



Environmental impacts and nutritional outcomes of cow's milk versus plant-based beverages

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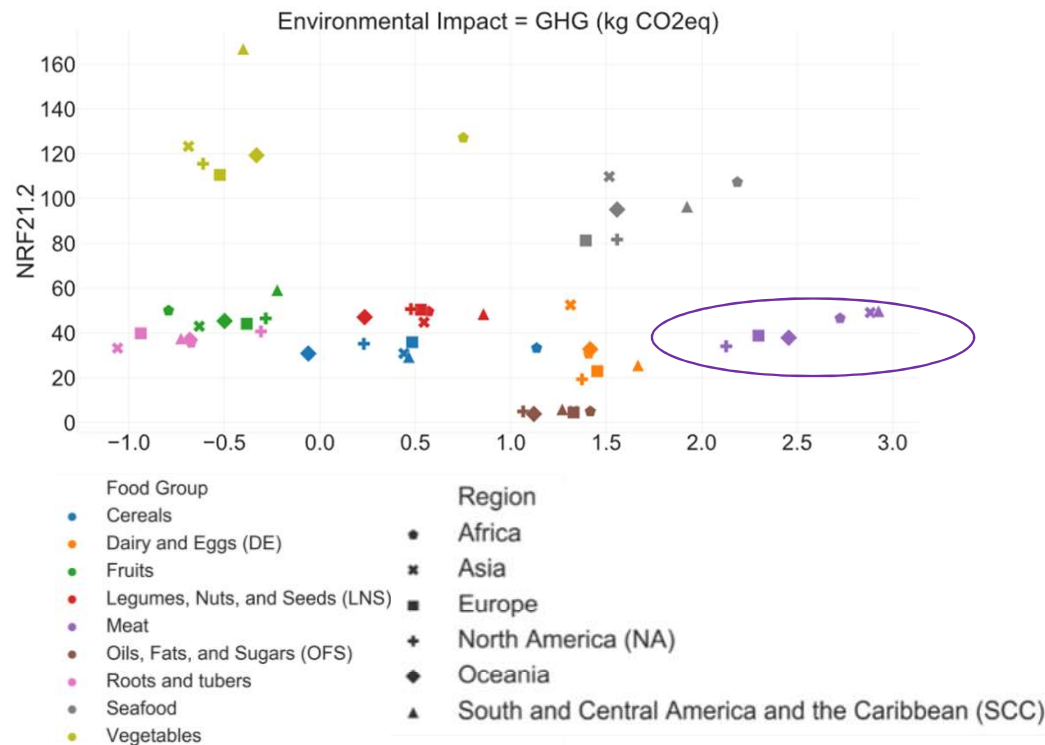
31.05.22

