**Contribution from FAO to the consultation organized by the HLPE on the VO draft of the report on Sustainable agricultural development for food security and nutrition, including the role of livestock**

**General comments**

Overall scope and approach to the question of sustainable food systems

The report is well written and provides relevant information for policy makers to understand the challenges of sustainability to the livestock sector. However, the question it’s trying to address should be better framed. The current title suggests that the report is addressing the whole of agriculture with a specific focus on livestock. Other subsectors (crop, forestry, fisheries and aquaculture) should therefore be included and the connections/integration between them and livestock should be better explained. This answers the author’s question 3.

The central role of livestock in agriculture is well highlighted yet could be further reinforced by stressing the synergies with other agricultural sub- sectors. For example, cropping systems, timber, aquaculture, benefit from nutrients cycling triggered by livestock. Manure is essential in securing key soil functions such as fertility, physical stability and support that is essential for plant growth. Livestock also turn non edible resources such as grass and other roughages but also wastes from food chains, into edible products. About 25% of livestock feed ration at global level is provided by crop residues (straws and stover) and 8% by agricultural by-products (brans, meals etc.).

The approach to the crop sector could also be improved/completed to include aspects such as the increasing yield plateaus of main staples, the ecological responses to technological solutions (herbicide resistance in weeds in GM crops; increasing costs of inputs, concentration in the breeding and agrochemical sectors, impacts of pesticides and herbicides – including for feed production- on terrestrial and aquatic ecosystems as well as on human health. Some related further insights beyond the Alexandratos and Briunsma report can be found in Conforti(ed) Looking Ahead in World Food and Agriculture. Perspectives to 2050.

Structure of the report

Though the overall structure of the report is good and provides the adequate chapters to address the challenges of sustainability in livestock supply chains, the developments within chapters could be refocused or reorganised. To address sustainable agriculture development, Chapter 1 should be structured around the definition of sustainable food systems (now only provided as footnote on page 21) and the contribution of livestock to food security and nutrition as part of food systems. Chapter 2 (Trends and Drivers) should be structured around identified and documeanted drivers such as demand for food and livestock products in particular as well as resource scarcity (feed, water, land, nutrient, climate etc.) and market globalisation. Chapter 3 (Challenges), instead of addressing the pillars of sustainability one after the other, should look at them through the lenses of food systems. Finally, Chapter 4 and 5 should provide real action points and proposals (cf point 3 on recommendations).

The focus given to the livestock sector is deserved and appreciated. The Report provides a well described, thorough overview of the challenges, threats and opportunities of the livestock sector with regards to its contribution to World Food Security and Nutrition. It both highlights the role of livestock in FS&N and the risks and threats including those related to climate change, human health, etc. Regarding the latter, the report (page 17, rows 38 and followings and again in page 28) points out both the positive contribution of livestock (by providing micro-nutrients and essential proteins) and negative impact (contributing to cardiovascular diseases, cancers, etc.) This is actually a question of quantities and balance. This is important and the report should better refer to FAO (and other) recommendations for balanced diets (including animal products) and to quantified recommendations when they exist.

Since the focus on livestock is well explained upfront in the document there may be a need to revisit the title of the report to better show the focus adopted .

The Report concentrates and provides a great number of details, figures and facts in relation with the livestock sector. However, the Report tends somewhat to be repetitive and turn along the document around the same challenges which are coming over and over in each chapter. (growing and changing demand, environmental challenge and natural resources, diseases, number of people depending on livestock. For instance, the fact that “animal products provide 13 % of calories and 28% of dietary proteins” is repeated four times in the report (page 8, page 17, page 26 and page 81). The authors should point this out once but instead of repeating it, provide a more elaborate analysis of this important fact, e.g. looking at trends, geographic differences, etc.

Chapter 4.4 needs to be further elaborated with “responses” providing concrete sets of actions to implement. The case studies need to be shortened and better integrated . Some of the discussion of a conceptual nature in Chapter 1, such as the discussion on the meaning of sustainable agriculture for FSN, the two boxes on sustainable intensification and on food sovereignty debate (boxes 2 and 3, pages 18 to 20) could be shortened or arrive later (for instance in Chapter 4, as pathways).

The report comprehensively mentions all important issues but tends to downplay (though it mentions) the importance of 3 crucial issues:

1. protein input vs protein output efficiency when it comes to livestock feeding strategies;
2. the Western model of consumption of livestock-derived foods is taken as a comparative baseline, despite recognition of the rise of non-communicable diseases in Western countries;
3. the FAO 2012 scenarios for 2050 do not consider climate change scenarios and challenged yields and natural resource use.

Insufficient consideration of these points result in an incomplete sustainability vision for the food system, with a bias on production rather than throughout the supply/consumption chain.

