

Livestock for a small planet

Ilse Köhler-Rollefson

League for Pastoral Peoples

and Endogenous Livestock Development



LEAGUE FOR
PASTORAL
PEOPLES AND
ENDOGENOUS
LIVESTOCK
DEVELOPMENT

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Preface

FIFTY YEARS AGO, FRANCES Moore Lappé published *Diet for a small planet*: the first major book to question the emphasis on meat in Western diets.¹ This influenced an entire generation and launched a revolution in diets and a trend towards eating less meat because of the environmental consequences of intensive livestock-raising.

Lappé drew attention to the “hidden talent” of livestock: their ability to use resources in ways that humans cannot and turn them into useful products:

“Because of this “hidden talent,” cattle have been prized for millennia as a means of transforming grazing land unsuited for cropping into a source of highly usable protein, meat.

But she went on to show how livestock were (and still are) being misused:

But [...] we [...] have turned that equation on its head. Instead of just protein factories, we have turned cattle into protein disposal systems...”

Despite the increased awareness created by *Diet for a small planet*, things have got worse rather than better. The world is eating more animal products than ever, produced in ways that harm the environment, biodiversity and the climate, and that are inhumane and socially unjust. In response, influential voices are now even calling to eliminate livestock production altogether, and to switch completely to vegan diets or lab-grown meat.

But such a move would be both unrealistic and counterproductive. Millions of people, especially in the poorer, drier parts of the world, rely on livestock for food and livelihoods. Livestock can be raised – and indeed in many places are being raised – in environmentally sensitive, humane ways. Yes,

the world, and especially the overweight, developed world, needs to eat less meat. But it also needs to produce it in a different way.

In homage to Lappé's bestseller, this new book, *Livestock for a small planet*, presents the case for the sustainable production of meat and milk in ways that are in tune with nature, that do not take away land or water that could be used to grow crops for human consumption, and that help mitigate climate change.

I hope that it will stimulate the debate about the role of livestock in agriculture and in the world's diets, and a move towards the sort of world that Frances Moore Lappé envisaged 50 years ago.

Photo: Hanwant Singh Rathore
(CC BY 4.0)



Ilse Köhler-Rollefson is founder and project coordinator of the League for Pastoral Peoples and Endogenous Livestock Development

Introduction

IF YOU LOVE ANIMALS and care for nature and the planet, you are probably disconcerted when you hear and read about livestock: they are heating up the climate by emitting greenhouse gases, taking up space that could better be used to grow crops, guzzling water, causing desertification, polluting water bodies, destroying biodiversity. Apart from that, consuming red meat is bad for your health and animal farming is “inherently cruel and unnecessary”.² So being a responsible human being, you become vegetarian or even vegan. In the supermarket you look out for oat milk or almond milk, instead of grabbing conventional cow milk. You may even think it’s a good thing for livestock to be phased out by 2035, as is the stated intention of Pat Brown, the founder of Impossible Meat.³

The anti-livestock statements that bounce around the mainstream media and are even echoed by some UN agencies are true on some level, but also grossly misleading and sometimes plain **false**. Because it is not livestock as such that is a problem, but the systems in which many of them are kept: concentrated in huge numbers, crammed into minimum space, bred for uniformity and selected for maximum yields at the expense of resilience against diseases. Nature has designed animals to move, and not to be grounded like a plant. Immobilizing them is against nature and therefore bound to cause problems. As is the scale on which they are raised: livestock population growth has vastly exceeded that of human population growth, with the number of chickens rising sevenfold and the pig population more than doubling in the last 50 years.

But there is a different way: keeping animals in tune **with** nature, rather than against it; in balance with local natural resources, rather than dependent on imported feed for which rainforests have been razed; as part of the landscape, and not locked away from view in hermetically sealed

animal factories; in a social relationship with humans, instead of being regarded as inanimate objects. Numerous pastoral cultures around the world are living examples of how this can be done. They set an example of ethical and environmental partnerships with livestock that contrast with the purely profit-driven industrial ways of livestock production which we have been made to believe are efficient and the only option for providing enough affordable protein to all.

Eliminating all livestock from the planet would be like sawing off the branch we sit on. Instead, we need to take a step backwards to re-orient the human–livestock relationship and build a more humane and ecologically oriented partnership that meets the requirements of a small planet with diminishing resources. And we need to act towards that **now**, and before the vast and invaluable body of knowledge accumulated over millennia by animal-oriented cultures vanishes and the options for living with livestock in landscapes disappear.

This book has two parts. The first part dissects nine “myths” or charges that are routinely levelled against livestock. We will see that a good case can be made for the opposite of each allegation. You can judge yourself which claim is true.

The second part is about rethinking livestock and its role in the Anthropocene. We will investigate the backstory about how we got to the current sorry state of affairs and the role of Science (with a big S) and corporations in this trajectory. We will examine the practical implications of re-imagining livestock from a passive and immobile input–output machine into an intelligent and moving ally that converts human-inedible biomass into highly nutritious food in a completely natural way, without fossil fuels and powered by solar energy alone.

Next page: Young herder and yak calf in Tajikistan.

Part I

Dismantling the nine myths about livestock



Photo: © Santiago José Carralero Benítez

Nine myths...

1

Livestock take up too much land... and if we would stop eating meat and dairy global, farmland could be reduced by more than 75%.

2

Livestock produce **only** 37% of our protein and 18% of our calories.

3

Livestock cause global warming through greenhouse-gas emissions.

4

All livestock keeping involves exploitation and animal cruelty.

5

Livestock are always bad for the environment and pollute water, air and soil.

6

Livestock destroy biodiversity and are harmful to wildlife.

7

Livestock guzzle water.

8

Eating red meat is bad for your health.

9

"Efficient" high-yielding livestock are in the public interest, as they enable low-cost access to animal-sourced foods and take up less space than extensively kept animals.

...and nine truths

1	Sustaining the human population on plant food alone would require more land. If there were a universal ban on eating meat and dairy, billions of people in non-arable areas would starve.
2	Livestock are very efficient producers of protein and certain essential amino acids as well as vitamin B12, which can be obtained only from animal-sourced food.
3	Livestock can help sequester greenhouse gases and produce enormous amounts of food based on solar energy alone.
4	Under human care, livestock can have a much better life than in the wild.
5	Livestock can prevent groundwater pollution and are an essential part of agroecological food production.
6	Livestock can be managed to increase biodiversity and co-exist with wildlife.
7	In water-deficient areas, food can be produced only by livestock.
8	The right kind of red meat can provide you with many nutrients that are otherwise difficult to obtain.
9	High-yielding livestock kept in large holdings are a major threat to global public health as they require the routine use of antibiotics, and are a driver for deforestation that leads to the emergence of zoonoses.

Myth 1

- ▶ **Livestock take up too much land... and if we would stop eating meat and dairy global, farmland could be reduced by more than 75%**

Truth 1

- ▶ **Sustaining the human population on plant food alone would require MORE land. If there were a universal ban on eating meat and dairy, billions of people in non-arable areas would starve**

“LIVESTOCK TAKE UP 80% of agricultural land and avoiding meat and dairy is the single biggest way to reduce your impact on Earth.”

This is a frequent statement bandied across the media. It achieved additional prominence with an article published in *Science* in 2018,⁴ whose Oxford University-based authors went on to claim that:

“without meat and dairy consumption, global farmland use could be reduced by more than 75% – an area equivalent to the US, China, European Union and Australia combined – and still feed the world.”

This assertion is now repeated endlessly by the anti-livestock lobby, especially those wanting to capitalize on artificial meat and dairy.

Yes, the use of some agricultural land could be reduced if we stopped growing animal feed. But the figure provided is wildly overstated and totally unrealistic. The authors made a colossal miscalculation, revealing a supremely ethnocentric, western view.

To understand where they went wrong, we need to look at the meaning of “agricultural land”. This term might conjure up images of fertile land providing bountiful harvests, but far from it: farmland or “agricultural land” is not synonymous with being suitable for growing crops. The Food and Agriculture Organization of the United Nations (FAO) divides “agricultural land” into “arable” and “non-arable” land. Arable means cultivable with crops. Out of the world’s 4.924 billion hectares of agricultural land, only 1.407 billion ha, i.e., less than one-third, can be used for growing plant food. The remaining two-thirds are not fit for that purpose.

