



# THE RAM'S HORN

A MONTHLY NEWSLETTER OF FOOD SYSTEM ANALYSIS

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## Prison Farms

One of the advantages of living in Ottawa (or maybe it's a disadvantage) is that we are able to go up to Parliament Hill in support of important causes. This can take the form of singing with the Raging Grannies at a wonderful street-theatre demonstration organized by trade unions against the proposed free trade deal with Colombia; being a witness at a House or Senate Committee hearing, or, as I did a couple of weeks ago, appearing at a media event organized by the local National Farmers Union and others to explain why Corrections Canada should not close down the six working farms connected to Canada's federal prisons.

Announcing the closure plans in April, Minister of Public Safety Peter Van Loan stated that "the prison farms are set up on a model of agriculture that really reflects the way it worked in the days of the old mixed farm in the 1950s". He claimed they should be closed because they do not provide relevant employment skills in today's economy.

Of course this is nonsense, not to mention insulting to the thousands of mixed farmers who have survived Canada's export-commodity-oriented agriculture policies over the past forty years. They have survived – and are on the verge of a resurgence – because they work, not in terms of an industrial-level wage but in terms of providing wholesome food, healthy environment, and an economic base for their communities. It is

certainly a different model than the one that has left us with a polluted environment and an epidemic of obesity and chronic disease, but that doesn't make it irrelevant, either in terms of the economy or in terms of prisoner rehabilitation. (One does sometimes get the idea that rehabilitation is not the government's priority – they should really call themselves "Punishment Canada" instead of "Corrections Canada".)

In fact, these farms are diversified, well equipped and highly respected – they are considered a model in other countries. They produce a range of foods and include facilities which are used by neighbouring farm communities such as egg grading equipment and abattoirs as well as facilities from dairy to greenhouses for their own use. In addition to providing food to their own and other federal institutions, the farms make important local donations – for example, thousands of eggs to the food bank in Kingston. The 300 inmates who work in the farms learn agricultural production and processing, teamwork, reliability and punctuality. They report that working with the animals makes them "calmer". The nutrition provided to inmates is also important; research in the UK showed that juvenile detainees provided with nutritional supplements showed a 37% reduction in violent incidents.

Mr. Van Loan is now claiming that the farms "cost" the system \$4 million a year. It is not clear where this figure comes from. The NFU has asked, and so far received no answers. It seems highly likely that this

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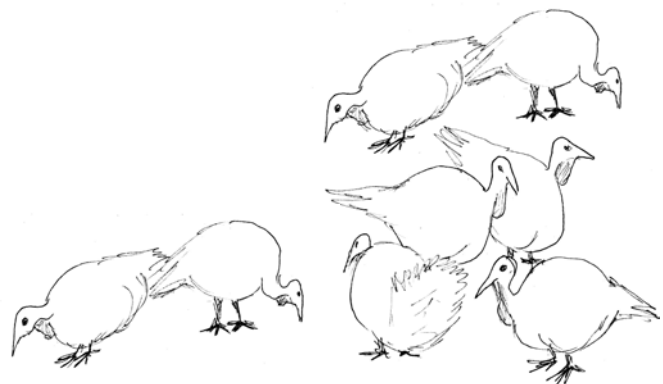


figure excludes income earmarked for training, and may be related to the potential price of the land on which the farms are located (rumoured to be \$2 million for the Kingston site alone). The Federal government is busy trying to sell off any assets it can think of, even if they have to be leased back by government departments, and certainly privatization of both the food service and the prisons themselves would be part of this scenario.

Selling the farm land does not mean that it will continue to be farmed – in fact, quite the opposite. The dairy and poultry operations are outside of the supply-management quota system (since they do not sell on the open market) and any farmer would have to get the necessary quota – a huge hurdle. (*see following article*) Given the development pressures for these lands, it is highly likely that these lands would be lost to food production, just at the moment when we need to increase our capacity to feed ourselves. – **C.K.**

*For more information and action, go to [www.nfuontario.ca/316/federal-decision-close-prison-farms-canada](http://www.nfuontario.ca/316/federal-decision-close-prison-farms-canada)*