ETH zürich

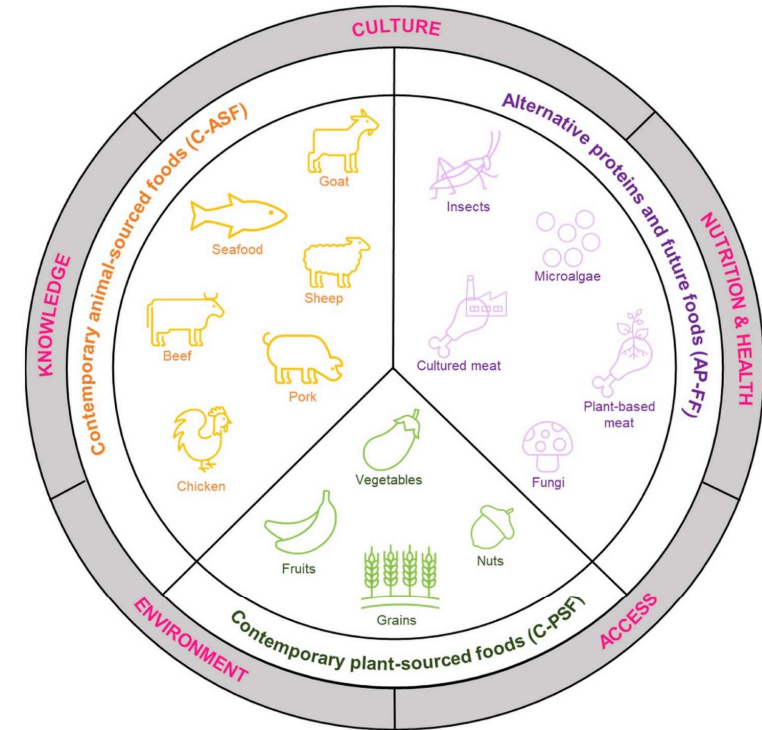
 **Agroscope**



FUTURE FOODS IN SUSTAINABLE FOOD SYSTEMS



- Green et al. (2021). 'Reconciling regionally-explicit nutritional needs with environmental production by means of nutritional life cycle assessment.' *Journal of Cleaner Production*.
- Green et al. (2022). 'The role of alternative proteins and future foods in sustainable and contextually-adapted flexitarian diets.' *Trends in Food Science and Technology*.



CONTEXT-SPECIFIC BOUNDARIES:

ENVIRONMENT: Environmental boundaries differ by region and environmental impacts of same food item/group can vary

- Regionally-explicit water scarcity
- Differentiated ability to adopt renewables
- Differences in production practices
- National regulatory approvals

ACCESS: Monetary and physical access vary based on locality and income level

- Food deserts
- Affordability

NUTRITION & HEALTH: Nutrient contents of a single food or food group can vary

- Regionally-explicit nutritional deficiencies
- Differences in production practices
- Gender-specific nutrient requirements

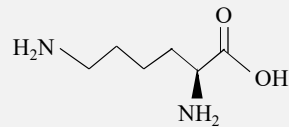
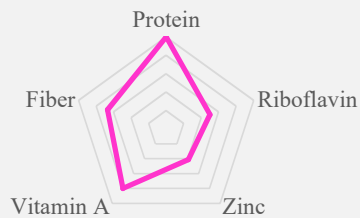
KNOWLEDGE: Information to support sustainable decision-making is lacking or unequally distributed

- Inaccessible trade data
- Incomplete food labelling
- Knowledge gaps linked to wealth and education

