Strauss Brands Inc.'s Free Raised™ Veal: A Reduced "Carbon Footprint"

An Analysis
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Abstract

The quest to eliminate the stressors intrinsic to accepted techniques used to raise Holstein bull calves for the North American veal industry led Strauss Brands Inc. to identify and implement methods faithful to nature. The result is "pasture-raised" veal from calves fed only milk from their biological mothers and grass from the pastures they roam. Strauss Free Raised™ veal calves are never confined to individual stalls, tethered, or administered growth hormones or antibiotics.

At a time when climate change associated with anthropogenic Greenhouse gases (GHG) - predominantly carbon dioxide, methane and nitrous oxide - is a global concern, the question is asked regarding equal efforts to reduce pasture-raised veal's "carbon footprint." An analysis of available data is compelling in the conclusion that veal from calves raised in an all natural environment require less energy invested in their care and emit less GHG and therefore have a reduced "carbon footprint" compared to veal from calves bred in ways that substitute alternatives to natural processes.

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Executive Summary

Strauss Free Raised™ veal is a product of calves pasture-raised in the United States and Australia. Strauss calves suckle their mothers, drink fresh water, and graze nature's grasses. Compared to the formula-fed veal industry predominant in the United States, Strauss veal calves are raised in an optimum, all natural environment that requires a minimum of energy use and results in a minimum of Greenhouse gas emissions.

An analysis of the various phases of both the Strauss Free Raised™ calves and those raised by the formula-fed veal industry illustrates the energy efficiency of the former approach versus the heavily energy reliance of the latter. Birth, post-birth transportation, calf mortality, diet, processing, "food miles" versus total expended energy, and carbon sequestration were examined in an effort to determine if the Strauss Free Raised™ approach produced a carbon footprint larger, smaller or equal to that of the formula-fed veal sector.

The results of this comparison were overwhelming. Strauss Free Raised™ veal does indeed express a reduced carbon footprint throughout it life cycle. In fact, the techniques employed by Strauss Free Raised™ farmers and ranchers demonstrate a natural equilibrium that appears to mitigate Greenhouse gas emissions on a number of levels.

Greenhouse Gases & Climate Change

Climate change and the reduction of Greenhouse gas (GHG) levels produced by human activities are key concerns not only in the United States but also globally. UN Secretary General Ban Ki-Moon called humankind's cavalier attitude towards production of carbon dioxide (CO_2) the "defining issue of our era."

Global concern over Greenhouse gas is complex. The earth's viability depends upon the balance of Greenhouse gases trapped in the atmosphere relative to the solar radiation entering and attempting to leave our atmosphere.

When the sun's thermal energy enters the atmosphere, roughly a quarter is reflected back into space by clouds. Nearly 20 percent is absorbed by clouds and gases like ozone (O_3). Some four percent is reflected by earth's surface back into space. Just over half (about 51 percent) actually reaches the earth's surface. Longwave band or infrared radiation bounces off the Earth's surface back toward space. At this point the importance of Greenhouse gases becomes apparent.

The planet's layer of GHG absorbs most of the outward bound infrared radiation and directs 90 percent back towards earth. That action maintains the planet's average temperature (57° F/14° C) enabling life to thrive. Without the so-called "greenhouse effect" and corresponding naturally occurring greenhouse gases (water vapor, carbon dioxide, methane (CH_4), ozone, and nitrous oxide (N_2O) the sun's warmth would be lost and the earth would quickly cool to a frigid -2.2° F/-19° C.

The advent of the Industrial Revolution in the late 18th Century brought with it an anthropogenic (human caused) increase in concentration of the key Greenhouse gases listed in the 1997 Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC). Those gases include: carbon dioxide, methane, nitrous oxide, tropospheric ozone and the "high global warming potential gases" – chlorofluorocarbons (CFC), hydroflourocarbons (HFC), perfluorocarbons (PFC), and sulphur hexafluoride (SF_6). Of these, carbon dioxide comprises 55 percent of this Post-Industrial Age increase and generates the greatest concern.

