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SOCAN Testimony supporting SB80

Chair Golden and members of the Senate Committee on Natural Resources and Wildfire:

As I have noted previously, Southern Oregon Climate Action Now is a grassroots climate organization of some 2,000 Southern Oregonians. We are concerned about the climate crisis and seek federal, state and local action to address it. We are rural and coastal Southern Oregonians who live on the frontlines of the warming, reducing snowpack, heatwaves, drought, rising sea level and the increasing wildfire risk that these trends conspire to impose on us. Because of our concern, we pay close attention to efforts nationally, statewide, and locally that impact our collective efforts to address the climate crisis. As our logo above indicates, the focus of SOCAN is to promote action through science.

Rather than detailing the full array of reasons that CAFOs are offensive, I will focus on the environmental and climate negatives. CAFOs are cruel and inhumane methods of producing food that deny the sentience or feelings of the confined animals and treat them as non-sentient unfeeling objects. The CAFO business model assigns to the animals in their charge but a single purpose – to generate profits for CAFO owners and stockholders. Maybe this concern will be addressed by others.

As Walton and Jaiven (2020) noted: “Today, approximately 99% of meat and other animal products in the United States are from factory farms, and the number of CAFOs in the United States continues to grow.” Hribar (2010) a decade ad a half ago, acknowledged that “properly managed, located, and monitored, CAFOs can provide a low-cost source of meat, milk, and eggs, due to efficient feeding and housing of animals, increased facility size, and animal specialization” and that they can enhance the local economy. However, her main concern, even fifteen years ago, was the negative effects of the operations on environmental and human health; she also expressed the concern that Animal Feeding Operations pose a potential environmental hazard noting that this was recognized as long ago as the 1972 Clean Water Act.

In terms of the **Groundwater** hazard, Hribar (2010) stated: “Groundwater can be contaminated by CAFOs through runoff from land application of manure, leaching from manure that has been improperly spread on land, or through leaks or breaks in storage or containment units.” Skinner

(2025) reported a study revealing “Dangerous levels of nitrates have been found in drinking water in eastern Oregon because of factory farms in the area….”

The **surface waters** of the state and nation are threatened by manure escaping from treatment lagoons, particularly problematic during heavy rainfall (events which are expected to increase in frequency with climate change) and consequent floods (Hribar 2010). Contaminants include nitrogen, nitrates, phosphates and ammonia. The first three of these serve as nutrients promoting algal blooms which initially starve water bodies of light, and then die only to decay and thus starve the water bodies of oxygen through resultant anaerobic decomposition. This suffocates aquatic animals whether invertebrate, insect larva, or fish.

Within and near the CAFO, **air quality** is compromised by emissions of gaseous and particulate items that pose health hazards to workers and neighboring communities (Hribar 2010). Notable among these are ammonia, hydrogen sulfide, and methane. Anyone living near or driving by a CAFO and inhaling is well aware of these consequences. Table 1 (from Hribar 2010) summarizes the air quality problems.

CAFO Emissions	Source	Traits	Health Risks
Ammonia	Formed when microbes decompose undigested organic nitrogen compounds in manure	Colorless, sharp pungent odor	Respiratory irritant, chemical burns to the respiratory tract, skin, and eyes, severe cough, chronic lung disease
Hydrogen Sulfide	Anaerobic bacterial decomposition of protein and other sulfur containing organic matter	Odor of rotten eggs	Inflammation of the moist membranes of eye and respiratory tract, olfactory neuron loss, death
Methane	Microbial degradation of organic matter under anaerobic conditions	Colorless, odorless, highly flammable	No health risks. Is a greenhouse gas and contributes to climate change
Particulate Matter	Feed, bedding materials, dry manure, unpaved soil surfaces, animal dander, poultry feathers	Comprised of fecal matter, feed materials, pollen, bacteria, fungi, skin cells, silicates	Chronic bronchitis, chronic respiratory symptoms, declines in lung function, organic dust toxic syndrome

Table 1 Typical pollutants found in air surrounding CAFOs. (from Hribar 2010)

The environmental impacts of CAFOs in the area of groundwater and surface water contamination are responsible for the ubiquitous fish kills (e.g., Nicole 2013, Ellison 2018, Merchant and Osterberg 2020, Redman 2020) that are associated with CAFO mismanagement. These present serious inconvenience to neighboring communities.

