



**Food and Agriculture
Organization of the
United Nations**



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ENVIRONMENTAL PERFORMANCE OF LARGE RUMINANT SUPPLY CHAINS

SUMMARY OF THE GUIDELINES FOR ASSESSMENT

OVERVIEW

In 2012, the world population of cattle and buffalo was about 1.5 billion and 200 million head respectively. Cattle and buffalo produce meat and milk products. For meat, the nearly 67 million tonnes of carcass weight were produced globally in 2012 mainly from North and South America (46%) and Asia (26%). It is interesting to note that nearly 22% of Asia's bovine meat production is from buffalo. For milk, the global production of 625 million tonnes of fresh, whole, cattle milk was almost equally divided between North and South America, Asia and Europe, with each contributing about 30% of the total. Africa and Oceania contributed about 5% each. For buffalo milk, almost all (98%) of the global production of nearly 100 million tonnes of whole milk was from Asia. Cattle and

buffalo for meat and milk production are raised under a wide variety of agroecological zones with a different climate, soil and terrain conditions and resources that ultimately determine the quantity, quality and composition of the animals' diet and hence, productivity. Because of the diversity of agroecological zones, the opportunities afforded by these different zones and the diverse production objectives and interests of the producers (e.g. family farmers, medium- and large-scale enterprises) occupying and/or living in them, there is a wide variety of large ruminant production systems globally. This diversity means that there is a great variety of production systems with different production intensities and purposes within and among countries.



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CHALLENGES AND SOLUTIONS

The production of large ruminant's products, is associated with significant use of natural resources such as land, water or nutrients and contributes to the environmental issues such as greenhouse gas emissions, loss of nutrient to water and air and biodiversity loss. These problems may potentially contribute to environmental impacts such as climate change or eutrophication, which threaten the ecosystems and human health. Large ruminants (cattle and buffalo) are responsible for about 74% of the emissions from the livestock sector. GHG emissions from cattle represent about 65% of these emissions (4.6 Gt CO₂e), making cattle the largest contributor to livestock emissions. Buffalo production contributes 618 million tonnes CO₂e or 9% of total sector emissions (Gerber *et al.*, 2013). The assessment of these impacts, however, is challenging due to the internationalisation of large ruminants supply chains as well as the lack of data and harmonisation of the scientific method. For example, the uncertainty in data and methods for carbon footprint can lead to diverging results, which could lead to a wrong policy decision or improvement measures. Conscious of these challenges, LEAP Partnership established in 2014 a technical advisory group to develop comprehensive guidelines on the assessment of the environmental performance of large rumi-

nants supply chains. Through consensus building, TAG experts from all regions of the world developed the guidelines, which strive for alignment with international standards such as ISO 14040/44 and IPCC guidelines. These guidelines are relevant for all large ruminant production systems and provide methods to assess greenhouse gas emissions and energy demand. Though not covered in depth, the guidelines also provide guidance on how to deal with other impact categories such as land-use, water footprint, eutrophication and acidification. LEAP is currently developing more in specific guidance on water and nutrient use efficiency.

These guidelines are illustrated with case studies. Figure 1 describes the system boundary of the beef and dairy cattle supply chains covered in LEAP guidelines. These guidelines are transparent and comprehensive because different review processes were undertaken, from peer-review to public review. They provide transparent allocation rules between co-products, they address data collection and data quality assessment, inventory and interpretation and reporting of results supported by uncertainty and sensitivity analysis.

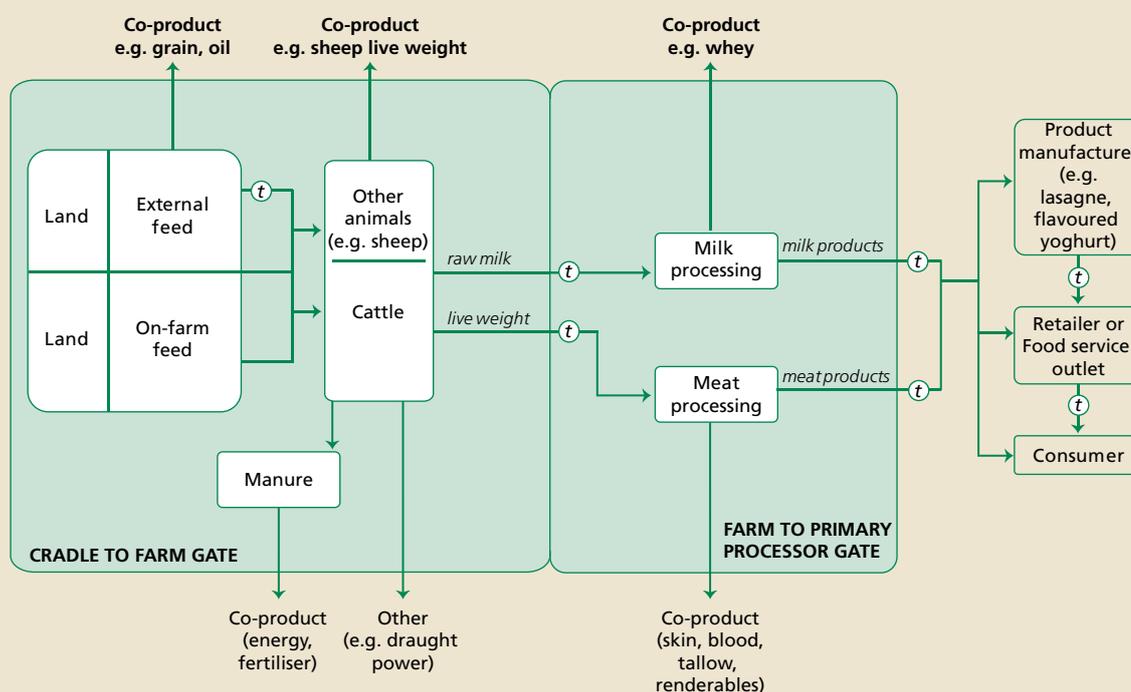


Figure 1. System boundary diagram for the beef and dairy cattle covering the main products of milk and meat and other coproducts.