AGRIFOOD ATLAS

Facts and figures about the corporations that control what we eat 2017

HEINRICH BÖLL STIFTUNG

ROSA LUXEMBURG STIFTUNG

Friends of the Earth Europe

IMPRINT

The **AGRIFOOD ATLAS** is jointly published by
Heinrich Böll Foundation, Berlin, Germany
Rosa Luxemburg Foundation, Berlin, Germany
Friends of the Earth Europe, Brussels, Belgium

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This publication is written in international English.
First English edition, October 2017

Produced by HDMH sprl, Brussels, Belgium

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2017

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INTRODUCTION

The contrast could hardly be greater. The list of the world's largest 500 companies by turnover contains a huge number of firms engaged in agriculture and food: firms that have carved up big chunks of the sector among themselves. At the same time, the sector is the basis of the livelihoods for many millions of farmers and farm workers who are among the poorest people in the world.

The trend continues towards a further concentration of power. In the developing world, the growth of the middle class is changing tastes and diets. Demand for processed foods is sure to rise. The declared aim of agriculture, chemicals and food corporations is to grab as big a slice of the cake as possible, but they have now been joined by banks, insurance companies and the information technology industry.

Takeovers and mergers like Monsanto by Bayer, Kraft with Heinz and Dow with DuPont are just the tip of the iceberg. A spate of corporate marriages is concentrating control at each link in the value chain, from field to fork. The biggest players are growing the fastest and are pushing through their own interests and approaches.

When does big become too big? That is not an easy question to answer. Attention to ecological and social values such as human rights, labour rights, as well as climate and environmental protection does not necessarily depend on the size of a company. But in many parts of the agrifood sector, individual corporations have gained so much market sway that they have the ability to shape markets and policies. Conflicts usually involve unequal power relations: between agricultural, food and trade corporations on the one hand, and farmers and farm workers on the other. The gap between their shares of revenues yawns ever wider. Across the globe, inequality is increasing.

> **The fight for market share is achieved at the expense of the weakest links in the chain: farmers, and workers.**

Agrifood corporations are driving industrialization along the entire global value chain, from farm to plate. Their purchasing and sales policies promote a form of agriculture that revolves around productivity. The fight for market share is achieved at the expense of the weakest links in the chain: farmers, and workers. The price pressure exerted by supermarkets and food firms is a major cause of poor working conditions and poverty further back in the chain. It also promotes the onward march of industrial agriculture and its associated effects on the environment and climate. The loss of soil fertility and biodiversity, marine pollution and the emission of greenhouse gases: all these are partly due to the spread of industrial farming.

Despite all this, a reorientation is still not in sight – except in a few promising cases. On the contrary, attempts to make binding rules on human rights, working conditions and the environment are routinely torpedoed. A major reason lies in the power relations described in this atlas. To push for the necessary political changes, we first need to understand the business models and growth strategies of the corporations.

Citizens must be able to influence food politics. But around the world, we see democratic freedoms being restricted. In many of the countries in which our organizations are active, civil society is increasingly being discouraged, censored and intimidated. Two trends coincide in the agrifood sector: ever-fewer corporations are taking control of an ever-bigger market share and are gaining influence in many parts of the world. At the same time, the opportunities for civil society and social movements to oppose such developments are being restricted.

The megafusions that have been announced in the seed and agrochemicals sector – between Bayer and Monsanto, Dow and DuPont and Syngenta and ChemChina – must serve as a wake-up call. Politicians and competition authorities must come to grips with mergers that have social and environmental effects in fields that are already concentrated in a few hands. They must push ahead with competition law reforms to prevent further concentration in the value chain. But the current debate over new permits for glyphosate has shown that political institutions and the interests of the industry are closely interwoven.

> **A growing number of people are changing their buying habits to recreate diversity in the value chain.**

A growing number of people are organizing themselves and are changing their buying habits to recreate diversity in the value chain. But that is not enough to end hunger and poverty or to protect the environment. The withdrawal of government from economic intervention is a major cause of the colossal environmental and climate damage and the global injustice that we see today. It is high time for a socially and politically oriented regulation of the agrifood industry. We hope that this atlas will stimulate a broad-based social debate on this vital topic.

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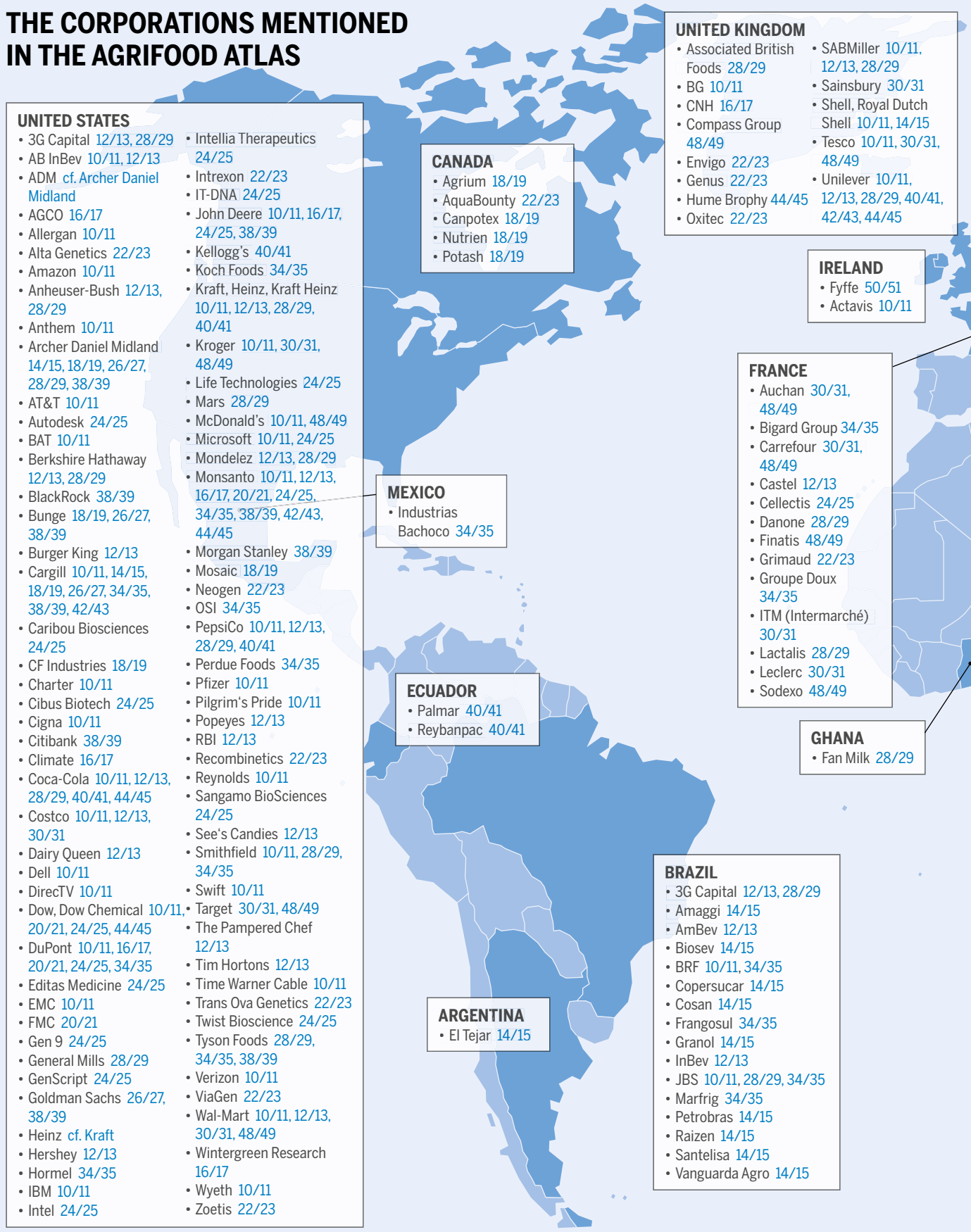

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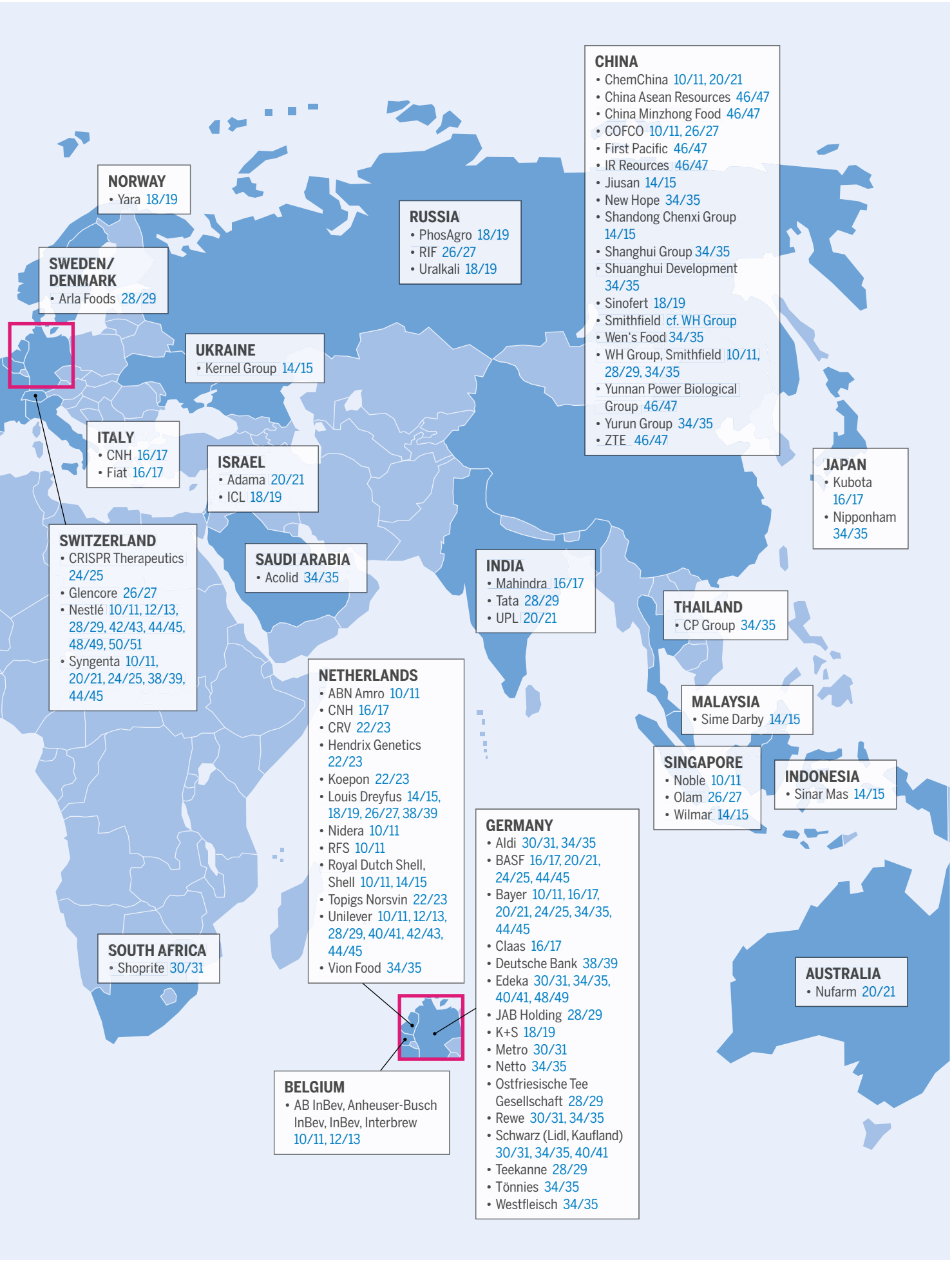
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SUPERSIZE ME

Whether protectionism or deregulation – the agrifood industry keeps growing. Mergers are making firms bigger all the way along the value chain.

The global agrifood system can trace its origins back to the last quarter of the 19th century in Britain, which was then the world's dominant commercial power. The first large agricultural corporations with a global reach emerged for a range of reasons, both technological and institutional. Farm work was mechanized; agrochemicals were invented and marketed; trains, ships and ports revolutionized transport; and new technologies improved the preservation and storage of food. Free trade removed tariff barriers, and futures markets overcame capital shortages by selling crops even before the seed had been put in the ground.

From the point of view of farm production, these corporations could be roughly divided into upstream and downstream firms. Upstream firms supplied farm machinery and chemicals to large estates in Europe and big commercial family farms in the Americas. Downstream firms focused either on trading and primary processing, or on the development of new food preservation and transformation technologies to produce food and drink for urban consumption. In the 1930s, the development of hybridization made crossing crop varieties or breeding lines possible. This led to the emergence of companies that produced seeds and animal breeding stock. Each of these industries had its own technologies or marketing characteristics that created barriers to entry for new firms. Food retailing remained local and family-based until the 1950s in the USA and the 1960s in Europe, when self-service supermarket chains emerged.

With the rise in protectionism and the decline of trade in the first half of the 20th century, big firms in the USA and Europe turned themselves into transnational corporations by investing in other countries, rather than just exporting their products there. Oligopolies, in which a few actors determine what happens, emerged at various stages along the value chain.

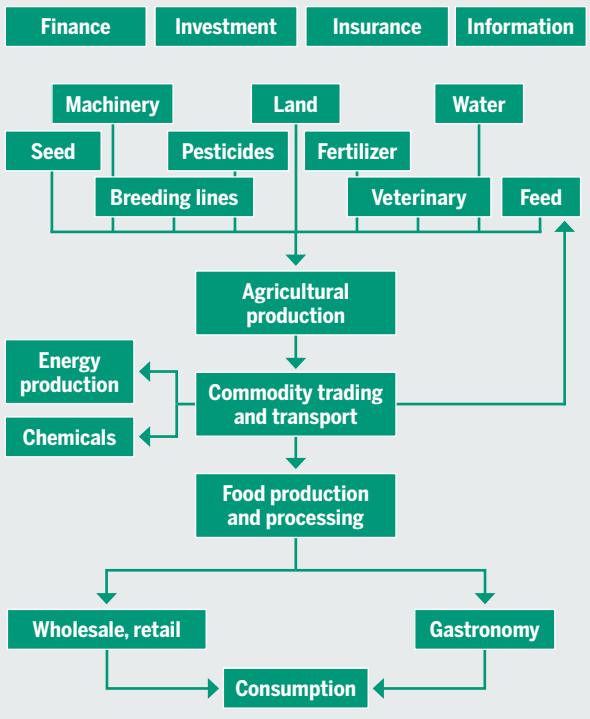
This process accelerated with the US-led reconstruction programmes in Europe after the Second World War, and was reinforced by the emergence of new types of products: fast food, snacks and drinks. The upstream machinery and agrochemicals firms, along with the newly created seed industry, paved the way for the industrialization of agriculture in Europe. Food aid and the Green Revolution, with its reliance on seed, fertilizers, pesticides and machinery, enabled these firms to spread in Asia and Latin America.

Post-war economic growth and rising incomes led to a shift in diets. Food options expanded. According to Engel's law, as income rises the proportion of income spent on food falls. Companies responded to this potential loss of turnover by launching new, more expensive, products and by intensifying their marketing. The family grocer gave way to supermarkets, and giant retailers exerted their influence both backwards along the agrifood chain to processors and farmers, and forwards with consumers. Health and fitness concerns created demand for fresh products such as vegetables, fruit and fish, which came to be organized under the direct control of the retailers.

