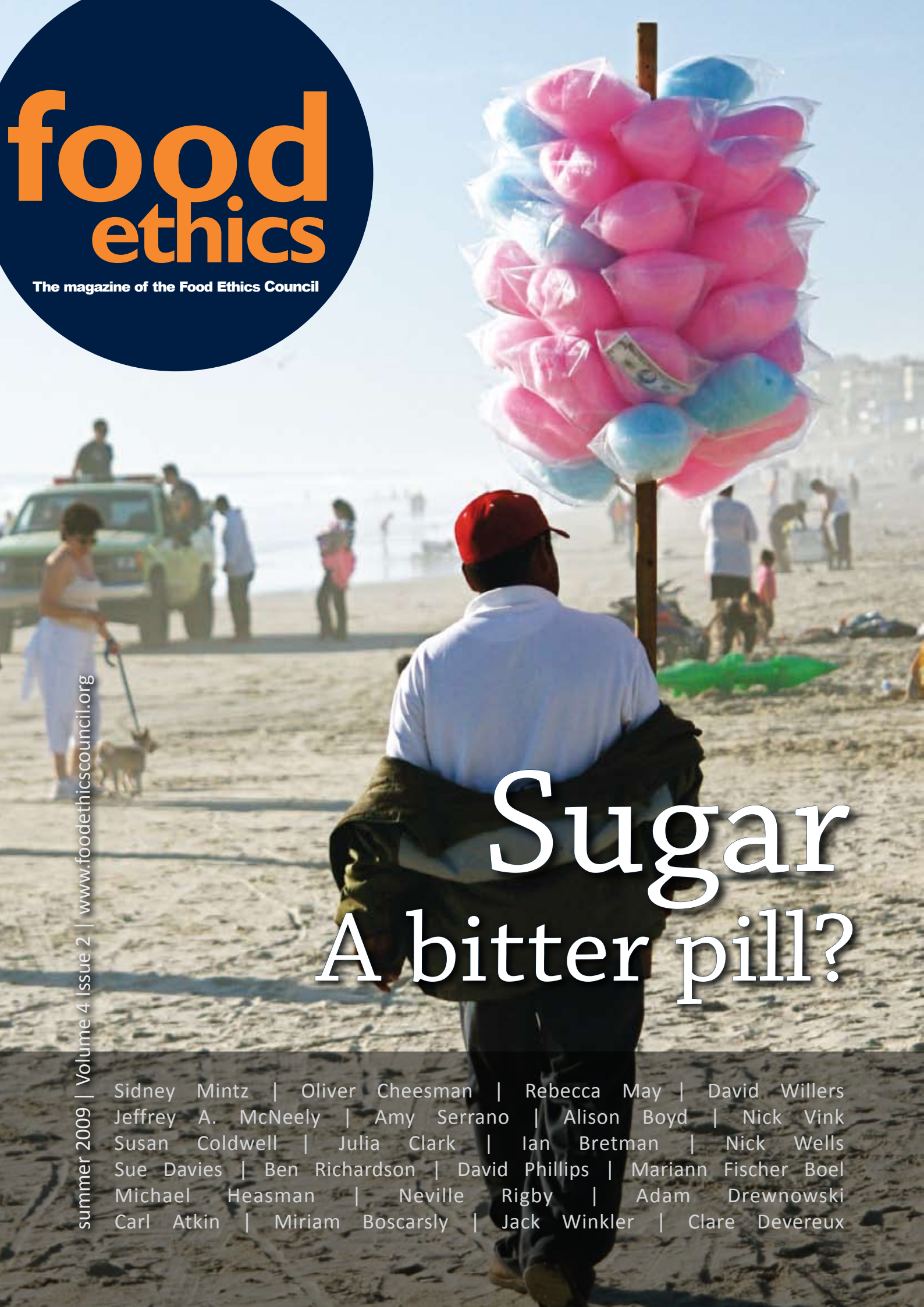
food ethics
The magazine of the Food Ethics Council



Sugar
A bitter pill?

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Sue Davies | Ben Richardson | David Phillips | Mariann Fischer Boel
Michael Heasman | Neville Rigby | Adam Drewnowski
Carl Atkin | Miriam Boscarsly | Jack Winkler | Clare Devereux

Contents

FOOD ETHICS COUNCIL

Food Ethics, the magazine of the Food Ethics Council, seeks to challenge accepted opinion and spark fruitful debate about key issues and developments in food and farming. Distributed quarterly to subscribers, each issue features independent news, comment and analysis.

The Food Ethics Council challenges government, business and the public to tackle ethical issues in food and farming, providing research, analysis and tools to help. The views of contributors to this magazine are not necessarily those of the Food Ethics Council or its members.

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More than just a sweet tooth

Tom MacMillan

Are we addicted to sugar? In the strict psychiatric sense, perhaps: if we binge on harmful amounts in spite of knowing the consequences, that's enough to have us diagnosed. But since food in general might tick the same boxes, explains Miriam Boscarsly (p.38), the jury seems out on whether sugar addiction is a medically useful idea.

As a metaphor for society's love affair with sugar, however, addiction is certainly compelling. As Sidney Mintz (p.5) describes, sugar has helped make the world go round since the first plantations bankrolled and fed colonial expansion and then industrial capitalism. Our economy was built on sugar and many countries still depend on it. Yet its ills – from slavery to tooth-rot – have seldom been far from public view.

Global sugar production is 165 million tonnes (2007) and rising.[1] While it comes mainly from cane in Latin America and Asia, the EU also produces a fair bit from beet, a legacy of agricultural protection. Overall, cane accounts for about two-thirds.

The environmental toll of producing cane sugar, which includes water scarcity and biodiversity loss, is pronounced but comparable to other tropical and subtropical monocultures. Its human cost is more closely linked to the crop's particular characteristics, presenting a narrow harvest window and inhospitable working environment. As Mintz puts it, these have meant that "sweated, unskilled, imported labour that was openly or furtively coerced under colonial or quasi-colonial conditions, has been the very hallmark of the cane sugar industry, almost always, and nearly everywhere".

When it comes to consumption, sugar has see-sawed with fats as the focus of concerns over obesity and diet-related disease. Brits on average eat around 40 kg a year, which works out at 14% of the energy in our diets – the recent trend has been downward, reports Heasman (p.31), but we still exceed government's healthy eating target of 11%. Globally, total sugar consumption is rising at about 2% annually, and attempts to set science-based guidelines on how much it is healthy to eat have been mired in controversy.

Is sugar really the right target?

Efforts to address these problems have been fraught, but not without success. An alliance of producers and NGOs called the Better Sugarcane Initiative seems to be making a mark on production, reducing fertiliser and pesticide use, and promoting better water and soil management. The EU's protection for sugar producers, which dumps beet sugar on world markets and gave preferential market access to some cane producing countries, is being painfully reformed. Fair trade schemes are winning a better deal for producers, with some benefits reaching hired workers. In the UK and elsewhere in Europe, nutrition standards on advertising are set to restrict the promotion of very sugary foods to children and to adults using health claims, while product reformulation is chipping away at our intake.

But is sugar really the right target? If we did all these things and more to improve production standards in the sugar industry, gain fairer terms of trade and expose hidden calories, we'd surely be better off. But would it crack the problems sugar presents?

Probably not. As contributors to this magazine attest, there are rival sources of sweet, cheap calories, such as high-fructose corn syrup, and plenty of other ways to exploit workers, including bioethanol production from cane. Squeeze sugar, and those problems bulge elsewhere.

Consider, for instance, how EU sugar reforms affect workers. Dismantling protection has accelerated corporate consolidation and mechanisation, according to Ben Richardson (p.24), shedding jobs and exposing vulnerable producers to market volatility. This will increase pressure on sugar businesses to ensure healthy, fair and dignified conditions for workers who remain in their pay and small producers who supply them. But what happens to those pushed out of sugar by restructuring?

So sugar illustrates Europe's debt to coerced workers and our obligation to repay it through significantly increased development assistance and an uncompromising political commitment to development-focused trade reform. Yet it also underlines that no single sector should be privileged in this effort, and that development assistance and trade reform across the board must be made radically more accountable to the workers, small producers and other vulnerable people it affects.

In Adam Drenowski's (p.37) analysis, employment conditions, income inequality and social protection are the biggest issues in consumption. "What leads to obesity may not be sugar but the low price of sugar. Or fat. Or refined grains," he argues. "The real question is not what made Americans obese, but who made them poor". Focusing on sugar, say by taxing empty calories, might make matters worse.

So the problems hinge, as Mintz famously put it, on 'sweetness and power' rather than simply on sugar. The solutions lie in tackling inequality and abuses of political and economic power by upholding human rights at home and abroad, and actively promoting democratic engagement and accountability. Admitting that this goes beyond sugar and even beyond food doesn't let our sector off the hook: it obliges us to lend our voices, our evidence and our support to far-reaching measures that will work. ■

1. All figures from articles in this magazine.

Dear Sir; Following the 'fish' edition of your magazine, you wrote to The Grocer asking that retailers only supply fish that has been certified as sustainable by the Marine Stewardship Council.

The continued supply of fish to meet increasing consumer demand is a major problem. It may seem that MSC certification is the best way we currently have of judging sustainability, which is why it is endorsed by most major retailers, but there is no evidence to suggest that any of the key MSC certified sustainable fisheries are actually sustainable. There are major question marks about the Pacific Salmon fishery, the Alaskan Pollock fishery, the New Zealand Hoki fishery and the Western Australian Rock Lobster fishery.

The Pollock, Hoki and Rock Lobster fisheries have all succumbed to the imposition of fishing quotas because of local concerns about future stock recruitment. These quotas show the fishery is no longer sustainable due to the fish catch exceeding the speed in which new stock is replaced. There are also concerns about the level of by-catch in the Alaskan Pollock fishery.

The Pacific Salmon fishery is different. It is only considered sustainable due to the huge numbers of hatchery reared fish released into Alaskan rivers. These fish, larger and stronger than wild fish, are thought to out-compete other wild salmon stocks for feed whilst at sea.

The problem with MSC certification is not with the MSC itself, but with their independent third party certifiers. These commercial companies review the local stock information and decide whether they think the fishery is sustainable. They are not hands-on certifiers with local experience of the fisheries. In some cases, fisheries have been certified even though they are part of a larger fishery which has not. This makes no sense.

The MSC refuse to certify farm raised fish, despite certifying fish from hatcheries. Yet, aquaculture offers the only hope in meeting consumer demand without wiping out stocks of wild fish.

Of course consumers should avoid threatened stocks - it is commendable provided the fish are truly sustainable. As yet, the jury is still out.

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Survey results

In the last issue we asked what you thought of the Food Ethics magazine, to find out what we're getting right and where we can make improvements. Thirty-one people responded, and congratulations go to Rosalind Eccles who receives a year's free subscription.

We are delighted that overall you like the magazine, and feel that it's timely and relevant, with a good mix of contributors. Respondents particularly the magazine's in-depth analysis, topicality, focus and balance of articles. They noted our wide range of interesting contributors, our objectivity and our coverage of contemporary and novel issues.

Lest we rest on our laurels, you've also told us that you'd like to see more colour in the magazine, shorter articles, campaign news, more case studies and executive summaries. These are all things we'll be looking at over the next few months. In the meantime, thank you for all your comments, and we hope that you continue to enjoy reading the Food Ethics magazine.

Sustainable food distribution – present and future

Two new reports are now available from the Food Ethics Council. *Future scenarios for the UK food system* and *From A to B: a snapshot of the UK food distribution system* are the final outputs from our two-year, Esmée Fairbairn Foundation-funded project into sustainable food distribution.

Future scenarios is a toolkit designed to help organisations plan for the uncertain future of the UK's food system. Based on expert analysis of current and emerging trends, it identifies different but equally plausible stories - or scenarios - about how the future could turn out.

Intended for civil society groups, public policymakers and businesses, it helps them test out policies, products and campaigns, and think more clearly about our aspirations for the future.

From A to B: a snapshot of the UK food distribution system lifts the lid on food transport, which often involves complex journeys and many staging posts in several countries.

People care increasingly about where food comes from, yet we usually barely glimpse the logistical feats that bring it to us. Our report starts by looking at the overall shape of the UK food distribution system, then follows the journey of food from overseas and UK producers via processors and manufacturers, wholesalers, retailers, foodservice companies, and, finally, shopping trips.

The report is an overview of a complicated and rapidly changing system. Its sister publications – *Food distribution: an ethical agenda* and *Future scenarios for the UK food system: a toolkit for thinking ahead* – provide critical analysis and a guide to how the system could, and should, change in the future.

Contact Ann Baldridge on 0845 345 8574 or ann@foodethicscouncil.org if you would like to order any or all of these reports. ■

Stop press... Stop press... Stop press... Stop press...

Look out for the Food and Fairness Inquiry, a major initiative to be launched this summer.

Sugar

Old champion, new contenders

Sidney Mintz

Research professor in the anthropology department at Johns Hopkins University, Baltimore, author of *Sweetness and Power* and other books, articles and reviews on the history, meaning and anthropology of food.

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Unlike our inclinations toward salt, sour, bitter, pungent ('hot') and all the other tastes, among human beings the near-universal liking for sweetness is probably tied to a built-in biological predisposition. A wide variety of substances in nature, including some which need to be extracted or processed, serve to satisfy that longing. The sugar maple, sugar beet, Chinese cane (Sorghum saccharatum), palmyra and toddy palms, and dozens of fruits and vegetables, including the intensely sweet date and fig, are only some of the best-known sources; during the past century, those sources have multiplied.

Marcel Proust's reflections, summoning up the past by recalling a dearly-loved madeleine, are known to everyone. But this writer's mother provided spirited recollections of childhood in a cold eastern European village slum, more than a century ago, that were also marked by echoes of sweetness – of parsnips, dug laboriously from the frozen earth, then grated into a frosty white dessert, a wintry delight for a child who had not yet ever tasted anything sweeter.

Such memories confirm the pull of sweetness. A wonderful Spanish cave painting near Valencia, thought to be at least twenty thousand years old, depicts a human figure stealing honey from a hive while enraged bees buzz around her. The painting thus reminds us of the allure of yet another truly ancient sweet substance, that of which the Hebrews and the Greeks also sang.

In the classical world as in the so-called 'primitive' world, honey above all marked humankind's seemingly unending fascination with a particular taste.

But in terms of its consequences for consumption, the most important source of sweetness for humanity during the last dozen millennia has been the sugarcane, which is a grass (Family Gramineae). There are six (some taxonomists say five) species of cane. At least three have played some role in its spread as a cultivated plant. Of these, Saccharum officinarum, the so-called 'sugar of the apothecaries', or 'creole cane', proved particularly important historically. A plant of the subtropics, the sugarcane's locus of domestication is almost certainly New Guinea. It was domesticated there around twelve thousand years ago, and for a hundred centuries after, human beings there – and later, on parts of the Asian mainland – have been growing sugarcane simply to be able to chew it for its sweet juice. To this day in New Guinea and some other places, many peoples still do.

Sweet sucrose

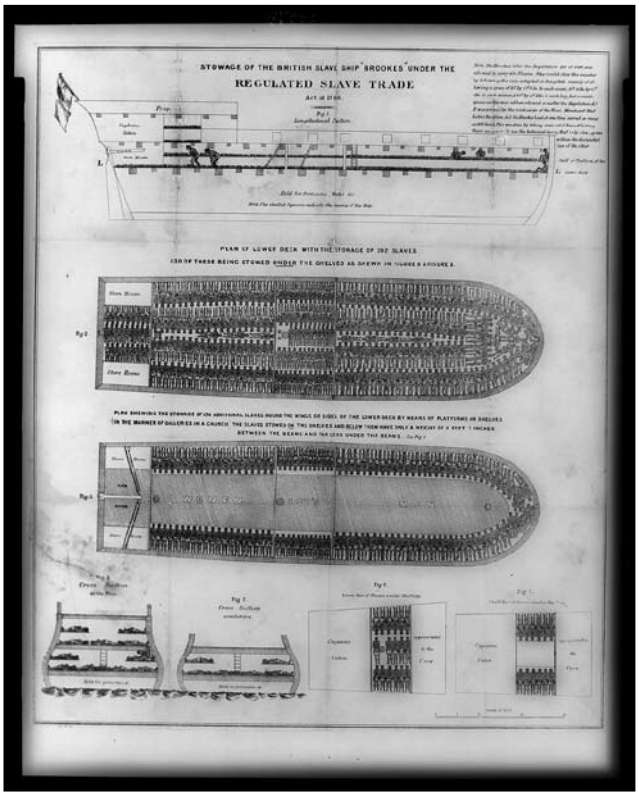
Sucrose is not the only sugar; but it is the sugar that the cane plant and other green plants produce. The origins of sucrose as food are perhaps best understood in terms of its place in nature. The chemical formula for sucrose is $C_{12}H_{22}O_{11}$, which is (or ought to be) familiar to every former student of high school chemistry. All green plants manufacture sucrose; they do so by combining water with carbon dioxide, through the miracle of photosynthesis. In so doing they release oxygen into the atmosphere, which we human animals and other oxygen-consuming organisms busily retransform into carbon dioxide. In short, humankind does not make sugar. Plants make sugar, with the help of the sun; we humans extract and process it.

The plant food which human beings win from sugarcane, crystallize and eat is thus a substance whose nature is close to the general evolution of green plants. But it may be close to the evolution of primates as well. If the sweet taste is the only taste toward which there appears to be a structural, or built-in, propensity among hominids, that also deserves to be explained. Several thoughtful scholars have suggested that sweetness might have been a signal or flag of edibility for members of the primate family, our human ancestors: that the sweet taste helped them to find and identify the more edible and nutrient plant foods. All small primates (under 250 grams) and most apes and monkeys are fruit-eaters (and also meat-eaters). Though the larger apes are primarily leaf-eaters, they eat fruit, too. If some special inclination toward the sweet taste is part of hominid physiology, as seems likely, that fact alone is enough to make sweetness a taste different from any other.

Historical perspective

From one perspective, the history of sweeteners themselves is elementary. Before the Christian Era, honey was humankind's source of the most intense sweetness and had been so, certainly since the Upper Paleolithic. Honey is an animal product; its manufacture, and the social life of the insects that manufacture it, charmed and even mystified humankind. Like honey, fruit must have attracted our predecessors for all of hominid existence. Seen in that context, sugarcane appears relatively late in the human record. After it was domesticated in New Guinea, it diffused to the Asian mainland in several successive waves. Then, around the start of the Christian Era a crystalline sugar was processed from cane juice. We do not know exactly where or when, but it must have been on the Indian subcontinent, or nearby. This solid sugar (from the Sanskrit term çarkarā,'gravel', which it was said to resemble in its earliest crystalline form) seems to have been little known at first, outside South Asia. But Alexander's generals described sugarcane in western India

Sugar
Old champion, new contenders



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in 325 BC; and Indian texts, which may (and probably do) refer to sugar, date from the same time.

Eventually the sugarcane, crystalline sugar itself, and the techniques of its production diffused east and west from the Indian subcontinent. The first such sugar seems to have reached the West by two main routes: through the Maghreb and then Spain, with the Moorish conquest; and through Venice, Amalfi, and other Italian trading states, a couple of centuries later. Sugarcane, introduced into Spain around 755 by Abderrahman I (The Magnificent), still grows in some localities on Spain's south coast, between Malaga and Alicante, the only region on the European subcontinent where it is still cultivated successfully.

