ESTIMATING THE NUTRIENT VALUE OF AGRICULTURAL PRODUCE

B McCormick
The Rowett Institute, University of Aberdeen | correspondence: benjamin.mccormick@abdn.ac.uk

Key Points

The objective of this work is to estimate the nutrients of different food commodities produced on farms in Scotland.

One important value of food is the nutrients it contains. When we make decisions about what is grown and where, we impact the supply of nutrients into the food supply chain.

With increasing demand placed on land, we need to understand what nutrients we might lose through land use changes, but equally where there are opportunities to increase the nutrient value of the food chain through the choice of food commodities.

This SEFARI Gateway Fellowship supports on-going work within RESAS on the evaluation of agricultural produce.

Foods are not created equal. Food stuffs grown in Scotland have different economic worth, but not all products are equally valuable to the national diet. For example, some might provide essential nutrients and others might be contribute very few nutrients that benefit health.

What is grown in Scotland matters because it, along with imports, forms the basis of nutrients supplied to the Scottish diet.

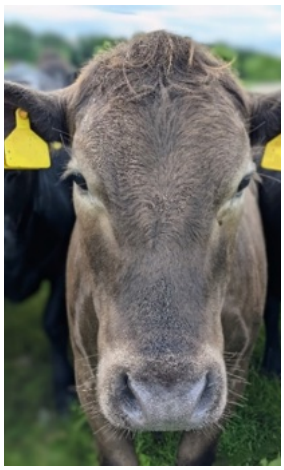
But land is in high demand. The commitments to achieve Net Zero increases pressure to use land efficiently – afforestation, biofuels, solar and wind farms are all examples of competing demands placed on land. Sometimes these uses will take land out of food production and lead to a reduction in the nutrient supply.

We have to make choices about what we prioritise between legitimate uses of land, for example to promote nutrient security and food sovereignty or habitat restoration and renewables.

Our focus is the nutrient value of agricultural commodities up to the farm gate. In fact, the things that are grown in Scotland often undergo some level of processing – wheat gets milled into flour, which is then eaten as, e.g., biscuits and bread.

The many ways of processing foods are complicated, often combining Scottish produce with things from elsewhere. For this reason, we focus on the rawest supply of nutrients from produce which leaves the farm gate.






Scottish Government Riaghaltas na h-Alba gov.scot
RESAS Rural & Environmental Science and Analytical Services
SEFARI LEADING IDEAS FOR BETTER LIVES
The Rowett Institute

Methods

Agricultural census data
- what is made?
- how much?
-where?

Agricultural commodities
identify the least level of processing to leave the farm gate

Nutrient data
link nutrient data to farm food stuffs

Map
project nutrient values back to the location of where foods are made

1) The annual June Agricultural Census tells us the quantity and location of land used by individual farms for different commodities.
2) Yields are adjusted for how much of a commodity is eaten. For example, only about half of an animal is meat and the rest (blood, bone, fat, skin, etc.) is used for non-food purposes. We identify the least processed food form of each commodity that could leave a farm. For example, for most cereals this would be whole flour, or for a dairy it would be whole milk.
3) The nutrients associated with each food are then collected from the standard UK food composition table (McCance and Widdowson) – a compendium of the nutrient data for foods.
4) Nutrients are then multiplied by the amount of food produced to give a national value for each product, or these values can be projected back onto a map of Scotland using the census data.

Challenges & assumptions

There are a number of assumptions necessary to estimate nutrient values and these assumptions shape how we can use the final nutrient density associated with land and products.

For example, not all varieties of a given crop have the same nutrient quantities, but since the nutrient data do not list every variety, we have decided to treat them as equivalent. This also applies to produce that are not recorded in the agricultural census, such as rare or emerging foods.

Our research goes up to the farm gate because beyond the farm gate the processing which adds ingredients, or entire foods might not come from Scottish agriculture and so the nutrients that are consumed might not align with nutrients grown here.

Lastly, some crops are grown just for livestock feed, or other non-food purposes, but this doesn't mean that the land used to produce them has no potential value for human food chain. Exactly how we account for these agricultural products matters when mapping the potential nutrients that could come from land.

Future directions

Individual nutrients are important and not comparable. We are estimating individual nutrients, but we might, for example, consider what proportion of recommended daily intakes could be met.

What is grown now, a snapshot in time, might not be the best reflection of all that could be grown to maximise nutrition. Examples for consideration could include how one area of land might be used for multiple crops and therefore we would want to identify the maximal nutrient *potential* coming from the land.

Similarly, climate change may further influence the sorts of crops that could be grown and their yields. In the future we could re-evaluate the potential nutrient value of food produced on the land based on forecasts of climate change.

Other future directions could estimate the nutrient value of foods derived from Scottish agricultural produce. For example, foods that require land, but their raw commodity does not directly enter the food chain such as whisky or fodder crops that are used to feed livestock.

Scottish Government | Riaghaltas na h-Alba | gov.scot
RESAS Rural & Environmental Science and Analytical Services
SEFARI LEADING IDEAS FOR BETTER LIVES
The Rowett Institute