

Australian pork's role in feeding people: net protein contribution explained



APL Project 2024/0134: Net protein contribution (NPC) estimation for Australian pig farms.

Project participants: SunPork Group

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The problem

Australian pork producers are increasingly being asked to demonstrate how their production systems contribute to a sustainable food system. One of the most common criticisms of intensive livestock production is the “feed versus food” argument, which suggests that feed ingredients used for livestock could be diverted directly to feed people.

However, this argument overlooks an important point: not all proteins are nutritionally equal or have the same environmental cost and consumer acceptance. Animal proteins are high quality and provide a complete set of essential amino acids. By converting lower-value feed proteins into high-quality pork, pigs play an important role in improving the nutritional value of resources that may otherwise have limited use in the human food supply.

The project

This project evaluated the net protein contribution (NPC) of seven Australian pig production systems, ranging in size from 544 to 4,559 breeders. Net protein contribution measures how effectively a livestock system contributes to human nutrition by considering:

- What human-edible protein is *consumed* in pig diets
- What human-edible protein is *produced* as pork
- The *quality* of protein consumed and produced based on essential amino acid content.

When NPC scores are above 1.0 this means the system contributes more human-edible protein to the food supply than it consumes.

1.0+ = higher protein output (pork) than protein input (feed)

When scores are below 1.0, this means the production system competes with human food supplies.

<1.0 = less protein output (pork) than protein input (feed)

Importantly, NPC accounts for the quality of the protein both going into and being produced by the system, and the improvement in protein quality that occurs when feed ingredients are converted into pork.

Outcomes

Aussie pork is a net contributor to human nutrition

All of the seven production systems achieved NPC values above the 1.0 threshold, demonstrating that each system contributed more human-edible protein than it withdrew from the food system.

NPC values ranged from 1.52 to 5.63, with an average of 3.30 across all participating farms. The consistency of the findings across all seven commercial operations is particularly important, as although the sites varied considerably in scale and production characteristics, every system produced the same outcome. This suggests that the positive NPC results are a feature of Australian pig production systems generally, rather than the result of a single farm having superior performance.

It's the quality, not the efficiency

A key finding from this project was that protein quality drives this result, rather than feed efficiency. All farms recorded human-edible protein conversion efficiency (HePCE) values below 1.0. This means the pigs consumed more human-edible protein than they ultimately produced. While this is expected from a monogastric animal, on its own could be used to support the traditional 'feed -vs- food' argument.

However, this view changes when protein quality is considered. Through the production process, pigs convert low-quality proteins in their feed into pork, which is recognised as an excellent quality protein source for human diets.

‘The contribution of Australian pork is therefore a story of quality conversion: the pig turns low-grade, mostly human-inedible feed protein into complete human protein.’

How does Australian pork compare internationally?

The average NPC observed across the farms was consistent with previous Australian research and significantly higher than reported values from Europe.

Production System	NPC value
Australian systems (this study)	1.52 - 5.63
Australian average	3.30
Austrian production	0.50 - 0.64
French production	1.06 - 1.23

The difference is largely due to the feed ingredients available to Australian producers, rather than genetics or production system. Australian pig diets differ from northern Europe’s in multiple ways, in particular:

- Processed animal proteins (meat meal, blood meal, fish meal) are common in Australian pig diets but are largely banned from European pig diets. They count as not human-edible yet still supply high-quality protein.
- Australia utilises large volumes of feed-grade or downgraded grain for pig diets. For example: sorghum, which Australians consume very little, weather-damaged barley or feed wheat. Each is considered less human-edible than the milling-grade grain assumed in European studies.
- Australian pork producers have the ability to utilise a broad range of feed ingredients and by-products that may otherwise have limited nutritional value to humans, while international pig diets are more reliant on imported human-edible soybean meal.



How does pork compare with other animal proteins?

Australian pork performs well against many other intensive livestock systems, including both monogastric and ruminant production. In comparison, broiler production typically has an NPC below the 1.0 threshold, generally ranging from 0.76 to 0.88, largely due to poultry being reliant on human-edible soybean meal. Pork also outperforms grain-finished beef, which has an NPC of 1.96.

The highest NPC scores are typically achieved by animals fed from land that does not grow human food, while Australian pork's strong score results because pigs can efficiently utilise human-inedible by-products and processed animal proteins, converting them into high-quality protein for consumers.

Value for producers

These results provide Australian pork producers with a robust, evidence-based response to the feed-versus-food debate and support other positive sustainability measures, including emissions intensity and land use figures. The project demonstrates that Australian pig farms are not simply consumers of food resources but are active contributors to the high-quality human protein supply.

Importantly, these findings rely on the availability of human-inedible feed ingredients and other by-products currently used in Australian pig diets. If regulations change, or these products are diverted into other lower-value circular technologies such as food waste to energy projects, it could threaten their availability for use in pig diets. This could reduce the current net protein contribution of pork production. Ensuring ongoing access to these feed resources will be critical to maintaining the sustainability and efficiency of the pork industry.

More information

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