Extending the shelf life of fresh meat : what is technically and legally feasible ?

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Shelf life of fresh meat is limited mainly by intrinsic and extrinsic factors favoring undesirable microorganism's growth and oxidative reactions. It can be extended by using individual or combined "hurdles" against deteriorative processes (removal of heat, modification of atmosphere, antimicrobial or antioxidant substances, biopreservation, …) and by using decontamination techniques (irradiation, high hydrostatic pressure treatment, …) reducing the initial microbial contamination. According to the EU legislation, fresh meat means meat that *has not undergone any preserving process other than chilling, freezing or quick-freezing, including meat that is vacuum-wrapped or wrapped in a controlled atmosphere*. No additive can be used (except some organic acids in pre-packed preparations of fresh minced meat). In spite of these constraints, a shelf life of several months can be obtained with chilled meat cuts by combining a temperature of -1°C and vacuum atmosphere. This exceptionally long preservation can be explained by selection of specific flora producing a competitive effect against spoilage or pathogen microorganisms. More research is needed to better understand the microbial flora dynamics in relation to "hurdle" conditions and physicochemical or sensory characteristics of the product. At the retail level, high oxygen atmosphere is often preferred in order to produce the attractive red color. In these conditions, the shelf life is reduced to 1-2 weeks due to oxidative unfavorable effects of oxygen on meat lipids and proteins. These last negative effects can be avoided by replacing oxygen with 0,3% carbon monoxide but this technique is not allowed in EU because it has been considered that, "should products be stored under inappropriate conditions, the presence of carbon monoxide may mask visual evidence of spoilage". Alternatively, the antioxidant status of the meat can be improved by using feed additives or plant extracts during the primary production.