HEALTH PROMOTING VALUES OF BEEF

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Abstract: The beef meat is mainly used as culinary cuts. The culinary value of beef and veal meat is determined by tenderness and palatability. 23% of meat produced in Europe (about 7,5 mln ton) is beef, veal production is estimated about 800 000 ton per year. Biggest producers of beef and veal are France (30%), Netherlands (26%), Italy (18%) Belgium (7%) and Germany (6%). 70% of beef and veal produced in Europe is consumed by French and Germans. Beef contains proteins (18 -23%) which have high biological value. Level of intramuscular fat is lower then 5 %, carbohydrates and products of their decay are less then 1%, mineral components are flirting about 1%.

Key words: beef meat, veal, chemical composition

Introduction

Market of the bovine meat is one of the most protected and controllable in whole European Union. Alive animals, meat and offals, products of meat industry and fat; all of them are regulated by law. It’s caused by appearance of prion diseases just like BSE (Bovine Spongiform Encephalopathy) in cattle, Scrapie in sheep, Chronic Wasting Disease (CWD) in deer, also Creutzfeldt-Jakob Disease (CJD), Gerstmann-Sträussler-Scheinker Syndrome (GSS), Fatal Familial Insomnia (sFI) and Kuru in humans. Scientists suppose that new variant of Creutzfeldt-Jakob Disease (vCJD) in humans is caused by infectious prions, come from cattle that suffer from bovine spongiform encephalopathy. Currently it’s assumed that primary method of infection in humans is through ingestion.

23% of meat produced in Europe (about 7,5 mln ton) is beef, veal production is estimated about 800 000 ton per year. Biggest producers of beef and veal are France (30%), Netherlands (26%), Italy (18%) Belgium (7%) and Germany (6%). 70% of beef and veal produced in Europe is consumed by French...
and Germans. Because between members of European Union were differences concerning productions, storage, and meat’s turnover, European Commission proposed and members ministers of agriculture adopted a regulation (11 June 2007) determining what “veal” means – “Meat from animals slaughtered aged 8 months or less”. Meat from animals slaughtered aged more than 8 months but not more than 12 months must be described as beef (Council Regulation 700/2007). This new definition should improve clarity of meat market and help consumers correctly recognize meat. Meat is indicator of well-being of society. F.M. Lappe called commonly “adore” of meat as “American religion of great beefsteak” (Lappe, 1982).