The only option for producing food in the roughly 66% of agricultural land that are non-arable is by means of livestock. Animals can convert the native vegetation – which may be grass, but can also be sparse, thorny, and fibrous shrubs – into milk, meat, fibre and a range of other products. Livestock form the basis of the nutrition and livelihoods for an estimated one billion people in these rangelands.⁵ Many of them move around with their herds of animals seasonally or around the year, and have developed



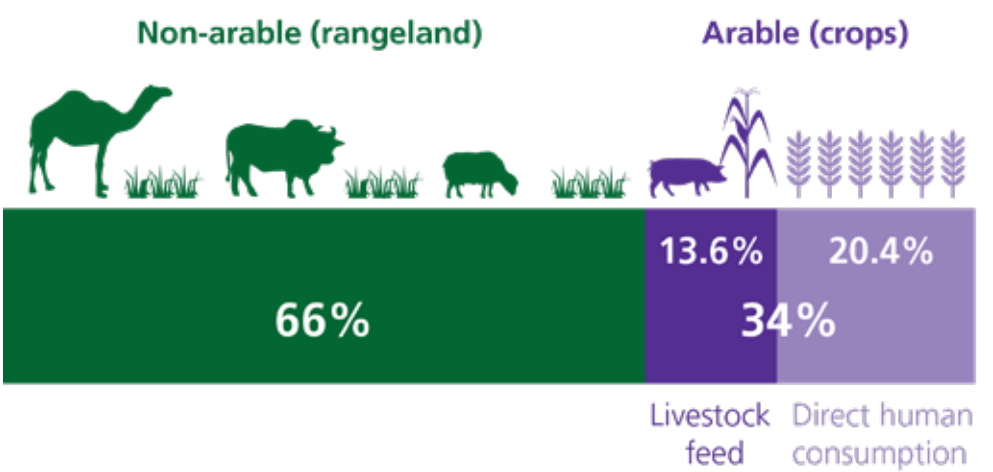
Photo: © Santiago José Carralero Benítez

Yak herders in Mongolia. Many livestock are raised in areas that are too hot, cold, dry, steep or stony to grow crops.

elaborate animal-centred cultures. Their diets are dominated by dairy products, with meat consumption usually limited to special occasions and festivals. For them, livestock does not just provide food, but also raw materials, fuel and fertilizer, as well as equally important non-tangible values such as identity, companionship, prestige and insurance.

Among them are reindeer herders in the tundra and taiga of the Arctic; yak herders in Asia’s high-altitude zones such as the Himalaya and the Tibetan Plateau; keepers of Bactrian camels and dromedaries in the deserts of Asia and Africa; cattle, sheep, and goat nomads in the semi-arid steppes and savannas of Africa, and llama and alpaca owners in the Andes in South America. In alliance with the right kind of animals, people can produce food in desperately dry deserts, killingly cold taiga and tundra, lofty and rocky mountaintops, places below sea level, and even mangroves steeped in sea water. From the Arctic Circle to Tierra del Fuego, from altitudes of 5,500 m to places 100 m below sea level like the Danakil Depression in Ethiopia – almost no place is out of range for livestock.

As we can see from the diagram below, growing crops is feasible only in about 34% of the world’s agricultural land, mostly where temperate climates prevail. About 40% of the arable land, or 13.6% of the total agricultural land, is used to grow feed crops. If we add these 13.6% to



Agricultural land area devoted to human food and livestock.

Data: FAOSTAT 2019, Mottet et al. 2017



Photo: © Marc Michel

Around one billion people who live in rangelands depend on livestock for their living.

the 66% of non-arable land, we arrive close to the 80% of land that is used by livestock.

It is apparently based on this calculation that the authors of the much-quoted article in *Science* came to their conclusion that without meat and dairy, global farmland use could be cut by more than 75%.

There are an estimated one billion of people living in rangelands, i.e., ecosystems, including deserts, shrub and grasslands, that are grazed by either wild or domesticated animals.⁶ What would happen to them if we eliminated livestock? They would either starve or have to vacate the area. Thus such a blanket advisory to stop eating meat and dairy is an irresponsible recipe for disaster in already impoverished parts of the world and for people for whom livestock represents a much better survival option during the frequent droughts than growing crops. For the 66% of agricultural land where livestock is the only option, we had better not forget this.

It is a different issue with respect to the 13.6% of total agricultural land used for feed cultivation. Currently about one-third of global cereal production is fed to livestock.⁷ There is room for reduction here, but we have to keep in



Photo: Sentinel Hub (CC BY 2.0)

Huge areas of the Amazon rainforest have been deforested to create pastureland for beef cattle.

mind that much agricultural land is dual-purpose: food and feed crops are rotated, and livestock are sustained on food-crop by-products. Many feed crops are legumes which restore soil fertility, and this is an absolutely fine and agroecological approach. Without livestock manure, organic farming would be very difficult, if not impossible, at least at scale.

Where the buck stops is when land is used **only** for feed production and when huge areas of tropical rainforest are cut down to create space for monocultures of soybeans, maize or palm oil that stretch to the horizon. Every year 10 million hectares of forest are lost. The main driver, responsible for 40% of tropical forest loss, is large-scale commercial agriculture in the form of cattle ranching and the cultivation of soybean and oilpalm.⁸

It is also ecologically irresponsible to plough up productive grasslands such as the Argentinian Pampas, which were once world famous for the quality of their beef. Now much of the grassland has been replaced by the culti-



Photo: Javier (CC BY-SA 2.0)

Argentina's Pampas region used to be grassland. Much is now used to grow soybeans for use in animal feed.

vation of soybeans, which are mostly exported to East and Southeast Asia (China and Vietnam) to supply the industrial livestock units that have been mushrooming there. What was once an entirely solar-powered livestock system producing prime beef has been transformed into a resource-intensive system requiring energy, water and agrochemicals, going along with erosion and biodiversity loss as well as rural livelihoods.

"The Argentine Pampa is one of the six most agriculturally productive regions in the world. Its soils cover some 9 million hectares and are rich in nutrients and organic matter. During the last quarter of a century, soybean production has increased at an unprecedented rate from an area of 38,000 hectares in 1970 to 10 million hectares today. Around 70% of the soybean harvested is converted in oil-processing plants most of which is exported, providing 81% of the world's exported soybean oil and 36% of soybean meal."⁹

Problems occur not only at the source of the feed, but also in Southeast Asia, where the exported soybeans have led to an enormous increase in pig and poultry density. This has turned this area into a hub for the emergence of diseases, where many zoonoses, such as bird flu, Nipah virus (NiV), and severe acute respiratory syndrome (SARS) originated.¹⁰

To sum up: there is no alternative to livestock on about 66% of the world's agricultural land. There is scope for reducing the roughly 14% of agricultural land used for growing feed, but only to some extent, as livestock play an important agroecological role in mixed farming systems where they provide organic manure and utilize crop by-products.

A team of scientists from the University of Wageningen¹¹ has modelled what would happen if we tried to sustain the human population on plant food alone. They have calculated that this would actually require **more** land, as without livestock, crop by-products such as stalks, leaves, straw and stover could no longer be converted into food.

Their conclusion is that if we stopped industrial livestock farming and feed cultivation, replacing it with “low-cost livestock” that can be sustained on either crop by-products and food waste or with biomass from non-arable land, there would still be scope for raising protein consumption in Africa and Asia, **if** consumption is reduced in Western countries.

To comply with planetary boundaries, livestock must be sustained on either natural graze or on locally produced crop by-products – i.e., “waste”.

Myth 2

- ▶ **Livestock produce ONLY 37% of our protein and 18% of our calories**

Truth 2

- ▶ **Livestock are very efficient producers of protein and certain essential amino acids as well as vitamin B12, which can be obtained only from animal-sourced food**

THE STATEMENT THAT LIVESTOCK provide produce only 37% of our protein and 18% of calories is based on calculations by FAO, the United Nations Food and Agriculture Organization, and is as accurate and authoritative as possible. It's the insertion of the "only" that makes it misleading.

The purpose of animal-sourced food is not to provide us with calories. These are much better and easier obtained from carbohydrate-dense food such as cereals. Also, in most parts of the world there is no shortage of carbohydrates, and obesity due to an over-consumption of calories is much wider spread than a lack of calories. Protein deficiency is a much bigger problem, and animals are easily the best providers.¹² The logic of this part of the statement is akin to saying there are 50 times more cars than trucks in the world, but they transport less than 2% of the goods.

Even if livestock produce "only" 37% of our protein, animal-sourced food has a much higher density of protein than any plant food and is crucial for improving the diets of people, especially young children, living in food-insecure areas.¹³ Furthermore, this is high-quality protein, containing certain amino acids that cannot be sourced from plants. It's also an amazing source

of a range of micronutrients, such as vitamins A, B2, B3, B6, B12, calcium, iron and zinc, which may otherwise be difficult to access.

The beautiful thing about livestock, especially ruminants such as cattle, sheep, goats and camelids, is their ability to synthesize protein from very fibrous vegetation and from crop residues that are inedible for humans. As omnivores, pigs are specialized in converting all kinds of discarded food and leftovers into meat. So basically, the benefit of livestock is that they convert “waste” into nutrient-dense food, and they can do this without any use of fossil fuels, just by means of solar energy.

The tragedy is that in modern livestock systems animals are fed with feed that is already nutrient-rich and that is grown especially for them. Pigs and poultry receive carefully calculated rations composed of grains. In feed-lots, cattle are stuffed with protein-dense feed that could also be directly consumed by people. This is not good for the cattle, whose metabolism is not adapted to this kind of feed, and it is ecological nonsense, as the input of protein is higher than the output.



