UNIVERSITEIT VAN PRETORIA
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26 March 2025

NEWS RELEASE

Food for thought: Could protein determine our socio-economic future?

PRETORIA - Our bodies need protein. But because protein-rich foods are expensive, millions of people do not have access to sufficient protein. Without it, people face health problems such as the loss of muscle mass, the inability to concentrate and, in severe cases, diseases such as kwashiorkor and marasmus.

Researchers at the Department of Animal Science and School of Health Systems and Public Health at the University of Pretoria (UP) have made a crucial discovery regarding the methods used to measure the protein content of foods. They have confirmed that current methods often produce inaccurate results, and that more accurate results could do much to prevent malnutrition, along with encouraging the cultivation of alternative sources of plant-sourced protein.

According to the World Health Organisation, the recommended amount of protein for adults is about 0.83g per kilogram of body weight per day. A man weighing 90kg would therefore need around 75g of protein daily.

“To determine whether a person is getting enough protein, we need to know how much protein is present in the foods they routinely consume,” Dr Beulah Pretorius says. “Traditionally, scientists have used a method called the ‘proximate system’ to measure protein content. By using specific nitrogen-to-protein conversion factors – also called the Jones conversion method – protein content is calculated based on the amount of nitrogen present in foodstuffs. This method assumes that most of the nitrogen in food comes from amino acids (the building blocks of protein) and that a significant portion of those amino acids are part of the protein.”

The commonly used conversion factor is 6.25, which again assumes that all proteins contain about 16% nitrogen. This research has now shown that this method can over- or underestimate the true protein content present in foodstuffs.

“This is why scientists prefer to report protein in food composition tables, and to indicate ‘true protein’ on product labels as the sum of individual amino acid residues,” Dr Pretorius says. “The chemical analysis to determine the amino acid content is, however, complicated and costly, and therefore not a feasible methodology to use in developing countries.”

But what if we could update and improve the conversion factors that are being used?

In an exploratory study, data was collected on the amino acid content in foods from animal sources. The crude protein was calculated by using the nitrogen value of the samples (as determined by the Kjeldahl method for dairy samples and the Dumas method for meat samples). These were then multiplied by the respective Jones conversion factors of 6.25 for meat samples and 6.38 for dairy samples. True protein was calculated as the sum of amino acid residues (the molecular weight of each amino acid, less the molecular weight of water).

“The findings were concerning,” Professor Hettie Schönfeldt says. “For all animal products, the protein content was over-reported. It became evident that the ‘assumed’ nitrogen content of protein is not 16% but varies significantly depending on the source of protein. By accurately determining protein content, we could not only counter malnutrition but also encourage the cultivation of a diverse range of plant species, including often-overlooked valuable sources of protein. A greater variety of crops would also result in much-desired biodiversity in regions.”

“These changes will affect virtually all sectors in the food chain: agriculture, manufacturing, food preservation, labelling and regulatory compliance, to name a few,” Dr Pretorius adds. “However, the greatest challenge would probably be to gain acceptance of new food options from the general population. Humans are by nature resistant to change. It would therefore require intensive, persuasive education to alter dietary preferences.”

Given humankind’s attachment to habits, the sooner we start changing ingrained preconceptions, the sooner more people will have the chance to see their children thrive.

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>> Picture caption: Accurate data today could promote the development of affordable, sustainable food systems that prioritise nutrient-rich foods while optimising the efficient use of natural resources. Source: Shutterstock.

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ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on its Hatfield Campus in Pretoria. This 115-year-old institution is also one of the largest producers of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country with a Faculty of Veterinary Science, which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The 2025 Times Higher Education subject rankings placed UP first in South Africa in the fields of Accounting and Finance; Architecture; Electrical and Electronic Engineering; Law; Sport Science; and Veterinary Science. UP's Faculty of Law has been ranked as the top law school in Africa for a remarkable eighth consecutive year.

Quacquarelli Symonds (QS) ranked the University among the top five in Africa, as part of their 2024 World University Rankings (WUR). UP was the only South African university featured in the 2023 World University Rankings for Innovation (WURI), falling within in the 101-200 range of innovative universities.

For more information, please go to www.up.ac.za