

## Sustainable Livestock Solution Cluster – A) Scaling Best Practices and Technology

### Why is it needed? Securing a Future for Sustainable Livestock

For millennia, livestock farming<sup>1</sup> has provided food, clothing, power, manure and income and acted as assets, collateral and status. In 2018, there was a global stock of 38,9 billion farmed land animals.<sup>2</sup> This has created an unprecedented challenge: on one side, the need to increase the availability of livestock derived foods to satisfy the unmet nutritional requirements of an estimated three billion people, and contribute to reducing stunting, wasting and anaemia.<sup>3</sup> On the other side, many methods and scale of livestock production systems around the world present severe tests to stay within the safe operating zone of planetary boundaries.<sup>4</sup> This is especially with regards to biodiversity, climate change and biochemical flows<sup>5</sup>, and ensuring healthy<sup>6</sup> levels of intake of meat, eggs and dairy across all populations as well as good science-based animal health and welfare within the One Health framework. A re-balancing of consumption may be beneficial in populations of high livestock product intake. With strong population growth concentrated mostly among the socioeconomically vulnerable populations in the world, the sustainability<sup>7</sup> challenge grows exponentially and solving it is more urgent than ever before.

### Why will it work? Enable Fast Scaling of Best Practices, Technology and Management

No other human-created system is as complex, as diverse, as interdependent, as subjected to the forces of nature, and as foundational to human civilization as agriculture and the role of livestock therein. Agriculture has always thrived on innovation. Major improvements through technology, business model and organisational innovation have been shown to be achievable across every kind of livestock production system. A non-exhaustive list below showcases what is possible when best practices and innovation are applied at scale:

- a) **Ethiochicken** is a privately-owned company in Ethiopia which combines a robust dual-purpose poultry breed developed by best-in-class animal genetics technologies, with advanced feed-, vaccination-, and farm management methods.<sup>8</sup> Within only 5 years from 2015 to 2020, the company has tripled the per person egg supply in entire Ethiopia, especially in rural communities. The company enabled the formation of 8000+ small enterprises and strengthened the socioeconomic livelihood of at least 4 million rural small-scale farmers in the country.<sup>9</sup> Most beneficiaries of these improvements are the livelihoods of women and children as the usual livestock keepers in these households. This case study demonstrates the power of business model innovation, high technology in intensive farming operations and public private partnership.
- b) **Sensor Technologies and Precision Livestock Farming (PLF)** make it possible to monitor and condition the health situation of single animals in large scale herds such as poultry flocks, pig pens, dairy operations or cattle feedlots. Increasingly this enables individualized feeding rations and better feed conversion ratios, significant reduction of mortality, better welfare and reduction of medication.<sup>10</sup> PLF has the potential to be an essential instrument on the pathway to fully circular livestock production systems.
- c) **Feed Technologies to Reduce Enteric Methane** are available for the ruminant livestock sector, both from natural<sup>11</sup> and chemical sources.<sup>12</sup> Some trials for such additives could almost completely eliminate enteric methane, and reductions of 50% can be routinely achieved.<sup>13</sup> This solution can reduce up to 40% of the IPCC declared amount of GHG emissions of global agriculture.<sup>14</sup> Moreover, due to geochemical properties of methane in the atmosphere, a relative reduction of methane emissions creates a large-scale direct cooling effect in the atmosphere.<sup>15 16</sup> No other already proven technology solution from any sector, agriculture or other, can engineer global cooling effects at this scale.
- d) **Dairy Development Impact on Poverty Reduction and Reducing Global Hunger**, two inquiries conducted under the program of Global Agenda for Sustainable Livestock (GASL) showcase how across all household-level studies, dairy cow ownership and/or improvement of dairy cow production consistently had a substantial positive and nearly always statistically significant impact on a wide range of indicators.<sup>17 18</sup>
- e) **Multiple Sustainability Initiatives Driven by Industry Associations, Academia and UN bodies**, such as the Dairy Declaration of Rotterdam<sup>19</sup>, the Dairy Sustainability Framework providing a holistic approach to sustainability in the dairy value chain<sup>20</sup>, the Global Roundtable for Sustainable Beef with its review of sustainability enhancements in the value chain<sup>21</sup>, the Responsible Meat Initiative<sup>22</sup>, the International Poultry Council's Declaration of Sao Paulo<sup>23</sup>, the Global Initiative for Sustainable Eggs<sup>24</sup> and many more regional initiatives. Several countries and companies have also announced firm commitments to make their livestock sectors sustainable by set deadlines, for instance the Danish Agriculture and Food Council<sup>25</sup> to be climate neutral by 2050, the Dutch Slow Growth<sup>26</sup> and Better Live instituted animal welfare initiatives<sup>27</sup>, Australian beef pledges to be carbon neutral by 2030<sup>28</sup>, or Brazilian beef producers guarantee deforestation free cattle in their entire supply chain within the current decade<sup>29 30</sup>. Each initiative sets the example for others to follow.