But to flourish, sugarcane really needs a subtropical climate. From Cyprus, Egypt, Palestine, Sicily and Spain, where the Arabs had introduced it, the Europeans carried the cane to the Atlantic islands.

Sugarcane grew well on Madeira, in the Canaries, and on São Tomé, among the Atlantic islands, during the third quarter of the fifteenth century. From the Canary Islands the cane was carried to the Caribbean island of Spanish Santo Domingo (today's Dominican Republic and Haiti), by Columbus, on his second voyage. Not long after, it reached to Puerto Rico, Jamaica and Cuba, all of which had been conquered and settled by Spain, and from there to Brazil and elsewhere in the New World.

For the New World sugar pioneers, producing a crystalline sugar from the juice of this transported grass was a challenge, both organizationally and technically. Cane must be cut quickly when it is ripe – when the sucrose content of the juice is at its maximum – and ground even more quickly when it is cut. Cut too late, its sugar content will have already fallen. Ground too late, it dries out and the juice begins to sour. Hence sugar production from cane demands precise coordination of field and mill, exacting managers, and an industrious – or driven – labour force. The answer to those needs was the plantation system, first introduced to the New World around 1510 and, in much-modified form, largely the basis for today's cane sugar production worldwide.

Slavery

In the early sixteenth century, the large estates, the unified field-mill operations, and the use of intense heat and heavy machinery to extract the cane juice and to process it into crystalline sugar, gave to these early enterprises a modern industrial colouration.

From the first, their labour force consisted of masses of coerced and contracted workers, subjected to quasi-military discipline (enforced with the lash, and worse), time-sensitive schedules: a forced march into modernity. These plantations burgeoned in the New World, where land was almost a free good, but labour a precious (and for just that reason, an enslaved and manacled) feature of production. From the US South to the north of Brazil, enslaved Africans soon repopulated the American lowlands, which had been emptied of their native peoples by disease, overwork, malnutrition and war.

From the first, their labour force consisted of masses of coerced and contracted workers

The total number of African slaves transported to the New World has been calculated and recalculated; but no one supposes that fewer than ten million Africans were carried to the plantations over the nearly four centuries that slavery prospered in the Americas. The contract systems that succeeded it after emancipation in most places were little better.

Not all plantations in this vast area were dedicated to the production of sugar; but on the Caribbean islands, the circum-Caribbean littoral, the Guiana coasts, and in Brazil, most

Sugar
Old champion, new contenders

were. Thus the association between sugar and coerced labour was forged soon after the sugar industry was established on the island of Santo Domingo in the second decade of the sixteenth century, and that link was never really broken. The twinning of modern machinery and methods, producing for the world commodity market using sweated, unskilled, imported labour that was openly or furtively coerced under colonial or quasi-colonial conditions, has been the very hallmark of the cane sugar industry, almost always, and nearly everywhere.

Between the Discovery and the nineteenth century the Caribbean islands and portions of the nearby mainland constituted a key economic area in European development. That development turned above all on the success of sugar production. Indeed, no serious history of the West is truly complete without this New World chapter. Yet it is simply not yet well enough understood that the modern world was in some genuinely important sense born on the Caribbean plantations, because their peoples, products, and their very creation were a part of the successful rise of capitalism, and of the coming of modernity to European states. The production of sugar, molasses, rum, tobacco, and of coffee and chocolate – with which sugar was sweetened – lay at their core.

The British people, and indeed all of the peoples of western Europe, fed hungrily upon these new foods and beverages, as did the economies of the nation-states themselves (Williams 1944, James 1963, Mintz 1985, Blackburn 1996). From the sixteenth century onward – and not only physiologically, but also socially, economically and politically – sugar helped to make the world economy go round. Many scholars have wondered over the possible contributions of the New World plantations to the growth of European capital, a hypothetical contribution still hotly debated. But fewer have pondered the caloric contributions these plantations may have made to the diet of European proletarians.

A changing picture

Yet by the mid-nineteenth century the same plantation system that had made the Caribbean internationally important before, now began to be engrafted upon colonial sub-regions elsewhere, perhaps particularly the European island colonies in the Pacific and Indian Oceans; the Caribbean thereupon began to lose its special commercial position. The world sugar picture changed dramatically and irreversibly. As early as the 1820s, by which time beet sugar was being produced in Europe, the significance of colonial cane sugar for the European economy had begun to dwindle. During the eighty years between the end of the Haitian Revolution (1804) and 1888, when slavery ended in Brazil, sugar plantations had been established in Mauritius, South Africa, Réunion, Fiji, and Queensland (Australia), and had begun to be revivified elsewhere, as in Java and the Philippines. Sugar consumption worldwide continued to rise.

As sugar diffused ever more widely, becoming cheaper and more ordinary, its once-enormous symbolic importance as an icon of prosperity wellbeing, and power declined.

Numerous lithographs by Daumier and Gavarni memorialize indelibly Europe's mounting proletarian sugar fix and the emergence of beet sugar as a challenge to cane sugar, and captured in political cartoon art sugar's enduring importance for the future.

The world's first true commodity, over the control of the production of which so many naval wars had been waged at an earlier time, was by the mid-nineteenth century firmly installed in the diet of the West, now amid caricature and banter. But as it became an item of mass consumption – an item the democratization of the consumption of which had made it into the world's first true commodity – sugar was able to take on new and unaccustomed meanings.

The history of sugar and its ever-wider distribution around the globe not only meant more sugar for more consumers, but also new uses for the same product: additional forms of consumption could easily be added to older ones. From medicine, spice and condiment to decorative substance, to preservative, to sweetener, and eventually, to food rather

Sugar
Old champion, new contenders

than mere sweetener – each use of sugar proliferated upon other, earlier uses. It was only when sucrose came to represent perhaps twenty percent or even more of the per caput caloric intake, as it eventually did in some North European countries in the twentieth century, that it surmounted the 'sweetener' label, and because of its caloric importance became a true food, beginning to compete even against the complex carbohydrates in its takeover of the structure of meals.

Many uses

As sugar became familiar, plentiful and cheap, its older meanings begin to drop away, only to be replaced by very different ones. While still rare and precious, sugar had been a medicine. Long before the rise of the New World sugar colonies, it figured importantly in every remedy employed in western Europe against the Black Death. Later, when those New World colonies were firmly in place, sugar was still being touted as a cure-all.

In Europe, sugar had been used as a spice long before it became a sweetener. The recipes in which it figures are numerous even before the fifteenth century; but it was used in minuscule quantities, less for adding sweetness, it seems, than for softening the taste of other additions. Its use as a spice is well attested by the twelfth century, but it was present in Britain long before that. Bede (Baeda), the English Benedictine monk and historian who died in 735 AD, had bequeathed his cache of spices to his fellow monks, and a bit of sugar was among them – apparently the first mention of sugar to be found in the British Isles.

More than six hundred years later, the master cooks of Richard II recorded their use of sugar in many of the recipes entered into the Forme of Cury, Richard's fourteenth-century cookbook.

Sugar's role as a preservative was practiced in the East long before it became a popular means of conserving fruit at the royal courts of western Europe. Pears in syrup were important at the wedding feast of Henry IV and Joan of Navarre in 1403, sugar and spices being "almost the only way of preserving fruit" at that time (Drummond and Wilbraham 1958).

Though today sugar is both prosaic and cheap, in sixteenth-century Europe it was otherwise. The massive and costly sugar sculptures that featured at royal feasts in fifteenth- and sixteenth-century Europe, (so-called 'subtleties', which often consisted of faithful renderings in sugar of the works of Bernini and Michelangelo) were spectacular works of art (Watson 1978). These sugar-paste sculptures, of great size and refinement, embodied kingly and ecclesiastical power because they were costly consumables.

Such usages imparted to sugar a somewhat magical meaning: sweet, precious, associated with both temporal and churchly power. When Archbishop Wareham, the Chancellor of Oxford, celebrated his 'inthronisation' in 1503, he threw a feast that featured a magnificent subtlety, decorated in spun sugar with the eight towers of the University, a figure of the king depicted standing before each tower (Warton 1824).

Sugar has been used as a spice long before it became a sweetener

The association between sugar and power would make even more dramatic what began to happen in the eighteenth century, as the price of sugar continued to decline, and it became available to more and more ordinary consumers. Annual individual consumption in Britain rose from four pounds in 1700 to 18 pounds in 1800. Its use with tea was particularly significant, but it acquired new uses along the way. The transformation of sugar from a rare and costly medicine into the food of Europe's labouring classes nicely epitomizes capitalism's secular successes. The power of the king to eat sugar was transmogrified into the power of the state to tax imports, and of its citizens to profit from production and trade in the world economy. 'Eating like a king' had come to mean drinking heavily-sweetened tea, coffee and chocolate; biscuits at morning and afternoon teas; eventually, marmalade with store-purchased bread, pastries when desired, and in the last hundred years, gorgeous wedding cakes (Charsley 1992), together with the pleasures of Cadbury, Fry, and Rowntree.

Sugar beet

What began as a seeming mimicry of the habits of the rich – it was of course, far more than mere emulation, and had more lasting effects – was greatly facilitated by the development of a commercially viable beet sugar, early in the nineteenth century, which was chemically indistinguishable from cane sugar. Competition from a product that could be produced at home – the first time, we are told, that a product of temperate climes would begin to supplant a product of the tropics (Timoshenko and Swerling 1957:235) – posed an important challenge to cane sugar producers. But in the end (and from the consumer's perspective), it simply meant cheaper sugar, even greater sugar consumption worldwide, and the start of an enduring rivalry between colonial and metropolitan producers, one that has never quite ended.

Sheridan tells us that sugar consumption in England and Wales had actually risen twentyfold between 1663 and 1775. But even such an astonishing figure did not mean an end to growth thereafter.

Sugar
Old champion, new contenders

Lord Boyd Orr's 1937 report on the nutrition of the United Kingdom concluded that the single most remarkable datum on the food habits of the British, Welsh and Scottish peoples during the nineteenth century had been the fivefold increase in sugar consumption in that hundred years. Not until well into the twentieth century did the increase slow to a virtual standstill.

During the past five centuries, only in times of war has the supply of sugar to European nations and their major overseas ex-colonies been threatened.

The story today

At the beginning of the twenty first century, though cane sugar is embattled by her many competitors, global consumption is still rising at rates that are truly stunning. In 1800, the world sugar output stood at about 250,000 tons; in 1900, about eight million tons; in 1950, about thirty million tons; in 1993, about 110 million; and though its immediate future seems bleak to many folks in the sugar business, it is still rising.

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Of course the place of cane sugar in the total world sweetener picture has undergone considerable change. Beet sugar production for a time even outstripped cane sugar production. In the last half century, yet other powerful competitors have also appeared, especially in the form of high fructose corn syrup in the developed countries, where so much food is processed before purchase and consumption. In 1985, American consumers ate as much refined sugar as they did corn sweeteners.

Since the 1980s, cane (and beet) sugar, or sucrose, has vied with high fructose corn syrup (HFCS) in a kind of seesaw rivalry. In carbonated beverages, frozen prepared foods of all sorts, cereals and candy HFCS has caught up, and mostly passed, sucrose use. Arguments suggesting that sucrose and high fructose cane syrup differ in their effects on human health remain open to contestation, and the scientific juries are still out.

As of 2007, the US Department of Agriculture, after making allowances for loss and waste, estimates that per capita sucrose consumption stood at 44.2 pounds, and per capita HFCS consumption at 40.1 pounds. The use of high fructose corn syrup is tightly linked to food preparation before sales – that is, in beverages, frozen foods, breakfast cereal, 'energy' bars, etc. Hence its spread and frequency of use is usually connected to changes in diet, the growth of prepared food consumption, and 'development', very loosely defined. Nonetheless, HFCS continues to prove sugar's fiercest rival. The 1997 per caput figures for the United States revealed that the corn sweeteners had decisively outstripped cane and beet sugar combined: 67.1 pounds of refined sugar, but 86.3 pounds of corn sweeteners. It bears note in passing that the annual US per capita disappearance figures for these two sources of sweetness (which overestimate consumption marginally) are about 153 pounds per annum, or slightly more than five ounces, per American, per day.

Nor, of course, are corn products the only rival. The noncaloric sweeteners have been cutting into the sweetener market more effectively in recent years, and show no signs of losing their influence in a market composed of apparently ever-fatter consumers. The use of noncaloric sweeteners is doubtless intimately connected to the use of caloric sweeteners, and the competition among the noncalorics has heightened recently, by the approval extended by the Food and Drug Administration to the sale of at least two such in the US. Beverage manufacturers in particular watch artificial – that is, non-sucrose – sweeteners with

Sugar
Old champion, new contenders

peculiar alertness, since the search for one that mimics sucrose perfectly, but without the calories, never stops.

Rise or fall?

Sugar – both cane and beet – may have nowhere to go in the North American market; but global sugar use is still growing, and habituation to sugar's taste promises an inelasticity of demand that rivals that of alcoholic beverages. While the highest average consumption continues to be found in the wealthy countries of Europe and the New World, sugar use is increasing in Africa and Latin America, and in Asia as well. In many of these areas, the traditional, less refined sugars – India's gur and jaggery, Colombia's panela, the Dominican Republic's raspadura – are being supplanted by granular white refined.

On the face of it there is no reason to expect global sweetener consumption to decline in the foreseeable future, nor to expect local crude sugars to hold out against refined products; but it seems likely that high fructose corn syrup will gain at the expense of sucrose as standards of living rise, and packaged foods further supplant fresh ingredients.

In the case of locally-manufactured brown sugar and refined white, we see a familiar process being repeated yet again. 'New' foods replace 'old, outdated' foods. 'Pure' foods replace what are called 'impure' foods. 'Science' triumphs. Soon enough, of course, the old foods will reappear, in attractive, modern and expensive packages, whereupon they will be touted as 'natural', Thus the market triumphs again. Meanwhile, the magic of sugar, positive and negative – particularly among the very young, the very old, and those who see morality in everything (and how much) we eat – will continue to do its work, positive and negative, at weddings, birthday parties, Weight Watchers meetings, Christmas, St. Valentine's Day, Easter, Mothers' Day, in hospitals, orphanages, food malls, colleges, at checkout counters, and hidden in drawers, jars and pockets. For five centuries, no other food has so successfully captured the interest of Everyman. Sugar's popularity only increases with time, as geopolitical and cultural shifts bring global brands to more consumers around the world. Our sweet tooth is inbuilt. Sugar's hold on humankind is unlikely to weaken in the near future. To whose cost and whose gain? ■

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Sugar production

An overview of its environmental impacts

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An overview of its environmental impacts

A number of publications, notably those produced or commissioned by WWF, have recently examined the environmental impacts of sugar production[1,2,3,4]. Key aspects include the destruction of natural habitats, impacts on soil and water resources, and associated degradation of aquatic ecosystems.

However, there are also positive environmental aspects of sugar production, including the extensive use of some processing wastes as by-products. Recent years have seen increasing pressure for, and interest in, more sustainable systems of production[5,3,4]. But there are new concerns, including the impacts of growing more sugar crops to manufacture biofuels. Patterns of sugar production, and hence environmental impacts, are substantially influenced by production subsidies, price supports and market barriers, which significantly affect international trade in this commodity.

Cultivation of sugar crops

In 2007, global sugar production reached approximately 165 million tonnes [6]. Around 60-70% was derived from sugarcane grown in tropical countries, principally Brazil, India, China, Pakistan, Thailand and Mexico. The remainder came from sugar beet grown in temperate regions, principally Russia, Ukraine, USA, Germany, France and Turkey. Some countries are able to grow both crops. In 2007, 22 million ha of sugarcane was cultivated worldwide, across more than 100 countries, with around 1,500 million tonnes of cane harvested[7]. Around 250 million tonnes of beet were harvested, from a total area of 5.3 million ha, across more than 50 countries.

Many of the environmental impacts of cane and beet cultivation are essentially generic to intensive agriculture, such as those associated with poorly regulated use of pesticides. Others, or their relative severity, are more specific to sugar crops.

Sugarcane is a perennial bamboo-like grass that stores sucrose in its stem. It is renowned for its efficiency in converting solar energy to organic material, but requires strong sunlight and abundant water. Under the right conditions, repeated crops (rattoons) can be cut from the same stools for a number of years. However, when replanting occurs, it is invariably in the same fields, so cane is typically grown in monoculture on the same site year after year. This tends to exacerbate the local impacts of its cultivation. In contrast, sugar beet, a biennial plant that stores sucrose in a bulbous root, is typically grown as part of a wider rotation of crops, in a more diversified agricultural system.

The destruction of natural habitats to clear land for cultivation is one of the most significant environmental impacts of agriculture. Through this route, it has been argued that

Cane is typically grown in monoculture on the same site year after year

sugarcane has resulted in greater biodiversity loss than any other crop, with relatively large areas involved, concentrated in naturally species-rich and ecologically important places such as tropical islands, coastal and wetland areas, and tropical forest zones.

Although most such habitat destruction occurred centuries ago, the area under cane cultivation has continued to increase in some localities. In Australia, for example, the latter half of the 20th century saw a huge expansion of cane growing. Impacts here included a 60% reduction in wetland habitats in the Johnstone River catchment between 1951 and 1992. Papua New Guinea is regarded as one of the centres of origin of wild sugarcane, but commercial growing only began here in 1979. Natural habitats remain under threat – the past two years have seen a successful campaign to save a substantial block of the Mabira Forest Reserve, Uganda, from being turned over to sugarcane cultivation, although not everyone is convinced that the threat has entirely receded [8].

Soils

In agriculture, loss of soil (as well as loss of soil fertility [9,5]) can be a major concern. In tropical areas, where most cane is grown, soil erosion can exceed the rate of soil formation. The washing of eroded sediments (which may carry pesticide residues with them), into rivers, estuaries and marine ecosystems results in siltation which can cause significant environmental damage. Soil erosion under sugar crops is influenced by a range of factors. In most situations, erosion is exacerbated by the movement of water across the soil surface, so heavy rainfall, poorly managed surface irrigation, and cultivation on slopes all increase risk.

Sugarcane is grown on sloping land in many parts of the world. Despite

Sugar production

recommendations that it should not be cultivated on gradients exceeding 8%, slopes of 20-30% are planted, for example, in parts of the Caribbean and South Africa. Worldwide, estimates of soil erosion rates under sugarcane range from around 15 to over 500 t/ha/yr. The sediment deposition rate in the lower South Johnstone River, Australia, has been estimated at 300,000 t/yr (equivalent to cane field erosion rates of 150 t/ha/yr). In sugar beet cultivation, soil erosion can also result from the action of wind on fields left bare over winter. Such losses have been estimated at 29-110 t/ha/yr in the USA. Losses to water erosion under beet in Europe have been estimated at 0.3-100 t/ha/yr.

Soil health and nutrient balance are impacted by many interacting factors, including timing and rates of fertiliser application, tillage and irrigation. Fertiliser-derived nutrients that are not taken up by the crop may leach out of soils (or be carried in runoff waters), leading to contamination of groundwater and eutrophication of aquatic ecosystems. Soil compaction can result from use of heavy infield machinery, both in cane and beet cultivation. Decline in soil organic matter is a problem under both crops. Soil organic carbon declined by about 40% in the first 17 years of commercial cane growing in Papua New Guinea.

