SLU GLOBAL

Policy brief

Healthy and fertile livestock for livelihoods, food security and reduced climate impact

How animal and reproductive health management can contribute to reduced green-house gas emissions in low-income contexts

Livestock is crucial for livelihoods and food security of millions of people living in poverty. It however emits substantial amounts of green-house gases. There are significant possibilities to transform the sector towards less emissions. By improving the animals' productivity, emissions can be reduced substantially while increasing the farmers' income and the animals' welfare. This may be achieved by applying basic and low-cost measures for better animal health and reproductive health.

Livestock supports the livelihood for more than 1.3 billion people and contributes to 40% of the global agricultural value. Livestock are also key for sustainable food systems by providing manure as fertilizer, draft-power in areas with low mechanization, storage of wealth and have the potential to preserve biodiversity and enhance carbon sequestration.

Livestock is an invaluable source of livelihood and critical for the nutrition for millions of vulnerable people living in poverty. Hence, climate mitigation policies relating to livestock must be designed with extreme care. Mitigation policies to reduce consumption of animal protein may be relevant in high-income countries, but in low-income countries it would worsen under- and malnutrition. Here we present how improved animal productivity, by applying basic and low-cost measures for better animal and reproductive health, may serve as a socially and economically feasible option for reducing the on-farm green-house gas emissions for livestock farmers in low-income settings.

KEY MESSAGES

- Improved animal health and reproduction can reduce the emission intensity from livestock on the farm, by increasing the productivity of the animal.
- Improved animal productivity allows increased revenues for the farmers if the cost-benefit balance for investing in improved animal health and reproduction is advantageous. The cost-benefit balance is highly context specific.
- Striving for improved animal productivity may thus work as a potent driver towards climate-smart livestock keeping.
- In resource poor-settings, introduction of improved management for animal health and reproductive health is particularly feasible as they are practices that do not need costly inputs and may sustain over time.
- Socially and economically sensible climate mitigation policies for livestock should include animal health and reproductive health.
- Accessible and affordable animal health and reproductive health extension services are key to reduce greenhouse gas emissions from livestock.

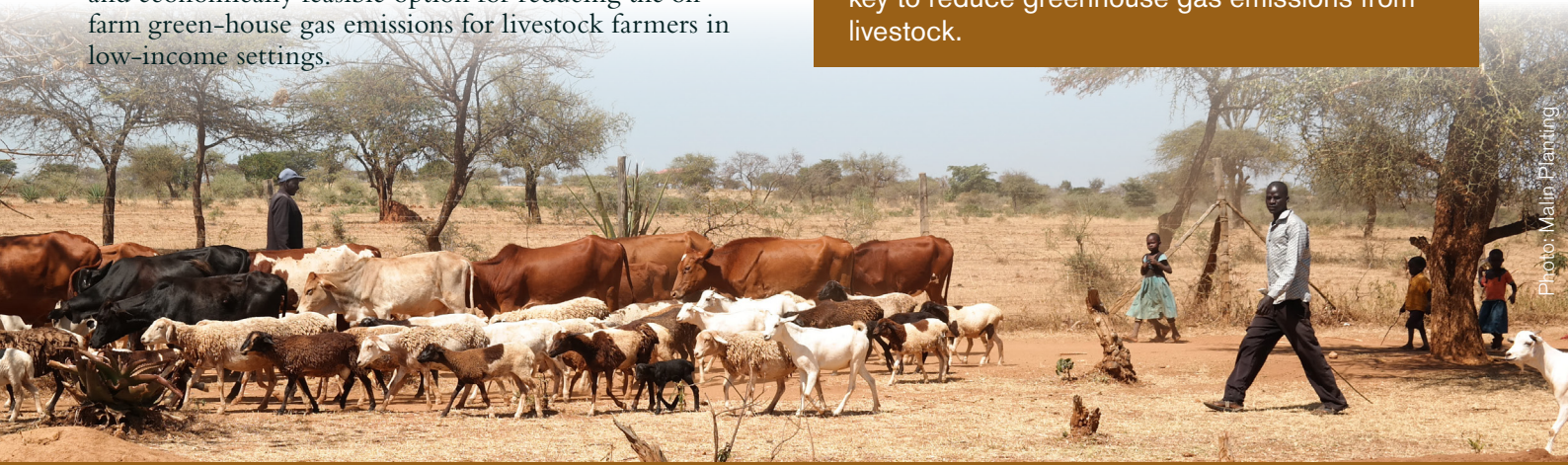


Photo: Malin Planting

Herding cattle in West Pokot, Kenya.