- f) **Real data collection, monitoring initiatives and research agendas are under way.** Data about what the global livestock herd is feeding on is either sparse or non-existent, which makes decision making hazardous and projections into the future too vague. GASL has been coordinating research and policy efforts in this area since 2010.<sup>31</sup> Major data collection efforts are beginning to fill important gaps. For instance, LEAP, the Partnership on Livestock Environmental Assessment and Performance<sup>32</sup>, the Global Feed Lifecycle Assessment Institute<sup>33</sup>, the Specialty Feed Ingredients Sustainability Project<sup>34</sup>, the Global Burden of Animal Diseases programme<sup>35</sup>, the Livestock Antimicrobial Partnership<sup>36</sup> or the Global Observatory on Accurate Livestock Sciences<sup>37</sup> work on making data available and accessible for decision-makers. Digital data collection methods allow actors to share information faster and cheaper, for better decision making, as in the case of dairy in East Africa.<sup>38</sup>
- g) **The World Farmers' Organisation (WFO)** as the biggest independent voice of the global farmers, committed itself *"to anchor the global food systems and to take full responsibility for the farmers' part towards sustainable food systems"*.<sup>39</sup> The WFO Scientific Council created the concept of *"SAFER Foods for a Sustainable World"*<sup>40</sup>, and on this basis reviewed in a synopsis that consumption of unprocessed red meat is not a risk to health.<sup>41</sup>

### **How Will It Work? Four Levers of Change to Secure the Future of Sustainable Livestock**

From the examples of pioneering solutions and initiatives we can distil four levers of change that give us the tools to secure sustainable livestock systems and reach the Sustainable Development Goals. The first is to build on the rich diversity of livestock knowledge, products and production systems. Second, we accelerate inclusive technical, institutional and societal innovation and financing thereof. Third, we improve how we measure and account for socioeconomic, health, environmental and ecosystem outcomes associated with livestock farming. Fourth, we prioritize farmer- and value chain-oriented and national/bioregional-specific strategies.

1. **Utilize Full Diversity:** livestock products and production systems differ greatly, from intensive to extensive, from arctic to tropical or from high technology to indigenous. Definitions vary, but there are at least 40 farmed animal species, with at least 7,000 breeds adapted to specific local needs and contexts<sup>42</sup>, feeding on diverse inputs mostly inedible for humans, and producing a vast range of foods and services. Only a small share of this bounty of diversity is utilized, which makes it a valuable resource pool for solutions.
2. **Accelerating Innovation:** Better technologies in livestock farming opens up new solution spaces. We can build on the enormous progress already made in areas like circularity of resources flow, biodiversity protection, production efficiency, precision livestock farming, genetics, robotics or data sciences. Livestock could provide almost half of our global protein requirements while staying within key planetary boundaries<sup>43</sup>, and more innovation will increase this share.<sup>44</sup> Moreover, these livestock proteins are of higher quality<sup>45 46</sup> and 45% more affordable than plant-based proteins.<sup>47</sup> To accelerate the pace, scale and roll-out of such innovation, more and better financing facilities need to be created. A sufficient share of the value chain needs to be available to the farming community so that the required investment can pay the local cost of capital, and thus be economically viable for farmers and other investors.<sup>48</sup>
3. **Improving Accounting Systems:** Enabling innovation and finance requires updating and improving the measurements that are explicit and implicit in inter- and intragovernmental laws and regulations, in global trade arrangements, and in consumer engagement. It is critical that we revise and strengthen global accounting tools (*e.g.*, monitoring, calculating, modelling, reporting and verification systems) that help us rationalize the use of planetary resources and take better account of circular material flows, biodiversity services, human nutrition efficiency and quality of livelihoods. More complete and more robust accounting will help all stakeholders, but especially consumers and investors to properly evaluate and assess the values provided by livestock and make their decisions accordingly.
4. **Farmer- and Value Chain-Oriented, Evidence-based and Country-specific Strategy Roadmaps for Livestock and Food Systems:** Strategies need to be developed in regional context leading to action on the ground, and aiming for either neutral or nature-positive production within planetary boundaries. These can be inspired by similar roadmaps already produced by several countries.<sup>49</sup> In such processes, key stakeholders from farming, science, government, business, civil society and consumers can outline pathways for each of their priority livestock and livestock systems, the priority goals and where and how innovation is best applied, and what to promote or reduce. The chosen pathways should respond to comparative advantages of geography, human skills topography, agribusiness structures and local demands. Appropriate accounting tools, financing and governance mechanisms should be specified in the roadmaps.<sup>50</sup>