Soil salinisation is a serious problem in some cane growing areas, and may also affect some beet growers. It can occur where water tables are naturally shallow, and drainage is poor, but can be greatly exacerbated by poor irrigation management. On soils of many types, pH tends to decrease under agriculture. Initially, this may be a consequence of changes in organic matter dynamics, but subsequent effects are attributable to the use of inorganic nitrogenous fertilisers such as urea and ammonium sulphate. Such soil acidification has been reported in many cane growing areas.

Water consumption

Agriculture accounts for some 70% of global freshwater usage (over 90% in some countries). In many cases, only around 30-35% of the water withdrawn for irrigation ultimately reaches the crop. The rest is lost by seepage from irrigation channels, evaporation, and runoff and drainage from the field. Excessive irrigation not only depletes available resources, it can increase runoff, soil erosion and leaching, and exacerbate soil salinisation. Sugarcane is amongst a group of 'thirsty' crops noted for their heavy water consumption. In Maharashtra, India, sugarcane covers just 3% of the cultivated land, yet it consumes around 60% of the state irrigation supply, drawing heavily on groundwater resources, causing the water table to drop substantially.

Soil salinisation is a serious problem in some cane growing areas

Traditional cane irrigation involves inundation of the field – flood/furrow techniques which are cheap and simple to operate, but inefficient. Overhead sprinklers and drip/trickle systems, in particular, are much more water-use efficient, but require significant investment in on-farm infrastructure. The storage of water for irrigation, particularly where this involves large infrastructural projects such as the damming and diversion of rivers, can have a range of negative impacts. In some countries, the sugar industry has been a significant player in major infrastructural projects. Over the past 60 years, for example, the construction of dams, barrages and irrigation systems in Pakistan has reduced the flow of freshwater into the Indus Delta by 90%, resulting in major impacts on local biodiversity. Sugarcane consumes significantly more water per unit area than any other crop grown in the Indus Basin.

Only around one fifth of the world's beet cultivation is irrigated, but this includes areas where it may not be strictly necessary, or where adverse environmental impacts can result. Beet irrigation in Andalucía, Spain, is said to be contributing to lowered water levels in rivers like the Guadalquvir, limiting the flow to important wetland habitats.

Harvesting

Traditionally, sugarcane in many areas is cut by hand, following pre-harvest burning of the cane field to remove dead leaves (trash) and clear the field of venomous snakes. Apart from the obvious impact on wildlife in the field, or adjacent areas into which fires may spread, this process can result in air pollution. Substantially elevated levels of carbon monoxide and ozone have been found around cane fields in Sao Paulo, Brazil, at the time of pre-harvest burning. If sustained, pre-harvest burning can also contribute to a decrease in soil quality. However, some growers (including in parts of Australia) increasingly practice green cane harvesting and 'trash blanketing', with burning discontinued and dead leaves left in the field as a form of mulch.

The removal of soil from the field during harvest is also a concern, particularly where root crops like sugar beet are concerned. As much as 10-30% of the total weight of material removed from the field at beet harvest is soil (tare). Three million tonnes of soil are lost per year from beet farms in the EU, 1.2 million t/yr in Turkey alone.

Processing, by-products and biofuels

The processing of cane and beet involves a series of operations, first to extract sugar-rich juice from the crop, and subsequently to concentrate and purify this. Cane mills and beet factories can use large quantities of water, and produce polluting effluents rich in organic matter which can have

Sugar production

major impacts if discharged directly into natural water courses. In 1995, the annual cleaning (flushing) of sugar mills in Santa Cruz, Bolivia, resulted in the death of millions of fish in local rivers. Mills and factories are also often sources of gases which affect local air quality.

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Many waste materials, particularly from cane processing, are used as by-products. In some cases, this can help to ameliorate the negative impacts of cane cultivation, for example, through the use of waste water for irrigation, or other wastes as fertilisers, provided that appropriate care is taken in their application. Bagasse, the fibrous material left after processing, is often burnt to power cane mills, providing a renewable substitute for fossil fuels. However, the utilisation and further processing of by-products can, in itself, result in negative environmental impacts. For example, the use of molasses for alcohol production, as in the manufacture of rum, generates a further waste material (vinasse) which also has the potential to be either a pollutant or a useful by-product, depending on its handling.

In the 1970s, Brazil pioneered the production of fuel alcohol (bioethanol) from sugarcane, and recent high oil prices have stimulated renewed interest in this. Whilst it may be considered one of the 'greener' biofuels, increased bioethanol production carries with it environmental risks associated with an expansion in cane growing and processing for this product [10].

Sugar production, whether from cane or beet, can cause serious environmental problems, and with the rise in popularity of 'green' fuels, it seems that the industry will continue to expand. But sugar growers and producers around the world are linking up with, for example, WWF and the Better Sugarcane Initiative, to develop practices and standards that mitigate some of those problems, and turn sugar into a more environmentally sustainable crop. ■

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Sustainable sugarcane production

A win win for the environment and producers

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Across the globe, sugarcane farming is expanding at a faster rate than sugar beet, and in so doing, it has become an increasingly important crop for food production and employment. In addition, sugarcane has emerged as a significant biofuel feedstock, and can generate a significant amount of "green" electricity through a process called cogeneration wherein the fibrous part of the sugarcane plant is burned at the mills. The increasing desire for biofuels – promoted as aiding the flight against climate change – and a growing human population demanding more sugar has led to increased plantings of sugarcane. According to the FAOSTAT, nearly 22 million hectares of land were occupied by sugarcane in 2007, which is a 69% increase in total area in the last thirty years.

As we saw in the previous article by Oliver Cheesman, growing sugarcane, like most other agricultural crops, can have significant impacts on the local and global environment. These impacts vary between geographies as well as different management practices. Some places are better suited for growing sugarcane and some practices lead to better outcomes.

Sugarcane can be grown and milled in a more sustainable manner. More efficient irrigation techniques mean less water is diverted from freshwater sources leaving more for people and the rest of the environment. Practicing green cane harvesting (without pre and post harvest burning of fields) improves soil health and reduces greenhouse gas emissions. Additional negative environmental impacts can be reduced or eliminated through whole farm planning of sugarcane plantations that include the following activities:

- Protecting and restoring important natural habitat;
- Appropriate fertilizer application based on the plant and soil needs;
- Improving tillage techniques and patterns;
- Maintenance of ground cover;
- Improving harvesting logistics to increase sucrose recovery rate;
- Implementing integrated pest management to reduce the ecotoxicity of pesticide application;
- Use of green manures such as leguminous plants after the last ratoon harvest.

WWF is actively working to promote the implementation of better management practices (BMPs) that reduce environmental impacts and increase production efficiency and profitability. WWF realises that it is important to measure the impacts to ensure that environmental, social, and economic production goals are met. Simply put, you can't manage what you don't measure. It is therefore important that the sugarcane industry views the implementation of BMPs as a means to reach specific metric-based outcomes. The metrics allow for us to credibly confirm that sugarcane production is increasingly sustainable. To achieve this end, WWF is an active participant in the Better Sugarcane Initiative's standard setting process.

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The Better Sugarcane Initiative is a multi-stakeholder process that involves all facets of the sugarcane value chain from farmers to millers to traders and end users, as well as non-governmental organizations. The Better Sugarcane Initiative's mission is, "To ensure that current and new sugarcane production is produced sustainably", and as described in a later article here, it has produced a draft set of measurable standards for the global sugarcane industry. These standards are undergoing a public comment period in accordance with the procedures of the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance (www.isealalliance.org/). The standards are scheduled to be finalized in the coming year.

Sustainable sugarcane production

Pakistan

Pakistan's economy and the livelihoods of millions of people are reliant on agriculture, and it is one of the top six sugarcane producing countries in the world. But growing sugarcane in Pakistan requires high quantities of irrigation water and the production of this 'thirsty crop' is presenting the country with the escalating problem of water shortages. This shortage will only be exacerbated by climate change, which threatens the current supplies reliability.

Over 90% of the water that flows through the Indus River is used in agriculture and such unsustainable levels of abstraction and pollution are starting to have a devastating effect on the biodiversity of the river and the lives of those that rely on it for their survival.

To address the issues and with co-financing from the European Union, WWF has been working with local NGOs, research centres and farmers in Punjab to demonstrate that significant reductions in terms of water, chemical fertilizers and pesticides are possible by adopting BMPs in sugarcane production.

The farmers who have been trained in the BMPs over the last three years (2006-2008) have reduced their irrigation water use by 28%, fertiliser applications by 36% and pesticide applications by almost 100%. Such savings give an indication of the impacts that could be seen if BMPs were implemented on a wider scale.

Whilst there was not a significant difference in yield between farmers using BMPs and those not using BMPs, the cost-benefit ratio, or gross margin, was significantly higher among farmers using BMPs (due to reduction in input costs).

The use of BMPs has proven better for the environment and farmers, and would contribute to achieving the standards being developed by the Better Sugarcane Initiative. Support for sugar which is grown using BMPs is needed from Government (through extension services and policy change) and the sugar industry (through encouraging BMPs and influencing the market) in order to make a difference to the environment and livelihoods across the sugarcane production regions.

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In addition to the critical role that the sugarcane industry needs to play, the way water resources are managed in water-scarce places such as Pakistan, is crucial to encouraging more efficient use of water in agriculture, thereby ensuring that it's available for the needs of people and nature, and that the Indus keeps flowing. Water policy needs to maximise the social, economic and environmental gains from water savings.

Central America

WWF is working with sugarcane producers in the catchments that empty into the Mesoamerican Reef. These engagements have led to the implementation of integrated pest management systems that are significantly reducing the amount of pesticides applied (by as much as 25%) and eliminating the use of highly toxic products. The organization has also coordinated a network of weather stations that will help farmers decide when and how to apply irrigation, fertilizer, and pesticides in a much more efficient manner. Additionally, WWF is piloting green harvesting in several areas with great initial success that has led to reduced pest pressure, and will most likely lead to reduced fertilizer application. Finally, WWF is conducting in-field soil and leaf analyses to improve fertilizer application efficiency.

Sugarcane is an important global commodity but the manner in which it is grown and milled can have variable impacts. By implementing better management practices and monitoring the subsequent outcomes, WWF is demonstrating that the negative environmental impacts can be significantly reduced. These measures can require up front financial investment, but these sums tend to be more than paid off. Raising the cash to change our practices is often much easier than mustering the will to change the way we think. WWF's field projects and global engagement with the BSI are making significant, measurable improvements in the way that sugarcane is grown, but they are just granules in the larger scheme of the sugar industry. These examples of positive change should be emulated in a globally significant, locally appropriate manner to catalyze the change needed to create a sustainable sugarcane industry. ■

The Better Sugar Cane Standard

A triumph of market-led standard setting for sugar cane

David Willers

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A quiet revolution is underway in the world of sugar and ethanol, as the biggest consumers and producers of core products from sugarcane finally work together to improve the environmental impact of this essential feedstock.

Sugarcane has historically had a bad press, accused of all kinds of dubious social and farm practices. This may have been true in past decades, but there has been an incredibly rapid modernisation of the industry in the best managed sugarcane centres, prompted in part by the never-ceasing search for production efficiencies on the one hand, and by consumer demands that the products they are buying are ethically and above all sustainably sourced.

The corporate social responsibility desires of the majority of the big end and intermediate user companies have played a role, but then it is also true that many of the better sugar industries have dramatically and voluntarily improved their production climate at all levels. Countries like Mauritius, Brazil, South Africa, Australia, Columbia and a host of others come to mind, and there are many more, as any familiarity with the world of the International Sugar Organisation (ISO) can testify.

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What has been lacking is a common standard for sugarcane production that embodies social, agricultural and processing/milling targets in one simple document, and that is now being achieved with the BSI standard.

Anyone who knows the sugarcane industry will also know that there is general resistance to standards that are seen as prescriptive on the one hand, and possibly a precursor to phytosanitary trade barriers on the other. Farmers are famously allergic to being told by outsiders how to manage their farms, and sugar farmers are no exception.

For all these reasons, the original founding members of the BSI, when they first met in 2005 to discuss the concept of a better sugar roundtable which could produce a single standard, determined that if there was going to be buy-in by the producers, the standard would have to be non-prescriptive and the benefits to producers would need to be clear.

A repeated concern expressed by producers was that a need to meet standards would impose reporting and measurement demands which soak up manpower, time and money. Consequently benefits had to be identified which would include: a means of self-assessment and performance improvement demonstration; a means of benchmarking against others; some credits as a premium for producing sugar sustainably; and a way of facilitating trade. And for industries already meeting the conditions there would have to be a levelling of the playing fields in terms of meeting environmental and labour related issues; management of risk and liability; and enhancement of brand image and reputation.

In the long run it is expected that conforming to the BSI standard will save money, as inputs such as energy and raw material are used more efficiently, losses and wastage are minimized and manpower is used more productively. It is certainly one of the objectives of BSI to achieve a system of standards which result in benefits to producers which outweigh any costs

But identifying producer benefits was only the first challenge for BSI. A more pressing preoccupation was how one went about constructing an international standard in the first place. Certainly, there were a few precedents – the Soy, Cotton and Palm Oil Roundtables were already in place – but as we soon discovered, one couldn't simply clone their structures and processes. Each feedstock has its own

The Better Sugar Cane Standard

demands and peculiar quirks and sugarcane is classic in this respect.

And then there were such issues as – why not include sugar beet? After all, at least a quarter of the world's sugar output came from this source. But sugar beet is a subsidised crop and sugarcane is not, and the general feeling of members was that one could not have a truly sustainable agricultural commodity if it was necessary to subsidise it in the first place.

Logically, since sugarcane would continually improve its production efficiencies and become even more violable, it was the crop of the future and sugar beet would invariably go into decline. This is in fact proving to be the case. Sugarcane, and the probability that some millions more hectares of land may come under sugarcane cultivation in the foreseeable future to satisfy ethanol and sugar demand, is the central focus of the BSI.

The BSI's website www.bettersugarcane.org details the myriad key steps taken to convert the original academic discussion of 2005 into practice. By 2007 the general principles of a standard had been agreed, followed by the essential criteria and indicators in 2008. There are no more than 60 indicators and they capture all the core concerns such as labour, social, climate change, pollution, high conservation value land use etc. The BSI decided on a metric approach to its standard. The Standard measures impacts numerically and by catchment area and it does not prescribe how farmers should farm to reach the target values. It leaves this up to the implementation of locally developed Better Management Practices (BMPs).

BSI has deliberately chosen to use measurable indicators. Great importance is attached to devising metrics (the numbers that can be put to each of the indicators). It is assumed that credibility comes with metrics; without metrics, certification programs can become subjective rather than science-based. However choosing the appropriate metrics is not simple. The metrics employed may vary radically in the degree to which they capture the full character of an individual effect. Some effects are intrinsically more readily quantifiable than others for example – particulate emissions vs. aesthetic landscape.

Nonetheless, the task has been accomplished, and how successfully is something readers may judge for themselves. This year, (2009) the standard is being advertised internationally for comment (www.bettersugarcane.com) which will be evaluated by the expert teams who drew up version 1. Version 2 will be published for further comment in September and final approval will be sought from the all selected BSI management committee and supervisory board in early November at the BSI's AGM. Full member elections were held in March 2009 under the rules of international standard and labelling bodies such as ISEAL who have protocols rules which ensure transparency and integrity in the standard setting process.

By March next year (2010) we hope to be certifying the first sugar and ethanol cargoes

At the same time BSI is constructing a certification model and by March next year (2010) we hope to be certifying the first sugar and ethanol cargoes under the BSI label. Standard bearer producers like Brazil and India have already secured considerable kudos by early recognising the importance of the BSI as providing a level playing field in environmental terms while providing a practical, robust standard, easy to audit, which will facilitate trade in ethanol and sugar.

A full list of our members is on the website and many of the biggest corporate names are to be found there. Many other companies are exploring the cost benefits of BSI membership, the savings to be made in not having to develop their own sustainability standard, but leaving it to professionals in the field instead; and above all, knowing that they are at the cutting edge of the world's first metric agricultural standard developed by an entirely non-profit body, completely dedicated to genuinely mitigating the effects of sugarcane production with the full cooperation of major producers. ■

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Biofuels

Sugar may not always be sweet

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Sugar is an ancient form of energy, and indeed has fuelled the evolution of life on our planet as we know it today. Photosynthesis helps to convert carbon dioxide into complex sugars that are then consumed by herbivores low on the food chain. Hummingbirds collect sweet nectar directly from flowers, and the honey produced by bees has long been a potent sweetener. The calories of energy provided by sugar therefore have an ancient and proud lineage.

More recently, sugarcane and sugar beets have become important feedstocks for biofuel that is expected to increasingly replace oil, fight climate change, and help rural communities to become more economically productive.

But while sugar is sweet and full of energy, it has a potential sour side that also needs to be considered, perhaps tempering some of the enthusiasm for these new uses.

Brazil is the poster child for biofuels from sugarcane, and undoubtedly has been the most successful country in integrating biofuels into its transport energy sector. Brazil has been producing ethanol from sugarcane since the 1970s, and three million hectares of land now yields some 16 billion liters of ethanol per year and the industry employs around one million workers.

Sugarcane in Brazil is grown primarily in the southeast, on lands that once were covered with Atlantic Forest habitats that were among the biologically richest on earth. Agricultural expansion has reduced the Atlantic Forest to just a few small relicts growing on lands that may not be suitable for growing sugarcane or other crops. And these tiny fragments of forest are still being nibbled away by people drawn to the region by the sugarcane boom.

The Brazilian Government has made serious efforts to ensure that no further forest is cleared and no more biodiversity is lost, but sugarcane is so profitable that it is expanding to cover more of Brazil's suitable agricultural land. The area devoted to sugarcane could easily double in the next 10 years, partly to meet external demand. Brazil anticipates expanding exports to eight billion litres by 2010, by which time it expects total production to have reached about 26 billion litres. This has pushed the production of soy beans further into the Cerrado, another biologically-rich ecosystem, and even into Amazonia, the biologically richest part of the country. This has in turn pushed cattle ranches into more remote areas, requiring that mature Amazonian tropical forests are cleared, with the significant biodiversity losses that this entails. Today's economic meltdown has reduced beef demand, but this may be only a temporary respite.

Sugarcane sequesters significant amounts of carbon dioxide during its rapid growth, and its supporters cite this as a climate change benefit; and it is true that one hectare of sugarcane grown for the production of ethanol may save 13 tons of carbon dioxide emissions. But that same hectare could have absorbed 20 tons of carbon dioxide if it had remained forested.

While sugarcane ethanol grown on existing agricultural land releases 80% less greenhouse gas than does petrol, this benefit does not extend to newly-cleared lands because clearing forests or savannas releases large amounts of greenhouse gas into the atmosphere (one hectare of rainforest contains nearly 300 tons of organic carbon). According to FAO, Brazil is leading the world in deforestation, accounting for 42% of the world's net forest losses from 2000 to 2005. Local NGOs claim that seven million hectares of the Amazon have been cleared over the past 5 years by soybean farmers, many pushed into the region by the more profitable sugarcane in the southeast.

