

**ENVIRONMENTAL FOOTPRINT OF ANIMAL-SOURCE FOOD BASED DIETS:  
A SYNTHESIS OF OPINIONS AND PERCEPTIONS FROM A HIGH LEVEL PANEL DISCUSSION**  
5th Global Science Conference on Climate-Smart Agriculture, 8-10 October, Bali, Indonesia

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- Idupulapati Rao, CIAT Emeritus Scientist (Plant Nutritionist and Physiologist)
- Brian Lindsay, Director, Dairy Sustainability Framework
- Tobias Baedecker, Agriculture Economist, World Bank

## **1. Background**

While demand for animal-source food increases all around the globe and will continue to do so with a growing middle class, concerns are raised on how this demand can be met sustainably. In fact, the livestock sector is one of the most important source of emission of greenhouse gases (GHGs), which also makes it a key target for mitigation actions. With on one side detractors defending vegetarian diets or low meat consumption (e.g. EAT-Lancet commission report) and on the other side the livestock sector claiming that climate-smart options are available and that livestock is necessary for economic development and resource use efficiency. As a result, the debate has taken global proportions and heats up the passions.

Still, governments worldwide have to take up the challenge and meet the commitments of the Paris Agreement, i.e. limiting global warming to below 2°C by drastically reducing global GHG emissions by 2050, while at the same time adjusting to a growing population and a changing diet. In order to bring some relevant, accessible, science-based and interdisciplinary advice to facilitate decision-making processes and implement new policies or strategies, a high-level panel discussion was held as part of the program of the 5th Global Science Conference on Climate-Smart Agriculture, 8-10 October, Bali, Indonesia. The discussion session had participation of multiple players including multilateral organizations, scientists, policymakers and the private sector.

## **2. Trends, drivers, impacts on global warming & pathways for sustainability**

The largest proportion of GHG emissions from livestock sector come from developing countries, simply due to the size of livestock population. The emissions continue to increase at the same rate from 1990-2017 compared to 1970-1990. There will probably be another 15% of emissions coming from livestock by 2050 regardless of any technology used to reduce them. Still, in terms of intensity, there is a strong downward trend (emissions per kg of meat and milk), meaning that livestock products are produced more efficiently considering the total GHG emissions. The same applies to nearly every food product (see IPCC

AR5 report). However, the total cattle meat and dairy production is outpacing the rate of change in emissions intensity. There, it is important to consider lifetime of gases in the atmosphere into account: long-lived gases like CO<sub>2</sub> and N<sub>2</sub>O will have to be reduced to zero to get the same effect as reducing CH<sub>4</sub> by 10%.

It will be difficult to meet Paris targets without reducing livestock sector emissions. As high milk & meat consumption may not be compatible with climate and other societal goals, the question of dietary choices arises. While prioritizing mitigation options, the broad role of livestock must be recognized, beyond climate change: food and nutrition security, livelihoods, nutrient cycling and carbon storage, biodiversity, landscape design and maintenance.

### **3. Major implications from the Paris Agreement and best bet interventions to address emissions in the livestock sector**

The Paris Agreement is primarily a temperature goal, but it does also point out that actions toward this goal should not compromise food security. Reducing emissions should be in both the agriculture and non-agricultural sectors. Emissions cannot be brought to 0 though, due to the presence of nitrogen in the system. While emissions intensity in all sectors has gone down by about 20%, it went up by about 70% in the dairy sector.

There is no single nice solution that everyone can adopt, interventions are country and system specific. For example, Indonesia has submitted its Nationally Determined Contribution (NDC) in 2016-2017, and it concentrates on beef cattle and manure management. In developed countries, a focus on dietary choices is recommended. However, recommendation of vegetarianism must be done carefully, especially in developing countries as it implies a choice that not everyone has. Likewise, promoting interventions without care for location and systems can be harmful: focusing on emissions intensity bares the risk of being perceived as moving to the US model of feed lots. There are however climate-smart high quality forage grass and legume options that could support intensification without going to the feed lot model, and adapted to developing countries and poor soils conditions. This leads to the definition of intensification for livestock systems: not every stakeholder has the same view, and there is a lack of awareness of the positive aspects of livestock for improving carbon (C) sequestration, nutrient cycling, food security and livelihoods in many countries.

The efficiency approach is interesting, but will not be sufficient for GHG emissions reduction in the developed world. Efficiency gains are a by-product of the work we do on productivity. Still, improvements in efficiency must be related to all production factors, to judge on their meaningfulness.

For any intervention, scaling is the big issue. For example, using seaweed as feed supplement makes ruminants' digestion massively more GHG efficient, but this solution might not be realistic when brought to scale, as this could also be a source of a potential natural chemical pollutant that depletes the ozone layer. One of the technologies that is most globally scalable is a vaccine that is kept going by salivary antibodies. It is cheap and last a lifetime, but currently doesn't get the investment that it needs. Methane or N<sub>2</sub>O inhibitors for feed have shown promise to reduce emissions by up to 50%. But the investment required to get these inhibitor technologies on the market at a price that enables scale is not there. The

options currently favored by finance organisms like the World Bank are rather the use of value chain approaches, "greased" with climate finance.

