Soy much at stake

Food Systems at a Crossroads: Emerging Risks to Resilience

PEAS ON THE PROD

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Executive Summary

High Dutch animal-protein consumption, and the Dutch and European agriculture sectors drive substantial demand for livestock feed, with soy playing a central role. This demand contributes to the expansion of large-scale monocultures in producing regions like Brazil, increasing land conversion and deforestation pressures. This dynamic is further multiplied by economic incentives towards scaling and standardization, concentrating production and trade along a limited set of routes and intermediaries – where the Netherlands also plays an outsized role. The outcome is systemic weaknesses that amplify exposure to climate shocks, geopolitical disruption, and price volatility. The analysis underlying this brief indicates that moderate dietary shifts – substituting red meat intake with plant-based alternatives, while maintaining total nutritional protein intake targets – can meaningfully ease feed demand and hence the associated land-use pressures. We suggest targeted urban and national policy levers with the objective to restore food system resilience. This includes lowering dependence on soy feed, through substitution and dietary shifts – as well as rebuilding diversity and adaptive capacity through careful sourcing, monitoring and governance.

Impact of the Dutch Diet

Dutch diets are characterized by high consumption of animal-based protein, particularly meat and dairy, which drives substantial demand for soy as livestock feed. Under current consumption patterns, this results in 312 m² of soy-related land use per person per year; largely sourced from Brazil, the US, and Argentina. Beef contributes disproportionately to soy land demand, with its low feed-to-food conversion efficiencies requiring large quantities of feedcrops in order to produce relatively small amounts of edible protein. Compared to direct human consumption of soy-based foods, the animal-in-the-middle diet is structurally resource-inefficient for meeting protein demand.

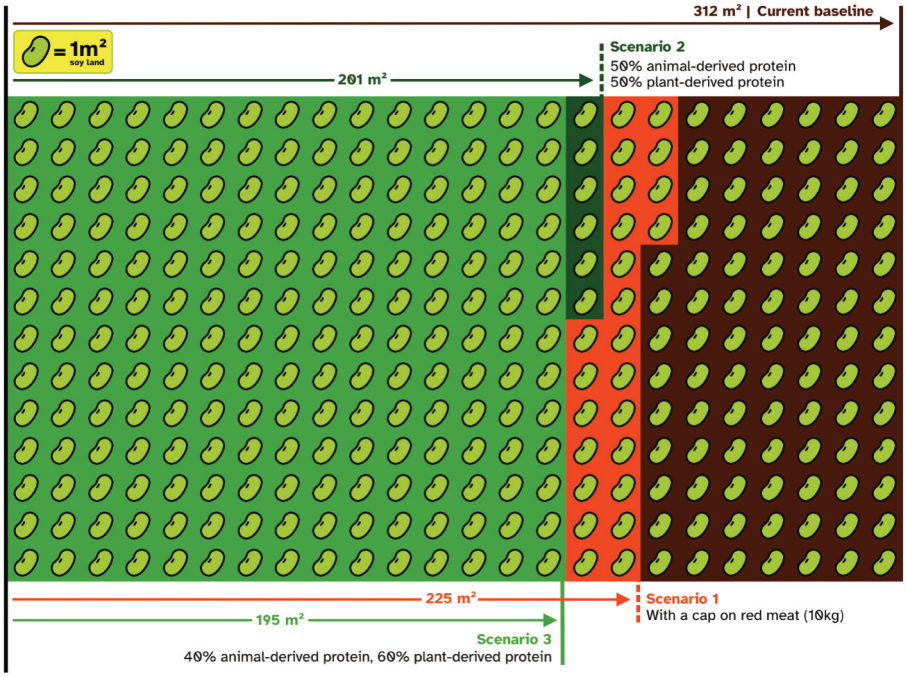

Figure: Per-person impact on land use by varying diet composition, with three scenarios tested.

