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Re: Q&A on lactic acid

Questions and Answers on Lactic Acid

What is lactic acid?

Lactic acid is a molecule most frequently found in micro-organisms, vegetables, and animals. It is a pale and water-soluble liquid naturally formed by the fermentation of lactose (milk sugar), it can be produced synthetically (by chemical or biological processes) and is commonly used as a food additive¹ for flavour and preservation. Lactic acid indeed helps minimize numbers of detrimental bacteria.

Is lactic acid commonly present in nature?

Lactic acid is found in virtually all tissues, physiological fluids and excretions (e.g. in human blood, in sweat and in urine). Lactic acid is produced in the muscles during intense activity by the breakdown of glucose. Most of this lactic acid quickly dissociates into hydrogen ions (protons) and lactate. For this reason, the terms lactic acid and lactate are often used interchangeably.

Lactate is naturally present in the muscle of any animals and humans. It is a natural component of very many foods, in particular fruits and fermented milk products. Under conditions of heavy energy demand (and thus high oxygen need) skeletal muscles convert glucose anaerobically into lactic acid, which is excreted from the muscle cells into the blood. In the liver this lactic acid is reduced to glucose. [*See the EFSA opinion [Click here](#) p. 8*]

Do we already find lactic acid in some food products?

Lactic acid can be found in some food products either naturally or as an additive. Indeed, lactic acid is naturally present in yoghurt containing 9 g/kg, traditional cheese

¹ The purity criteria referred to in Article 3(3)(a) of Directive 89/107/EEC for food additives other than colours and sweeteners, as mentioned in Directive 95/2/EC, are set out in Annex I to Commission Directive 2008/84/EC of 27 August 2008 laying down specific purity criteria on food additives other than colours and sweeteners.

with 8 g/kg, dry fermented sausages with 9-15 g/kg, and beef meat with a content of 1.4 – 5.0 g/kg [See the EFSA opinion [Click here](#) p. 8]. It is also produced naturally by meat in packed vacuum. Finally, lactic acid is a permitted food additive (E 270) that may be used in a variety of foods other than meats (i.e. nectars, jam, jellies, marmalades, mozzarella and whey cheese, fats of animal or vegetable origin for cooking and/or frying, canned and bottled fruits and vegetables, fresh pasta, beer, etc.) according to Regulation (EC) No 1333/2008¹⁰ on food additives. Specifications for purity are laid down in Directive 2008/84/EC¹¹.

What is the purpose of using lactic acid as an anti-microbial treatment on meat?

Thanks to the "EU Food law" and the "Hygiene package", Food business operators have reached a high hygiene level in the EU. Nevertheless, the zero risk does not exist and some contamination with pathogen may still occur. Lactic acid would be an additional hygiene safety tools for slaughterhouses and cutting plants to look for the "zero risk".

What is the interest of using it on meat?

Lactic acid is a safe substance with biocide effects. *"The primary objective of the lactic acid application is to reduce the incidence of foodborne illness by lowering the prevalence and/or numbers of human pathogens on beef. Secondly, when used, lactic acid may also reduce spoilage organisms and increase the storage time of beef cuts and products"* (EFSA opinion p. 9).

This can be achieved either by inhibition of undesirable micro-organisms (bacteriostatic and fungistatic action) or by killing these micro-organisms (bactericidal and fungicidal action), it depends by the concentrations used. For the meat industry, the antimicrobial effect is particularly desired during beef carcass processing. In addition, the possible extension of the shelf-life of fresh or semi-processed foodstuff is key for increasing resource efficiency.

Does it modify the meat?

The substance diluted to a concentration of 2% to 5% would be used either by spraying or misting only on the surface. The way acid lactic works is mainly based on the well-known principle that microbial inhibition increases with the medium pH decrease. As, generally, the intracellular pH is higher than the extracellular one, the acid undergoes dissociation as soon as it enters the cell's cytoplasm and then decreases the intracellular pH by the proton release phenomenon. The effect is very limited and in any case not irreversible.

Is there any residue?

According to the EFSA opinion: *"The amount of lactic acid that can be absorbed in the beef meat from lactic acid treatment may be estimated to be within the range 50-190 mg/kg. So, the overall concentration of lactic acid in beef will not be majorly affected by those residual levels."* *"The amount of endogenous lactic acid in human blood is about 90 mg/L in a resting condition. Based on such estimates, the potential increase in lactic acid in the body after consumption of treated meat is negligible."*

Is there any risk for the consumer?

