

# THE SCIENCE BEHIND



# PEA+ PROTEIN

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### Key Points

- Pea protein is a suitable, plant-based alternative to more commonly supplemented proteins such as whey and milk.
- Pea protein possesses a good amino acid composition, including a high quantity of leucine, which is fundamental for MPS stimulation and the maintenance and (or) development of LBM following exercise.
- Pea protein can be supplemented similarly to other protein supplements, however, to suppress the gritty and earthy texture and taste of some pea protein blends, practical recommendations suggest adding pea protein to smoothies, and other nutritional recipes.

Protein concentrates and isolates used for sports nutrition supplements are typically derived from dairy, soy or animal tissue (i.e. Collagen). However, due to the growing interest in vegetarian and plant-based diets, there has been an increased demand for plant-based proteins, one of which is pea protein (Krefting, 2017; Lam et al., 2018).

### What is Pea Protein?

Pea protein is a plant-based alternative to the already existing amino-acid protein blends, such as whey and casein. Suitable for meeting the daily protein targets of vegetarian and vegan athletes, pea protein is produced by extracting protein from the split yellow field pea (Lan, Chen and Rao, 2018). The protein content of split yellow field peas has been estimated to be between 18-30%, depending on the variety of pea used (Adebiyi and Aluko, 2011; Ruscigno, 2016). Pea protein is constituted of two main proteins, these being albumin and globulin, which represent 10-20% and 70-80% of the total proteins found in the extract respectively (Taherian et al., 2011). Furthermore, pea protein contains each of the nine essential amino acids, including a high quantity of the BCAA's leucine, isoleucine and valine (Gorrisen et al., 2018) (See tables 1 and 2 for the complete amino acid composition). As a protein source high in vitamins and minerals (table 3), as well as being low in fat, pea protein may provide a benefit to general health when included in the diet (Swanson, 1990).

**Table 3.** Nutrients, Vitamins and Minerals contained within peas (Ruscigno, 2016)

| Green / Split Yellow Field Pea |             |            |
|--------------------------------|-------------|------------|
| Nutrients                      | Vitamins    | Minerals   |
| Fiber                          | Vitamin K   | Manganese  |
|                                | Vitamin B6  | Folate     |
|                                | Vitamin B12 | Copper     |
|                                |             | Phosphorus |
|                                |             | Niacin     |
|                                |             | Molybdenum |
|                                |             | Zinc       |
|                                |             | Magnesium  |
|                                |             | Iron       |
|                                |             | Potassium  |
|                                |             | Choline    |

## Why and How should Pea Protein be supplemented?

It is well established that providing protein post resistance training is essential to maximise muscle protein synthesis thus promoting growth and repair. Emerging evidence has also suggested that the branched chain amino acid leucine is particularly important at this time acting as the key signal to initiate protein synthesis. Unlike other plant based proteins, pea protein contains a relatively high quantity of BCAA's, including leucine (Gorissen et al., 2018) and is therefore an ideal protein source to be consumed around exercise. Recommendations for the consumption of pea protein follows similar recommendations to those of other protein supplements – with 1 scoop (approx. 30g) per serving enough to augment rates of MPS following exercise. This can be repeated throughout the day