The nutrition aspect of the report could be strengthened. The report looks at past trends of livestock product consumption and on projections for the future, including at the ‘anxiety’ of producing enough animal products to respond to the demand by 2050 considering the increased purchasing power of the world population. However, this discussion should be enriched by bringing together the various dimensions of the discussion: recommended quantities (e.g. recommended by WHO or FAO) of animal products, the over consumption in segments of the population (and under-nutrition in others); the important of nutrition awareness / education systems to sensitize consumers about the excessive / insufficient levels of consumption and their potential impact on future consumption levels…

The report rightfully points out the cost and benefit of livestock for the planet (cost on climate change but potential mitigation if better systems are followed) and human health (nutrition, both potential costs and benefits) respectively. This is a critical area of debate and strategic choices. For this purpose, more solid cost benefit analyses (on both nutrition and climate change) of various sources of proteins (both vegetal and animal) and of various livestock systems would be contributing to the debate.

There is sometimes the feeling that the report focuses too much on meat when talking about livestock and the report could provide more insight on non meat animal products such as milk, eggs, etc. This is particularly important in countries where culturally meat is consumed in limited quantities (e.g. India) but for which milk / dairy and other products are critical to address their high malnutrition rates. The cultural dimension aspect of nutrition of animal products is neglected in the report. Other animal products (such as edible insects), are also neglected.

Consolidating livestock specific recommendations

In order to improve the reach of the report, a limited number of sector’s specific recommendations should be available upfront, as the reader may expect from the title of the report. The current list of recommendation appears too long and a large number of them don’t focus on livestock. We suggest the following recommendations to be considered as priorities, building on the current recommendations from the report:

* ON DATA, INFORMATION AND KNOWLEDGE (1f +6 +9 + 24): Increase efforts to improve data collection, analysis and tools on sustainable livestock systems and their contribution to food security and nutrition, including at micro, meso and macro level and taking advantage of progresses made in the area of methodology harmonization, including the use of modelling and life cycle assessments. Existing efforts such as the Global Livestock Environmental Assessment Model –GLEAM or the Livestock Environmental Assessment and Performance Partnership LEAP can be used as examples here.
* ON PROCESS (1.e and 23): Provide the necessary institutional and financial support to the range of multi-stakeholder partnerships at national, regional and global level that will be instrumental in ensuring a sustainable growth of livestock and maximizing its contribution to the SDGs (link to the Global Agenda for Sustainable Livestock).
* ON LIVESTOCK PRODUCTION (8): Focus policies and investments to reduce “yield gaps” between the best and worst performers in specific systems and location, i.e. promote the widespread adoption of already available good livestock practices, which is critical to achieving sustainable livestock development and food security, particularly in low income food deficit countries (Gerber et al, 2013)
* ON RESILIENCE: Provide support to livestock food systems to be prepared to respond to shocks and crises (e.g. economic/financial, disease, climate change, etc), which will require working with climate scenarios, building an increased capacity to deal with vulnerability and change as well as mechanisms to support recovery from shocks. AGA’s work on resilience in the African drylands can support this point.
* ON CONSUMPTION OF LIVESTOCK PRODUCTS (18b): Focus policies and investments to foster healthier diets, encouraging increased animal protein consumption in population suffering undernutrition and micronutrient deficiencies and more sustainable levels of consumptions in other regions/countries.

**Elements of answer to the specific questions in the cover letter**

1. The report is wide-ranging and comprehensive in analyzing the contribution of sustainable agricultural development to ensuring food security and nutrition (FSN), with a particular focus on the livestock sector because of its importance for both nutrition and sustainable futures. Do you think that the report is striking the right balance between agricultural development overall and the livestock sector specifically with respect to their relative contribution to FSN?

It is balanced. The authors may wish to integrate the recent findings of the Lancet on red meat consumption, strengthening the argument for balanced diets. Mention of the sustainable diets concept? FAO [Sustainable Diets and Biodiversity](http://www.fao.org/docrep/016/i3004e/i3004e00.htm) <http://www.fao.org/docrep/016/i3004e/i3004e.pdf>

The strong focus on livestock is largely justified; however, the role of over-fertilization for N2O emissions should be addressed in such a report as well, as there lies a big potential for improvements. In addition, the focus is on the production side and much less so on demand side measures.

A major defect of the report, which pays special attention to animal-source food, is to neglect seafood (including finfish, crustacean, molluscs and other aquatic animals) as an important source of animal protein and the contribution of seafood sector (including aquaculture and fisheries) to FSN.

* Seafood is an important source of animal protein in human consumption (Delgado et al 2003)[[1]](#footnote-1), and features prominently in the diet of many people; seafood are often easily accessed and affordable. Seafood is especially rich in essential omega-3, long-chain polyunsaturated fatty acids, amino acids and micronutrients, including vitamins, bioavailable calcium, iron and zinc (HLPE 2014[[2]](#footnote-2), Longley et al 2014 [[3]](#footnote-3)), which all play a critical role in cerebral development, immune defense systems and general health. Small quantities of fish can have a significant positive nutritional impact by providing essential amino acids, fats, and micronutrients that are scarce in vegetable based diets (FAO 2012[[4]](#footnote-4)).
* Aquaculture and fisheries provided 141 million tonnes of seafood per year to direct human consumption by world population during 2012-14. Globally, the contribution of seafood to animal protein increased from 15 percent in 1980 to 17 percent in 2011. During the period, the contribution of seafood to animal protein has increased in countries that hosted over 60 percent of world population.
* Aquaculture has been the fastest growing animal food-producing sectors. Its average 7.6 percent of annual growth in the past two decades was much faster than livestock (1.7 percent), poultry (4.4 percent), eggs (3.1 percent), and milk (1.8 percent). In the past two decades aquaculture has grown faster than the rest of seafood and meat sector in over 120 countries or territories (85 percent of world population).