Further, sugarcane fields are burned before manual harvesting, releasing substantial carbon dioxide into the atmosphere as well as smoke pollution leading to human respiratory diseases and acidification of tropical soils that already are relatively poor.

Of course, Brazil is a sovereign state, free to use its land as it sees fit. Energy security is a significant issue for Brazil, with sugarcane playing an important part of addressing this concern. But any time a crop is used for one purpose (in this case, energy), that land is not available for other uses that may have higher social values, such as food production or nature conservation. Some Brazilian scientists therefore call for careful evaluation of plans for expanding ethanol production in Brazil, worried that environmental and social problems could far outweigh long-term economic gains.

In Brazil, many citizen organizations are concerned that the expansion of land allocated to growing biofuels will exacerbate existing problems of landlessness, hunger, unemployment, environmental degradation, and agrarian conflict. Striking the right balance among the competing lands therefore calls for careful consideration of all relevant factors, some of which may be unpredictable. In times of unprecedented challenges, extraordinary wisdom is essential. ■

The Sugar Babies

A modern tale of slavery and sugar in the Dominican Republic

Amy Serrano

Award-winning filmmaker and a fellow of the Human Rights Foundation. She is at work on a book based on human rights and the relationship that continues to exist between sugar, slavery and power. The Sugar Babies, which examines the moral price of sugar - present and past - is narrated by Haitian-American author Edwidge Danticat, and co-produced by The Hope, Courage and Justice Project of New Orleans and the Human Rights Foundation of New York.

www.SugarBabiesFilm.com

It is sad to imagine a world where people live in the darkness of injustice and in the grim absence of hope. I've been there; I've seen their world; I know their names. Even more heartbreaking and ironic, is that this suffering is endured to produce sugar, a sweet commodity that makes its way across our dining tables every day, and travels in our direction as a consequence of poverty, human trafficking and modern-day slavery.

The histories of slavery and sugar have been inextricably linked from the moment Columbus first transported the crop to the new world. More specifically, sugarcane was initially taken to Hispaniola, a small Caribbean island composed of Haiti and the Dominican Republic – two countries with ongoing tensions. As a result of Columbus' new world interpolations, sugar became the dominant reason for the steady flow of human cargo during the time of the transatlantic slave trade. With disregard for innate human rights, people were harvested like the sugar in the name of profit. This continues to occur today, and sadly, it is often the children who suffer most.

Such is the cruel legacy of sugar on the island of Hispaniola where Haitians continue to be trafficked under the exploitative auspices of the Dominican government to work on the sugar plantations of two of the country's most powerful families: the Vicinis and the Palm Beach-based Fanjuls. And while times have changed in other places, the storyline in these sugar plantations remains the same. In the Dominican Republic, the narrative is still based on greed, power and profit, at the expense of others. The exploitation relies on the poverty and abject misery experienced by Haitians in their own country at the hands of their ineffective and corrupt government.

Upon unexpectedly encountering these conditions on the sugar plantations in the Dominican countryside, I felt as if I'd stepped back in time. It compelled me to do whatever I could, to witness, document, and recount the stories of the descendants of the first Africans taken to the island of Hispaniola to cut sugarcane for the benefit of European mercantilists. This is the story told through the award-winning documentary, "The Sugar Babies: The Plight of Children of Agricultural Workers in the Sugar Industry of the Dominican Republic."

There is currently much controversy and discussion on the topic of modern-day slavery and its relation to human trafficking. Unfortunately, discussions and debates do not obliterate the harsh reality. While certain parts of our world have progressed, there are still many that attempt to conceal their practices, and for that, they require closer scrutiny and reform. With the conditions labourers face, it is difficult to conjure images of sugar cultivation without tying it to slavery; especially when 51% of the world's sugar crop is still hand harvested, and when in places like Brazil, the sugar industry is not only tied to the trafficking of humans, but also, to the kidnapping of child sugarcane workers for the harvesting and selling of their organs.

When we first visited the Dominican Republic, we found sugarcane cutters toiling under a scorching sun for an average of twelve to fourteen hours a day—their wages were a little over two US dollars paid in 'chits' to be used at the company store, essentially forcing them to live off credit. This way of life plunges the family system into deep poverty and an ever increasing debt cycle from which there is little chance of escape.

After further investigation my film crew and I discovered that these workers and their families were lured from Haiti over the Dominican border by human traffickers. We also found and corroborated that the lead trafficker, a Dominican-Haitian man by the name of Walter 'Chong' Estrada, was on the payroll of the Dominican government. In the film we denounce Chong's role in making contact with 'recruiters' on the Haitian countryside to entice people over the border with false promises of a better way of life, but then actually deliver them into a life of indentured servitude at best, or, at worst, slavery.

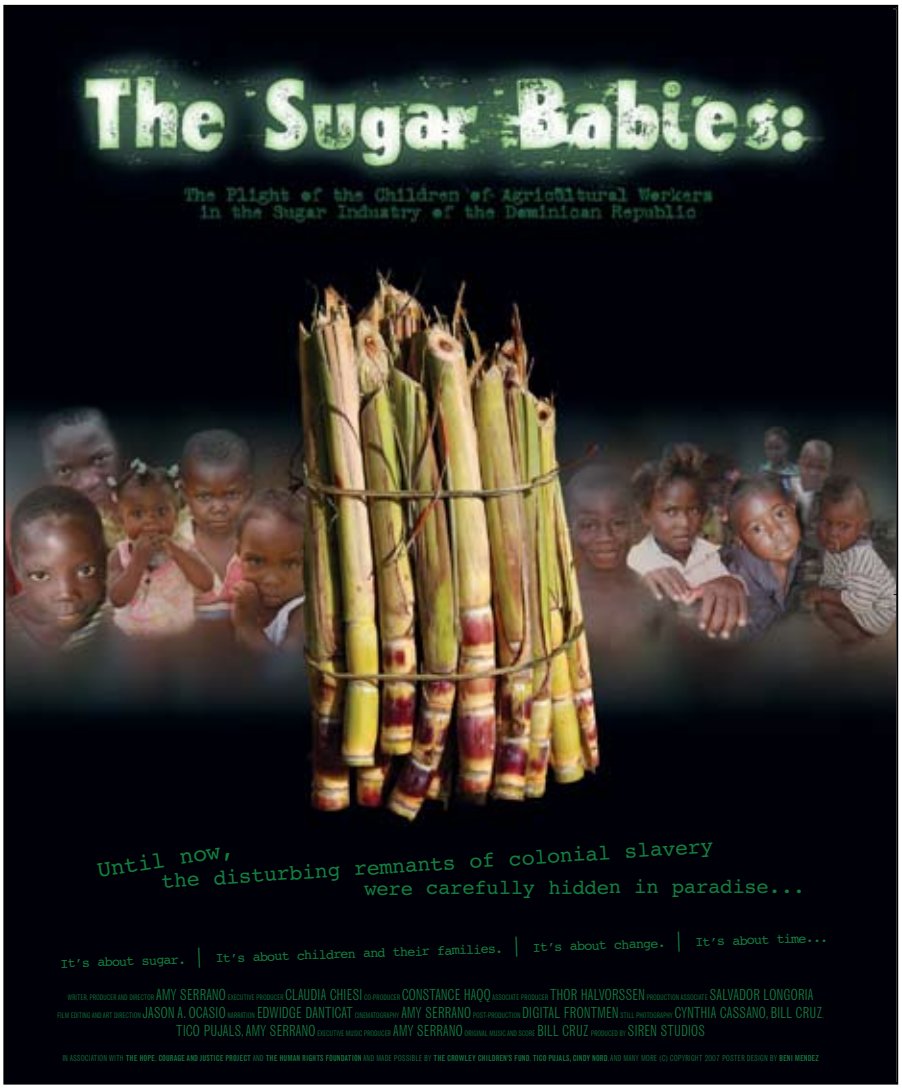
The workers were stripped of their meagre possessions upon arrival and, after clandestine acknowledgement by the Dominican military and immigration authorities, loaded onto buses in the middle of the night and delivered to the country's two main privately-owned sugar plantations. What followed was the denial of identity and all rights: dehumanizing conditions that involve hunger, extreme poverty, disease, and several forms of terror as further means of subjugation. Apart from these conditions, the children also suffer from a lack of access to a proper education, and in the case of Dominican-born children of Haitian ancestry, the denial of birth rights to citizenship. Without education, freedom, and choice, children are forced to work in the sugarcane fields as early as the age of seven.

The film does not hold back in naming the culprits in this horrifying situation—and denounces not just the two most powerful families within an industry that considers itself invincible, but also condemns the government of

The Sugar Babies

the Dominican Republic for criminal involvement with human trafficking. Not surprisingly, the film has been met with fierce opposition from this unholy triumvirate that, instead of improving conditions for sugarcane workers and their families, has sought to pay off, silence, malign, or destroy any opposition and maintain the profitable status quo. Yet as a consequence of socially-conscious media working with courageous field activists like Dominican human rights lawyer Noemi Mendez, former UN Ambassador Armando Valladares, and many others, much of the trafficking of Haitians for the benefit of the sugar industry has dramatically reduced, and child labour has exponentially decreased.

Despite media exposure and the 1991 ratification of Article 7 on the United Nations Convention of the Rights of the Child, which states that all children born within national territory have the right to be registered upon birth and awarded citizenship--especially in cases where a child might be subject to statelessness--the Dominican government arbitrarily continues to deny Dominican-born children of Haitian ancestry their right to a nationality. Without change, these children cyclically become the future labour force of the sugar industry. The Dominican Government's argument exempting these children from citizenship relies on a claim that their parents entered the Dominican Republic illegally. But we counter their anti-constitutional claim by reminding them that they, the government, were complicit in orchestrating their parents' arrivals.



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On the plantation, the off-season is known as 'tiempos muertos', which translates to 'dead times', but the workers will tell you they mean 'times of death' because so many people, in this agricultural industry, die of hunger.

And during these times of exacerbated hunger and death, I think about that heavy sense of timelessness in that other part of the world where harrowing scenes of daily life bring back oppressive images of practices that should never have been, yet surprisingly endure. I linger on haunting portraits of stolen lives on modern-day sugar plantations where ideas of freedom and self-determination are but lofty concepts given the economics of dark skin. I dwell on easy recollections of starving children running into near seven-foot high cane fields at noon, disappearing into the green as they'd scavenge for edible stalks to feed their daily hunger. I recall barefoot children venturing deep into those fields, vulnerable to cuts from the razor sharp blade of the cane and to bites from infectious rodents endemic to the sweet terrain.

The irony of their gleeful little faces appearing through shifting green shapes and emerging with a prized stalk of sugarcane stays with me, for it is the very same thing that feeds these little ones which enslaves their families and chains them to their bitter future.

As we face the conversion of sugarcane fields for ethanol production and a rising global demand for this sugar fuel, it is my hope that society will gain a much deeper compassion for and understanding of the people who have historically toiled for a commodity that we use every day. Let us hope that our personal relationship to sugar—and other products extracted from the earth—be respectful, and the rights and compensation of their propagators dignified. ■

the big question
Sugar: an unhealthy addiction?

Sugar is an economically important crop in Africa, as it is around the world. Rather than asking whether consumers should – or could – give it up, the burning question on the lips of sugar producers across our continent is how policy reforms in sugar trade will affect us.

The protectionist sugar policies of the EU and the USA depress the world market price for sugar but also allow some lesser developed countries preferential access. The reforms to US and EU policies that are under way benefit some, but will inevitably harm others.

Among sugar producers in Africa, the losers are those countries with preferential access that will see economic rents decrease, such as Mauritius. The winners are low cost producers who will see the prices at which they sell increase. South Africa is the only potential short term winner, but may not be able to compete against even lower-cost countries such as Brazil and Australia.

Potential winners in the long term are some least developed countries that will have free access to the EU market under Everything but Arms, as well as countries that show potential to be internationally competitive. These include Angola, DRC, Malawi, Mozambique, Sudan, Swaziland, Tanzania, Zambia and Zimbabwe.

In rich countries, producers who lose because of policy changes are compensated and assisted to transition to other economic activities. African countries should stand together and negotiate similar benefits for the countries and producers that will lose from these changes to the global sugar regime. ■

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Humans are born with an innate liking for sugar, which drives our selection of sweet foods. Even immediately after birth babies show a satisfied face in response to a sweet taste [1]. Young children's food preferences are determined by how sweet a food is and how familiar they are with it[2]. Their preferred levels of sugar can seem overly sweet to most adults.

Our lab found evidence that enhanced preference for sugar during youth is associated with rapid growth [3]. We used a bone metabolite present in urine during growth-related bone remodeling to assess how fast children in our study were growing. They tasted different amounts of sugar in drinks. Those that preferred more sugar in these drinks also had more bone metabolite in their urine, suggesting a physiological mechanism active during growth helps to drive children's high sugar preference.

When parents ask children to decrease their intake of sweetened foods, they are fighting their offspring's natural drives. But, today's era of ready access to refined sugars, letting children freely eat what is available puts them at risk of obesity and dental decay.

So, our research suggests that – for children and their parents at least – the questions over whether we can or should quit sugar are complicated and equivocal. ■

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the big question
Sugar: an unhealthy addiction?

Ian Bretman

Deputy Director of the Fairtrade Foundation currently seconded to the international umbrella for Fairtrade Labelling helping devise and implement a new global strategy for Fairtrade. He writes here in a personal capacity.

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Growing sales of Fairtrade sugar have been good news for poor farmers who rely on exporting sugarcane for their income. Commitments from Tate & Lyle and others, and increasing sales of products that include sugar as one of several Fairtrade ingredients have all helped benefit farmers and their communities. In Malawi, the Fairtrade premium earned by the Kasinthula co-operative has brought clean water to villages previously reliant on crocodile-infested and disease-ridden rivers.

But Fairtrade sugar has its critics. Some say that productive farmland would be better used to grow more nutritious foods for local people. Others point to sugar's role in lifestyle diseases such as obesity and diabetes. Such concerns are valid, but we should not set them at odds with the interests of poor farmers in the South. It's interesting instead to imagine what a sustainable sugar system might look like.

As consumers we need to use sugar more wisely in our diet. While better education, information and regulation could all play a part, consumers could buy less, but better. Paying sustainable prices for sugar could secure better livelihoods for small-scale farmers in poor countries, improving quality whilst farming less intensively, benefitting the environment, while also addressing local food needs or enabling diversification.

By aligning the various perspectives on sugar we can take a more holistic approach to production, trade and consumption. Conventional market economics may deride such an approach as asking consumers to pay more for less but in fact it's a value-based approach and Fairtrade's success has shown that consumers increasingly understand that value is far more than just low prices. ■

Alison Boyd

Director of The Sugar Bureau, and a member of the British Dietetic Association and Diabetes UK. She sits on Committees of the British Nutrition Foundation and the World Sugar Research Organisation.

www.sugar-bureau.co.uk

One major difficulty with any discussion about sugar is the general misconception that it is an unhealthy and unnecessary part of the human diet. The reality is that this view does not stand up to examination against the large amount of scientific evidence now available.

At one time or another, sugar has been blamed for obesity, diabetes, heart disease, tooth decay, hyperactivity or other such ills. Recent, thorough and independent reviews of the evidence have failed to substantiate any of these hypotheses, with the sole exception of a contributory role in tooth decay. Even here, the notion that sugar should be avoided has been replaced by effective strategies centred on fluoride toothpaste use and the avoidance of frequent snacking. These new approaches have resulted in a great reduction in tooth decay in the UK.

The current preoccupation among policy makers to reduce sugar consumption is not based on evidence of public health benefit. Indeed, there is reason to believe it may be counter-productive for the nation's waistline, since people who eat less sugar tend to be heavier. Sugar is important. Not only does it bring huge economic benefits, especially to many in the world's poorest countries, it is a key component of a healthy and enjoyable diet and lifestyle.

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Sugar: an unhealthy addiction?

Sue Davies

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www.which.co.uk

Millions wake up every morning to a bowl of cereal, believing it is a nutritious start. But Which? research has found this is rarely the case. With the majority of the top 100 cereals high in sugar and some levels similar to ice cream and doughnuts, it seems cereal companies are helping fuel the nation's sweet tooth.

Many people will be aware that sugar-coated or chocolaty cereals are not the healthiest, but discovering that Kellogg's Special K is high in sugar was news to many dieters. Other 'healthy' brands proved just as sweet, and yet clever marketing, together with irresponsible health claims and a lack of transparent labelling would have us thinking differently. Few consumers are in a position to easily compare sugar levels when they are in the cereal aisle.

Most worrying was the 27 out of 28 cereals marketed to children that were high in sugar – and not down to fruit content. The only one that wasn't had a high salt content.

From a cartoon Tony the Tiger training imaginary Tibetan tiger monks to Coco Pops' cartoon dancing milkmen, the adverts promoting them are appealing to children. However, with rising childhood obesity across the UK, it's time this ingenuity was channelled into developing and promoting healthier choices.

Breakfast is just one sector, but it's an important one that has a largely undeserved healthy image. It also illustrates action needed across the board. The Food Standards Agency (FSA) needs to move with its strategy to reduce saturated fat and energy levels, but also needs to clarify advice around sugar so that there are no more excuses for inaction.

Sugar reductions are clearly possible, but at the very least consumers should be able to see what they are buying. All manufacturers need to adopt the simplified labelling scheme shown to work best from the FSA's independent evaluation: highlighting whether levels are high, medium or low and adding traffic lights as well as percentage guideline daily amount (GDA) information. It's time companies were honest and open about the sweet stuff in their products. ■

Julia Clark

Head of Marketing at Tate and Lyle Sugars.

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In February last year Tate & Lyle announced it would switch its entire retail sugars range to Fairtrade by the end of 2009. The sugar company is on track to meet this ambition with Tate & Lyle's Granulated White Cane Sugar the first of its products to gain Fairtrade accreditation. In December 2008, Tate & Lyle Caster Sugar, Icing Sugar and Royal Icing Sugar also became Fairtrade certified.

Tate & Lyle does not pass the premium on to consumers, so shoppers can continue to buy their favourite sugars knowing that they are doing their bit to help farmers in poor communities. The impact on the Belizean farmers who produce Tate & Lyle Fairtrade sugars has been very positive; in the first year alone their communities received £2million, in addition to the payment for their produce.

The Fairtrade Foundation recently commissioned an impact report showing how farmers and their communities have benefited from Tate & Lyle's commitment to Fairtrade in the first year:

- Improved facilities at farmers' associations' branch offices, allowing more members to attend meetings and more women to participate.
- Subsidised fertiliser and pesticides which improve crop quality and yield.
- Roads used for harvesting sugarcane have improved.
- Funding has helped families displaced from their homes due to severe flooding.
- Grants help children to attend school with school meals provided for the poorest.

These results speak for themselves – in one year the impact of Fairtrade can already be seen, demonstrating how a small change by consumers, such as choosing Fairtrade, can make a big difference. ■

Nick Wells

Vice Chairman of the NFU Sugar Board. Nick is particularly interested in investigating and promoting alternative uses for sugar beet. He farms in North Lincolnshire, and his cropping includes winter and spring malting barley, feed wheat, vining peas and sugar beet.

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The NFU represents all UK beet growers who produce 7 million tonnes of beet in the East of England. British Sugar processes it into just over a million tonnes of sugar accounting for around half of UK demand.