## References

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|                      | Oat  | Lupin | Wheat | Hemp | Micro algae | Soy  | Brown Rice | Pea  | Corn | Potato | Whey | Milk | Caseinate | Casein | Egg  |
|----------------------|------|-------|-------|------|-------------|------|------------|------|------|--------|------|------|-----------|--------|------|
| <b>Threonine</b>     | 1.5  | 1.6   | 1.8   | 1.3  | 2.1         | 2.3  | 2.3        | 2.5  | 1.8  | 4.1    | 5.4  | 3.5  | 3.5       | 2.0    | 2.9  |
| <b>Methionine</b>    | 0.1  | 0.2   | 0.7   | 1.0  | 0           | 0.3  | 2.0        | 0.3  | 1.1  | 1.3    | 1.8  | 2.1  | 2.2       | 1.4    | 1.7  |
| <b>Phenylalanine</b> | 2.7  | 1.8   | 3.7   | 1.8  | 2.1         | 3.2  | 3.7        | 3.7  | 3.4  | 4.2    | 2.5  | 3.5  | 4.2       | 2.3    | 3.8  |
| <b>Histidine</b>     | 0.9  | 1.2   | 1.4   | 1.1  | 0.7         | 1.5  | 1.5        | 1.6  | 1.1  | 1.4    | 1.4  | 1.9  | 2.2       | 0.9    | 2.8  |
| <b>Lysine</b>        | 1.3  | 2.1   | 1.1   | 1.4  | 3.6         | 3.4  | 1.9        | 4.7  | 1.0  | 7.1    | 7.1  | 5.9  | 5.9       | 2.7    | 6.6  |
| <b>Valine</b>        | 2.0  | 1.4   | 2.3   | 1.3  | 2.1         | 2.2  | 2.8        | 2.7  | 2.1  | 3.5    | 3.5  | 3.6  | 3.8       | 2.0    | 4.3  |
| <b>Isoleucine</b>    | 1.3  | 1.5   | 2.0   | 1.0  | 1.2         | 1.9  | 2.0        | 2.3  | 1.7  | 3.8    | 3.8  | 2.9  | 3.0       | 1.6    | 3.4  |
| <b>Leucine</b>       | 3.8  | 3.2   | 5.0   | 2.6  | 4.0         | 5.0  | 5.8        | 5.7  | 8.8  | 8.6    | 8.6  | 7.0  | 7.8       | 3.6    | 6.3  |
| <b>TOTAL EAA</b>     | 13.6 | 13    | 18    | 11.5 | 15.8        | 19.8 | 22         | 23.5 | 21   | 34     | 34.1 | 30.4 | 32.6      | 16.5   | 31.8 |
| <b>TOTAL BCAA</b>    | 7.1  | 6.1   | 9.3   | 4.3  | 7.3         | 9.1  | 10.6       | 12   | 12.6 | 15.9   | 15.9 | 13.5 | 14.6      | 7.2    | 10.7 |

**Table 1.** EAA Profile of Protein Sources: Values presented in grams (g) per 100g of raw material (Gorrisen et al., 2018)

|                      | Oat  | Lupin | Wheat | Hemp | Micro algae | Soy  | Brown Rice | Pea  | Corn | Potato | Whey | Milk | Caseinate | Casein | Egg  |
|----------------------|------|-------|-------|------|-------------|------|------------|------|------|--------|------|------|-----------|--------|------|
| <b>Serine</b>        | 2.2  | 2.5   | 3.5   | 2.3  | 2.1         | 3.4  | 3.4        | 3.6  | 2.9  | 3.4    | 4.0  | 4.0  | 4.2       | 3.3    | 2.3  |
| <b>Glycine</b>       | 1.7  | 2.1   | 2.4   | 2.1  | 2.6         | 2.7  | 3.4        | 2.8  | 1.6  | 3.2    | 1.5  | 1.5  | 1.5       | 1.4    | 3.1  |
| <b>Glutamic Acid</b> | 11.0 | 12.4  | 26.9  | 7.4  | 5.7         | 12.4 | 12.7       | 12.9 | 13.1 | 7.1    | 15.5 | 16.7 | 16.0      | 5.1    | 13.1 |
| <b>Proline</b>       | 2.5  | 2.0   | 8.8   | 1.8  | 2.3         | 3.3  | 3.4        | 3.1  | 5.2  | 3.3    | 4.8  | 7.3  | 8.7       | 1.8    | 0    |
| <b>Cysteine</b>      | 0.4  | 0.2   | 0.7   | 0.2  | 0.1         | 0.2  | 0.6        | 0.2  | 0.3  | 0.3    | 0.8  | 0.2  | 0.1       | 0.4    | 0    |
| <b>Alanine</b>       | 2.2  | 1.7   | 1.8   | 1.9  | 4.0         | 2.8  | 4.3        | 3.2  | 4.8  | 3.3    | 4.2  | 2.6  | 2.6       | 2.6    | 4.1  |
| <b>Tyrosine</b>      | 1.5  | 1.9   | 2.4   | 1.3  | 1.2         | 2.2  | 3.5        | 2.6  | 2.7  | 3.8    | 2.4  | 3.8  | 4.4       | 1.8    | 2.0  |
| <b>Arginine</b>      | 3.1  | 5.5   | 2.4   | 5.3  | 3.4         | 4.8  | 5.4        | 5.9  | 1.7  | 3.3    | 1.7  | 2.6  | 2.9       | 2.6    | 4.4  |
| <b>Total NEAA</b>    | 24.6 | 28.3  | 48.9  | 22.3 | 21.4        | 31.8 | 36.7       | 34.3 | 32.3 | 27.7   | 34.9 | 38.7 | 40.4      | 19     | 29   |

**Table 3.** NEAA Profile of Protein Sources: Values presented in grams (g) per 100g of raw material (Gorrissen et al., 2018)