Human civilization has been built on livestock from initiating the bronze-age more than 5000 years ago<sup>51</sup> towards being the bedrock of food security for modern societies today.<sup>52</sup> Livestock is the millennial-long proven method to create healthy nutrition and secure livelihoods, a wisdom deeply embedded in cultural values everywhere. Sustainable livestock will also provide solutions for the additional challenge of today, to stay within the safe operating zone of planet Earth's boundaries, the only Earth we have.

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- <sup>1</sup> For the purpose of this solution cluster we classify all domesticated mammal and poultry species as livestock
- <sup>2</sup> FAOSTAT 2018, (retrieved on 22 June 2021) current stock: poultry: 32.9 bn; cattle ruminants: 1.8 bn; small ruminants: 2.6 bn; pigs and other: 1.6 bn
- <sup>3</sup> Iannotti, L., et al. 2021. Livestock-derived foods and sustainable healthy diets. Rome, Italy: UN Nutrition Secretariat. <https://hdl.handle.net/10568/113923>
- <sup>4</sup> Mo Li et al, 2021. The role of planetary boundaries in assessing absolute environmental sustainability across scales, *Environment International* 152: 106475 <https://doi.org/10.1016/j.envint.2021.106475>
- <sup>5</sup> Bowles, N., Alexander, S. and Hadjikakou, M., 2019. The livestock sector and planetary boundaries: A 'limits to growth' perspective with dietary implications. *Ecological Economics*, 160, pp.128-136
- <sup>6</sup> Food Systems Summit Action Track 2 Scientific Group Paper. Shift to Healthy and Sustainable Consumption Patterns. Available at [https://sc-fss2021.org/wp-content/uploads/2021/04/Action\\_Track\\_2\\_paper\\_Shift\\_to\\_Healthy\\_Consumption.pdf](https://sc-fss2021.org/wp-content/uploads/2021/04/Action_Track_2_paper_Shift_to_Healthy_Consumption.pdf)
- <sup>7</sup> UN Food and Agriculture Organisation's definition of sustainability: A sustainable food system (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised. This means that: – It is profitable throughout (economic sustainability); – It has broad-based benefits for society (social sustainability); and – It has a positive or neutral impact on the natural environment (environmental sustainability). <http://www.fao.org/3/ca2079en/CA2079EN.pdf>
- <sup>8</sup> <https://www.ethiochicken.com/about/strategy>
- <sup>9</sup> <https://www.finnfund.fi/en/investing/investments/ethiochicken/> (2020 number update in private communication)
- <sup>10</sup> Yaneth, Stygar Anna H., Boumans Iris J. M. M., Bokkers Eddie A. M., Pedersen Lene J., Niemi Jarkko K., Pastell Matti, Manteca Xavier, A Systematic Review on Validated Precision Livestock Farming Technologies for Pig Production and Its Potential to Assess Animal Welfare, *Frontiers in Veterinary Science*, May 2021 <https://www.frontiersin.org/article/10.3389/fvets.2021.660565>, DOI 10.3389/fvets.2021.660565
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- <sup>12</sup> Meale, S.J., Popova, M., Saro, C. et al. Early life dietary intervention in dairy calves results in a long-term reduction in methane emissions. *Sci Rep* 11, 3003 (2021). <https://doi.org/10.1038/s41598-021-82084-9>
- <sup>13</sup> Vijn S, Compart DP, Dutta N, Foukis A, Hess M, Hristov AN, Kalscheur KF, Kebreab E, Nuzhdin SV, Price NN, Sun Y, Tricarico JM, Turzillo A, Weisbjerg MR, Yarish C and Kurt TD. 2020. Key Considerations for the Use of Seaweed to Reduce Enteric Methane Emissions From Cattle. *Front. Vet. Sci.* 7:597430. doi: 10.3389/fvets.2020.597430
- <sup>14</sup> IPCC Special Report on Climate Change and Land, 2019, section 5.4; <https://www.ipcc.ch/srccl/>
- <sup>15</sup> Allen, M.R., Shine, K.P., Fuglestedt, J.S. et al. A solution to the misrepresentations of CO2-equivalent emissions of short-lived climate pollutants under ambitious mitigation. *npj Clim Atmos Sci* 1, 16 (2018). <https://doi.org/10.1038/s41612-018-0026-8>
- <sup>16</sup> <https://www.darigold.com/new-methane-math-could-take-the-heat-off-cows/>
- <sup>17</sup> <http://www.fao.org/3/ca0289en/ca0289en.pdf>
- <sup>18</sup> <http://www.fao.org/3/ca7500en/CA7500EN.pdf>
- <sup>19</sup> <http://www.dairydeclaration.org/>
- <sup>20</sup> <https://dairysustainabilityframework.org/>
- <sup>21</sup> [https://grsbeef.org/resources/Documents/MemberResources/animals-07-00026%20\(1\).pdf](https://grsbeef.org/resources/Documents/MemberResources/animals-07-00026%20(1).pdf)
- <sup>22</sup> <https://www.wbcsd.org/Programs/Food-and-Nature/Food-Land-Use/FReSH>
- <sup>23</sup> <https://internationalpoultrycouncil.org/wp-content/uploads/2020/10/IPC-FAO-Declaration-Poultry-Sustainable-Development.pdf>
- <sup>24</sup> <https://www.internationalegg.com/our-work/sustainability/>
- <sup>25</sup> <https://csr.dk/sites/default/files/Fact%20sheet%20Danish%20Crown%20Sustainability%20Strategy.pdf>
- <sup>26</sup> <https://www.poultryworld.net/Meat/Articles/2020/5/Study-compares-4-Dutch-broiler-production-systems-584069E/>
- <sup>27</sup> <https://beterleven.dierenbescherming.nl/english/>
- <sup>28</sup> <https://www.mla.com.au/research-and-development/Environment-sustainability/carbon-neutral-2030-rd/cn30/>
- <sup>29</sup> <https://www.reuters.com/article/jbs-esg-idUSL2N2OC2YN>
- <sup>30</sup> <https://www.marfrig.com.br/pt/sustentabilidade/plano-marfrig-verde>
- <sup>31</sup> <http://www.livestockdialogue.org/en/>
- <sup>32</sup> <http://www.fao.org/partnerships/leap/en/>
- <sup>33</sup> <https://globalfeedlca.org/>
- <sup>34</sup> <https://ifif.org/our-work/project/the-speciality-feed-ingredients-sustainability-project-sfis/>
- <sup>35</sup> <https://animalhealthmetrics.org/about/>
- <sup>36</sup> <https://www.slu.se/lamp>
- <sup>37</sup> <https://goalsciences.org/>
- <sup>38</sup> <https://www.ilri.org/research/projects/african-dairy-genetic-gains>