For thousands of years prior to the Industrial Revolution, concentrations of greenhouse gases sheltering the Earth were fairly constant. Carbon dioxide levels prior to 1700 were 280 parts per million (ppm). Anthropogenic activities caused CO_2 levels to rise 100 ppm to 380 ppm by 2005. Methane increased from 0.71 ppm (1750) to 1.79 ppm (2003). Nitrous Oxide rose from 270 parts per billion (1750) to 319 ppb (2003).[i] It should be noted that where Carbon dioxide is typically measured in parts per million

Methane, Nitrous Oxide and Ozone are traditionally measured in parts per billion while the CFCs, HFCs, and PFCs are measured in parts per trillion illustrating the relative densities of each.[ii]

As a proportion of the totality of the Earth's life vital "Greenhouse Effect," carbon dioxide is seen variously as comprising nine to 26 percent depending upon the source. The two major components of the Earth's atmosphere – Nitrogen (N_2) and Oxygen (O_2) – are not Greenhouse gases. They do not absorb radiation.

The fear and threat of global warming stems from concern over a growing increase in climate change. Post Industrial Age greenhouse gas emissions are estimated by the Intergovernmental Panel on Climate Change (IPCC) to have caused a rise in the Earth's temperature of between 0.4 and 0.8 degrees Celsius over the past 100 years.[iii] Shifts in the Earth's temperature are being linked to potential cataclysmic alterations in ocean levels, weather, and the very ability of the planet to sustain life.

While it is true that the popular focus on increased Greenhouse gases centers on carbon dioxide, the most abundant of the gases identified under the Kyoto Protocol - methane and nitrous oxide - are, in reality, far more powerful heat trapping gases. Methane is 21 times and Nitrous Oxide approximately 310 times more effective in retaining heat than Carbon dioxide.[iv] But, as noted above, their concentrations relative to Carbon dioxide and the planet's greenhouse effect are small.

No less an authority than the Food & Agriculture Organization (FAO) of the United Nations cast the public policy spotlight on the role agriculture and livestock in specific plays in Greenhouse gas production and its contribution to climate change. In its landmark report –"Livestock's Long Shadow: Environmental Issues and Options" (2006) – the FAO's Animal Production and Health Division detailed the size of world livestock production and its impact upon the environment.

According to FAO, global livestock is responsible for 40 percent of the world's agriculture gross domestic product (GDP) and employs 1.3 billion people. Fully one billion of the planet's poor depend upon raising livestock for their meager livelihoods. Livestock farming and ranching supplies one-third of humankind's protein. Compounding the importance of livestock within the current global warming debate is the fact that world meat and milk production is expected to more than double by 2050.[v]

While livestock's importance is undeniable, the fact remains that, according to FAO, it is responsible for 18 percent of Greenhouse gas emissions measured in Carbon Dioxide equivalent. Livestock globally is responsible for nine percent of anthropogenic CO_2 as well as 37 percent of methane and 65 percent of nitrous oxide discharge.

Carbon Dioxide equivalency is the amount of CO_2 with the same global warming potential (GWP) as a specific quantity of a non CO_2 Greenhouse gas over a distinct period of time. Methane has a GWP of 21-23. Nitrous Oxide's GWP is 296 – 310. Using the latter equivalents, a million metric ton of methane equal 23 million metric tons of CO_2 while the same quantity of Nitrous Oxide has the Global Warming Potential of 310 tons of CO_2.

The merits of reducing Carbon dioxide, or any Greenhouse gas, output during the life cycle of any product are self-evident to individuals, corporations, and governmental entities alike. Nations, municipalities, corporations, family-run farms and businesses as well as individuals of every age are heeding the call to reduce the Greenhouse gases they emit at work and home.

Three related terms are common in the discussion of climate change: carbon footprint, Life Cycle Assessment (LCA), and Ecological Footprint. Of the three the Life Cycle Assessment is the most complex. The LCA for a typical consumer product is an evaluation from the extraction of raw materials through the manufacturing, distribution and sales phase to its use by consumers and "end-of-life" categories such as recycling, energy recovery, and ultimate waste disposal. Variants can be "cradle to grave" or "cradle to plate" etc. The LCA approach uses evaluation techniques established by the Swiss-based International Organization for Standardization (ISO) under its ISO 14040 and ISO 14044 standards.