The report should be improved by properly recognizing the contribution of seafood and seafood sector (including aquaculture and fisheries) to sustainable agriculture development and FSN.

* Seafood should be explicitly treated as part of “animal-source food” (ASF). For example, the sentence in lines 38-40 on page 17 should be modified into “[N]utritionally, meat and other animal products such as milk and eggs and seafood globally provide xx percent of total calories, xx percent of dietary protein, and are sources of vitamins and key micronutrients, several of which are not found in plant foods, thus contributing to optimal nutrition. ” (Underlined words are added to or modified in the original text). Adding seafood would make the sentence as well as the entire paragraph in lines 38-48 on page 17 more accurate and comprehensive.
  + If unfortunately it is decided that the report should narrow its attention to terrestrial animals only, then the term “animal-source food” (ASF), which is widely used yet not clearly defined in the report, should be qualified into “terrestrial-animal-source food” (TASF) in order to be more accurate and avoid confusion.
* The report recognizes livestock production as a resource demanding sector (e.g. the paragraph in lines 16-20 on page 27). In such context, the much lower ecological footprint of aquaculture and fisheries should be noted (Hall et al. 2011[[5]](#footnote-5)).
  + For example, aquaculture fish convert more of their feed into body mass than terrestrial animals; the production of 1 kg of beef (resp. pork and fish) protein requires 61 kg (resp. 38 and 13 kg) of grain (HLPE, 2014[[6]](#footnote-6))
* It should also be noted that:
  + If fish production from capture fisheries would have to be replaced by grazing livestock, this would result in a substantially increased grazing area and increased water extraction at levels which would be difficult and environmentally costly to sustain.
  + When decisions are made with respect to managing water, for instance to irrigate cereals needed for animal feeds, one of the effects could be the reduction of fish production. The net effect might therefore be that less animal protein production.

2. The report is structured around context, trends, challenges and pathways/responses. Do you think that these are comprehensive enough, and adequately considered and articulated? Does the report strike the right balance of coverage across the various chapters? Are there important aspects that are missing?

In the introduction and throughout the text, environmental issues are mentioned but they could be stronger supported with references such as:

UNEP: THE ENVIRONMENTAL FOOD CRISIS

UNEP: GEO5 Environment for the future we want

UNEP: Avoiding Future Famines: Strengthening the Ecological Foundation of Food Security through Sustainable Food Systems

The structure is ok, but it should become much more concrete when it comes to recommendations, cf. detailed comments; missing aspects: also see the detailed comments, in particular, as just mentioned: demand side aspects and fertilization.

The report should draw information, knowledge and insights about the contribution of the seafood sector to FSN from “The State of World Fisheries and Aquaculture (SOFIA)” (http://www.fao.org/fishery/sofia/en) which is one of FAO flagship publications.

3. The report uses a classification to distinguish between four broad categories of livestock systems, in order to better identify specific challenges and sustainable development pathways for each of them. Do you find this approach useful for identifying specific policy responses and actions in different socio-economic and environmental contexts?

Well, this approach could be useful, but it is not used that much in the report, in particular towards the end and for structuring recommendations, etc. – thus, if such a structure is proposed, it could be utilized more prominently.

The report should draw information, knowledge and insights from projection and scenario studies on seafood such as:

* The chapter on fish in OECD-FAO Agricultural Outlook 2015-2024 (http://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2015/fish\_agr\_outlook-2015-12-en)

World Bank. 2013. Fish to 2030 : prospects for fisheries and aquaculture. Agriculture and environmental services discussion paper ; no. 3. Washington DC ; World Bank Group. http://documents.worldbank.org/curated/en/2013/12/18882045/fish-2030-prospects-fisheries-aquaculture

4. The report has referenced key projections and scenario studies in identifying the drivers and trends through to 2050. Are there other studies that the report needs to reference, which offer different perspectives on the future outlook for the agriculture (including livestock) sector, in particular those that focus on nutrition and diet?

Regarding projections, you may add some other models which take into account biodiversity, starting from the MEA process, prepared mostly for CBD:

PBL: Roads from Rio+20 Pathways to achieve global sustainability goals by 2050

# PBL: The protein puzzle: the consumption and production of meat, dairy and fish in the European Union

CBD: Global Biodiversity Outlook (GBO) 4

See other papers from M. Kok and Rob Alkemade

In 2012, FAO produced the bulky study: Greening the Economy with Agriculture, which review Buisma and Alexandratos projections in light of climate change; this paper must be considered. Furthermore, scenarios that emphasize dietary changes should be included and discussed more prominently (e.g. Stehfest et al. 2009); also other livestock management strategies, such as reduced concentrate feed and grassland-based ruminant production has its potential as a complement to increased efficiency – this could also be described (e.g. Schader et al. 2014).

