

Global Food Security — Deep-Dive

Purpose. “But how do we feed the world?” is the most common objection to any argument for a dietary shift — and it deserves a serious, quantitative answer. This text works through the strand and shows an often-overlooked twist: properly understood, the food-security question **cuts against industrial grain-fed animal production**, because it competes with human food — *not* against subsistence and grazing livestock, which upgrade biomass inedible to humans. Examined closely, the objection therefore flips in favour of the bundle’s core thesis.

1. Food vs. feed — the central figure

Cassidy et al. 2013 (*Environmental Research Letters* 8(3):034015, doi:10.1088/1748-9326/8/3/034015) recompute global agricultural output not in tonnes but in “people nourished per hectare”. Finding: **36% of the calories from the world’s crops go to animal feed — and only about 12% of those feed calories return as human food**. Redirecting crop calories (away from feed and biofuel, toward direct human consumption) could in principle feed **about 4 billion additional people**. The reason is **trophic inefficiency**: every step of the food chain loses energy; feeding an animal as an “intermediary” costs most of the input calories.

2. The conversion losses in detail

Calorie and protein recovery varies strongly by species: beef is least efficient (a few percent of feed calories become edible meat), poultry and eggs markedly better, milk in between. The effect compounds the land inefficiency (Poore & Nemecek 2018, cf. 0090-B3 §2): **83% of farmland for animal products that provide only ~18% of calories**. Feed grain — soy and maize that *could be grown for humans* on cropland — is run through the animal and largely “consumed” in the process.

3. Hunger is (also) a distribution problem

Globally, hundreds of millions are chronically undernourished (FAO *State of Food Security and Nutrition in the World*, recent editions: order of ~700–800 M). Important qualification: hunger is **not primarily a production but a distribution and poverty problem** — the world produces, on paper, enough calories. But the **feed competition sharpens** the distribution problem: grain that could feed humans becomes meat (destined for the affluent); rising meat demand drives feed and thus grain prices. The link is therefore indirect but real.

4. Affordability and justice

A healthy, sustainable reference diet is unaffordable for a large share of humanity: **~1.58 billion people cannot afford the EAT-Lancet Planetary Health Diet** (Hirvonen et al. 2020, doi:10.1016/S2214-109X(19)30447-4). This is the hard class and Global-South limit of every dietary recommendation. It cuts both ways: it counsels modesty toward blanket “eat this” messages — *and* it shows that wasting crop calories in the feed trough is a justice problem.

5. The honest counter-objection: not all feed competes

Decisive and fair: **not all feed competes with human food**. Ruminants on **non-arable grass-land** turn cellulose (indigestible to humans) into protein; pigs and chickens in **smallholder mixed systems** use kitchen and crop waste, by-products (bran, pomace, whey) and food scraps. In such systems the animal is a **net calorie gain**, not a loss — it unlocks food that would otherwise be lost. The food-vs-feed critique therefore hits **grain-fed industrial CAFO production** with full force, extensive grazing only partly, and subsistence use of residues **not at all**. This differentiation is not a concession but precision.

6. The twist in the argument

From this follows the real point: the “how do we feed the world?” objection, usually raised *against* reducing animal products, on close inspection speaks **for** reducing *industrial, grain-fed* animal production — because that is precisely what withdraws crop calories from human food. Food security is an **argument against CAFO grain feeding**, not for it. At the same time the same finding supports keeping livestock in subsistence, grazing and mixed systems, where it *adds* food rather than withdrawing it. Both together are exactly the bundle’s position: critique of *industrial* production, caveat for *subsistence*.

7. Evidence grading

Finding	Best source	Status
36% crop calories → feed; 12% returned	Cassidy et al. 2013	Robust
Redirection could feed ~4 bn more (on paper)	Cassidy et al. 2013	Model upper bound
83% farmland for 18% calories	Poore & Nemecek 2018	Robust
Hunger primarily distribution/poverty	FAO SOFI	Consensus
~1.58 bn cannot afford reference diet	Hirvonen et al. 2020	Robust
Not all feed competes (grass/residues)	Agroecological differentiation	Robust, system-dependent

8. Synthesis

First: the trophic and land inefficiency of grain-fed animal production is quantitatively robust — it withdraws calories from human food on a large scale.

Second: hunger is primarily a distribution problem, but feed competition and the affordability limit sharpen it — so food security is an argument *against* industrial grain feeding.

Third — the differentiated point: the “how do we feed the world” objection, examined closely, flips in favour of the bundle’s thesis and simultaneously in favour of the subsistence caveat: **reduce industrial CAFO grain feeding** (improves global food security), **protect subsistence and grazing livestock** (adds food). The primary addressee is again the industrial structure, not the smallholder or pastoral keeper.

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