10 Myths About Grazing

In response to calls for major reductions in meat and dairy production, a recent strategy of the industry has been to frame certain forms of livestock grazing as "regenerative," claiming that properly managed grazing systems sequester massive amounts of carbon, improve soil fertility, and promote ecosystem biodiversity. The science, however, says otherwise.

Myth 1. Grazing Can Be Climate Neutral.

Counter to industry claims, grazing systems cannot sequester large amounts of carbon for long amounts of time. All forms of cattle grazing, regardless of the management system, result in net increases in greenhouse gases, particularly methane and nitrous oxide. While it's true that *some* grazing systems can sequester *some* carbon in soils, sequestration potential is much more limited and nuanced than many livestock advocates acknowledge.

The ability for soil to sequester carbon is site-specific and varies among ecosystems and microclimates. Much of the world's pasture currently used to graze livestock came from clearing forests or wild grasslands, which naturally store more carbon than managed pasture. Furthermore, soil carbon sequestration is time limited. Soils reach "carbon equilibrium" within a span of 20-30 years, beyond which no more carbon can be taken in without a corresponding loss. Even before reaching carbon equilibrium, soil carbon stored in topsoil is easily lost during drought, flooding and other disturbances.

"Grazing livestock — even in a best-case scenario — are net contributors to the climate problem, as are all livestock. Good grazing management cannot offset its own emissions, let alone those arising from other systems of animal production … Methane will be emitted and continue to warm the planet as long as cattle are still reared. The problem only disappears if ruminant production is abandoned."
—Tara Garnett, Food Climate Research Network, lead author of the report *Grazed and Confused*

Several recent studies indicate that as temperatures increase in a warming climate, the total amount of carbon released from soils is also increasing. A study published in *Nature* found that when researchers artificially warmed the soil in a Panamanian rainforest to model the long-term effects of climate change, the increase in temperature caused soils to release 55% more carbon than the soil in nearby unwarmed areas — a much larger release than anticipated. Evidence suggests that microbes in warmer soils grow much more active, leading to the increased release.

Agricultural soils contain 25% to 75% less SOC than their counterparts in undisturbed or natural ecosystems. According to a meta-analysis out of Oxford University, the maximum global potential (of carbon sequestered in these soils), in the most optimistic conditions and using the most generous of assumptions, would offset only "20%-60% of emissions from grazing cows, 4%-11% of total livestock emissions, and 0.6%-1.6% of total annual greenhouse gas emissions."

Projections of long-term soil carbon storage have depended upon the presumed existence of a substance called humus, a component of soil that was believed to be a composite of nondegradable or "recalcitrant" carbon

molecules that could not be broken down by soil microbes, and thus persisted to be stored in soils indefinitely. Claims around soils' capacity for long-term carbon sequestration have been entirely underpinned by this longstanding paradigm.

But recent advances in soil science technology have upended this theory. In the past decade, advanced microscopy and spectroscopy sampling of soils have found no presence of persistent soil carbon molecules that cannot be broken down by microbes and released back into the atmosphere.

In addition to the finite and reversible carbon-storage potential of soils, grazing livestock are one of the largest sources of anthropogenic methane and nitrous oxide emissions. These emissions, which trap heat on a far larger scale than CO_2, persist regardless of how much carbon soils are able to sequester. With climate scientists now saying that slashing methane emissions is the best and quickest strategy for slowing warming by 2040, massive reductions in ruminant animal production are crucial to climate mitigation.

Myth 2. Grazing Is a Conservation Solution.

Contrary to industry claims, grazing is not a conservation solution. Cattle grazing is a leading driver of deforestation, species endangerment, habitat degradation and biodiversity loss. The conversion of forests and grasslands to pasture for grazing livestock has been one of the most significant drivers of ecosystem destruction globally. Between 2001 and 2015, the conversion of forests to pasture resulted in five times more deforestation globally than for any other leading deforestation-driving commodities, with the bulk of forest replacement by cattle occurring in tropical forests.

Grazing is a serious threat to ecosystems, particularly on federal lands. It's the largest commercial use of public lands, occurring on more than 260 million acres. Additionally, most ecosystems in the western United States are not adapted to the impacts of large herds of livestock. Domestic livestock consuming vegetation in these ecosystems has detrimentally altered fire cycles and promoted invasive vegetation at the expense of native plant species. By destroying vegetation, damaging or completely eradicating wildlife habitats, and disrupting natural processes, grazing wreaks ecological havoc on riparian areas, rivers, deserts, grasslands and forests alike — causing significant harm to native species and the ecosystems on which they depend.