## Ontario Organic Turkey

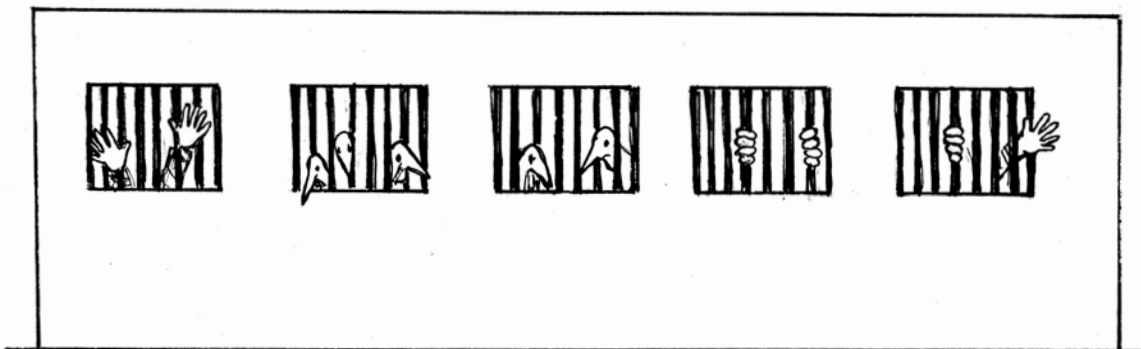
Turkey Farmers of Ontario is one of the ‘family’ of supply-management marketing boards operating under federal-provincial legislation in Canada. Producers of ‘broiler’ chickens, laying birds, turkeys, and dairy farmers are allocated quota: a permit to produce a certain number of birds or litres of milk or dozens of eggs, designed to ensure that the total amount produced meets the total market demand. There are penalties for under or over-producing. The organizations are also responsible for self-regulation.

When the marketing boards were initially set up, quota was distributed to the then-current operators; since then, quota itself has become a commodity which producers have to buy, either from retiring quota-holders or the marketing boards. The high cost of quota has made it a major capital investment.

Production of eggs, poultry and milk, including organic, outside of the marketing boards is strictly limited by law. As public demand for organically produced food has grown, there have been a number of confrontations between organic farmers and marketing boards (which have appropriated the territory by changing their names to ‘Dairy Farmers of Canada, Turkey Farmers of Ontario’, etc.).

Recently Turkey Farmers of Ontario (TFO) imposed a rule which requires that “all turkeys must at all times be housed under a solid roof.” The excuse is the theory that avian flu is spread by wild birds so poultry must be kept in confinement to avoid any contact. The newly-minted Canada Organic Standard, however, requires all poultry, including turkeys, to have regular access to outdoors to be certified organic. This means farmers holding turkey quota in Ontario cannot produce turkey that meets the Canadian Organic Standard. Interestingly, this rule only applies to turkey producers who hold quota, not to ‘backyard’ flocks of under 50 birds. The effect of this rule is that organic turkey farmers would be limited to small flocks – a great way to curtail competition for the industrial turkey farmers from free-range organic turkeys.

The Organic Council of Ontario has tried unsuccessfully to work within the regulatory framework to challenge the TFO rule, including direct appeals to the TFO Board, the Ontario Ministry of Agriculture and Rural Affairs Appeal Tribunal and the Farm Products Marketing Commission. OCO has pointed out that there is no reliable evidence linking outdoor husbandry to outbreaks of Highly Pathogenic Avian Influenza, in fact, all the outbreaks to date have occurred in confinement systems. Experts in the field of epidemiology say that the supposed link between wild birds and the spread of HPAI is “highly conjectural”. In an attempt at compromise, OCO has asked the Minister of Agriculture, Hon. Leona Dombrowsky, to intervene and instruct TFO to change the rule from total confinement to require that “all feed and water must be kept under a solid roof”, while the birds themselves can roam.



There are only 186 licensed quota holders for turkey production in Ontario, producing 63,000,000 kg. of turkey each year (45% of Canada's total production). On average, each of Ontario's turkey producers has over 30,000 birds. Almost all of this production is in total confinement. The National Poultry Board, of which Turkey Farmers of Ontario is a member, has a declared agenda that *all* poultry production be moved to total confinement.

## How Sweet It Is

How does Cargill win at every turn? A look into their 'sweetener' operations is revealing: (1) maximize control over sourcing and processing; (2) develop alternative products (even competitive with your own), with secure sources and unique market opportunities, either among food fabricators or even directly in retail.

