

A win-win strategy for China's ruminant consumption and global environment

Ruminant production is one of the major contributors to global environmental degradation. In the livestock sector, beef, mutton and milk production contributes 80% of total greenhouse gas (GHG) and 75% of ammonia (NH₃) emissions. Rising demand for ruminant meat and dairy products in developing countries is expected to double anthropogenic greenhouse gas and ammonia emissions from livestock by 2050. Without effective action in developing nations, rising demand for ruminant products is likely to push the global environment close to or beyond a sustainable threshold.

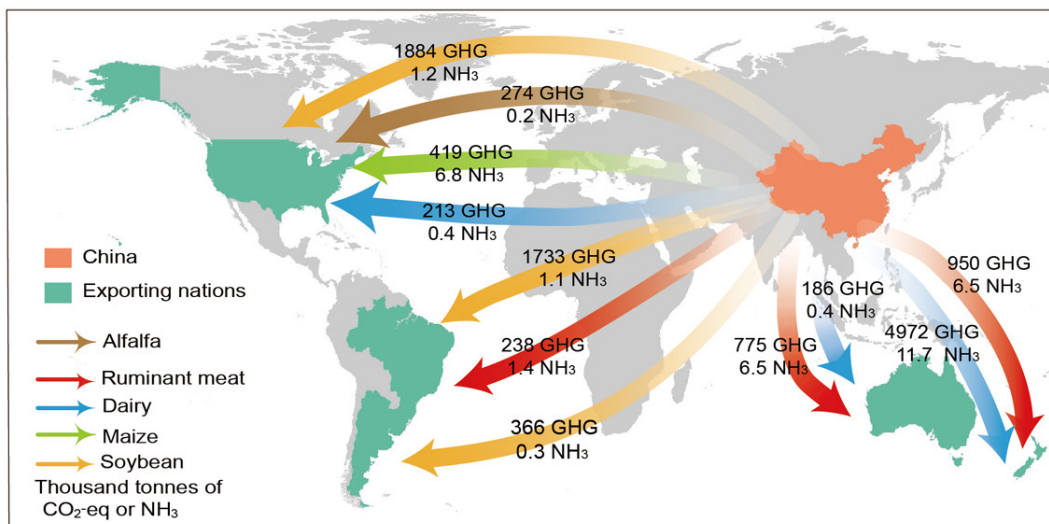


Fig. 1. The associated local and global transfer of environmental impacts.

China is arguably the most important new consumer market for ruminant products, and consumption is increasing rapidly. We project that the demand for ruminant meat and dairy products in China will reach 17.8 and 77.8 kilogram per person per year by 2050, which is still only 48% and 30% of current USA values for ruminant meat and milk consumption, respectively. China has also become one of the largest global producers of ruminant products in its own right. In 2012, the total damage cost of GHG plus NH₃ (\$54.8 billion) is equal to nearly 50% of the gross annual value of ruminant production in China.

Changing consumption patterns also have a broader global environmental footprint beyond China. China's consumption of ruminant meat and dairy products far outstrips domestic supply, and demand is increasingly supplemented by overseas imports of ruminant products and livestock feed. China has become the world's largest net importer of dairy products and mutton, and the second largest net importer of beef. In 2012, China's import of ruminant products and livestock feed transferred 12 Tg CO₂-eq of GHG emissions and 42.8 Gg NH₃ emissions to exporting nations (Fig. 1). It is worth emphasizing that, in stark contrast to trade in industrial goods that transfer the impacts from developed nations to developing nations, the impacts from ruminant production are transferring from developing to developed nations. These current transferred

emissions figures are just the tip of the iceberg. According to our projections, China's domestic production capacity will only meet 66% of ruminant meat demand and 48% of dairy demand by 2050. Assuming the supply gap continues to be met by international trade with no change in types of imports under current agreements with exporting countries, China will transfer emissions of a staggering 106 Tg CO₂-eq and 0.65 Tg NH₃ to the rest of world in 2050.