**Effect of different factors of beef meat quality**

Beef contains proteins (18-23%) which have high biological value. Assimilation of this proteins by human, because of almost optimal set of exogenous amino acids, is between 70% and 90 % depends on amount of connective tissue. Level of intramuscular fat is lower then 5 %, carbohydrates and products of their decay are less then 1%, mineral components are flirting about 1%. Moreover beef is rich in minerals compounds, especially phosphorus and iron. This meat involves more iron (it’s 35% of daily dietary level intake) then other animals of slaughter. It’s main source of vitamin B12 (70% of Recommended Dietary Allowances (RDA)), which is not present in plant and vitamins B1 and B6 (about 40 – 50% of Recommended Dietary Allowances). Beef is parasite-free meat. It’s not only processed, like pork but also is use as culinary meat, consumed often as raw meat like tartar steak or rare steak. Biological value of meat’s protein, especially beef determine concentration of intramuscular connective tissue – composition, amount and morphology depend on age, breed, muscle. It is main reason why costs of beef are different. Main compound of intramuscular connective tissue is collagen, whose unique element is amino acid called hydroxyproline (13 -14% of collagen weight). Because of lacking of hydroxyproline in other meats, according hydroxyproline contents we can define collagen level – (PrPN-ISO 3496-2000) – Polish Standard of define collagen level). Collagen level in beef is between 1 -15 % of dry matter, and elastin, second important protein of intramuscular connective tissue is between 0,6 – 3,7% of dry matter (Bailey and Light, 1989; McCormick, 1994). Low biological value of this proteins decreases nutrition value of this meat. This value is low, especially when proportion of connective tissue nitrogen and overall level of nitrogen in carcass is higher then 1 (Lawrie, 1985). Beef is red meat because of high level of myoglobin (1-3 mg/g tissue in calves and 16 – 20 mg/g tissue in old beef cattle) (Kołczak, 2008).
Intramuscular fat of beef include 44% saturated fatty acids (mainly C_{14:0}, C_{16:0}, C_{18:0}), 46% unsaturated fatty acids (mainly C_{18:1} n-9) and 10% of polyunsaturated fatty acids (mainly linoleic and linolenic acids). Small amounts of trans isomers may be synthesized in rumen in biohydrogenation of cis isomers of unsaturated fatty acids from feed. Trans configured saturated fatty acids have higher melting temperature, so in room temperature have constant consistence. Whereas cis – configured unsaturated fatty acids are fluent. Replace saturated fatty acids by unsaturated and polyunsaturated fatty acids decreasing overall level of cholesterol and LDL – cholesterol. Unsaturated fatty acids increasing level of HDL but don’t have influence on triglycerides. Most of polyunsaturated fatty acids from omega-3 family function as antiarteriosclerotic and antithrombotic factors. Most of unsaturated fatty acids naturally present in nature are cis – configured. Trans isomers of this fatty acids, have similar effects like saturated fatty acids. Moreover additional adverse effect on health is caused by decreasing HDL – cholesterol, and increasing level of Lipoproteid a, factor of coronary heart disease. Trans – isomers can also perturb synthesis of long-chain unsaturated fatty acids n3 and n6, especially important during fetal and early life period. Milk and dairy products provide about 30%, meat and its products 10% of fully sum of trans-isomers. Rest 60-70% comes from hydrogenated vegetable and fish oils and products prepared from them. During last 50 years, because of changes in nutrition, level of saturated fatty acids decreased and unsaturated fatty acids increased twice (Wood et al., 2004). It’s caused also by growth of meat level in carcass. According to FAO/WHO ratio of fatty acids n-6/n-3 in food for human should be 5:1, and ratio of polyunsaturated fatty acids to saturated fatty acids 0.45. Ratio of polyunsaturated to saturated fatty acids is low in beef (only in some well-muscled breeds this ratio is about 0.5-0.7). From nutritional point of view very important is n6/n3 fatty acids ratio, in beef fat this ratio is beneficial and equals 3. Main isomer of conjugated linoleic acid (CLA) is cis -9, trans- 11 acid contain 72 – 90% of CLA fully level. In red meat we have about 1g CLA/100g fat, fresh meat 1-46 mg CLA/100g fat and in roasted meat 30-100mg CLA/100g. Very important mark of beef quality is high level of long-chain polyunsaturated fatty acids from n-3 family (DHA, EPA i DPA) - 0,031 g EPA/100g fresh tissue, 0,051g DPA/100g fresh tissue and 0,006 DHA/100g fresh tissue.

Fatty acids provide aldehydes to synthesis chemical compounds deciding of meat flavour (Kołczak, 2005). These compounds like alcylofuranes, alcylopyridines, alcylothiazoles, they have heterocyclic rings with sulfur and/or nitrogen (Mottram 1998). Most important unpleasant smell aldehydes are hexanal and penatanal. Most of them are formed during heat treatment – frying, grilling, cooking. Linolic acid (C18:2) during cooking oxidize rapidly, giving meat products characteristics rancid smell. Main product of oxidize is arachidic acid (C20:4) with
characteristic fungi-like smell. Oxidize of n-3 acids family cause disagreeable fish odour – linolenic acid (C18:3) and docosahexaenoic acid (C22:6). According to American and British research consumers tolerate at best 3% (C18:3 + C20:5 + C22:6) in fully sum of fatty acids. Stearic acid plays important role in forming meat tenderness and juiciness Wood et al. (2004) and Purslow (2005) shown positive correlation between meat taste and level of saturated and unsaturated fatty acids. That’s why feeding system (grass feed or other) influence on meat taste. With growth of animals the taste of meat increases. Veal can be characterized as meat with weak taste and smell, which increase till 18 months of life. Increase of one part – and polyunsaturated fatty acids can lead to worsening stability of meat and decrease flavour (Scollan et al., 2006).