A carbon footprint or carbon profile is a "limited" LCA where the analysis is confined to emissions that effect climate change. A carbon footprint uses a specific unit of measurement such as the Global Warming Potential (GWP).[vi]

The ecological footprint is controversial and not an actual scientific standard. It attempts to determine the consumption of resources as well as the extent of new resources needed to regenerate both the original resources and others needed to negate the waste produced by a product. At best it is seen as an approximate evaluation of a product's impact on the environment.

Recognizing the merits of reducing Greenhouse gas emissions, Strauss Brands Inc. seeks via this analysis of currently available data to determine if the carbon footprint of its Free Raised™ veal is equal to or greater or lesser than that of conventionally produced veal.

Agriculture & Climate Change

Today, livestock production directly or indirectly involves a quarter of the Earth's ice-free land surface for grazing, 33 percent of arable land for feed crop production and 70 percent of all agricultural land.[vii] Add the fact that worldwide demand for livestock is rising thanks to improvements in human and animal health, human and animal nutrition, economic opportunities, crop and livestock yield raising the standard of life among more and more developing nations. For these reasons, the years since 1999 and continuing until 2020 are being called a "livestock revolution."[viii]

As noted earlier activities associated with livestock stand accused by the UN Food & Agriculture Organization (FAO) of contributing an estimated 18 percent of all anthropogenic greenhouse gas emissions from energy, industry, waste, land use, land use change, forestry and agriculture.[ix] Livestock accounts for fully half of human-caused Greenhouse gas emissions from land use, land use change, forestry and agriculture and 80 percent of emissions contributed by agriculture alone.

Taking into account deforestation for pasture, pasture degradation, and feed crop cultivation and manufacture, livestock is assumed to account for nine percent of global carbon dioxide emissions. That share of carbon dioxide is expected to rise as livestock diets shift from local pasture to fabricated feed that depends upon fossil fuels for cultivation, production, and transportation. Respiration from livestock is considered negligible. The majority stems from indirect sources.

Livestock feed is a topic that covers a wide range of carbon dioxide emissions. According to FAO, roughly a third of world cereal production (670 million tons) went into livestock feed. Eighty percent of U.S. corn and more than fifty percent of corn globally is used as animal feed. Corn also happens to be the crop most demanding of nitrogen fertilizer. Processed soy meal, sorghum, cotton seed and more are also used for animal feed and they too, sorghum in particular, demand nitrogen fertilizer.[x]

Carbon dioxide associated with livestock feed begins with burning fossil fuel in the production of nitrogen-based fertilizer. The annual global manufacture of some 100 million tons of fertilizer is estimated to emit 41 million tons of carbon dioxide during that process. That includes fuel used in packaging and transportation of the fertilizer.

Energy use in livestock production doesn't end with fertilizer for feed crops. It includes energy spent for seed, herbicides and pesticides, irrigation pumps, heating and ventilation in shelters, and running farm machinery. Diesel fuel produces more carbon dioxide than gasoline upping the GHG emission levels. FAO estimates that the CO_2 from fossil fuel used for seed, herb and pesticides, as well as farm machinery equals that of fertilizer manufacture and transportation.

Scientists acknowledge that certainty of CO_2 emissions from livestock transportation and processing is lacking. Transportation of various livestock products – milk, cheese, meat etc. – vary in frequency of trips, mode of transport, type of fossil fuel used, energy expended annually for miles traveled and refrigeration. The FAO's estimate suggests transport may release 0.8 million tons of CO_2. Processing data not only includes that of livestock carcasses but also of livestock related products such as soybeans and other substances for feed. FAO suggests that carbon dioxide emissions from processing may add "several tens of millions of tons per year."[xi]

Although it has little or no bearing with the topic of this analysis, livestock induced carbon dioxide emissions resulting from deforestation primarily in developing nations and many developed farming nations through Latin America are believed to be on the order 2.4 billion tons per year. Significant carbon losses in soils converted to crop or grazing land occurred after the original forest cover was removed. On-going carbon loss from farm land and pasture comes from conventional plowing and burning. The growing practice of "No Till" farming not only halts carbon loss but is seen as a means of returning farmed soil to its use as a carbon sink absorbing CO_2. However the traditional practice of tilling the soil to plant crops is estimated by FAO scientists to add only another 18 million tons of carbon dioxide annually.