CULTURE: Consumer preference varies based on region

- Behavioral choice—e.g., politics, culture, lifestyle, disgust, naturalness

PLANT-BASED BEVERAGES VERSUS COW'S MILK



Nutrient quality

Burdens of malnutrition



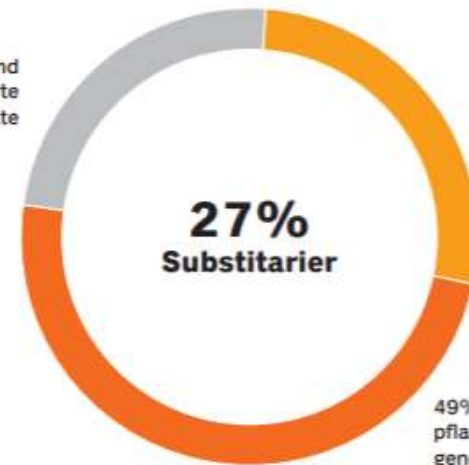
Deforestation



Global warming

Environmental degradation

24% genießen ab und zu pflanzenbasierte Produkte



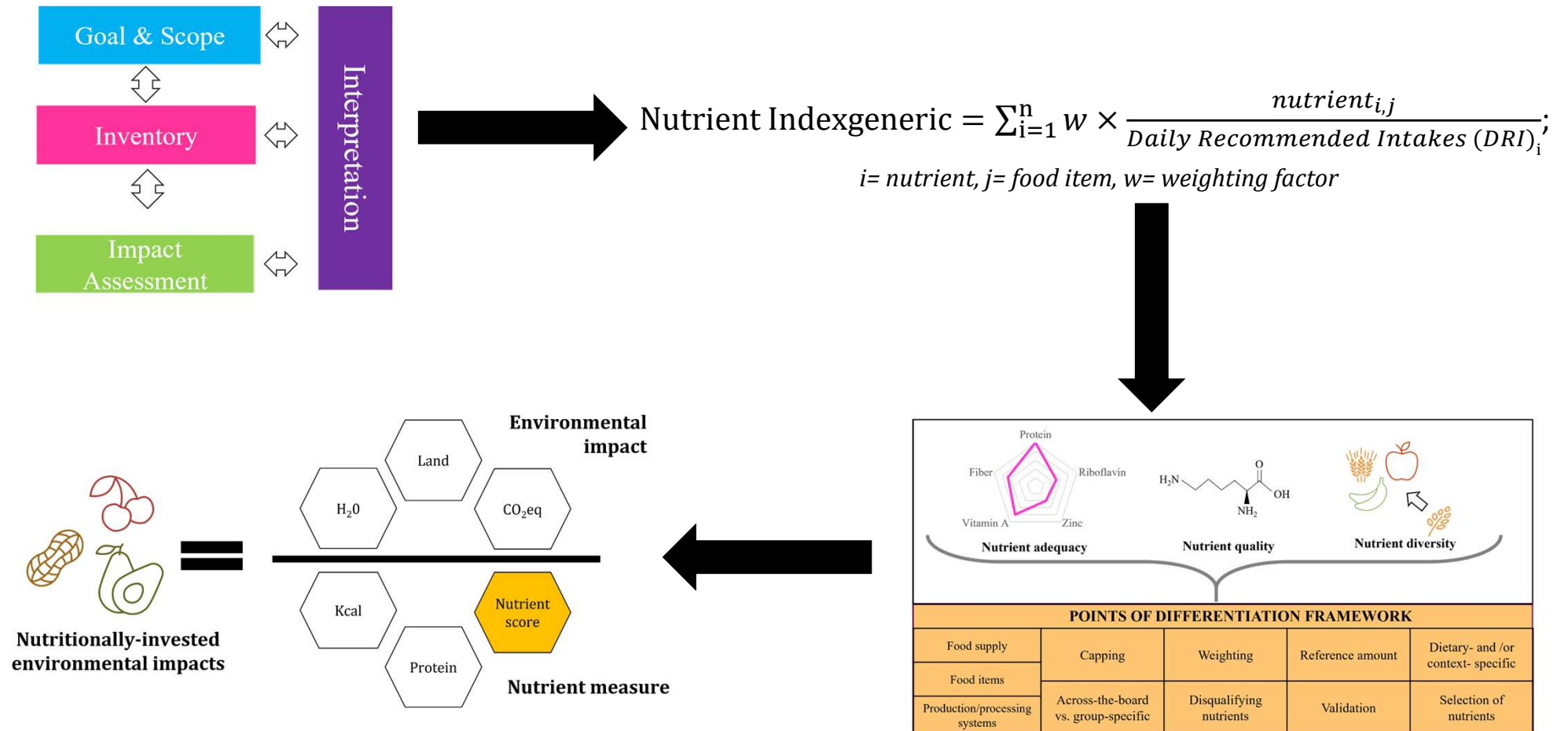
27% essen mehrmals im Monat pflanzenbasierte Ersatzprodukte