5. The report has identified a wide range of challenges likely to be faced in the coming period to which policy makers and other stakeholders will need to take into account so that SADL can contribute to FSN. Do you think that there are other key challenges/opportunities that need to be covered in the report, including those related to emerging technologies, the concentration and intensification of production in livestock, and the implications for feedstuffs (crops and oilseeds), and international trade?

As already pointed out, the consumer behavior side should be covered more in depth and on a similar standing as the production side. Furthermore, some key aspects of crop production should be addressed: N inputs and also climate change impacts on yields (there is one reference Havlik et al. 2015 that evidently presents some scenarios on this, but it is not in the reference list); several publications suggest that these impacts can be considerably negative (e.g. Müller et al. 2010, Challinor et al. 2014, Porter et al. 2014, Müller and Robertson 2014).

6. A decision-making approach that could be useful for policy makers in designing and implementing policies and actions has been proposed in Chapter 4 of the report. Is this a useful and pragmatic approach?

No, it is just a general suggestion on how to solve any problem: on p 67, it reads as follows: “It is imperative, in first identifying the priority challenges, to articulate them as clear, measurable objectives, then undertake analysis based on sound data and evidence in order to define the potential response options as a prelude to design and implement chosen policies and actions and, finally, to monitor and evaluate the results, which, in turn, could generate another round in the response cycle.” But this is basically common sense to solve any problem. The contribution of such a report would be in providing much more detailed proposal for the specific aspects listed before this section 4.5., namely the challenges and responses – as information is needed on when to choose which response and what may be its advantages and drawbacks, etc. – maybe assessing this with a SWOT analysis, for example (cf. detailed comments for some further suggestions on how to make this more concrete).

7. Chapter 4 also contains case studies/examples of evolutions of agricultural development policies and actions in different contexts/countries. Could you offer other practical, well-documented and significant examples to enrich and provide better balance to the variety of cases and the lessons learned in agricultural development, including the trade offs or win-win outcomes in terms of addressing the different dimensions of sustainability and FSN?

Yes, the literature contains thousands of case studies that could serve to illustrate specific aspects – I would suggest to identify some few most informative case studies for basically each response listed, drawing conclusions from each of those case studies in order to allow policy makers to adapt it to their own cases of interest. – It would be good to complement this report with a web-based data-base of case studies to identify optimal strategies and responses. Given the necessity to in detail account for the specific local context in each situation, it would be of key importance to systematically collect the wealth of information available from a host of case studies in both the scientific literature, but also in government and NGO reports.

Setting up a well-searchable and standardised database containing all this information would help to identify viable options in specific cases. Successful cases of responses and policy design, but also failures, would serve as a rich basis for policy and management design in new cases of similar characteristics. Compiling such a data base, with help of the public, would be an important task for the FAO, for example, as such authoritative hosting would support achieving high quality and coverage, as well as consistent data representation. However, the public should repeatedly be asked to fill in own case studies which subsequently would be harmonized by the host. Because of the context-specificity, such a database could be a valuable tool for designing and implementing optimal policies. The NRC Sustainability Pathways webpage has started such a database: see [www.fao.org/nr/sustainability](http://www.fao.org/nr/sustainability) and choose sustainable livestock.

8. The social dimension of sustainable agriculture development has often been less well described and understood, including due to lack of data. Examples and experiences on such issues (livelihoods, gender, share and situation of self employed versus wage workers, working conditions, etc.) would be of particular interest to the team.

Social issues are prominent in traditional systems and ESW could be sollicited for livelihhods ad gender information.

9. The upstream and downstream sectors are playing an increasingly important role in respect of the orientation of agricultural development, food choices and diets. Can you provide examples of the role these sectors play in sustainable agricultural development and FSN?

Well, this is a whole research program in itself – include it in a well-organised attempt to fill such a data base with help of the public, as described above.

10. What are the key policy initiatives or successful interventions to improve the sustainability of food systems, in different countries and contexts that merit discussion in the report? Is there evidence about the potential of economic incentives, and which ones (taxes, subsidies etc.), regulatory approaches, capacity building, R&D and voluntary actions by food system actors?

Again – compiling and synthesizing this would be a whole research program in itself – there is quite some literature of potential relevance for this report, and it would definitely be good to have this included in the report in detail. In general, the report is strong in synthesis of the problem statement and forecasts – but more work is needed to have a similarly encompassing assessment of potential responses in such a way that it really serves to guide decision makers.

11 The design and implementation of policies for FSN requires robust, comparative data over time and across countries. Where are the data gaps that governments, national and international organizations might need to address in the future in order to understand trends and formulate better policies?

Again a big task; cf. remarks above; such a data base would also help to identify data gaps.

12 Are there any major omissions or gaps in the report? Are topics under-or over-represented in relation to their importance? Are any facts or conclusions refuted or questionable? If any of these are an issue, please send supporting evidence.

Remarks above and detailed comments below; most important: (i) take up demand side measures; (ii) address key aspects of crop production for food (e.g. fertilization) as well as (iii) protein input efficiency versus protein output; (iv) be more concrete regarding policy suggestions.