The analysis shows that small dietary adjustments deliver large land-use gains. Simply reducing red meat intake to existing dietary guideline levels (max. 10kg/year/person) lowers soy land use to 225 m² per person (−28%), without fundamentally changing overall dietary patterns. Partial shifts in protein sourcing further reduce pressure: a 50/50 animal–plant protein split lowers soy land use to 201 m² (−36%), and a 40/60 split to 195 m² (−38%). These reductions are achieved while maintaining adequate total protein intake. Total feed land use and associated pressures from grassland, pasture and housing would decline substantially in parallel. As soy is directly edible by humans, its predominant use as animal feed represents a case of food–feed competition. From a policy perspective, this highlights red meat reduction and moderate protein shifts as high-impact, low-disruption leverage points for reducing the global land footprint and resilience risks embedded in Dutch food consumption.

Centrality of Dutch Trade

The Netherlands plays a structurally significant role in the global soy trade that extends beyond its domestic consumption. In addition to generating demand through intensive livestock production, the country functions is a major soy trade and re-export hub, with logistics infrastructure developed in part to support such supply chains. Our trade network analysis shows that the Netherlands consistently occupies a strong brokerage position in the global soy network. A disproportionate share of soy (given the Dutch domestic market size) passes through Dutch-controlled routes, positioning the Netherlands not only as a consumer but also as a key intermediary that shapes how global trade is organized.

This intermediary role is to be seen in light of structural concentration in the soy market – of which NL is a beneficiary. Market concentration metrics (HHI) indicate that trade value is progressively channelled through a smaller number of routes and trading relationships. While such concentration can improve short-term efficiency and affordability, it reduces path redundancy. When flows depend on a limited set of countries, commercial actors, ports and pathways, any disruptions, such as logistical bottlenecks or market shocks, can propagate more widely and impact food security for more people. While trade concentration does not create independent risks, it can certainly amplify their reach.

Production-side vulnerabilities arise through a distinct mechanism. In Brazil, soy expansion is closely linked to large-scale monoculture systems and land-use change, which are associated with reduced ecological resilience and greater sensitivity to drought and climate variability. Alongside the growing impacts of climate change, these pressures affect yields on the production size. In such a system, shocks in a few producing regions could have disproportionate downstream effects.

Dutch consumers and residents are active drivers in this system – not only through diet, but through participation in an economy that occupies such a central logistical role. Choices made here in the Netherlands therefore represent a tangible leverage point: reducing reliance on feed-intensive products, and in the longer run, shifting the centre of gravity of the Dutch economy can have significant effects on the resilience and fairness of this food system.

A Changing Climate

To complement the demand and trade analyses, we assessed how climate change may affect soy production in Brazil's main sourcing regions for the Netherlands, drawing on literature evidence and spatial yield projections. The results indicate that many of the states supplying the largest share of Dutch soy imports are also projected to experience declining or more variable yields under warming scenarios.

This creates a production-side vulnerability that compounds the structural risks identified earlier. Demand modeling shows that Dutch consumption of feed-intensive animal products (partly) drives high soy import volumes, while trade network analysis reveals that these flows are concentrated through a limited number of routes and intermediaries, including NL. Climate sensitivity in key producing regions adds a further layer of risk: local yield shocks are more likely to affect a large share of supply and to propagate quickly through the system.