In the 1980s, the transnational crop companies increasingly became global players with interests around the world. In developing countries, liberalization dismantled state controls over commodity markets and tariff barriers, leading to a rapid expansion of global trade in foodstuffs. Big retailers began organizing new supply chains to source fresh produce from developing countries. They also expanded in the larger countries in the developing world to serve the needs of the new middle classes there.

A handful of global corporations now organizes the world's agriculture and food-consumption patterns. They are remarkably long-lived: many of today's leaders were

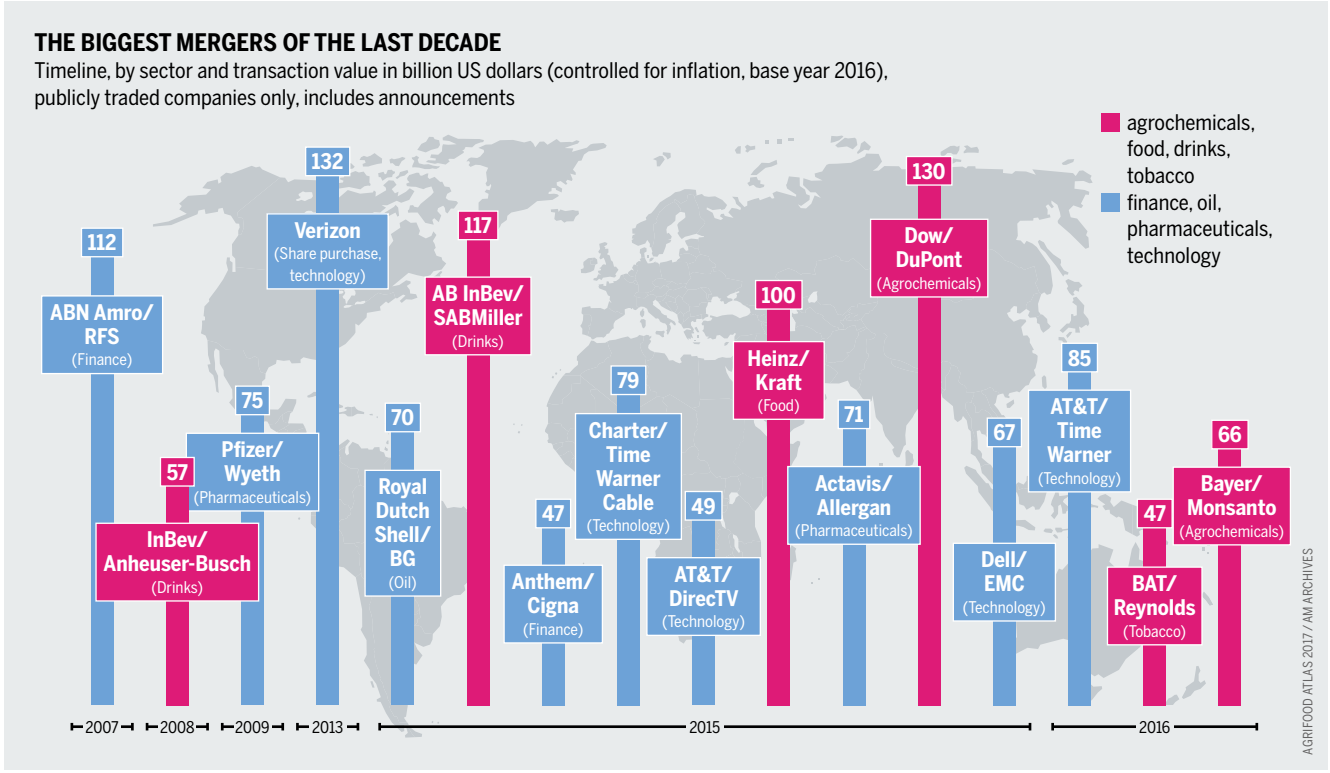
WHERE CORPORATIONS WORK
Major areas of activity in the agrifood industry, schematic diagram



Information: weather, markets, farm management

AGRIFOOD ATLAS 2017

It's a long way from field to plate. Farmers are the most vulnerable link in the chain



Mergers in the agrifood industry are just as big as in other sectors of the economy

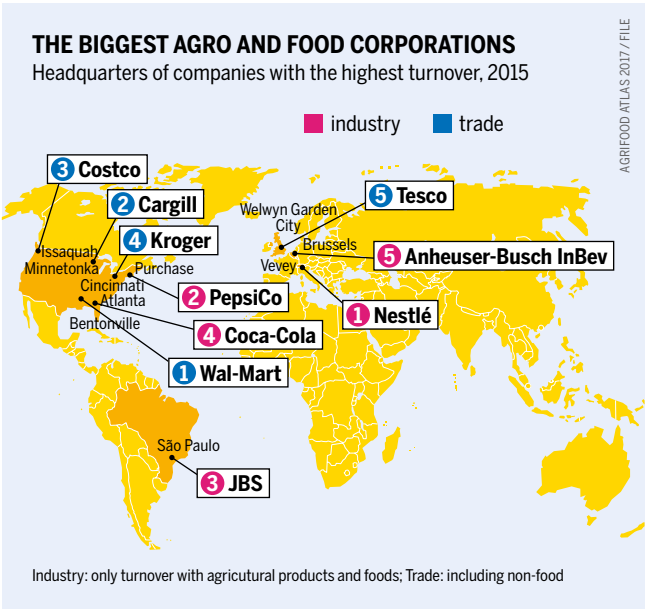
founders of the modern agrifood system, such as Cargill (grain trader), John Deere (farm machinery), Unilever (processed food, and plantation production in the past), Nestlé (dairy and chocolate), McDonald's (fast food), Coca-Cola (fizzy drinks). Two developments – the shift towards finance capital and the impact of biotechnologies – have led to a wave of mergers and acquisitions since the 1980s, changing the face of the sector.

In the last 20 years, much of the action has shifted to the developing world and to Asia, especially China, which has become the leading market for commodities. New global players are emerging. Two Brazilian firms are now world leaders in the meat sector. BRF (formely Brasil Foods) has expanded in Argentina, the Middle East and Thailand. JBS has snapped up Swift, Pilgrim's Pride and part of Smithfield Foods, three of the largest US meat producers. Chinese state-owned companies are also getting in on the act. ChemChina is acquiring Syngenta, a Swiss agrochemicals and seeds business. COFCO, the China National Cereals, Oils and Foodstuffs Corporation, has bought two commodity traders: Singapore-based Noble and the Dutch firm Nidera. Meanwhile, global trade is once again leaning towards protectionism.

At the same time, the digital revolution and biotechnology are redefining the sector and result in the emergence of new external players. Big data and intelligent vehicles are making farm production and food retailing attractive for the likes of IBM, Microsoft and Amazon.

Despite their all-embracing power, the food majors have so far paid little attention to the impact of their actions on the wider world. They must begin to address issues such as hunger, climate change, waste, sustainability, health and disease, as well as social justice. These concerns have been highlighted by social movements, international conventions and civil society organizations. These organizations and institutions are now exerting more pressure than ever on the global corporations, demanding changes in the production approaches, marketing methods and purchasing practices, which the latter have used over the last 150 years. ●

Only one of the top five agrifood trade and industrial firms comes from the developing world: a meat producer from Brazil



MERGERS

ONE GROUP TO RULE THEM ALL

A single private equity firm, 3G Capital from Brazil, controls some of the world's biggest food and beverage corporations. The company's aggressive takeover strategy is just the tip of the iceberg.

Large-scale takeovers in the food and beverage industry are nothing new. Mirroring trends in other sectors, in the late 1980s and the 1990s corporations such as Nestlé and Kraft diversified their control over brands by making acquisitions in various markets. Since the end of the 1990s, financial investors began exerting a strong influence on mergers and acquisitions in the food and beverage sector. Firms were urged to focus on their core brands and industries, and to make vertical and horizontal acquisitions within the same subsector.

Profit maximization, rather than expansion, became the key objective. Instead of accumulating capital to expand a firm's operations, financial investors demanded that it channel its cash flow into dividend payouts and share buybacks, giving financial investors (and not the firm itself) the flexibility to diversify their investments. Both institutional investors and leading market analysts now wanted acquisitions to be "leveraged" – to be based on debt. Since the early 2000s, all major acquisitions in the food and beverage sector have been justified using the pretext of increasing short-term shareholder value.

One of the most prominent private equity firms that has fundamentally restructured a number of corporations is 3G Capital. Founded in 2004 by Jorge Paulo Lemann and partners, 3G is headquartered in New York and has offices in Rio de Janeiro and São Paulo. Before founding 3G, Lemann and his partners laid the foundation of their wealth through investments and acquisitions that resulted in the formation of the Brazilian beer giant, Ambev.

In 2010, 3G acquired Burger King, along with its outstanding debt, for US$4 billion. Around one-third of Burger King was owned by another private equity consortium and around two-thirds were floated to the public. Part of the new business model was a "refranchising initiative": before 2010, out of more than 13,000 restaurants, 1,344 were still company-owned. By 2013, only 52 were.

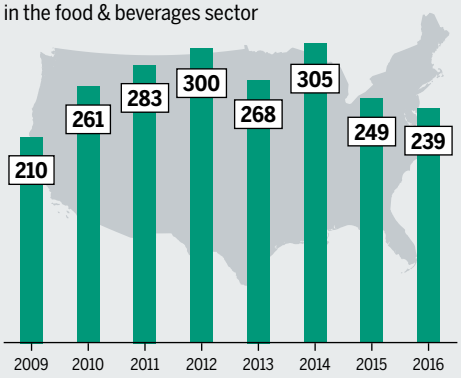
In 2013, 3G Capital joined forces with Warren Buffett's Berkshire Hathaway and bought the food giant Heinz. Two years later, in 2015, Heinz acquired Kraft Foods Group for US$62 billion to form Kraft Heinz, the world's fifth-largest food and beverage company, with revenues of US$6.6 billion in 2016. The motives for this merger are symptomatic for the whole wave of mergers in recent years: while Heinz had a strong global foothold with 61 percent of its sales outside North America, Kraft Foods generated 98 percent of its sales in North America. At the time of the merger, Kraft had a very good credit rating, which made it easy for 3G and Berkshire to refinance its debt. The management announced cost savings arising from synergies and rationalisation of logistic structures, which amounted to US$1.5 billion per year for the first three years. This rationalization resulted in the loss of around 5,000 jobs. In the USA and Canada, one-fifth of 41 processing plants were closed.

Two years later, in February 2017, 3G attempted, through Kraft Heinz, a takeover of its much larger rival Unilever for US$143 billion. The offer was rejected. In 2016, Mondelez, a snack-and-confectionery maker spun off from Kraft in 2012, failed to take over Hershey, a US chocolate maker. These failures have increased the likelihood of Mondelez being reabsorbed into Kraft Heinz.

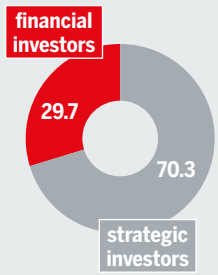
Snack producers – high-growth companies in 2016 – became expensive buys while slow-growth retailers were cheaper

INVESTORS' ACTIVITIES, CLOSELY EXAMINED

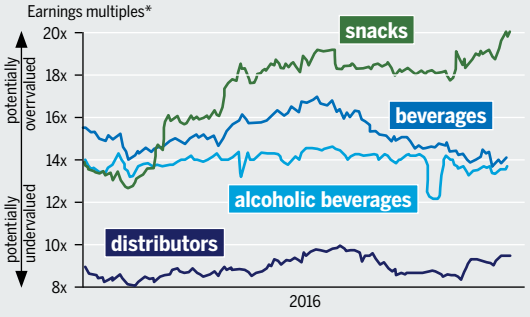
Mergers and acquisitions activity in the United States, number of transactions in the food & beverages sector



Deals by financial and strategic buyers, 2016, in percent

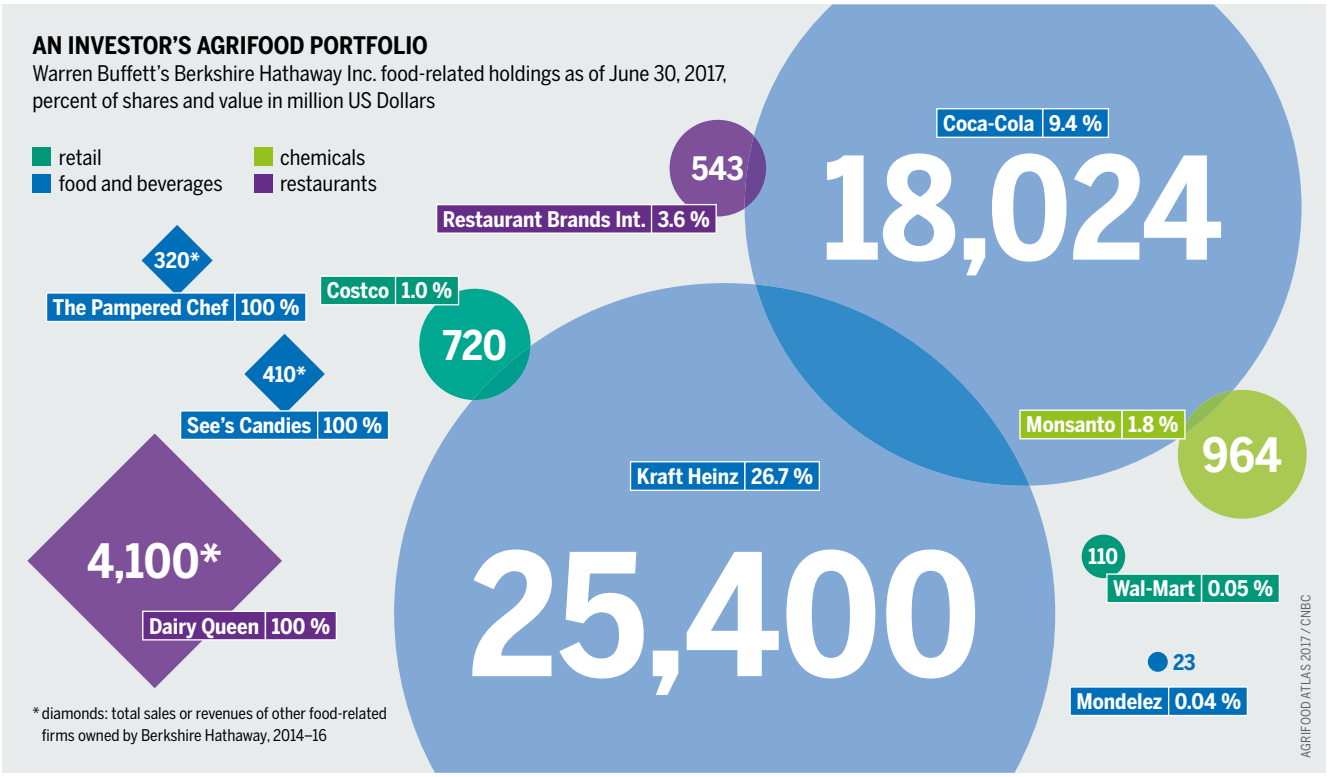


Public food and beverages companies by earnings multiples, selected product groups



*Earnings (before interest, tax, depreciation and amortization) multiples define the assumed value of a company by financial investors in relation to annual income

