

**Session Biosphere: April 12th 11.30 hrs**

**1s2 Healthy foods produced in circular food systems**

## **Can dietary recommendations of animal source food align with circular production principles?**

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A change of human diets has potential for reducing environmental pressures that originate from food production. Food Based Dietary Guidelines (FBDGs) can support this change by informing consumers about dietary patterns and behaviour. However, FBDGs are generally designed from health principles and do not include environmental aspects like resource suitability and environmental consequences of the associated food production. Recent research shows that applying circularity principles in food production, such as raising livestock solely on non-edible feedstuffs, leads to resource efficiency and can therefore reduce environmental pressures. Our aim was to assess and integrate nutritional and environmental consequences of limiting animal-source food (ASF) recommendations to livestock raised in a circular food system. We therefore assessed if the recommended ASF in FBDGs from five European countries (Bulgaria, Malta, the Netherlands, Sweden, and Switzerland) could be met by livestock fed only with nationally available non-edible feedstuffs. A resource optimization model was used to allocate non-edible feedstuffs to either dairy cows, beef cows, pigs or chicken, to include all recommended ASF types in the diet. The resulting quantities of ASF were assessed for global warming potential, land use, and their nutritional contribution. The results showed that the quantities of recommended ASF in FBDGs were substantially high with a contribution between 34 to 56 g/cap/day to total recommended protein. These quantities of recommended ASF were not compatible with the amount and nutritional contribution of ASF in a circular food system. Furthermore there were large differences between

individual countries that could be assigned to cultural and geographical circumstances. For example, in Malta only 15.9 g protein per capita per day could be produced with the nationally available non-edible feedstuffs while in Switzerland 38.9 g per capita per day could be produced. Although these protein quantities are almost one third up to half of the daily human protein needs, they did not meet the ASF recommendations in these countries' FBDGs. We conclude that when livestock is only fed on non-edible feedstuff that is nationally available, the available ASF for human consumption can cover a significant amount of nutrient requirements while the related dietary pattern can contribute to a more climate-friendly food system. Using circularity principles, health and environment can be aligned, which emphasizes the opportunity to create future guidelines with a holistic approach.

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