

# DIET CHOICES - ETHICAL IMPACTS

## FEEDING PEOPLE

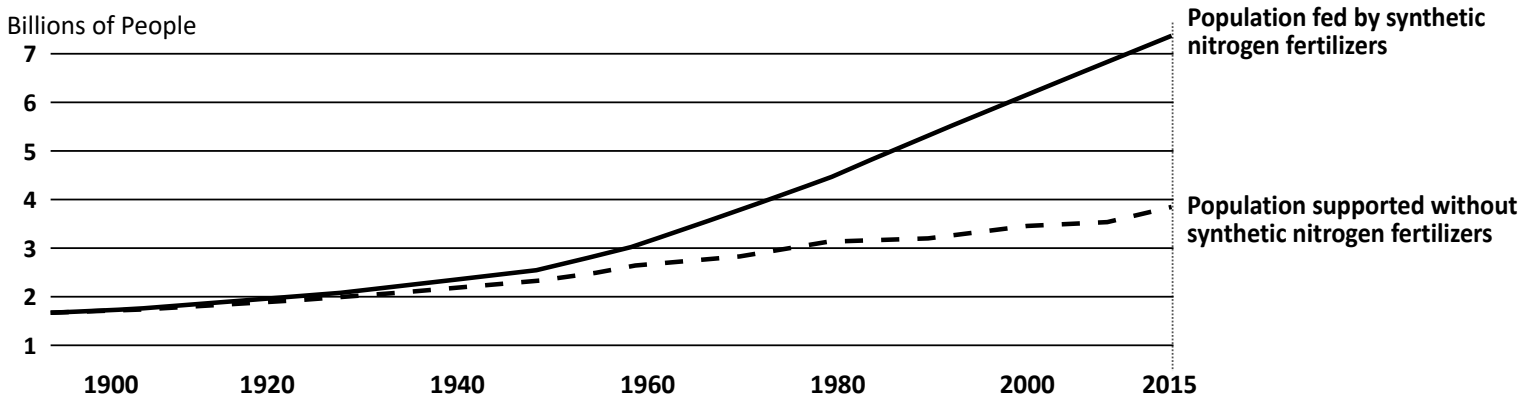
### Current and Projected Agricultural Land Use - World



Current and projected agricultural land use under various scenarios. Current land use is cropland, pasture, meadows, as reported in our land use exhibit from **FAO**. Population in 2060 is the median forecast from **World Population Prospects**. Projected yields are an annual increase of 0.8%, based on **FAO**. Chinese, European, and American diets are shown in **FAOSTAT**, and the land use impacts of these diets are estimated as in our diet and land use exhibit derived from **Clark and Tilman** and **Froehlich et al.**. Total farmable land is estimated as the sum of current farmed, grazed, and arable land from **The World Bank**.

**References:** Food and Agriculture Organization of the United Nations. "FAOSTAT".  
 United Nations, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section. "World Population Prospects: The 2017 Revision". Accessed April 18, 2019.  
 The World Bank. "Arable land (% of land area)". Accessed January 5, 2020.  
 Clark, M., Tilman, D. "Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice". *Environmental Research Letters* 12(6). June 2017.  
 Froehlich, H., Runge, C., Gentry, R., Gaines, S., Halpern, B. "Comparative terrestrial feed and land use of an aquaculture-dominant world". *Proceedings of the National Academy of Sciences of the United States of America* 115(20), pp. 5295-5300. May 2018.  
 Food and Agriculture Organization. "Global agriculture towards 2050". Office of the Director, Agricultural Development Economics Division. October 2009.

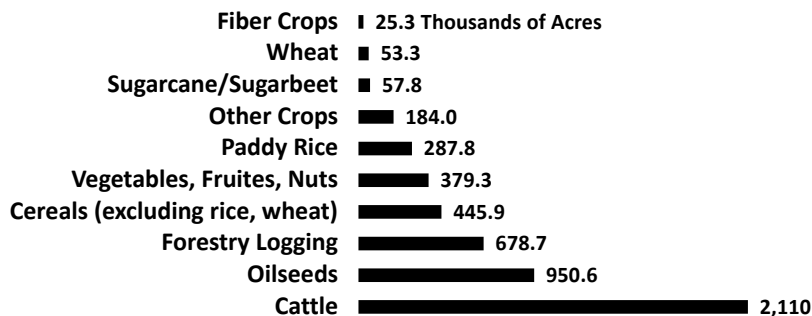
### World Population Supported by Synthetic Nitrogen Fertilizers



**Source:** Erisman, J. W., Sutton, M. A., Galloway, J., Klimont, Z., & Winiwarter, W. (2008). [How a century of ammonia synthesis changed the world](#). *Nature Geoscience*, 1(10), 636-639.