Sugar beet is an important spring-sown crop in the UK, serving as an effective 'break' in an arable rotation; this is because its host pests and diseases are generally different from those of other combinable crops which means the cultivation of sugar beet reduces disease and pest levels in the rotation which contributes to lower pesticide applications.

Over the last 10 to 20 years, UK yields of sugar have doubled, the total amount of pesticides used on the crop reduced by over 60%. The UK industry continues to make advances and jointly invests over £1.5m annually in R&D focused on increasing efficiency, improving yields and enhancing the crop's sustainability.

Sugar beet makes an important contribution across the rural economy – on farms, in the transport industry and in the factories, where it is an important employer. Beet manufacturing creates a wide range of co-products from animal feed to soil conditioner. The factories operate a power generation system that produces both steam and electricity, which is exported to the grid. Homegrown sugar is also turned into bioethanol delivering a CO_2 emissions saving of 71% relative to petrol when measured on a full life-cycle basis. Residual heat, together with CO_2, is used to grow 80 million tomatoes. ■

Refined power

The political economy of sugar in the 21st Century

Ben Richardson

Holds a PhD in Political Economy from the University of Sheffield and is the author of the forthcoming book *Sugar: Refined Power in a Global Regime.*

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From the mercantilist navigation acts of the 17th century to the preferential trade systems of the 20th century, sugar has always been an intensely political industry. Indeed, between 1999 and 2001, more than half the value of sugar production in OECD countries came from government support or over-charged consumers, reaching a staggering $6.4 billion per year [1]. Reacting to this uneven distribution of wealth, many commentators have challenged governments to reduce their intervention in the industry and let free markets guide the way.

The problem with this analysis is that in focusing on countries rather than companies, it misunderstands why policy takes the form it does, and by blindly advocating market-rule, risks replacing one form of unevenness (international inequality) with another (industry inequality). To move to a more equitable and democratic regime, we need to rethink what kind of power is shaping the sugar policy in 21st century, and ask who exactly this is benefiting.

Hedging bets on free trade

We begin this task by looking at the world market, which accounts for about a third of the global exchange in sugar, the majority being produced and consumed within domestic borders. This figure has changed little since 1995, the point at which the governance of agricultural trade passed into the remit of the World Trade Organisation (WTO), and stands as testament to the efforts of sugar producers to defy liberalisation of their national markets.

The reason for this lobbying is assumed to be that producers need protection from cheaper imports. For those grossly uncompetitive producers this is undoubtedly the case, but for many, the need to mitigate uncertainty cannot be underestimated. In international commodity markets like sugar where there are few barriers to entry, instability is endemic and most producers facing this fact have not been swayed by the promises of free trade to eradicate this volatility.

Sugar has always been an intensely political industry

To give a quick example, one argument for the liberalisation of trade is that it will reduce production in those countries receiving excessive state subsidies and benefit those countries holding comparative advantage by raising the world price. Though not a result of liberalisation but of collapsed Cuban production and later internal EU reform, this event has happened twice in the last decade. Yet in both cases, the world price dropped because Brazil had been increasing its production by such great volumes.

The point here is not that support programmes have no effect on world prices nor that they are defensible in all cases, but to show that free markets are predicated on an uncertainty that should not be theorised away. In fact, exposure to such uncertainty was the main complaint of the Least Developed Countries, who were offered duty-free quota-free access to the EU market under the terms of the 2001 Everything But Arms agreement. Instead of grabbing the opportunity with both hands, they actually responded by requesting a temporary continuation of the quota limits so they could better manage the ultimate adjustment to floating EU prices.

Concentration and diversification: the escape from protectionism

So in short, while sugar has now been encompassed by a number of free trade agreements – including Everything But Arms, the EU Economic Partnership Agreements, the North American FTA and the Association of Southeast Nations FTA – because of clauses inserted into their text, growth in international trade has been either diverted or stunted.

Moreover, despite the negotiating efforts of the G20 bloc in the WTO, the Doha Round seems unlikely to deliver significant reductions in tariff barriers on sugar as the US, the EU and Japan have all lined up innovative policies and loop-holes by which to neuter the impact of any final agreement. Nevertheless, we should not conclude that just because international trade has faltered, the sugar regime has been without change.

Most prominently, the de-legitimisation of border protection and the reluctance of developed countries to mandate ever higher domestic prices have meant that dominant producers have begun seeking out new ways to enhance their profit margins in order to reduce their reliance on protectionism. These strategies include: foreign investment in countries now benefiting from improved market access, such as British Sugar's stake in southern Africa and Tate & Lyle's in Laos; penetration of the lowest-cost producer Brazil, which in 2007 received $17 billion of investment funding; and diversification into related sectors such as artificial sweeteners, ethanol, and electricity production. Undertaken by the larger, well-capitalised sugar processors, this shift has ushered in a number of significant changes.

First, there has been an increasing concentration of global ownership as a handful of sugar processors have bought up smaller entities and undertaken Greenfield expansion. Allied to this, the sugar traders, who had previously been constrained in the amount of value they could capture in the industry by virtue of the tighter controls on trade and the

Refined power

national orientation of ownership, are also pursuing vertical integration and diversification. In the case of the UK's ED & F Man and Czarnikow for instance, this has involved investment in productive capacity and infrastructure in Brazil, in order to graduate from delivery service to supply chain manager.

In 2007, the ten biggest sugar producers accounted for 25.6 million tonnes of production, or just 15% of the entire world total. Now the 'national envelope' of investment has been opened and further liberalisation prepared for (if not yet consented to) the oligopoly redolent of domestic markets is likely to go global [2].

Second, the benefits of additional wealth creation have continued to be unequally distributed between people in the industry. For some time now, mechanisation and mergers have promoted a small and relatively well-paid set of technical jobs at the expense of a larger swathe of jobs linked to less-skilled labour or smaller landholdings. For instance, even prior to reform in the EU, between 1992 and 2002 over 20,000 jobs were lost in the sugar factories, and since this point, another 75,000 have disappeared on the farm [3]. The difference now is that this trend is beginning to accelerate in the developing world – Brazil and China in particular – in places where the industry provides much needed rural employment. According to figures produced by the Brazilian sugarcane industry association, between 2010 and 2021 around 114,000 net jobs are expected to be lost in São Paulo alone, despite the huge expansion of production in this area [4].

Third, new public policies have emerged that are consonant with neo-liberal trade regulation but which still seek to offer insulation from competition for the country's national champions. These include WTO-permissible domestic support payments, which are decoupled from production but nonetheless offer opportunities for cross-subsidisation, and supports linked to bio-fuel production, which include research funding, tax breaks, aid payments and tariff barriers.

Intertwined with these policies has been the mobilisation of new industry discourses, such as environmental stewardship or energy security, which in turn have pointed to a new way of doing politics. While explicit and crude forms of power such as party political donations or last minute lobbying (what we might refer to as 'raw' power) remain evident, they are no longer the deciding factor in shaping outcomes in the sugar industry.

Instead, it is the coming together of different interests in the industry to present a united front and direct debate prior to policy making that is increasingly important. Made easier by the growing concentration of ownership, this 'refined' power is central to the institutionalisation of regulation favourable to dominant processors and is the place at which democratic interventions must now be made.

Refined power and the right to politics

The most important forms of power in the sugar industry, then, are those that decide the agenda, narrow down the terms of debate and produce de-politicised policy that is difficult to assail. With this in mind, how should efforts at reform be launched?

First is to empathise with farmers' fear of existing in turbulent markets and recognise the merits of managed markets. However, more effort should be made to extract a quid pro quo from this situation, perhaps by imposing a higher corporate tax on profits derived from what is in effect a public subsidy. A situation in which larger farms and larger firms benefit most from inflated consumer prices is not one that should be tolerated.

How should efforts at reform be launched?

Second would be to demand that the sugar industry plays a more responsible role in society, with greater emphasis laid on the number of jobs supported and the amount of resources, especially water, diverted to sugarcane and away from small-scale peasant farming. Given that the new discourses frequently focus on the agri-culture of sugar production and the contribution it makes to rural ways of life, proponents of this perspective should be held firmly to account in those instances where the industry becomes depopulated or local lands degraded.

Finally, a fuller democratisation of sugar policy requires that governments create opportunities for criticism to be cast and alternatives aired. To have an effective control of policy, dominant producers not only seek to influence regulation when the window of reform is opened up, but at certain times, prevent this window from opening in the first place. To overcome such self-governing systems, efforts should be renewed to place the sugar industry in its wider social context and acknowledge that the millions of farmers and labourers and billions of consumers and taxpayers implicated in its politics should have the right to influence its policies as well. ■

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Global sugar and fair trade

Insights from Malawi

David Phillips

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In what has become a highly regulated and larger-scale producer dominated industry, fair trade has entered the global sugar market in an attempt to provide a supportive environment to smaller-scale sugar producers who have more recently entered the sector. By intervening, fair trade offers some potential opportunities for these producers. But fair trade also faces a number of challenges in a complex global industry and in poorer nations such as Malawi.

The global sugar industry

For centuries global sugar production and trade maps have been shaped by colonial relations, politics, and inequalities.

Over the past century sugar has been increasingly associated with numerous international agreements, quota systems, subsidies, and tariffs, and has become a highly politicised commodity. Unlike some other tropical commodities such as coffee and cocoa, sugar producers in tropical countries compete with non tropical production due to the sugar beet production in parts of the US and EU. This adds to the challenge faced by smaller-scale producers in poorer sugarcane producing nations in attempting to compete in the global sugar market.

In terms of trade and consumer good production, barriers to entry for smaller-scale producers also exist. Global sugar trade is controlled by a few large international trading houses such as Cargill, ED & F Man, and Tate and Lyle. Similarly, food processing of sugar is dominated by large multinational organisations such as Nestle, Unilever, Coca-Cola, PepsiCo, and Cadbury Schweppes. Therefore, there are low levels of participation and few opportunities for small producers to add value to their crop.

ACP sugar production

Against such a backdrop the EU sugar regime was established in 1968 in part to provide some level of support to producers in less industrialised countries. As part of that agreement non-EU sugar was subject to tariffs with exceptions made for the 18 Africa, Caribbean, and Pacific (ACP) sugar producing nations[1]. Through subsequent Lomé and Cotonou agreements this situation remained virtually unchanged with these nations receiving EU market access via fixed quota volumes and guaranteed prices significantly higher than world prices.

However, the global sugar political and production map was changed significantly following the WTO ruling in 2005 that has seen the wholesale restructuring of the European sugar beet industry and phasing out of preferential access agreements between the EU and the formerly colonised ACP nations.

Some cane producing nations who are less competitive in the new 'free' sugar market scenario are concerned about the viability of maintaining cane production. A few smaller Caribbean nations are withdrawing from production completely; others such as Barbados are searching for niche quality brown sugar markets. In Southern Africa, Mauritius is likely to be most adversely affected – as a relatively expensive sugarcane producer; almost one hundred percent of its sugar sector relies on preferential markets.

It is against the background of such a macro political economic environment and other barriers faced by smaller-scale producers that fair trade aims to intervene to provide an alternative level of support. In a sector dominated by big business, such producers generally lack access to processing technologies, depend on large-scale processing and marketing partners, have limited direct relations with end market traders and buyers, and face financial constraints due to both poverty and lack of affordable credit.

Fair trade aims to intervene to provide an alternative level of support

Smaller-scale sugar production

The majority of sugar comes from large-scale sugarcane plantations and mills. In the main the highly capital intensive nature of sugar processing and associated high capital costs act as barriers to upgrading and increasing returns for smaller-scale producers. There are, however, a variety of smaller-scale production schemes that have emerged which vary in forms of ownership and organisation.

This situation is reflected in the sugar map in Southern Africa. The sugar sector is dominated by production from plantations majority owned by the Illovo Sugar Group, now a subsidiary of Associated British Foods plc. In Malawi the group has controlling ownership of two estates, two mills, and two refineries, all located in the central district of Dwangwa and the Southern district of Nchalo.

Historically such large-scale plantation agriculture has been promoted in Malawi. However, due in part to issues of land access constraints and a desire to increase production to get more sugar through mills, some outgrower schemes have emerged. In Malawi the land for these schemes is leased by the government to be held in trust on behalf of the smaller producer groups. One of these schemes in Southern Malawi is Kasinthula Cane Growers Limited, a Fairtrade certified sugar outgrower scheme that has produced sugar for processing by Illovo since 1997.

Kasinthula Cane Growers and fair trade

As has been well documented elsewhere, both fair trade as a movement and Fairtrade as a labelled certification system have grown significantly over the past couple of decades. For smaller-scale producers fair trade represents an opportunity to overcome some of the challenges they face. Generally speaking fair trade relationships aim to improve the well-being of producers, their

Global sugar and fair trade

families, and communities with the provision of guaranteed prices and social premiums. In addition, certification encourages greater participation, democracy, and transparency in trade and community relations to empower smaller-scale producers.

Sugar is a relatively new commodity in the fair trade arena and in 2002 Kasinthula became the first ACP sugar producer group to receive Fairtrade certification. Part of the motivation for certification is that Malawi is seen as a relatively cheap producer of good quality sugarcane and therefore more likely to be able to increase exports in the new free trade, post EU sugar regime era. Moreover, fair trade is seen as one form of intervention to provide additional layers of support to poorer producers.

Now they are connected to fair-trade networks, the Kasinthula producer group has begun to see real differences, building capacity and enhancing livelihood. They have far greater international exposure too, which has meant more visits from sugar buyers. Making connections with a wider fair trade network of other organisations gives them opportunities to learn more about the global trade arena. Some of the social premiums they receive from Fairtrade sugar sales to companies such as Divine Chocolate in the UK and Wholesome Sweeteners in the US have been reinvested in the business, for instance in much needed field plough-out and replanting schemes.

Direct relationships with some Alternative Trade Organisations such as Twin Trading and Traidcraft have led to benefits too, from training programmes in quality and process management, and in general crop husbandry. Sugarcane requires a lot of capital and labour investment to produce a good quality high yielding crop and so all this extra investment and training should enable greater returns than the group earned when it started in 1997.

At individual levels some of the 282 farmers who own title to the land have many dependents in a very poverty stricken environment. With extra fair trade revenues some have been able to increase their incomes and provide funds to send their children or grandchildren to school. Some farmers have invested in water and electricity provision to surrounding villages. Hired labour employed to work in the cane fields have seen improvements too, with recent investments to improve their working and collective bargaining conditions.

Future opportunities and challenges

The initial benefits that fair trade has provided to producer groups like Kasinthula, and the optimism toward increased volumes of sugar exports for some ACP nations, suggests that fair trade can play a strong role in global sugar production. And as Fairtrade sales have increased, approximately one half of Kasinthula's sugar production is now being sold to Fairtrade markets, with other groups signing up to be certified, for instance in Kaleya in Zambia.

The increased level of interest and support for partnerships with smaller-scale producer groups by larger sugar companies such as Illovo demonstrates a clear role for such initiatives in the future. However, analysis of the structure of relations and control points in the supply of sugar in countries such as Malawi highlights the still legion inequalities and barriers that must be overcome to give small scale producers more significant opportunities for upgrading value returns and greater equity in cane supply agreements.

As the Fairtrade movement enters more commodity markets and countries, it continues to learn from its experiences. It has already identified opportunities for forging a role in facilitating more progressive partnerships between larger sugar mills, local development organisations, and sugar buyers with poorer sugar producing communities. In such a highly regulated and controlled industry, more accountability and transparency on the part of some who process and purchase Fairtrade sugar will help to deliver these and other such changes in the future. ■

1 Sugar protocol countries: Kenya, Mozambique, Zambia, Zimbabwe, Tanzania, Congo Br., Madagascar, Cote d'Ivoire, Swaziland, Malawi, Belize, Guyana, Fiji, Trinidad, St Kitts, Jamaica, Barbados, Mauritius.

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Sugar reform

The view from Europe

Mariann Fischer Boel

European Commissioner for Agriculture and Rural Development since 2004. She is a member of the Liberal Party and has served as Member of Parliament (Folketinget) for Funen County Constituency, a Member of the Liberal Party's General Council and of the management committee of the Parliamentary Liberal Party.

March this year saw the completion of the restructuring process for the European sugar sector resulting from the wide-ranging reform agreed by European Union farm ministers in late 2005.

Europe's sugar industry today looks radically different from the situation pre-reform.

The changes introduced have reduced production by around six million tonnes, roughly a third. The price paid to producers has fallen by 36%, and Europe will change from the world's second biggest net exporter of sugar to a net importer.

This has been a painful process, but one which we had to go through to ensure the long-term survival of sugar production in Europe.

Pre-reform, the sugar sector was completely out of synch with the rest of the reformed Common Agricultural Policy. Thanks to a combination of vested interests, it had remained largely immune to reform for around 40 years.

EU prices were at the utterly unsustainable level of three times the world market price, and we faced new pressures on our market from recent changes on the international scene.

Europe had lost a case brought by Brazil, Australia and Thailand in the World Trade Organisation which severely limited our ability to subsidise exports of surplus sugar.

In the longer-term, we were offering to phase out all export subsidies as part of a global trade deal in the Doha Round of world trade talks. In 2001, we had also opened our market to exports from the world's 50 poorest countries free of tariffs and quotas under the so-called 'Everything But Arms' (EBA) undertaking, a key part of our development policy.

Of course, the easy option would have been to sit on our hands and do nothing.

But that would have meant the slow and painful death of European sugar production.

We needed to reform the way we support our sugar sector to guarantee a viable long-term future for EU sugar. The status quo was unsustainable.

Naturally, the proposals were controversial, because they would mean the end of sugar production in a number of countries and regions, the closure of factories and a shift in production for many farmers.

But the alternative was clearly worse. Besides putting our own production on a safe long-term footing, the reforms would bring many other advantages too. They would strengthen our hand in the WTO negotiations, allowing us to offer to phase out export subsidies entirely.

They would bring sugar into line with the rest of the modernised CAP, which would improve the sector's green credentials. The EU would become a net importer, and we would source our supplies to a large extent from African, Caribbean and Pacific countries and the Least Developed Countries covered by EBA. Finally, we hope that cheaper producer prices might feed down into the price paid by the consumer.

After long months of tough negotiations, the deal which emerged remained true to our original proposals. The reform comprised three key elements.

The first was a 36% cut in the guaranteed minimum sugar price, under which the price paid to processors would fall from €631.9/tonne in 2006/2007 to €404.4/tonne from 2009/2010. Second, farmers would receive partial compensation for the price cut in the form of non-production-related payments.

Third, and perhaps most importantly of all, a Restructuring Fund was established, financed by a levy on all sugar producers, to encourage uncompetitive producers to leave the industry and thus reduce production under quota.

I am pleased to say that the 2006-2009 restructuring scheme resulted in the renunciation of 5.8 million tonnes of quota, very close to the initial objective of six million tonnes.

EU quota for sugar and isoglucose has now been lowered to 14 million tonnes (of which 13.3 million tonnes for sugar).

EU sugar production is now concentrated in 18 Member States, as opposed to 23 before the reform. These are mainly the countries which have the most suitable agronomic conditions for producing the crop. Nearly 70% of production is in the seven Member States with the highest sugar yields.