(1) Back in November, 2005, Cargill announced that it was planning a joint venture with Louisiana Sugar Cane Products Inc. to build a \$100 million sugar refinery adjacent to its 200-acre Mississippi riverfront complex in Reserve, Louisiana. It would be the largest sugar refinery in the US with a capacity to refine 1 million tons of raw sugar cane a year, or about 75% of all of the raw sugar produced in the state and 10% of the nation's sugar.

Cargill actually broke ground for the new refinery in April 2008, and Cargill expects its Louisiana Sugar Refining, LLC to begin production in the first half of 2010. The new company is a joint venture between Cargill and Sugar Growers And Refiners, (SUGAR). SUGAR is a Louisiana marketing cooperative representing eight sugar cane mills and approximately 700 growers in the marketing of raw sugar and molasses, marketing about 800,000 tons of raw sugar annually. These arrangements virtually guarantee Cargill a captive supply of raw material to operate its mill at full capacity and maximum profit.

Sugar mills in Brazil are currently working at full capacity (31.2 million tonnes in the current April-November harvest) and cannot increase output (refined sugar and ethanol) any further to meet rising demand. Sugar production is declining in India, Thailand, Mexico and Pakistan, creating a global deficit. Nestlé is the biggest buyer of Brazil's coffee and sugar, and commodity prices are expected to rise this year as growers worldwide fail to invest in expansion and demand increases faster than output. *– Bloomberg, 2,6/6/09*

(2) While Cargill has been expanding its cane sugar capacity, as we reported in *The Ram's Horn #261* Cargill has also been engaged in development of a radically different sweetener, 'Truvia.'

Cargill describes Truvia as a "calorie-free sweetener – born from the leaves of the stevia plant, where perfect sweetness comes with zero calories attached." It comes in a little green and white packet just like other sweeteners, including Splenda. Cargill's promo for Truvia says, "Our sweetener is more than splendid, it's natural." "A single packet . . . provides the same sweetness as two teaspoons of sugar."

With thanks to our Cargill spy and supplier Sandy Berman in Minnesota, I tried a packet in my morning coffee. Not good! Sweet, yes, but a 'hard' flavourless sweet, particularly compared to organic sugar which has a pleasant 'round' flavour.

According to Cargill's press release, Truvia is made from rebiana, the best-tasting part of the stevia leaf:

"TRUVIA™ rebiana begins with a leaf. Leaves from the stevia plant, a shrub native to Paraguay and today commercially grown in China, are harvested and dried, then steeped in fresh water in a process similar to that of making tea. This process unlocks the best-tasting part of the leaf, which is then purified to make a food-grade sweet ingredient. The finished product is the pure sweetness of rebiana, which is 200 times sweeter than sugar. . .

"This new, natural sweetener leverages Cargill's expertise in specialty food ingredients, agronomy, food science and safety as well as consumer insight and marketing capabilities," said Steve Snyder, vice president, Cargill Health & Nutrition. "The company is positioned to manage the development of this new sweetener from the first plantings in the field to formulation for foods and beverages, all the way to the product that will sweeten your morning coffee."

"The stevia plant has been grown, harvested and used in South America to sweeten foods and beverages for more than 200 years. The plant was discovered by the Guarani natives of Paraguay who used its leaves to sweeten drinks. In 1931, two French food-researchers isolated the sweet components of the stevia leaf. . .

"Because rebiana begins with a leaf, supply is contingent upon the strength of the stevia crop. Over many years, Cargill has built a strong and consistent stevia supply chain in anticipation of launching TRUVIA™ natural sweetener, and has a dedicated staff on the ground and partner



companies in key regions around the world supervising production and ensuring good stewardship of land and water. Today, one stevia plant yields enough rebiana for 30 six-ounce cups of coffee."

-cargill.com/news-center/news-releases/2008

And then there is the ubiquitous High Fructose Corn Syrup (HFCS), which Cargill produces in vast quantities in a wide variety of formulations for its customers in the food and drink fabrication business.