Variations among species and places

It is estimated that about 60% of the GHG emissions from livestock come from cattle – which at the same time is the only species together with other ruminants that in harsh environments can convert natural resources, which humans cannot eat, to food. Poultry on the other hand contribute less then 10% to the total livestock emissions but consume a large share of grains that are edible for humans.

The livestock productivity and emission intensity, emission per unit meat, milk and egg, vary considerably in the world among and within livestock systems. The productivity is usually lower, and the emission intensity higher, in low- and middle-income countries than in high-income countries. Healthy and fertile animals make better use of feed and other resources, they produce more and need less medicines than sick animals. They live longer and have a higher lifetime production, and thus a lower emission per unit produced. They have better animal welfare and do not need extra handling by the farmer. Where there is a low productivity and high emission intensity, there are often mitigation opportunities.

Some factors may be difficult to change or improve, like agroecological zone or supply of inputs, whereas others such as management and practices are often easier to change at low costs.

Co-benefits for improved livelihoods, food and nutrition security and climate

It has been estimated in multiple studies that mitigation measures in low- and middle-income countries have the potential to reduce the emissions by 20-40% in the livestock systems. *See further reading.* The largest potential for reducing emissions is in mixed dairy and small ruminant systems. Improved animal health and reproductive efficacy is being highlighted as common and effective measures in all livestock systems studied. Fertility is a key function ensuring that the production and the use of resources is optimised, by having the right animal at the right place and right time in the entire production system. *Figure 1.* It should also be noted that good health and fertility are prerequisites for exploiting the potential of other mitigation means like introduction of exotic genetics or new feed additives.

Thus, improved animal health and reproductive efficacy reduce the emission intensity by increasing the productivity of the animal. Improved animal productivity in turn, opens for increased revenues for the farmers if the cost-benefit balance for investing in improved animal health and fertility is advantageous. Such an advantageous balance may thus serve as a potent driver for transformation towards climate-smart livestock keeping in vulnerable and disadvantaged settings.

Steps forward on farm level

There is a range of measures at different costs to improve reproduction and animal health. In resource-poor settings, farmers can seldom afford to invest in the most technical and costly ones. In contrast, improving basic reproductive management and animal health routines may be made at low cost and sustain over time. *Figure 2.*

POLICY RECOMMENDATIONS

- Include improved animal health and reproductive health in climate mitigation policies.
- Ensure affordable and professional extension services to farmers regarding basic animal health and reproductive health.
- Establish breeding strategies including promotion of livestock breeds adapted to prevailing conditions.
- Promote herd recording systems including evaluation systems for production, animal health and breeding.