### ALLOWING OTHERS TO LIVE

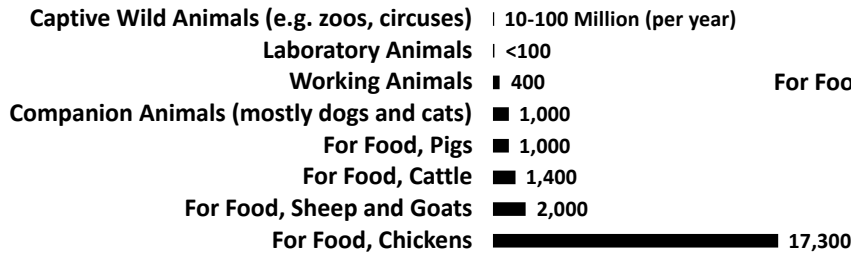
#### Annual Deforestation by Commodity



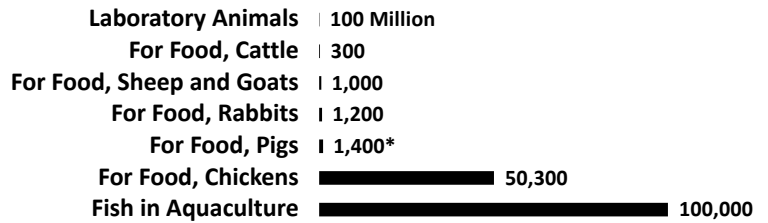
Research by Michael Goff, initial graphics and selection by Lee Nelson, layout and further selection by John van der Harst, and final graphics by Richard Burd, 2/24/2023

Ritchie, H. "Cutting down forests: what are the drivers of deforestation?". *Our World in Data*. February 2021  
 Pendrill, F., Persson, U. M., Godar, J., Kastner, T., Moran, D., Schmidt, S., Wood, R. "Agricultural and forestry trade drives large share of tropical deforestation emissions". *Global Environmental Change* 56, pp. 1-10. May 2019..

## Animals Kept in Captivity



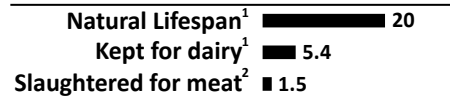
## Animals Killed Annually



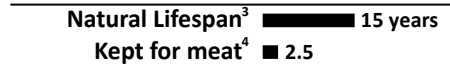
References: Fraser, D., MacRae, A. M. "Four Types of Activities that Affect Animals: Implications for Animal Welfare Science and Animal Ethics Philosophy". *Animal Welfare* 20(4), pp. 581-590. November 2011. \*Pigs are sent to slaughter before they live for a complete year, so this number exceeds the number of pigs in captivity