Methane is another Greenhouse Gas associated with livestock. Globally, domesticated ruminant livestock (cattle, buffaloes, sheep, goats and camels) are considered a major source of anthropogenic methane thanks to their digestive system and diet. Methane emissions vary by region, quantity and quality of feed, age, exercise etc. U.S Environmental Protection Agency statistics suggest that 71 percent of U.S. agricultural methane emissions and 19 percent of methane from all sources in the nation originate from beef and dairy cattle.[xii]

Rice cultivation too is notorious for methane release that has a direct relationship to livestock. Ironically, the culprit is the use of "organic" fertilizer common to rice fields: livestock manure. Non-organic mineral fertilizer is a lesser precipitant. Of course the trade there is that nitrogen fertilizer contributes to the GHG nitrous oxide emissions from rice. Enteric fermentation and manure contribute 80 percent of agricultural methane and 35-40 percent of all anthropogenic methane. Enteric fermentation contributes about 86 million tons globally. Manure may add another 18 tons each year.[xiii]

Life needs Nitrogen (N_2). Seventy eight percent of the Earth's atmosphere is Nitrogen. All living organisms require Nitrogen if they are to survive. Nature, however, is very conservative in the limited ways it allows Nitrogen to be taken from the atmosphere and converted by Nitrogen fixing bacteria into a useful form promoting vegetative growth. In large part that is why some areas of the globe are agriculturally fecund while a nearby region might produce scant crop yields. The introduction of the Haber-Bosch process in the early days of the 20th Century for transforming Nitrogen into mineral fertilizer also transformed the face of global agriculture by enabling greater yields to feed the Earth's growing population. Because use efficiency of Nitrogen fertilizer is barely 50 percent, its use doubled the amount of Nitrogen entering the land based Nitrogen cycle with excess runoff acting as a pollutant.

Elemental Nitrogen is not a Greenhouse gas nor is it an atmospheric pollutant. Nitrous oxide (N_2) is a Greenhouse gas and a very powerful one. Nature emits some ten million tons per year roughly divided between soil (65 percent) and ocean origins (30 percent). Anthropogenic sources including agriculture, biomass burning, industrial processes and livestock management add another seven to eight million tons. Agriculture (soil and livestock) is accountable for 70 percent of that amount.

Nature Friendly: Waste versus Warming

Defining the phrase “nature friendly” has many facets. Strauss Brands Inc. invested nearly a decade searching for the most natural, most humane method of raising veal calves. Strauss Free Raised™ veal represents the gold standard in that quest. Strauss Free Raised™ domestic and imported veal comes from pasture raised calves fed only their mothers’ milk, water and fresh grass. They are not fed manufactured milk replacer or feed. They are not separated from their biological mothers. They are not confined to stalls or pens or tethered. They are never given antibiotics or growth hormones. Their lifestyle meets the highest standards of animal welfare.

Re-introduction of free range veal to the United States marketplace is a phenomenon so lost to the American consumer that the U.S. Department of Agriculture had no appropriate category as recently as mid-2007. USDA definitions were only “Bob” and “Special-Fed” veal. The former marketed up to three weeks of age. The latter include calves that are milk fed and calves fed a milk-replacer formula usually raised for a period of 16 to 18 weeks. In Europe, largely Spain and the Netherlands, yet another category exists: a non-formula fed category that describes calves on a largely grain-fed diet that would result in the meat from these calves to be considered “beef” in the United States.