In the discussion from over a decade ago, Hribar (2010) continues by delineating the human problems caused by CAFOs, discussing odors largely a result of the ammonia, hydrogen sulfide,

carbon dioxide and miscellaneous volatile and semi-volatile organic compounds; insect vectors notably house flies stable flies and mosquitoes; pathogens such as parasites, bacteria, and viruses (see Table 2); pathogens (see Table 2); anti-biotics employed to promote growth and resist disease, especially critical as more and ever more animals are confined together; and finally, property values.

Pathogen	Disease	Symptoms
Bacillus anthracis	Anthrax	Skin sores, headache, fever, chills, nausea, vomiting
Escherichia coli	Colibacilosis, Coliform, mastitis-metris	Diarrhea, abdominal gas
Leptospira pomona	Leptospirosis	Abdominal pain, muscle pain, vomiting, fever
Listeria monocytogenes	Listerosis	Fever, fatigue, nausea, vomiting, diarrhea
Salmonella species	Salmonellosis	Abdominal pain, diarrhea, nausea, chills, fever, headache
Clostridium tetani	Tetanus	Violent muscle spasms, lockjaw, difficulty breathing
Histoplasma capsulatum	Histoplasmosis	Fever, chills, muscle ache, cough rash, joint pain and stiffness
Microsporum and *Trichophyton*	Ringworm	Itching, rash
Giardia lamblia	Giardiasis	Diarrhea, abdominal pain, abdominal gas, nausea, vomiting, fever
Cryptosporidium species	Cryptosporidosis	Diarrhea, dehydration, weakness, abdominal cramping

Table 2 Select pathogens found in animal manure. (from Hribar 2010)

The concerns expressed by Hribar (2010) have not been resolved. In a literature review, Brewer (2020) focused on antimicrobial resistance problems appearing in humans that result from CAFOs and the problem of manure contamination causing eutrophication (nutrient enrichment) of waterways. Dip (2021) reported: “that communities—and children in particular—living near CAFOs have higher rates of Asthma….”, and “In 2020, factory farms spent over $140 MILLION lobbying our elected officials against effective climate change legislation to ensure they can continue to use CAFOs….” No doubt these lobbyists will be out in force in connection with SB80.

The Climate Crisis

It is well known, I suspect, that the sequence of events leading to our climate crisis is as summarized below:

(1) the increasing concentration of greenhouse gases released as a result of human activity leads to,

(2) the capture of outwardly radiating heat from the Earth’s surface. This heat is derived from incoming solar radiation (mainly in the short wavelength visible light range) being turned into

longer wavelength heat radiation when arriving at and contacting the Earth's surface. This, then radiates back out and results in,

(3) greater heat energy in our atmosphere leading locally to reducing snowpack, greater evaporation and droughts inducing drying soils and vegetation and, in turn, greater wildfire risk plus more severe weather – especially storms, hurricanes, etc.

Projections of temperature trends resulting from the ongoing emissions of greenhouse gases suggest plausibly that globally we will see a warming of between 3.3 and 5.7^{o}C (5.94 and 10.26^{o}F) relative to 1850-1900 conditions by the end of this century (IPCC 2021), an outcome that would devastate our natural ecosystems, agriculture, forestry and fisheries. This would be unmanageable and must be avoided if life on the planet as we know it is to continue.

This sequence clearly identifies the primary cause as the climate pollution resulting from human activities, particularly the release of carbon dioxide, methane, nitrous oxide and other heat-trapping gases into our atmosphere. As depicted in Figure 1, the dominant gas is carbon dioxide. However, as presented in that Figure, where the Annual Greenhouse Gas Index (AGGI) (NOAA 2022) is shown, other gases are also important. With carbon dioxide established as the basis for comparison with a Global Warming Potential (GWP) (or carbon dioxide equivalent CO_2e) of 1, other gases are reported relative to this. The most recent IPCC Assessment Report 6 (IPCC 2021) reports the value for nitrous oxide (N_2O) as 273, and that for methane (CH_4) – because it is relatively short-lived in the atmosphere - as about 80 on a 20-year basis and between 27 and 29 on a 100-year basis. The AGGI depicts the warming of the planet, measured in terms of the Radiative Forcing of the constituent gases in terms of Watts per meter squared at the Earth's surface. The AGGI was set at unity (i.e.,1) in 1990 with the deviation from that before and after 1990 showing a clear and consistent increase. By 2023, the AGGI had reached 1.51. (NOAA 2024).This means that the AGGI has increased over 50% in twenty five years. Potentially equally disturbing is the realization that gases other than carbon

