Beef and Lamb LCAs in EWG's Meat Eater's Guide: Some Clarification

We have received a few questions about the data and modeling for beef and lamb production in our life-cycle assessment work as reported in EWG's Meat Eater's Guide. We recommend that you first review the information that is currently in the methodology document:

- Pages 24-29: Basic description and overview of the beef and lamb production systems that we analyzed.
- Page 56: Links to more detailed external data sources for the production systems.

All available details of diet, operations, time periods and inputs/outputs in the various stages of production are either in the methodology document or in the external data sources. We are providing below *some* supplementary notes for clarification (this is intended to help explain specific points and not meant to be comprehensive).

Beef Production:

- The Idaho cow-calf stage is based on a 500-head operation. Livestock investment includes 500 cows and 25 bulls. In addition to grazing on federal/private ranges, feed includes significant amounts of hay and crop residues. Cows have a useful life of 5 years after they are placed in the breeding herd. The culling rate is 17 percent and the cow herd has a 3 percent death loss. The ranch buys two-year old bulls and replaces them every 4 years. The weaned calf crop is 85 percent of the number of cows wintered. The top end of the heifer calves are kept as replacements, and the rest of the heifers and steer calves are sold. The feedlot stage is based on a 5000-head operation and uses a concentrate ration for 220 days. The animal inputs to the feedlot stage (steers and heifers) are supplied by multiple cow-calf stages – this is enforced in the LCAs by system-wide mass balance.
- The Nebraska system is a combination of three stages. The cow-calf stage is based on a scenario where the cows are fed hay and corn-silage in a lot. The backgrounding stage is based on a scenario of 180 days of wintering on prairie hay. The feedlot stage is based on a scenario of 170 days on high-concentrate ration. Herd size and operation size are not available for these beef production systems because the data used for analysis were provided on a normalized basis per cow-calf unit or per confined animal. Bulls are purchased for replacement. According to the data source, the backgrounding and feedlot stages use steer calves as inputs – therefore, our assumption has been that the heifer calves from the cow-calf system are used internally for replacement and/or sold for other purposes. This does not impact our analysis because the backgrounding/feedlot stages only draw the appropriate inputs (steer calves) from the cow-calf stage – this is enforced by system-wide mass balance and stage-level allocation in the LCAs.
- The EWG guide uses the average cradle-to-farmgate GHG emissions from these two beef production systems (we also modeled a third beef production system that is not reported in the guide). The two systems are within 20% of each other in terms of GHG emissions, and consistent with other independently published LCA studies.

Lamb Production:

- The Idaho system combines ewes on pasture and lambs on drylot. Livestock investment is 100 ewes and 3 rams. Ewes have a useful life of 7 years after they are placed into the breeding herd. The culling rate is 12% and the ewes have a 3% death loss. Ewe replacements are raised on the

farm and have a 6% death loss rate and a 6 percent cull rate. The weaned lamb crop is 150% of ewes wintered and the lamb death loss rate in drylot is 1%. The forage source is summer pasture, and winter feeding is required. Lambs are weaned before ewes are moved out to summer pasture, and fattened in drylot.

- The Ohio winter lambing system is based on a 200 ewe flock, and data is provided per ewe (we used the 2008 budget). The diet is similar to the Idaho system. We analyzed two scenarios: an average productivity system with a 150% lamb crop and a high-productivity system with a 175% lamb crop.
- The EWG guide uses the average cradle-to-farmgate GHG emissions from these three lamb production systems. All three of our results fall *within the lower half* of the plausible range that we have seen from other studies – which shows that our lamb results are not outliers and not unreasonably high.

Comparing Beef and Lamb:

- We found that the gross energy obtained from feed per unit of live weight produced is similar for lamb and beef systems, and methane emissions from enteric fermentation are comparable. However, lamb meat tends to have higher net GHG emissions than beef when resource uses and emissions are allocated to the meat and co-products in each system.
    - We assumed that the edible percentage of live-weight is 55% for beef and 42% for lamb, and the relative economic value of the meat is 84.4% for beef and 87.2% for lamb. (Barber, et al, Tables 18-19). In a mass-weighted economic allocation using these numbers in the LCAs, lamb meat bears a higher burden relative to beef.
    - For corroboration of the edible percentages: The University of Kentucky extension service provides estimates of dressing percentages for grain-fed beef (60-63%) and freshly-shorn sheep (50-53%). With 15-20% additional weight loss for boneless edible meat (ignoring other factors and uncertainties, and assuming similar weight loss for both beef and lamb – the latter point supported by USDA's loss estimates in beef and lamb supply chains), the edible percentages of live-weight are in the range of 48-54% for beef and 40-45% for lamb. The average ratio of these beef and lamb edible percentages is 1.2, whereas the ratio for percentages we used is 1.3. And this ratio (1.2-1.3) is *one* of the key factors that make the production emissions for lamb higher relative to beef.
- In addition, a higher percentage of lamb is wasted at the retail/consumer stages (per USDA loss estimates). Per unit of consumption, lamb production needs to be about 9% higher than beef to compensate for this, resulting in more production emissions.
- As a result of these (and other) factors, lamb has significantly higher *total life-cycle* GHG emissions than beef per unit of consumption.