



# Actazin<sup>®</sup>, Actinidin & Protein Digestion

## Kiwifruit contains a unique cysteine protease known as actinidin.

Actinidin, which is mainly found in the green (Hayward) variety of kiwifruit, constitutes up to 40% of the soluble protein in the fruit.

Numerous in vitro, in vivo and clinical studies have shown actinidin enhances protein digestion in the stomach and small intestine, increases gastric emptying and results in a more rapid increase in the absorption of amino acids.

Actinidin 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 soy, rice and wheat gluten

Actinidin is also able to reduce bloating/gastric discomfort.

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 discomfort 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.
<b>Jayawardana, et al., 2021</b>	In vitro	Effect of actinidin on gluten digestion	Actinidin breaks down the most allergenic/immunogenic peptide that is produced during the digestion of gluten. Actinidin is more effective at digesting gluten and its peptides than other fruit enzymes, e.g. bromelain and papain.
<b>Jayawardana, et al., 2022</b>	Mixed in vivo & in vitro	Effect of actinidin on gluten digestion	Actinidin significantly accelerated the digestion of wheat proteins and known gluten immunogenic peptides.

## ACTAZIN INCREASES COLLAGEN DIGESTION BY 17%

Actazin, being from the green Hayward kiwifruit, naturally contains high levels of actinidin.

In vitro analysis of Actazin specifically, shows that it is effective in increasing the digestion of proteins, including collagen (Figure 1).

Additionally, a 3 mg/mL solution of Actazin is effective in tenderising meat (beef brisket), improving tenderness, juiciness and flavour (Zhu, et al., 2018).



### Effect on actinidin on the digestion of collagen in vitro

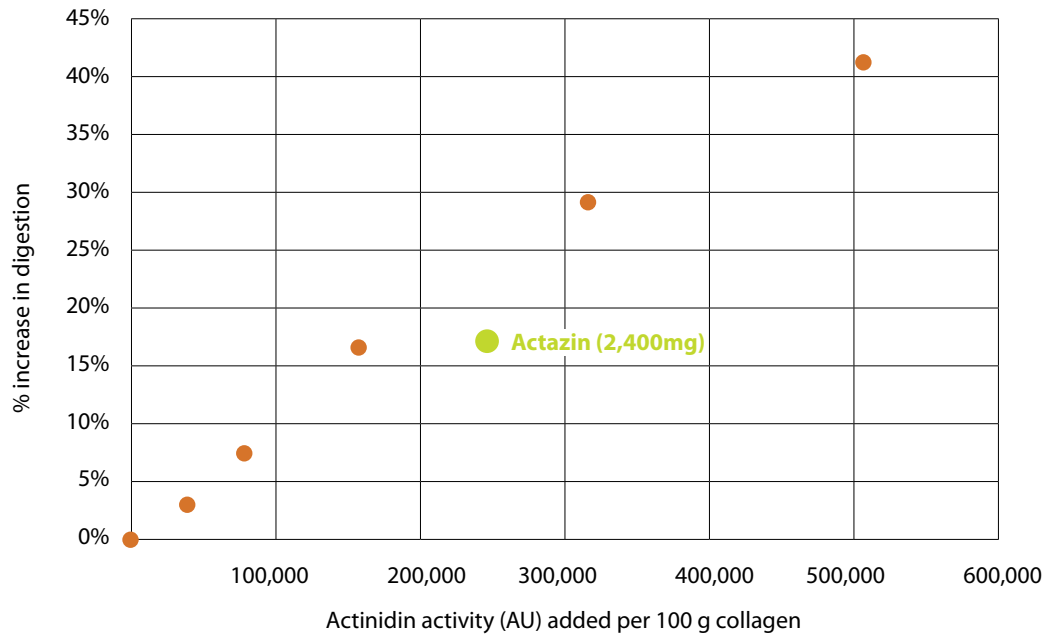


Figure 1: In vitro analysis comparing the effect of various concentrations of an actinidin concentrate (orange dots) to a 2,400 mg dose of Actazin (green dot). With increasing actinidin, comes increased digestion, as expected. A 2,400 mg dose of Actazin (as used in this assay) provided approx. 250,000 AU to increase the digestion of 100 g of collagen by 17%.