Domestic prices are showing a downward trend consistent with the objective of the reform to achieve a sustainable and competitive EU sugar sector. The EU will remain an attractive market for ACP/LDC exporters, despite the reduction in the price.

I recently visited Mauritius, where concerns had been expressed about the potentially disastrous effect our reforms would have on the sugar sector there. What I saw told a different story.

Thanks to domestic restructuring, assisted by EU aid, the Mauritian sugar industry has become more modern and competitive and is in rude health.

European farmers affected by sugar factory closures have been able to switch to different crops. This is something I was able to witness at first hand, as my husband was forced to stop sugar production after the closure of the local factory on the Danish island of Fyn!

The production of renewable energies, such as bioethanol from sugar beet, could also prove to be an interesting alternative in some cases.

I am pleased to report that the logic of the reform is now widely accepted and I feel confident that the sugar industry in the European Union can look forward to a long and healthy future. ■

UK sugar production

A sweet or bitter future?

Carl Atkin

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Sugar is one of the most politically contentious global agricultural commodities, and the UK and European beet industry we have today is almost entirely a result of the policy instruments and trade policies of the past two centuries. Prior to 1800, Europe was totally dependent on cane sugar principally produced in the West Indies and South America; between 1701 and 1810 ships brought nearly one million African slaves to work in Jamaica and Barbados alone. In 1747, sucrose was first identified in beet roots, but it was not until the Napoleonic Wars of the early nineteenth century and a ban on cane sugar imports that a European beet sugar industry emerged. Though biologically less efficient than its counter-part cane, temperate sugar beet production grew rapidly and today, beet provides approximately 30% of world sugar production. By the end of the Napoleonic Wars, over 300 beet sugar mills operated in Europe alone.

While no longer grown by slaves, sugar from developing countries has an on-going association with workers earning minimal wages and living in extreme poverty. The political arguments surrounding sugar production, protectionism and the use of policy instruments by various regional trading blocs (especially the EU) mean that the commodity remains more politically sensitive than most.

The UK industry today

Policy has always been fundamental to the UK domestic sugar beet industry and since the 1970s the Common Agricultural Policy (CAP) has been the main driver. Sugar production within the EU has been regulated by a system of production quotas since the Regime was established in 1968. This limits the amount of sugar which is eligible for the established prices (prior to the 2005 CAP reforms there was an intervention price, a beet price and a white sugar price) and there have been the usual import and export regimes. Production levies in the sector – rather exceptionally for the CAP – meant the scheme has been largely self financing to date. The result of the policy was that for the first 35 years of the regime, EU sugar prices were set at about three times world market levels, leading to heavy criticism of the 'dumping' of surpluses on an already depressed world market.

Fundamental reform did occur in 2005, drastically reducing the target sugar price, eliminating the 'dumping' and restricting and then eliminating public intervention for sugar.

The effect of these reforms has been a substantial industry downsizing on across Europe. The 2005 EU Reforms led to a UK grower restructuring scheme in 2006. Prior to this, there were almost 7,000 growers of sugar beet, principally in East Anglia, the East and West Midlands and Yorkshire growing about 150,000 ha of crop. These growers produced about nine million tonnes of beet on contract to British Sugar plc, which holds the national UK quota as the monopoly processor. This beet produced on average, about 1.5 million tonnes of sugar (or 60% of UK refining), with the industry representing 2% of total UK agricultural output and supporting between 10,000 and 20,000 jobs in farming, processing and transport.

Following restructuring, the number of growers has reduced to just over 5,000. Most significantly for British Sugar, the number of large growers with more than 10,000 tonnes of contract has doubled to 50, whilst at the bottom end the number of small growers with fewer than 500 tonnes has fallen from 2,650 to 1,670 – a step in the right direction, but probably not a big enough rationalisation from British Sugar's point of view. The overall effect of this 'one off' industry restructuring was to increase the average contract size by 23% and encourage the increased specialisation of sugar production to larger, more commercial farmers.

The future

The 2005 EU Reform was followed by a new Inter-Professional Agreement (IPA) between British Sugar and the National Farmers Union (NFU) who are responsible for negotiating a single price for all growers. This followed an announcement by British Sugar that it would be closing its operations at York and Allscott, focussing production on four sites: Newark; Cantley; Wissington and Bury St Edmonds.

There was much talk in the farming press at the time of the reforms that if British Sugar paid only the EU minimum beet price (about £17.50/tonne by 2009/10) then few would grow the crop in the UK. This theory looks unlikely to be tested in the short term, as the NFU secured a beet price above the minimum price set out in the European regulations of between £20 and £25 per tonne.

For the most efficient UK farming businesses, this squeezes the profitability of sugar beet to a similar magnitude to many combinable commodities with production costs anywhere between £15 and £25 per tonne for most businesses, although for the most efficient sugar beet producers it still remains the break crop of choice, outperforming oilseed rape at both the gross margin and full cost per tonne level. Simplistic analysis of individual enterprises also fails to take into account the 'contribution to overheads' made by marginal crops and the fact that many farmers are better off producing marginal crops rather than fallow because of sunk costs which cannot be scaled back. For most sugar beet growers, who employ specialist contractors to harvest the crop and outside hauliers to take the crop to the factory, their own specialist capital

investment is limited and thus they could probably choose to substitute an alternative enterprise with relative ease, with the issues of combine capacity, limited grain storage or rotational flexibility the reasons why many producers continue with marginal sugar beet crops.

Production on heavy clay soils may fall due to the removal of the early delivery bonus (EDB) and the need for early harvest on these soils which results in an effective penalty on adjusted tonnages due to low sugars. These highest cost producing farmers are likely to be those who quit the industry. Similarly there will be a reduction in production on droughty light, where the crop competes against fallow and environmental schemes (and of course vegetable letting for those who have water). The issue of sugar beet performance in relative terms in the rotation becomes much more pertinent. There may be increases in production on silts and well bodied loams that can reach 70 tonnes/ha adjusted yields, and there is inevitably likely to be polarisation around the factories.

British Sugar plc, as part of Associated British Foods, is clearly hedging its bets

It is worth reflecting on the current supply chain structure. The monopoly processor position means that there must be a single organisation representing beet growers (as set out by law). There has been talk about producer groups forming and representing themselves, but in today's legal and political environment this looks unlikely. However, for the largest and most efficient producers there could be supply chain benefits from breaking away, because at the moment the largest growers pay for the supply chain costs and inefficiencies (from a large number of transaction points with small growers) through the single pricing structure. Can one organisation genuinely represent the interests of all growers? Probably not. However, change will be difficult – turkeys very rarely vote for Christmas!

Can one organisation genuinely represent the interests of all growers?

But what are the implications of the current structure? Unless an organisation like British Sugar is genuinely allowed to sort out and rationalise its supply base in the most economically optimal way (like many of the packing and processing companies in the fresh produce sector), then growers can't expect it to show all of its cards and work together in a totally co-operative way to genuinely improve supply chain efficiency.

If constraints continue within Europe, then will British Sugar continue to look further afield to source product (raw or refined) without the constraints placed on it by European Union bureaucracy? The long term removal of production quotas for sucrose (already mentioned as a possible option after 2014/15), and freeing up restrictions within Europe will lead to the removal of quotas for other sweeteners (most notably isoglucose). By 2020, who knows how the relative performance of components of the sweeteners market will have evolved, or indeed how consumers' appetite for sweeteners and sugar products will have changed.

British Sugar plc, as part of Associated British Foods, is clearly hedging its bets. It is retaining a balanced portfolio – whilst honouring its commitment to UK sugar beet production (the purchasing of 83,000 tonnes of additional quota will take the output of the remaining four factories to be larger than the previous six), and has expanded the operations of British Sugar Overseas (BSO) in Poland and China. This should re-enforce British Sugar's position as one of the lowest cost producers in Europe, and its collaboration with BP and Du Pont for the production of biofuel adds again to its strategic portfolio by ensuring industrial, as well as feed markets, are covered. It has also purchased a 51% stake in Illovo sugar in Southern Africa.

The other question often asked is whether biofuel is a threat to the 'food sugar industry'. Whilst bioethanol from sugarcane in the tropics is probably the only truly 'economic' biofuel in the world, ethanol from beet falls into the same 'trap' as most temperate substrates including US corn (maize) – it is simply not economic without production incentives. True, it is more economic when oil is at $150 per barrel (rather than at $40 per barrel), but never truly economic.

The outlook for the UK sugar industry is probably relatively stable; inertia serves as the biggest barrier to large scale cropping change, and the EU regime thwarts large scale supply chain rationalisation. Policy now has less of an influence than it previously had, but the single reference price constrains real supply chain efficiency in the medium term. Competition from non-sucrose sweeteners is likely to be an increasing medium term threat. ■

The persistence of sugar in UK food supply

A hundred year battle

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Sugar –the white stuff found in sugar bowls or, more likely, added to products like soft drinks, cereals, and confectionery – has a controversial and often ignoble history in the UK diet and food supply.

Sugar has remained a stubbornly persistent component of the overall British diet. From the mid-1950s to the mid 1970s annual per capita supplies averaged around 47-50 kg, and from 1975 through to the 1990s around 39-42 kg per person per year. Since 2000, around 2.2million tons of sugar has been produced each year in the UK for use in food, 75% of which goes direct to industrial producers for use in confectionary, soft drinks and cereals.

According to the latest Family Food Survey, sugar contributed 14% of energy to the average individual diet in 2007. While down from 14.8% in 2004/5, it is still a long way short of the government's healthy eating target that non-milk extrinsic sugars should contribute no more than 11% of energy to the diet.

So what explains the persistence of sugar – or sucrose to use the technical term – in the UK diet and food supply over the past 60 years? For the answer we have to see sugar supply over the long-term. Sugar's history provides us with important lessons to help explain how our often taken-for-granted food habits, products, and agricultural practices are constructed and shaped by distinct consumer, industry, political and nutritional choices.

Sugar contributed 14% of energy to the average individual diet in 2007

Such long-term perspectives are both helpful and hopeful, illustrating that our current industrial food supply with its negative health and environmental externalities, does not have to continue into the future, and that significant changes and choices to food supply can be made.

The history of sugar also shows us the importance of public policy, taxpayer money in supporting industry sectors, and political choices in shaping how food businesses succeed (or fail). In the case of sugar there would be no industry without large payouts of public money or state protection and political moulding to assist food industry interests during the 20th century.

The persistence of sugar in UK food supply during the 20th century can be seen as the outcomes of the continued battles between the business interests behind the two main agricultural sources of sugar: these are sugarcane, grown and harvested in the tropical countries and exported as raw cane sugar to be refined in the UK, and sugar beet, a temperate climate crop that does particularly well in northern Europe, which is both grown and processed into sugar in the UK.

Sugar's 'systems of provision'

When considering sugar in the British diet one must note that by the late 1800s and early 1900s it had already become an essential ingredient of the British working-class diet, according to Sidney Mintz in his seminal book *Sweetness and Power*. This cements sugar's place as a unique dietary component of the nation's nutritional history.

In my particular analysis of the persistence of sugar in the UK, I divided the 20th century into three broad sugar 'systems of provision': pre-1914; 1914-1973; and 1973-through to 2000s.

Before the First World War – and the first sugar 'system of provision' – the majority of UK sugar, perhaps surprisingly, came from European beet suppliers, because the sugarcane industry had collapsed in the 19th century in the face of the abolition of slavery and 'free trade' policies. The outbreak of World War I changed all that. Cut off from its European supplies, and without a home-grown sugar beet industry, the UK once again turned to its sugarcane interests to fuel its sweet tooth.

The next 60 years or so (1914-1974), or second 'system of provision', saw the political and market dominance of sugarcane interests. But it was not all one-way traffic. The government, pressurised by UK farming interests, began to finance the establishment of a home-grown sugar beet industry that finally came to fruition during the 1930s, culminating in 1936 when sugar beet interests merged to form British Sugar. Today British Sugar remains the UK's only sugar beet company and is currently owned by Associated British Foods.

The establishment of a UK-grown beet industry set in place the future battle ground for British hearts and minds: beet versus cane. The major player in sugarcane refining today, and the only UK survivor from this sugar war, is Tate & Lyle – one of the largest refiners in the world.

The persistence of sugar in UK food supply

There was a hiatus in the evolution of these sugar wars, not least while sugar was rationed from 1940 to 1953. But the politics of sugar was playing out behind the scenes even then; as the sugarcane industry successfully fought off an attempt take the whole of the UK sugar industry into public ownership in 1949.

As the 1950s and 1960s progressed, faced with twin industries of beet and cane, policy-makers, together with beet and cane interests, 'carved up' the UK sugar market between them giving both players virtual beet or cane sugar monopolies in different 'zones' of the UK.

By the end of the 1980s more than 70% of sugar was accounted for by industrial users

The 1970s, however, saw the sudden end of sugarcane's dominance and the rise of sugar beet – the birth of the third sugar 'system of provision' – facilitated by dramatic restructuring of the industry following Britain joining the EEC in 1973. Sugar was now incorporated into the EC Sugar Regime within a Common Agricultural Policy that only allowed sugar from European beets.

However, a special concession negotiated as part of Britain's entry package into the European Union, allowed the UK to keep its sugarcane refining industry and admit raw cane supplies into Europe from selected African, Caribbean and Pacific countries for refining by Tate & Lyle.

Changes in patterns of consumption

Important changes were also taking place in terms of sugar consumption. In the first half of the 20th century, the large majority of sugar was consumed direct from the packet, (i.e people adding sugar to things such as tea or for use in cooking). From the late 1950s and 1960s onwards there was an accelerating shift from the packet to the consumption of sugar as an ingredient used in processed foodstuffs, so that by the end of the 1980s more than 70% of sugar was accounted for by 'industrial users'.

These include the soft drinks and confectionary industries that accounted for 50% of industry sugar sales. Other important industry users of sugar are cake, biscuit, breakfast food, bakery ingredient, canned food and ice cream manufacturers.

The nutritional battle

The 1980s, in my analysis, saw the pivotal nutritional battle over sugar consumption, nutrition and public health, in particular during the period 1983 to1989. The aftermath of this particular sugar battle continues to be played out today.

The battle lines were set out in 1983 with the publication of the National Advisory Committee on Nutrition Education report (NACNE) which for the first time set out quantified dietary guidelines for the UK. Among these was one for sugar which stated that consumption should be limited to 20 kg per person per year; in other words a virtual halving of then current per capita sugar consumption.

In the 1980s concerns about sugar and diet centred on three main areas:

First, sugar, in the quantities being consumed, was thought to be causally linked or contributing to a number of diseases and illnesses;

Second, sugar (sucrose) had become a major source of refined carbohydrate (that is, devoid of fibre, vitamins, minerals, etc) and therefore contributed to an 'unbalanced' diet; and

Third, was the 'sweet-fat' argument which, to put it simply, suggested that sugar makes fat more palatable thus encouraging people to eat more fatty foods.

During this six-year period (1983-1989) the sugar industry fought back through public relations, nutritional campaigning and corporate lobbying. The industry was not entirely successful. But with the publication of the Department of Health's 1989 COMA report on dietary sugars, and with public health nutrition now turning its energies increasingly towards fats and health disease, the nutritional sugar wars had reached an uneasy truce.

The 1989 COMA report suggested that sugar posed a limited direct threat to human health other than in the case of dental

The persistence of sugar in UK food supply

caries. This is, in short, almost identical to today's government health warning about sugar which states only that non-milk extrinsic sugars are considered to be a major contribution to the development of dental caries.

One particular area of concern about sugar consumption during this period was the amount of sugar in children's products and the marketing of sugary foods to children. And now, more than 20 years later, it still remains a major area of concern. The Which? Report published in April this year, and written about by Which? Chief Policy Officer Sue Davies earlier in the magazine, shows just how worrying that is.

Mapping sugar's progress through the 20th century shows us how intransigent the food industry can be when 'healthy eating' threatens its interests, how slow it is to change, and the failure of industry nutritional self-regulation of its marketing and product labelling practices.

Sugar or 'sweetness'?

By considering the persistence of sugar in UK food supply over the long-term we can identify a number of interlocking factors influencing the sugar food 'system'. Key are the geographical location and political significance of sugar at different times; the use of sugar (particularly as an ingredient in the industrial processing and manufacture of food and beverages); the influence of consumers, changing patterns of consumption and the reshaping of demand, especially around nutritional and 'health eating' opportunities; and finally the role and forms of state or government intervention, which in the case of UK sugar enabled both the sugarcane and sugar beet industries to develop and survive over time.

Sugar is part of a palette of sweetness

So how can we consider the persistence of sugar today? I argue we should look at food and beverage markets in terms of their 'sweetness' or 'sweet-taste', not just as sugar. Over the long-term sugar (sucrose) was the dominant force delivering sweetness. But now it is part of a palette of sweetness that includes a range of artificial sweeteners (such as aspartame, sucralose, acesulfame K), sugar polyols, corn syrups and other syrups, and the so-called natural sweeteners like honey, fruit sugars, and so on. Within this 'sweetness' palette sugar remains dominant, but its persistent within food supply is 'hidden' once again as part of number of strategies to keep our food supply 'sweet'. ■

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Sugar consumption and public health

Crossed swords on diet and sugar

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Sugar, like tobacco, has been at the centre of a defining debate that became one of the first great public health battles of the 21st century. At one stage, lobbying over the sugar controversy was so intense that the Bush administration was under pressure to impose a financial blockade on the World Health Organization, while the entire G77 agricultural group of developing countries was persuaded to declare war on WHO's health plans. The sugar war is not over yet.

One of the many ironies of the bitter debacle over sugar is that while WHO was seeking to broker agreement on its new strategy to improve diet and health, one of the great global purveyors of sugar drinks was casting an eye over who it might bring on board to sweeten its image.

It was rumoured that as Director-General of WHO, Dr Gro Brundtland delivered a robust rebuke to the big soft drink brands during a private meeting at the WHO Headquarters in Geneva, when they tried to persuade her that their sugar-saturated sodas had nothing to do with obesity. But if the beverage industry felt chided by her firm stand on health, they had the last laugh. As Wikipedia succinctly puts it, she now works for Pepsi as a consultant [1].

Oddly a discreet public relations silence accompanied the company's triumphant acquisition of the eminent public health champion. Dr Brundtland, twice Prime Minister of Norway, her name indelibly given to the UN commission on sustainable development she chaired, who earned the sobriquet of Scientific American's Policy Leader of the Year for her handling of the SARS outbreak in 2003, quietly slipped under the media radar onto the Pepsi Blue Ribbon Advisory Board to the chagrin of some of her closest friends and allies [2].

To her credit, she had tried to face down the raw power of the sugar lobby – a brute force that was exposed during the spectacular furore prompted by an updated WHO scientific expert report, which restated an earlier recommendation that added sugars should account for no more than 10% of daily calorie consumption[3]. She confronted a campaign to denounce the report as 'bad science', a campaign dominated by sugar interests and supported by major food and beverage companies. Provocatively she arranged its launch at the Food and Agriculture Organization Headquarters in Rome in April 2003. Just three months later she had bowed out of office, leaving a measurably weakened WHO to face the growing onslaught.

The Sugar Association in the USA mobilised its 'sweetener caucus' senators to demand that the US Treasury freeze funds to Geneva, while the US Department of Health and Human Services concocted a bizarre 37-page critique of WHO's strategy, effectively joining in the denunciation of the work of the expert group, which had been chaired by no less a figure than the Chilean president of the International Union of Nutritional Sciences, Professor Ricardo Uauy, based at the London School of Hygiene and Tropical Medicine.