AGRIFOOD ATLAS 2017 / IMAP



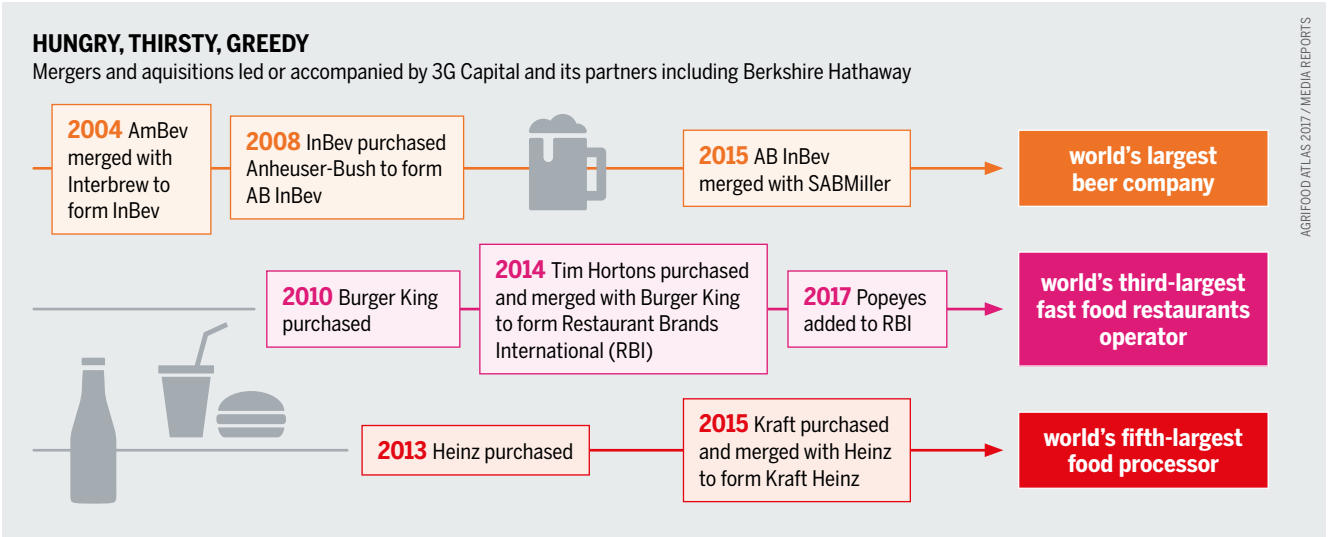
Warren Buffett is the world's largest private investor and a key player in acquiring and merging companies

3G has followed a similarly aggressive strategy in the beverage sector. Through successive mergers in 2004 and 2008, Ambev together with Interbrew from Belgium and Anheuser-Busch from the USA formed AB Inbev, the largest brewing company in the world. In 2015, AB InBev took over SABMiller. The resulting company has 25 percent of global beer sales and 45 percent of the sector's profit.

Again, a key motivation has been to drastically cut operating costs by creating a global giant. AB Inbev plans to cut 5,500 jobs in this process. Together, AB Inbev and SABMiller control seven of the ten most important beer brands globally, including Budweiser, Corona, Stella Artois, Becks and Jupiler. The SABMiller takeover is the likely end of AB InBev's merger activity in beer because of the risk of being blocked by antitrust regulators. Options may include diversifying into other alcoholic beverages (e.g. wine through Castel in France) or into soft drinks (e.g., PepsiCo or Coca-Cola).

After failing to acquire Unilever, the world's largest consumer goods company, in 2017, 3G is said to be looking for other targets

However, 3G's aggressive takeover strategy is just the tip of the iceberg. Almost all large food companies have launched their own venture capital arms in recent years, investing in smaller, upcoming brands. Aggressive takeovers, pushed by venture capital, have become the status quo. ●



MODERN-DAY LANDOWNERS

New corporations have emerged that buy or lease vast areas of farmland in developing countries. They grow monocultures to feed the industrialized agriculture.

From the start of the colonial era in the 16th century, globalization was driven by European powers in their search for cheap labour and slaves. Trading companies established plantations to produce food and industrial raw materials for the rapidly growing cities of Europe. This changed in the second half of the 20th century. As Asian and African countries gained their independence in the 1950s and 1960s, Western corporations reduced their activities there. Many pulled out of direct primary production in the 1980s, but maintained control of the sector through contract farming, as in the case of banana cultivation in Central America or tea growing in India. They focused instead on more profitable downstream activities. The traditional approach of producing on plantations seemed less lucrative.

Since the end of the 20th century, there has been a dramatic increase in the area used to cultivate oil palm, maize, sugarcane and soybeans. These four crops are used not only as food, but also as animal feed, biofuel and industrial feedstock, earning them the moniker "flex crops".

The production of oil palm is closely linked to rapid development in Southeast Asia. Agricultural concerns from Malaysia, Singapore and Indonesia dominate the market. They both supply raw materials to Western industries and cater to the enormous demand in their home countries.

The Malaysian state-owned company Sime Darby was created through the nationalization of British colonial companies. It first expanded to Indonesia and Papua New Guinea and is now also active in Liberia and Cameroon. Sime Darby controls nearly a million hectares around the world. The Singaporean firm Wilmar is the world's leading producer of cooking oil. Robert Kuok, billionaire and majority shareholder, is often called the "King of Cooking Oil". His company cultivates over 200,000 hectares worldwide, mostly in Malaysia and Indonesia, and controls parts of the processing industry. Another major player is the Widjaja family. It controls the Indonesian company Sinar Mas, which owns over 100,000 hectares.

The sugarcane sector is structured in a similar way. In Brazil, seven joint ventures between Brazilian capital and Western commodity corporations control 50 percent of the sugar mills. The Brazilian side belongs mostly to associations of family enterprises whose wealth is based on the ownership of vast tracts of land.

The Copersucar corporation, which in 2014 created a joint venture with the US agricultural giant Cargill, owns 47 sugar mills and controls another 50 through contracts. Raízen is another joint venture formed by the Cosan corporation with the mineral-oil company Shell; Biosev is a partnership between Santelisa with Louis Dreyfus Company, one of Cargill's competitors. Sugarcane plantations are expanding worldwide, but nowhere as fast as in Brazil. The cultivated area doubled between 2005 and 2013 from five to ten million hectares.

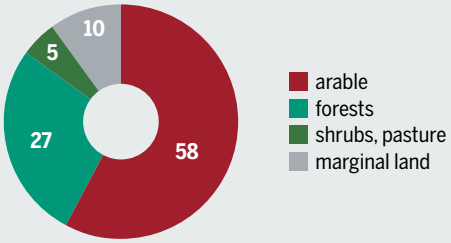
In contrast to oil palm and sugarcane, large soybean producers focus mainly on production, not processing. The Argentinean grain-and-meat producer El Tejar controls 700,000 hectares in Brazil, Argentina, Paraguay, Bolivia and Uruguay through leases and contract farming. Amaggi owns 200,000 hectares of land on which soy is grown. Blairo Maggi, the head of the company, is the former governor of the Brazilian state of Mato Grosso and the current Minister of Agriculture of Brazil.

Shifting land use to livestock and industrial crops increases the risk of regional and national food insecurity

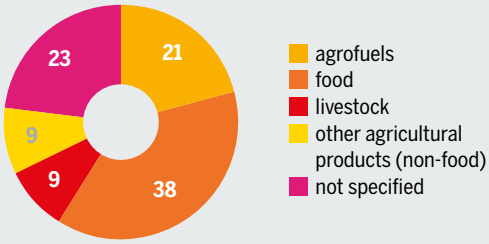
BEFORE AND AFTER

Land use changes as a result of international investment
1,004 deals made between 2000 and 2016 in the Land Matrix Register,
Figures in percent

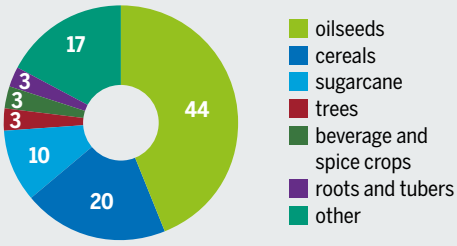
Land use before acquisition



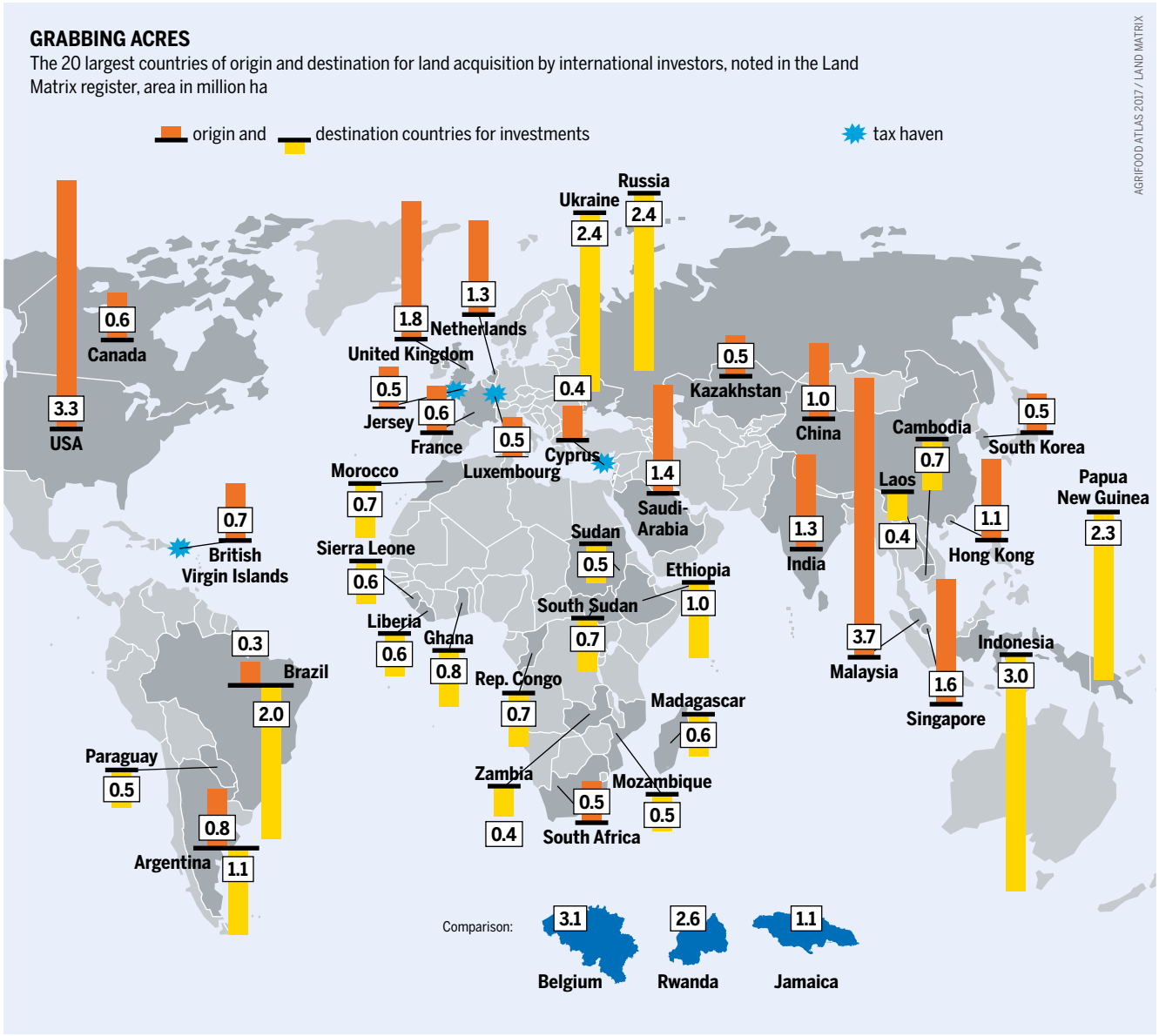
Production target at acquisition



Land use after acquisition



AGRIFOOD ATLAS 2017 / LAND MATRIX



Land acquisitions to produce for the world market are booming in Eastern Europe, South America, Southeast Asia and Africa

Various corporations compete to control the production of feed and biodiesel from oilseeds. These include Brazilian corporations such as the state-owned Petrobras and privately held Vanguarda Agro and Granol, Western commodity traders such as Archer Daniels Midland and Cargill, as well as importers such as the state-controlled Jiusan and the private Shandong Chenxi Group from China, the leading importing country.

The main maize-growing areas present a mixed picture. In the Midwest of the United States, ethanol production from maize has increased steadily over the last 20 years. Today maize is grown on 40 million hectares in the USA, mainly by family farms that use modern technology to cultivate large areas.

But US producers are increasingly facing competition from Eastern Europe, mainly from Ukraine, Russia and Kazakhstan. Ukraine is the third-largest wheat producer worldwide. The Kiev-based Kernel Group is a large and fast growing producer and exporter of grain and sunflower oil from Ukraine and Russia. In 2017, it became Ukraine's largest land user with a land bank of 700.000 hectares, a quarter of the country's 2.8 million hectares of agricultural land.

These firms contribute to the economic growth of emerging countries. They control vast areas of farmland; many have been criticized for grabbing land. They benefit from cheap labour and new technology. Many holdings are in family ownership, while others are listed on the stock exchange, and a few are state owned. By and large they act discreetly and opaquely. The workforce of sugarcane and oil palm plantations face colonial-style working conditions: they are paid piece-wages, and safety standards are low.

States play a central role in promoting the flex crop industry. Politicians decide to sell or lease state-owned land and whether to finance transport infrastructure. Production and processing plants are often subsidized. Quotas for bio-fuels push up demand, sales and earnings of these crops.

Plantation corporations are modern, financially strong actors that are transforming agriculture into agro-industry. We can no longer see them as mere relicts of colonialism. ●

DIGITAL MANOEUVRES – WHEN TRACTORS GO ONLINE

Precision farming promises to revolutionize farm management. But it will only benefit large landholdings and capital-intensive agro enterprises.

The market for agricultural machinery and technology is huge. With a worldwide turnover of $US 137 billion, 2013 was the best year ever for the sector. Since then, the sales of tractors, balers, milking machines, feeding equipment and other technical gear have been falling. In 2015 the turnover dropped to $US 112 billion. A further decline is expected in 2016. An immediate recovery is uncertain.

There are several reasons for the recession. Low prices for agricultural products around the world depress investment. The European and North American markets are saturated. The number of farms is decreasing, especially in animal production. The area used for farming is shrinking and fewer subsidies are being paid out.

China and India remain the most attractive markets. Chinese agriculture is regulated by the government. State policies have boosted the percentage of work done by machines in the past 15 years from 34 percent in 2005 to 61 percent in 2014. India's market is not yet as advanced. The industry hopes that the government will modify its agricultural policies to encourage equipment sales. Producers plan to sell half of all tractors worldwide in these two countries by 2020. Asia will then account for over 40 percent of the global market.

A few large corporations share the equipment market amongst themselves. Instead of growing organically, they have bought up smaller competitors and maintained their brands. The global market is dominated by three players. The US corporation Deere & Company is the market leader; it is known for its biggest brand, John Deere. CNH Industrial belongs to the Fiat group; its twelve brands include Case, New Holland, Steyr, Magirus and Iveco. The third-largest player is the US company AGCO, with Gleaner, Deutz-Fahr, Fendt and Massey Ferguson. These three corporations share more than 50 percent of the global market. Deere alone had a turnover of $US 29 billion in 2015: higher than the combined seed and pesticide sales of Monsanto and Bayer.