## Animals Slaughtered for Consumption

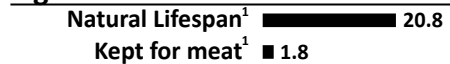
### Cows



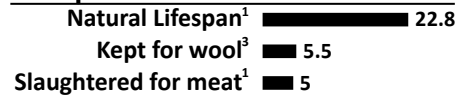
### Bison



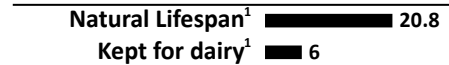
### Pigs



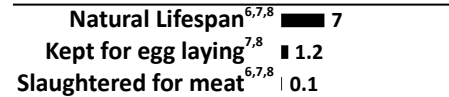
### Sheep



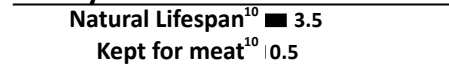
### Goats



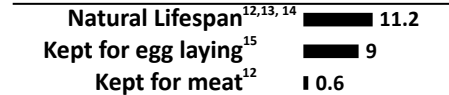
### Chickens



### Turkey<sup>9</sup>



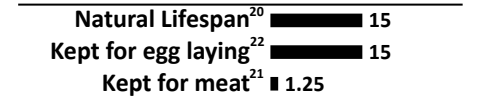
### Duck<sup>11</sup>



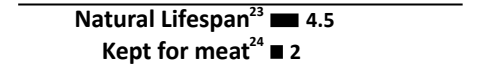
### Geese<sup>16</sup>



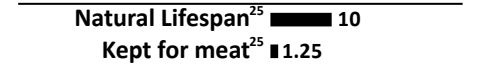
### Emu<sup>19</sup>



### Catfish

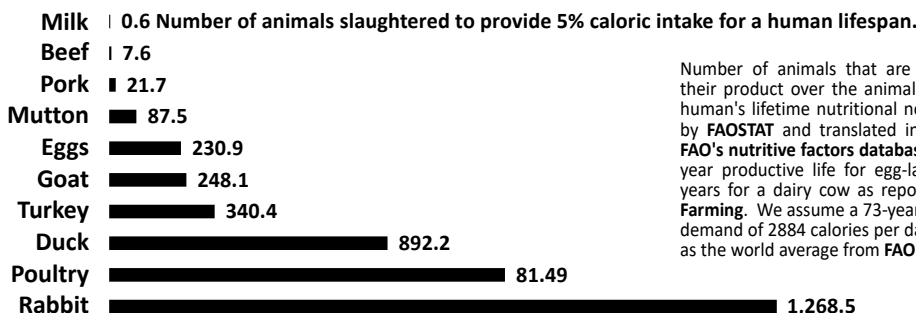


### Salmon



- 1.) Hoffman, J.M., Valencak, T.G. *A short life on the farm: aging and longevity in agricultural, large-bodied mammals*. *GeroScience* 42, 909–922 (2020). See Fig.1 for lifespan data.
- 2.) McDade, Erin. *The Lifespan of a Cow Depends a Lot on Their Job*. June 18th, 2021 Wide Open Media.
- 3.) National Parks Service. *15 Facts About Bison*. Accessed on 8/15/2022
- 4.) Sergeant, Deborah. *Raising and Selling Bison*. Accessed on 8/15/2022
- 5.) Animal Liberation. *16 Reasons To Stop Wearing Wool*. Accessed on 8/15/2022
- 6.) Compassion in World Farming. *About Broiler Chickens*. Acc. on 8/15/2022
- 7.) The Happy Chicken Coop. *How Long Do Chickens Live: 6 Factors That Impact Life Expectancy*. Accessed on 8/15/2022
- 8.) Lifespans vary with breed; numbers shown are averages of the previous two sources as well as other data points
- 9.) Not used to produce eggs commercially: [Source](#). Accessed on 8/15/2022
- 10.) AZ Animals. *How Long Do Turkeys Live?* Accessed on 8/15/2022
- 11.) The Khaki Campbell breed is most commonly used for egg laying while the Muscovy is most commonly used for meat. This often leads to confusion as the Muscovy is technically not a duck (Genus: *Anas*) but a member of the *Anatidae* family which includes ducks, geese, and swans.
- 12.) Khaki Campbell ducks live for 10-15 years while Moscovys live for 8-12 years. The value shown is an average of the two
- 13.) Backyard Poultry. *Breed Profile: Khaki Campbell Duck*. July 20, 2019. Accessed on 8/15/2022
- 14.) Oakvale Wildlife Park. *Muscovy Duck*. Accessed on 8/15/2022
- 15.) Lesley, Chris. *Khaki Campbell Duck: Care Guide, Size, Eggs, and More...* June 7, 2022. Accessed on 8/15/2022.
- 16.) Embdens are the most common goose breed used for commercial meat production. Generally speaking, Geese aren't used for commercial egg production [Source](#). Accessed on 8/15/2022
- 17.) Gray, Elizabeth. *Emden Goose*. Pet Keen. August 3, 2022. Accessed on 8/15/2022
- 18.) Metzger Farms *Production Brochure*. Accessed on 8/15/2022
- 19.) Emu can live up to 35 years or more in captivity (without predation ) but typically live between 10 & 20 years in the wild per next source below
- 20.) *How Long Do Emu Live?* Bird Fact, May 11, 2022. Accessed on 8/15/2022
- 21.) *Emu Processing \$Emu Production* American Emu Association. Accessed on 8/15/2022
- 22.) *About American Emus*. Sugar Maple Emu Farm Accessed on 8/15/2022
- 23.) Chapman, F. 2000. "University of Florida IFAS Extension" (On-line). *Farm-raised Channel Catfish*. Accessed on 8/15/2022
- 24.) *Ibid. \$Nutrition and Feeding*. Accessed on 8/15/2022
- 25.) *What Is Farm-Raised Salmon? Is It Bad for You and the Environment?* The Human League August 16, 2021. Accessed on 8/15/2022

## Animals Slaughtered for Consumption



Number of animals that are slaughtered or that produce their product over the animal's lifetime to provide 5% of a human's lifetime nutritional needs. Animal yields are given by FAOSTAT and translated into caloric terms through the FAO's nutritive factors database. Calculations assume a one-year productive life for egg-laying hens from FAO and for years for a dairy cow as reported in *Compassion in World Farming*. We assume a 73-year human lifespan with a caloric demand of 2884 calories per day (including losses and waste) as the world average from FAO.



Research by Michael Goff, initial graphics and selection by Lee Nelson, layout and further selection by John van der Harst, and final graphics by Richard Burd and jye, 3/16/2023

### Sources:

- Food and Agriculture Organization of the United Nations. "FAOSTAT". *Compassion in World Farming*. "The life of: dairy cows". September 2012.
- Food and Agriculture Organization of the United Nations. *Egg Marketing - A Guide for the Production and Sale of Eggs*. ISSN 1010-1365, FAO Agricultural Services Bulletin 150, Chapter 1. 2003
- Food and Agriculture Organization. "Nutritive Factors". Accessed January 7, 2020.