## ACTAZIN® IMPROVES DIGESTION OF PLANT PROTEINS

Actazin improves the digestion of plant proteins in an in vitro oral-gastric digestion model.

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 compared to control as measured by free amino nitrogen release (Figure 2 and 3). The addition of Actazin increased the amount of free amino nitrogen released from pea and hemp protein indicating it is also capable of digesting these proteins, although this did not reach significance compared to the control (Figure 4 and 5).

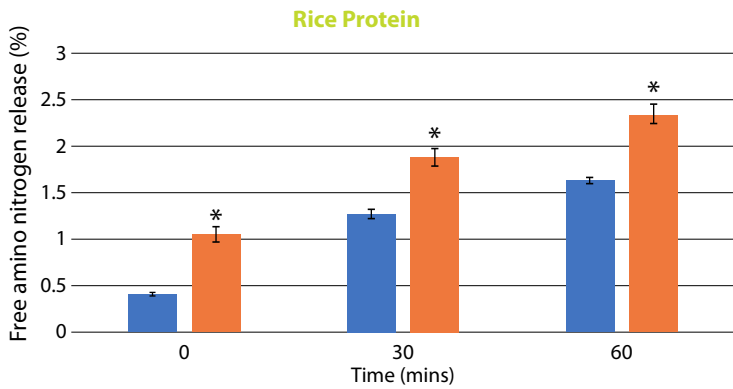


Figure 2: Effect of Actazin on the digestion of rice protein. **CONTROL** **ACTAZIN**  
\*  $p < 0.05$  vs control

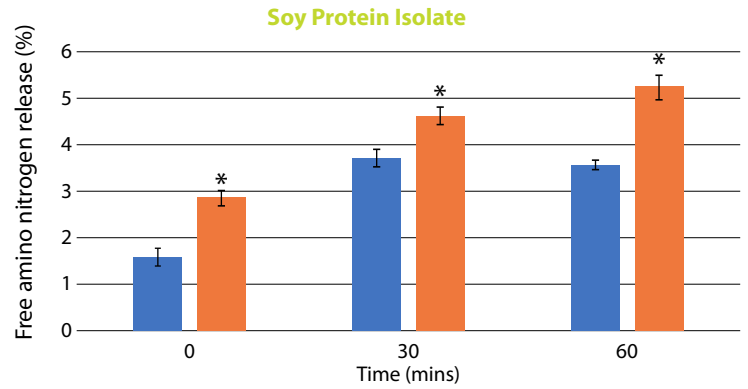


Figure 3: Effect of Actazin on the digestion of soy protein isolate. **CONTROL** **ACTAZIN**  
\*  $p < 0.05$  vs control

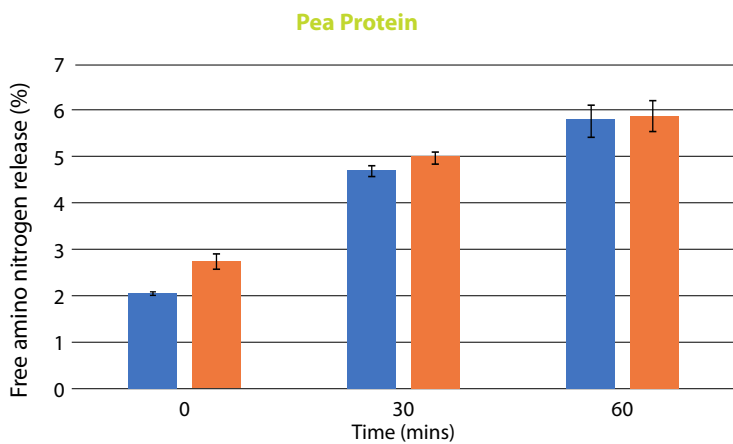


Figure 4: Effect of Actazin on the digestion of pea protein. **CONTROL** **ACTAZIN**