Coca-Cola Zero, launched worldwide by the company as no-calorie soft drink, has been pulled from grocery store shelves across Venezuela amidst claims from authorities that the product contains an unapproved chemical. A company spokesperson claims that no ingredients used in its beverages were considered harmful to human health, though the drink maker says it is respecting the national ban by bringing a halt to production of the brand. The company has already faced backlashes across Latin America over possible use of an ingredient called cyclamate, although regional representatives for Coca-Cola claim that the sweetener is not present in the Zero brand. Cyclamates have not been used in the US since 1969.

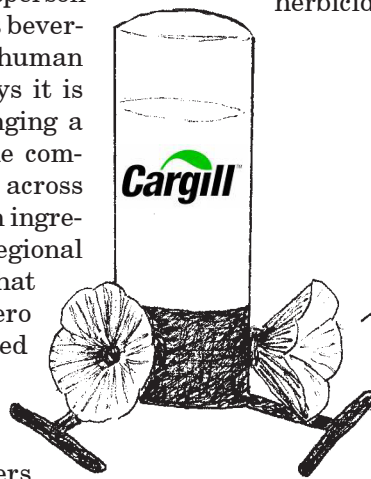
Fears have existed over a potential link between some sweeteners and cancer since the 1970s, but findings from animal studies linking saccharine to bladder cancer were not reproduced in similar human testing. Less is known about other sweeteners such as aspartame and cyclamate, though the sweetener market is undergoing a major shake up following an increased dynamism in the sweetener industry linked to a number of new options available after years of relative stability. [i.e. stevia/truvia] -Foodproductiondaily.com 15/6/09

U.S. maple syrup and maple sugar production plummeted in the late 19th century as urban life and imported cane sugar realigned the American sweet tooth. Today, the U.S. imports four times as much syrup as it produces while Canada produces 80 percent of world supply. Quebec, which has fewer tappable maple trees than New York, has about 35 percent of its trees in production and generates more than 70 percent of the world's supply. In the United States, Vermont leads with slightly more than 2 percent tapped. For New York, which has more sugar maples than any state or province in North America, the utilization rate is 0.5 percent. -Ithaca, NY, Journal, 28/3/09

## Roundup time

A flood of inexpensive Chinese-made herbicide and deep price cuts by its rivals are leading Monsanto to cut profit expectations for its Roundup weed killer. Monsanto has made billions of dollars selling Roundup and crops resistant to its effects since the herbicide was developed in the 1970s. It was first commercialized in the United Kingdom and Malaysia in 1974. Monsanto greatly expanded its market by genetically engineering crops (corn, canola, soy) to be resistant to its effects. But the last patents on Roundup herbicide expired nine years ago, opening the door for rivals like Dow and Syngenta to sell competing products and erode Monsanto's market share. Overall, Monsanto expects to sell about 200 million gallons of glyphosate-based herbicide in 2009 — 22% less than last year.

-St. Louis Post-Dispatch, 28/5/09



## Love the Language!

In mid-May, Monsanto issued a press release announcing "which of its current pipeline products will be the next wave of high impact technology (HIT) products focused on contributing to improving farmers' yields and driving the long-term growth in the company's seeds and traits platform".

"After creating the standard for HIT projects, Monsanto has raised the bar. Now an HIT project must have the potential to be planted on more than 45 million acres and deliver more than \$300 million gross revenue opportunities by 2020 in the country of initial launch. Seven HIT projects that are expected to launch by the middle to the end of the next decade, positioning the company to launch a HIT project every one to two years.

"By leveraging its successful innovation, Monsanto is well-positioned to optimize the key drivers of its gross profit through price, seed share and trait penetration. The company expects its U.S. seeds and traits gross profit to double by 2012 from a 2008 baseline, with growth of nearly 85 percent from international seeds and traits forecasted for the same time frame." -Monsanto, 13/5/09

"Monsanto's discovery engine - to which the company contributes \$2.6 million a day - combines cutting-edge breeding and biotechnology research using elite germplasm from around the world to deliver the best seed-based solutions for increased on-farm productivity." -Monsanto, 9/6/09

## A peoples' victory over Monsanto: South Africa

After a protracted court battle of seven years, a small South African environmental organisation won a major legal victory against Monsanto. In a judgment in South Africa's highest court, the Constitutional Court, this month, Judge Albie Sachs overturned a previous ruling by a High Court judge that Biowatch had to pay the costs of Monsanto and the government's department of agriculture.