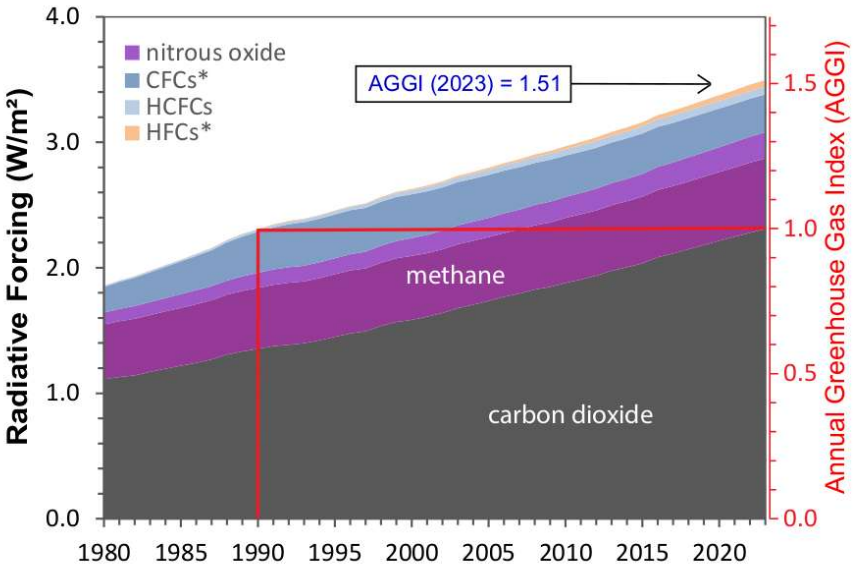

Figure 1. NOAA's Annual Greenhouse Gas Index indicates the contribution of gases other than carbon dioxide to global warming. (NOAA 2024)

dioxide are contributing substantially to the problem. All other gases combined are responsible for about 33% of overall global warming while the leader among these other gases is methane, contributing about 15% to the global warming problem. The message should be clear, but in case not: this means that in addition to reducing the carbon dioxide emissions and atmospheric concentration, we must address the other gases, especially methane.

An estimate of the contribution of livestock to the global climate crisis via emissions of gases from enteric fermentation was reported as 14.5% a decade ago (Gerber *et al.* 2013). Incidentally, an entirely parallel anaerobic bacterial breakdown process occurs in the gut of cattle to that driving decay in anaerobic CAFO manure lagoons. The product in both cases is methane. The overall contribution of methane to the atmosphere a decade ago was less than the reported 2024 value of 15% (see Figure 1 and discussion). Globally, methane comes from a diversity of sources, including, for example, natural wetlands, rice paddies, fossil fuel (especially fossil [natural] gas) extraction, processing and transmission, and permafrost thawing. In the U.S., Massey and Keintzy (2021) reported that enteric fermentation in cattle is responsible for 179 million of the U.S. total of 6,577 Million Metric Tons of total emissions, all measured in terms of carbon dioxide equivalent. This is slightly over 2.7% of U.S. emissions. If this value is accurate, and the U.S. contribution of methane to the problem follows the global trend (i.e., about 15%), then enteric fermentation is responsible for over 18% of our national methane emissions. The IPCC (2019), reporting on emissions from land use, concluded "Agriculture, Forestry and Other Land Use (AFOLU) activities accounted for around 13% of CO_2, 44% of methane (CH_4), and 81% of nitrous oxide (N_2O) emissions cumulatively during 2007-2016. This represents 23% (12.0 ± 2.9 $GtCO_2eq$ yr-1) of total net anthropogenic emissions of GHGs." Hersher and Aubrey (2019) note that, at that time, 50% of vegetated land globally is dedicated to agriculture, while 30% of the cropland grows grain just to feed animals. Our hunger for meat products makes meat production a leading cause of deforestation – a process that both emits carbon dioxide and other greenhouse gases itself and thwarts the capacity of removed trees to sequester further carbon from the atmosphere. The International Energy Agency (IEA 2022) reported that Methane is responsible for around 30% of the current rise in global temperature. The indication is that we should examine agricultural activities that result in methane emissions and respond accordingly by reducing them as much as possible.