References of interest:

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30. PBL: The protein puzzle: the consumption and production of meat, dairy and fish in the European Union
31. CBD: Global Biodiversity Outlook (GBO) 4
32. See other papers from M. Kok and Rob Alkemade<http://www.fao.org/docrep/016/i3004e/i3004e.pdf>
33. Ecosystem services provided by livestock species and breeds, with special consideration to the contributions of small-scale livestock keepers and pastoralists <http://www.fao.org/3/a-at598e.pdf>
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43. Mottet et al 2015
44. Havlik et al. 2015
45. Perry et al.

Additional detailed comments from individual officers

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| page | lines | comment |
| 8 | 19 | Line 19: substitute the word “environment” with “climate change” |
| 8 | 24 | Line 24: add at the end of the sentence “and environmental health” |
| 8 | 37 | Line 37: Balance this paragraph by adding a sentence on the downside of excess animal products, such as non-communicable diseases (NCDs) |
| 8 | 39 | Line 39: to the list of concerns, add “N and P surplus” |
| 8 | 41 | Line 41: after “food-borne diseases” add “and NCDs” |
| 9 | 3 | Line 3: reference to health problems from overconsumption is rather weak when NCDs are the most growing health concern |
| 9 | 31 | Line 31: this introductory section declares the bias that the livestock sector “must” grow, rather than looking for sustainable production and consumption. OECD consumption rate of livestock products is taken as written in stones rather than being left open for revisiting (and eventually confirmation) after he analysis. The 2012 FAO projection predicts a 60% increase in food “demand” – it does not say “it must happen”, as consumption patterns are not optimal |
| 9 | 38 | Line 38: basing technology improvement on “narrowing the yield gap” is a wrong assumption, as high yield gaps are based on high fossil-fuel based inputs. Also, the yield focus does not take into account or multi-purpose livestock (also in term of livestock commodity: i.e. milk and meat cow) nor longevity of animals. Here what must be prominent is efficiency gains. |
| 12 | 23 | Line 23: USDA data also demonstrates that for the same period, most crop yields (not only corn) lost an average of 30% on their Nutrition Index. Thus, yield increases in the post WW2 period must be balanced with nutrition decreases per hectare. |
| 12 | 30 | Line 30: in addition to Phosphorus, N flows are also distorted. |
| 13 | 12 | Line 12: health concerns should also include growth hormones impacts |
| 13 | 39 | Line 39: at the end of the sentence, add “and even more so, under climate change scenarios” |
| 13 | 46 | Line 46: the optimism of the 2012 FAO report on availability of “sufficient resources” ought to be nuanced with different (more pessimistic) trajectories when climate change scenarios are considered: the food system (now not needing more lands) will have higher soil erosion potential, higher annual deforestation potential, higher arable land occupation, and more no-renewable energy and pesticides demand. |
| 13 | 50 | Line 50: the assumption on higher productivity lifting smallholders out of poverty has proven its limits in the last decades. For such a credible statement, a discussion is needed on who gets the benefits of higher productivity, in what system. So at least nuance this statement and refer to the section later that provides differentiated analysis. |
| 16 | 3 | Line 3: again, the yield gap analysis is partial (see comment above). The one key indicator in livestock efficiency is “protein input versus protein output”: feeding cereals to cows may boost productivity and is the least efficient use of resources. AGA has data on such efficiency ratios by livestock type. |
| 17 | 17 | Line 17: to the list of diseases, add “cancer”. Also, substitute “Alternative” with “Balanced” diets. |
| 17 | 46 | Line 46: asserting that animal-sourced foods are the “word’s most important” denotes a bias when opposite perspectives are emerging. |
| 17 | 48 | Line 48: associating meat consumption with “cognitive development” may offense vegetarians, implying for example, that Indians lack cognition! |
| 23 | 6 | Line 6: after “diets”, add “and lifestyles” to include the cultural element that drives consumption models |
| 23 | 45 | Line 45: here again, nuance the global resource sufficiency by adding “without considering climate change”. |
| 24 | 4 | Line 4: add “and novel biomaterials” |
| 25 | 39 | Line 39: reference to Save and Grow proposal as the only feasible exception is far from being convincing (it is presented like a joke) |
| 27 | 26 | Line 26: rather than comparing meat and milk consumption levels to developed countries (i.e. excess consumption), it may be more useful to use recommended daily rations or some optimal nutrition indicator. Using the BAU baseline for livestock-derived foods is the main weakness of this paper, unless the title is modified to let go "sustainable". |
| 28 | 22 | Line 22: dairy products and casein impact on health in adults is also subject of scientific debate |
| 32 | 13 | Line 13: the distinction of main categories of livestock systems is very good for a qualified analysis and a table aligning the different management systems to different contributions to: (i) food provision, (ii) labour, (iii) use of natural resources and (iv) promotion of ecosystem services would be very useful. |
| 35 | 33 | Line 33: efficiency ought to be explained here as economic, environmental and agronomic efficiency differ in terms of what is considered efficient and at what cost. |
| 41 | 49 | Line 49: it is recommended to use data of the Food Wastage Footprint publications to describe FLW impact on natural resources as well as cost-benefits of mitigation measures (see www.fao.org/nr/sustainability and go to Food loss and waste page). In the following para on page 42, there is a starement on lack of cost-benefit of investments while this is incorrect: current legislations have been compiled in the FWF Toolikit while the FWF Mitigation volume presents a livestock case study. |