This judgment followed after a number of court cases which started in 2002 when Biowatch launched court proceedings in the High Court demanding access to information about genetically modified (GM) crops produced by Monsanto. Biowatch is a non-profit organisation that campaigns for sustainable agricultural practices.

"Although Biowatch won the case, it was ordered that we pay all costs of both the department of agriculture and Monsanto. It would have destroyed us if we had to pay the costs," Rose Williams, Biowatch director, told IPS.

In his judgment Sachs said "public interest litigation could be jeopardised by the severe financial penalty that costs orders would impose on the organisations bringing these suits. The protection of environmental rights will not only depend on the diligence of public officials, but on the existence of a lively civil society willing to litigate in the public interest." Sachs also said that this case is "a matter of great interest to the legal profession, the general public, and bodies concerned with public interest litigation".

Monsanto said it would "naturally abide by the court decision."  
– IPS, 16/6/09

## Labour-intensive farming boosts development

An "Agribusiness Forum" in South Africa has concluded that development in Africa should be boosted through labour-intensive production on small to medium-sized farms. To advance food security in Africa, governments should assist small farmers with credit lines and infrastructure while buffering them against fluctuations in world food prices.

"Two-thirds of the world population are trapped in a cruel web of circumstances that limit their rights to the necessities of life. These include decent jobs, educa-

tion, healthcare, housing and, most importantly, food. The situation is exacerbated by the global financial slowdown," according to South Africa's minister of agriculture, fisheries and forestry Tina Joemat-Pettersson. "There is agreement that development should, as in Asia, take the form of labour-intensive production on small to medium farms. This will generate jobs needed to reduce mass poverty and provide the food and savings that are the basis for industrialisation."

The Forum was hosted by the European Marketing Research Centre, South Africa's department of agriculture, fisheries and forestry, the Agricultural Business Chamber of South Africa and the United Nations Food and Agricultural Organisation (FAO).

Agricultural output per person has fallen in Africa. From 2005 to 2007 it was 15 percent lower than 1960 to 1962 levels. African countries are also increasingly dependent on agricultural imports. In South Africa, agricultural imports were worth 34 billion dollars in 2008 – an increase of 41 percent when compared to 2006/2007.  
– IPS, 18/6/09

## Outside the Box

In his weekly televised address, Venezuelan president Hugo Chavez has questioned the validity of patented products such as Tetra Pak. He announced that his government may copy packing technology developed by Tetra Pak in a bid to cut back on imports and reliance on foreign companies, according to a report by Bloomberg. "We have aluminum and paper, why can't we make that material here?", said Chavez. "What are patents? That's universal knowledge. We don't have to be subject to capitalist laws."

Jesse Chacon, Science and Technology Minister, said the country had spent \$63 million dollars on importing packaging material manufactured by Tetra Pak in May.

Tetra Pak is not the first company to be targeted by Chavez. In March, he ordered the seizure of 1,500 acres of land owned by Irish firm Smurfit Kappa Cartons, which makes cardboard boxes and paper packaging products. The government said it would use the land for "more rational" crops such as yucca and beans but would pay compensation to the company. Smurfit Kappa's chief executive confirmed last month the company was involved in technical evaluation of land with the Chavez administration to determine if it was suitable for growing food crops. He added that a land-swap deal was also being considered and there was no sense the company was being targeted. □

## On the menu: Brazilian Amazon forest beef or Canadian grain-fed (feed-lot) beef

Friends of the Earth–Brazilian Amazonia has announced that after three years of monitoring and lobbying efforts, it has succeeded in getting the International Finance Corporation (IFC), the private sector arm of the World Bank, to reverse its decision to finance expansion in the Amazon region of the Brazilian meat-processing giant Bertin, S.A. through a multi-million dollar loan contract signed in March 2007. According to the NGO, the Bank decided to cancel its contract with Bertin, the largest beef exporter in Brazil and second largest in the world and requested immediate payment of the loan balance, equivalent to US\$ 30 million.

Bertin has been purchasing beef from illegal producers, and also expanded its acquisitions in the Amazon region, including beef produced by ranchers that invaded and deforested indigenous lands and other legally-protected forests. Major supermarket chains in Brazil have suspended purchases of beef products supplied by Bertin and other meat-processors in the Amazon region.

