

ATF Contribution

**High level Panel of Experts - Committee on World Food Security
Consultation on the VO draft of the Report: "Sustainable agricultural
development for food security and nutrition, including the role of
livestock"**

Link consultation & report: http://www.fao.org/fsnforum/cfs-hlpe/sites/cfs-hlpe/files/files/Sust-Agr-Dev-Livestock/HLPE_Sust-Agr-Dev-Livestock_2-October-2015_Draft-VO.pdf

Link Contributions: <http://www.fao.org/fsnforum/cfs-hlpe/Sust-Agr-Dev-Livestock-VO>

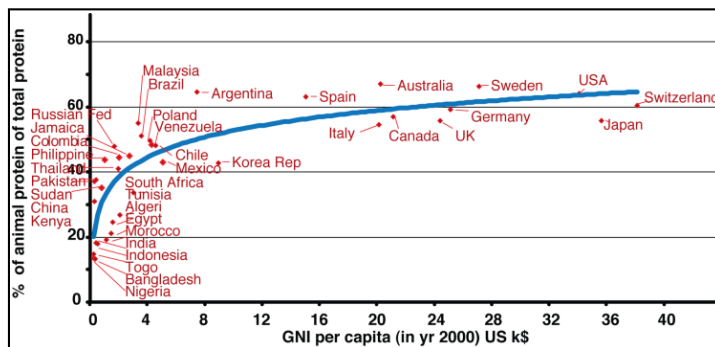
November, 2015

The central role of livestock could better take into consideration the major role animal productions can play in a sustainable circular biomass based economy, by contributing to a sustainable protein security and regulating the ecological cycles. Research and innovation are needed to develop new pathways for improving the sustainability and competitiveness of the animal production sector, with food and nutrition security, climate change adaptation and mitigation as one of the key challenges.

Animal productions in food and nutrition security

Food security in perspective

To secure nutritious food for the growing population, the livestock related production has been increased from 60 and 250 MT/year of meat and milk respectively in the 1960's, to 300 and 700 MT/year nowadays, of meat and milk respectively. A further increase in production is to be expected as more middle class people in developing countries can afford to shift to a more animal protein based diet. Livestock production also contributes to a better livelihood in poor countries to provide nutritious food, labour, capital and risk insurance, and specific ecosystem services (biodiversity, grassland ecology, soil carbon stocking). Urbanization provides better logistical perspectives for animal protein supply from intensive, sustainable farms in the metropolitan areas. For all these reasons it is expected that in 2050 about 450 resp. 1050 MT/year of meat and milk is needed in 2050. The trend to consume less meat in developed countries will hardly have any effect on this expected increase.



Sustainable Protein Security

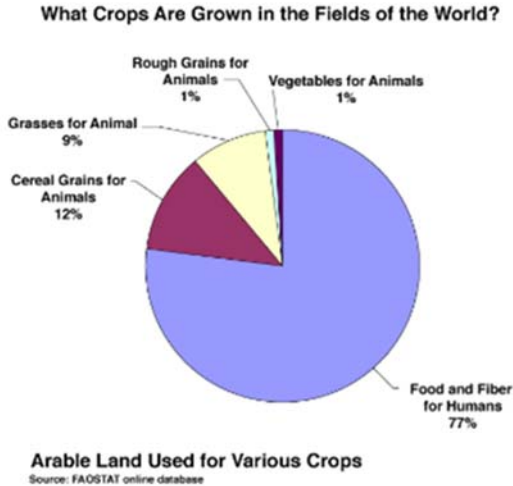
While the world population increases by 1.7% per year, the demand for food increases by 2.2%. Still 40% of the world population suffer from hunger or malnutrition, mainly related to protein deficiencies. The share of animal proteins in the diet increases with disposable income.

