

ACTICOA™: an innovative process designed to preserve antioxidants in chocolate

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INTRODUCTION

The medicinal and nutritional properties of the cocoa bean have been known and exploited by traditional cultures for centuries. However, it is only recently that scientific studies have begun to unravel the mysteries surrounding this ancient medicinal source. Much of the attention over recent years has been devoted to the role of the so-called polyphenols found in abundance in the cocoa bean. These are powerful antioxidants thought to have a range of positive effects on human cognitive functions, while helping to protect the body against the damaging effects of free radicals. Research into the effects of cocoa polyphenols continues to add weight to suspected links between these physiologically active components and a range of benefits from improved cardiovascular health and immune response to the prevention of certain forms of cancer.

Inspired by the potential benefits of this remarkable plant, chocolate-maker, Barry Callebaut has devoted a great deal of energy, resources and know-how not only into unlocking the secrets of the cocoa bean but also into developing ways to incorporate these benefits into chocolate. For despite the claims of several chocolate manufacturers, the vast majority of the polyphenols found in the

cocoa bean are in fact destroyed during the conventional chocolate-making process. The challenge for Barry Callebaut was therefore to develop a production process which could preserve and enhance these compounds without compromising the celebrated taste and texture of real chocolate. ACTICOA™, Barry Callebaut's answer to this challenge, is the first chocolate to guarantee a minimum polyphenol content and is now the richest source of polyphenols known to man.

The remarkable cocoa bean

Cocoa has played an integral role within several ethnobotanical traditions in places as far removed as South America, Africa and South-East Asia. Its applications are equally diverse, having been used as a diuretic, an antiseptic and even as toothpaste. More commonly, it has been a central ingredient in general medicinal applications for the treatment of anything from kidney ailments to rheumatism, listlessness, chest pains as well as being applied to burns, snake bites and other wounds.

Analysis also shows that cocoa is a vital source of important vitamins, minerals and other nutrients such as magnesium, which stimulates memory function, and theobromine and caffeine, which have positive effects on the respiratory and central nervous systems. Indeed, of the approximate 600 compounds to have been isolated from the cocoa bean, more than 200 are thought to have positive effects on health and well-being.

The majority of cocoa's beneficial properties are, however, attributed to the activity of one special class of compounds known as the polyphenols. Polyphenols are strong antioxidants believed to have numerous positive effects on several aspects of human bodily function. While the cocoa bean is by far the richest known source of polyphenols in the world, the particular sub-type of polyphenols found in abundance in the cocoa bean - the procyanidin flavanols - are also regarded as the most powerful.

Cocoa polyphenols and the chocolate-making process

Many chocolate manufacturers are exploiting the mounting evidence in support of the nutritional effects of cocoa, making particular reference to the power of cocoa polyphenols. However, in doing so many manufacturers neglect the fact that the overwhelming majority of polyphenols, though abundant in the raw cocoa bean, are in fact destroyed during the various stages of the conventional chocolate-making process. Moreover, there are a multiplicity of factors which determine the polyphenol content of the end product even before the chocolate-making process begins. Polyphenol content can vary enormously depending on the variety and origin of the cocoa plant and even within a single origin, soil and climate conditions can result in significant inconsistencies in polyphenol content.

However, it is the chocolate-making process itself which is predominantly responsible for the loss of polyphenols. Between the fermentation and drying of raw cocoa and subsequent processing through alkalisation, roasting, liquor extraction and conching, up to 85% of the original polyphenol content is lost, in many cases leaving less than 0.5% of total polyphenols in the final product (1).

Aware of the growing body of evidence in support of the potential benefits of cocoa polyphenols and faced with the significant loss of these compounds during the conventional chocolate-making process, chocolate manufacturer Barry Callebaut devoted years of intensive research towards developing alternative techniques for preserving and enhancing the presence of cocoa polyphenols in chocolate.

The result of that painstaking research, ACTICOA™, succeeds in preserving up to 70% of the natural polyphenol content of raw cocoa without the use of extracts, additives or other chemical substances.