49% haben noch keine pflanzenbasierte Produkte genossen

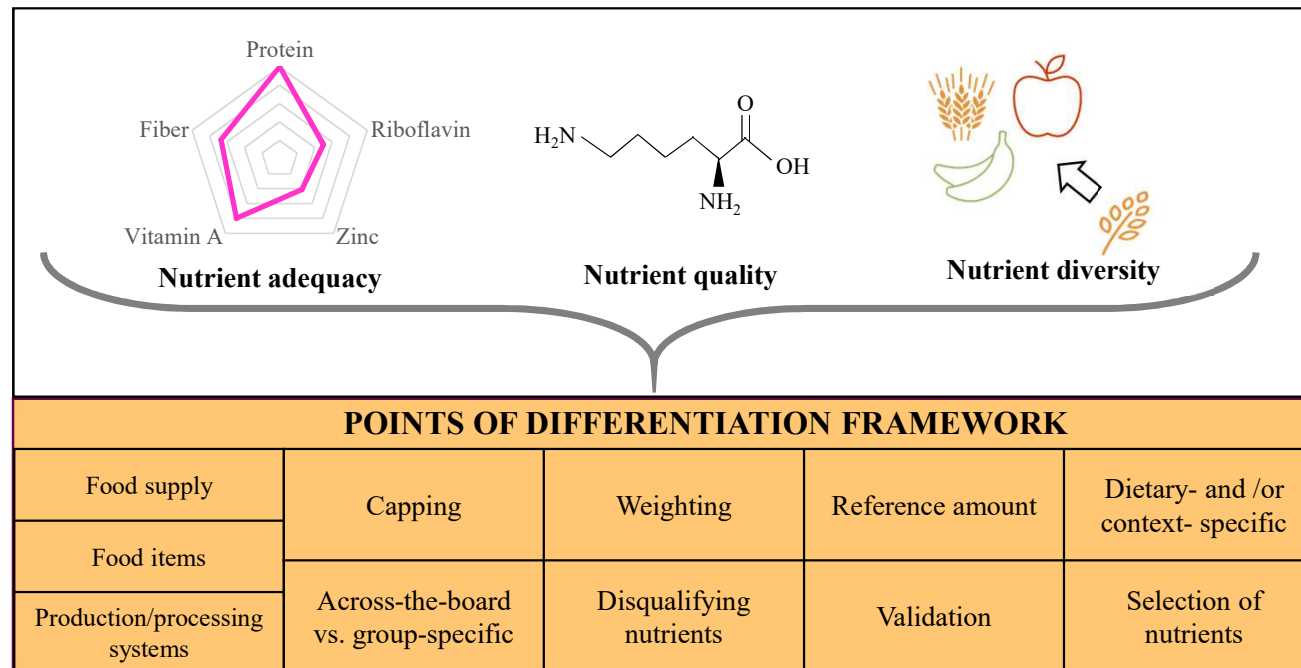
Genuss von pflanzenbasierten Ersatzprodukten mehrmals pro Monat
(Quelle LINK Institut)

1. Coop (2022) 'Plant-based food report'

METHODS



UNDERSTANDING BEST PRACTICES FOR NUTRIENT METRICS



- No perfect index exists → important to understand the points of differentiation
- Points at which methodological application of the same nutrient metric can diverge (e.g., capping vs. not capping)

1. Green, A. (2022). Dr. thesis, ETH Zurich
2. Green et al. (2021). 'Reconciling regionally-explicit nutritional needs with environmental production by means of nutritional life cycle assessment.' *Journal of Cleaner Production*.
3. Green et al. (2020) 'Assessing nutritional, health, and environmental sustainability dimensions of agri-food production' *Global Food Security*.

CONCLUSION

Soy milk, when produced in certain regions, is a strong alternative to cow's milk

Plant-based beverages are only nutritionally competitive with cow's milk if fortified

On a nutritional-environmental combined basis, cow's milk can be sustainable when compared to plant-based beverages

