

UF-Gainesville Beef Cattle News Corner

A primer on fat and human health

Raluca Mateescu, Department of Animal Sciences, University of Florida

Fat and human health

Animal fat has been stigmatized due to an association with several diseases, from cardiovascular diseases to cancer. Consequently, consumption of beef, perceived to have a high fat content, has suffered the most from this negative image. Although the association between animal fat and disease is more and more being challenged by new research, the idea that 'fat is bad for you' is well entrenched in consumers' mind and 'fat free' is still a powerful marketing tool.

There are three types of naturally occurring fatty acids, each with a different chemistry: saturated, monounsaturated, and polyunsaturated. There is also trans-fat, but naturally occurring trans-fat is quite rare. The trans-fat that is bad for your health (just think how often did you see the label "NO TRANS-FAT" to indicate a healthy food choice?) is the result of the process of hydrogenation of liquid oils done by food processors in order to firm them up.

The other class of fat that has been linked to negative effects on health is the saturated fat. Epidemiologists identified strong relationships between a diet high in saturated fat and the incidence of coronary heart disease and colon, prostate, and breast cancer. The saturated fat-coronary heart disease story seemed to relate to the influence of saturated fat on the development of high levels of cholesterol in the circulating serum lipoproteins. This led to recommendation "Eat a low-fat, low-cholesterol diet." Most of us have heard this simple recommendation so often over the past two decades that we can recite it in our sleep. Touted as a way to lose weight and prevent cancer and heart disease, it's no wonder much of the entire nation hopped on board. With beef labeled as a food high in saturated fat, per capita consumption of beef declined.

It turned out that this simple message is actually wrong. Detailed research carried out in the last decade shows that the total amount of fat in the diet, whether high or low, is not really linked with diseases. What really matters is the type of fat in the diet. Results from the large and long "Women's Health Initiative Dietary Modification Trial" showed that eating a low-fat diet for 8 years did not prevent heart disease, breast cancer, or colon cancer, and did not do much for weight loss, either. What is becoming clearer and clearer is that bad fats, meaning trans and some short-length saturated fats, increase the risk for coronary heart disease as well as other diseases, while good fats, meaning mono- and polyunsaturated and longer-length saturated fat, lower this risk. The key to a healthy diet is not to reduce total fat intake but to substitute bad fats for good fats.

Beef fat composition

How is beef fitting into this scenario? Fat in beef is present as membrane fat (as phospholipids), intermuscular fat (between the muscles), intramuscular fat and subcutaneous fat. Marbling fat is an important meat quality trait in relation to juiciness, aroma and tenderness and is the fat depot of most interest in relation to fatty acid composition and human health. It refers to the white flecks or streaks of adipose tissue between the bundles of muscle fibers and is closely linked to intramuscular fat content.

Beef intramuscular fat consists on average of:

- 50% saturated fatty acids. However, about 30% is stearic acid or C18:0 – a longer chain saturated fatty acid which does not increase plasma low-density lipoprotein (or bad cholesterol) level.
- 45% monounsaturated fatty acids
- 5% polyunsaturated fatty acids (including omega 3, omega 6 and CLA or conjugated linoleic acid)

Also, beef is a major dietary sources of conjugated linoleic acid (CLA) which possesses a range of health promoting biological properties (antioxidant, reduces circulating cholesterol, reduces cardiovascular risk, protects against atherosclerosis, anti-carcinogenic, reduces body content of adipose tissue and lipid, enhances the immune system). Beef contributes significantly to man's intake of the important fatty acids EPA and DHA (omega 3 fatty acids), of which there are few rich sources apart from oily fish.

Different fatty acids have different effects on health and disease prevention and this has shifted emphasis from reducing fat content to beneficially altering the fatty acid profile of a particular food. The good news is that fat in beef can be modified in content as well as composition using genetics and a goal for beef industry would be to increase the content of monounsaturated, omega 3, CLA (healthy fat) and reduce saturated fatty acids (especially the short chain ones which pose a risk for cardiovascular disease), with the net effect of increasing polyunsaturated to saturated fatty acids ratio.

Ongoing research in the Department of Animal Sciences at University of Florida is focusing on characterizing the nutritional and health value of beef from *Bos Indicus* influenced cattle. The goals are to determine the extent to which phenotypic variation is controlled by genetics and to develop genomic tools that will allow identification of genetically superior animals with respect to these traits and use this information for selection, management and marketing. Preliminary results from these studies will be reported in a future edition of FL Cattlemen Magazine.