Cattle destroy native vegetation, damage soils and stream banks, and contaminate waterways with fecal waste. After decades of livestock grazing, once-lush streams and riparian forests have been reduced to flat, dry wastelands; once-rich topsoil has been turned to dust, causing soil erosion, stream sedimentation and wholesale elimination of many aquatic habitats; overgrazing of native fire-carrying grasses has starved some western forests of natural fire cycles, making them overly dense and prone to unnaturally severe fires.

Wildlife are harmed and displaced by even the best-managed grazing systems. A meta-analysis of 109 studies examining the impacts of removal of grazing livestock on wildlife found that across all animals, livestock exclusion increased abundance and diversity. In the arid West, livestock grazing is the most widespread cause of wildlife endangerment. Grazing cattle and sheep has contributed to the listing of 22% of federal threatened and endangered species in the United States — nearly as much as logging (12%) and mining (11%) combined.

Additionally, millions of native wild animals are routinely killed to protect the profits of meat and dairy producers. While grazing advocates frequently claim that grazing non-native livestock is beneficial, even crucial, for ecosystem health because it "mimics natural systems," native grazers like elk, deer, bison and pronghorns are systematically killed en masse to reserve more pasture and forage for cattle.

Meanwhile, hundreds of thousands of native carnivores like bears, wolves, coyotes and mountain lions are destroyed in the most gruesome methods imaginable by government "predator control" programs that kill them on behalf of grazing livestock producers.

Myth 3. Regenerative Grazing Is an Effective Ecosystem Restoration Solution.

Counter to industry claims, holistic and regenerative cattle grazing is not an effective ecosystem restoration solution. Overwhelming peer-reviewed science has found that the application of these management practices can be as detrimental to plants, soils, water and climate as conventional grazing systems.

Despite the damaging history of cattle grazing, the claim has emerged that certain forms of managed livestock grazing are actually good, or even necessary, for ecosystem health. Variously referred to as holistic management, regenerative grazing, mob, adaptive or rotational grazing, these systems are promoted as a means of restoring degraded desert and grassland ecosystems and mitigating or reversing climate change through soil carbon sequestration.

Proponents of holistic/regenerative grazing claim that rotating livestock herds mimics the migration patterns of native ungulates like bison or antelope when they flee from predators. The stampeding hoof action, it's claimed, disturbs biological soil crusts and tramples plants into the earth in a way that promotes soil restoration. Additionally, since the natural movement of wild herbivore herds means they do not tend to graze the same place for long periods of time, it is claimed that rotational or "multi-paddock" grazing prevents the harms of overgrazing.

However, a 2008 meta-analysis by rangeland scientists reviewing six decades of research concludes: "Evidence indicates that rotational grazing is a viable grazing strategy on rangelands, but the perception that it is superior to continuous grazing is not supported by the vast majority of experimental investigations. There is no consistent or overwhelming evidence demonstrating that rotational grazing simulates ecological processes to enhance plant and animal production compared to that of continuous grazing on rangelands."

Holistic and regenerative grazing also requires 2.5 times more land than conventional grazing. There is only enough U.S. pastureland to support 27% of current beef production if beef producers switched to all grass-fed and regenerative grazing practices.

Myth 4. Grazing Is Good For Marginal Lands.

Contrary to industry claims, cattle do not make the best use of marginal lands. Such claims assume that land only has value if it can produce crops and ignores the vital, resilient and biodiverse native wildlife and ecosystems that thrive in these habitats. In terms of biodiversity and planetary health, we must look beyond immediate economic gains. We all depend on the well-being of our deserts, oceans, wetlands and forests — far beyond their ability to produce food.

Shifting to more plant-based food production requires vastly less land, leaving more marginal lands available for conservation or restoration. Meanwhile the United States wastes 40% of the food it produces, and addressing this problem would make food production far more efficient. And the livestock industry currently uses a whopping 77% of the world's agricultural land — to provide a mere 18% of global calories.

Some cattle producers claim they graze "marginal lands" that cannot support crop production. Many lands are not suited to large monocultures like those grown to feed livestock but may provide sources of food without ecologically destructive cattle grazing. For example, western pinyon-juniper forests on public lands that are sacrificed to make way for cattle grazing actually provide an important source of tribal foods like pine nuts. With large and deep root systems that can penetrate rock crevices, native trees are adapted to thrive. In arid, semidesert areas, species like olive trees have used their widespread and resilient root system to persist for hundreds of years.