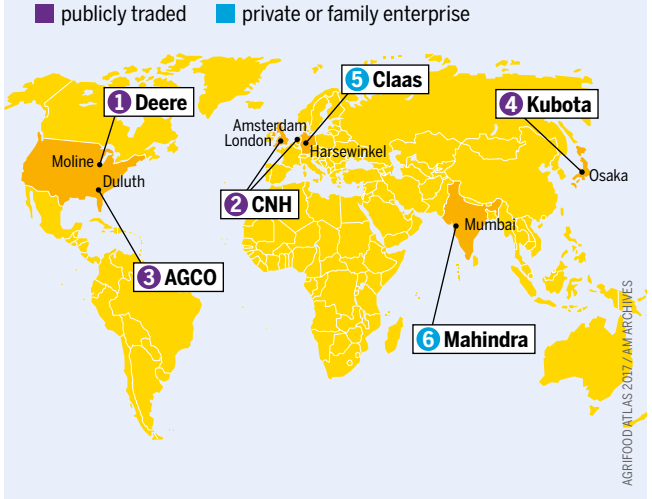
Market consolidation is not the only trend in the farm equipment sector. The digitalization of agricultural production is still at an early stage, but is developing quickly. Sensors measure milk production, livestock movements and feed rations. Quality assessments are performed online during milking instead of afterwards in a laboratory. In crop farming, digitalization (known as "precision farming") optimizes operations, saving money and resources and maximizing yields.

Tractors are steered by GPS; apps provide data about soil quality to planters via wireless networks, and calculate optimal sowing patterns and planting distances. Drones could take over the spraying of pesticides. Information technology enables digital "farm management systems" to access databases and combine soil-quality data with weather forecasts. Control over this technology is concentrated in the hands of a few corporations.

Digitalization is opening up new markets for agrotech companies. New joint ventures and acquisitions already point towards this trend. AGCO and the pesticide producer DuPont announced in 2014 that they would work together on data transmission. In the same year, CNH and Monsanto's "Climate Corporation" division signed a contract to develop precision planting technologies. Deere and the Climate Corporation have agreed to give Deere's farm management system permission to access the large datasets of the Climate Corporation. AGCO and the chemical company BASF have also formed a partnership to develop their own farm management system.

CNH introduced self-driving tractors in 2016. Sensors guide the vehicle, making a driver's cab unnecessary. They are among the first "agricultural robots": machines that plough, sow, spray, prune, milk, shear and harvest. The US consulting firm Wintergreen Research estimates that the global market for these technologies will grow from $US 1.7 billion in 2016 to $US 27 billion in 2023. However, Win-

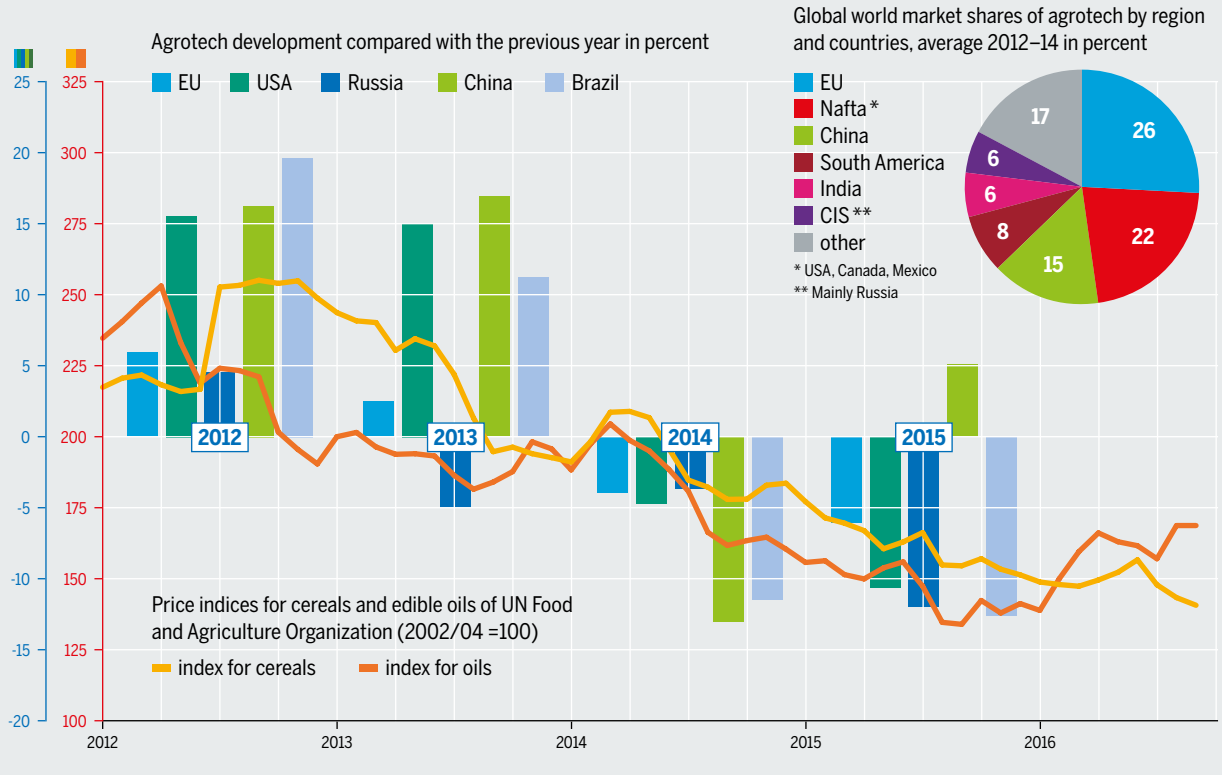
TOP 6 AGROTECH CORPORATIONS
Headquarters of the leading enterprises in 2016



Some dominant producers sell equipment under their own brand names. Others have several brands

HEAVY MACHINERY IN A LIGHT MARKET

Declines in food prices and turnover in agrotechnology



AGRIFOOD ATLAS 2017 / AMIS, VDMA

tergreen expects the price of the equipment to fall once it is produced on a large scale.

While a boom in the sector will generate employment in equipment production, servicing and software, it will reduce the number of jobs in animal production and in labour-intensive aspects of crop farming. The developers aim to reduce labour costs and drudgery, and enable farmers to become independent of working hours. Image-recognition techniques are advancing quickly, allowing computers to detect if fruit and vegetables are ripe for harvest and which ones to pick. Manufacturers promise that unlike human workers, their machines can work day and night without errors. For cost reasons, humans can only pass through a field once or twice to harvest it; machines can do so continuously.

Hopes exist that the digitalization of agriculture can help combat climate change. Sensors could calculate soil carbon stocks and farmers could earn money by selling the stocks on the emission offsets market. That would pave the way for larger-scale industrial agriculture but it would leave the environmental problems unsolved. Such techniques could be used only by large, capital-intensive farming enterprises in the developed world. Farms not only have to expand but will also have to digitalize to remain profitable. The notion "up or out" will change to "digitalize or out". Structural changes in agriculture will continue to make workers redundant.

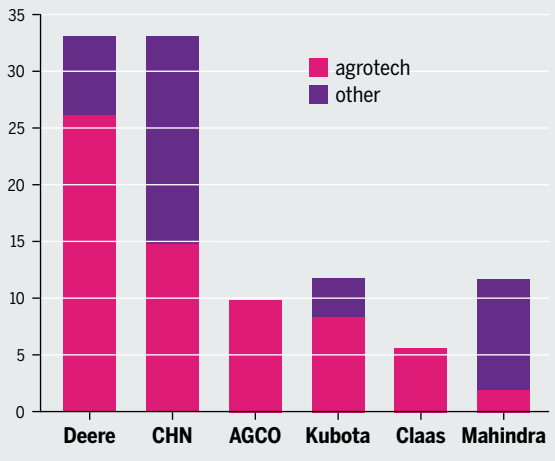
Some experts speculate that producers will buy up competitors to stay competitive with the market leader, Deere

The recession in the sector is expected to last until 2018. But these corporations refrain from talking about a crisis so as not to appear weak

AGCO expects consortia to form around Deere and Claas, a German tractor-maker. The ETC Group, a non-governmental organization based in the USA, anticipates a takeover of the seed and pesticide industry by agrotech corporations due to their financial power. This would increase their control over farms and our food even further. ●

MAKING MACHINES FOR FARM AND FIELD

Turnover of the largest corporations, by size, in billion US dollars, 2014



AGRIFOOD ATLAS 2017 / AG WEB

FERTILIZERS

CHEMICALS FOR THE SOIL

Synthetic fertilizers increase agriculture's productivity, but do not improve soil quality. Manufacturers want to sell more – despite the high energy and environmental costs.

Soil fertility is of central importance to farmers. They fertilize their fields to replenish the nutrients removed through the harvest. The three main nutrients, nitrogen, phosphorus and potassium, are found in manure, chicken droppings, crop residues and other materials of animal or vegetable origin. Mineral fertilizers also contain them, but their sources are different: phosphorus and potassium are mined from rock. Synthetic nitrogen is produced through a chemical process.

The invention of mineral fertilizers made possible the industrialization of agriculture first in Europe and North America, then in developing countries. The Green Revolution introduced Western agricultural practices to other regions. A billion-dollar fertilizer business has emerged. The industry proudly points to rising yields but ignores the negative impacts on soils, climate and environment.

Corporations are trying to turn the international debate surrounding "climate-smart agriculture" (CSA) to their advantage. The Food and Agriculture Organization of the United Nations (FAO) introduced this concept in 2010. Its idea was to link agriculture, food security and climate protection. Selected practices adapted to local climate, and soil conditions were supposed to make smallholder farms more productive and boost humus formation. The idea is to adapt agriculture to climate change and promote carbon sequestration in soils, especially in developing countries.

But the original idea changed quickly. In 2014, FAO, the World Bank and several governments, as well as lobby groups and fertilizer corporations co-founded the Global Alliance for Climate-Smart Agriculture. The aim of this alliance is to increase productivity by using fertilizers, pesticides and improved seed. It also wants to include carbon sequestration in soils in international emissions trading.

However, measuring the carbon stock is difficult. And the prospect of making money with sequestration would give farmers the wrong incentives. It might promote unsustainable cultivation methods and land speculation that would threaten fundamental goods: food security, soil fertility and biological diversity.

The production of artificial fertilizers is extremely energy intensive, which means that their prices are tied to gas and oil prices. Synthetic nitrogen is produced mainly in North America, India, China, Russia, the Middle East, Australia and Indonesia. Eighty percent of the potassium comes from Canada, Israel, Russia, Belarus and Germany. Rock phosphate is extracted in opencast mines: more than 75 percent of the world's reserves are located in Morocco and in the Moroccan-occupied Western Sahara.

Since 1961, the consumption of artificial fertilizers has increased sixfold, and in 2013, world sales totalled US$ 175 billion. Manufacturers, especially of phosphate and potash, dominate certain geographic markets or sectors and act as monopolists. The biggest players are Agrium in Canada, Yara in Norway and the Mosaic Company in the USA. They operate their own mines and factories; together they account for 21 percent of the global fertilizer market.

For the period 2015–20, FAO expects artificial fertilizer deliveries to rise from 246 to 273 million tonnes. The latter includes 171 million tonnes of nitrogen fertilizer and about 50 million each of phosphate and potash. The industry expects uneven growth in this period. Africa is expected to have the strongest annual growth rate, at 3.6 percent, followed by Latin America, South Asia, and the successor states of the Soviet Union.

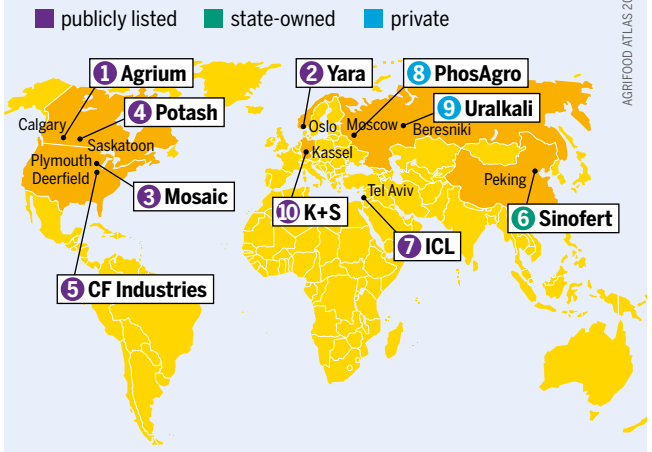
China's demand for fertilizer is plateauing. In 2015, the government decided to limit the country's fertilizer use to one percent a year. By 2020/21, markets in 50 percent of the global market – China, North America, Western Europe and Australia – will be saturated, with sales growing weakly or shrinking. But if these regions import more feed and food, for example from Brazil, they will be outsourcing agricultural production as well as fertilizer usage.

Multinational agricultural trading groups such as Archer Daniels Midland, Bunge, Cargill and Louis Dreyfus Company have reduced their investments because of the low growth prospects. At the same time, the big players are buying up their competitors. The Canadian PotashCorp, world's #4, holds shares of Sinofert (#6) from China and ICL

In 2018, a new leader will dominate the fertilizer top 10 when the merger between Agrium and Potash is completed and its name is changed to Nutrien

