

ANTIMICROBIAL ADDITIVES CHOICES FOR FOOD AND DRINK, W. EUROPE AND USA

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Abstract

The changing choices for antimicrobial solutions in the food and drink sector are considered and forecasts offered to 2010. In particular, the opportunities for “natural” as opposed to “chemical” solutions are considered.

Introduction

The range of antimicrobial ingredients/additives in the food is in some turmoil, driven by the search for “clean labels”. In addition, ‘ultra-natural’ ingredients such as herbal extracts and fermentation metabolites are being considered by food processors though both cost and legislation will restrict the use of deodorized materials.

Legislative Authorities are seeking greater food safety and some antimicrobials, especially cyclic chemicals, are falling under a cloud. Hurdle technologies are often being introduced to reconcile these demands.

This article considers the market size, shape and opportunities for the various key food-grade antimicrobials. It is based on a major study by Giract, with an in-depth understanding developed from interviews with key supplier and important user industries across the USA and W. Europe.

Antimicrobial Agents

The compounds may be loosely considered under two categories:

‘Chemical’/traditional antimicrobials, being organic and inorganic salts, especially:

- Acetates
- Benzoates
- Diacetates
- Dimethyl dicarbonate

- Lactates
- Nitrites
- Propionates
- Sorbates
- Sulfites

‘Natural’/modern products:

- Bacteriocins (nisin, natamycin)
- Fermentation and enzymatic products (including lysozyme)
- Natural extracts (including lactoferrin)

Traditional antimicrobial treatments, which significantly change the nature of the product, are not considered. These include drying, reducing water activity with sugar, salting and pickling in vinegar. Use of acids, per se, is referenced but not tabulated.

Sectors

The key sectors are:

- Meat
- Bakery
- Dairy and spreads
- Beverages
- Other food

Pure “processing sector use” where sulphur dioxide is usually generated on site are not included in this review (e.g. corn steeping).

Legislation

Most antimicrobials are food additives in both the USA and W. Europe. Additive regulation is tight and many antimicrobials have quantitative restrictions. Approval of new additives is fraught and, in W. Europe especially, full of hurdles.

“Modern” solutions may follow additive or, in the EU, novel food approaches. There is high resistance in W. Europe to approving new additives; threats are largely to delete some.

Clean label pressure, in W. Europe especially, gives an incentive but Authorities are reluctant to approve non-standardised materials.

When the novel products are concerned, few are additives. However, all have some drawbacks, frequently specification and thus approval. Antibiotics are under some threat in W. Europe but listeria scares in USA mean that this is a much more dynamic market. Deodorised extracts are unlikely to gain approval.

Packaging concepts fall foul of “materials in contact with food” legislation. Technologies are either “un-natural” e.g. irradiation; or small scale and costly.

Supply

The majority of those additives used as antimicrobials have also other technical functions. Many are used extensively in other industries. In this article we confine our consideration to antimicrobial supply and demand.

The manufacturers are many of the best known names – especially in the organic salt antimicrobial sector. They include the following, by major product type:

Key Producers	USA	W. Europe
Acetates, diacetates	Niacet	Kemira, JBL
Dimethyl carbonate		Bayer
Lactates	Purac, ADM,	Purac, Galactic, Roquette
Nitrites	US Salt, Gen Chemical	BASF
Propionates	Niacet, Kemin	Kemira, Lohman
Sorbates		Nutrinova, Cheminova
Sulphites	S Ionics, Inspec, Solvay	BASF, Esseco
Benzoates	Noveon Kalama, Velsicol	DSM

In the case of the more prevalent “modern products”, again supply is concentrated as shown in the next table:

Key Producers	USA	W. Europe
Lactoferrin	Glanbia, Cabot	DMV
Nisin		Danisco, DSM
Natamycin		Danisco, DSM
Fermentates	Kerry, Danisco	
Lysozyme		Chr. Hansen, DSM

Demand – Traditional Antimicrobials

Curiously, the market value of many of the subsets of antimicrobials lies in the range USD 20-30 mio. The exceptions are sorbates, propionates and lactates with market values above USD 50 mio and nitrites and sulphites (excluding sulphur dioxide) each at less than USD 10 mio across the 2 markets.

Acetates and diacetates are largely used in meat (diacetates), bakery and dairy/spreads. In the case of acetates (the large majority of the two), the bulk of use is the sodium salt. In the USA, it is treated as a flavouring substance. A major role is ‘anti-roping’ in bakery, though this is losing importance in the West. Diacetates have a role as “acetic flavor” in snacks.

Vinegar was not considered since it usually is fulfilling a flavour/taste function and not just antimicrobial.

Benzoates are used much more in the USA than in Europe. Demand is predominantly in drinks with small use in dressings.

Dimethyl dicarbonate has small volume but again a value of over USD 20 mio. Its use is entirely in drinks, 80% in Europe. It is attractive yields a “clean label” since the end products in solution are ingredients – not additives.