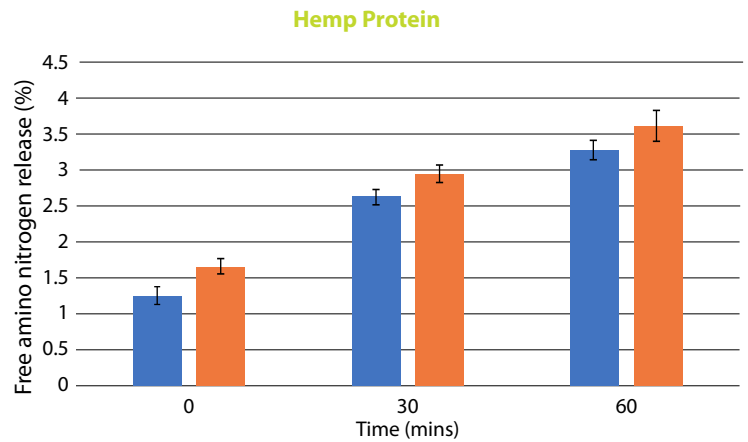


Figure 5: Effect of Actazin on the digestion of hemp protein. **CONTROL** **ACTAZIN**



## ACTAZIN & PROTEIN DIGESTION – POSSIBLE CLAIMS

Actazin is suitable for:

- Assisting digestion of dietary proteins
- Reducing feelings of fullness and discomfort
- Releasing amino acids to be utilised by the body
- Meat tenderisation
- Other formulations with protein powders to aid in digestion upon consumption.

Key benefits of Actazin:

- Natural, whole fruit source of protein-digesting enzyme
- Enhances protein digestion
- May facilitate more rapid uptake/absorption of amino acids
- May reduce bloating, fullness and gastric discomfort
- Suitable for keto, athletes, pre- or post-workout, elderly



---

### REFERENCES

- Jayawardana, I., Boland, M., Higgs, K., Zou, M., Loo, T., McNabb, W., & Montoya, C. (2021). The kiwifruit enzyme actinidin enhances the hydrolysis of gluten proteins during simulated gastrointestinal digestion. *Food Chemistry* 341, 128239.
- Jayawardana, I., Boland, M., Loo, T. S., McNabb, W., & Montoya, C. (2022). Rapid proteolysis of gluten-derived immunogenic peptides in bread by actinidin in a combined in vivo and in vitro oro-gastrointestinal digestion model. *Food & Function*.
- Kaur, L., Rutherford, S. M., Moughan, P. J., Drummond, L., & Boland, M. J. (2010). Actinidin Enhances Gastric Protein Digestion As Assessed Using an in Vitro Gastric Digestion Model. *Journal of Agricultural & Food Chemistry*, 58: 5068-5073.
- Montoya, C. A., Hindmarsh, J. P., Gonzalez, L., Boland, M. J., Moughan, P. J., & Rutherford, S. M. (2014). Dietary Actinidin from Kiwifruit (*Actinidia deliciosa* cv. Hayward) Increases Gastric Digestion and the Gastric Emptying Rate of Several Dietary Proteins in Growing Rats. *The Journal of Nutrition*, 1-7.
- Montoya, C. A., Rutherford, S. M., Olson, T. D., Purba, A. S., Drummond, L. N., Boland, M. J., & Moughan, P. J. (2013). Actinidin from kiwifruit (*Actinidia deliciosa* cv. Hayward) increases the digestion and rate of gastric emptying of meat proteins in the growing pig. *British Journal of Nutrition*, 1-11.
- Park, S., Church, D. D., Starch, C., Schutzler, S. E., Azhar, G., Kim, I., Ferrando, A. A., Moughan, P. J., Wolfe, R. R. (2020). The impact of Hayward green kiwifruit on dietary protein digestion and protein metabolism. *European Journal of Nutrition*.
- Rutherford, S. M., Montoya, C. A., Zou, M. L., Moughan, P. J., Drummond, L. N., Boland, M. J. (2011). Effect of actinidin from kiwifruit (*Actinidia deliciosa* cv. Hayward) on the digestion of food proteins determined in the growing rat. *Food Chemistry*, 129: 1681-1689.
- Wallace, A., Eady, D., Drummond, L., Hedderley, D., Ansell, J., & Gearty, R. (2017). A Pilot Randomized Cross-Over Trial to Examine the Effect of Kiwifruit on Satiety and Measures of Gastric Comfort in Healthy Adult Males. *Nutrients*, 9: 639.
- Zhu, X., Kaur, L., Staincliffe, M., & Boland, M. (2018). Actinidin pretreatment and sous vide cooking of beef brisket: Effects on meat microstructure, texture and in vitro protein digestibility. *Meat Science*.



For more information contact  
[info@anagenix.com](mailto:info@anagenix.com)

  
**Anagenix.**