Research demonstrates the human health benefits of Pasture for Life meat

In recent years there has been increasing evidence of the benefits of eating pasture-raised and grass-fed meat and dairy. These are not just limited to animal welfare and the environment, but also include health benefits for humans.

Grass-fed meat tends to be lower in total fat and also has higher levels of 'good fats' such as omega 3. Milk and meat from grass-fed animals have higher vitamin levels, particularly vitamins A (β-carotene) and E(α-tocopherol). Some studies also show higher mineral levels.

Although by no means a complete list of all research on pasture-raised and grass-fed meat and dairy, this summary prepared by the PFLA, gives an idea of the range of different benefits, with the published studies that support them.

Omega-3 and Omega-6 Polyunsaturated Fatty Acids (PUFAs)

Omega-3 and omega-6 fatty acids are often cited as being beneficial to our health. However, it is the ratio between these two fatty acids that is probably most important. Omega-3 and omega-6 PUFAs have differing and often conflicting physiological functions. However, it is the ratio of these two classes (n-6:n-3) that is important for human health and development (Simopoulos A. P., 2002).

Two of these essential fatty acids are critical to human health, as they cannot be synthesized by human metabolism: Alpha-Linolenic Acid (ALA), which is an omega-3 fatty acid, and Linoleic Acid (LA), an omega-6 fatty acid.

Additional, longer chain PUFAs are also critical to health and are synthesized from ALA or LA. Furthermore, as humans cannot convert between the two types, the dietary intake ratio of the PUFAs has potential influence on overall health.

Humans probably developed with a diet that represents a ratio of n-6:n-3 close to 1:1. At the onset of the industrial revolution, about 140 years ago, there was a marked shift in the ratio. Consumption of omega-6 fats increased at the expense of omega-3 fats. Modern Western diets typically have a ratio closer to 15:1. It has been suggested that the change in this ratio may be linked to a number of poor health outcomes. Evidence suggests that a healthy diet should aim for a ratio no higher than 4:1 (Simopoulos, 2008).

Table 1 brings together the results from a wide range of studies showing that pasture-fed beef has a lower, and therefore healthier ratio of n-6:n-3 fatty acids, than grain-finished beef. In all cases the grass-fed ratio is below the recommended ratio of 4:1.