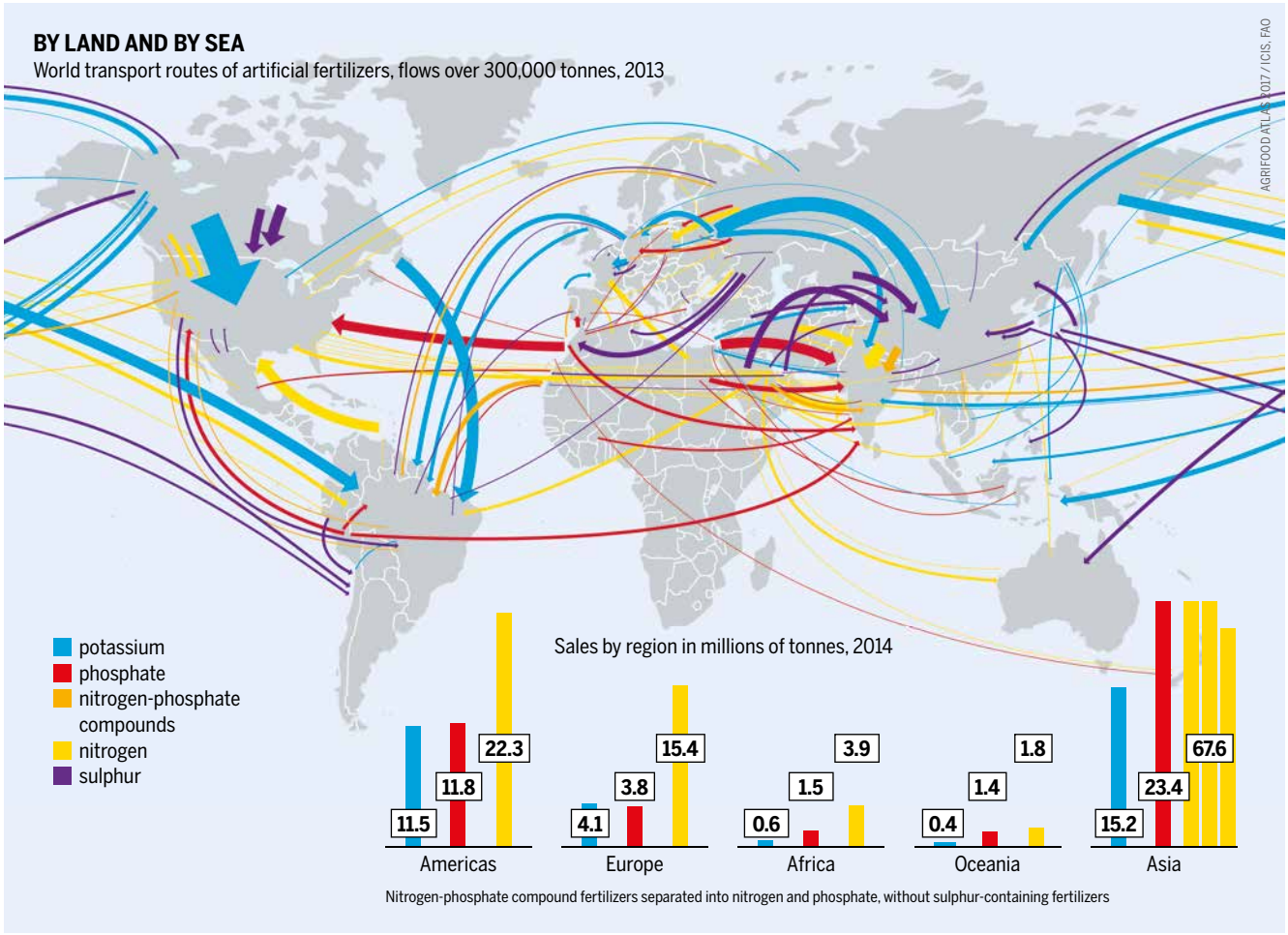
THE FERTILIZER TOP 10

Headquarters of firms with the biggest turnover, 2015



ICL and K+S: only fertilizer sales

AGRIFOOD ATLAS 2017 / SOIL ATLAS



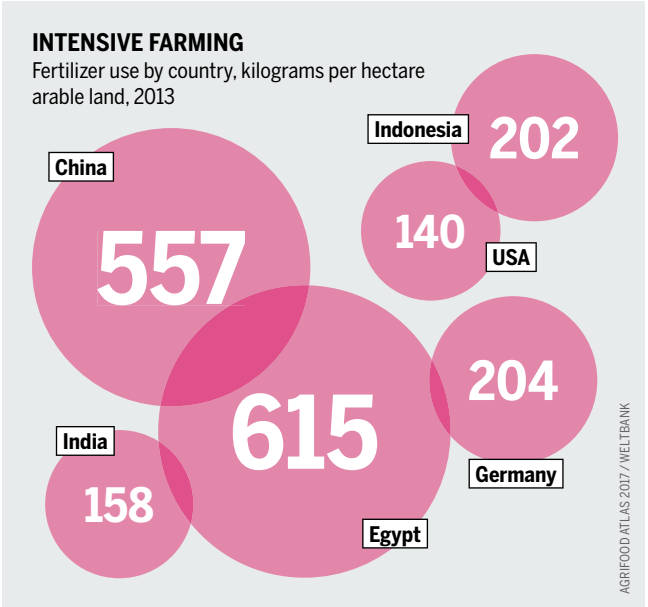
Potassium and phosphate deposits, as well as the natural gas used to produce nitrogen fertilizer, are unevenly distributed. That steers international trade

(#7) from Israel. Norwegian Yara, the world's second largest fertilizer producer, has acquired holdings in Brazil and the USA. Yara also plans to expand its business in Africa by promoting large-scale, industrial agriculture and participating in public–private partnerships such as the New Alliance for Food Security and Nutrition in Africa.

The four largest companies control more than half of the production in all major producer countries except China. In North America, three big companies dominate the potash sector: Agrium (the world's number one), Mosaic and PotashCorp. They work together in a cartel and distribute their products through a joint company, Canpotex. Some countries such as Hungary and Norway have only one fertilizer company.

In Germany, nitrogen usage has increased by two-and-a-half times and the usage of agricultural lime by half since 1961. Germany is dependent on imports: 66 percent of its nitrogen and 94 percent of its phosphate come from abroad. Domestic potassium is abundant. K+S is one of the world's largest manufacturers. Fertilizers account for half of this firm's turnover of € 3.8 billion. Good for K+S, bad for the environment. The firm discharges effluent into the river Werra or injects it into the ground. Salt that cannot be sold is piled into large heaps. The groundwater is contaminated, and heavy metals are leached out of the heaps. For cost reasons, K+S refuses to bring the tailings back into the mine. However, regional politicians have celebrated a minor success: K+S says it will reduce the discharges by half by 2027. ●

In many parts of world, the overuse of fertilizers acidifies soils and pollutes groundwater, lakes and rivers



FROM SEVEN TO FOUR – GROWING BY SHRINKING

Mergers galore: Bayer wants to buy Monsanto and become the world's largest producer of seeds and agrochemicals. All top rivaling companies are pairing up.

Seven companies currently dominate the global production of pesticides and seeds, a key sector in agriculture. But this oligopoly will shrink if the EU and US competition authorities give their green light. The two US corporations DuPont and Dow Chemical have merged, ChemChina has bought the Swiss company Syngenta, and the German chemical giant Bayer is going to take over the US company Monsanto. Three newly-formed conglomerates would dominate more than 60 percent of the market for commercial seed and agricultural chemicals. They would manage the supply of almost all the genetically modified plants on this market. They would also own the majority of patent applications for intellectual property rights for plants at the European Patent Office.

The new Bayer-Monsanto would be the world's largest agricultural corporation, holding one-third of the global market for commercial seed and a quarter of the market for pesticides. Bayer has agreed to buy Monsanto for US$ 66 billion. Bayer-Monsanto and DuPont-Dow will remain on the stock market, and will continue to be accountable to their shareholders. The management of DuPont-Dow plans to split the new group into three listed companies, one of them an independently operating agrochemicals company. ChemChina, a state-owned firm that is China's biggest chemicals producer, has also agreed to pay an eleven-digit figure, US$ 43 billion, for Syngenta. Along with Syngenta's pesticide and seed production, ChemChina, already a producer of non-patented chemicals, will gain an enormous amount of knowledge on genetic engineering despite resistance by many Chinese about using this technology in farming, and doubts over whether the Chinese government will support the introduction of genetically modified plants. Whether Syngenta's new owners will list parts of the company on the stock exchange is unclear.

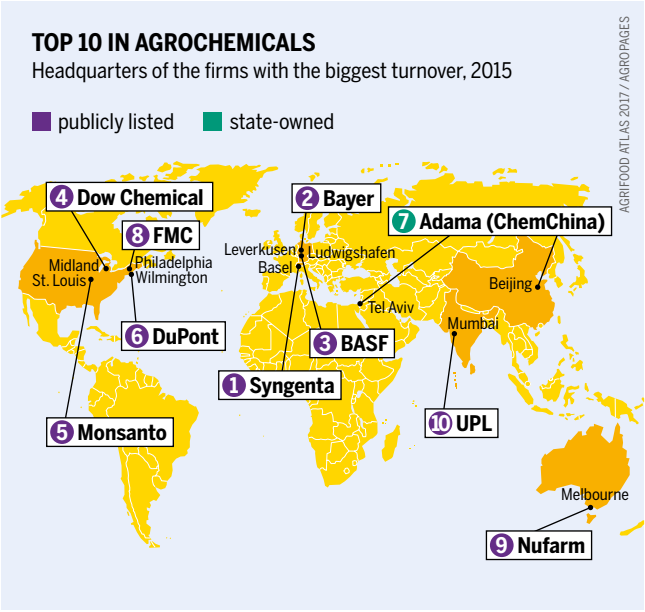
Bayer is financing the takeover of Monsanto with US$ 57 billion of loans. Its board argues that the enormous potential of global agricultural markets justifies the price, and taking on so much debt. It expects the global turnover of seed and pesticides to increase from US$ 85 billion in 2015 to US$ 120 billion in 2025. For comparison: in 2015 Bayer and Monsanto had a turnover of US$ 25.5 billion and a profit of US$ 5 billion.

Bayer AG, the world's tenth largest chemicals manufacturer, has expanded into seeds by acquiring other companies. It has joined the league of large multinational seed corporations, following in the footsteps of other chemicals companies. Five of the world's seven largest seed producers come originally from the chemical industry: Monsanto, DuPont, Syngenta, Dow and Bayer.

No other company has swallowed more competitors in the seed sector than Monsanto. This corporation began buying up seed producers around the world in the 1990s and now dominates a quarter of the world's commercial seed market. It owns rights to most of the genetically modified plants, but also sells many conventional seeds, in particular vegetables. Monsanto's presence is difficult to detect because the companies it controls often keep their original name; Monsanto's logo rarely appears on a seed package in Europe.

The narrowing of the oligopoly from six or seven to three members will bring Bayer-Monsanto, DuPont-Dow and ChemChina-Syngenta closer to their objective of dominating seed and pesticide markets and dictating products, prices and quality standards. All three groups are pursuing the strategy of ousting other suppliers and eliminating competitors, if necessary through acquisitions.

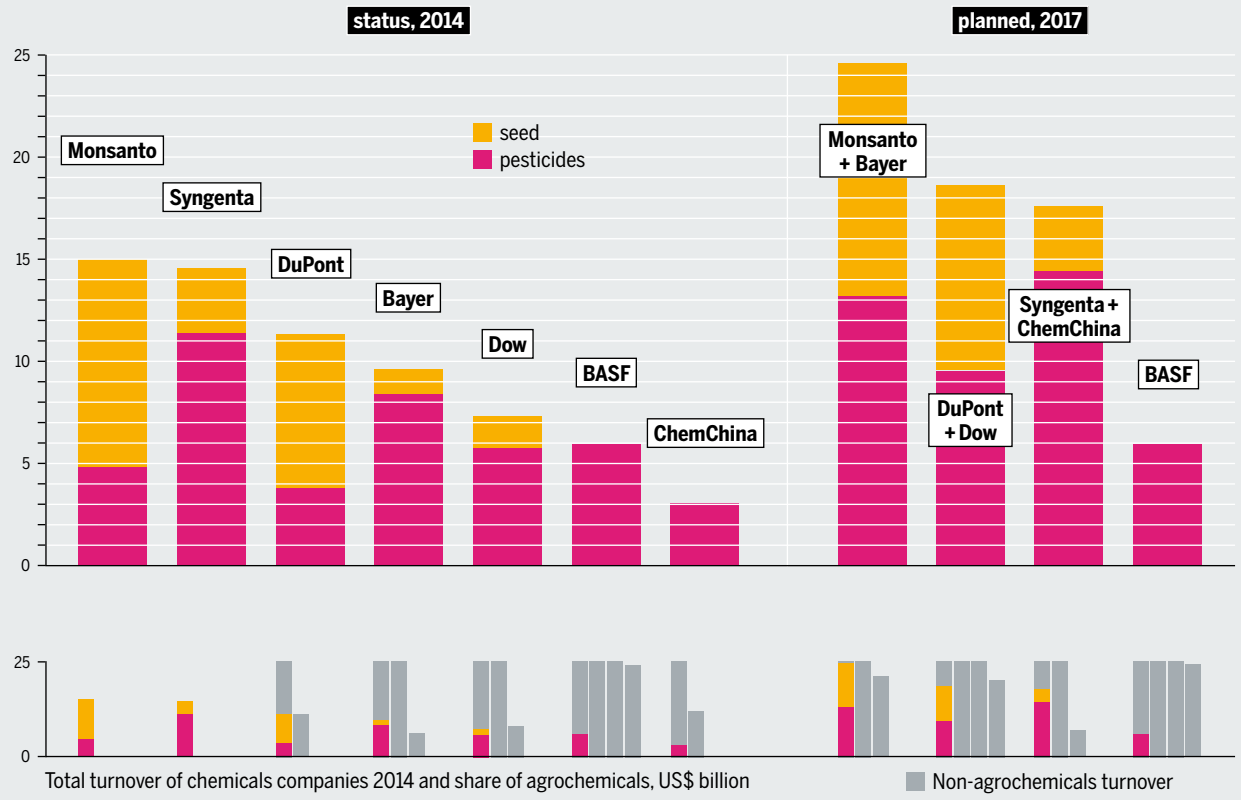
Thirty national antitrust authorities worldwide are analysing these mega mergers. The European Commission has ruled that DuPont must sell off some of its pesticides as well as its research and development branch. To squeeze past the regulators Bayer is forced to sell off its South African business in genetically modified cotton, as well as its Liberty Link crops and chemicals.



The influence of transnational corporations can be difficult to detect. They often sell their products under the brand names of the companies they buy up

BUY TO SQUEEZE OUT THE COMPETITION

Concentration of the world's biggest agrochemicals companies, 2014 turnover, without merger-related sell-offs, in billion US dollars



AGRIFOOD ATLAS 2017 / BLOOMBERG

Other corporations want to benefit from the wave of mergers by buying up business segments that the merging companies have to sell off. US-based FMC, formerly known as Food Machinery and Chemicals Corporation, has benefited from the Dow-DuPont scraps, buying some of their pesticides and research departments, making them currently the 5th largest valued pesticide producer in the world. The German company BASF is also buying sell-offs from the mergers.

The bigger a multinational, the more power it has to lobby politicians and to influence legislation. Bayer could soon become the world's number one in the seed and pesticide sector. The group is under pressure because of its high debt, but is certain of the support of Germany, Europe's economic giant.

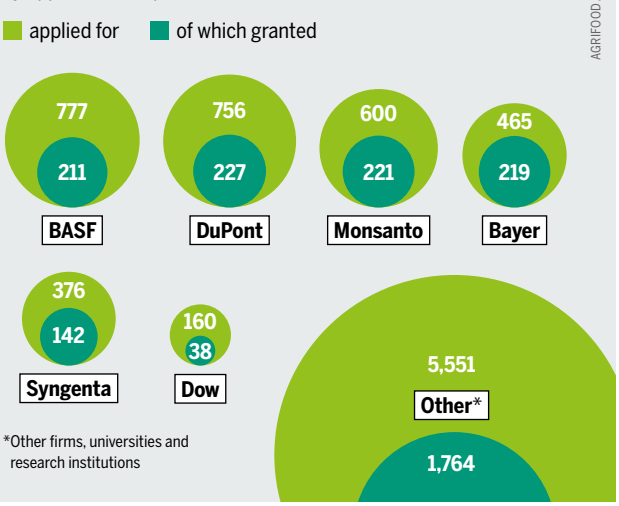
A risk is that the new German global player and its political allies could target the fundamental achievements of EU legislation. These include the principle that the safety of pesticides must be demonstrated before they can receive EU approval: i.e., they do not cause cancer, affect reproduction, damage embryos or the hormone system. Bayer is likely to try to alter the licensing and labelling requirements of genetically modified plants, portraying these rules as obstacles of growth and trade. Big tasks lie ahead: Whoever secures genetic material through patents will control the seed sector and will influence agriculture, food production – and ultimately world food security. ●

Six market leaders share 37 percent of the patents for plants granted by the EU

Seeds and pesticides are of great importance for the chemicals corporations, but their market influence extends far beyond agriculture

BOUNTEOUS HARVEST

Number of patents on plants applied for and granted, by applicant, European Patent Office, end 2015



AGRIFOOD ATLAS 2017 / EPA

IN THE BEGINNING WAS THE PATENT

Genetically modified livestock are prone to disease and are difficult to market. But many labs are developing methods to further industrialize animal production.

Mammals, not plants, were the first genetically modified organisms. Successful experiments were carried out with mice in 1974 and the first reports on sheep and pigs were published in 1985. While masses of genetically modified mice and rats are now to be found in laboratories, most attempts to introduce this technology in animal production have so far failed.