Also cholesterol is oxidized during frying, grilling and cooking. Till today about 100 compounds from cholesterol oxidize was identified. It is considered that they are one of main reason of atherosclerosis.

Factors which are important on meat’s lipid

Discussing meat’s lipids we should mention:

L-carnitine – very important role in fat degradation in cells, therefore it’s very important factor decreasing cholesterol level. It also influence on sugar level in body, level of potassium ion thereby increasing physical strength of our muscles. L-carnitine is synthesized in liver, vitamins (C, PP, B₆) and iron are needed as substrate. Most important source of L-carnitine is lamb meat (209 mg/100g tissue). In Beef meat there is about 60 mg/100g tissue

Choline, find as vitamin-like substance and part of some phospholipide like lecithin and sphyngomyelin. Choline is barely synthesized in our body, but is very important as precursor of neurotransmitters and cell membranes. Main sources of choline are eggs, milk and liver. Beef has high concentration of choline itself – 78 mg/100g tissue

Creatine – occurs naturally in muscles and help supply energy needed in chemical process like muscle protein biosynthesis. In human body is synthesized from glycine, which react with arginine and changes into Guanidinoacetate which lead to creatine. Red meats (beef, pork, horse meat) has about 350 mg/100g tissue

Taurine – amino acid with sulfonic group. It’s final product of cystene degradation. Small quantity of taurine is synthetized in human body, mainly in liver, brain and skeletal muscle. It’s naturally sources are meat (especially liver), fishes, clams. In beef there is about 77mg/100g tissue.

Coenzyme Q10 – vitamin-like substance, necessary for cell, because of strong influence on metabolism. It is also strong antioxidant. In beef and lamb is about 2mg/100g fresh tissue.
Glutathione is tri-peptide, naturally occurring in all plant and animal. It is antioxidative, coenzyme of some oxidoreduction enzymes. Protect cells from toxins, and in beef there is 12-16mg/100g tissue

Veal is full of niacin (16 mg/100g) vitamin B₆ (0.8 mg/100g) and panthothenic acid (1.5 mg/100g) while beef is rich of vitamin B₁₂ (2.5 μg /100g) and β-carotene. Super quality veal is from 4-8 weeks old calves, feeding milk. To avoid loss of nutrition components veal should be washed in one part and after this put into boiling water. To frying best is small fibrous meat with small amount of delicately membranes. Most healthy meat is grilled or fried in foil without fat. Veal shouldn’t be spiced, just to leave their natural taste. Spiced for veal: sweet basil, estragon, summer savory, marjoram, paprika, pepper, allspice, bay leaf, onion, garlic. Fresh meat can be stored in fridge for 2-3 days during summer and no longer then 5 days during winter (Lawrie, 1985; Zając, 2007).

Govedina sa stanovišta poboljšanja zdravlja

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Rezime

Govedina se uglavnom koristi u kulinarstvu i vrednost govedine i teletine se određuje mekoćom mesa i ukusnošću mesa. 23% mesa proizvednog u Evropi (oko 7,5 mil. tona) je govedina, proizvodnja teletine se procenjuje na 800.000 tona godišnje. Najveći proizvođači govedine i teletine su Francuska (30%), Holandija (26%), Italija (18%) Belgija (7%) i Nemačka (6%). 70% govedine i teletine koja se proizvode u Evropi konzumiraju potrošači u Francuskoj i Nemačkoj. Govedina sadrži proteine (18-23%) koji imaju izrazitu biološku vrednost. Nivo intramuskularne masti je ispod 5%, ugljenih hidrata i proizvoda njihovog raspadanja manje od 1%, mineralnih materija oko 1%.

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