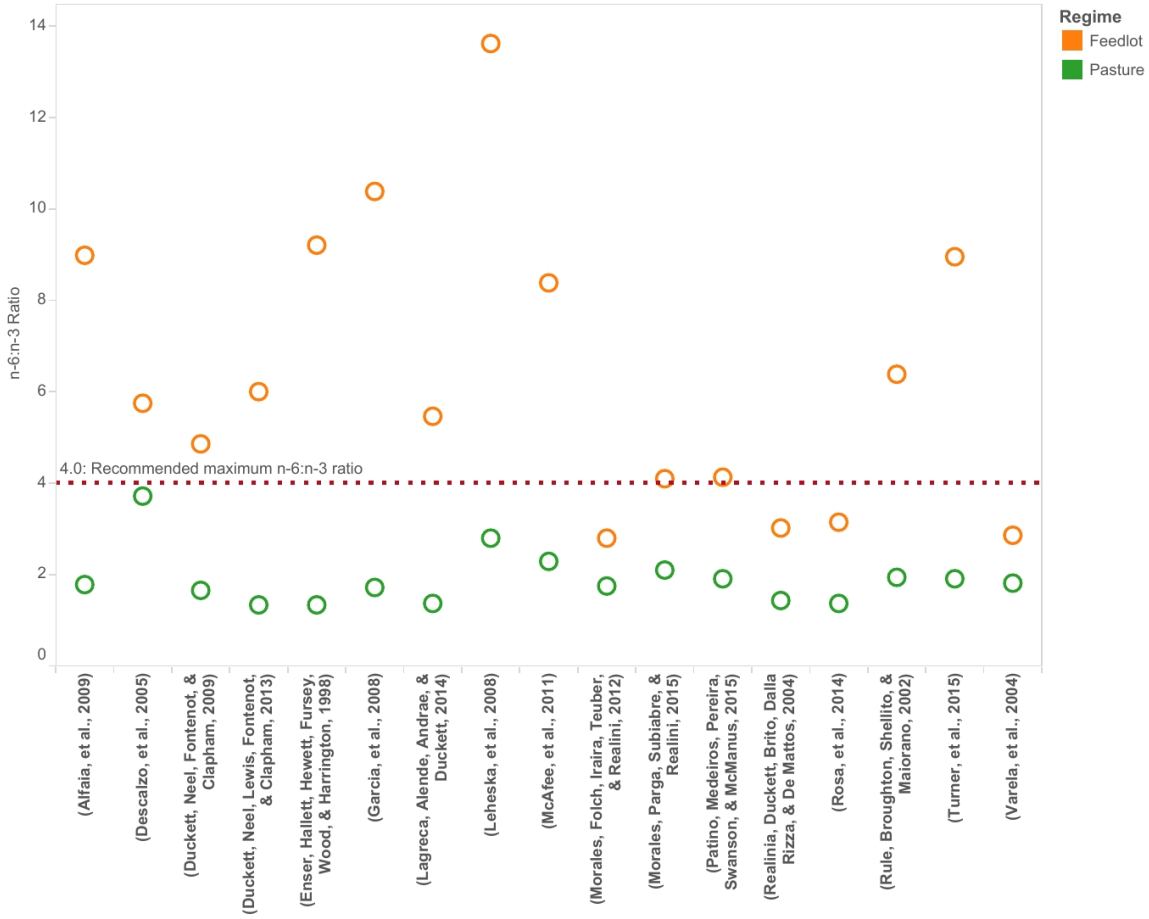

Table 1: Scientific papers written showing that pasture-fed beef has a lower and healthier ratio of n-6:n-3 fatty acids than grain-finished beef.

Omega-3

Omega-3 fatty acids are most abundant in seafood and certain nuts and seeds, such as flaxseeds and walnuts, but they are also found in meat from animals raised on pasture.

The reason is simple. Omega-3s are formed in the chloroplasts of green leaves and algae. Sixty percent of the fatty acids found in grass are the omega-3 fatty acid ALA. When cattle are taken off grass and given a grain-rich diet, which is the way most beef is fattened these days, they lose their valuable store of ALA, as well as the two other omega-3 fatty acids, EPA and DHA.

Each day an animal spends indoors eating grain, its supply of omega-3s is diminished, resulting in a significant decrease in omega-3s in retail beef cuts. Figure 1 illustrates this rapid decline.

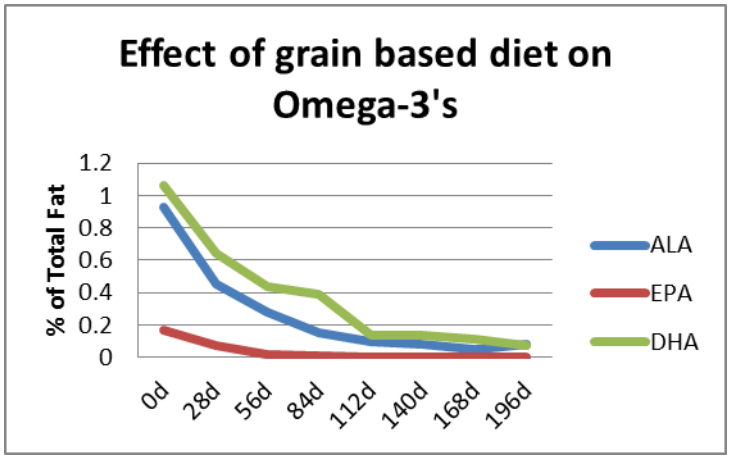

Figure 1: The effect of a grain-based diet on the omega-3 content of beef. (Duckett, S. K., Wagner, D. G., Yates, L. D., Dolezal, H. G., & May, S. G. (1993). Effects of Time on Feed on Beef Nutrient Composition. *Journal of Animal Science , 71*, 2079-2088.)

