



# Consumer attitudes to enzymes in food production

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The use of enzymes in food production has potential benefits for both food manufacturers and consumers. A central question is how consumers react to new ways of producing foods with enzymes. This study investigates the formation of consumer attitudes to different enzyme production methods in three European countries. Results show that consumers are most positive towards non-GM enzyme production methods. The enzyme production method is by far the most important factor for the formation of buying intentions compared to price and benefits. Results also show that environmental concern and attitudes to technological progress are the socio-political attitudes that have the highest predictive value regarding attitudes to enzyme production methods.

## Introduction

Technology has been used for the production of foods since the birth of industrial food production. Some technologies have been introduced without consumers taking notice of anything but the product advantages. However, the public debate about the use of genetic modification (GM) in food production shows that consumer attitudes about new technologies for food production is something which cannot be overlooked.

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Enzymes have been used in food production for centuries since they play a natural role in the traditional production of e.g. wine and cheese. However, when enzymes are added to a process or a product in which they do not naturally occur, the use of enzymes in food production can be defined as a new technology. Furthermore, enzymes can be produced in different ways, e.g. by extracting them from plant sources or by production with microbes. Gene technology is often applied in industrial enzyme production to improve production yields. Therefore, it is in the interest of scientists, food producers and regulatory institutions to know how consumers form attitudes towards the use of different kinds of enzymatic technologies in the industrial production of foods. Most consumers, at present, do not have any knowledge of the different types of enzyme production methods that can be used in industrial food production. However, future food directives will most likely make it mandatory to label when either enzymes or GM material are used in food production. This way, consumers will be confronted with the technologies.

## Theoretical approach

Consumer attitudes to products manufactured with the use of enzyme technology may differ according to the production technology used; i.e. whether the enzyme is produced in GM plants, GM-microbes or traditionally using non-GM production methods. There has been much public debate about GM-food, but not about the use of GM in the production of enzymes. Therefore, this study investigates how consumers form attitudes to different enzyme production methods, and what impact these attitudes have on their intention to buy food products where enzymes produced in these ways have been applied.

Research has shown that consumers form attitudes to GM foods in a top-down rather than a bottom-up manner (Scholderer & Frewer, 2003). The two processes are not mutually exclusive but will usually be operating simultaneously (see Fig. 1).

In the top-down process, consumer attitudes towards a technology like GM reflect their general socio-political attitudes, whereas in the bottom-up process consumers form these attitudes based on information about potential risks and benefits of the technology. It has often been found that consumer perceptions of the risks and benefits of GM products can reasonably well be predicted by general socio-political attitudes. Among these are, for example, attitudes