Photo: © Francesco Farina

A shepherd in Germany with her flock. Livestock convert vegetation that humans cannot eat into meat and milk.



Photo: U.S. Department of Agriculture (CC BY 2.0)

Confined cattle feeding operation in a ranch in California. Large numbers of cattle, pigs and chickens are raised indoors or in feedlots. They are fed with food that humans could eat – or with fodder grown on land that could be used to grow food. This is inefficient and wasteful.

Therefore, in the countries with the so-called efficient livestock systems, such as the USA, livestock are fed twice the amount of “human-edible protein” as they produce. But in countries where livestock graze on natural vegetation, for instance in Kenya and Ethiopia, up to ten times more protein is produced than is inputted!¹⁴

Fattening livestock with nutrient-dense, specially grown feed defeats their purpose and has no place in an increasingly resource-restricted world. It also consumes a significant amount of fossil fuels and should stop!

Myth 3

- ▶ **Livestock cause global warming through greenhouse-gas emissions**

Truth 3

- ▶ **Livestock can help sequester greenhouse gases and produce enormous amounts of food based on solar energy alone**

YES, RAISING LIVESTOCK CONTRIBUTES to human-caused (“anthropogenic”) greenhouse-gas emissions that cause global warming. But it’s complicated, and it is certainly not appropriate to put the blame on cows.

Let us start by explaining the two main types of greenhouse gases. One is carbon dioxide, or CO₂, which is generated by the burning of fossil fuels. CO₂ stays in the atmosphere almost indefinitely: it is additive. It keeps accumulating, and there is really no easy way of removing it from the atmosphere. Even if we stopped using fossil fuels right now, it would still be there for ages.

The other main type of greenhouse gas is methane, or CH₄. Methane is generated as part of the biological cycle whenever cellulose – the main component of most plants – is broken down naturally by bacteria. Since cows and all other ruminants, such as sheep, goats, yaks, reindeer and camels, mainly eat cellulose, methane is generated by their digestive systems and then emitted via “eructation” (belching), as well as in manure. Methane is a short-lived greenhouse gas – it only stays in the atmosphere for about 10 years before it is broken down and re-absorbed by plants. And not only domesticated animals emit it, but all wild ruminant animals



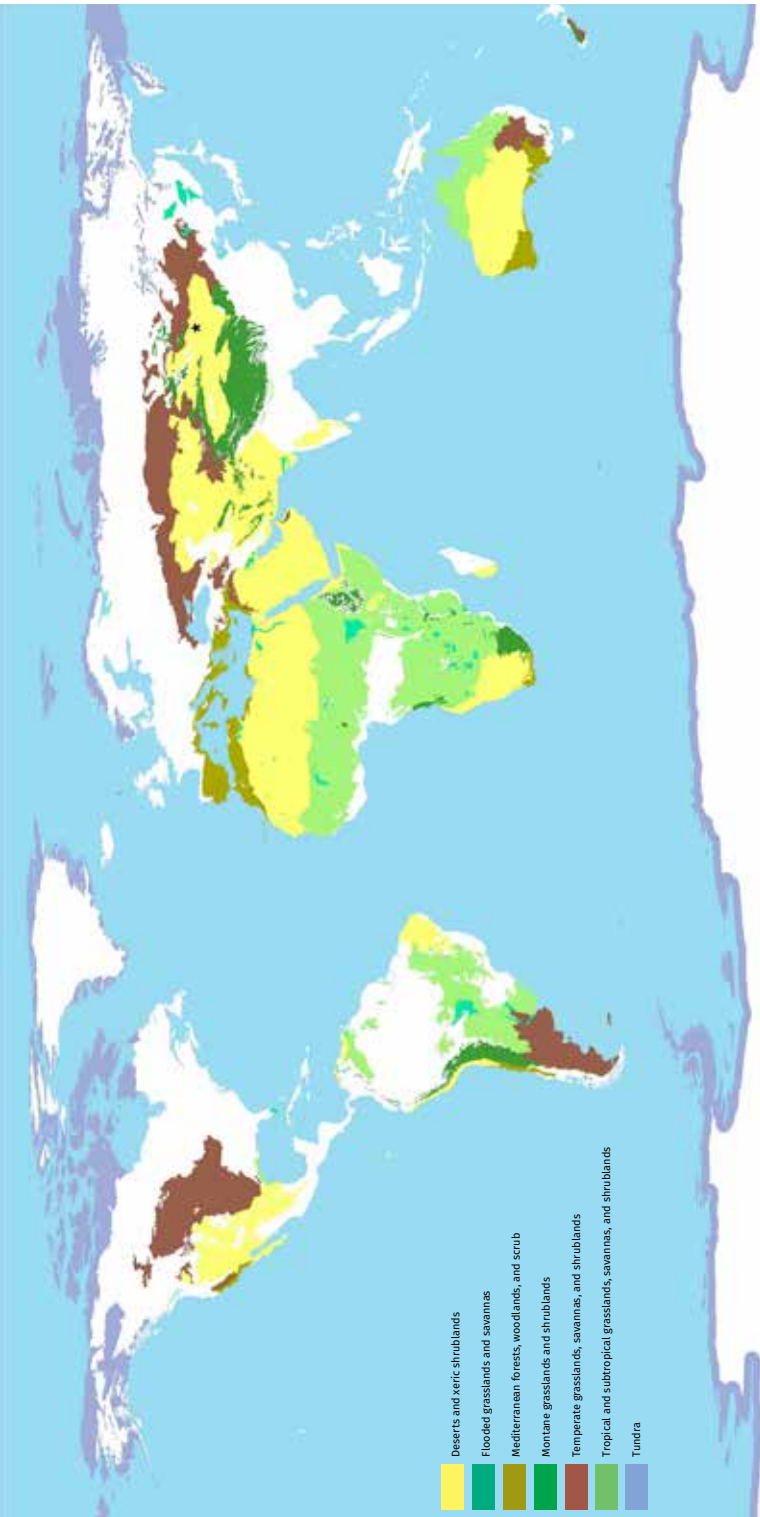
Photo: Carol M. Highsmith (CC BY 2.0)

Cattle grazing in California. Regenerative grazing can increase carbon sequestration by the soil.

as well, such as antelopes, giraffes and buffalo. The huge pre-colonial bison population of the USA in fact contributed almost as much methane as domestic cattle do now.¹⁵

If we want to reduce greenhouse-gas emissions (as we should), we need to focus on reducing CO₂ emissions. Crop cultivation, depending on tractors for ploughing, chemical fertilizer, pesticides, combine harvesters, etc., is a major user of fossil fuels. By contrast, livestock **can** generate food **without** fossil fuels, depending on solar energy alone, if they are kept in traditional systems in which animals walk to their feed. Such livestock production systems can be found all over the world's rangelands.

But the benefits of livestock do not stop there. Our domesticated herd animals can actively support the absorption of CO₂ by the soil. While we are always told to plant trees to counter climate change and support CO₂ absorption, grasslands can fulfil this function just as well, or even



Rangelands cover 54% of the world's land area. They are home to millions of people and livestock. Source: ILRI et al.³³

better in temperate climates. This has been convincingly demonstrated for California.¹⁶ Grasslands have co-evolved with herds of livestock, be it ruminants such as bison, antelopes or buffalo, or other animals such as wild horses. Grazing of grass supports its root development, which in turn draws CO₂ from the atmosphere. In fact, grasslands need to be grazed to stay grasslands. (They also need to be periodically burned, but that is a different issue.)

“Restorative grazing” or “regenerative grazing” to counter climate change by supporting carbon sequestration, restoring biodiversity, and building soils is a trendy development in the rangelands of the USA, promoted for instance by multi-billionaire and former democratic presidential candidate Tom Steyer, who raises free-range cattle on his ranch for this purpose. It also has economic benefits for cattle raisers who save money on inputs as well as time and labour.¹⁷

Climate change is caused mainly by our use of fossil fuels for energy, transport, industry, etc. We need to tackle these as a priority.

While restorative grazing is a phenomenon of the rich North, pastoralism as practised by indigenous people throughout the world fulfils a very similar function. Although not oriented at fighting climate change – but at food production – it is a way of fossil fuel-free, solar-energized production that must urgently be recognized for its value.

Myth 4

- **All livestock keeping involves exploitation and animal cruelty**

Truth 4

- **Under human care, livestock can have a much better life than in the wild**

INDUSTRIAL LIVESTOCK KEEPING IS indeed unimaginably cruel, totally reducing animals to inanimate objects whose only purpose is to convert input into output in the most efficient way: producing maximum yield with minimum input in the shortest possible time. In the process they are deprived of all



Photo: Humane Society of the United States (CC BY 3.0).

Sows in gestation crates. In intensive pig operations, sows spend much of their lives in such crates. They have been banned in some parts of Europe and some states in the USA.