Front page headlines flashed around the world's media after the Norwegian nutrition guru, Professor Kaare Norum, who chaired WHO's independent reference group on the global strategy on diet, fired off a vitriolic letter to the US Health Secretary, Tommy Thompson, accusing him of siding with the sugar and soft drinks industries. The apparently principled US objections to the global strategy crumpled and after a week of re-drafting, the US agreed to drop its objections.

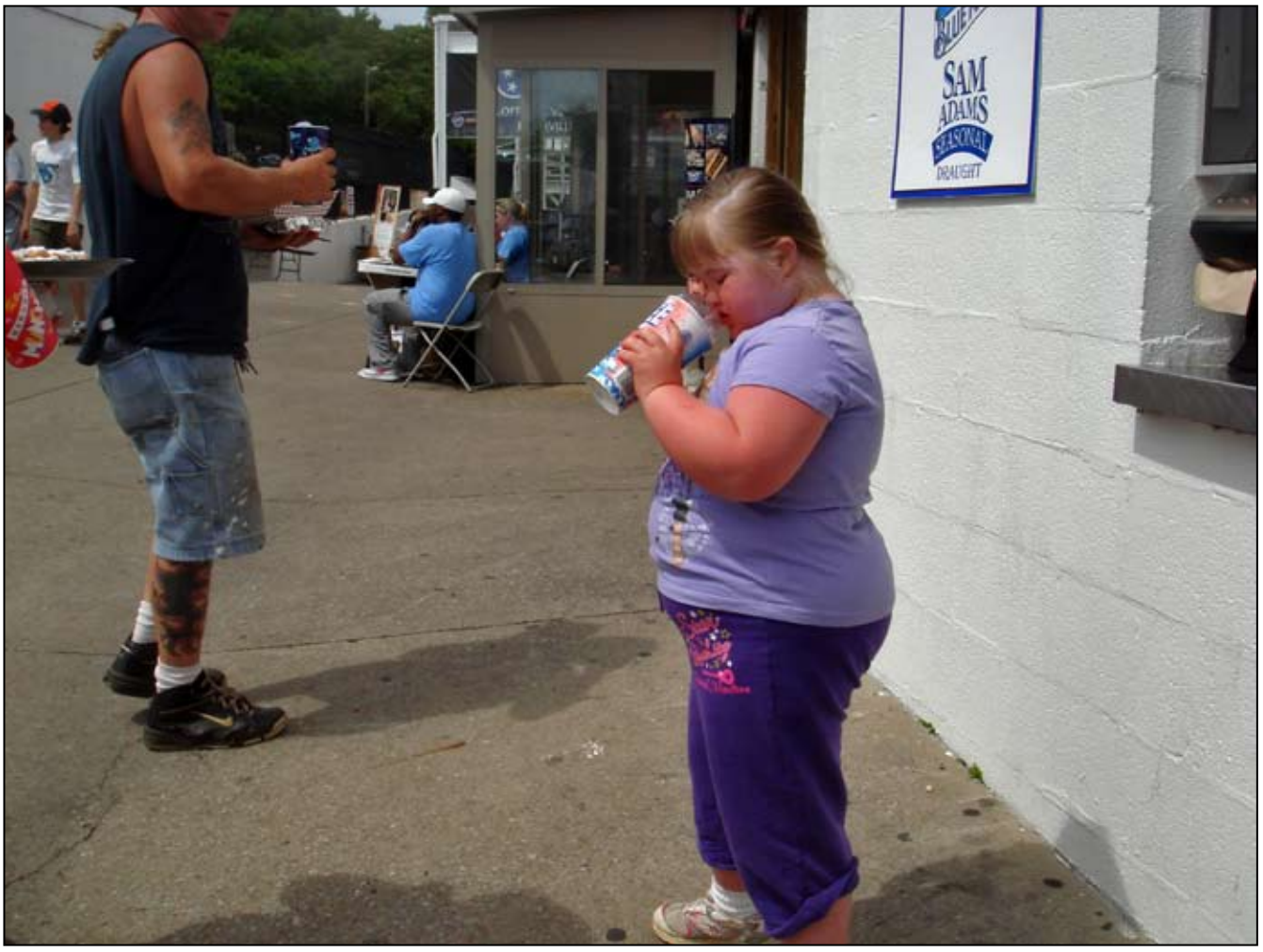
The sugar industry did not relent, and within a few weeks had organized an ambush at the next FAO committee meeting in Rome, convincing agriculture representatives of the G77 countries and China that the world's sugar production would suffer greatly if the less than 10% added sugar recommendation were accepted. The move was based on a selective confection of production and consumption figures that took no account of the exploding bio-fuels market, and the sugar industry simply ignored a World Bank analysis by its senior economist, Donald Mitchell, pointing the finger at the cosy protectionist state subsidies in the USA and Europe, which it said were preventing one million agricultural jobs being created in the sugar sector of developing countries by artificially depressing free market prices [4].

The horse trading which led to the international food and beverage trade groups lowering their guns and acquiescing to the WHO global strategy meant that all reference to the expert report and its sugar recommendation should be expunged from the text of the strategy. This was finally agreed in May 2004. On the first day of the World Health Assembly, a single reference to the expert report remained in a tiny footnote of the strategy document. By the time the agreement was finalised in an extraordinary weekend session, the footnote had disappeared.

The cover of the online version of the WHO 916 report now carries the disclaimer: “This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the World Health Organization or of the Food and Agriculture Organization of the United Nations.”

The whole debacle had exposed a fault line running through the global food and beverage sector already

Sugar consumption and public health



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troubled by the growing momentum behind attacks on junk food. The controversy generated over this comparatively modest health target, the established norm for many countries, ended up challenging the ethical values of everyone concerned in the nutrition debate.

Some nutritionists had been shown to be willing to bend with the prevailing wind. The Institute of Medicine in the USA had already incorporated a confusing dietary recommendation of a 25% limit on added sugar – based on a maximum human tolerance threshold – at which point vitamin deficiencies begin to emerge – rather than an acceptable level for a healthy diet and weight control. Some prominent researchers were accused of concealing evidence that sugar causes weight gain, and in one case had to pay over to charity personal payments received from the sugar industry while in public office.

Less than six months after the WHO global strategy was adopted, the BBC Panorama programme exposed the way in which sugar had influenced the development of an expert consultation on carbohydrates. The BBC claimed the World Sugar Research Association (WSRA) and the International Life Sciences Institute (ISLI) had secretly funded the report in return for choosing the chair and a number of the experts who took part [5]. As a consequence ISLI had restrictions imposed on its role in consultations, but it managed to avoid being deleted from WHO's formal register of non-governmental organizations.

Why should sugar provoke such a powerful reaction? The answer is by no means straightforward, but inevitably comes down to money. In the early 1980s sugar prices had never been higher and many developing countries with low-grade production facilities were tempted to invest heavily in expanding and updating their capacity. But the resulting oversupply of the market for sugar, distorted for decades by market protection mechanisms, led to an enduring collapse in world prices that has only recently seen a limited recovery as the oil crisis turned ethanol into a competitive source of bio-fuel. As oil prices subside, and the boom in ethanol slows down, the temptation once more will be to divert superfluous sugar back into food chain.

But the market structure of protected domestic production and a fluctuating world price for surpluses remains at the heart of the nutritional concerns. It is tempting to see a

Sugar consumption and public health

surplus of cheap sugar as an easy source of quick profits by promoting increased human consumption. Production quotas in controlled and subsidised markets also provide an impetus to maintain and increase consumption in order to justify 'market growth' even as global stockpiles grow.

One of the most revealing aspects of the great debate over added sugar limits was that consumption in many developing countries was shown to be well below the WHO's 10% of calories ceiling. In other words for the world's poorest people, even cheap sugar can remain an expensive luxury, especially if there isn't a convenient local supermarket on every corner. And traditional tastes in many cultures are not attuned to the over sweetened range of foods we have become accustomed to in the West. But the world is changing fast.

Sugar consumption in developing countries is foreseen to grow by 2.8% on last year

The FAO's Food Outlook predicts continued growth in world sugar consumption to rise to 163 million tonnes – 2.2% up on last year – despite global concerns about diet and obesity, and notes that higher growth is anticipated in the United States, due to "greater use of sugar in food and beverage processing."[6] Sugar consumption in developing countries is foreseen to grow by 2.8% to 113.9 million tonnes. India, the largest sugar consuming country in the world, is set to increase consumption by almost a million tonnes to 25.5 million tonnes, while China continues to increase its non-traditional consumption of sugar due to "strong demand from the food and beverages sectors" as well as the high price of alternative sweeteners. Consumption is also growing in Brazil and Mexico, but the saturated markets of the European Union, Australia and Japan reflect an existing high consumption of 36 kg a year – almost one and half 500 gm bags of sugar per person per week.

For China's new cohort of 'little emperors' already celebrated as the fattest generation of Chinese ever, the legacy of the Olympics, fuelled on Coca Cola and fast food, is likely to be even greater increases in consumption of Westernised diets, greater obesity and greater prevalence of diabetes, cardiovascular disease and ultimately cancer. Yet as one recent investment report suggested: "The demand for sugar by Chinese consumers is steadily growing, despite price fluctuations due to the effects of altering world sugar prices and local shortages. Growth is being stimulated by growing use of sugar as an ingredient in food and beverage products as well as an additive to foods and drinks."[7]

Few of us need convincing that the consequences of increasing our consumption of sugar can be readily seen on the scales, but it seems the food and beverage sector in the USA is ignoring the message, according to the FAO, and is concerned to export the drive for market growth and ever increasing consumption despite an awareness of the damaging health impact of these business strategies.

Ironically both big soda brands should understand the public health implications of promoting global overconsumption of their sugar drinks. Dr Maxime Buyckx, formerly nutrition officer at the Food and Agriculture Organization in Rome, became director of nutrition and health sciences at Coca Cola's Beverage Institute for Health and Wellness. Dr Derek Yach, the WHO official who masterminded the Global Strategy of Diet, Physical Activity and Health, is now director, global health policy, for PepsiCo.

In the aftermath of the last war between sugar and health, the global industry seems to have settled for a deal that looks suspiciously like business as usual. ■

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Global obesity trends

Is sugar responsible?

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No longer a malady of affluence, obesity is now a disease of the working poor. Highest rates are found among immigrant and minority groups and people with low education income. Impoverished neighborhoods across the globe, from Sao Paulo to New York, are the new breeding grounds for obesity, diabetes, and the metabolic syndrome. Postcodes and housing costs can reliably predict local obesity rates. Any argument that body weight is genetically driven is undercut by the simple observation that thin neighborhoods and fat ones are mostly separated by money.

The dividing lines are easy to spot. East 96th Street in Manhattan separates East Harlem from the Upper East Side. Leaving the leafy East Side means stepping into the world of poverty, unemployment, deprivation and food assistance. Not surprisingly, obesity rates quadruple, and the rates of diabetes increase seven-fold. Obesity is an economic issue, no doubt about it, linked to limited resources and multiple indices of social class.

Money also affects diet quality. Simply put, healthier diets cost more. Higher quality diets, with more vitamins and minerals, not only cost more per calorie but are also enjoyed by better educated and richer people who happen to be thin. In contrast, added sugars and fats taste good and satisfy hunger at minimal cost.

Yet this economic reality of food choices was steadfastly denied, at least for the past eight years, by the Economic Research Service of the US Department of Agriculture, which told us that all Americans, regardless of income, could afford a nutritious diet of whole grains, low-fat meat and dairy, and fresh vegetables and fruit. If poor people failed to adopt such diets, and ate sugar instead, they had only themselves to blame.

In retrospect, this was a coldly calculated scheme, designed to prevent advocacy groups from demanding adequate food assistance for the poor. Whereas bailouts for the Upper East Side bankers are perfectly acceptable, asking for a nutrition bailout for East Harlem smacks of socialism and class warfare.

Rather we salve our consciences by pretending that specific nutrients, ingredients, or actual foods are directly responsible for high obesity rates. The blame pendulum swings with some regularity, every 10 years or so, from sugars to fats and back again. Right now, the focus is still on sugars and sugared beverages. If only sweet foods weren't around, we say; if only beverages could be legislated out of existence, or made more costly through taxation, then even the poor will happily turn to 100% juice, salad, and poached salmon. They might even be satisfied with less. As readers of the New York Times asked – why can't the poor just live on a big pot of home-made nourishing lentil soup for a week or two?

The focus on individual nutrients, such as sugar, has obscured the economic context of food choice. Frequent soda consumption in New York City is one case in point. It has been linked to young age, male gender, minority status (African American and Latino), less than high school education, and incomes below 200% of federal poverty level. Its geographic distribution matches those of obesity and poverty, with highest rates found in Harlem, South Bronx, and the poor areas of Brooklyn and Queens.

Sugared beverages provide added sugars, whether sucrose or high fructose corn syrup, at a relatively low cost, sometimes as low as 25 cents per 2,000 kcal. They are associated with obesity and weight gain. Pure fruit juices provide natural sugars at 10 times the price. They are associated with good health. Even more costly liquid meal replacements, effectively sugared drinks, are associated with weight loss. Interestingly, the amounts of sugar in each set of beverages are approximately the same, around 12 g per 100g – but their price clearly is not. Low cost sugared beverages, in other words, are most often consumed by minorities and the poor.

However, arguments for intervention are rarely phrased that way. Instead, we hear how all Americans are becoming obese and how all of us would benefit from a tax on fats, fast foods or soft drinks. The obese poor – we are told – would derive the greatest societal benefits; after all, sugared beverages are not necessary for survival. This argument ignores the sad reality that people eat (and drink) only what they can afford. Whereas upper income people may indeed switch to other diets, the obese poor most likely will not.

In fact, their obesity was probably caused by low diet cost in the first place. Much of past epidemiologic research on diet and disease is consistent with a single explanation. What the 'obesogenic' nutrients, ingredients, foods or food groups seem to have in common is their low cost. Fats and sweets are good tasting, inexpensive, widely available and convenient. The low cost of dietary energy (in dollars per 1,000 kcal), rather than any specific food or beverage, may turn out to be the best predictor of population weight gain. And yes, low cost diets tend to be energy rich but nutrient poor.

In other words, what leads to obesity may not be the sugar but the low price of sugar. Or fat. Or refined grains. Whatever beverages or foods supply the most calories at the lowest cost to vulnerable groups are most likely to blame. The links between obesity, poverty and limited diet choices are only too evident. But the real question, sometimes side-stepped by public health, is not what made Americans obese, but who made them poor? ■

Sugar addiction

More than just a sweet tooth?

Miriam Boscarsly

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'Sugar addiction' is a colloquial phrase used to describe people with an extraordinary sweet tooth. It is a favourite term amongst those that have engaged in the low-carb lifestyle, professing that eliminating sugar has allowed them to break free from the bonds of bingeing, overeating, mood disorders, cravings and unwanted weight gain that accompany excessive sugar consumption.

'Sugar addiction' has been the topic of several popular books, and the fuel behind several popular diets. However, until recently, it was a phrase based on anecdotal experiences and personal accounts. But emerging scientific evidence has indicated that bingeing on sugar can, in fact, precipitate behavioural and neural states similar to those seen in cases of substance dependency and drug addiction.

Bingeing – a maladaptive eating behaviour clinically defined as eating a larger amount of food than normal during a discrete period of time [1] – is an increasingly occurring eating behaviour in the industrialised world[2]. This is potentially driven by the overwhelming availability of highly-palatable and simultaneously highly-caloric foods, combined with our fast-paced culture.

Clinically, binge eating behaviour is associated with several eating disorders, including binge eating disorder and bulimia nervosa, as well as obesity. Recently, 6.6% of the sub-clinical population was estimated to suffer from binge eating disorder, making its occurrence more frequent than that of either anorexia or bulimia nervosa [2]. Additionally, a salient link has been identified between obesity, which afflicts 33% of the adult US population [3], and binge eating [4]. Binge eating also appears to be a predictor of body-fat gain among children, leading to a high risk for adult obesity [5].

In addition to early-onset of obesity, binge eating disorder is associated with increased frequency of weight fluctuations, weight regain, depression, anxiety and drug use [6]. With the incidence of this aberrant eating behaviour on the rise, research has begun to investigate the source of this problem and its potential biological underpinnings.

Clinical and sub-clinical populations that report episodes of binge eating often report feeling loss of control, obsession and disruption of daily life. In addition to being observed in some eating disorders, all of these characteristics are noted in substance dependence or drug addiction[1]. Some scientists have even suggested that "intense sweetness surpasses cocaine reward" (with regards to a study in which it was determined that when forced to choose between a sweet beverage and intravenous cocaine, the majority of animals opted for the sweet taste) [7].

Scientists are now using a variety of techniques to study how the commonalities between eating disorders and addiction may provide insight into the etiology of maladaptive eating and inform personal treatment as well as public action and education.

In order to study binge eating in this light, one must understand the defining characteristics of drug addiction and dependence. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), the guidebook for all mental disorder diagnostic criteria as outlined by the American Psychiatric Association, has identified seven criteria for the diagnosis of dependency. These include (1) bingeing, (2) tolerance, (3) withdrawal, (4) negative consequences, (5) significant time, thought and energy spent obtaining/using substance, (6) neglect of other activities and (7) continued use despite knowledge of psychological or physical problems that are caused by use [1]. The appearance of any three of these criteria during a 12-month period can be used to label and diagnose drug dependency. To date, several of these specifications have been identified in cases of binge eating, albeit to a lesser degree, using laboratory animal models.

Laboratory studies

In order to induce binge eating in rats, animals are allowed 12-hour access to a sugar solution (similar in sweetness to soft drinks) and standard rodent food beginning four hours into their day. This can be likened to the teenager who skips breakfast, only to guzzle a sweet beverage from a vending machine between classes.

Using this animal model of restricted access, 'bingeing', or the intake of unusually large amounts of food in a short period of time, opiate-like 'withdrawal' indicated by signs of anxiety and depression and 'craving', which is measured during sugar abstinence as motivation to consume more sugar than before, have all been documented (for a detailed review see Avena et al., 2008 [8]).

Cross-sensitisation, whereby sensitisation to one drug makes an animal susceptible to the effects of another drug, is another characteristic that is well established in drug dependency. This phenomenon has also been observed with regards to sugar. Specifically, bingeing on sugar sensitises animals to amphetamine, and likewise, amphetamine sensitises animals to sugar, indicating a synergistic effect based on sensitisation of a dopamine system [9, 10]. As well as a characteristic of addictive substances, this may be related to the known comorbidity between maladaptive eating and substance abuse.

Additionally, sensitisation to one drug can lead not only to enhanced reactivity to another drug, but it can also lead to a subsequent increased intake of another drug or substance. In the clinical literature, this link is referred to as the 'gateway' effect. This too has been observed in sugar bingeing animals. For example, animals that are maintained on a sugar bingeing schedule, and then forced to abstain, will increase intake of alcohol [11]. Other studies have indicated that animals that prefer sweet-taste will self-administer cocaine at a higher rate [12].