Table 1. Polyphenol content over the various stages of the chocolate-making process. Conventional chocolate vs. ACTICOA™ chocolate

ACTICOA™: back to the bean

Each stage of the chocolate-making process - from bean selection to conching - was analysed and adapted in order to guarantee maximum polyphenol content. ACTICOA™ cocoa beans are selected according to strict criteria based on variety, origin and cultivation conditions. In the various subsequent process steps extra care is being taken to preserve the natural content of polyphenols. The results of the ACTICOA™ process are striking. ACTICOA™ chocolate is the only chocolate which can guarantee a minimum polyphenol content in dark chocolate (2 times more than standard dark chocolate) and in milk chocolate (4 times more than normal milk chocolate), making ACTICOA™ chocolate the richest known source of polyphenols.



The power of polyphenols

Polyphenols potentially play an important role in various human bodily functions. By helping to reduce cholesterol and improve blood vessel function, for instance, they are thought to have positive effects on cardiovascular health, while their anti-inflammatory properties and marked anti-microbial activity may also contribute towards improving immune response and general brain function.

Most excitingly, however, recent studies are lending increasing weight to the view that cocoa polyphenols play an active role in the prevention of several types of cancer, including prostate, colon, lung and breast cancer.

Independent research commissioned by Barry Callebaut (2) has scientifically demonstrated the inhibitory effects of various cocoa polyphenols on the growth of human cancer cells. These striking findings are the outcome of a series of in-vitro experiments involving the exposure of two human prostate cancer cell lines to very small concentrations of cocoa polyphenols. The results demonstrate that even at low concentrations of around 0.2%, the cocoa extracts induced a complete inhibition of cancer cell growth without any negative effects on normal, healthy prostate cells.

Recent independent studies have also confirmed the efficacy of the polyphenols contained within ACTICOA™ chocolate. More specifically, the findings of a recent study conducted by the ETAP Research Centre in France point to the possibility that ACTICOA™ not only helps improve vital functions, it may even be effective in prolonging life as such. The study involved measuring the relative lifespan of rats subjected to chronic oxidative stress in combination with ACTICOA™ polyphenol extracts. Particularly at low doses of 24mg/kg body weight, the ACTICOA™ polyphenol powder was shown to significantly inhibit the effects of chronic oxidative stress and increase lifespan by up to 30%.

ACTICOA™ chocolate, and the array of scientific research commissioned by Barry Callebaut around it is all about going back to the bean. It is about trying to understand the natural properties of this remarkable plant and enhancing all its goodness without the use of artificial additives. It is therefore very much part of Barry Callebaut's response to growing consumer demand for more positive, functional foods. That is why Barry Callebaut have set up a special

website devoted to the issue of polyphenols and the many other health benefits of chocolate.

www.acticoa.com contains a wealth of information for both consumers and professionals about the health benefits of polyphenols and the innovative chocolate-making process designed to integrate and enhance them into fine quality chocolate for everyone to enjoy.



Innovation: the fuel of progress

Barry Callebaut's research into cocoa polyphenols is part of a wider emphasis on innovation at the world's leading chocolate manufacturer. 'Going back to the bean' has, indeed, led to innovative techniques and products in other areas besides chocolate, such as revolutionary fat-free frying oils, cosmetics and even beer brewing agents. One of Barry Callebaut's most rigorous research programmes in this regard has been aimed at producing a soluble cocoa powder. In collaboration with the Dutch food research group, NIZO, Barry Callebaut has been involved in an intensive study of the chemical and physical structure of cocoa powder with a view to improving its solubility in water. Initial trials have already produced results in excess of 70% solubility and it is hoped that a sellable proposition will have been achieved by the end of 2007. This is just another way in which Barry Callebaut is fuelling the march of progress in developing innovative applications inspired by the remarkable cocoa bean.

REFERENCES

1. Based on a typical chocolate recipe: 46% sugar, 42% cocoa liquor, 11.4% cocoa butter, lecithin, flavours
2. See Jourdain, C., Tenca, G., Deguercy, A., Troplin, P., Poelman, D. (2006). In-vitro effects of polyphenols from cocoa and beta-sitosterol on the growth of human prostate cancer and normal cells. *European Journal for Cancer Prevention*, 15, 353-361