

# **Beer**

# **Health and Nutrition**

Charles W. Bamforth

Professor, Department of Food Science and Technology

University of California, Davis

**Blackwell**  
Science



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From man's sweat and God's love, beer came into the world

St Arnoldus

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Dedicated to my forebears





# Contents

Preface	ix
Acknowledgements	xiii
<b>1 Beer as Part of the Diet</b>	<b>1</b>
Beer: a vice or a staple part of the diet?	2
Getting beer into perspective	13
What is moderation?	18
But what about addiction?	20
Impacts on behaviour	25
<b>2 Beer Through History</b>	<b>30</b>
Brewing travels west	32
Restraining excess	33
Religious origins	34
Maintaining standards	35
Beer: a nutritious dish for the whole family	37
Temperance pressures	42
Towards prohibition	45
<b>3 The Basics of Malting and Brewing: Product Safety and Wholesomeness</b>	<b>49</b>
Chemical beer?	49
Basic outlines of malting and brewing	63
Styles of beer	69
The chemistry of beer	71
<b>4 The Basics of Human Nutrition</b>	<b>86</b>
Energy	86
Phytonutrients	91
Carbohydrate, fat and protein	91

Vitamins	92
Minerals	93
Fibre	94
Water	95
Balance	95
<b>5 The Composition of Beer in Relation to Nutrition and Health</b>	<b>96</b>
Energy	97
Carbohydrate, fat and protein	105
Water	106
Vitamins	106
Minerals	109
Fibre	112
Comparison of beer with other foodstuffs for nutrient value	112
Potentially deleterious components of beer	116
Beer as a 'treat'	117
<b>6 The Impact of Alcohol on Health</b>	<b>120</b>
The metabolism of ethanol	122
Direct and indirect impacts	123
The heart and the circulatory system	124
The liver and the digestive system	135
The reproductive system	139
Brain and cognitive function	142
Kidney and urinary tract	146
Age	147
Cancer	149
Allergy	153
The common cold	154
<b>7 Conclusion</b>	<b>155</b>
<b>References</b>	<b>159</b>
Index	179

## Preface

John Hudson peered at me over his half-moons. A firm frown was on his forehead. His hands were folded firmly on his desk.

‘Say that one more time, lad’, he grunted in his familiar and frequently feared North Yorkshire accent.

I gulped and let it go one more time.

‘I don’t think the work I am doing here is worthwhile. I mean, I could be researching cancer – something beneficial for mankind. But I’m working on beer – what puts bubbles on a pint, why lager tastes of sweetcorn, how to choose the best barley. It’s not exactly crucial, is it?’

I’d been worrying about my *raison d’être* for some while. Surely my expertise as an enzymologist could be put to better use?

Hudson, Deputy Director of the Brewing Research Foundation at Nutfield in leafy Surrey, was unexpectedly calm on that dull winter morning in 1980.

‘Do people drink beer, Charlie?’

‘Well, yes.’

‘Who drinks beer?’

‘Lots of people.’

‘Such as the working class man and woman, for instance?’

‘Yeah.’

‘Does it make them happy?’

‘Well, sure, as long as they don’t get drunk, and they can afford it, and nobody suffers as a result of them doing it.’

‘True, but accepting all that, do they like their pint?’

‘Well, yes.’

‘So you don’t think that helping brewers make grand beer, that people will enjoy, is worthwhile?’

I just looked at him. At that very moment I matured considerably. I realised that my humble place in society’s tapestry was not insignificant, that I did have a worthwhile role to play, and that there was no shame associated with the work that I was doing on a topic that, admittedly, I found to be fascinating.

Dr Hudson wasn't finished.

'Don't forget, lad, that beer has long since been important to the diet of some people. It gives them energy, vitamins, minerals. It soothes them. Don't knock it.'

Hudson was a wise man. Irascible for sure, but a man who loved beer in every respect and would have nobody badmouth it.

I, his young protégé, was certainly receptive to the fact that beer could actually be a worthy part of the diet. And, for a number of years prior to the conversation in question, it had formed a prominent part of my social activity, as it did for a great many young folk in late sixties and early seventies England.

I had my own clear appreciation of the merits and de-merits of alcohol consumption. As a young biochemistry student at the University of Hull, who worked ludicrously hard during the week, I looked forward eagerly to the weekend when my buddies and I would make for old town Hull and its plethora of outstanding pubs.