In addition to the behavioural similarities that have been shown between models of binge eating disorders and addiction, scientists have also discovered addictive-like brain changes in both animal models and in patients with maladaptive eating patterns. Daily binge eating on a palatable sugar solution or fat diet has been shown to alter the release of neurochemicals in an area of the brain that processes reward and motivation [13,14]. Also, studies conducted in humans suggest that the dopamine gene is altered in patients suffering from pathological eating disorders, including obesity [15].

Given the similarities in both behaviour and neurochemical functioning in binge-eaters and drug users, it has been suggested that binge eating of palatable foods (especially sugar) may result in addictive-like behavior and concomitant neurochemical changes [8]. It is critical that this relationship between sugar and addictive behavior be better understood in hopes of influencing policy and education.

This construct of addiction to food begs the question: are all people addicted to food? And in this instance, we come to the delicate level of definitions and denotation. All people need food to survive, and are therefore dependent on it. However, it seems that in some individuals this system has been pushed to the limit, allowing for the development of an unhealthy food addiction when sugary food and drink is everywhere. It is in these people that we observe the maladaptive behavior, similar to that seen in cases of drug addiction, as well as the accompanying neurochemical adaptations. For these people, sugar may be a dangerous substance.

Unfortunately, addiction to food cannot be treated in the same way as addiction to drugs such as alcohol or nicotine. Unlike drug addiction in which one can abstain from the substance of abuse, humans cannot completely abstain from food. For these people, even dieting could trigger a downward spiral. For example, in dieting, many aim to completely eliminate the 'abused' substance, such as sugar. However, in cases of addicted individuals it is possible that this may precipitate the negative mood state that accompanies withdrawal. This negative mood state may best be treated by self-medication with more sugar. This could then lead to the perpetuation of sucrose bingeing and to further escalated intake and the accompanying neurological changes. This complicated balance between dependence on food for sustenance and aberrant eating behaviours fuels the need for careful, planned treatments as well as education. ■

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Consuming sugar

Where next for public health strategies?

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Sugar is a pleasure, not a poison. Billions of people enjoy sweet foods and drinks every day. There is no reason why they should not go on consuming them.

The problem with sugar is that we eat too much of it. So we suffer the consequences in the form of obesity and rotting teeth.

We eat too much of it because we like it. We like it, not just because of some local cultural preference, but also because humans are genetically programmed to like it in several ways. For example, our innate preference for sweet tastes is one way to distinguish ripe fruit from that which is not yet ready or too far-gone.

So, the nutritional goal is not abstinence, but less sugar, less often. That is a hard sell. Against the combination of social conventions and biological pre-dispositions, injunctions to restraint avail little. Moderation is never a mobilising message.

Over the past 25 years public interest and attention has focussed on healthy eating as never before. These days we make prime time television programmes about obesity and nutrition. Food stories are on the front pages of popular newspapers. We are repeatedly informed and exhorted about healthy choices. And yet...

Over the same past quarter century our diet has demonstrably deteriorated. Official surveys do not tell the full story, because they are vulnerable to massive 'under-reporting'. The proof is in the pot-belly. We have been getting fatter and fatter, men and women, children as well as adults.

When you are losing, it is time to change your game. We need to move beyond traditional, rational health education to structural options. We need to focus on the composition, promotion, availability and price of the sweetened products that provide most of our sugar intake.

First and foremost, we should concentrate on changing foods, rather than trying to change people. That means reformulating sweet foods and drinks to reduce or eliminate sugar. There are two routes reducing the amount of sugar we add to products, or replacing it with sweeteners.

In fact, the Food Standards Agency (FSA) has quietly, behind the scenes already begun a sugar reduction programme.

This is an extension of its salt reduction programme, the most successful nutrition policy in Britain to date. That started by identifying the major salt-bearing products. Then making a series of small, incremental reductions, imperceptible to consumers, that will extend over decades. Already per capita salt consumption has by more than 10% in just six years. The next two phases are already planned.

The same strategy is being applied to sugar. The FSA is now negotiating the first set of sugar reduction targets with the industry. For example, the initial goal for soft drinks will be a 4% cut in added sugars, a level at which consumers will not sense a loss of sweetness. It is a small beginning, but just the first step in a long process.

Sugar reduction will be greatly aided by the arrival of “taste potentiators”. These are substances, not sweet in themselves, that work on the sweetness receptors on the tongue to amplify the taste of sugar. Developmental versions allow a 40% reduction in the sugar content of soft drinks, for example, while maintaining the same perceived taste. They should be commercially available soon.

This approach raises a strategic, some would say ethical, issue. Should we pandering to people’s liking for sugar? The principled approach is to educate them to prefer healthier foods. Fine in theory, but it has not worked. The pragmatic approach is to start with the popular foods that most people eat most of the time, then improve their nutrient profiles.

That is the way we are now going. The salt story proves it can work. The hard test, however, remains sweeteners. Despite endless testing, they remain controversial among some scientists and some nutritionists.

But not with the general public. Already, more than half the soft drinks sold in Britain by the big two manufacturers are sugarless, using sweeteners. And both companies are only now seriously trying to sell sugarless drinks for men, Pepsi Max and Coke Zero.

And significantly this year, for the first time the government has explicitly recommended sugarless soft drinks as part of the 'sugar swaps' in the Change4Life programme.

The next big development with sweeteners will be their use in cooked products, especially chocolate, breakfast cereals, biscuits and cakes. Sweeteners that do not lose their potency on heating have been available for some time. But no commercially successful product has emerged so far.

In recent years there has been considerable progress on another structural policy, limiting the promotion of sweetened foods. One of the basic problems with under-funded nutrition education programmes is that they are overwhelmed by advertising for all the foods we should being eating less of.

The most significant achievement so far has been restrictions on the foods that can be advertised on children’s television. Only products with healthy nutrient profiles are allowed. That is a start, but 70% of the ads kids see are outside traditional children’s TV hours.

Nutrient profiling is also central to the new controls on nutrition and health claims now being implemented in Europe. And also to some new 'front-of-pack' labelling schemes.

Consuming sugar

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The real challenge ahead, however, is to control the promotion of sweet products via the new media, especially the Internet. On this, we have hardly begun.

Another major challenge is the availability of sweet foods. Soft drinks and confectionery are the most widely distributed products in Britain. They are available not only in supermarkets and grocery shops, but in newsagents, garages, vending machines and catering outlets. If people want snacks, the easiest to find are full of sugar.

One structural option, on which we have just begun, is to squeeze this distribution system. The School Foods Trust has banned fizzy drinks and confectionery in schools, but other public sector caterers, even hospitals, have not changed.

The Healthy Neighbourhood Shops scheme in Scotland has been successful in promoting healthier options and has now been extended to northern England. For a while, there was success with some supermarkets to 'Chuck Sweets Off the Checkout', aiming to reduce impulse purchases while waiting to pay. But there is still much to do.

On price policy, we have actually been going backwards. Sugar has always been cheap, even at inflated European levels. For consumers, at retail, measured in calories-per-pence, the cheapest source of energy you can buy is sugar --- unless you want to eat lard neat.

And now, the EU has just reduced the price of sugar. Following a legal decision that Europe had been dumping its excess sugar on the world market, the Common Agricultural Policy is reducing the support price for sugar by 36%.

Agricultural ministers have never been much interested in public health. But cutting the price of sugar by more than a third in the midst of a global obesity epidemic is aggressively anti-nutritional.

The most important consequence is that sugar will become a cheaper ingredient for food manufacturers. So they will be inclined to use more, not just to add sweetness, but to provide bulk or texture. And it is from processed foods that we already obtain most of our sugar. The FSA's sugar reduction programme will be battling against formidable economic pressures.

But we must face that challenge. Obesity is a major risk factor for Type 2 diabetes. So, coming on behind the obesity epidemic, after a short lag time, is an epidemic in diabetes. Diabetes is a very expensive disease to treat --- involving kidney failure, amputations, blindness, plus continuous care and drugs.

If diabetes ever does reach epidemic proportions, the treatment costs will put intolerable financial pressure on all health care systems, however they are financed. Reducing obesity is the most important mechanism for prevention.

Sugar is not the sole cause of obesity. Reducing our sugar consumption will not cure the obesity epidemic. But sugar is an important contributor to our excess energy intake. Reducing it is one important part of any future public health package.

This is urgent. We have to reverse the rising tide of obesity soon. We cannot wait for nutrition education to take effect, if it ever does.

Changing the composition of popular foods to reduce sugar works much more quickly. And consumers do not have to consciously opt for healthy choices every time they shop. And most importantly, reformulated foods affect everyone, even those who hate the whole idea of healthy eating.

To cope to our sugar/obesity problems we need to supplement nutrition education with pragmatic structural policies, above all the reformulation of sweet foods and drinks. ■

books

reviews

Agriculture in Urban Planning

Mark Redwood ed. | 2009 | Earthscan | ISBN 978-1-84407-668-0

Can city farming make a difference to livelihoods and food security across the globe? Using case studies, this book examines strategies for integrating urban agriculture into city planning, and assesses the social, environmental and human health impacts of growing food in urban landscapes. EB

Ecological Debt

Andrew Simms | 2009 | Pluto Press | ISBN 978-0-7453-2727-3

Irresponsible debt management is creating yet another crisis for the world: but this time it's an ecological debt rather than a monetary one. Heading towards a global environmental meltdown we rationalise our self-destruction, which is why, as Simms explains, "humans are more stupid than frogs". The debt must be repaid by those that created it and this is the repayment plan. ABC

Cradle to Cradle: remaking the way we make things

Michael Braungart, William McDonough | 2009 | Jonathan Cape | ISBN 978-0-224-08786-5

This book proposes a radical industrial rethink whereby every component of a product can circulate for ever as a pure and valuable material. Already embraced by far-thinking manufacturers and governments, cradle to cradle moves beyond recycling, a system the authors say perpetuates the long term problems of waste. EB

Fed Up with the Right to Food?

Hospes, O. and van der Meulen, B. eds. | 2009 | Wageningen Academic Publishers | ISBN 978-90-8686-107-1

An assessment of what the right to food means and how that right has developed under international law. It asks why the Netherlands, one of the world's richest countries, abdicates its responsibility towards feeding people, and how this situation could – and should – be put right. EB

Fresh: a perishable history

Susanne Freidberg | 2009 | Harvard University Press | ISBN 978-0-674-03291-0

A compelling account of the history of fresh food, Freidberg investigates the contents of our fridges. She asks how technological innovations, corporate control and consumer choice have reframed our ideas about fresh food and at what environmental and social cost. EB

Kitchen Table Sustainability

Wendy Sarkissian et al | 2009 | Earthscan | ISBN 978-1844076147

There is much useful and thought-provoking information in this book on approaches to community engagement, drawing on the authors' vast personal experiences. However, the tone of the book – part self-help manual, part testimony of personal transformation, with a hint of New Age spirituality – can quickly become grating. RS

Let Them Eat Junk

Robert Albritton | 2009 | Pluto | ISBN 978-0745328065

Over a quarter of the world's population does not have enough to eat, whilst vast numbers of the rest gorge themselves on junk. The food crisis is mostly reported as if it were a natural disaster, something that occurs unpredictably, but Albritton disputes this, analysing economic factors and calling for capitalist markets and corporations to think about public health not profits. SAR

Soil Not Oil

Vandana Shiva | 2009 | Zed Books | ISBN 978-1848133150

Arguing that the food crisis, peak oil and climate change are inherently linked, Shiva suggests they should be tackled together. She calls for the end of the fossil fuel dependent economies and advocates for small, independent farms in localised economies that ensure sustainability by being more resistant to disease, drought and flood. SR

Sustainable Animal Production

Aland, A. and Madec, F. eds | 2009 | Wageningen | ISBN 978-9086860999

Essential reading for teachers and students of agriculture and veterinary science, farm managers and agricultural advisers, this book gathers in one place the latest thinking on sustainability in agricultural production. With essays on the farm environment and animal feed, on environmental and human health impacts, and many other constraints, this book covers all aspects of rearing animals for food. EB

The Spirit Level: why more equal societies almost always do better

Wilinson, R. and Pickett, K | 2009 | Penguin and Allan Lane| ISBN 978-1846140396

Based on 30 years' research, this book demonstrates why unequal societies are bad for almost everyone, poor and rich. It reveals that almost all modern social and environmental problems – ill-health, lack of community, violence, drugs, obesity and mental illness – are more likely to occur in a less equal society. SR

restaurant review

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Terre à Terre

The Vegetarian Restaurant

71 East Street, Brighton, East Sussex, BN1 1HQ

Clare Devereux

Founder director of Food Matters, a not-for-profit company that supports people and organizations working towards more sustainable and equitable food systems.

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How I rate it

Overall: *****

Fairness: ****

Health: ****

Animals: ****

Environment: ****

Taste: *****

Ambience: ****

Value for Money: ****

(maximum five stars)

There aren't many restaurants that require a glossary to decipher the menu! At award winning Brighton vegetarian restaurant, Terre à Terre, the description of dishes are legendary among customers – and can either drive you to distraction or provide unexpected entertainment as you navigate your way through the generous and colourful menu. One item on our lunch menu contained fifteen different ingredients, including such delights as 'pippin tendrils' and 'wheat berry popcorn'.

Dishes are given wonderfully inventive names such 'Pea Shooter', 'Slap it On', and 'Ice Cream You Scream', which in any other restaurant might be regarded as twee. Terre à Terre gets away with it because the food is fun, creative, often brave and invariably delicious. And although it is a vegetarian restaurant, there is hardly a lentil in sight. The menu draws on a multitude of exciting ingredients, with an emphasis on fresh vegetables, local Sussex cheeses, and dreamy desserts.

Eating out can often involve making tradeoffs over a variety of issues – cost, taste, principles. Eating at Terre à Terre ticks so many boxes that you can enjoy a fabulous gourmet meal almost guilt free. Being a vegetarian restaurant eliminates concerns over the provenance of meat and animal welfare issues. We all need to reduce our meat consumption, and I challenge even the most diehard carnivore to eat a meal at Terre à Terre and mourn the lack of animal flesh. In fact only one out of every five customers is a vegetarian.

Unlike many veggie restaurants which often go overboard with cheese, pulses or grains, the Terre à Terre menu prefers to give centre stage to vegetables, fruit, leaves, and salads. This was particularly true on the day we ate, which saw the launch of a new 3 course menu, 'Plot to Plate' – celebrating 'all things sown and grown', at an affordable price of £13.99. Fresh rhubarb, broad beans and herbs came from a city allotment site, wild garlic had been foraged from beside the railway line, and flour was locally milled. Without sacrificing taste, the menu was light and healthy – one dish even called 'Five a Day the Terre à Terre way'.

Although a special promotional menu, sourcing locally without compromising taste or exceeding budgets is a priority. However, as for many restaurants this is never as easy as they would like, and many of the more exotic ingredients are inevitably imported. Teas, coffees and some wines are fair trade – but not chocolate, as they have been unable to find a brand which measures up to their high taste standards.

Wines are 100% organic – and the wine list recently won them runner up for best ethical restaurant in the Observer Food Awards. And lest I become too gushing about the restaurant, it is here that I have an issue – why not continue this policy through to the menu? Organic ingredients seem to be scarce – apparently because customers haven't requested it, and because of the inevitable increase in costs. It would be good to see more locally produced organic dairy produce in evidence.

This would also help with the other inevitable challenge often faced by many vegetarians – does it make sense to avoid meat and not dairy produce? Although there are several vegan options on offer, it would be great if at least all animal products were organic, and therefore coming from sustainable production systems with the highest animal welfare standards. As a step in the right direction all the eggs used come from a local battery hen rescue centre.

Writing a review involves the application of critical faculties – and it is probably unfair of me to pick holes in what is otherwise a highly ethical restaurant. But in their words they 'try their best', and this no doubt includes looking at how to improve not just the quality and taste of their already superlative dishes, but also their ethical and sustainable policies. ■

forthcoming events

4th Jun '09	The Future of Rural Land Use RELU | www.relu.ac.uk | London, UK
9th - 11th Jun '09	Food and Function 2009, the International Scientific Conference on Nutraceuticals and Functional Foods | PAMIDA | www.foodandfunction.com | Zilina, Slovakia
10th - 14th Jun '09	BBC Summer Good Food Festival BBC | www.summer.bbcgoodfoodfestival.com | Birmingham, UK
11th Jun '09	Sustainable Distribution '09 IGD | www.igd.com/sustainabledistribution2009 | London, UK
14th Jun '09	Reducing Energy Costs in Food Processing Institution of Mechanical Engineers | events.imeche.org | London, UK
18th Jun '09	Satiation, Satiety and Their Effects on Eating Behaviour British Nutrition Foundation | www.nutrition.org.uk/satietyconference | London, UK
18th Jun '09	Sustainable lives? The Challenges of Low-carbon Living in a Changing Economic Climate RESOLVE | www.surrey.ac.uk/resolve | London, UK
26th - 27th Jun '09	BioBlitz Bristol Natural History Consortium | www.festivalofnature.org | Bristol, UK
29th Jun - 3rd Jul '09	International Conference on Human Ecology: Human Ecology for an Urbanising World Commonwealth Human Ecology Council and the Society for Human Ecology www.societyforhumanecology.org | Manchester, UK
29th Jun '09	Annual Green Supply Chain Summit Ethical Corporation Conferences | www.ethicalcorp.com/conferences | London, UK
8th - 10th July '09	ECOSUD 2009: 7th International Conference on Ecosystems and Sustainable Development | Wessex Institute of Technology UK www.wessex.ac.uk/09-conferences/ecosud-2009.html | Chianciano Terme, Italy
8th Jul '09	Food Security Westminster Food & Nutrition Forum | www.westminsterforumprojects.co.uk London, UK
29th Jul - 1st Aug '09	Green Economics Conference Green Economics Institute | www.greeneconomics.org.uk | Oxford, UK
5th - 10th Sep '09	British Science Festival British Science Association | www.britishsciencefestival.org | Surrey, UK
12th - 13th Sep '09	Organic Food Festival Soil Association | www.soilassociation.org | Bristol, UK
14th Sep '09	The 2nd Annual Water Summit Ethical Corporation Conferences | www.ethicalcorp.com/conferences | London, UK
23rd - 24th Sep '09	Measuring and Marketing the Environmental Costs and Benefits of Agricultural Practice Association of Applied Biologists | www.aab.org.uk | Basingstoke, UK
5th Oct '09	Annual Sustainable Finance Summit Ethical Corporation Conferences | www.ethicalcorp.com/conferences Brussels, Belgium
12th - 14th Oct '09	Africa's 'Engine for Growth' - Plant sSience & Biotechnology Hold the Key Association of Applied Biologists | www.aab.org.uk | Harpenden, UK
9th Oct '09	Annual Ethical Supply Chain Europe Summit Ethical Corporation Conferences | www.ethicalcorp.com/conferences
11th - 12th Nov '09	Acrylamide: Influence of Plant Genetics, Agronomy and Food Processing Association of Applied Biologists | www.aab.org.uk | Harpenden, UK
2nd - 4th Dec '09	Earth System Governance: People, Places and the Planet International Human Dimensions Programme on Global Environmental Change www.earthsystemgovernance.org/ac2009 | Amsterdam, The Netherlands
7th - 18th Dec '09	Climate Change Conference United Nations | www.cop15.dk/en | Copenhagen, Denmark