The biological value of animal proteins for human nutrition (digestibility, amino acid profile) is much higher than that of protein of plant origin. The score of animal protein (expressed as the ratio between the digestible content of the most limiting AA in 1 g of animal protein versus the concentration of this AA in the reference protein corresponding to human need) is 40% higher for milk and bovine meat and 25% higher for pig, poultry meat and eggs. This means that we need to eat at least 25% more protein of plant origin to cover our needs. This explains why the Carbon footprint of vegetarian diets is not lower than that of classical diets because vegetarians need to eat more food (DUALINE, INRA scientific collective expertise 2011). Protein from poultry origin today has unparalleled opportunity costs, whereas removing the soy proteins is very expensive. The "Isolated Soy Protein" has a lower nutritional value than caseins and caseinates from dairy products. We will probably have the same technological difficulties with other sources of plant protein.

Customized Feed Security

A sustainable nutrition security requires that we optimize the mobilization of human edible proteins from the produced biomass. In that case we can secure protein supply without growing more biomass that requires sparse land and limited resources. The "kg human edible proteins produced per hectare of land without depletion of soil and water" is a sound and straightforward measure of sustainability from a nutrition security perspective.

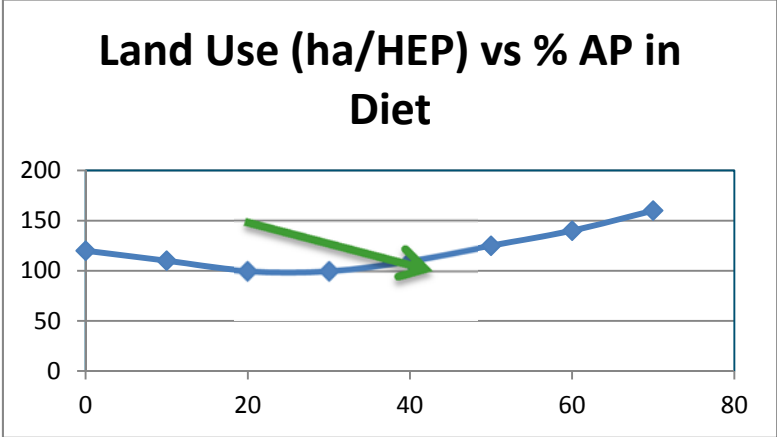
The yield gap for protein production is in large parts of the world related to the yield gap in plant biomass production. Think of better management of marginal land, including the wide spread rangelands. But even in highly productive agricultures there is a yield gap, as only 40% of the crop production is directly used for food or feed (e.g. corns, grains, rice, pulses). The nutritional value of the crop residuals as feed resource can be improved by degrading lignin's using fungi (mushrooms) resulting in a feed with a nutritive value comparable to fresh grass for herbivore ruminants. Another example is the conversion of raw biomass residuals by insects, resulting in a protein rich feed resource for fish and, to a lesser extent, poultry, that by nature is insectivorous. From this perspective nutrition security actually means feed security by alternative feed stocks.



Animal productions in a sustainable circular biomass based economy

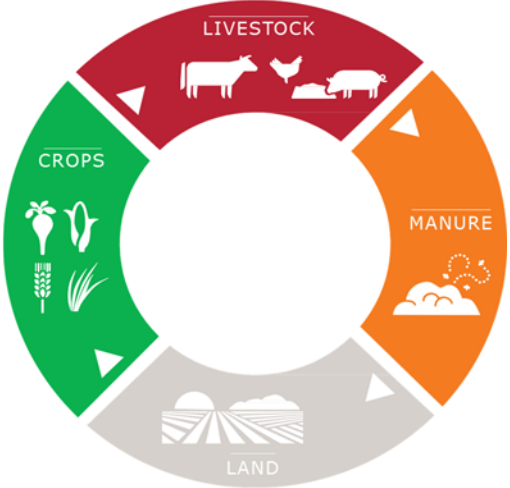
Integrated livestock and cropland production

Integrated cropland/livestock systems are the best to optimize human edible protein production. With the actual practices, the optimum is realized when 25% of the proteins are produced by animals and 75% by plants. When animals are optimally used to convert human indigestible plant biomass, the optimum is realized when >25% of the proteins are produced by animals.