Sometimes I made a complete fool of myself. My conscience will not allow me to deny the fact that, from time to time, I imbibed to excess. It didn't take me long to learn the lesson, however, that this was disadvantageous, not least from the unpleasantness of the day after. Before long, though, I had come to understand the pleasure that is to be had from taking one's beer steadily and in moderation – a pint or two daily. It tasted good. It complemented the food I was taking, whether a sandwich, a curry or just a bag of crisps. It made me mellow and calmed. And, as I usually took the beer in a pub rather than at home, it was a valuable part of a holistic social experience.

For the majority of my beer-drinking life (33 years officially – and still counting loud and strong), I have never contemplated beer in an overtly dietary manner. It has been taken for pleasure and not as part of a carefully considered diet. Few people would treat it as a foodstuff per se. And yet, as you will find from reading this book, beer is very much a food. It is unreasonable for critics to refer to beer as 'empty calories' and, as we shall see in Chapter 5, it is entirely possible to tally the contribution of calories, fibre, vitamins, minerals, and so on from beer alongside those of the other items on the dinner table. Proteins and carbohydrates, but (despite the myth) absolutely not fats, are very much a part of beer as they are of bread, meat, vegetables and cereal. Indeed, what is beer if it is not liquefied barley with added value?

As consumers become more and more health conscious and aware of the need for a well-balanced diet, it is not sufficient simply to bracket a product such as beer as 'something for pleasure', as if it was just water and contributing no nutritive quotient. It does kick plenty, in various ways, and people need to be aware of the extent of this and how it impacts the rest of their intake. It would never be my intention to advocate beer as an inherent substitute for any other component of the diet. It seems entirely logical, though, to include beer amongst the diverse other items on the menu in the ready reckoning exercise and even to fashion a sustaining and, of course, pleasurable meal

that incorporates a glass of beer. One less slice of bread perhaps? Skipping the stodgy or ludicrously sweet dessert?

The supermarket shelves are loaded with diverse choices and all manner of foodstuffs – fortified with this or that, low calorie variants, ‘organic’, etc., etc. Beer is no different – except that there is no overt fortification going on, rather the inherent components such as vitamins and minerals that can be in quite useful quantities.

What, I wonder though, would people say if I said that beer might as justifiably be located in the medicine cupboard as in the larder? The evidence is mounting that moderate consumption of beer (of the order of one to two pints per day) lowers the risk of mortality and morbidity and has a range of beneficial impacts on the body. When my wife was in the maternity ward with our first born, the drinks trolley included stout alongside the other beverages on offer. It was accepted wisdom that beer is rich in valuable nutrients, as well as offering a soothing impact after an intense emotional and physical experience.

It would be stupid to argue against the fact that drinking alcoholic beverages to excess is dangerous (health-wise and accident-wise) and prone to lead to suffering, both for the imbibor and for those close to them. It is no surprise whatsoever, therefore, that organisations have sprung up with the aim of attacking the alcoholic beverages industry. It is equally unsurprising that those within the industry (and, as a professor whose specialisation is beer, I guess this includes me) should seek to counter such sieges. However, it is important that this is done in a responsible and conscientious manner, and with a rationality that seems to be too frequently lacking from those who decry alcohol.

The producers of alcoholic beverages must position their products for what they are: valuable and positive components of the human diet that should be enjoyed responsibly by adults. They should not be (but, too often, regrettably are) marketed with images of wild and irrational behaviour. And, when arguments for their positive contribution are made this should be done in as balanced and critical way as possible.

Would that those who oppose alcoholic beverages take the same approach in considering all the evidence. Perhaps then more of them might come to accept that, taken wisely and temperately, beer and other alcoholic beverages are a worthy component of society. The vast majority of people who take a beer are not drunken drivers, wife beaters, football hooligans, panhandlers or, above all, alcoholics. And neither will they go on to become these things. Certainly, excessive alcohol intake can reduce inhibitions that could increase the likelihood that a football job will wreak havoc. However, it’s not the alcohol, any more or less than the game of soccer itself, that has made the thug what he is.

Drinking of alcohol, including as beer, is so often an integral feature of social occasions for adults. As Gusfeld (1987) says, a drink is a signal for an important change of pace or venue.

So, what is someone who has been employed either in the brewing industry or as a professor teaching its science and technology for a quarter of a century doing writing this book? Is it, as some will undoubtedly say, an exercise in self serving, an unashamed piece of biased lobbying to tout one's favourite beverage? I have very little doubt that the anti-alcohol lobby will come to that conclusion. With just as much vehemence, I would refute the inference. I must stress, too, that I have neither been commissioned to write this book nor am I directly paid by any brewing company. This volume seeks to discuss beer in a warts-and-all context. I have certainly not fought shy of discussing any of the adverse impacts that excessive consumption of alcoholic beverages can have.