Photo: Ilse Köhler-Rollefson (CC BY 4.0)

Maasai herder in Kenya. Pastoralists have an intimate relationship with the animals they rely on, developed over centuries of experience and passed down by parents to their children.

the experiences that make life – whether human or animal – pleasant: social relations, moving around, self-selecting diets on daily grazing rounds.

This supposed “efficiency” of modern livestock systems comes with enormous costs not only to animal welfare, but also to the environment, food quality and public health. It is not surprising that it has led to a huge backlash and inspired the development of artificial alternatives to real animal-sourced food.

But raising livestock does not need to be cruel and deprive animals of the opportunity to express their natural behaviour. All over the world there are examples of cultures that have entered into virtually symbiotic relationships with their herd animals and who look at them not as objects but as members of their households, who know each one of them individually and who even refer to them collectively as their children or as their parents. In such systems, animals have a much longer lifetime than if they were left to fend for themselves in the wild, and people go to extraordinary lengths to adjust their way of life so that it ensures the happiness of their animals. They follow them on long migrations exposed to the elements, they nurse them when they are sick, they lift water for them, they bottle-feed young ones that have lost their mothers, and rescue them when they get into trouble.

Animals and people communicate with each other: the animals listening to the voices or musical instruments of their herders, and herders carefully observing the behaviour of their animals.

Animal cruelty is a consequence of the efficiency paradigm that dominates animal science. Farmers who are vertically integrated into corporate value chains have no options to improve the welfare of their animals, even if they feel for them.

Animals living in traditional herding systems usually lead better and longer lives than their wild relatives, due to protection from predators and diseases.



Photo: Ilse Köhler-Rollefson (CC BY 4.0)

Gujjar buffalo pastoralists on the move in northern India.

Myth 5

- ▶ **Livestock are always bad for the environment and pollute water, air and soil**

Truth 5

- ▶ **Livestock can prevent groundwater pollution and are an essential part of agroecological food production**

YES, LIVESTOCK CAN BE devastating to the environment by polluting air, water and soil. But again, this only happens when they are amassed and confined in large numbers, and feed is transported to them from far away, often from the other side of the world.

In nature, plants are basically immobile as they can synthesize their own food from sunlight and CO₂ by means of photosynthesis. Herbivores – plant-eating animals – need to move around to harvest and aggregate the solar energy that has been captured by plants. Basically, in nature, plants are fixed and animals mobile.

But in much of current livestock production the roles have become reversed. Animals are immobilized, while plants are moved around to feed them, necessitating the transformation of a solar production system into one based on fossil fuels. This is driven by the hunger for profit for one, but also abetted scientifically by the argument that this is the most efficient way of generating livestock products and keeping them affordable for the masses.

But the nutrients that are shipped to industrial livestock units and factory farms are only partially transformed into product. Many are excreted, so

have to be disposed of. The soil around these livestock units cannot absorb the excess nitrogen and phosphorus, as it would if animals were more dispersed. It is not only these elements that accumulate, but also pathogens, arsenic, ammonia, antibiotics and hormones. People working on these farms or living nearby often suffer from asthma, eye irritation, difficulty in breathing, wheezing, sore throats, chest tightness, nausea, bronchitis, and allergic reactions.¹⁸ Property values in the vicinity of livestock units drop dramatically.

Nitrogen and phosphorus released into water bodies cause eutrophication – an excess of nutrients that leads to the growth of plankton and algae that in turn use up the oxygen in the water, which kills fish and other aquatic life. An infamous incident was the rupture of a “lagoon” of pig manure at a hog-fattening farm in North Carolina. That led to the death of 10 million fish in rivers, lakes and the ocean.

The last major incident was in 2018, caused by Hurricane Florence, when 50 such lagoons in North Carolina overflowed, releasing pig waste into the



Photo: Waterkeeper Alliance (CC BY-NC-ND 2.0)

Manure lagoons at an intensive pig operation in North Carolina, USA. When such lagoons overflow, they create an environmental catastrophe downstream.

environment, and many more were at imminent risk of doing so.¹⁹ But such events occur not only in North Carolina but everywhere where pig factories are located, such as in southern China. On the coast of Brittany in France, pig effluent promotes the growth of green algae in the English Channel. The seaweed washes up on beaches and produces highly toxic hydrogen sulphide, which smells like rotten eggs and can kill people and animals.

If livestock are dispersed and are not confined, none of these problems occurs. Under such conditions, the supposedly negative impacts of farm animals are transformed into benefits.

Grazing livestock actually contribute to keeping groundwater clean. Grazing activity stimulates the development of thick networks of grass roots, which act as a filter that prevents nitrogen and other toxic substances from trickling into the groundwater. Perennial grassland is a wonderful way of keeping groundwater clean. By contrast in arable fields where maize or other annual crops are grown, the soil is exposed and there is no root



Photo: Andrew (CC BY 2.0)

Manure slurry from livestock is a valuable fertilizer. But spreading too much of it can pollute surface water and groundwater.

network preventing nitrogen, for instance from the application of chemical fertilizer, from infiltrating the groundwater.

Dense grass cover also protects the soil from wind and water erosion, absorbs water and supports soil microbiota. Grazing by sheep and goats does not compress the soil, and salinization of the soil due to mineral fertilizers or irrigation is avoided. No pesticides are required.

Thus, instead of destroying environments and property values, livestock can contribute to the opposite: enhanced landscapes and agroecological food production. They can be a draw for tourists who look for healthy and delicious local specialty foods. It's all a question of balance, and of having the right number of animals – which is basically as many as can be supported from local resources throughout the year.

There are many examples in Europe. Consider the pigs grazed in southern and central Spain and southern Portugal. They produce famous and highly prized ham that fetches prices of up to €3,600 per leg. These pigs are an integral component of the *dehesa* agrosilvopastoral system. *Dehesas* are ancient landscapes created by livestock grazing in woodlands, especially oak forests. In a age-old practice, small and slow-growing pigs of the



Photo: Max Pixel (CC0 1.0)

Pigs in the dehesa parkland, Spain. The dehesa is a cultural landscape that has developed alongside the Ibérico pig breed and depends on pigs for its maintenance.

Ibérico breed are herded into these biodiversity-rich mosaics of meadows and ancient trees, where they feed predominantly on acorns as well as on aromatic herbs. Every pig needs a least one hectare of land, and the oak trees are hundreds of years old. Ironically, several decades ago, this traditional agrosylvopastoral system was almost extinct due to the mainstream promotion of fast-growing stall-fed hybrid pigs that economists and efficiency believers are fond of. Fortunately, culinary demand for the tasty meat of the Ibérico breed saved it.

Such extensive pig-rearing systems, in which pigs can follow their natural behaviour patterns by moving around in a group, are not only for the pleasure of the rich and for the tastebuds of connoisseurs. They can also benefit the very poor. In eastern India, in Bangladesh and in China, nomadic pig keepers herd their animals across harvested paddy fields, hoovering up any rice grain that may have evaded harvest. This diet is complemented by a variety of leftovers, insects, and so on. Pigs are omnivores, after all. Their role is not just to convert “trash” into protein-rich food, but at the same time they also fertilize the fields with their manure.

Livestock need to be kept in balance with local resources and as part of agroecological systems that allow local recycling of nutrients!



Photo: Ise Köhler-Rollefson (CC BY 4.0)

Pig pastoralists in Odisha, India. Various tribal groups in eastern India herd pigs on harvested rice fields and in forests, and feed them with kitchen and fishing waste.

Myth 6

- ▶ **Livestock destroy biodiversity and are harmful to wildlife**

Truth 6

- ▶ **Livestock can be managed to increase biodiversity and co-exist with wildlife**

THERE IS OFTEN AN apparent conflict between livestock and wildlife, with conservationists accusing herders or ranchers of overgrazing and out-competing wild herbivores or killing predators that prey on their herds or flocks. This kind of conflict certainly occurs, and often makes it into the news.

But again, it is a question of management. Livestock can and do have positive impacts on biodiversity and live together relatively harmoniously with wildlife.

To start with, livestock grazing or browsing in the landscape has a beneficial effect on the micro-organisms and small animals at the bottom of the food chain. Livestock droppings are powerful incubators for a huge diversity of beetles and buzzing insects that not only feed populations of insectivorous birds, bats and reptiles, but also loosen up the soil and break down the manure into its constituents that feed soil bacteria. The presence or absence of grazing animals in a landscape makes a huge difference to its biodiversity.