The campaign against Amazon rain-forest beef was given a great boost by the detailed satellite photos produced by Greenpeace pinpointing the destructive practices.

Satellite photos are not necessary to identify the feedlots that supply Cargill and XL Foods with their raw material, about 8000,000 tonnes of which (feedlot beef, that is) Canadians consume per year (roughly 70 lbs. per person). Another 200,000 tonnes is imported for Canadian consumption, but Canada has nevertheless become the world's largest exporter of grain-fed (feedlot) beef.

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## Uncivilized Behaviour from Dow

In our last issue we reported on how Dow Chemical is suing the Government of Canada, under NAFTA, for lost business as a result of Quebec's ban on lawn pesticides, including 2,4-D. Here we bring you a report on Dow's uncivilized behaviour in Brazil.

In May Dow AgroSciences, a subsidiary of the US company Dow Chemical, issued a request to the National Technical

Commission for Biosafety (CTNBio) to undertake field trials with a GM soya variety tolerant to 2,4-D herbicide. Affiliated to Brazil's Ministry of Science and Technology, CTNBio is responsible for analyzing and authorizing the release of GM organisms in Brazil. Since its creation in 1996, its actions have consistently shown an intransigent defence of transgenic crops and a highly questionable level of technical rigour.

Glyphosate-tolerant soya has been widely planted in Brazil for years and, inevitably, has already led to the development of resistance in some wild plants, which are no longer controlled by the herbicide

2,4-D, manufactured by Dow, is an auxinic herbicide considered much more toxic than glyphosate (itself toxic). Just to give an idea, glyphosate is classified by Anvisa (Brazil's National Health Surveillance Agency) as "Toxicological Class IV; Mildly Toxic." On the other hand, 2,4-D herbicide is "Class I; Extremely Toxic."

2,4-D was also one of the two components of the infamous "agent orange," the defoliant used in the Vietnam War responsible for thousands of cases of cancer, leukaemia and neurological pathologies, as well as the birth of countless babies with physical and mental problems. Indeed, the launch of a variety of soya tolerant to such a harmful herbicide is so shocking that neither the company nor CTNBio had the courage to publicize the fact openly.

The Brazilian press reported that Dow would enter the Brazilian GM soya seed market with 'a new herbicide-tolerant variety tolerant', without specifying which herbicide was involved. A company director merely reported that the new variety would be tolerant to "auxins."



CTNBio also omitted the information, referring generically to “genetically modified herbicide-tolerant soya.”

Dow’s requests for field trials include a maize tolerant to the 2,4-D and haloxyfop-R herbicides. The latter has not been given registration for use in the USA on the basis that it causes cancer and congenital defects in laboratory animals. The EPA (Environmental Protection Agency) classified it as a “probable human carcinogen.” Transgenic soya tolerant to haloxyfop-R would have high levels of residues of a herbicide that has not been authorized for use even in its country of origin.

The fact that Dow is preparing to launch crops tolerant to 2,4-D and haloxyfop-R only confirms the reports that glyphosate is no longer controlling weeds effectively.

CTNBio’s scientists know as well as ourselves the devastating effects that this kind of production could provoke on a large scale. Even so, they are almost certain to favour the company by opening up a gigantic market for the herbicide, once again claiming that “the protein produced by the new GMO is safe and that “it is not up to them to evaluate the toxicity of the herbicide.” If the Commission approves the field trials, there is a very good chance it will later approve commercial use of the GM crop. After all, as the argument goes within CTNBio, “makes no sense for the company to conduct trials knowing that its produce won’t be marketed in the future.”

Brazil’s National Congress has also done its part in defending Dow’s commercial interests. Last month, the Environment Commission of the Chamber of Deputies rejected three law bills designed to ban the use of agrochemicals containing 2,4-D. The proposal had also been rejected earlier by the Chamber’s Agriculture Commission.

We have no news of transgenic soya varieties tolerant to 2,4-D being approved in any other country. The companies apparently want to use Brazil as a point of entry for this disastrous technology. It is worth remembering that Brazil is the world’s second largest exporter of soya (last year 24.5 million tons were shipped). The European Union imports around 36 million tons of soybean and soymeal each year, more than half of which comes from Brazil. Most of this soya is used to feed animals, which, if this aberration is approved, will consume extremely contaminated feed.