We carried out a quantitative scenario planning exercise to develop six scenarios of supply-side management for mitigating the high emissions predicted under the business-as-usual scenario. We considered potential short-term mitigation strategies via increased imports from nations with low emissions intensity in their production systems (green-source trade), and long-term mitigation via improving domestic technologies toward global best-practice in emissions control. Results showed that intensification of domestic production and globalized expansion through increased trade result in reductions in global emissions by nearly 30% over a business-as-usual scenario, but at the expense of trading partners absorbing the associated negative externalities of environmental degradation (Fig. 2). Only adoption of a mixed strategy combining global best-practice in sustainable intensification of domestic production, with increased green-source trading as a short-term coping strategy, can meet 2050 demand while minimizing the local and global environmental footprint of China's ruminant consumption boom.

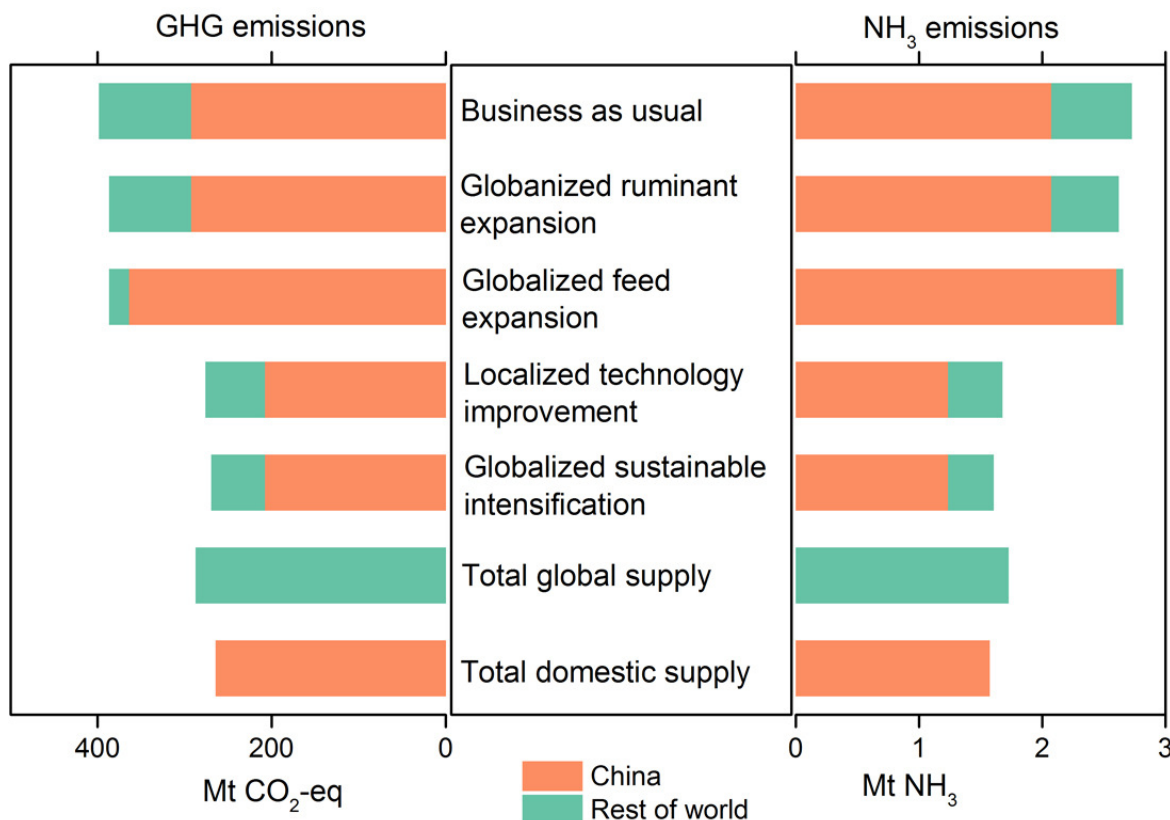


Fig. 2. Potential mitigation strategies to meet China's demand for ruminant products in 2050 and the corresponding domestic and transferred contributions to global greenhouse gases and ammonia emissions.

We believe this integrated strategy is also applicable to other developing nations with underdeveloped technology and rapidly increasing demand. As global consumption of ruminant products is increasing, there is no time to lose.

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