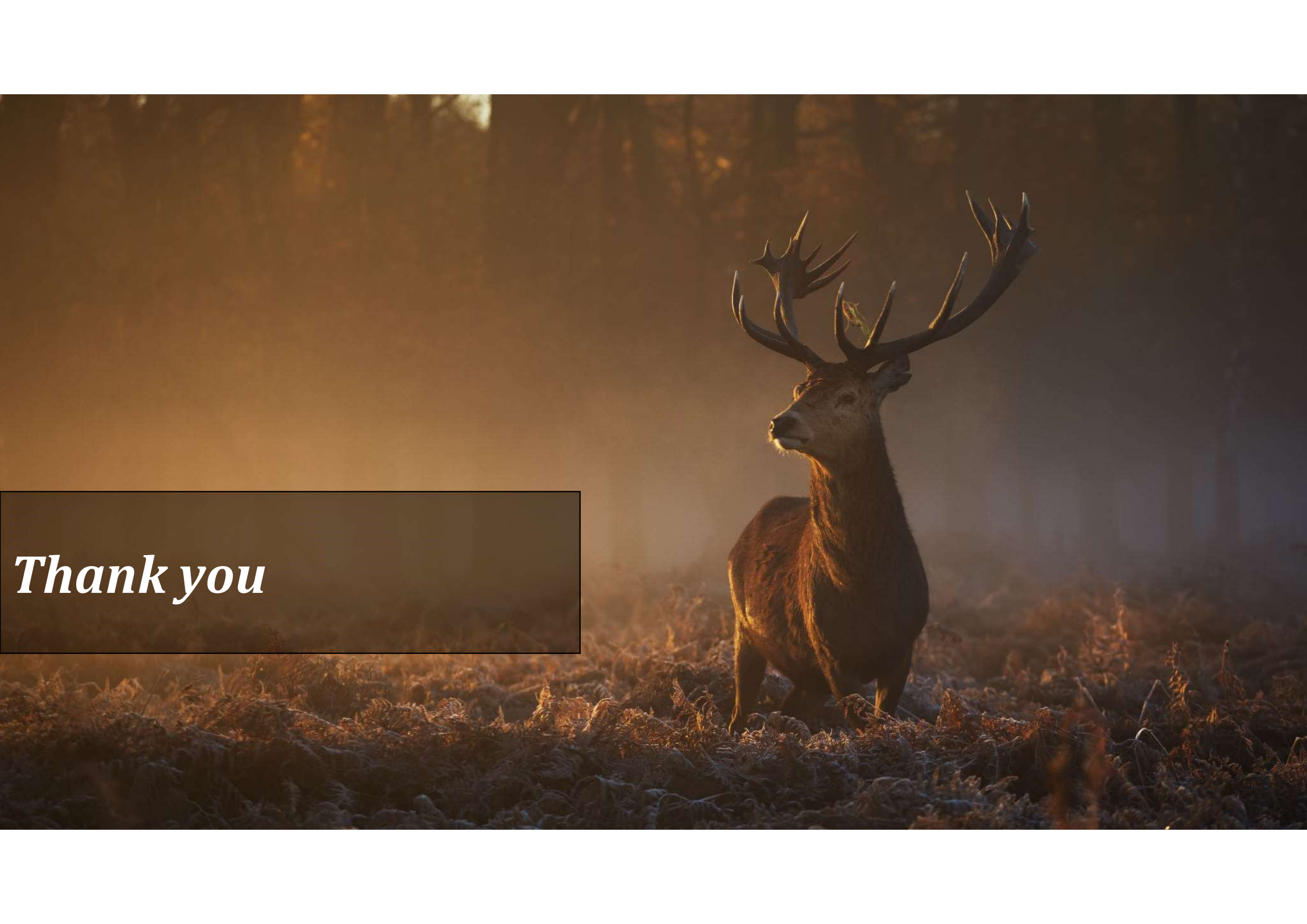
Choice of cow production system (e.g., feed composition) can influence results

Geographic origin of raw plant product needs further exploration (e.g., sustainability tradeoffs between Brazilian and French soy production)

Fortification should be strategically targeted at crops with low environmental impacts, when practical

The choice of nutrient metric can affect results: important to follow the points of differentiation framework

Aligned with the above, we developed the FSI20 metric to show which beverages are most suitable for a specific population

A majestic deer with large, dark antlers stands in a forest at sunset. The deer is positioned on the right side of the frame, facing left. The background is a warm, golden-brown glow from the setting sun, with silhouettes of trees and foliage. The foreground is filled with dry, brown ferns and grass. A semi-transparent dark rectangle is overlaid on the left side of the image, containing the text "Thank you" in a white, italicized serif font.

Thank you