Myth 5. Cows Are Like Bison and Other Native Grazers.

Counter to industry claims, cattle grazing does not adequately mimic the grazing behaviors of native herbivores

like bison who evolved with their habitat. Cattle are a non-native species in the United States and have different impacts on landscapes than native wildlife like bison have, particularly in the West. Claims about replacing native grazers like bison and elk with cattle fail to take into account crucial differences between cattle and native herbivores and their roles in different ecosystems.

Much of the arid West — including most of the Great Basin; the deserts of Southern California, Arizona, New Mexico and Colorado; and the grasslands of eastern Washington, western Montana and northern Idaho — never had large herds of grazing animals and did not evolve with and are not adapted to significant grazing pressure from bison. Bison distribution was limited or nonexistent in these regions. There is no comparison and no evolutionary parallel with cattle in these lands.

Additionally, native herbivores like elk or bison rarely regraze the same areas in the way that cattle often do. In regions where bison were present under natural conditions, they moved freely and frequently, seldom regrazing the same site for long periods of time.

Natural cycles of life, including predator-prey relationships, also maintain the size of wild native grazing herds in a way that is not true for cattle, whose presence often leads to the direct killing of predators by livestock operators or government programs.

Claims about holistic grazing models ignore the obvious difference between an ecosystem where the carcasses of wildlife remain and nourish the habitat with nutrients, vs. the unnatural removal and transportation of cattle for slaughter, which contributes enormous amounts of pollution. Wildlife carcasses also play an important role in biodiversity and ecosystem function and benefit many other animals, especially during the winter.

The impact on watersheds is also a crucial difference. Bison, for example, do not congregate near water the way cattle do. This means greater erosion and stream sedimentation in the presence of cattle herds.

The replacement of native grazers with cattle has also caused steep rises in emissions of methane — a GHG that is 86 times more potent than CO_2 in the short term. This is because cows are "ruminants" and have specialized stomachs capable of digesting tough and fibrous material, such as grass, through fermentation. The digestive process causes cows to belch and otherwise expel large amounts of methane.

Native herbivores and wild ruminants, on the other hand, typically have much smaller methane footprints. Many large herbivores are "hindgut fermenters" and have a simple stomach, carrying out fermentation of food in the large intestine. This type of digestion produces much smaller amounts of methane.

Finally, cattle exist in much larger numbers than bison ever did. Migrating bison that evolved with the landscape may have numbered 25 million to 60 million at one point; this is a far cry from the current 93 million non-native cattle in the United States.

"Unlike native herbivores, livestock are usually concentrated by fences or herding and are often forced to regraze plants. Livestock prefer green plants that are higher in nutrients and protein. Many native grass plants take up to 10 years to fully recover from one grazing event, and there are few pastures rested for that kind of period. Bison tend to graze the coarser grasses, elk the regrown grass that follows bison, antelope seek out the forbs (flowers), and deer tend to eat shrubs. When you have a full suite of native herbivores, no one group of plants is overly affected by herbivory."
—George Wuerthner, *How Livestock Differ From Wildlife*

Myth 6. Cows Are Good for Grasslands Ecosystems.

Contrary to industry claims, grasslands do not need to be grazed by cattle. Native herbivores and natural grasslands are much better at sequestering carbon than managed grasslands with herds of cattle. There are very

few places on the planet where vegetation has not historically been grazed or browsed by native herbivores. However, hundreds of years of intensive livestock farming have contributed to steep declines in native herbivores.

In fact, a recent study of grassland carbon sequestration showed that grasslands are better able to sequester carbon with light grazing from native ruminants. The study states that the "net global climate warming caused by managed grasslands cancels the net climate cooling from carbon sinks in sparsely grazed and natural grasslands," which the authors specify as "sparsely grazed" by native herbivores. In other words, to mitigate climate change, we will need to enhance carbon storage in grasslands and reduce GHGs from managed grasslands. Cattle grazing on grasslands produces substantial amounts of methane with limited ability to sequester carbon.

The natural processes of grasslands and native grazers have only been interrupted because of the presence of domestic cattle and sheep. Cattle, sheep and goats are non-native species introduced to the Americas by European colonizers — and today's selectively bred bovines are a far ecological cry from those initial cows.

