



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



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ENVIRONMENTAL PERFORMANCE OF SMALL RUMINANT SUPPLY CHAINS

SUMMARY OF THE GUIDELINES FOR ASSESSMENT

OVERVIEW

The world populations of goats and sheep in 2012 were 975 and 1 159 million, respectively. Goats and sheep produce wool, meat and milk products. For goat meat, the nearly 5.3 billion kg of carcass weight were produced globally in 2012 predominantly in Asia (70%) and Africa (25%). The 8.4 billion kg of sheep meat (carcass weight) was more evenly distributed: Asia (48%); Africa (21%); Europe (14%) and Oceania (12%). The global production of fresh, whole, goat and sheep milk was 17.8 and 9.9 billion kg, respectively. For goat milk, most of the global production was in Asia (59%) followed by Africa (24%) and Europe (14%). Sheep milk production shifts from Asia (47%) to Europe (30%) with Africa remaining at approximately the same percentage contribution as goat milk. Greasy wool production of nearly 2.1 billion kg was produced predominantly in Asia (44%) and Oceania (25%) with Africa and Europe (~12% each). Goats and sheep are raised under a wide variety of agro-ecosystem conditions (climatic, edaphic, and biotic

that determine the plants that are found or that can potentially be cultivated. This in turn determines the quantity, quality and distribution of the feed base, which governs the development of animal production systems. Because of the diversity of agro-ecological zones, the opportunities afforded by these different zones and the diverse production objectives and interests of the producers, there is a wide variety of large ruminant production systems globally. Goats and sheep play an important socio-economic role in many rural areas. They are capable of utilizing low-quality fibrous feeds and are highly valued for the multiple products they produce, including edible products, such as meat and milk, and non-edible products, such as manure, hides and skins and natural fibre (mohair, cashmere or wool). Thus, there is a wide variety of small 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 small ruminant's products, is associated with significant use of natural resources such as land, water or nutrients and contributes to 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. Globally, sheep and goats are responsible for about 6.5% of the livestock sector's emissions (475 million tonnes CO₂e). The global average GHG emission intensity of milk is lower for goats than for sheep (5.2 and 8.4 kg CO₂e/kg product, respectively), mainly because goats have higher milk yields on average at the global level. The corresponding GHG emission intensity of meat is very similar between the two species at about 23 kg CO₂e/kg meat. For both milk and meat, emission intensity tends to be lower in developed than in developing regions. Enteric fermentation and feed production largely dominated the sources of GHG emissions along the supply chains, accounting for 55% and 35% of emissions from small ruminants, respectively. In regions where natural fibre production (wool, cashmere, mohair) is economically important, a substantial share of emissions can be attributed to these products when the economic value is used to allocate emissions between edible and non-edible products. The assessment of these impacts, however, is challenging due to the internation-

alisation of small ruminants supply chains as well as the lack of data and harmonisation of scientific methods. For example, the uncertainty in data and methods for carbon footprinting can lead to diverging results, which could lead to wrong policy decisions or improvement measures.

Conscious of these challenges, the LEAP Partnership established in 2014 a technical advisory group to develop comprehensive guidelines on the assessment of the environmental performance of small ruminants 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 small ruminant production systems and provide methods to assess greenhouse gas emissions and energy demand, and are illustrated with case studies. Figure 1 describes the system boundary of the small ruminant 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 and they address data collection and data quality assessment, inventory and interpretation and reporting of results supported by uncertainty and sensitivity analysis.

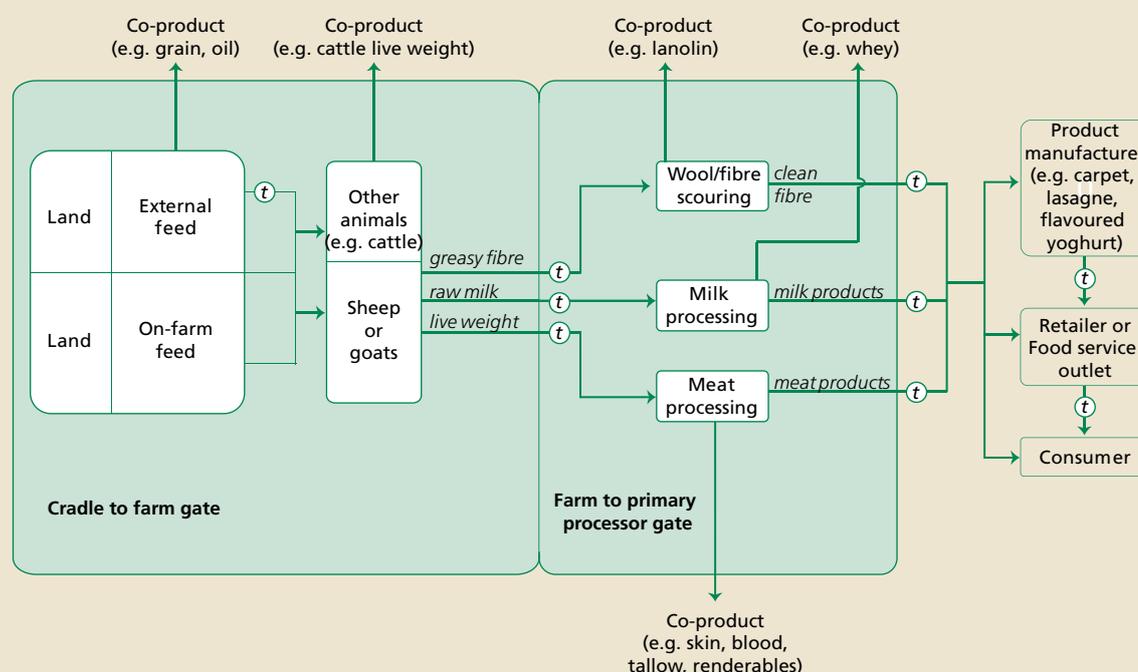


Figure 1. System boundary diagram for small ruminants covering the main products of milk, meat and fibre