| 43 | 3 | line 3ff ICT’s – this could be expanded considerably, - and may not address communication and information only, but also 3D-printing (e.g. Pearce 2015), etc. – may also refer to all the new remote-sensing data that becomes available and will allow improved monitoring of certain activities, states and developments, and will provide improved data on land use and land cover, etc. |
| 43 | 46 | line 46-50: the content of this paragraph should be expanded in the previous sub-section 2.6 on food systems – then “food systems” would play a more prominent role in section 2.6 (cf. the previous comment). |
| 45 | 24 | lines 24/25: this is very vague – be attentive to not implicitly assume some overly romantic picture of how agricultural production should be – “fostering liveable rural communities;”, for example, is a different goal than increasing sustainability of the food system – this increased sustainability should be achieved in a way that is acceptable for the current rural communities – but given the drastic change of those communities over the past 50 years, in particular in developed countries, we have to be cautious to not cement the current rural communities in a certain state, thus rather hindering their development. The question is, for each country: “which agricultural production system do we want to have in 30 years?” or so – and this can well include a change towards bigger farms, less rural population – in case these peopel find decent jobs in the urban centers or urbanization of rural areas takes place in a sustainable manner; - just make such issues explicit when addressing them similarly, “and producing food in ways compatible with values.” is very vague – what does this mean? Which and whose values? Is the core of these values a market liberalism or a strong focus on environmental protection? This has totally different consequences and needs to be made explicit and specified. – OK, it is somewhat expanded further down, but could be made more detailed – basically discusses the potential of labels in a context of free choice – but as said, other approaches to live these values may be chosen in a societal process. |
| 45 | 26 | line 26-28: emphasize “internalization of external costs” when talking about efficiency – this is one thing that has to be made explicit as it is behind many of the adverse developments in agriculture: a lot of the external costs of production and consumption are not internalized. |
| 45 | 29 | line 29-31: may add: pesticide use and ecotoxicity; water USE and scarcity (not only pollution) |
| 45 |  | section 3 in general: take up these additional points just mentioned above in detail. |
| 46 | 48 | line 48 – p47, line 2: and what is the conclusion of this observation? Please make this more explicit (cf. the comment above for P45, lines 24/25, regarding “fostering liveable rural communities”); I would suggest that this report should be more concrete and more detailed regarding this challenge of workforce, productivity, and GDP-share. |
| 47 | 32 | line 32-42: “livable rural communities”: again, be more detailed on what exactly is the problem and the aim – what does mean “livable” and who decides on this? – and is agricultural policy indeed the right approach to achieve this goal? – A key will be the availability of jobs and education – but just keeping much workforce in agriculture may not be a good goal per se – in the long run; given the ITC developments, other job opportunities than agriculture may emerge in rural areas over the next decades; thus, be attentive to not cement the rural communities via agricultural production – and strongly differentiate this discussion in relation to countries, regions affected. |
| 48 | 16 | line 16-22: please add references for the impact studies; this GMO topic is very sensitive and it should not be dealt with in such a short paragraph only. I would suggest to expand this towards a balanced coverage and discussion of positive and negative impact studies; - in its current form, it implicitly strongly suggests that this approach is an important part of solutions, but this should be discussed in more detail. |
| 48 |  | section 3.2.1 this sections covers many important topics, but it does not mention “internalization of external costs” at all – please add a paragraph on this as external costs play a key role in agriculture and its environmental impacts; related to this are economic incentive schemes, such as abandoning distorting subsidies or taxation of polluting inputs. Clearly, this rather tends to increase prices than reducing them, but this discussion also needs to be taken up: should food become cheaper or more expensive? – Consumers and producers will be affected differently and there is a big danger of very distortive intervention; - If the goal is access to food, then the means to have cheap agricultural production may by far not be the most efficient means to achieve this, as it also makes food cheap for those that could afford more expensive food, and as it generally comes with external costs that are borne by the society afterwards, in total decreasing welfare |
| 49 | 9 | line 9-12: this is the “rebound effect” of efficiency measures – may add some paragraph to the related literature. It is the core of the argument that only increasing efficiency production without addressing changes in demand may not lead to much improvement. |
| 49 | 13 | line 13-18: this is interesting and visionary – and it is in line with some comments made above: which agricultural production system do we want to have in 30 years? I would suggest to take up this question with all its welfare related consequences on rural jobs and livability or rural communities much more explicitly. |
| 49 | 19 | line 19-26: this paragraph sort of blocks any argument that aims at discussing such fundamental changes in diets – but this is crucial: a true food system approach, the rebound effect mentioned above, etc. make it unavoidable that production changes and consumption changes are discussed together and that the projected increase in animal products should also be strongly questioned – reducing the amount of animal products is one approach with big leverage to reduce environmental impacts from agriculture and need not only be argued via health arguments (cf. also the scenario discussions further up in the report, e.g. Erb et al. 2009, Stehfest et al. 2009). |