Based on EFSA opinion, the use of lactic acid on beef carcasses, cuts and trimmings is of no safety concern [*See EFSA opinion p. 8*].

Is this process in line with EFSA opinions?

EFSA assessed studies evaluating the safety and efficacy of lactic acid treatment for decontamination of beef carcasses, cuts and trimmings. EFSA released its opinion in July 2011 [[Click Here](#)]. The efficacy of lactic acid is recognised for *Enterobacteriaceae* on beef carcasses, cuts and trimmings and for *Salmonella* and/or STEC/VTEC on carcasses, beef cuts and trimmings. *"Considering the expected low level of exposure deriving from the use of lactic acid in carcasses, cuts and trimmings and the fact that it is an endogenous substance, it was concluded that the treatments, as described, will be of no safety concern, provided the substance used complies with the European Union specifications for food additives."* (p. 20)

Is it already used in some countries, with which effect?

Yes, it is used in some third countries such as Canada and USA. The effects are good, that's why the use of anti-microbial treatments is highly recommended in those countries.

What are the advantages in comparison with physical treatments?

The allowed physical treatments in the EU are only with potable water, cold or with steam. There is a draft proposal to allow the use of hot water with a recycling procedure but it is not yet adopted. The system with hot water in a cabin is applied with good results in DK, the weak point is the volume of water needed. In comparison with cold water, the interest of lactic acid is clear as cold water has no biocide effect. In comparison with steam, the equipment is different. For vacuum steam, the action of a man is requested. The steam is applied on a part of the carcass where it may remain some faecal contamination and, generally speaking, water may leach materials that support bacterial growth. The possibility to integrate low concentrations of lactic acid in existing "soft" preventive tools would lead to a strengthening of hygienic conditions during carcass processing. Its use should be seen as an increasingly strict application of GMP rules (Good Manufacturing Practices) and HACCP (Hazard Analysis of Critical Control Points).

Is it legal to use lactic acid on meat?

It is legal to use lactic acid as anti-microbial treatment in some third Countries such as in USA and Canada, where it is even highly recommended by the authorities. In the EU, lactic acid is already used as an additive in compliance with Regulation (EC) No 1333/2008 on food additives and with Directive 2008/84/EC for the specifications for purity. The legal basis to use lactic acid as an anti-microbial treatment is laid down in article 3 of Regulation EC/853/2004. Nevertheless, an implementing Regulation must be firstly adopted by the Commission services. Then it's not possible nowadays to use lactic acid as an anti-microbial treatment.

Is there any proposal on the table?

Considering the favourable EFSA opinion and according to article 11 of Regulation EC/853/2004, the Commission services drafted a proposal of implementing Regulation. It was transmitted to the EP and to the Council on 3rd October [[Doc. COM \(578\)](#)].

How will it be applied on the meat?

The substance diluted to a concentration of 2% to 5% would be used either by spraying or misting only on the surface. The exact procedure will need to be defined and monitored by the Food business operator in compliance with his HACCP based procedures, as any other hygiene requirement.

In the Commission's draft: will it be compulsory to use it?

In line with the EFSA recommendations, the use of the acid lactic would be integrated in the HACCP based system of the companies. It means it is up to the companies to decide whether they want to use this additional tools depending of their needs and their own procedures.

Would it be used for all meat or only for certain species?

The EFSA opinion deals only with the use of lactic acid for beef. Then the draft proposal is dealing only with beef. For extending the use of the substance to other species would require a new and specific EFSA opinion.

Would the use of lactic acid undermine the high level of hygiene reached in the EU?

It won't undermine the high level of hygiene but on the contrary it will reinforce it. Indeed, it is because good hygiene practises and HACCP based system are in place in the EU that this additional tool can be envisaged. Indeed, the best the hygiene is, the best is the result of anti-microbial treatment. The reduction is in average always between 1 and 2 log, whatever the starting level of contamination. Then food business operators, who have the primary responsibility for the safety of their product, have the incentive to maintain the best level of hygiene as possible. Lactic acid would be an additional tool to reach even better results.