Biomass utilization while recycling

Livestock production recycles biomass not directly usable for human food to produce food of high nutritional quality, and is a strong engine for the Nitrogen (N), Phosphorous (P) and Carbon (C) cycles, which in turn contribute to the production of biomass. Livestock contributes to the management of biodiversity as well.



Animals consume almost all by-products of crops and grains that are not suitable for grain markets (e.g., those with a low protein content). Manure should be considered as a resource, representing 10.3 million tons of nitrogen versus 10.5 million tons of synthetic N fertilizers. At world level, they also represent 17 million t P that is more than the amount of P supply on the soil with mineral fertilizers (14 million t / year). The substitution of mineral fertilizers by effluents and manure could be further improved. The current trend towards

specialization of farms and indeed geographical specialization in either livestock or crops are barriers to optimal use of the N and P effluent.

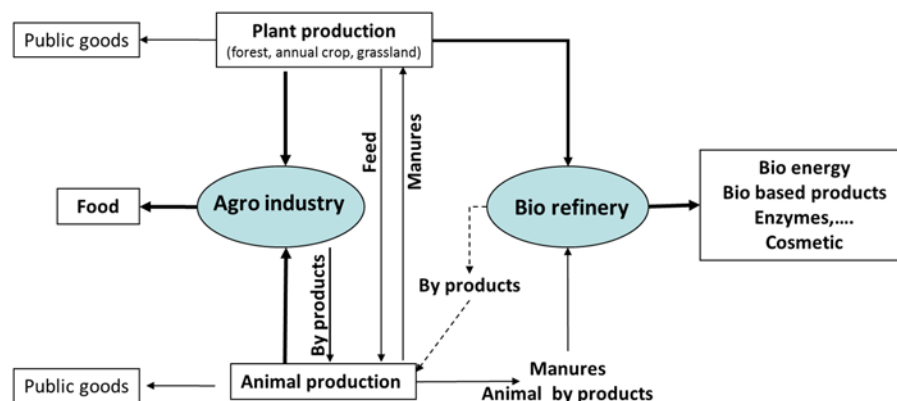
Grassland, including permanent grassland, and effluent spreading (especially solid manure and compost), contribute to the management of OM and promote soil carbon storage, which in turn is favorable for the sustainability of plant production.

Livestock systems also contribute to the maintenance of biodiversity through 65 million ha of permanent grassland (FAOstat), 17 million ha of rangeland and 10 million ha of sown grassland (totaling 48% of EU-27 UAA) in 2007. These areas and associated structures (field edge, hedges, ditches, etc.) are a source of specific, genetic and functional biodiversity and provide habitats for wildlife.

Animal production systems are a part of a generalized sustainable bio-economy

Apart from its contribution to the regulation of ecological cycles, animal production can contribute to the bio-economy in different ways.

- Valuation of new resources such as by-products or losses from agro industry or bio refineries by converting them into animal products. This may require the development of new technologies to secure these by-products.
- Bio-refinery of animal by-products such as (i) manure by extracting organic compounds of interest, then extracting nutrients (N and P) and finally producing energy through anaerobic digestion; and (ii) animal by-products (wastes from slaughterhouse, hatcheries, dairy industries);
- Valorisation of protein for non-food use, development of antimicrobial properties of bone and eggs etc. There is a role for innovations in developing new techniques.