I was driven to write the book by several forces:

- (1) To consider dispassionately the role of beer in the human diet now and through history, as an exercise in scholarship.
- (2) To consider the impact that beer (as part of the spectrum of alcoholic beverages) has on health, in an era when the average person has probably never been more conscious of, and concerned about, the state of their well-being.
- (3) To redress the balance about the relative worth of beer and wine as beneficial parts of the diet.

It seems to me that those writing on the topic from within (or closely associated with) the alcoholic drinks industry tend to cover both the positive and negative aspects of alcohol. By contrast, those writing from the opposing stance seldom do other than consider the consumption of alcoholic beverages as entirely negative.

I believe that there is a key need for education, to present facts as we know them (and as they emerge consequent to state-of-the-art research) and not to shy away from any facet of the debate. In a class I teach to students of all ages on the Davis campus of the University of California we endeavour to do just this. I bring in guest speakers from breweries but also expose the students to medical experts able to articulate the perils of taking alcohol to excess. Some of the images can be quite gruesome. We want the students to understand, to find themselves in this conflicting arena.

For after all, is not a maxim from the Temple of Apollo at Delphi (Braun 1996), 'Know thyself and nothing to excess'?

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# 1 Beer as Part of the Diet

Beer has been drunk for more than 6000 years, from the time that it was first made by happenstance in the middle age of ancient times (Bamforth 2003). Ever since, it has become a staple part of the diet in many cultures. Furthermore, it has not only comprised a valuable addition to the table, but has served various medicinal roles, including mouthwash, enema, vaginal douche and applicant to wounds (Darby et al. 1977).

Beer (and other forms of alcohol) differs in its significance, acceptability and importance from culture to culture. At one extreme the prophet Mohammed forbade his followers to drink alcohol, thereby establishing a point of difference from Christianity. The Koran speaks of alcohol as being an 'abomination and the work of Satan' (5: 90). Conversely, the Kofyar of northern Nigeria believe that 'man's way to god is with beer in hand' (Netting 1964). In the Aztec nation, religious worshippers were obliged to get drunk for fear of displeasing the gods (Thompson 1940). In India, the various deities demand different approaches to the use of alcohol. Indeed, in some areas of India, alcohol is replaced by infusions of hashish (Carstairs 1957). What better illustration might one use to stress the need for tolerance of others' customs and beliefs and of what is or is not acceptable?

Mandelbaum, in discussing the Tiriki of Kenya, observes:

Beer is a constant medium of social interchange for men; beer drinking is a pre-occupying activity that few men reject. Drinking beer together induces physical and social mellowness in men. Very little aggressive behaviour is ever shown as a result of drinking, and that little is promptly squelched. Pathological addiction rarely, if ever, occurs.

Mandelbaum (1979)

This thought-provoking view surely reminds us that we should view the consumption of beer (and other alcoholic beverages) from a holistic standpoint.

The historical importance within society of beer (and other alcoholic beverages, such as wine in climates where grapes could be grown) is illustrated by the argument that nomadic tribes gravitated to crop farming and organised communities in order to ensure a constant supply of beverages (Kendell 1987).

In many cultures, especially those of Northern Europe, beer was through generations the staple drink for the whole family, young and old. At least in part this was on account of beer being safer to drink than water in days when there were no water purification systems. The ale, after all, had been through a boiling stage, whereas the local supply of water had not. The ale tasted better too. Cesar de Saussure, a Swiss writing in 1720 (see de Saussure 1902), found in London that:

Though water is to be had in abundance in London, and of fairly good quality, absolutely none is drunk. In this country beer is what everybody drinks when thirsty.

The early settlers in Virginia fell sick for want of ale, on account of the local infected water that they were obliged to drink. One of the first settlers, Richard Ffretborne, bemoaned the lack of any creature comforts, bitter that back in England folk were healthy on their strong ale whereas here there was only water to drink (Kingsbury 1906–1935).

It was only with the development of cleaner water and the advent of tea and coffee drinking in the seventeenth century that beer in countries such as Great Britain progressively shifted away from being the staple beverage at mealtimes for all members of the family unit, and became more of a luxury item.

Yet there remain cultures, notably the Czech Republic and Germany, where the consumption of beer to accompany a meal remains a key feature of the diet, which is reflected in the per capita consumption figures (Table 1.1).

## **Beer: a vice or a staple part of the diet?**

Were we able to transport ourselves back to the Middle Ages and enquire in England, Flanders, Bavaria or Bohemia about the key features of the popular diet, ale or beer would unquestioningly and unhesitatingly be listed alongside meat, bread, milk and vegetables. The questioner would be regarded as being mightily peculiar if he or she were to question ale's legitimate place on the table. It was neither a comfort food nor an extravagance. It was an integral part of the food intake in all walks of society. In eighth-century England a monk might consume eight pints of ale a day.