In sub-Saharan Africa, herders set up thorn-fence enclosures known as *bomas* to keep their animals safe during the night. They may be kept in use for days, weeks, or months. Due to the manure that accumulates,



Photo: Jürgen Mangelsdorf (CC BY-NC-ND 2.0)

Heidschnucke breed sheep grazing on the Lüneburg Heath in northern Germany. Grazing is necessary to maintain a heath landscape that is rich in biodiversity and attractive for tourists.

abandoned *bomas* are nutrient hotspots that attract insects, birds and wild herbivores. This phenomenon is widespread in the savannas of eastern, western and southern Africa.²⁰

If we replace grazing with mowing, the consequences are dramatic. Researchers in Germany have concluded that mechanical mowing of meadows has a disastrous effect on insects, killing up to 80% of cicadas, for instance. They see it as one of the major factors in the dramatic loss of insect, bird, amphibian and reptile populations that the country has experienced.²¹

Looking at mammalian biodiversity, in Africa one often sees mixed herds of livestock and wild ruminants grazing together, with benefits for both. In fact, as wild animal populations have reduced, livestock grazing is essential to encourage growth of new grass.²² Even the conservation of large carnivores often depends on the presence of herd animals, which compose the major part of their diets. At least in India, herding communities are very nonchalant about livestock losses due to predators, and see this as part of nature that they accept stoically. Shepherds on the Deccan Plateau in

India's interior even worship wolves. They believe they remove the weak animals from their flock, thereby keeping it healthy.²³

But the relationship between herded animals and biodiversity also pertains to plants. Quite a few plants require grazing pressure. To prevent them from becoming extinct, shepherds in some countries are paid to supervise very careful movements of their flocks. In Germany, most shepherds obtain a large part of their income not from wool or animal sales, but from payment for environmental services. Contract grazing in nature areas is the most frequently used conservation measure in Germany. In Spain, the revival of the traditional transhumance routes, the *cañadas*, has had immense beneficial impacts on biodiversity, bringing back almost-extinct vultures that feed on the carcasses of animals left *en route*.

Despite these examples of positive interaction, it cannot be denied that livestock is probably the biggest indirect driver of biodiversity loss. The demand for soybeans and palm oil as animal feed is the main reason for the loss of tropical rainforest in the Amazon and Southeast Asia. The massive deforestation in these regions not only eliminates biodiversity on a massive scale but also creates perfect conditions for the emergence of zoonoses and pandemics.²⁴

Livestock can perform the ecological role of wild ruminants and other grazing animals if managed as an integral part of landscapes. But they become a major driver for deforestation and biodiversity loss if kept in feedlots and industrial systems, as these depend on the growing of feed monocrops.

Myth 7

► Livestock guzzle water

Truth 7

► In water-deficient areas, food can be produced only by livestock

HOW OFTEN DO YOU read alarming sentences like “it takes 450 gallons of water to produce a quarter-pound beef patty”?

The figures of how much water it takes to make a kilogram of beef are everywhere, and they differ widely. Yes, if cattle are fed on irrigated alfalfa and on feed concentrates, then this way of raising them will require enormous amounts of water. Now, 98% of the water footprint of cattle goes into growing feed. But if cattle just graze on pastures and natural vegetation, their water footprint is absolutely minimal, restricted to drinking water which composes only 1.1% of their total water requirements.²⁵ The gigantic water footprint for which livestock are blamed is associated with industrial animal production systems, for which feed needs to be specially grown.²⁶

Pastured cattle also obtain much – 70–90% in temperate areas – of their water requirements from grass. They then return much of it to the soil through their manure and urine.

The important thing about livestock is it is actually the **only** way of systematically producing food in water-deficient low-rainfall areas. Camels are the species with the lowest water requirements, followed by small ruminants and cattle. In pastoralist areas, such as India’s Thar Desert, water was once rarer than milk. Camels and cattle obtained much of their water



Photo: Ilse Köhler-Rollefson (CC BY 4.0)

Raika herder with her camel and flock of sheep. In Rajasthan, India, it is not livestock but intensive irrigation using pumped groundwater that guzzles scarce water.

requirements from the vegetation on which they browsed and grazed. People fulfilled their fluid needs by drinking their milk.

An interesting experiment is taking place in California, a state where groundwater resources have been almost depleted due to decades of intensive agriculture in the Central Valley. The Angeles Crest Creamery in the San Gabriel Mountains is trying to develop a climate-change-resilient model for agriculture in southern California and to demonstrate how food can be produced without imported or pumped water. For its owner, Gloria Putnam, shepherding small ruminants is “*humanity’s most time-tested method of agriculture*”.²⁷

In water-scarce situations, livestock are the only way of producing food. They only start guzzling water when feed has to be cultivated for them. Otherwise they are an absolute water saviour!

Myth 8

- ▶ **Eating red meat is bad for your health**

Truth 8

- ▶ **The right kind of red meat can provide you with many nutrients that are otherwise difficult to obtain**

RED MEAT HAS BEEN cast in the role of the devil, and white meat is said to be the healthier and the more environment-friendly option. Nutritionally, red meat has been implicated in heart diseases, cancer, diabetes and premature death.²⁸

Numerous studies have been conducted on this aspect, and there does not seem to be any agreement. A factor that is ignored, or not mentioned in the study designs, is how the beef was grown.

There is reason to believe that it makes a huge difference whether cattle are raised “on the range” or in confinement. The vast majority of beef cattle in the USA are born on ranches, but then sent for finishing to feedlots, where they are stuffed with energy- and protein-rich diets that are usually based on soybeans or maize.

Grass-fed beef, organic milk, and eggs from free-range chickens are much healthier than those from confined animals fattened on soybeans and maize: they are leaner, and the composition of fatty acids is more conducive to human physical well-being.

A recent article by Provenza et al. summarizes it elegantly:

“The health of livestock, humans, and environments is tied to plant diversity – and associated phytochemical richness – across landscapes. Health is enhanced when livestock forage on phytochemically rich landscapes, is reduced when livestock forage on simple mixture or monoculture pastures or consume high-grain rations in feedlots, and is greatly reduced for people who eat highly processed diets.”²⁹

The connection between livestock diets and the quality and taste of their products is well known to traditional livestock keepers. In India, the pastoralists in the Thar Desert are proud that their camels and goats feed on 36 different plant types, most of them also used in ayurvedic medicine. Ghee (butterfat), goat meat and camel milk produced in such systems raise significantly higher prices than those from stall-fed animals, and even poor people will go to great lengths to obtain them out of a belief that they are better for their health.

Animal-sourced food from biodiverse management systems is an excellent source of micro-nutrients that are missing from modern diets.



Photo: Washington State Department of Agriculture (CC BY-NC 2.0)

Free-range chickens scavenge on seeds and insects.

Myth 9

- ▶ **“Efficient” high-yielding livestock are in the public interest, as they enable low-cost access to animal-sourced foods and take up less space than extensively kept animals**

Truth 9

- ▶ **High-yielding livestock kept in large holdings are a major threat to global public health as they require the routine use of antibiotics, and are a driver for deforestation that leads to the emergence of zoonoses**

THIS ARGUMENT IS BROUGHT forward by the livestock community whose sole goal has been to improve “efficiency”. Livestock efficiency is defined in terms of feed input versus product output, or the feed conversion rate. For example, a modern broiler currently has to be fed 1.6 kg of dry matter to produce 1 kg of poultry meat. In beef cattle this ratio is 6:1 – it takes 6 kg of feed to produce 1 kg of beef.

Often this is then linked to greenhouse-gas emissions. The global dairy sector prides itself on having reduced emissions of CO₂-equivalent from 2.8 to 2.5 kg per kilogram of product in the 10-year period from 2005 to 2015.³⁰ Currently efforts are on to arrive at “net zero emissions” for the dairy sector, by further improving “efficiency”.

Certainly, it makes a difference to the farmer how much feed is needed to produce a certain yield.

But the sole focus on efficiency ignores the negative fallout it is associated with. There is a downside to efficiency. Productivity goes at the expense of fitness and disease resistance. When so much metabolic energy is directed at growth or yield, animals have no “bandwidth” left to resist diseases.

And, if again for the sake of efficiency, huge numbers of genetically uniform animals are concentrated in confined spaces, this creates ideal conditions for the emergence of diseases and for viruses to increase their potency.³¹

The animals cannot slow down their metabolism, and if their regular supply of high-quality feed is disrupted, they stop producing, and die. The animals that are raised for meat production in industrial systems have to be slaughtered at a pre-ordained age for value chains to function. Broilers not culled at the right age put on so much weight that their legs can no longer carry them. Pigs become too big to fit into the standardized slaughtering processes.

Furthermore, such high-performing animals require exactly calculated dietary rations, rich in protein and/or energy, mostly made from soybeans, maize and palm oil. Cultivation of feed plants is a major driver for deforestation in the Amazon and Southeast Asia.³² The associated loss of biodiversity is implicated in the emergence of novel zoonoses.

A sole focus on “efficiency” is the leading cause for a host of negative externalities of livestock. We need to adopt a holistic approach when evaluating livestock systems, including aspects such as antimicrobial resistance and the impact of growing feed crops on biodiversity.

Conclusion

LIVESTOCK ARE NOT A black-and-white issue. They require a nuanced approach. If managed properly, livestock are an asset for making better use of our small planet's resources.

Continuing to manage our planet against nature is a threat for human survival.



Photo: © Marian Quiroga Mendiola

Llamas are one of the main pastoralist species in Argentina.

Next page: Young people need to see potential for the future if they are to follow their parents into livestock herding.