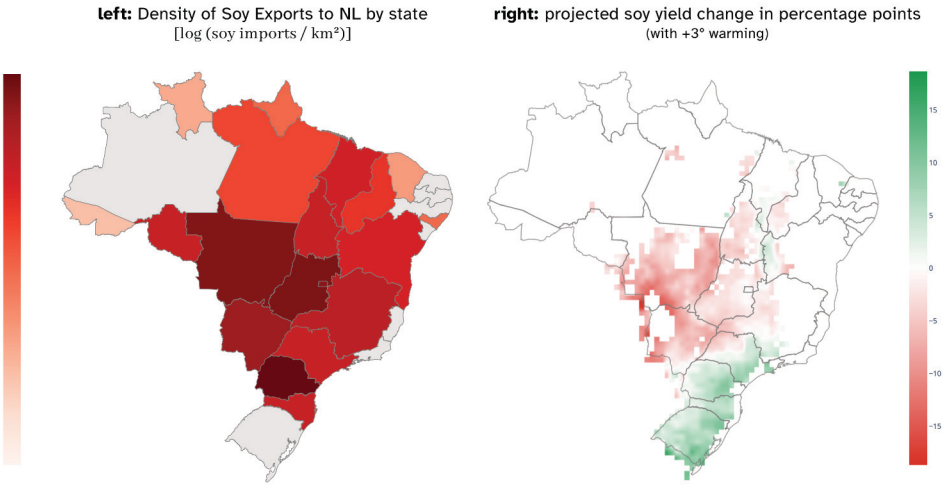

Figure: Soy yields are expected to be impacted due to climate change. Some regions are expected to experience soy yield gains, while others – current regions of significant export – will experience decreases. This will undoubtedly cause shifts in the global supply chain, in trade and in land-use patterns. Net yields over Brazil would fall, increasing deforestation pressures.

For the Netherlands, choices we make – both for the food on our plate, and for the political structures that govern the economy – impact food security both at home and abroad. Food security can be strengthened by lowering dependence on climate-vulnerable soy imports, and encouraging both producers and downstream importers to gradually diversify to reduce the shared climate risks.

Policy Tools

The dietary scenarios developed in this study suggest that relatively modest shifts in diet composition can lead to substantial reductions in soy-driven land use, without requiring complete elimination of animal products.

At the national level

Embed land-use impacts in dietary guidelines

National dietary guidelines could more explicitly acknowledge land-use impacts, feed conversion inefficiencies, and global distributional effects alongside health criteria. The analysis indicates that even moderate dietary adjustments could help reduce feed demand, supporting the case for integrating sustainability and fairness considerations into the process of generating these guidelines.

Frame protein transition in food security terms

Concentration in global soy supply chains increases exposure to climate shocks, geopolitical tensions, and market volatility. Protein transition policies can therefore be framed not only as health or environmental measures, but as part of a broader food security and resilience strategy.

Diversify and monitor feed systems

Reducing dependence on a narrow set of feed crops, particularly soy, can improve system resilience. National policy could support diversification in this area through research and innovation funding. Potential alternatives include rapeseed or canola, lupins, field peas, insect protein (with careful attention to societal concerns), and algae-based systems. Monitoring of feed sourcing concentration could allow earlier identification of emerging vulnerabilities within the Dutch food and feed system.

At the city level

Normalize plant-based protein

Cities can support targeted experimentation to better understand why consumers hesitate to adopt vegetarian or vegan options. Pilot programs in catering and retail can test menu design, pricing, messaging, and hybrid products, generating evidence on what drives sustained behavior change. Funding research and supplier collaborations helps identify practical barriers and develop interventions that make plant-based choices more attractive.

Reshape food environments

Cities can influence consumption patterns by reshaping food environments rather than targeting individual choice. Public institutions such as schools, hospitals, universities, community kitchens, and neighborhood food programs can make plant-based meals the default, while keeping animal-based options available as active opt-ins. Partnerships with retailers, caterers, and local initiatives can further increase the visibility, availability, and affordability of plant-based proteins, while moderating promotional emphasis on feed-intensive meat products. By embedding these options in everyday public and community settings, plant-forward eating becomes the convenient, ordinary, and socially reinforced norm.

Monitoring and feedback

Feed demand and trade dependence remain largely invisible in urban food governance. Cities could increase transparency by reporting on the protein composition and feed intensity of municipal food procurement and, where feasible, publishing aggregated indicators of urban consumption impacts. This would strengthen feedback mechanisms and support more system-aware policymaking.

About this research

This policy brief was developed as part of the the Challenge-Based Project course – with the Amsterdam Institute for Advanced Metropolitan Solutions as a partner. It examines how Dutch dietary demand, global soy trade networks, and climate vulnerability interact to shape systemic food-security risks. Combining demand modelling, trade network analysis, and climate exposure assessments, the study identifies structural dependencies in soy-based feed systems and highlights policy levers that can strengthen resilience through dietary shifts, diversified sourcing, and more transparent governance. The full report is available via the authors.

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