A lot of small additive, economically viable options might be the solution. All these options need support at policy level, and partnerships with both public and private sector to achieve reduction of emissions at scale. Indeed, the private sector can make progress at scale, like for example the model of the Dairy Sustainability Framework (DSF) which tracks how members are progressing with their sustainability commitments. The framework is pre-competitive and so they encourage data sharing to speed up the rate of progress, which led to a reduction in the intensity of emissions in every country. The private sector is hungry for technology, knowledge and advices to implement in the supply chain, and is able to make changes at scale through daily contact with producers. In addition, the private sector is under pressure with media. Scientists should collaborate much closer with it.

#### **4. The reality of increasing efficiency is to eventually reduce price, increasing demand and production. How to reconcile this with emissions reductions targets?**

Policies would be essential here, but difficult to implement. There is currently no price on GHG in the agricultural sector: what will it be, and who will pay for it? Some technologies to increase efficiency come at great costs, like for example breeding low emitting animals and developing inhibitors: who will bear the research and development (R&D) costs of these emerging technologies? Putting a price on GHGs would have too high political ramifications, and therefore might not be the best way to regulate emissions.

Demand for ruminant meat should decrease, but where and for whom remains as a matter of debate. For the more extreme sources, consumption of red meat should stop, whereas all the other meats and dietary options are basically negligible in terms of emissions impact. Practically, a 50% reduction in consumption of ruminant meat should be applied, and targeted to those in rich countries with diets that are high in ruminant meat rather than small producers with little dietary choice or countries like Indonesia and India where annual meat consumption is still too low. The WRI claims that this would eliminate the land problem of encroaching into forests, deliver half of the reduction required in the agricultural sector, and allow an increase in meat consumption in developing countries where meats are needed. More subtle approaches urge for a recognition of the difference between a soy-fed feed lot in the US and grass-fed ruminant, and the fact that no global warming potentials (GWPs) are used. In addition, it might well be cutting out one problem and replace it with a new one.

In any case, dietary measures could be better formulated for each country based on their national dietary guidelines.

#### **5. Methodological issues in emissions calculations**

Many factors are usually not taken into account in the calculations of emissions, which would change a lot the understanding of the issues and the priorities for action. The entire system should be taken into account, using a Life Cycle Analysis (LCA) approach for example. The case of exogenous breeds of cattle and their role in forest fires gives us an example.

## **6. Audience choices**

A set of three questions was proposed to the audience as a live poll, and responded by more than 50 people. Results are given in annexes. Briefly, 53% of the respondents would be ready to adapt their diet by adopting a moderate cut on meat consumption, with or without information on meat provenance. When choosing among other measures that could help reduce emissions, only 4% of the respondents would cut on air travel, while more than 50% would eat local or reduce food loss. Buying local vs reducing food loss and waste are not the same thing. Reducing food loss and waste are clearly related to GHG emissions reduction. Buying local is not. There is no evidence that buying local has a positive effect on mitigation.

A lot of progress is needed on marketing and consumers awareness. We have to better understand impacts of different livestock production systems (e.g. extensive vs otherwise) to give consumers the choice.

The emotional factor plays in the diet debate a role at least as important as the rational factor, with issues including peer pressure as well as animal welfare.

## **7. The billion dollar action: what would have best potential?**

Harry: a technology with complete global and scalable potential. The only example I've seen is a vaccine.

Rao: provide farmers the best feed options for their cattle

Brian: pool money with others to enable livestock systems to be sustainable for the future

Tobias: subtle approaches to reducing ruminant meat consumption

Bess: improve dairy consumption and dairy goat production in Indonesia, mainly in Java: introduce dairy goats that can live off of local feedstock such as cassava and cocoa residues.

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## Annexe: live poll responses

### 1. How much are you ready to adapt your diet?

Answer Options	Responses	Percentage
Drastic cut on red meat	8	14.55%
Moderate cut on red meat, grass-fed only	15	27.27%
Moderate cut on red meat, provenance irrelevant	14	25.45%
No cut on meat	9	16.36%
Drastic cut on meat + dairy	2	3.64%
Already vegetarian/vegan	7	12.73%
<b>Total</b>	<b>55</b>	<b>100.00%</b>

### 2. What external factors would make you reduce your meat consumption?

Answer Options	Responses	Percentage
No incentive needed, happy to do it	13	23.21%
Better information on environmental footprint of meat	16	28.57%
Attractiveness and availability of vegetarian options and ingredients (restaurant, supermarkets, etc)	8	14.29%
Higher prices through a meat tax	6	10.71%
Peer pressure	1	1.79%
None of the above would influence my consumption	12	21.43%
<b>Total</b>	<b>56</b>	<b>100.00%</b>

### 3. What other measure are you ready to take today for the planet?

Answer Options	Responses	Percentage
Drastic cut on air travel	2	3.57%
Use mainly public transportation	14	25.00%
Eat local and reduce food loss and packaging	30	53.57%
Change to green electricity	10	17.86%
<b>Total</b>	<b>56</b>	<b>100.00%</b>