| 49 | 25 | lines 25/26: this comparison of orange juice and milk is not entirely correct and seems to serve to just illustrate that animal products are climate friendly. First, the carbon footprint (g CO2 per 100g product) of milk is HIGHER than of orange juice, also according to the study cited; however, it is correct that the carbon emissions per aggregate nutrient density to climate impact index (NDCI), which they also report in this study, is higher for orange juice: thus, focusing on a range of nutrients instead of the quantity, the emissions of milk are lower; however – it is then important whether the comparison of beverages on the basis of these nutrients make sense – as can be seen for water: water has no nutrients and thus has a NDCI=0 – but still, tap water is a very sustainable beverage with very low carbon footprint (CO2 per 100g; a tenth of that of milk). – Thus, when comparing NDCI, beverages rather seem to be compared as nutrient supply, i.e. food, rather than as liquidity supply (i.e. beverage). – Please be more explicit and transparent with such numbers. – Would also be interesting how much of the CO2 emissions of orange juice stem from transport and how apple juice would perform in this analysis. |
| 49 | 28 | line 28 ff: that’s good, the externalities are taken up and their importance is acknowledged – but it would still be good to mention them already earlier, as indicate above. |
| 50 | 43 | line 43/44 – implicitly, and with the context of the previous sections, this is rather termed as a negative development – but why not? Again, one key aspect is a discussion on which agricultural system will be present in 2030 years – which average farm sizes, etc. |
| 52 | 21 | line 21: please mention – or make explicit – the emissions related to land use change for feed production and may also mention the soil-c sequestration in grasslands that can make grassland –based production systems carbon neutral (at least till saturation is reached; Soussana et al. 2010) resp. that may contribute to conserving grasslands which, if converted to cropland (where this is possible), would lose huge amounts of CO2 (Smith 2014). |
| 54 | 9 | line 9: add “grassland based feed” to “increased use of crop residues and by-products”. |
| 55 | 21 | line 21: reference Havlik et al 2015 is missing in the reference list. |
| 56 |  | section 3.4.2: a discussion on the CAUSES of the animal diseases would be interesting – please add such, in particular addressing which animal production systems may lead to more or less diseases (e.g. correlation with high productivity levels or not, etc.). |
| 62 | 29 | line 29-31 – please emphasize the problem of the rebound effect here as well: WITHOUT changing output, such emission reductions are viable, but given that the output increases considerably by 60-70% or so (e.g. based on Alexandratos and Bruinsma 2012), total emissions from the livestock sector would still increase by 20% or more. |
| 62 | 40 | line 40: when mentioning c-sequestration in grasslands, may add that this shows a saturation dynamics and thus only delays the need for true emission reductions but cannot offset part of the emissions indefinitely (Smith 2014). |
| 62 | 50 | line 50: mention “internalization of externalities” explicitly as well, e.g. right after “improve the efficiency of markets” (as it is part of increasing this efficiency – as long as externalities are not internalized, the markets are not efficient, as prices are not reflecting true costs). |
| 62 |  | section 4.3: “pathways…”: please be much more concrete when discussing those; as it is now, it mentions important general aspects, characteristics and types of solutions, but way too general to serve as more concrete policy advice. It is indicated, that this section will be further elaborated – thus please make it more concrete when doing so. The “solutions” part of such a report should not provide general statements that are agreed on by (almost) any reader, while no reader will be prompted to action, but it should rather suggest concrete paths of action, that may be criticized, but in such criticism, alternatives may be developed as well. The only thing that counts is then that concrete action is identified and then implemented – and at least some suggestions for such concrete actions should be provided in such a report – on page 10, it is stated that “the report will offer policy-makers and other stakeholders realistic options to achieve that goal [which is: improving FSN through sustainable agricultural development]” – thus, such realistic options should be presented, and to be realistic, they need a certain level of concreteness and detail. Or maybe state at the beginning of section 4.3. that these “pathways” line out the challenges ahead and key issues to be decided on, but that concrete options on how to act will be presented in section 4.4. |
| 63 | 55 | line 55: the subsequent list does not mention consumption side measures at all. But given that the report claims to adopt a food systems approach and that consumption has been a topic above in various places, it should show up here as well. Important aspect of pathways towards the goals of increased FSN through sustainable agricultural development are key consumption measures such as reduced food wastage, reduced consumption of animal products and related dietary change, as well as a discussion on biofuel futures. – Please give those aspects the role they deserve also in this section. |
| 65 |  | line 27 ff: this list is also quite general and should list more concrete measures – e.g. “apply social safety nets” – this is important, but how exactly? Similar: “prepare for and adapt to climate change”; other suggestions remain even more unclear, e.g. “Encourage formation of voluntary associations in the agri-food chain” – why should this lead to improvements of the kind and size needed? It clearly can, but some motivation and discussion should be provided. Add to the list: |
| o develop and implement insurance solutions to deal with weather and market risks |