Lactic acid and lactates play a role mostly in meat, though there is a further important market in carcass rinsing in the USA. Lactic acid also has the attraction of being viewed as natural, at least when the optically active form. Nitrites are also focussed on meats with use largely in W. Europe. Propionates are largely in bread baking, more in the USA than W. Europe.

Sorbates are a very sizeable market of about USD 100 mio, and are found in many food sectors. Not counted in this figure is significant use in animal feed and cosmetics.

Sulfites have a small merchant market, largely in shrimp and meat, but this does not include sulphur dioxide made in-house by users.

Demand – Modern Antimicrobials

The market sizes of the “natural” and modern products are generally smaller, in the range USD 10-30 mio. Lactic acid was considered above, but could also fall into this sector, with a significantly bigger market in carcass rinsing.

Nisin and natamycin are largely used in W. Europe and in the dairy sector. There is a question mark over natamycin, concerning EU legislation and its thrust to eliminate non-essential antibiotic use. Lysozyme is also mostly found in the W. European dairy sector. Meanwhile lactoferrin is largely used outside the antimicrobial sector in infant formulae.

Fermentates have their market in the USA, especially in bakery and dairy. They satisfy US clean label requirements (though the product contains antibiotics, they do not have to be labeled in the USA).

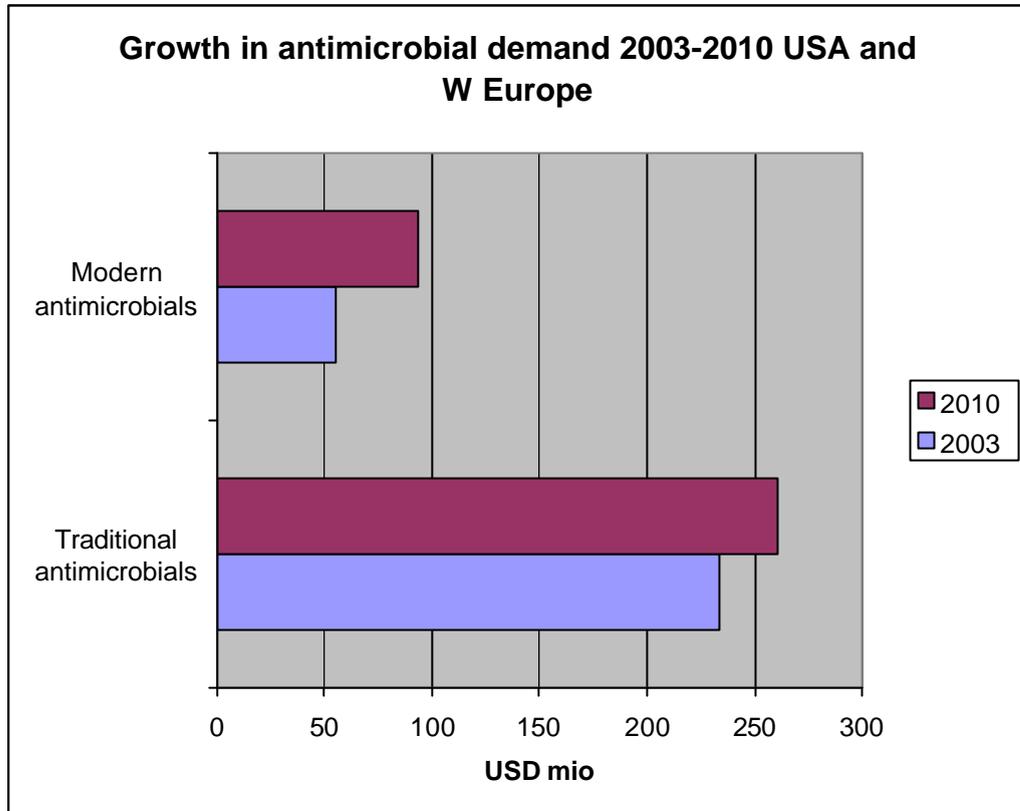
The full study examined a range of other ingredients, as well as packaging and process solutions.

Forecasts

Demand for each product is considered in detail in the study. Growth is influenced by:

- End product trends
- Legislative and labelling issues
- Cost/efficacy in use

The figure shows Giract's assessment of the development of the market to 2010, the whole market growing to over USD 350 mio:



- While value forecasts for antimicrobials are based on 2003 prices, Giract believes that the western producers face a significant threat from Chinese producers, who offer several antimicrobials at prices that are often 50% of those made in the W. Europe!
- USA has 'highest class' meat concern, while W. Europe is facing the 'natural' product (clean label) phenomenon. This will increase the pressure to explore new and better process technology options in both regions
- 'Natural' effect in W. Europe will continue to be the major hurdle for the inclusion of antimicrobials

In general, the winners in terms of growth rates can be grouped as follows:

US winners: lactoferrin, nisin, natamycin, fermentates, lysozyme

W. Europe (moderate) winners: sorbates, dimethyl dicarbonate, lysozyme

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