The Strauss nature-based approach – raising young calves nursed by their biological mothers and allowed free access to pasture grasses, not fabricated feeds – prompted the designation “pasture-raised” veal to be adopted by USDA as a regulatory distinction between the richer pinkish to light red pasture raised veal from the “beef” designation for deep red meat from older grass and grain-fed calves.

Ironically, after three decades of intense campaigning by animal advocates to convince the public and policy makers that the American veal industry practice of taking cast-off dairy bull calves and raising them for veal is cruel and unnatural, the Strauss insistence on pasture and mother raised calves has become the target of criticism claiming that switching from that system to one where calves and cows are raised together is wasteful. The fulcrum of the argument appears to be the idea that it is wasteful and therefore detrimental to the environment NOT to use unwanted dairy bulls – the mainstay of the contemporary veal industry – as well as the residue of various dairy products such as cheese that go into milk replacer formulas.

The basis for that argument comes from data generated by the American veal industry itself. In its White Paper on scientific veal production, the American Veal Association (AVA) states that each formula-fed veal calf consumes roughly “11,000 lb of waste by-products of milk, butter, and cheese production such as whey, whey protein concentrate and fat…” for an industry wide total waste consumption of some 5,367,500 pounds of food by-products used in its milk replacer formulas.[xiv] It is a compelling but by no means complete description of the environmental impact associated with the production of industry milk replacers including those derived from soy and other non-milk protein sources.

The oftimes blurred lines separating what is environmentally friendly and sustainable in terms of animal welfare and in terms of the welfare of the Earth's environment and specifically climate change via Greenhouse gas emissions can cause a temporary loss of focus as well as stir controversy. There can be no doubt that the pasture-raised process is natural and animal friendly. Similarly, given the limitations of raising dairy bull calves for veal, i.e. separation of calves from their biological mothers mere days after their birth, animal welfare concerns are also being addressed by the American veal industry through its shifting from individual stalls to group pen facilities.

This analysis seeks the answer to one question: does the Strauss Free Raised™ veal process reduce the "carbon footprint" associated with contemporary veal from dairy bull calves now on the market. It compares the energy/manufacturing intense components upon which the dairy veal industry relies to the natural processes of pasture-raised veal to determine how the latter compares to the former in terms of emission of Greenhouse gases and relative contribution to climate change.

Reducing Veal's Carbon Footprint

To compare Greenhouse gas emissions between Strauss Free Raised™ veal calves (imported and domestic) and formula-fed, typically dairy bull veal calves used in the contemporary North American veal industry the analysis must start literally one to three days after birth.

1. AT BIRTH

Strauss Free Raised™:

Calves affiliated with the Strauss' system are pasture born, fed colostrum (their mother's natural first milk filled with immune-system building antibodies) directly from their mothers teats, and remain roaming in the warm climate pastures of Texas, Oklahoma and Australia on their birth farms throughout their lives. Zero to negligible birth-related expenditure of Greenhouse gases into the atmosphere can be attributed to the pasture-born and bred calves.

Formula-fed:

Bull calves born to dairy cows are dropped in temperature controlled dairy barns or other such shelters where an ideal temperature range between 50° and 80°F with the optimum at 70° must be maintained.[xv] In the United States veal "production is concentrated in Indiana, Michigan, New York, Ohio, Pennsylvania, and Wisconsin"[xvi] where temperature extremes are commonplace with the season changes. Shelters kept too cold reduce growth because energy is expended by calves trying to keep warm. Temperatures at 80°F and above cause respiratory problems.

Yet another energy consuming requirement of barn life is ventilation. Noxious gases such as carbon dioxide, ammonia, methane, and hydrogen sulfide pose threats to respiration and life if allowed to build in concentrations.[xvii]

Energy required to keep their sheltered environment sustainable increases the carbon output for Formula-fed veal from the start. It only increases with every day that passes.

Dairy bull calves are separated from mother cows immediately after birth. First feeding of colostrum comes from a nipple-capped two-three quart bottle, not the mother cow's teat. That "first milk" might have been refrigerated for up to one week. Again, energy is expended keeping stored and refrigerated colostrum viable.