| o “Reduce food losses and wastes” can also be seen as a social response, not only an economic; this illustrates, that for each of those bullet points, there should be at least a paragraph with some details and discussion, aiming at making it more concrete. Similarly: “Apply the polluter pays principle” can also be listed as economic response. |
| o Other important aspects that are missing: reduce N inputs and increase N use efficiency; close nutrient cycles; address fossil P use and identify alternative sources (recycling). Reduce pesticide loads, etc. |
| o Demand side measures addressing dietary change towards less animal products are also missing. |
| o When remaining on this level of generality, though, this will not really change much: at least, some assessment of the context in which each suggestion may be implemented and when not should be added, maybe it would be good to have a SWOT-analysis of each of those suggestions. As the scope of the report is global, such suggestions can never be tailored to single countries or regions – but they could be presented with a suggestion on how to assess the viability in a given situation; and this could be addressed via a broad SWOT analysis for each point, collecting and analyzing which barriers it may face, which possibilities for success there are, etc., depending on certain context characteristics. it will for example be difficult to reduce N inputs in a context where governmental default suggestions for N fertilization rates are way too high, etc. Such a SWOT analysis could be taken up as part of the suggestions on how to approach this provided in section 4.5 and it would also allow to identify trade-offs and synergies between different responses (cf. 4.6) |
| o The other thing that can help to become more concrete is to present a wealth of detailed case studies on these different responses (this may come further down in the report?). |
| 68 |  | ff: the case studies are helpful and their structure as well; however, these are entirely focusing on production and a food system approach is lost – no case study on food wastage reduction beyond the production stage or on dietary changes; such should be added. In addition, case studies may need to provide more details to truly capture all aspects; - in the Amazon-case, for example, the issue of indirect Land Use Change is not mentioned at all, although this may be an important driver behind deforestation – thus, the original cause may not be beef production but sugarcane (e.g. Andrade de Sá et al. 2013). It would be nice to have more case studies and it may be an idea to in addition evaluate those with a SWOT analysis of the various responses involved – they need to provide as much information as possible for a policy-maker to identify, whether a specific response may be an option for his or her country or region, and what the specific strengths, weaknesses, opportunities and threats – i.e. “challenges” may be. |
| 81 | 30 | line 30-33: not only waste, loss and health reasons may work towards dietary changes, big leverage for environmental improvements exists also for diets with reduced animal products in general (also monogastrics), argued by the amount of animal products that may be supplied without food-competing feedstuffs (Schader et al. 2014). |
| 20 | 3 | the HLPE definition of Sustainable food systems should be reported in the text and not in the footnote |
| 21 | 8 | the HLPE definition of Sustainable food systems should be reported in the text and not in the footnote |
| 21 | 48 | Pag 21, lines 48-50, Food consumption is effect... “after a reference should be included such as “Kearney J. (2010). Food consumption trends and drivers. Phil. Trans. R. Soc, 365: 2793-2807” or Reisch, L., Eberle, U., & Lorek, S. 2013. Sustainable food consumption: an overview of contemporary issues 25 and policies. Sustainability: Science, Practice, & Policy, 9(2):7–2.5. |
| 26 | 13 | Pag.26, line 13, after Livestock production is central to food systems, a reference should be inserted: Herrero M., Thornton P. (2013). Livestock and Global change: Emerging issues for sustainable food systems. PNAS;110(52):20878-81 |
| 28 | 26 | Pag.28, line 26 after ....for health and the environment a reference on its environment benefits should be inserted, (because inside the Box 4 there is no reference on environment): Tilman D, Clark M. Global diets link environmental sustainability and human health. Nature (2014) 515, 518–522. |
| 43 | 8 | Pag.43, line 8 Concluding comments, a paragraph on dietary changes and in the types of livestock products consumed should be also inserted |
| 48 | 8 | Pag. 48, line 8, after “In response to this, various initiatives ...which meet required criteria”, a reference should be inserted: FAO (2014). Voluntary Stardards for Sustainable Food Systems: Challenges and Opportunities. Eds. Meybeck and Redfern. FAO, Rome |
| 32 | 21 | P32 l 21-31. Mention that pastoralism occurs in ecologically sensitive areas (e.g. mountains). |
| 21 | 28 | Additional Ref for p 21 l 28-35 is PBL: How do biodiversity and poverty relate? An explorative study |

1. Delgado, C.L., Wada, N., Rosegrant, M.W., Meijer, S. and Ahmed, M. 2003. Outlook for fish to 2020; Meeting global demand. World Fish Center, Malaysia. [↑](#footnote-ref-1)
2. HLPE, 2014. Sustainable fisheries and aquaculture for food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2014. [↑](#footnote-ref-2)
3. Longley et al. 2014. The Role of Fish in the First 1,000 Days in Zambia. IDS Special Collection. Institute of Development Studies, Brighton BN1 9RE, UK www.ids.ac.uk [↑](#footnote-ref-3)
4. FAO 2012. The State of World Fisheries and Aquaculture. Rome, FAO. [↑](#footnote-ref-4)
5. Hall, S.J., Delaporte, A., Phillips, M.J., Beveridge, M., O'Keefe, M. (2011) “Blue frontiers: managing the environmental costs of aquaculture” <http://worldfishcenter.org/content/blue-frontiers-managing-environmental-costs-aquaculture#sthash.bFzqqKD6.dpuf>. The WorldFish Center. Penang, Malaysia. 92 p. [↑](#footnote-ref-5)
6. HLPE, 2014. Sustainable fisheries and aquaculture for food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2014. [↑](#footnote-ref-6)