Ritchie (2021) reported that "agricultural products as a whole contribute 33% to global [greenhouse gas] emissions" again implying we need to address them. Meanwhile, in a study of trajectories for achieving Intergovernmental Panel on Climate Change warming targets, Clark *et al.* (2020) concluded: "Even if fossil fuel emissions were rapidly reduced, emissions from the global food system are on a trajectory that would prevent achievement of the 1.5° and 2°C targets before the end of the century."

CAFOs inevitably contribute substantially to the problem since the sheer number of animals is immense. However, purely from a climate perspective, it has been suggested that grass-fed cattle, taking longer than CAFO cattle to grow, actually emit more methane per unit of product.

Lupo *et al.* (2013), for example, assessed that grassfed cattle produced 37% more emissions than feedlot cattle, though they noted that 15 – 24% reductions occur when soil organic carbon gain from grassfed versus CAFO cattle was accounted. Countering the conclusion that grassfed cattle are more greenhouse gas intensive than CAFO cattle, Hayek and Miller (2021), assessing emissions using a top-down rather than bottom-up approach, concluded that the methane emissions from confined feeding operations may be 39% - 90% higher than previously reported. This would negate the CAFO benefit reported by Lupo *et al.* (2013). Hayek and Miller (2021) also suggest "We find that region-wide emissions from meat and milk production could reach 1.52 (1.41–1.62) Gt CO_2eq by 2050, an amount 21% (13%–29%) higher than previously predicted. Therefore, intensification may not be as effective in mitigating emissions in developing countries as is commonly assumed." The purported climate benefit of CAFOs is clearly questionable.

Meanwhile among complete Life Cycle Analyses (LCA), support for the grassfed approach has been reported. For example, Stanley *et al.* (2018) concluded that, in grassfed operations: "Emissions from the grazing system were offset completely by soil C sequestration." They added: "Soil C sequestration from well-managed grazing may help to mitigate climate change." A full life cycle study conducted on a grassfed regenerative grazing operation at the behest of General Mills at White Oaks Pastures in Georgia, concluded that the system: "effectively captures soil carbon, offsetting a majority of the emissions related to beef production." They even also suggested that the system: "may have a net positive effect on climate."

Whether the greenhouse gas emissions from CAFOs are a little more per pound of beef or a little less, the associated environmental and health negatives of CAFO production discussed above should be enough to tip the balance against them. The comment offered by Matsumoto (2019) seems entirely appropriate here: "the world [needs] to cut back on its meat consumption…" This suggestion was also evident in the Brewer (2020) review where the author "stressed the importance for a reduction in meat consumption, as this is ultimately the driver of intensified livestock production systems."

As a closing comment, I refer to the 'right to farm' laws and principles which, no doubt, will be promoted by those defending CAFOs. According to NALC (2022): "All fifty states have enacted right-to-farm laws that seek to protect qualifying farmers and ranchers from nuisance lawsuits filed by individuals who move into a rural area where normal farming operations exist, and who later use nuisance actions to attempt to stop those ongoing operations." Note that the principle is not to defend an operation such as a CAFO that itself constitutes a threat to the lives, livelihoods, and health of neighbors and small family farms.

As a point of interest, I note that as of March 30th 2025, at 8:00pm, there were only two submitted testimonies in opposition to this bill, and one of these (Travers) actually supported the bill but, presumably, opposed CAFOs. The other (Torres) claimed that CAFOs are family farms and not factory farms while offering no arguments to counter the problems that CAFOs

impose on society in the form of methane emissions and naively argued that by meeting harsh regulatory requirements, CAFOs could not be polluting Oregon's waterways.

It's time to protect Oregon's water by restricting CAFO development as would be required by SB80 (OLIS 2025) where their construction or expansion would likely compromise waters in a groundwater management area as defined by ORS 468B.180 (Oregon undated). Restricting CAFOs would also have immense climate benefits. For these reasons, SOCAN support SB80.

Respectfully Submitted

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