\* p<0.05 vs control

# Actazin Increase Collagen Digestion by 17%

Actazin, from green (Hayward) kiwifruit, naturally contains high levels of actinidin to assist with protein digestion.

This assay contained 250,000 AU of Actinidin (in 2400mg of Actazin – subject to seasonal variation)

Effect on actinidin on the digestion of collagen in vitro



● Collagen ● Actazin (2,400 mg)

# An Ultimate Plant Based Protein Powder Contains....

Hydrolyse majority of the  
intact pea proteins **in a  
few seconds**

Hydrolyse the peptides  
produced during  
hydrolysis of the intact  
pea protein



## Ultimate Protein Powder

More complete protein digestion  
Faster and better amino acid delivery to cells  
Improved satiety





**ACTAZIN**<sup>®</sup>  
*inside*

# protein digestion for athletes and active individuals



- Athletes have an increased intake of 1.2g to 2 g of protein per kg of body weight. This is equivalent to 160g of protein powder (approx. 8 scoops of protein powder) for an average 70 to 80kg athlete.
- Excessive amount of protein can cause bloating, constipation and gastro discomfort.
- Actazin digests protein faster than pepsin and reduces bloating. It also promotes bowel regularity.
- Actazin inside delivers amino acids more quickly to cells and may promote greater muscle protein synthesis for athletes and physically active individuals .





**ACTAZIN<sup>®</sup>**  
*inside*

# protein digestion for elderly



- Protein powder with Actazin inside can compensate for the loss of natural digestive ability in some population groups such as the elderly.
- Protein powder with Actazin inside reduces bloating and gastro discomfort from increased protein intake.
- Actazin inside delivers amino acids more quickly to cells and may promote greater muscle protein synthesis.



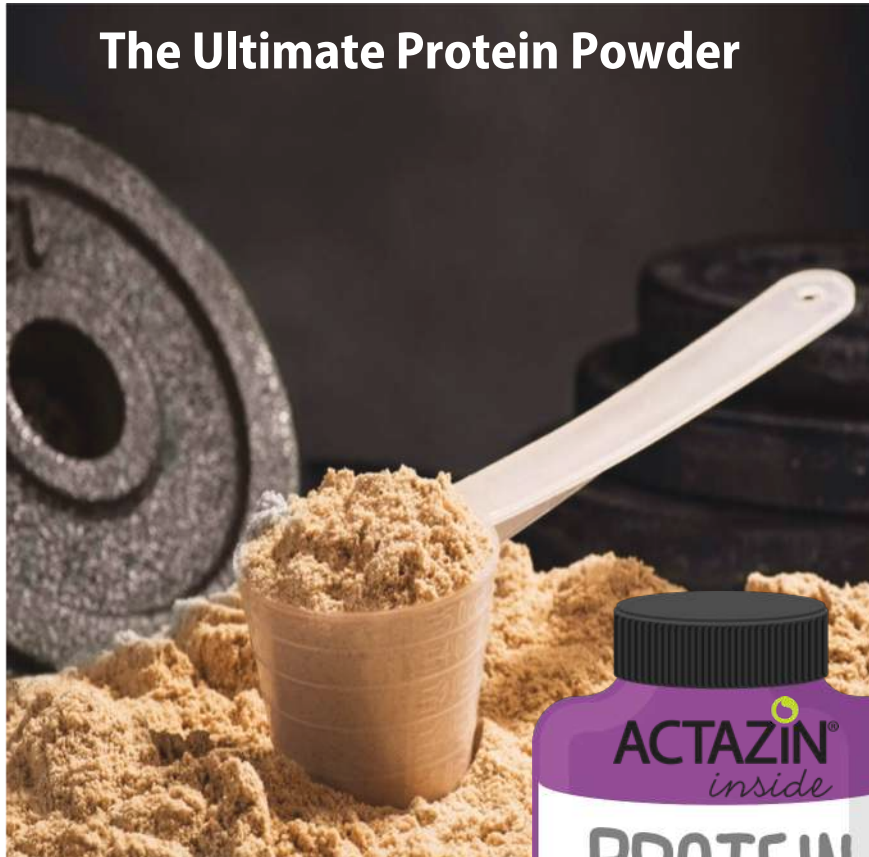
**ACTAZIN**<sup>®</sup>  
*inside*

## Protein digestion for weight loss



- Actazin inside delivers amino acids more quickly to cells and may promote satiety.
- Actazin inside reduces bloating and discomfort for weight watchers switching from low carb to high protein diet.
- Actazin inside promotes bowel regularity.

# Actazin For Protein Digestion – Possible Claims



The Ultimate Protein Powder

ACTAZIN<sup>®</sup>  
*inside*

- Contains natural, whole, NZ kiwifruit with protein-digesting enzyme (Actinidin)
- Digests pea protein in seconds
- Superior digestion for soy and rice protein
- Facilitate more rapid uptake/absorption of amino acids
- May promote greater muscle synthesis
- Reduce bloating and gastric discomfort
- Promote bowel regularity
- Suitable for active individuals, athletes, pre- or post-workout, weight watchers, elderly