The reasons are a lack of acceptance by consumers, animal welfare concerns, and technical problems. The risks for humans, animals and the environment are considerable. For example, genetic engineering of dairy cattle leads to undesirable changes in the composition of milk. Attempts to make African cattle resistant towards trypanosomiasis have resulted in other health risks for the animals.

Only one genetically modified organism has been given the go-ahead: a salmon breed modified to grow faster was approved for human consumption in the USA in 2015 and in Canada in 2016. According to reports, the salmon reached the market in Canada in 2017. Critics fear that the modified genome might spread in natural salmon populations. The fish was developed by the Canadian firm AquaBounty Technologies. The company applied for a patent in 1992, and it was granted in Europe in 2001. But the patent has now expired and AquaBounty was on the verge of bankruptcy before it was bought by the US company Intrexon.

Based in the US state of Virginia, the company belongs to the billionaire Randal J. Kirk. Intrexon is making renewed attempts to introduce genetically modified animals in agriculture, and has registered patents for genetically modified mice, rats, rabbits, cats, dogs, cattle, goats, pigs, horses, sheep, monkeys and chimpanzees. Its website is www.dna.com. It has bought up companies like Trans Ova Genetics and ViaGen, which specialize in cloning stud bulls. Intrexon has also taken over the British biotechnology company Oxitec, which tries to market genetically engineered insects. With its salmon, Intrexon is the only company in the world that is currently able to bring a genetically modified farm animal.

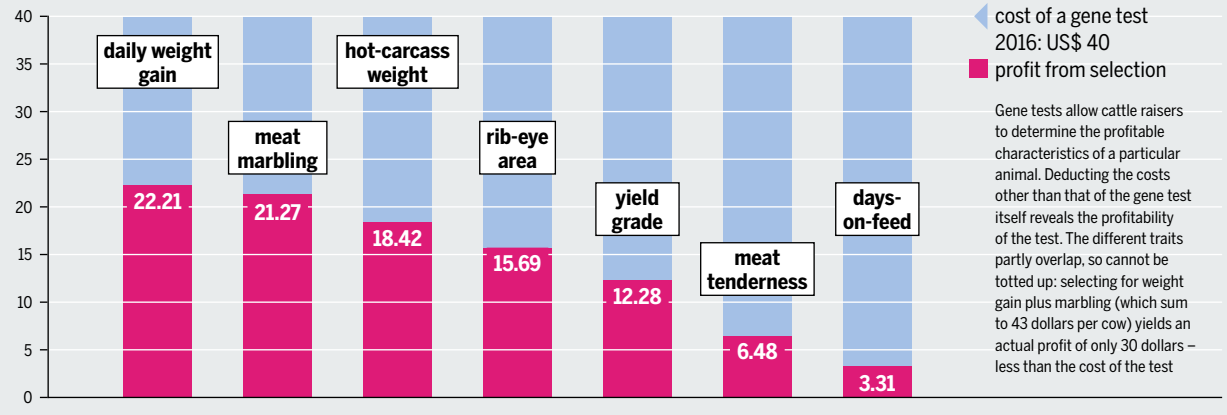
The US firm Recombinetics is in second place. It has also applied for patents and will soon be in a position to apply for approvals to market genetically modified animals. The firm is located in Minnesota, a centre of the US meat industry. Recombinetics is working on animals that produce more milk and meat; hornless cattle that are easier to manage, and cattle that do not sexually mature. These "terminator animals" are sterile and cannot be independently bred. They would only be fattened for slaughter. Gene editing is at the centre of this research. Strands of DNA are reassembled in the laboratory and inserted into the genome using DNA scissors. This new approach is cheaper and more targeted than previous scattergun methods, which do not allow to determine where a new gene is inserted.

Gene editing can have unwanted side-effects on the animals. Health problems in cattle are an example: many genetically modified animals die at birth or soon afterwards because of damaged organs and joints. No one can foresee all interactions that genetic medications cause.

It is not yet profitable for beef producers to genetically test single animals: even the most valuable selection does not cover the costs

GENE TESTS UNDER COST PRESSURE

Value of genetic information on seven characteristics of cattle, compared to cost of the gene test, US dollars per animal



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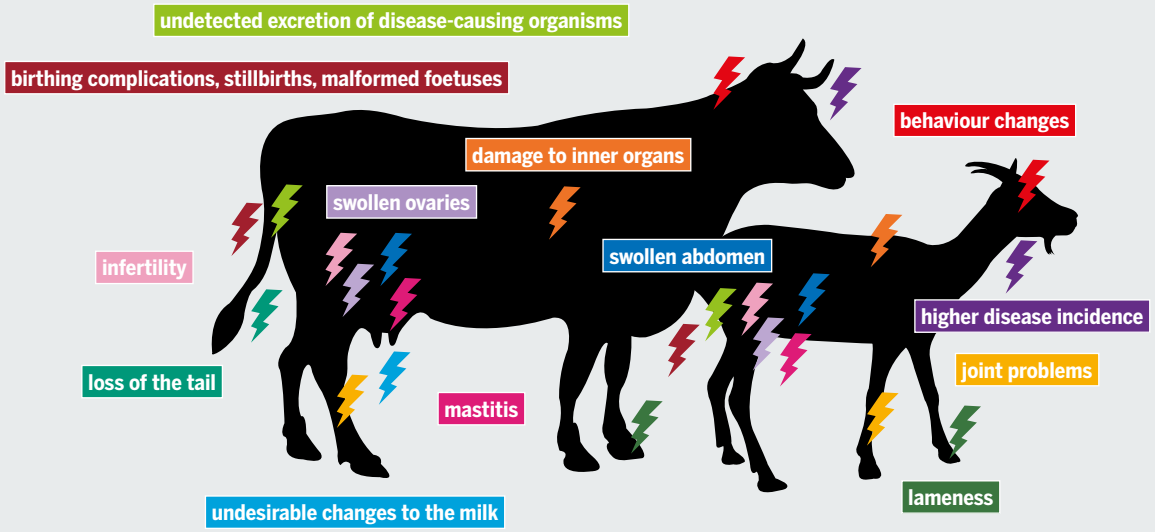
AILING ANIMALS
Effects of genetic manipulation of ruminants in New Zealand, 2000 to 2014, selected



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Modifying the genome harms animals and causes diseases. But gene-lab researchers still dream of disease-resistant livestock

Gene editing can also be used to produce modifications that are hard to detect. Recombinetics uses genetic variants that are also found in conventional breeding. Belgian Blue cattle have a genetic defect that causes excessive muscle growth and makes birthing very difficult: 90 percent of the calves are delivered by caesarean. Recombinetics is using the Belgian Blue as a genetic template to increase the muscle mass of pigs, cattle and sheep.

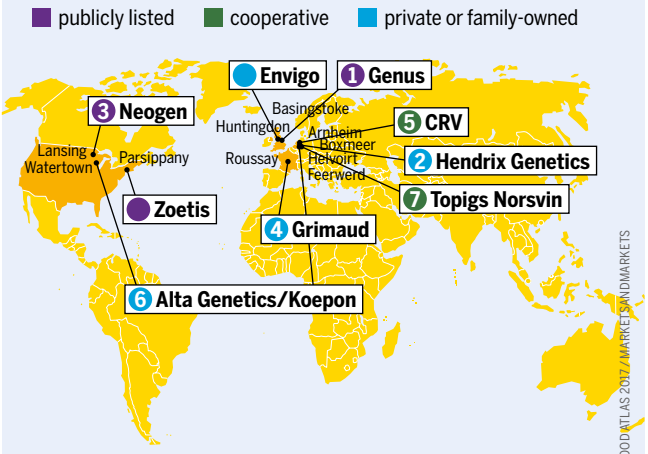
Genetic engineering increasingly allows livestock to be modified to meet the demands of industrial animal production. New business ideas are driving the development. For example, genetic engineering makes it possible to take patent laws into cowsheds and pig houses. Farmers may still milk their patented cows, but they are no longer allowed to sell the offspring for breeding.

Founded in 2008, Recombinetics has an annual turnover of only US$ 1 million. But in 2016 it received nearly US$ 10 million in capital from private investors. And it has a giant as a customer: the British company Genus. Reaching sales of around € 450 million, Genus is one of the world's largest companies for pig and bovine genetics and the biggest shrimp breeding stock supplier. If traditional breeders succumb to competition and large farms and processors become interested in genetically modified livestock, Genus would be among the main beneficiaries. The company also stated its readiness to introduce such animals into the market.

The global market for animal genetics is forecast to grow from US$ 3.7 billion in 2016 to US$ 5.5 billion in 2021, says Marketsandmarkets, a US analysis firm. This would mean an average increase of 8.4 percent per year: two and a half times faster than the world's economy as a whole. The strongest growth is expected in Europe. Farmers who want to avoid genetically modified animals could soon have no choice. If pigs engineered for resistance against African swine fever (a disease no longer confined to Africa) are introduced to the market, current disease-control measures would force producers to replace entire populations. The new pigs would not fall ill, but could still transmit the disease. The disease could spread quickly and hit traditional farms hard – forcing them to buy the engineered and patented pigs too. As a result, pig production would not be possible without genetically modified animals. Veterinary policies might even forbid keeping animals that are not resistant. ●

Many large livestock genetics firms are family-owned or they belong to large farmer cooperatives with thousands of members

BIG PLAYERS IN ANIMAL GENETICS
Headquarters of companies with the highest turnover, 2015/16



Envigo, Zoetis: Share of animal genetics cannot be separated from total turnover

AGRIFOOD ATLAS 2017 / MARKETSANDMARKETS

CROP GENETICS

JUGGLING GENES

In the coming years, seed companies plan to use genome editing to produce crops with new characteristics – and market them without having to state that they are "genetically modified".

In the race to control agriculture from the roots up, whoever wields economic, legal and technical control over the genetics of living things will exert considerable power. Early advantages in genetic engineering enabled companies such as Monsanto to reshape seed and build a new business model around it. They succeeded in making the cultivation of millions of hectares dependent on their proprietary seeds and chemicals.

The techniques of that first "transgenic" generation now appear crude compared to a new set of tools that directly edit the DNA building-blocks of life. Agribusiness giants are positioning themselves to prosper from the new technologies. Control over tomorrow's agricultural landscape starts with big data, using very large datasets to reveal patterns, trends and associations. Over 1,000 research centres are generating data on genome sequences at a breakneck speed. By 2025, we will have more data on genomics than on as-tronomy. The resulting exabytes of data are often housed in open, public databases that are only accessible to companies with the costly bioinformatics capacity needed to tap into their potential value. They use special algorithms and artificial intelligence to pinpoint gene sequences that may be of interest.

The hosts of these genome databases naturally understand the treasure trove they are amassing on the industry's behalf – succumbing to the temptation, one public database, Divseek, which collects data on the genomic diversity in agricultural species, was recently caught trying to sell privileged access to data to Syngenta and DuPont. This would have given these agrochemical giants an inside track to patenting modified genes that confer traits desired by customers.

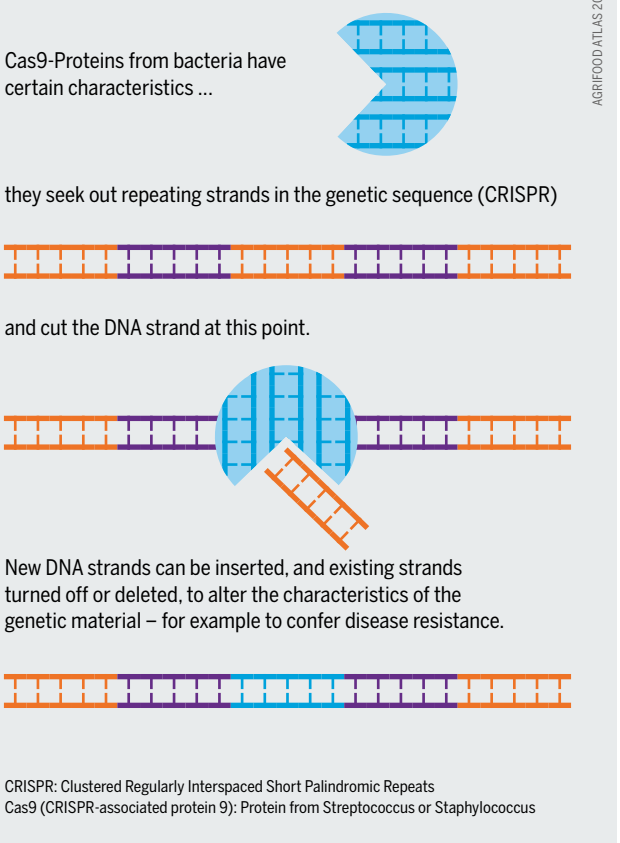
The biotech majors are actively seeking so-called "climate genes": they want to digitize the DNA sequences thought to be responsible for a plant's ability to handle environmental stresses such as flooding and drought. In a warming, changing world, owning the rights to a plant's ability to adapt is a far-sighted strategy. If a crop must be "climate-ready" to survive or to thrive, then those who own the relevant traits also control the viability of industrial agriculture. In 2010, there were 262 "patent families" (over 1,600 patent documents) claiming rights to "climate genes". Two-thirds of these were claimed by three companies: Monsanto, BASF and DuPont.

The agribusiness giants hope one day to combine climate-targeted seeds with precision planting and sensing systems. Farmers would purchase seeds genetically modified for their specific field conditions, and the machines would sow and fertilize them accordingly. This vision is now driving mega-mergers in the pesticide and seed sectors. Another wave of mergers between agri-input firms and farm machinery manufacturers is on the horizon. The US tractor maker John Deere has already signed deals with the agrochemicals giants Syngenta, Dow and Bayer to develop the equipment needed for digitized farming.

Identifying (and patenting) the key gene sequences for the future of agriculture is one thing, incorporating sequences into living crops is another. The big news in genetics is not so much reading genomes as the ability to write and rewrite DNA. A growing list of genetic engineering techniques based on fast, flexible "gene-editing" and synthesis of DNA promise that the DNA codes of crops, animals and microbes can now be easily reshaped using digital and laboratory tools. DNA synthesis, the ability to "print" new strands of artificial DNA, is now going to become a bulk business. In 2016, approximately one billion base pairs of

The technical journal MIT Technology Review called genome editing "the biggest biotech discovery of the century"

TACKLING DNA
Genome Editing with the CRISPR/Cas9-Method, schematic diagram



CRISPR: Clustered Regularly Interspaced Short Palindromic Repeats
Cas9 (CRISPR-associated protein 9): Protein from Streptococcus or Staphylococcus

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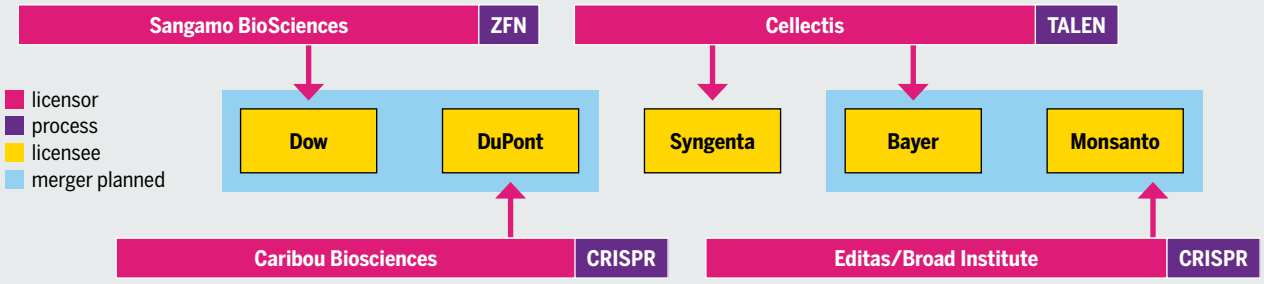
ALLIANCES AND LICENSES

Three genome-editing processes for crop production that are especially attractive for multinationals, licensing (mostly subject to legal challenges)



ZFN = Zinc finger nuclease TALEN = Transcription Activator-like Effector Nuclease CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats

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synthetic DNA were manufactured by a small number of companies, including Life Technologies, Twist Bioscience, Gen 9, IT-DNA and GenScript. However, software giants may become power players in this field: Autodesk, known for its technical design software for engineers and architects, is driving a high-profile project, known as GP-Write, to synthesize genomes. Microsoft and Intel are also investing in synthetic biology.