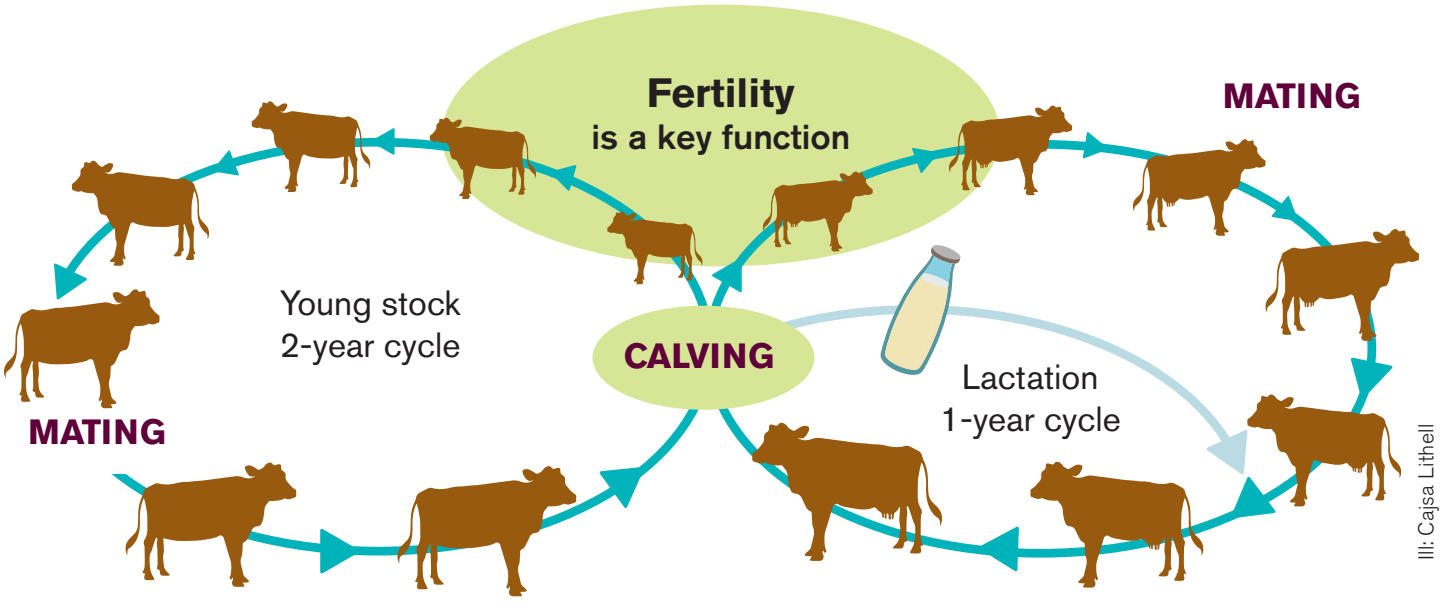
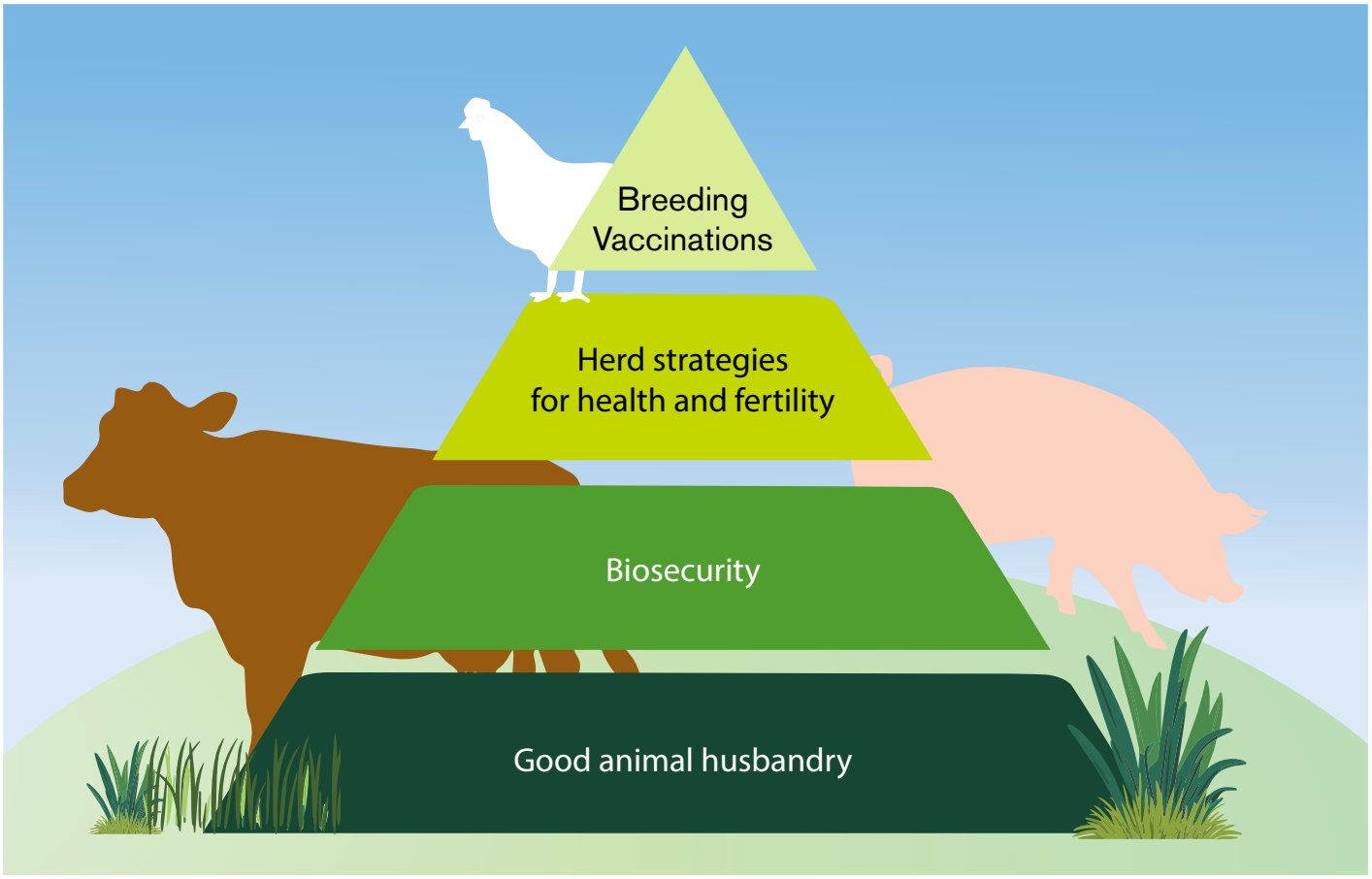


Figure 1. Sustainable production relies on a longterm strategy for herd dynamics and replacement animals, which in turn is dependent of healthy and fertile animals reproducing at a planned time point.