Studies have shown that meat from grass-fed animals has two to four times more omega-3 fatty acids than meat from grain-fed animals.

People who have ample amounts of omega-3 fatty acids in their diet are less likely to have high blood pressure or irregular heartbeat.

In 2011 *The British Journal of Nutrition* published a study, which concluded that eating moderate amounts of grass-fed meat for only four weeks, would give consumers healthier levels of essential fats.

The research showed that healthy volunteers who ate grass-fed meat increased their blood levels of omega-3 fatty acids and decreased their level of pro-inflammatory omega-6 fatty acids.

Conjugated linoleic acid (CLA)

Conjugated Linoleic Acid exhibits potent antioxidant activity. Research indicates that it may be one of the most potent defences against heart disease, diabetes, and cancer.

This was exemplified in 1996 when The National Academy of Sciences publication *Carcinogens and Anticarcinogens in the Human Diet* stated:

> *"Conjugated Linoleic Acid (CLA) is the only fatty acid shown unequivocally to inhibit carcinogenesis in experimental animals"*

Since this time there has been significant research reported showing the anti-cancer properties of CLA, as well as many other potential health benefits (Yang, et al., 2015).

For example, laboratory studies have shown that a very small percentage of CLA - a mere 0.1 percent of total calorie intake, greatly reduced tumour

growth. Another study (Aryaeian et. al., 2008) found that adults with rheumatoid arthritis showed a significant decrease in blood pressure after CLA additions to their diet.

Beef is one of the best dietary sources of CLA, and grass-fed beef contains significantly more CLA than grain-fed beef. This is because grain-based diets reduce the pH of the digestive system in ruminant animals, which in turn inhibits the growth of the bacterium that produces CLA.

When ruminants are raised on fresh pasture alone, their meat and milk contain from three to five times more CLA, than similar products from animals fed a conventional grain-based diet.

References for omega-3 and CLA content of grass-fed livestock products

Aryaeian N, Shahram F, Djalali M, Eshragian MR, Djazayeri A, Sarrafnejad A, et al. 2008. Effect of conjugated linoleic acid, vitamin E and their combination on lipid profiles and blood pressure of Iranian adults with active rheumatoid arthritis. *Vascular Health Risk Management* 4(6):1423–32.

Daley, Abbott, Doyle, Nader and Larson 2010 “A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef.” *Nutrition Journal* DOI: 10.1186/1475-2891-9-10

Dewhurst, R.J., Shingfield, K.J., Lee, M.R.F., and Scollan, N.D. 2006. Increasing the concentrations of beneficial polyunsaturated fatty acids in milk produced by dairy cows in high-forage systems. *Animal Feed Science and Technology* 131:168–206.

Dhiman, T. R., G. R. Anand, et al. 1999. "Conjugated linoleic acid content of milk from cows fed different diets." *Journal of Dairy Science* 82(10): 2146-56.
Dhiman, T.R., "Conjugated linoleic acid: a food for cancer prevention." Proceedings from the 2000 Intermountain Nutrition Conference, pages 103-121.

Duckett, S. K., D. G. Wagner, et al. 1993. "Effects of time on feed on beef nutrient composition." *Journal of Animal Science* 71(8): 2079-88.
Kraft J., Kramer J. K. G., Schoene F., Chambers J. R., and Jahreis G. 2008. Extensive Analysis of Long-Chain Polyunsaturated Fatty Acids, CLA, trans-18:1 Isomers, and Plasmalogenic Lipids in Different Retail Beef Types. *Journal of Agriculture and Food Chemistry* 56:4775-4782.