Until a formula-fed calf can be taught at the veal barn to drink from a bucket, bottle feeding continues. To be absolutely faithful to a Life Cycle Assessment (LCA) Carbon Footprint, the energy and resources required to make the bottle and nipple as well as the pail for later feedings, not to mention keeping them sanitized and bacteria free should be included. Such arcane data is not included here.

2. POST-BIRTH TRANSPORTATION:

Strauss Free Raised™:

Strauss pasture-raised calves require no fossil fuel burning transportation. They are born where they will be raised throughout their lives.

Formula-fed:

Fossil fuel energy expenditures begin to build rapidly in the life of the Formula-fed calf. If the calf is sold directly to a veal farmer, a truck is dispatched from the veal farm to pick up the newborn for a round trip pick-up and delivery. If the calf is to be sold at auction, a different first round trip phase of trucking takes place. Then after being sold at auction, the calf is loaded onto the veal farmer's truck for the journey to its new home.

3. CALF MORTALITY:

Morbidity (disease rate) and mortality (death rate) for calves run highest during the first few days after birth and the weeks prior to weaning. Newborn and pre-weaned calves face a host of life-threatening stress threats beginning with separation from their mothers and continuing through each vehicle ride and relocation to veal barns where they are housed with an array of calves from different origins that may or may not bring with them an equal variety of potential health problems demanding antibiotic intervention.

Strauss Free Raised™:

Calf mortality is rare. Anecdotal discussions suggest minimal numbers of one to five individual calves per farm per year.

Formula-fed:

For the typical dairy calf operation – the source of the majority of North American veal calves – the USDA found the mortality of preweaned calves was 8.4 percent. After weaning that rate dropped to 2.2 percent.[xviii] Other calf mortality studies in the U.S. and the United Kingdom range concur and express rates from 2.2 percent to five to seven and above eight percent.[xix] [xx] On the other hand, confidential interviews with veal producers suggest mortality from stress, climatic factors and disease can run as high as 20 percent of a barn's residents. Carcass removal requires yet one more final trip aboard a fossil fuel burning vehicle.

4. DIET:

Strauss Free Raised™:

Pasture raised calves suckle at their mothers until their digestive tract develops and they begin to graze among pasture grasses, often ryegrass, Bahia and Coastal Bermuda grasses. Fresh water is available any time.

Strauss Free Raised™ calves are fed diets in harmony with their natural digestive system: mother's milk, water and fresh grass. Fresh whole mother's milk is the most nitrous and efficiently digestible food for pre-ruminant calves. It is digested in the calf's abomasum stomach chamber by-passing the rumen, reticulum and omasum chambers. Enteric fermentation in the rumen is the main source of carbon loss in the form of methane gas due to the inefficient digestion of fibrous material. Unweaned calves do not use their rumens.

As the calf begins to incorporate vegetative matter into its nutritional intake the grass component in the Strauss calf diet again proves more natural as well as calf- and environmentally friendly. The sugars and starches in grass stimulate the development of the rumen and are transformed into useful energy to a far greater degree than hay, straw, or corn silage.[xxi]

Formula-fed:

Once at the veal barn, an entirely new and extensive array of energy consuming processes and machinery associated with the "Formula-fed" title dominates the calf's life. The newly relocated calves most often begin life on a liquid starter diet.

Whole mother's milk contains roughly 26 – 27 percent protein, 12.7 percent solids and 30 percent fat. Traditional milk replacers average 20-22 percent protein, 10 – 20 percent solids and 10 to 12.5 percent fat. Antibiotics and necessary vitamins (A, D, E and sometimes C) can be mixed into a replacer formula.[xxii]

Protein is the greatest expense in milk replacers with the best quality (and easiest for calves to digest) consisting of some form of milk protein: dried skim milk, sodium caseinate, whey protein concentrate, dried whole whey, delactosed whey, dried buttermilk, and milk albumin. Another protein source are red blood cells and plasma. Soy protein is also used but only for calves three weeks or older. Prior to their third week, calves cannot digest soy protein. Fat, often from lard or tallow or increasingly from vegetable sources is another component.