A fierce battle is being fought over the ownership of new tools that do the genetic engineering. An early gene-editing toolset known as zinc finger nucleases (ZFN) was patented by Sangamo BioSciences, a company in California, and exclusively licensed for crop engineering to Dow Chemical, a company that is now merging with DuPont. Another tool, called TALEN (Transcription Activator-like Effector Nucleases), was mostly patented by France-based Cellectis and licensed to Bayer and Syngenta.

The technique drawing most attention is CRISPR (Clustered Regularly Interspaced Palindromic Repeats). Two rival teams of inventors are fighting over the patent rights, with billions of dollars riding on the outcome. On one side are Emmanuelle Charpentier, a French microbiologist working in Germany, and Jennifer Doudna, an American from Berkeley University who co-founded Caribou Biosciences. They have licensed the use of CRISPR in crops to DuPont. On the other side, Feng Zhang of the Broad Institute, a biomedical research centre associated with MIT and Harvard University in Cambridge, Massachusetts, has granted a CRISPR license to Monsanto. Meanwhile, Cellectis claims that its gene-editing patents may pre-empt both sides – perhaps putting their partner Bayer in a key position.

Both Monsanto and DuPont intend to bring CRISPR-edited crops to market by 2021. US regulators have already confirmed that two early CRISPR crops, a type of mushroom and one of maize, are not even subject to regulation. This decision has given CRISPR a boost. Lawyers for biotech firms have convinced some governments to approve the use of organisms modified using this technique, and to dispense with requirements that they be labelled as such. A gene-edited herbicide-tolerant canola variety, developed by the Californian company Cibus Biotech, is being grown by US farmers and has entered the global supply chain. It is marked as "non-transgenic" and even as "not genetically modified", because it contains no genes introduced from other organisms.

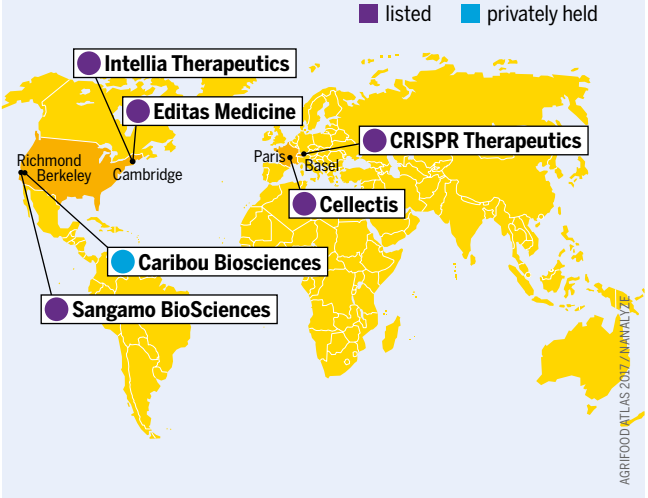
On the stock exchange, only a few gene-editing firms are expected to develop products that can be used widely. Buying shares is seen as risky

Lawyers argue about almost every patent and license in the USA. New alliances of corporations are already involved in using the technology

This is a dream scenario for biotech firms, in which they can bring new, genetically modified crops to market, without regulation or labelling while still enjoying patent protection and garnering higher prices because they are supposedly not genetically manipulated. Officials no longer demand time-consuming tests to uncover risks or debates about their significance. In other words, biotech firms can not only edit the genome; they can also edit out the precautionary principle and public opposition in politics. ●

EXPERTS WITH THE GENE SCISSORS

Headquarters of companies involved in CRISPR/Cas9 frequently mentioned in the media, 2016



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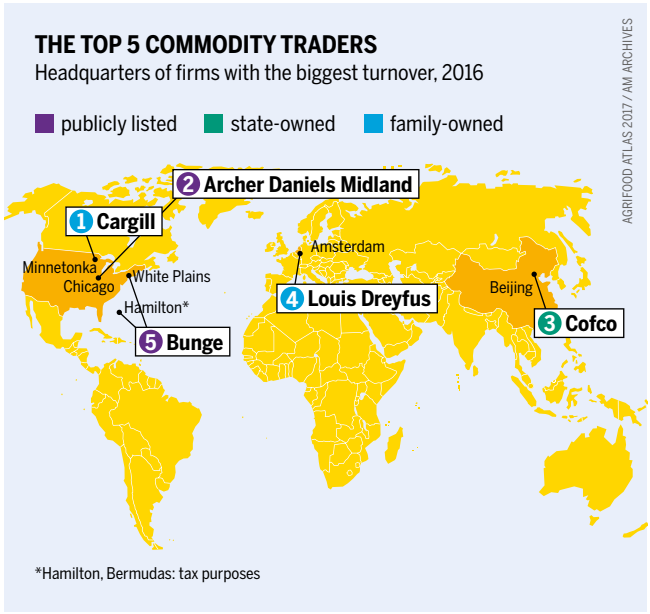
AGRICULTURAL TRADERS' SECOND HARVEST

Four Western corporations dominate the global trade of agricultural products. Now a Chinese firm has joined them.

Wheat, corn and soybeans are the three most important agricultural raw materials traded worldwide. The market situation, quality and price determine whether these commodities are sold as foodstuffs, biofuels or animal feed. The next most important global commodities of this type are sugar, palm oil and rice.

Four companies dominate both the import and export of agricultural commodities: Archer Daniels Midland, (ADM), Bunge, Cargill and the Louis Dreyfus Company. Together they are known as the "ABCD group" or simply "ABCD". ADM, Bunge and Cargill are US firms; Louis Dreyfus has its headquarters in the Dutch capital, Amsterdam. All four were founded between 1818 and 1902. Apart from ADM, they are controlled by their founding families. They trade, transport and process many commodities. They own ocean-going ships, ports, railways, refineries, silos, oil mills and factories. Together they account for 70 percent of the world market of agricultural commodities.

Cargill is the biggest firm, followed by ADM, Dreyfus and Bunge. Customers of ABCD include feed manufacturers, meat producers, biofuel producers and food retailers. They are often of prime importance for their customers because they can ensure a steady supply of raw materials in large quantities. Cargill is the only one directly involved in meat production and marketing. It also holds 25 percent of the global trade in palm oil.



Recently, the Chinese state-owned grain trader Cofco caught up with ABCB and replaced it as the main buyer of Brazilian maize and soya. ABCD's share in Brazil's grain exports fell from 46 percent in 2014 to 37 percent in 2015; Cofco accounted for 45 percent. In Russia, the grain trader RIF took top spot as exporter in 2015, overtaking the previous three dominant traders: Glencore from Switzerland, Cargill (the only ABCD member) and Olam from Singapore. This reshuffling reflects the emergence of Russia as an important grain exporter and China as a major importer.

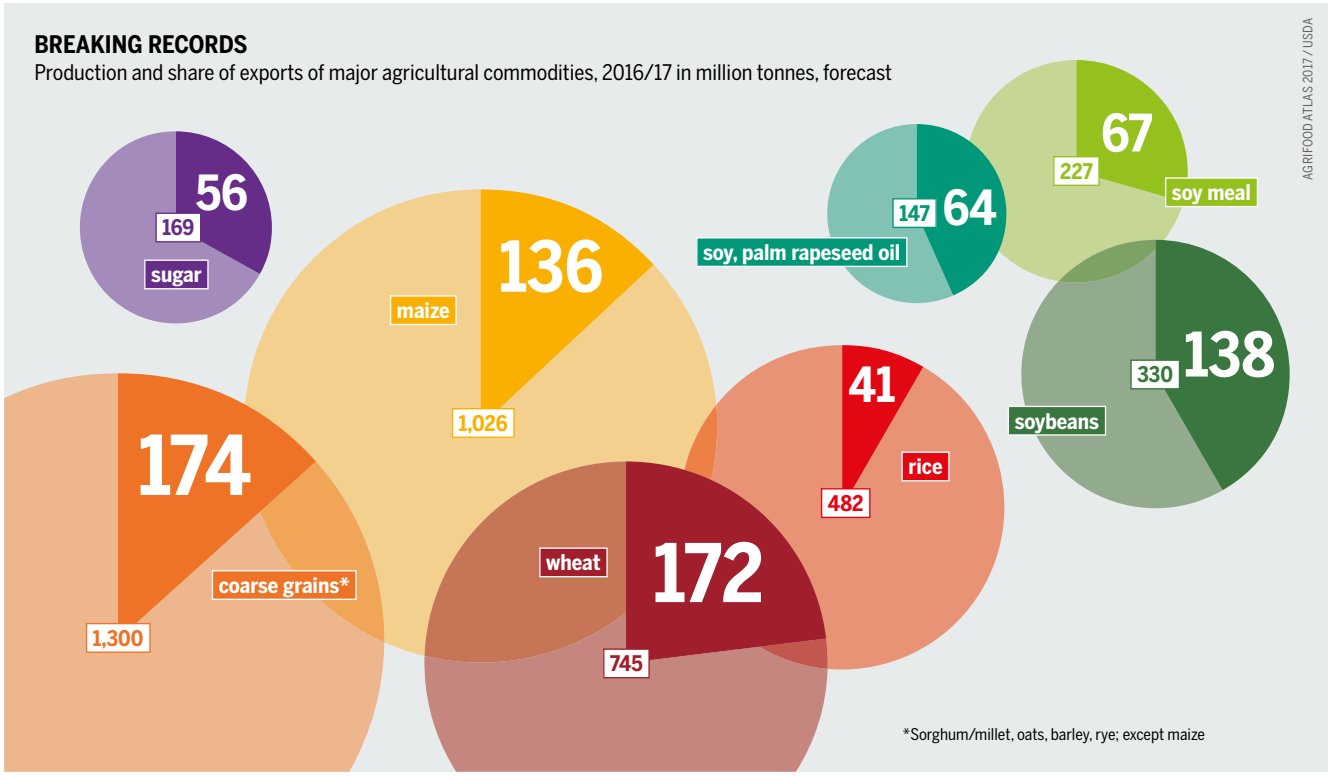
The ABCD group is well informed about harvest levels, prices, currency fluctuations, weather data and political developments in all parts of the world. Every day, data gathered from growing areas is analysed by financial experts. All four companies have subsidiaries that hedge the trade of agricultural commodities against price-related risks and engage in speculative transactions on futures exchanges, especially in Chicago.

The software and media company Bloomberg calls Cargill the "Goldman Sachs of agricultural commodity trade" in reference to the US bank's reputation of being well-informed. In a 2001 corporate brochure Cargill described itself as: "We are the flour in your bread, the wheat in your noodles, the salt on your fries. We are the corn in your tortillas, the chocolate in your dessert, the sweetener in your soft drink. We are the oil in your salad dressing and the beef, pork or chicken you eat for dinner. We are the cotton in your clothing, the backing on your carpet and the fertilizer in your field".

Extreme price fluctuations in global agricultural markets do not threaten Cargill. On the contrary, the firm benefits from them. Early on, the company's experts recognized the huge harvest shortfall of 2012. They speculated on increased prices for soybeans, wheat and corn, and made favourable future purchase contracts that could be traded on the stock exchange. When prices rose, they sold these contracts, making a considerable profit. In 2016, Cargill and its three major competitors made less money as a result of low world prices and fluctuations.

Trade in agricultural commodities has traditionally been the focus of the ABCD group, but it is declining in importance. Processing cereals and soybeans as well as manufacturing foods such as orange juice or chocolate have long been a part of their business. Since the 1980s, vertical integration – the combination of two or more stages of production in one firm – has become increasingly important. In 2014, ADM bought up three companies that turn nuts,

Straight flush: a state-owned company has now joined the old established family firms and publicly traded giants



legumes and fruit into food ingredients and flavouring for beverages. Fatter profit margins and fast growth beckon. Bloomberg once said that Cargill was not only part of the value chain but was the chain itself – from the field to the shop counter.

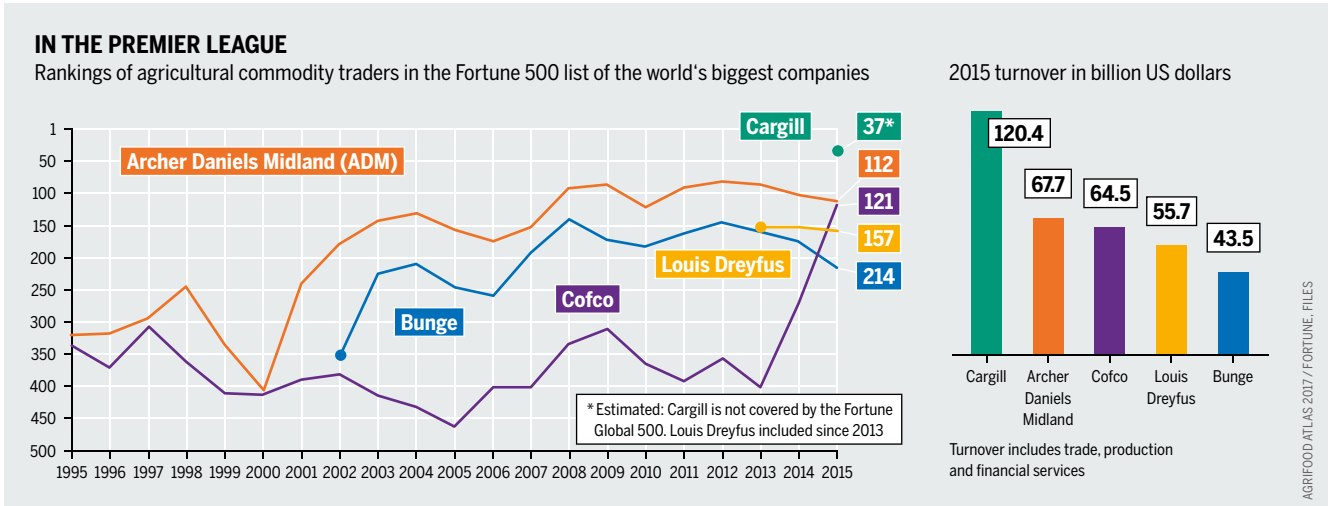
ABCD also invests in related industries such as agricultural fuels, plastics and paints. In Hamburg, ADM operates the largest oilseed processing and refining complex in Europe. It turns rapeseeds and soybeans into margarines, pharmaceutical glycerine and biodiesel.

The ABCD group uses its market clout to influence the world's agricultural markets. Its members apply their enormous bargaining power to negotiate prices with producers, and use their market knowledge to achieve high returns from financial transactions.