In healthy ecosystems native herbivores exist in much smaller numbers than the artificially large populations of billions of cattle, sheep and goats farmed for meat and dairy. Grassland ecosystems in particular are better suited to rewilding and a return of native species with naturally evolved foraging and grazing systems. Relying on cattle to graze vegetation also reduces ecosystem integrity since a diversity of wildlife would naturally graze different plants, and different parts of plants, at different times and seasons, which is why a pasture in and of itself is not "biodiverse" and doesn't promote biodiversity. Particularly on public lands, native plants and grasses are better served by promoting native herbivores over non-native cattle.

Myth 7. Grazing Is an Efficient Form of Food Production.

Contrary to industry claims, grazing cattle is not an efficient way to produce food. Cows are highly inefficient converters of calories and protein, in terms of both energy consumed and resources used.

At the caloric level, cows convert only 3%-4% of what they consume into human food, meaning it takes 25-30 calories of grass or grain intake to produce 1 calorie of human food. While it's true that 100% pasture-fed cows consume grasses that humans can't digest, all of that pasture is a massively inefficient use of land when compared to the land required to produce plant-based foods for direct human consumption.

Beef cattle alone use nearly 60% of the world's agricultural land but account for less than 2% of global calories and 5% of global protein consumed. Compared to plant proteins such as beans, peas and lentils, beef requires six times more water and 20 times more land — and it emits 20 times more GHG emissions per gram of edible protein. One liter of cow's milk emits three times more GHGs than one liter of soy milk; it requires 22 times more water and 12 times more land.

Grazing cattle are also very water intensive. As climate change and drought ravage the West, grazing cattle are increasingly supplemented with irrigated feed due to decreased vegetation in drought-ridden pastures. And cattle grazed in grasslands instead of pasture are eating the habitat of native wildlife.

Assuming that land is only valuable in terms of its ability to produce items for human consumption is problematic. At current rates of consumption, this is not a resource-efficient *or* a calorically effective system.

Myth 8. It's Not the Cow, It's the How.

Contrary to industry claims, no form of grazing management can solve the problem of how damaging cows are for the planet, especially at current levels of consumption. It's the cow, it's the how, and it's especially how many cows.

As non-native animals, cattle have tremendous ecological impacts. While some grazing practices cause less harm than others — though with different harmful tradeoffs and opportunity costs — the farming of cattle will continue to be environmentally devastating. People in the United States eat four times the global average of beef, for example, in contradiction to both health guidelines for beef and dairy and environmental standards.

A Harvard study found that shifting to exclusively pastured systems would require 30% more cattle and increase beef's methane emissions by 43% just to keep up with current demand, while a 2012 study found that a shift to all grass-fed beef in the United States would require an additional 200,000 square miles of land — an area larger than the states of New York, Pennsylvania, Florida and Ohio combined. This is because people in the United States consume at least 56 pounds of beef per person annually, which is vastly out of proportion to what's environmentally sustainable.

The most widely touted example of regenerative grazing, White Oaks Pastures, claims to produce "carbon neutral beef" with a management system called Adaptive Multi-Paddock Grazing (AMP). In recent peer-reviewed analysis, White Oaks was found to be lower in emissions compared to conventional grazing, but it was *not* carbon-negative.

More broadly, a five-year landscape-scale study that compared adaptive multi-paddock rotational grazing and traditional season-long, continuous grazing found that AMP grazing did *not* improve quality, productivity or density of vegetation or perennial grasses.

The latest report from the Intergovernmental Panel on Climate Change, or IPCC, emphasized the importance of reducing methane, a GHG 86 times more potent than carbon in the short term. According to UNEP, agriculture contributed 40% of methane emissions globally, while another study showed methane from animal agriculture specifically is 35-40% of worldwide methane emissions.
Animal agriculture via enteric fermentation and manure is the largest domestic source of methane in the United States. That effectively means that cattle are the leading source of U.S. methane and a leading contributor to agricultural emissions worldwide, a fact the industry tries hard to downplay.

Cattle production has a significant negative impact on the environment, no matter the production method. The more cows, the greater the impact. Meanwhile cattle producers are the leading reason that wildlife like wolves, bison and coyotes are killed, as well as a leading source of water pollution, species endangerment and habitat degradation.

Myth 9. Grazing Is an Effective Wildfire Solution.