Ill: Cajsa Lithell

Figure 2. Measures for improved animal health, with good animal husbandry providing the foundation.

Progressive and context-depending actions for healthy and fertile livestock, with examples of measures at each level:

Good animal husbandry forms the basis for robust and healthy animals and comprise the following: Safe, clean and comfortable housing; Good lighting and air quality; Nutritious feed of good hygienic quality and in adequate amount; Good access to clean drinking water; Daily management of health and fertility issues; Observance of stress behavior to safeguard animal welfare; On-farm record keeping of production, health and fertility.

Biosecurity acts as a-broad range filter to prevent disease-causing microbes to enter the farm (external biosecurity) or to spread within the farm (internal biosecurity). The former includes to examine new animals for disease signs before buying them; applying quarantine when introducing such animals to the farm, restrict contact between the animals and other livestock farmers and animals, use artificial insemination instead of natural mating, and protect feed storages from rodents and wild birds. The latter may include the "all in/all out" practice with proper cleaning of facilities in between, starting the daily routines with the youngest and most vulnerable animals, and if feasible keep age groups separated. *Figure 3 on the next page.*

Apply **herd strategies** to fight specific diseases identified – these diseases may be infectious or non-infectious as well as acute or chronic in nature. Best practices for management of reproduction and for a successful animal replacement strategy include routines for oestrus detection, mating or artificial insemination, pregnancy diagnosis, birth management and monitoring of the postpartum period.

Apply a **breeding strategy,** using genetics adapted to the local conditions, species and breeds, and relevant reproductive techniques. Select for production traits as well as for health and fertility. **Vaccination programmes** should target diseases that are present in the region and be efficient for the particular, circulating strain of disease-causing microbes. The programme should focus on the most relevant age group of animals and must sustain over time. Vaccines must be handled properly to maintain their efficacy.

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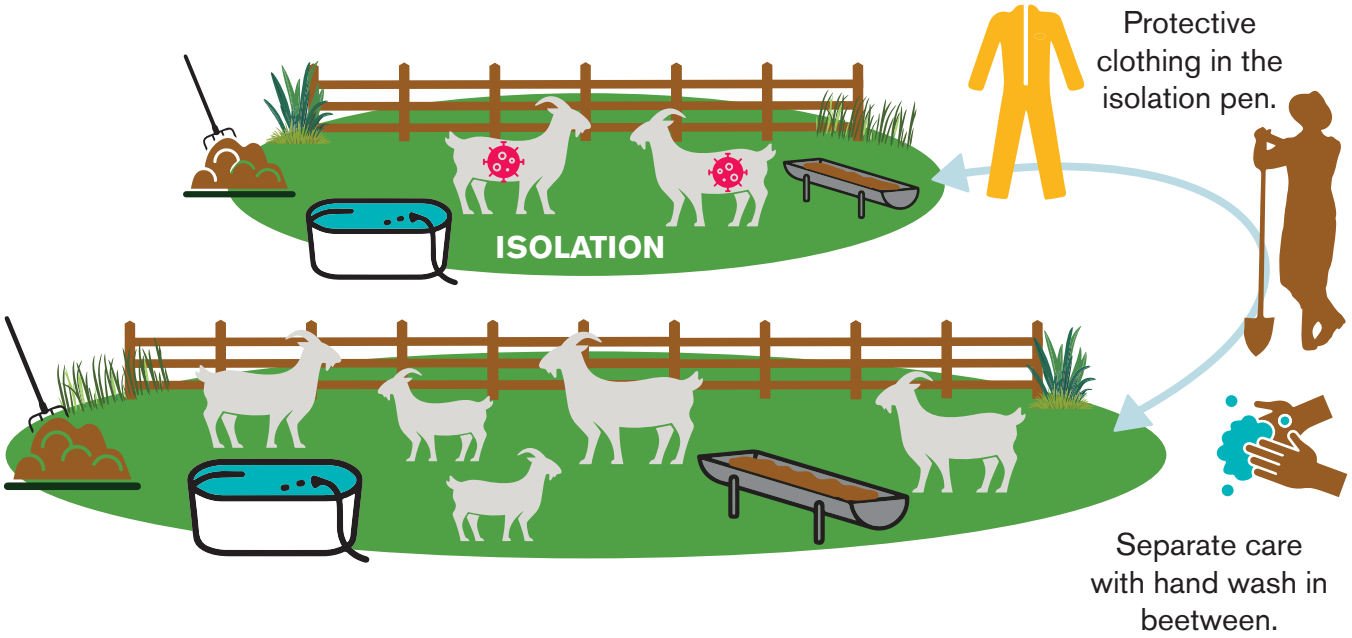

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Figure 3. Prevention of disease-causing microbes to spread within the farm (internal biosecurity). This may include quarantine of new animals, isolation of sick animals and the "all in/all out" practice with proper cleaning of facilities in between, starting the daily routines with the youngest and most vulnerable animals, and if feasible keep age groups separated.