McAfee, McSorley, Cuskelly, Fearon, Moss, Beattie, Wallace, Bonham and Strain. 2011. “Red meat from animals offered a grass diet increases plasma and platelet N-3 PUFA in healthy consumers British” *Journal of Nutrition*. Volume 105, pages 80-89. DOI:10.1017/S0007114510003090

Scollan, N., Hocquette, J., Nuernberg, K., Dannenberger, D., Richardson, I., and Moloney, A. 2006. Innovations in beef production systems that enhance

the nutritional and health value of beef lipids and their relationship with meat quality. *Meat Science* 74:17–33.

Ponnammpalam E N, Mann N J and Sinclair A J. 2006. Effect of feeding systems on omega-3 fatty acids, conjugated linoleic acid and trans fatty acids in Australian beef cuts: potential impact on human health. *Asia Pacific Journal of Clinical Nutrition* 15(1):21-9

Yang, B., Chen, H., Stanton, C., Ross, R. P., Zhang, H., Chen, Y. Q., et al. 2015. Review of the roles of conjugated linoleic acid in health and disease. *Journal of Functional Food , 15*, 314-325

Antioxidants, vitamins and minerals

Meat from grass-fed animals contains considerably more antioxidants, vitamins, and minerals than meat from grain-fed animals.

Carotenoids, such as beta-carotene, are precursors to vitamin A and are found as pigments in plants. Grain-fed beef does not contain appreciable levels of carotenoids, for the simple reason that grains do not contain them.

However, cows that eat carotenoid-rich grass and forage incorporate significant amounts of these compounds into their tissues. These carotenoids make the fat from grass-fed beef more yellow than the fat from grain-fed beef, so fat colour can be a good indicator of how nutrient-rich the meat is.

Grass-fed beef also contains significantly more of the antioxidants vitamin E, glutathione, superoxide dismutase (SOD), and catalase, than grain-fed beef. These antioxidants play an important role in protecting human cells from oxidation, especially delicate fats in the cell membrane including the omega-3 and omega-6 types.

Antioxidants such as vitamin E, and beta-carotene also work together synergistically to protect meat from damage during the journey from butcher to plate. These antioxidants are especially important if the meat is fried or grilled, as high-heat cooking methods can be more damaging to meat than wet or low-heat methods, such as stewing or braising.

Grass-fed beef also contains higher levels of beneficial minerals including zinc, iron, phosphorus, sodium, and potassium.

References for vitamin, mineral and antioxidant content for grass fed meat

Choe and Min. 2009. “Mechanisms of antioxidants in the oxidation of foods” *Institute of Food Technologists*, Vol. 8, DOI: 10.1111/j.1541-4337.2009.00085.x

Daley, Abbott, Doyle, Nader and Larson. 2010. “A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef”. *Nutrition Journal* DOI: 10.1186/1475-2891-9-10

Realini C E, Duckett S K, Brito G W, Dalla Rizza M and De Mattos D. 2003. Effect of pasture vs. concentrate feeding with or without antioxidants on carcass characteristics, fatty acid composition, and quality of Uruguayan beef. *Meat Science* 66 (2004) 567–577

Smith, G.C. "Dietary supplementation of vitamin E to cattle to improve shelf life and case life of beef for domestic and international markets." Colorado State University, Fort Collins, Colorado 80523-1171

Leheska, Thompson, Howe, Hentges, Boyce, Brooks, Shriver, Hoover, and Miller. 2008. “Effects of conventional and grass-feeding systems on the nutrient composition of beef”. *Journal of Animal Science* 2008 86: 12: 3575-3585 DOI:10.2527/jas.2007-0565

Yang, A., Brewster, M. J., Lanari, M. C., & Tume, R. K. 2002. Effect of vitamin E supplementation on a-tocopherol and b-carotene concentrations in tissues from pasture- and grain-fed cattle. *Meat Science , 60*, 35-40