A steady stream of energy is required to keep a formula-fed facility up and running. Energy is needed to heat the water necessary to mix the formula and render the fat into a liquid state. The mixture them must cool to the appropriate temperature for optimum use by the calf.

Rising cost of milk replacer has shifted some attention towards the use of "waste milk" or unsaleable milk including milk contaminated with antibiotics or bacteria.[xxiii] The dangers inherent in waste milk center on bacteria content. Studies show varying degrees of Salmonella, Mycoplasma, E. coli, Mycobacterium and other organisms of concern in raw waste milk.

Waste milk requires the use of a pasteurizer. The batch pasteurizer acts like a stove-top double boiler where milk is heated to 145 degrees F for 30 minutes. A High Temperature Short Time (HTST) pasteurizer heats the milk to 161 degrees for 15 seconds. HTST units require their own hot water source distinct from that used to mix the replacer formula.

Channeling energy into growth is important economically and in terms of calf health. If a calf's energy is diverted to warm its body or bring nourishment to the correct temperature the animal can undergo health threatening stress. For that reason, its liquid food intake must be kept at a constant temperature, ideally 105°F.

Constant vigilance against illness necessitates not only attention to the temperature of the prepared formula but also to care in washing and sanitizing equipment used in calf feedings increasing the energy use for formula-fed calves.

Capital energy consumption can be seen in the manufacture of steel or plastic containers to store formula. Direct energy is used to operate the equipment, to bring formula components up to sufficient temperatures to insure integration of fats into the liquids. The equipment and energy needed to constantly heat, cool and store milk replacer or waste milk as well as the to maintain sanitary conditions has no parallel within the pasture-raised process. Here the carbon footprint generated by formula-fed veal far outstrips that of Strauss' pasture-raised calves.

5. PROCESSING:

Processing calves into veal products requires the same energy used in transporting the calves to slaughter, the process of slaughter, and the rendering of the carcass into commercially desirable cuts regardless of how they are raised or fed.

6. “FOOD MILES” VERSUS TOTAL ENERGY EXPENDED:

The issue of miles traveled from farmer/rancher to production facilities to a supermarket or other retail facility to the consumer appears at first to be a logical, straightforward mathematical equation where the sum of miles traveled equals the burden placed on climate change via carbon dioxide emitted into the atmosphere from fossil fuel powered conveyances. Close scrutiny of the subject demonstrates it is a topic that is anything but simplistic. In fact, the “food miles” concept is completely misleading as it reflects only energy expended in transportation, not total energy costs of food production.

“Food miles,” energy expenditures, and climate change are of particular importance to those nations whose economies are heavily reliant on global trade. Research on the issue of “buying local” versus global is vital to exporting nations such as Australia, the source of Strauss Free Raised™ imported veal.

New Zealand, Australia’s close neighbor, completed a landmark, modified Life Cycle Assessment study of “cradle to plate” energy expenditures associated with key processes of a product’s origin, processing, and transport to the consumer in the United Kingdom in 2006. The authors purposely omitted the “grave” or waste disposal segment of a full LCA study. The comparison was between New Zealand produced sheep meat, onions, milk, butter and apples to the same products produced in the United Kingdom.

Using International Organization for Standardization’s ISO 14040 series criteria, the New Zealand study serves as a reliable model for comparing the energy expended by the veal exports from Australia to the United States versus energy used by the U.S. domestic formula-fed veal industry.[xxiv] Specific data on U.S. energy use and Greenhouse gas emissions associated with diary calves is in the planning stages at the University of Michigan’s Center for Sustainable Systems thanks to a $320,000 grant from a Colorado-based Foundation.[xxv]

Factors considered in the New Zealand study include direct sources of energy (diesel, gasoline, and electricity); items that require indirect energy use (chemical fertilizer, herbicides, processed feed); capital items requiring energy consumption (farm buildings, tractors, farm equipment, other vehicles, fencing, irrigation); shipping and road transport as well as the product itself (sheep meat, milk, butter, onions and apples) and energy expended (energy use, carbon dioxide emissions).