It is important to note too the complete lack of control in segregating Brazilian crops. The country’s mainstream media has highlighted the problem caused by widespread contamination of soya crops by GM varieties, which is making conventional and organic production impossible in

various regions. According to all the large cooperatives and cereal producers, Brazil’s first harvest of transgenic maize, which is beginning to be harvested now, will not be separated from the conventional crop. The producers complain that no infrastructure exists for segregating the crops in the country (no regulations for segregating maize have been issued) and that the government says that it will only actively intervene and inspect harvested produce if and when complaints are made. Absence of control reigns supreme in the field. A government representative went as far as to declare to one of the biggest Brazilian newspapers that “control is an unnecessary luxury.”

– GM-Free Brazil Campaign – June 2009  
<livredetransgenicos@aspta.org.br>

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## GMO Corn & Soy: Negligible Yield Increases

While a great deal of damage has already been done by the unseemly and officially-approved development and growing of transgenic crops, we are now benefitting from independent studies of the consequences – the kinds of studies that should have been done and required by the so-called regulators – before any of the crops were released for commercial production.

One such study was recently released by the Union of Concerned Scientists: ***Failure to Yield – Evaluating the Performance of Genetically Engineered Crops***, by Doug Gurian-Sherman

### THE FINDINGS:

#### 1. Genetic engineering has not increased intrinsic yield.

No currently available transgenic varieties enhance the intrinsic yield of any crops. The intrinsic yields of corn and soybeans did rise during the twentieth century, but not as a result of GE traits. Rather, they were due to successes in traditional breeding.

#### 2. Genetic engineering has delivered only minimal gains in operational yield.

##### *Herbicide-Tolerant Soybeans and Corn.*

Although not extensive enough to develop precise yield estimates, the best data (which were not included in previous widely cited reviews on yield) show that transgenic herbicide-tolerant soybeans and corn have not increased operational yields, whether on a per-acre or national basis, compared to conventional methods that rely on other available herbicides. The fact that the herbicide-tolerant



soybeans have been so widely adopted suggests that factors such as lower energy costs and convenience of GE soybeans also influence farmer choices.

*Bt Corn to Control Insect Pests.*

Bt corn contains one or more transgenes primarily intended to control either the European corn borer (this corn was first commercialized in 1996) or corn rootworm species (commercialized in 2004).

Based on available data, it is likely that Bt corn provides an operational yield advantage of 7–12 percent compared to typical conventional practices, including insecticide use, when European corn borer infestations are high. Bt corn offers little or no advantage when infestations of European corn borer are low to moderate, even when compared to conventional corn not treated with insecticides.

Evaluating operational yield on a crop-wide basis, at either a national or global scale, is needed to determine overall food availability. Given that about a third of the corn crop in the United States is devoted to European corn borer Bt varieties, using the yield data summarized above we estimate that the range of yield gain averaged across the entire corn crop is about 0.8–4.0 percent, with a 2.3 percent gain as a reasonable intermediate value.

Similar calculations can be made for Bt rootworm corn. One of the few estimates from the literature suggests that Bt rootworm corn provides about a 1.5–4.5 percent increase in operational yield compared to conventional corn treated with insecticides. Extensive field experiments in Iowa, mostly with heavy rootworm infestations, show a range of values not inconsistent with these estimates. Given that Bt rootworm corn is probably planted on up to a third of corn acres, the aggregate operational yield advantage for these varieties averaged over all corn acres is roughly 0.5–1.5 percent.

Combining the values for Bt European corn borer corn and Bt rootworm corn gives an estimated operational yield increase from the Bt traits of 1.3–5.5 percent. An increase of about 3.3 percent, or a range of 3–4 percent, is a reasonable intermediate. Averaged over the 13 years since Bt corn was first commercialized in 1996, this equates roughly to a 0.2–0.3 percent yield increase per year.

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*The full 51-page report is available at [www.ucsususa.org](http://www.ucsususa.org) or may be obtained from: UCS Publications, Two Brattle Square, Cambridge, MA 02238-9105 USA*

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