Beer in Britain has long been considered to be a key part of the diet, as much so as wine in France. Henry Brougham MP (Brougham 1830) said that 'To the poor the beer is next to a necessity of life.'

Over 50 years ago the nutritive value of beer was emphasised. An admittedly weakish beer [3% alcohol by volume (ABV) in the austere early post-war years] was claimed to provide 200 calories and a fifth of a working man's requirement for calcium, phosphorus,

**Table 1.1** Worldwide consumption of beer, 2000.

Country	Consumption (litres per head)
Argentina	32.7
Australia	90.0
Austria	107.0
Belgium*	98.3
Brazil	48.2
Bulgaria	51.0
Canada	67.4
Chile	27.5
China	17.3
Colombia	32.7
Croatia	86.2
Cuba	20.3
Czech Republic	158.9
Denmark	98.6
Finland	80.2
France	35.9
Germany	123.1
Greece	39.0
Hungary	73.0
Ireland	125.0
Italy	28.9
Japan	55.9
Korea (Republic of)	35.5
Mexico	48.3
New Zealand	79.5
Netherlands	80.5
Nigeria	5.6
Norway	52.0
Peru	22.8
Philippines	15.9
Poland	62.8
Portugal	61.3
Romania	55.4
Russia	37.9
Slovak Republic	87.1
Slovenia	92.0
South Africa	53.8
Spain	72.0
Sweden	56.4
Switzerland	58.3
Ukraine	21.1
UK	95.4
USA	82.4
Venezuela	76.0

\*Includes Luxembourg, because of inaccuracies introduced by cross-border trading.

Source: Tighe (2002).

nicotinic acid and riboflavin (Bunker 1947). The satisfaction of having at least part of one's dietary intake in a pleasurable form was not sneered at then.

Perhaps the first person to conduct a serious study of the impact of abstinence, moderation and excessive drinking on health was statistician Raymond Pearl. On the basis of interviews with over 2000 workers in Baltimore, he concluded almost 80 years ago that on average moderate drinkers lived longer than abstainers and much longer than those who were heavy drinkers (Pearl 1926).

Yet now, at the dawn of the twenty-first century, beer-drinking is regarded in many societies as a vice. It is surely astonishing that in the United States it is possible to buy cigarettes at the age of 18, but it is not legal to purchase alcohol until the age of 21. It would be a struggle to identify any merit associated with smoking, with the possible exception of its role as an anxiety relaxant. By contrast there is accumulating evidence that alcohol, including beer, in moderation can have a beneficial impact on health and wellbeing.

In passing, let us consider the legal age at which, in the US, it is possible to partake of other activities that surely might be considered a genuine risk to health and wellbeing, not only for the partaker but also for those around them. A child may legally drive a car, with relatively few restrictions, at the age of 16. More alarmingly, 35 states in the US have no licensing or registration requirements for guns ([www.soros.org/crime/highlights.htm](http://www.soros.org/crime/highlights.htm)). Seven states lack a legal minimum age for buying a rifle or shotgun from an unlicensed dealer, while six states have no legal minimum age for a child to possess a handgun. In five states there is a minimum age – 16 in New York, Georgia, Vermont and Alaska, and just 14 in Montana. But the minimum legal age for drinking alcohol in all 50 states is 21!

Opinions about the relative merits and de-merits of smoking, driving, guns and alcohol will of course differ between individuals. Certainly if we consider the respective virtues of smoking, weapon use and alcohol (in restraint), then it seems to this author that there may be a warped set of priorities in one country at least. Nonetheless beer is the second most popular drink in the United States, with annual average per capita consumption at 357 8-ounce servings, after sodas and other soft drinks (861) (Beverage Digest 1998). Worldwide production of beer in 1999 ran at 0.13 billion litres.

It seems that we have lost sight of the real benefits of a foodstuff such as beer (and it is a foodstuff, as we will explore in Chapter 5) for the body and for overall wellbeing. P.G. Wodehouse, in *The Inimitable Jeeves*, wrote: 'It was my Uncle George who discovered that alcohol was a food well in advance of modern medical thought.'

In *Pearson's Weekly* (a rival to *Tit-Bits* and founded in 1890 by Sir Arthur Pearson, who went on to create the *Daily Express*), Bass Ale received the following testimonial:

An old friend of mine, Colonel Worsley CB, when in India, had a very dangerous attack of dysentery and was given up by the doctors. When dying as it was thought,