Part II

Livestock for the future



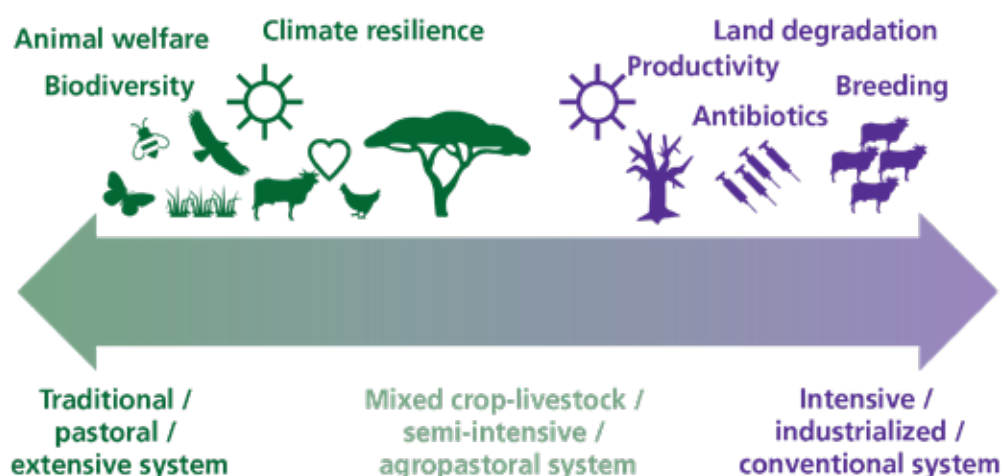
Photo: © Marc Michel

WE HAVE SEEN THAT the impacts of livestock on the environment, the climate, human health, and animal welfare can range from devastating to beneficial. It all depends on the way animals are managed – whether in tune with nature, or against it. In very simplified terms, this is the situation:

At one end of the spectrum is livestock with which we have social relations, that forage on native vegetation and/or crop by-products, are fully sustained by local resources, upcycle waste into value, co-exist with wildlife, support organic and agroecological production, and are a joy to behold that enhances the landscape. They produce less food, but of much higher value.

At the other end of the spectrum, livestock are concentrated and immobilized in “CAFOs” (concentrated animal feeding operations) – factory farms and feedlots. Their function is to metabolize feed that has been grown as monocultures and is often transported over huge distances. Some of the feed ingredients come from land that was formerly covered by tropical rainforests. These systems produce huge quantities of food, but their effluents are a toxic liability that poison the air, soil and water, and that nobody wants in their neighbourhoods. They contribute to the emergence of zoonoses by promoting deforestation and the transformation of grasslands into crop monocultures.

This is, I repeat, the situation in starkly abridged terms, describing two extremes of a very wide set of diverse livestock systems. There are innumerable arrangements in between, including agroecological approaches of integrated crop-livestock farms.



What is at stake?

IF WE ELIMINATED ALL animal agriculture, or removed livestock from 1.2 billion ha of agricultural land,³⁴ we would lose the following:

- ▶ The capacity to produce food on two-thirds of the world's agricultural land.
- ▶ A billion livelihoods for people living in rangelands and other marginal areas.
- ▶ Our ability to adapt to climate change because livestock are far more resilient to higher temperatures and extreme environments than any crop.
- ▶ The option of having natural diets without commercial supplements such as vitamin B12.
- ▶ Indigenous cultures with a huge body of traditional knowledge that can teach the world how to live harmoniously with animals.
- ▶ Close relationships across species borders that bring us joy, keep us grounded in the natural world, and make us more humane.

We would not save much methane, as the livestock would be replaced by wild ruminants and termites, which also emit the gas.³⁵

I hope you agree that a world without livestock is not really a viable scenario and that it would be a wild goose chase to seek to eliminate them.

It makes much more sense instead to focus our energies on supporting the good ways of managing livestock – in tune with nature, as intelligent creatures and integral parts of landscapes. We should try to curb the bad ways that use animals as if they were inanimate objects and keep them in unnatural ways.

What went wrong with livestock?

IF WE WANT TO find our way out of the livestock crisis – as we must – it is important to understand the dynamic that has led us into the current conundrum.

At the bottom of it are two wrong assumptions or, if you like, two further myths that are propagated by many livestock experts and economists:

- ▶ Higher yields mean higher income for farmers
- ▶ Efficiency equals sustainability.



Photo: Dživnieku brīvība (CC BY-NC 2.0)

The quest for higher yields and greater efficiency is what has given us layer hens in battery cages.

Wrong assumption 1

► Higher yields mean higher income for farmers

THERE IS A WIDESPREAD belief, or implicit assumption, that livestock profitability depends on their yields, and that higher-yielding animals are more profitable for the farmer. Based on this rationale, the solution promoted for improving farmers' incomes in the Global South is to increase livestock productivity and efficiency. "Improved breeds" have been at the core of numerous development projects. Replace a cow that produces 4 litres of milk a day with a 20-litre cow, and your income will multiply. Swap local chickens for hybrids, and poor tribal women will be lifted out of poverty. Go for fast-growing exotic pigs instead of the local variety, and your family will become wealthy.

But in the Global North, farmers already have the improved breeds and nevertheless can no longer make a living. So here they are told that they have to "grow or go" and increase their livestock holdings if they want to stay in the business. Having 50 cows is not enough; you need to expand your herd to 200 to stay afloat.

It sounds logical and alluring. But it's often a fundamental error. Owning better breeds means having to purchase feed, which may be expensive or not even available in developing countries. In many a scenario, low-input local breeds are more profitable than high-input types because they have no maintenance costs. They largely take care of themselves, foraging on their own during the day and delivering their contribution of eggs or milk without any ado. High-yielding animals are susceptible to diseases and need more care. Rural women, who commonly care for sick animals, generally prefer the local breeds because they don't need to worry about them.

Mainstream farmers in the Global North, who have been made to believe that their only chance of survival is by becoming bigger and adding more animals, routinely take out huge loans to invest in ever bigger operations.



Photo: pxfuel.com

A grain elevator in Nebraska, USA. The focus on productivity and efficiency benefits multinational input suppliers and feed companies, not farmers. Pressed to expand or die, many farmers are encumbered by debt.

At the same time, they have no control over either feed costs or farm-gate prices for their product, often getting squeezed in the middle. Once they have taken a loan, there is no way back. Many farms are practically owned by banks.

The focus on production, and wrongly equating production with higher incomes for farmers, has set in motion a treadmill. It has led to an over-supply of many livestock products, which in turn has left farmers without the means to negotiate for fair prices.

The beneficiaries of this development have not been farmers but the companies that supply inputs. This includes the four or five companies that control 90% of the grain trade and are specialized in shipping livestock feed around the world; a handful of breeding businesses with global reach that provide the kind of genetics that thrives in artificial systems; and the corporations that control the antibiotics, fertilizers and pesticides that are necessary to operate large animal farms. Many farmers are locked into vertical integration, having to buy feed from the same supplier to whom they sell their products.

Ironically, the farmers who own the most efficient and highest-yielding livestock often can no longer make a living. In both the EU and USA they have become heavily dependent on subsidies. The EU shells out EUR 54 billion a year in agricultural subsidies; the world as a whole subsidizes farming to the tune of USD 700 billion annually.³⁶ The subsidized overproduction by US and EU farmers leads to a scramble for export opportunities and the dumping of produce in developing countries at low prices, out-competing local farmers and undermining local economies.



Photo: Ilse Köhler-Rollefson (CC BY 4.0)

A Bahima herder milking Ankole cattle, Uganda. Development projects frequently promote improved, high-yielding breeds such as Holstein-Friesian dairy cattle. But these require special housing, feed and veterinary care to thrive. Without these costly inputs, they quickly succumb to diseases. Local breeds such as the Ankole are much better adapted to the conditions.

Wrong assumption 2

► Efficiency equals sustainability

THE MANTRA IN ANIMAL-SCIENCE circles is that by making livestock more efficient we improve the sustainability of livestock systems, and that we need to “close the efficiency gap” between the high-output livestock systems in the North and the low-output systems in the South. Livestock efficiency is mainly defined as the ratio between inputs and outputs, or the amount of feed needed to produce a certain amount of milk or meat. Since efficient animals need less feed to arrive at a certain output, this means a reduction in the amount of greenhouse gases emitted. Thus, further increasing efficiency is regarded as the solution to lessening the climate impact of livestock and putting it on the path to sustainability.

At first glance this is logical. But it reduces sustainability to one single parameter: greenhouse-gas emissions per unit of product. If we measure sustainability through this parameter, then industrial systems come out on top. But sustainability is more than that: it also encompasses biodiversity, soil health, air and water quality, public health and rural livelihoods. These facets of sustainability are overlooked if we just focus on greenhouse-gas emissions in relationship to milk or meat output.

If we take a more holistic, “landscape” view and include other environmental parameters in the equation, including the ability of grasslands to sequester CO₂, we arrive at different results, and pastoral and pasture systems do much better.³⁷ Although there are no detailed studies on this, we also know that the “efficient systems” go along with a loss of rural livelihoods, with antimicrobial resistance and other public-health issues.