Contrary to industry claims, targeted cattle grazing is not an effective wildfire solution. Cattle grazing has greatly increased the incidence of wildfires in the American West. For decades under the dual guise of "wildfire reduction" and "restoration of sage grouse habitat," huge tracts of old-growth pinyon-juniper forest have been chained and razed by the Bureau of Land Management and turned into cattle pasture, despite the reality that both grazing and the removal of pinyon-juniper forest have been shown to *increase* cheatgrass invasion and wildfire risk.

Grazing is one of the primary reasons invasive winter grasses, which dry up and become wildfire fuel, have such a stronghold in the western United States. For example, overgrazing of native grasses has spurred the spread of invasive cheatgrass, which can damage or destroy intact sagebrush and bunchgrass ecosystems that are more fire-resistant. Cheatgrass is a highly flammable annual grass considered the main culprit in the rangeland megafires that are increasingly devastating the Great Basin region, where livestock grazing is a leading conservation threat.

Ironically, many livestock producers and agencies like the Bureau of Land Management promote grazing as a way to control cheatgrass and reduce wildfire risk. This framing, however, has been exposed by numerous

environmental experts and organizations as a ruse for improving and expanding cattle pasture, thereby increasing profit for ranchers. Unproven "fire suppression" programs are used as a cover for massive deforestation projects on western federal lands to make room for even more grazing.

Myth 10. Grazing Creates Healthy Soil.

Contrary to industry claims, cattle hooves can cause significant harm to landscapes. Trampling the earth does not unilaterally improve vegetation growth. Biological soil crusts — biocrusts — are the living skin of the Earth in desert environments. These crusts are highly sensitive to livestock trampling and slow to recover, regardless of the type of grazing system implemented. Common impacts include increased erosion, reduced soil fertility, and proliferation of non-native weeds that increase wildfire incidence.

A core premise of so-called regenerative grazing is that the trampling hoof action of grazing livestock provides the same important ecosystem services that native ungulates like deer, bison, elk and antelope once provided through natural herd movement cycles. These services include breaking up biocrusts, increasing water infiltration, reducing runoff and erosion, embedding seeds, and increasing soil fertility by incorporating decomposing plant matter, manure and urine into the soil. Some of this is true in the right places. Certain rhizominous plants only regenerate with hoof pressure.

The reality is that in the western United States, displacement of fire-resistant native bunchgrass by highly flammable exotic cheatgrass is widely attributed to livestock destruction of biocrusts. Intact bunchgrass communities limit both the spread of fire and the invasion of exotic grasses.

Additionally, much of the West, where cattle grazing is concentrated, did not evolve with a significant presence of hooved large herbivores, with the exception of bison in the plains states. So the claim that livestock grazing and hoof action are important to western lands is inaccurate.

Overall, trampling patterns of livestock have been shown to destroy biological crusts, increase soil compaction and erosion, and reduce soil fertility and water infiltration. The claim that hoof action of cattle increases water infiltration of soils has also been disproven. Livestock grazing frequently compacts soil, thereby reducing water seepage and absorption, and increasing runoff, erosion and sediment yield. Nor is hoof action needed to increase soil fertility and decomposition of litter. Soil microorganisms, bacteria and fungi naturally decompose plant and animal residues in ecosystems.

Scientific evidence points to the importance of burrowing animals in enhancing soil fertility by embedding decaying plant matter into the earth, but not grazing animals like cattle and bison, whose removal of native vegetation and disturbance of biocrusts reduces fertility and organic content of soils. Cattle trample burrows, causing burrowing animals to be targeted for killing by federal programs such as the U.S. Department of Agriculture's Wildlife Services because they pose threats of injury and competition for cattle.

The assumption of holistic management claims "that increasing hoof action will increase infiltration" has been disproven. Livestock grazing can compact soil, reduce infiltration, and increase runoff, erosion, and sediment yield [67–71]. Major increases in erosion and runoff occur under normal stocking when comparing grazed to ungrazed sites [68, 71–74]. Extensive literature reviews report the negative impacts of livestock grazing on soil stability and erosion [75–77]. For example, a study of wet and dry meadows in Oregon found the infiltration rate in ungrazed dry meadows was 13 times greater and 2.3 times greater in ungrazed wet meadows, compared to similar grazed meadows [78]."
—"Holistic Management: Misinformation on the Science of Grazed Ecosystems."