Further reading

1. de Abreu LÂ, Rezende VT, Gameiro AH, Baruselli PS. (2022). **Effect of reduced age at first calving and an increased weaning rate on CO2 equivalent emissions in a cow-calf system.** Revista Engenharia na Agricultura-REVENG, 2022; 30(Contínua): 311-318.

2. Baruselli PS, de Abreu LÂ, de Paula VR, Carvalho B, Gricio EA, Mori FK, Rebeis LM, Albertini S, de Souza AH, D'Occhio M. **Applying assisted reproductive technology and reproductive management to reduce CO2-equivalent emission in dairy and beef cattle: a review.** Anim Reprod. 2023 Sep 8;20(2):e20230060. doi: 10.1590/1984-3143-AR2023-0060.

3. Beauchemin KA, Ungerfeld EM, Abdalla AL, Alvarez C, Arndt C, Becquet P, Benchaar C, Berndt A, Mauricio RM, McAllister TA, Oyhantçabal W, Salami SA, Shalloo L, Sun Y, Tricarico J, Uwizeye A, De Camillis C, Bernoux M, Robinson T, Kebreab E. **Invited review: Current enteric methane mitigation options.** J Dairy Sci. 2022 Nov;105(12):9297-9326. doi: 10.3168/jds.2022-22091.

4. Browne NA, Behrendt R, Kingwell RS, Eckard RJ. **Does producing more product over a lifetime reduce greenhouse gas emissions and increase profitability in dairy and wool enterprises?** Animal Production Science 2014; 55(1) :49-55

5. Båge, R., Jacobson, M., Dione, M., Gertzell, E., Genfors, E., Kiara, H., König, U., Rajala, E., Ström-Hallenberg, G., Wieland, B. and Magnusson, U. 2020. **A practical guide to herd health management in pigs, dairy and small ruminants.** Nairobi, Kenya: ILRI.

6. Clasen JB, Fikse WF, Ramin M, Lindberg M. **Effects of herd management decisions on dairy cow longevity, farm profitability, and emissions of enteric methane - a simulation study of milk and beef production.** Animal. 2024 Feb;18(2):101051. doi: 10.1016/j.animal.2023.101051. Epub 2023 Dec 12

7. Dall-Orsoletta AC, Leurent-Colette S, Launay F, Ribeiro-Filho HM, Delaby L. **A quantitative description of the effect of breed, first calving age and feeding strategy on dairy systems enteric methane emission.** Livestock Science, 2019; 224: 87-95.

8. Havlík P, Valin H, Herrero M, Obersteiner M, Schmid E, Rufino MC, Mosnier A, Thornton PK, Böttcher H, Conant RT, Frank S, Fritz S, Fuss S, Kraxner F, Notenbaert A. **Climate change mitigation through livestock system transitions.** Proc Natl Acad Sci U S A. 2014 Mar 11;111(10):3709-14. doi: 10.1073/pnas.1308044111.

9. Hristov AN, Ott T, Tricarico J, Rotz A, Waghorn G, Adesogan A, Dijkstra J, Montes F, Oh J, Kebreab E, Oosting SJ, Gerber PJ, Henderson B, Makkar HP, Firkins JL. **Special topics--Mitigation of methane and nitrous oxide emissions from animal operations: III. A review of animal management mitigation options.** J Anim Sci. 2013 Nov;91(11):5095-113. doi: 10.2527/jas.2013-6585.

10. Herrero M, Havlík P, Valin H, Notenbaert A, Rufino MC, Thornton PK, Blümmel M, Weiss F, Grace D, Obersteiner M. **Biomass use, production, feed efficiencies, and greenhouse gas emissions from global livestock systems.** Proc Natl Acad Sci U S A. 2013 Dec 24;110(52):20888-93. doi: 10.1073/pnas.1308149110.

11. Magnusson, U., Boqvist, S., Doyle, R., Robinson,T. 2022: **Animal health and welfare for sustainable livestock systems.** Global Agenda for Sustainable Livestock, Rome ISBN 978-91-576-9996-1

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