In essence, mainstream animal science, with its fixation on efficiency measured by product output, has looked at livestock in isolation from its social and ecological context and ignored the laws of nature. The impacts on biodiversity, other environmental parameters, social-welfare indicators



Photo: Javier Lastras (CC BY 2.0)

Intensively raised chickens. No – efficiency does not equate with sustainability.

and even food quality have been ignored or externalized. Some degree of efficiency is obviously necessary, but one wonders why the real efficiency of pastoral systems in generating animal protein is ignored. Other aspects to be considered include the nutritional density and composition of animal-sourced food, which differ between pasture-raised and intensively fed livestock. The pre-occupation with greenhouse-gas emissions has also led to the standard recommendation to improve fodder quality, basically to feed less fibrous and more digestible feed. Yes – but that goes at the expense of protein efficiency, and the sector has not concerned itself with the consequences of growing such feed. The need, or rather demand, for livestock feed has contributed in a major way to, or even driven, the deforestation of the Amazon, the conversion of the Pampas into soybean acreage, and the razing of the tropical forests in Southeast Asia to produce palm oil.

The universally promoted high-yielding livestock depend on cultivated feed with the many fossil fuel-dependent steps that entail cutting down vegetation, ploughing, seeding, fertilizing, harvesting etc. Local, low-input livestock as raised by pastoralists and some farmers have the ability to directly convert biodiverse vegetation into food, with no other energy requirements than those provided by the sun.

On a planet with limited resources, where it is utterly urgent to reduce our use of fossil fuels, we need to rear livestock according to the laws of nature instead of against them. In the absence of fossil fuels, livestock numbers would adjust themselves to the availability of natural resources. These define the boundary to the amount of animal protein we can produce sustainably on our small planet. Instead of seeking to double livestock output by 2050 to make it affordable for all – as promoted by FAO – we need to distribute animal-sourced foods more equitably between the North and South. Especially, we need to support the nature-positive livestock systems that still exist widely in the South and are making a small comeback in the North. Their output could be improved with the right kind of policies and interventions, including veterinary care, recognition of customary rights to grazing areas, appreciation of pastoralist cultures, decentralized processing facilities and value chains, and integrating livestock keeping in overall natural resource management.³⁸



Photo: Paul Mundy (CC BY 4.0)

Herding a mixed flock of sheep and goats in Mongolia: sustainable rather than efficient.

Nine principles for livestock for a small planet

OUR PLANET IS ECOLOGICALLY and culturally very diverse, and there are no one-size-fits-all solutions. It is also not the time to be dogmatic in our approaches. But certain ecological, socio-economic and animal-welfare principles are broadly applicable and should govern our actions.

Ecological principles Work with nature

The key proposition here is to introduce as much mobility into livestock systems as feasible to unlock the capacity of livestock for solar powered, nature-positive production.

► Extensify

Instead of stuffing animals with feed specially grown for them, we need to put them to work to **harvest unused biomass or add value to food and crop waste**. Instead of further intensifying by increasing output per animal, as is the mainstream approach, we need to **extensify**, meaning to deploy livestock to maximally harvest as much “waste” and unused biomass as possible, both in the remotest corners of the world as well as in the most urban ones. Such practices are going on all over the world but do not receive enough attention in appreciation. In India, goats graze

Ecological principles

1	Extensify	Revive transhumance Support city herders
2	Mobilize	Provide services to mobile livestock keepers Ensure rights to customary grazing Celebrate herders as environmental heroes
3	Feed only waste	Make all animal husbandry land-based Feed pigs and chickens on food waste
4	Re-integrate livestock into landscapes	Encourage interaction between croppers and livestock keepers, e.g., organic certification or climate credits

Socioeconomic principles

5	Enable small livestock farmers to make a decent living	Make producers pay for negative externalities they cause Link livestock keeping with nature conservation for environmental services
6	Reintroduce hardy, multi-functional breeds	Support multi-functionality through subsidies, consumer awareness and rules
7	Process and market locally	Invest in and subsidize decentralized processing infrastructure, such as networks of micro-dairies

Animal welfare principles

8	Animals are made for walking	Develop a generic global label for animals kept in herding systems Provide subsidies for setting up stables and runs that allow animals movement
9	Keep livestock in natural social groups	Learn from herders and avant-garde farmers how to do this

on roadsides, female agricultural labourers tether sheep nearby while they harvest crops, camels swim in the sea to feed on mangroves, pigs seek out leftover rice grains on harvested paddy fields, ducks migrate from pond to pond in nomadic systems, and buffaloes go out for night grazing on their own to return in the morning to deliver their milk.

Herdling is the key word here. Skilled herders can graze their animals in parks and on lawns even in the middle of cities, as demonstrated by the *bergers urbains* in Paris and the *Stadtshäfer* of Berlin.

Actions

Revive transhumance.

Support city herders.



Photo: © Guillaume Leterrier www.bergersurbains.com

Urban shepherding: sheep mowing a lawn in Paris. Pollution and noise-free, and a pleasure for local residents.

► Mobilize

Let animals walk to their feed instead of transporting it to them. This is a core principle, as it replaces fossil fuels with solar energy. Exercise keeps animals healthy and has multiple benefits, although it also means that they burn more calories – which is scorned as undermining their efficiency. Pastoralism has been neglected, and made very difficult, both intentionally and unintentionally. Because of the general association of nomadic pastoralism with backwardness, young people are – unsurprisingly – not willing to take up the hardships. As a result, former grazing areas are lying unused or underused. This situation has to be turned around by facilitating migration, easing associated hardships and raising the reputation of being a grazer.

Actions

Provide services to mobile livestock keepers.

Ensure rights to customary grazing.

Celebrate young (and old) herders as environmental heroes.



Photo: Ilse Köhler-Roller/son (CC BY 4.0)

Young Raika herders in India. The neglect of pastoralism has made it an unattractive career choice for young people.

► Feed only waste

Restrict the use of livestock to their original function of upcycling plants and waste that humans cannot consume.

Using limited arable land to grow grain and oil crops to feed livestock requires a lot of energy and wastes a lot of protein. This is something we can no longer afford to do, especially if it involves cutting down tropical forests. Instead we need to maximize the ability of livestock to make use of food and crop waste as well as of natural vegetation.

Actions

Make all animal husbandry land-based.
Feed pigs and chickens on food waste.



Photo: Rbreidbrown (CC BY-SA 4.0)

Backyard chickens produce meat and eggs. They can scavenge for food as well as eat kitchen waste.

► Re-integrate livestock into agricultural landscapes in order to ensure agroecological recycling of nutrients

In arable areas, we need **animals to feed on crop by-products** while also providing organic manure. This is ordained by nature where plants, herbivores and carnivores are all part of a gigantic nutrient cycle. This integration can happen at the farm level, or between cultivators and pastoralists. Throughout much of India, harvested fields are grazed by pastoralist herds that metabolize crop waste and “weeds”. At the same time, they deposit organic manure directly on the field, saving huge amounts of chemical fertilizer.

Actions

Encourage the traditional interaction between croppers and livestock keepers – for instance by organic certification or by giving climate credits for saving chemical fertilizer.



Photo: Ozlady (CC BY-NC 2.0)

Ducks in a harvested rice field in Bali, Indonesia. They search for fallen grains, snails and insects. They control weeds and reduce the need for insecticides.

Socioeconomic principles

Think local, promote social justice

Livestock keeping involves a lot of hard work, and the margins are low or non-existent. That demotivates and discourages even young people from livestock-keeping communities. But we need **dispersed small and medium-sized operations** rather than “concentrated animal feeding operations” and factory farms. We must create economic and social incentives to make nature-friendly livestock keeping attractive.



Photo: © Schäfferei Seebürger

In Germany and the Netherlands, grazing by sheep is the ideal way to maintain the dykes that protect both cities and farmland from flooding.

► Enable small and medium-sized livestock farmers to make a decent living

The on-going consolidation of livestock holdings in the dairy and other sectors is undermining sustainability in a big way. Part of the reason is that small and medium-sized farms can hardly survive. This trend must be stopped, and policies must be put in place that enable them to make **reasonable incomes**.

Actions

Make producers pay for negative externalities they cause.
Link livestock keeping with nature conservation for environmental services.



Photo: Paul Mundy (CC BY 4.0)

Shepherd and sheep in Shetland, UK. Many small livestock farms are de facto organic, even if they are not certified as such.

► Reintroduce hardy and multi-functional livestock breeds

Traditional, heritage or heirloom breeds have many advantages. In the North, they are kept mostly by hobby farmers, but have advantages in being easier to care for and being more resistant to diseases. Their product quality is often higher, and they have potential for producing regional specialty foods that reflect *terroir* – the characteristics of a particular area. Pastoralists keep animals that have been selected for making best use of the local vegetation. For them, the ability to walk is an important criterion.