Carbon dioxide emissions for New Zealand electricity proved less than similar to electrical power production in the UK. The former generates a third of its electricity via coal and gas and two thirds by hydroelectric while nearly three quarters of UK electricity is coal and gas dependent.

The study's authors found New Zealand sheep meat "food miles" transport miniscule and of no consequence compared to the energy used and carbon dioxide emitted by similar UK raised animals. New Zealand sheep required 10,618 megajoules of energy per ton of carcass compared to 45,859 mj/ton carcass for UK sheep meat. Carbon dioxide emission comparisons exhibited the same imbalance with NZ sheep meet accounting for 688 kg of CO_2 per ton versus 2849.1 kg CO_2/ton.

<u>Strauss Free Raised™:</u>

Energy used to raise Strauss' calves in Australia closely approximates the economy of energy use associated with New Zealand sheep. No group housing with corresponding energy demand for heating or cooling is required. No energy is expended for elaborate pasteurizing or refrigeration of replacer formula. No indirect energy is used for fertilizer, herbicides, harvesting or processing crops for vegetable protein-based formula.

Strauss Free Raised™ domestic calves are raised under conditions highly similar to their counterparts imported from Australia. They do not require barn shelters or energy and carbon intense fabrication of feed. At most when dry or drought conditions exist and fields can be over grazed, a farmer or rancher may apply a single treatment of nitrogen fertilizer unless the livestock is grazing on public lands. Then no treatments are made.

<u>Formula-fed:</u>

The energy use in maintaining the health and growth of formula-fed veal calves is described in each of the categories in this analysis. Absent specific scientific data examining every aspect of the life cycle of veal – pasture-raised or formula-fed – the comparisons made provide a compelling case that Strauss Free Raised™ veal, both imported and domestic, imparts a far smaller carbon footprint than formula-fed veal.

<u>7. SEQUESTRATION:</u>

<u>Strauss Free Raised™:</u>

Pasture raised calf operations have yet another distinct advantage over barn-housed formula-fed veal farms. They actually promote mitigation of Greenhouse gas emissions. Permanent grasslands increase soil carbon sequestration.[xxvi]

Researchers at North Carolina State University describe grasslands, like forests, acting as "carbon sinks" where elevated levels of carbon dioxide stimulate grass growth that incorporates nitrogen that would have been used for plant decomposition, a process that in turn releases Nitrogen oxide into the atmosphere.[xxvii]

U.S. Environmental Protection Agency (EPA) researchers postulate that improving nitrogen assimilation efficiency in livestock occurs through "optimizing proteins or amino acids to match the exact requirements of individual animals or animal groups.[xxviii] That optimization occurs daily with the diet of Strauss Free Raised™ veal calves in the United States and Australia. It's a nutritional standard the formula-fed veal industry as yet strives to duplicate. Further crop cultivation is seen as the major culprit in release of Nitrous oxide into the atmosphere via repeated applications of nitrogen-based fertilizer and soil cultivation. As noted earlier, those calving operations affiliated with Strauss Free Raised™ imported and domestic veal engage in absolutely minimal pasture fertilization if at all.

Soy cultivation for replacer protein is only affiliated with formula-fed veal.

With regard to methane mitigation, a white paper prepared for FAO on forage grass use to reduce Greenhouse gases researchers from the United Kingdom's Institute of Grassland and Environmental Research and the FAO Crop and Grassland Service found that "a significant factor affecting methane emissions is the animal's diet…particularly where the animal is fed a diet with a significant forage component."[xxix] Again, the Strauss Free Raised™ calf diet meets that description as the ideal, therefore minimal methane producing approach.

8. CONCLUSION:

A compelling case can and has been made that Strauss Free Raised™ veal – imported and domestic – is consumer, animal and earth friendly. Based on its all natural, pasture-raised principles and practices, Strauss Free Raised™ veal casts a minimal carbon footprint across the environment when compared to formula-fed veal processes.

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