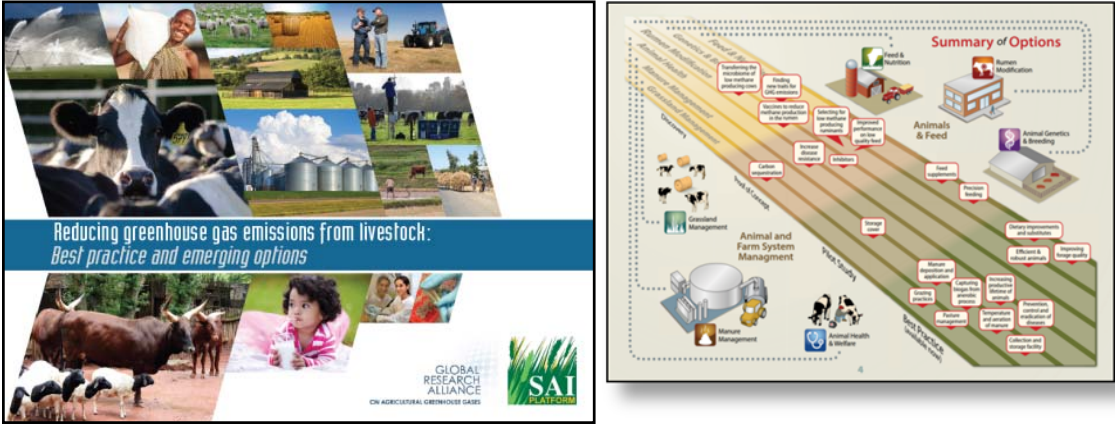


Others outputs from animal production systems

The livestock sector is inextricably linked to the vitality of territories and provides a lot of different ecosystem services. The livestock sector contributes to soil fertility, and to maintain open and diverse landscapes appreciated for tourism activity. It also provides skins for further processing in the clothing and furniture industry. The livestock sector thus generates jobs on farms, in agro-food industries and other industries and trade. Most of these jobs are not located in large cities, but are contributing directly to the vitality of our territories. Indeed, all these services are poorly evaluated and not deeply studied to date.

Climate Smart Livestock Productions

Accounting for an estimated 14.5% of global anthropogenic greenhouse gas emissions, livestock sector plays an important role in climate change. Ruminant products are considered to have the highest C-footprints. But for a biomass based circular economy ruminants are essential in optimizing the Human Edible Protein production per unit of land use for agricultural biomass production.

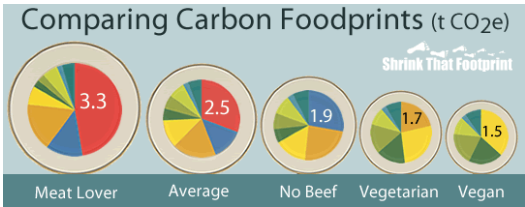


Research and innovation plays an important role for further improving the sustainability and competitiveness of the cattle production sector, with climate change adaptation and mitigation as one of the key challenges. The global perspectives for greenhouse gas mitigation in ruminant production is a more than 40% less C-footprint by:

- Genotyping low methane production for selection
- Improving feed quality and digestibility
- Improving animal health and husbandry conditions
- Manure management: collection, storage and utilisation
- Improving C sequestration soils ("4pro1000")
- Precision livestock farming

Meat 'Myth' Busters

Some LCA based studies are used to indicate that diets with lower animal products are more sustainable:

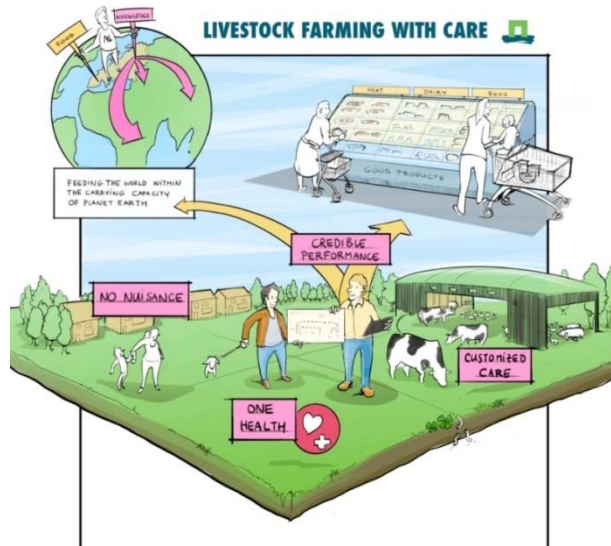


But this is a false picture as:

- It is a simplified linear summing up of Single Products LCA's
- That do not account for integration in a Global Agro-Ecosystem (dynamics, time)
- And ignores the variation and optimization in Feed for Food Footprints
- And thus, do not envisage optimal land use for Human edible Protein Production

Livestock Farming with Care

Livestock Farming requires good care. The concept of “Livestock Farming with Care” is founded on care ethics with an integrated approach based on four principles: One Health (i.e. healthy and safe for animals and humans); Customized Care (i.e. from the individual animal’s perspective and integrity); No Nuisance (i.e. from an environmental and societal perspective) and Credible Performance (i.e. from an economic and public prospect).



Land and Sea

Land is a limiting factor for food or biomass production, as 70% of the earth’s surface is covered with water. These aquatic and marine environments constitute a promising additional perspective. Seafood is a major source of essential proteins, omega-3 fatty acids and micronutrients. Currently, only 17% of the supply of animal proteins comes from seafood. While only 7% of the biomass used in the bioeconomy is waterborne. And there is hardly an integration of the marine and terrestrial bioeconomy.

Both fishery and fish farming are not optimally governed to use the marine and fresh water production capacity in a sustainable manner. Improvements in this area on basis of an Ocean Farming approach will lead to a promising source of biomass for proteins in the future, while “fueling” the bio-economy. Ocean Farming along the food chain with fish, shellfish and algae.



Conclusion

For a sustainable nutrition security on the basis of an optimal exploitation of protein-stocks in biomass resources, integrated biomass production is needed, including terrestrial and marine livestock.

Support to research and innovation is also needed. It should be fostering integrated approaches, interdisciplinary research and concerted actions between farmers, industry and research providers. ATF has developed a White paper on "Suggested priorities for support under Horizon 2020 to enhance innovation and sustainability in the animal production sector of Europe's food supply chains" in April 2013. The key areas for research and innovation for contributing to a 'Better Society' and 'Competitive Industries' under the Horizon2020 strategy, identified in this position paper are:

- Resource efficiency – using limited resources in a sustainable manner by robust and efficient animals; more efficient feed chains that incorporate health and welfare; making better use of livestock by-products and alternative feed resources; and the use of precision livestock farming.
- Responsible livestock farming systems – minimise environmental impact of animal production while improving animal health and welfare; increase protein and energy autonomy in Europe; improve productive grassland based livestock production; and create climate smart, robust and resilient animal production systems.
- Healthy livestock and people – prevention and control of disease by integrated management of animal health; the microbiome; improve product quality; and increase food and feed safety.
- Knowledge exchange towards innovation – cooperation and knowledge exchange with producers towards innovation; implementation of animal welfare management and 'omics' tools.

The paper also identifies major opportunities for fundamental investments in 'Excellent Science':

- Host-microbiome interactions.
- Long-term effects of environmental effects in early life.
- Predictive understanding of phenotypic expression.
- Immune regulation at mucosae.

To support research and innovation in livestock to contribute to a sustainable, smart and competitive Europe, adequate research infrastructures are essential. Priorities for research infrastructures identified by the ATF are:

- Facilitating pan-European sharing of expensive experimental research facilities.
- Developing high throughput phenotyping infrastructures – physical and virtual.
- Investment in biobanks.

Attachments

- ATF Comments on 4th Foresight, May 2015 -attached
- "Sustainable livestock production in Europe : A question of Food security, climate and innovation", Knowledge For Innovation, Oct. 2015 - [link](#)
- ATF White paper, 2013 – [link](#)
- SAI publication http://www.saiplatform.org/uploads/Modules/Library/lrg-sai-livestock-mitigation_web2.pdf - [link](#)