Industrial breeds have been selected for only one purpose. In chickens, this is either eggs or meat. In cattle, there are dairy and beef breeds. In dairy cattle, the male calves are practically worthless for fattening and are sold off for a pittance. In order to cut out waste, we need to go back to multi-functional animals.

Actions

Support multi-functionality through subsidies, consumer awareness and rules – as in Germany, where shredding male layer chicks immediately after hatching has been banned.



Photo: Pigsels.com

The red-and-white Fleckvieh breed is adaptable and can be used to produce both meat and milk.

► Establish local processing facilities and support regional marketing

Control over value addition is the key to increasing livestock keepers' income. Artisanal cheese making is an example, and is the vision for the camel dairy sector in Rajasthan, India. Networks of small, local processing facilities are better from the animal welfare and climate perspectives as they reduce transport distances. They can also create jobs in remote areas.

Actions

This is where public investment is necessary and justified as it supports rural livelihoods and prevents rural–urban migration. It should be a priority for donor agencies that work on addressing poverty.



Photo; . ILRI/Jules Mateo (CC BY-NC-ND 2.0)

Collecting milk in Haryana, India. Small-scale dairies, abattoirs and other processing facilities can provide a market outlet for perishable livestock products.

Animal welfare principles

Make livestock happy

► Animals are made for walking

Giving animals the freedom to move and, especially, to select their own diets, keeps them healthy and happier, reducing the need for antibiotics. It is not always possible to achieve this, but good livestock keepers try to create conditions in which animals have to move and exercise. This improves their health and longevity.

Actions

Label products according to the space and diets that animals have access to.

Provide subsidies for setting up stables and runs that allow animals movement.



Photo: Andreas Metz (CC BY-NC-SA 2.0)

The annual “Almabtrieb”, when herders bring the animals down from the mountain pastures in September, is a tourist attraction in the Allgäu region of southern Germany.

► Keep livestock in natural social groups

Separating calves from their mothers is standard practice in dairying, and it is convenient. **But it is possible to do without**, as is shown by the Calf at Foot dairy in the UK,³⁹ for example. It certainly involves more work, but many consumers are willing to pay a premium in exchange for guilt-free consumption. It is acceptable to separate mothers and young for part of the day and to reunite them at night. This is a practice followed by many herders in India, who keep young animals at home while the mothers go out for grazing and browsing.

Actions

Learn from herders and avant-garde farmers how to do this!



Photo: Ilse Köhler-Rollefson (CC BY 4.0)

A Raika family and their flock, Rajasthan, India. Both humans and livestock are happiest when they are in natural social groups.

The way ahead

Fundamentally rethinking livestock

WE HAVE SEEN HOW the impact of livestock on the environment depends on how we engage with them and ranges from being the most ecologically positive way of food production to one that is extremely detrimental.

Through a focus on feed conversion rate at the expense of all other considerations we have more or less reversed the role of plants and animals: we have immobilized livestock and move around plants to feed them. Thereby we have essentially turned a solar powered system into one heavily dependent on fossil fuels.

We have also often disconnected crop cultivation and animal husbandry, looking at them as separate entities, instead of complementary functions. This has resulted on the one hand in extensive monocultures that require chemical fertilizer, and on the other in feedlots or factory farms that generate toxic manure which is difficult to dispose of.

In order to re-balance the planet, we need to follow the principles of nature and mimic it as much as possible. We have to return our farm animals to their original function of aggregating the solar energy that is embedded in plants, and enabling them to directly recycle nutrients into the soil.

In rangelands where crops cannot be grown, we need to optimize the role of livestock in converting biodiverse biomass into protein and other products for human consumption. Digital technologies such as mobile phones, drones, remote sensing and global positioning systems can play a major role in this.

In arable areas, we need to reintegrate livestock into the crop cycle to create agroecological landscapes in which herd animals provide organic manure and maintain soil fertility. If we manage to do this, we will on one hand save enormous amounts of chemical fertilizer, and on the other hand eliminate the need for disposing of unwanted manure that has turned into a toxic externality.

We, and especially the animal scientists among us, need to fundamentally rethink livestock and leave behind the narrow way of judging its merits on the basis of efficiency or feed conversion rate. Instead we have to adopt a more comprehensive and holistic framework, such as True Cost Accounting, that takes into account biodiversity and public health.⁴⁰

Pastoralism is the most widespread method of food production globally⁴¹ and there are many hundreds of pastoralist communities that have a heritage of keeping livestock in balance with nature. Their almost ubiquitous presence underscores the potential for putting livestock keeping on an ecologically sustainable and animal welfare friendly track. We can learn much from these herding societies how to maintain the link to nature and how to engage with it without overtaxing it. The issues they face are manifold, but the concept of **Livestock Keepers' Rights**, which was developed in a bottom-up approach and is supported by a large number of herder and civil society organizations, encompasses many of the requirements for supporting nature-positive production by small-scale livestock keepers.⁴²

For ecological animal production, we require livestock that are different from the kind pursued by commercial animal breeding and maximized for output: animals that can walk well and that are in a position to thrive under the variability that climate change is imparting on us. The need for livestock to be optimally adapted to their respective environments means that breeding must remain in the hands of local livestock keepers and cannot be outsourced to global genetics companies that provide one-type-fits-all options.

For moral and ethical reasons, we need to reconnect with farm animals, treat them as partners rather than lifeless mechanical devices, and take advantage of their animal intelligence – or “AI”. Regarding them as fellow-creatures, we must strive to provide them with a happy life, but also acknowledge that death is a part of life.

We must accept that there are planetary limits to the amount of animal protein we can produce sustainably and search for structures and mechanisms that distribute it equitably between people.

Urgently, governments need to develop land use plans that ensure space in the landscape for herd animals to move around safely between grazing areas.

There are currently several UN-level processes engaging with livestock:

- ▶ The **UN Food Systems Summit** (UNFSS) has a “livestock solutions cluster”, while the Global Peoples’ Summit is focusing on taking down corporate control over the food sector and encouraging disinvestment from industrial livestock sector.
- ▶ **FAO’s Committee on Agriculture** has set up a sub-committee on livestock. We need to make sure that it does not only engage with cosmetic changes to the livestock sector and busy itself with designing diplomatic language to arrive at the lowest common denominator. It should address livestock issues at their roots instead of pandering to interest groups.
- ▶ The **Government of Mongolia** has taken the initiative of promoting an International Year of Rangelands and Pastoralists (IYRP) for 2026. This provides the opportunity of highlighting the role of mobile livestock keeping for nature and local economies.

It is hoped that these processes will disentangle and clarify the differences between “good” and “bad” livestock and agree on a global framework that takes into account the finite resources of our planet, the needs of the many people who directly depend on livestock, as well as the ethical imperative to treat livestock as co-creatures rather than inanimate objects. Re-mobilizing livestock – so it can unfold its potential for food production with nature rather than against it – is a challenging and urgent task. The world’s pastoralist heritage in combination with selected technological innovations is our best bet for achieving this.

Livestock keepers’ rights

Livestock Keepers’ Rights are a set of principles and rights proposed by civil society in 2012.⁴³

Principles	
1	Livestock keepers are creators of breeds and custodians of animal genetic resources for food and agriculture.
2	Livestock keepers and the sustainable use of traditional breeds are dependent on the conservation of their respective ecosystems .
3	Traditional breeds represent collective property , products of indigenous knowledge and cultural expression of livestock keepers.
Rights	
1	Livestock keepers have the right to make breeding decisions and breed the breeds they maintain.
2	Livestock keepers shall have the right to participate in policy formulation and implementation processes on animal genetic resources for food and agriculture.
3	Livestock keepers shall have the right to appropriate training and capacity building and equal access to relevant services enabling and supporting them to raise livestock and to better process and market their products.
4	Livestock keepers shall have the right to participate in the identification of research needs and research design with respect to their genetic resources, as is mandated by the principle of prior informed consent.
5	Livestock keepers shall have the right to effectively access information on issues related to their local breeds and livestock diversity.

About LPP

THE LEAGUE FOR PASTORAL Peoples was founded in 1992 to provide relief in an acute crisis experienced by Raika camel pastoralists in India. Its initial mandate was to support pastoral societies and other small-scale livestock keepers to pursue their own vision of development through research, technical support, advisory services and advocacy.

Now LPP conducts research and advocacy that supports and strengthens pastoralists and other “small-scale” livestock keepers. In collaboration with our wide international networks of organizations that represent the interests of local livestock keepers – many among them pastoralists – we develop alternative approaches, challenge mainstream opinions, and build up the case for strengthening livestock keepers through appropriate policies and interventions. We support livestock keepers to make visible and validate their traditional knowledge and resources.

A special emphasis is on building the capacity of our partners to stand up for their rights under international legal frameworks and agreements, such as the United Nations Convention on Biological Diversity (CBD), the Global Plan of Action for Animal Genetic Resources (GPA), the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), and the UN Convention on Combating Desertification (UNCCD).

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