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- <sup>39</sup> World Farmers' Organisation. *The Farmers' Route to Sustainable Food Systems*. [https://www.wfo-oma.org/wfo\\_news/wfo-policy-paper-for-fairer-and-more-sustainable-food-systems](https://www.wfo-oma.org/wfo_news/wfo-policy-paper-for-fairer-and-more-sustainable-food-systems);
- <sup>40</sup> "SAFER" Foods for a Sustainable World. *Towards Sufficient, Affordable, Farm-anchored, Ethical and Regenerative Diets and Food Production Systems*. [https://www.wfo-oma.org/wp-content/uploads/2021/02/WFO\\_SAFER-Foods-for-a-Sustainable-World.pdf](https://www.wfo-oma.org/wp-content/uploads/2021/02/WFO_SAFER-Foods-for-a-Sustainable-World.pdf)
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- <sup>49</sup> ILRI, *Livestock Master Plans*. <https://www.ilri.org/livestock-master-plans>
- <sup>50</sup> HLPE 14: *Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition*.
- <sup>51</sup> *The Horse, the Wheel and Language*, by David W. Anthony, Princeton University Press, 2007
- <sup>52</sup> John Hodges FAO 1999, *Animals and values in society: "Today, one has only to visit rural areas of Africa, Asia and Latin America to see the contrast with the West and the significant contribution of domestic animals"* <http://www.fao.org/ag/aga/agap/frg/lrrd/lrrd11/3/hod113.htm>