The Chinese firm Cofco has overtaken two of the top four, mainly as a result of deals in Brazil

In addition, they are directly or indirectly responsible for the deforestation of the rainforest. In Brazil, indigenous Guaraní communities accused Bunge of buying sugarcane produced on stolen land, and although Bunge thought that its suppliers had respected land rights, it did not renew their contracts. In contrast, several British and US retail chains have refused to purchase Uzbek merchandise in protest against the forced child labour in cotton plantations there – nevertheless Cargill has remained a major buyer of cotton in Uzbekistan. ●

Transport is a vital part of trade. Over 850 million tonnes of the eight biggest export commodities are loaded onto trains, lorries and ships each year



MANUFACTURERS

BRANDS DOMINATING MARKETS

Fifty manufacturers account for 50 percent of global food sales in the industry. The big companies are growing fastest and are rapidly increasing their market share.

Fewer, ever larger, global players compete to control the food industry of the 21st century. Even the top food manufacturers are coming under pressure from international supermarket chains. Competition is intense, and markets in the US and Europe are saturated. This drives food corporations to expand into emerging markets and developing countries.

A merger boom has set in since the end of the world financial crisis in 2010. In 2015 alone, two major mergers worth over US$ 100 billion were agreed upon. One was a takeover of SABMiller by its rival, the brewery group Anheuser-Busch. The other was a merger between the ketchup-maker Heinz and its competitor Kraft. The resulting Kraft Heinz Company is the sixth-largest food manufacturer worldwide. Extensive cost-cutting strategies, which include shedding jobs, are expected to finance the deal and boost market shares and profit margins. Financial investors, including 3G Capital, an investment company belonging to the Brazilian billionaire Jorge Lemann and known for its tough cost-cutting measures, are behind both mergers. Lemann teamed up with the US investor Warren Buffett and his company Berkshire Hathaway for the Kraft-Heinz deal.

Consumers increasingly demand natural products and are pushing the food industry to replace artificial ingredients. Companies like General Mills, Archer Daniels Midland (ADM), Coca-Cola and Unilever have bought up companies that produce natural ingredients and flavours.

The coffee market reflects current trends in both generalization (a wide product range) and specialization (in a single market segment). In addition to other premium brands, JAB Holding, an investment company belonging to the German Reimann family, now controls major coffee brands including Jacobs Douwe Egberts, Caribou and Keurig Green Mountain. The family business also covers coffee capsules and machines. JAB's acquisitions are putting pressure on Nestlé, the market leader. Nestlé's share of the global market for packaged coffee is just under 23 percent; currently holding 20 percent, JAB has almost caught up with it.

Eighty percent of the global tea market is controlled by three corporations: Unilever (the Lipton brand), the Indian company Tata (Tetley) and Associated British Foods (Twinings). The market for packaged tea is not yet as concentrated as coffee. In Germany, it is controlled by two family companies: Teekanne holds a share of 35 percent and the Ostfriesische Tee Gesellschaft 25 percent.

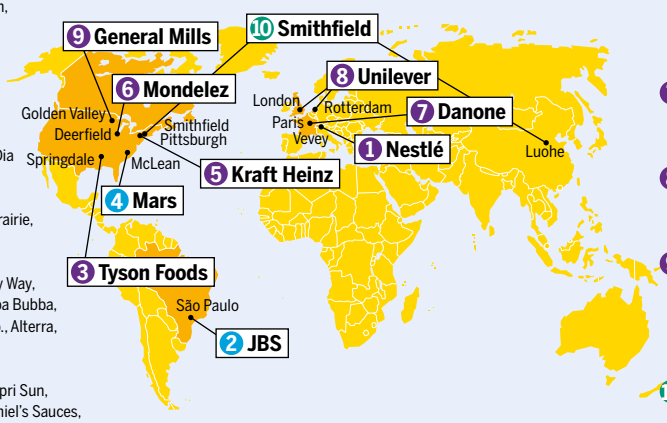
In 2010, Unilever, Nestlé, Danone and PepsiCo announced that they would expand into new markets – especially in China and Russia, but also in Africa. European dairies are also noticeably active. Small manufacturers have been put under pressure by a decline in milk prices that started in 2014 and are still decreasing. The French dairy Lactalis made nine acquisitions in 2015 alone, and another four by mid-2016. Danone has become the main shareholder of West Africa's Fan Milk. The Swedish-Danish dairy Arla Foods has entered into several joint ventures and plans to quintuple its sales in West Africa by 2020.

The sector is growing, but even the big players are not growing everywhere. Markets are penetrated with global and local brands, some of them shared with other companies

THE TOP 10 FOOD MANUFACTURERS

Headquarters of the companies with the highest turnover in 2016 and selected brand names, excluding beverage and tobacco companies

publicly listed state-owned family-owned



1 **Nestlé:** Aero, Bakers Complete, Boost, Buitoni, Cailler, Chef, Coffee-Mate, Crunch, Friskies, Gerber, Häagen-Dazs, Herta, KitKat, Maggi, Milo, Mövenpick, Nescafé, Nespresso, Nesquik, Nestea , Perrier, Purina, S. Pellegrino, Smarties, Thomy

2 **JBS:** Seara, Friboi, Swift, Primo, Hans, Beehive, Moy Park, Pilgrim's, Pierce, Del Dia

3 **Tyson Foods:** Hillshire Farm, Sara Lee, Wright, Bosco's, Corn King, Gallo, Open Prairie, Tastybird, Wunderbar

4 **Mars:** Balisto, Bounty, M&M's, Mars, Milky Way, Snickers, Twix, Wrigley's Spearmint, Hubba Bubba, Orbit, Mirácoli, Uncle Ben's, Bright Tea Co., Alterra, Chocamento

5 **Kraft Heinz:** Kraft, Heinz, Bagel Bites, Capri Sun, De Ruijter, Good Taste Company, Jack Daniel's Sauces, Jell-O, Kool-Aid, PurePet, Velveeta, Weight Watchers, Wyler's

6 **Mondelez:** Cadbury, LU, Marabou, Milka, Oreo, Philadelphia, Ritz, Stimorol, Toblerone, TUC, Chips Ahoy!, Nabisco, Trident, Bubbaloo, Tang, Belvita, Lacta, Suchard Express

7 **Danone:** Danone, Activia, Vitalinea, Badoit Evian Volvic Bonafont Mizone Nutrilon Aptamil SGM Milupa, Gervais

8 **Unilever:** Becel, Bertolli, Rama, Flora, Langnese, Magnum, Lipton, Ben & Jerry's, Knorr, Pfanni, Unox

9 **General Mills:** Bisquick, Pillsbury, Knack & Back, Chex, Kix, Monsters, Trix, Häagen-Dazs, Betty Crocker, V.Pearl, Yoki, Immaculate Baking, Annie's, Muir Glen, Yoplait

10 **Smithfield:** Smithfiel, Eckrich, Farmland, Armour, Margherita, Curly's, Nathan's, Cook's, Gwaltney, John Morrell

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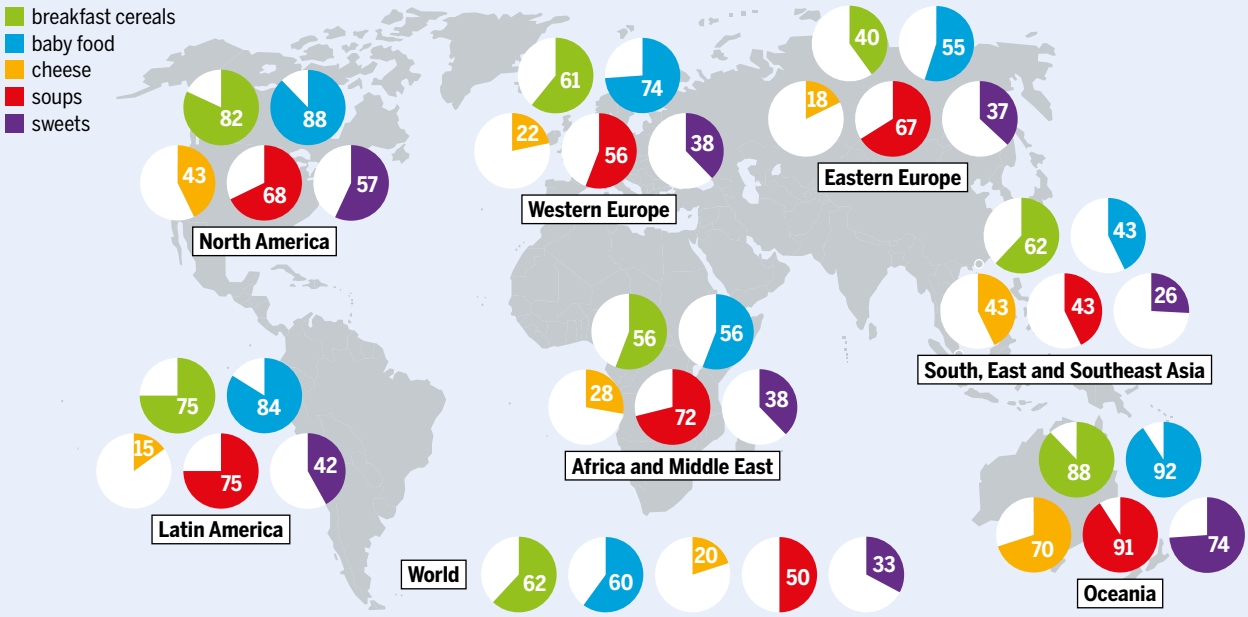
FOOD CONCENTRATE

Shares of the four biggest manufacturers in each of selected markets, product groups by region, 2007



AGRIFOOD ATLAS 2017 / EUROMONITOR 2009

Big national or international food manufacturers dominate in many regions and product groups

Because of the many regional producers, the world market for processed foods is not yet as concentrated as the trade in agricultural raw materials, seeds or pesticides. The 50 largest food manufacturers account for 50 percent of global sales. The biggest corporations have recorded the strongest growth. The globalization of food systems and the expansion of multinational companies offering many products will continue to drive this trend. Eating habits are not only changing in the developed world, but also in emerging and developing countries. Unprocessed foods are being replaced by highly processed, ready-made meals such as pizzas and soups.

Obesity, diabetes and chronic diseases are the consequence of these trends. Ready-made meals are increasingly enriched with proteins, vitamins, probiotics and omega-3 fatty acids. Health-conscious consumption has become a lucrative business. Food corporations sell "healthy" foods as a way of fighting nutritional problems and diseases, even though the manufacturers themselves are partly responsible for the problems.

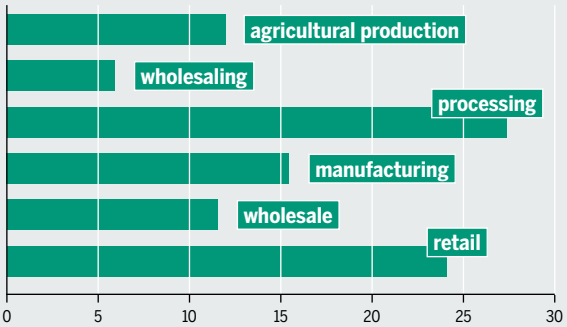
Food safety is of enormous importance for consumers – also in developing countries. In China, numerous food scandals have raised customer food safety awareness, making it one of the most important sales factors. On average, there are around 300 major food recalls a year worldwide, involving more than 75 foodborne disorders, 325,000 hospitalizations and 5,000 deaths. Food-safety issues in supply chains that used to be regulated by public entities are now controlled by companies at the end of the chain. This is problematic for producers at the start of the chain. Food manufacturers and retailers define high standards that increase production costs borne by farmers. Other aspects of food safety are also becoming more important: today consumers expect more information about products, including their origin, production methods and ingredients.

Manufacturers aim to expand into new markets because of the price pressure of retail chains. From the farmer to the final consumer – collaborating with other actors of the supply chain is of strategic importance. Food manufacturers link up with upstream actors, including large commodity traders, and downstream food retailers. The focus of competition is shifting: from one firm versus another, to one supply chain versus another. ●

From illegal price collusion to market dominance: the agrifood industry keeps competition authorities busy

WHERE COMPETITION IS A PROBLEM

Legal cases against cartels in the EU, distribution of 182 cases in agriculture and food supply chains, 2004–2011, in percent



Processing: intermediate products; manufacturing: end products

AGRIFOOD ATLAS 2017 / ECB

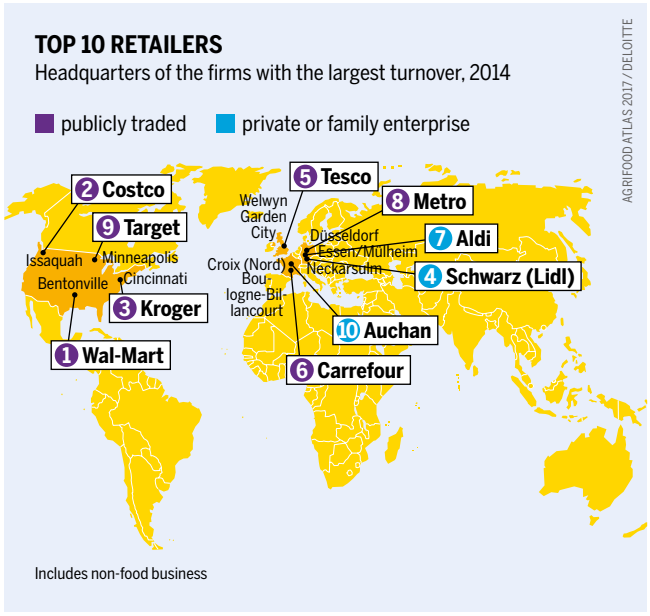
EXPANDING AISLES

Food shoppers in the developed world let the cash registers ring at the likes of Wal-Mart, Lidl, Carrefour and Tesco. The supermarket revolution is now expanding throughout the developing world.

The modern retailing sector – hypermarkets, supermarkets and discount stores – plays a major role in the food chain that links field to plate, especially in the developed world and in emerging economies. This is where a large part of what farmers produce ends up, and where billions of consumers can choose from a huge range of food and drinks.

Food retailers have become influential gatekeepers of the food trade. By choosing which suppliers can sell through their stores and what types of food consumers can buy there, they increasingly influence the conditions under which the food is produced. A number of factors have underpinned the growth of the supermarkets' power since the 1980s. The liberalization of trade and investment and the deregulation of agricultural markets have reduced the bargaining power of producers and facilitated the growth of big retail chains. Regional and urban planning has long favoured the development of huge retail complexes outside of town centres with their small, fragmented land parcels.

In both developed and emerging economies, recent decades have seen the grocery business become increasingly concentrated. Wal-Mart, the world's largest retailer, alone accounts for 6.1 percent of global food retail sales. In the European Union – one of the three biggest markets along with the United States and China – the ten biggest grocery chains (four German, four French, and two British) account for almost 50 percent of food retail sales. Market concentration is even higher in several other European countries. Discounters are most rapidly expanding through aggressive marketing. The food retailers push down the prices they pay to their suppliers. Discounters such as Aldi stock their own products rather than other brands. In 2014, the Schwarz group, which owns the Lidl discounter, became the largest European retailer, leaving UK's Tesco behind in second place, and Carrefour from France in third place.



The main growth in grocery sales is currently in lower-middle-income countries such as India, Indonesia and Nigeria. Rising incomes, urbanization and foreign direct investment are pushing the growth of supermarket chains more quickly than in the developed world. Emerging and developing countries have become strategic markets for big international retailers looking for new expansion opportunities. This endangers the livelihoods of a multitude of small-scale traders and artisans who process and sell food. The new marketing system does generate jobs in warehousing, processing and retail, but far fewer than are lost.

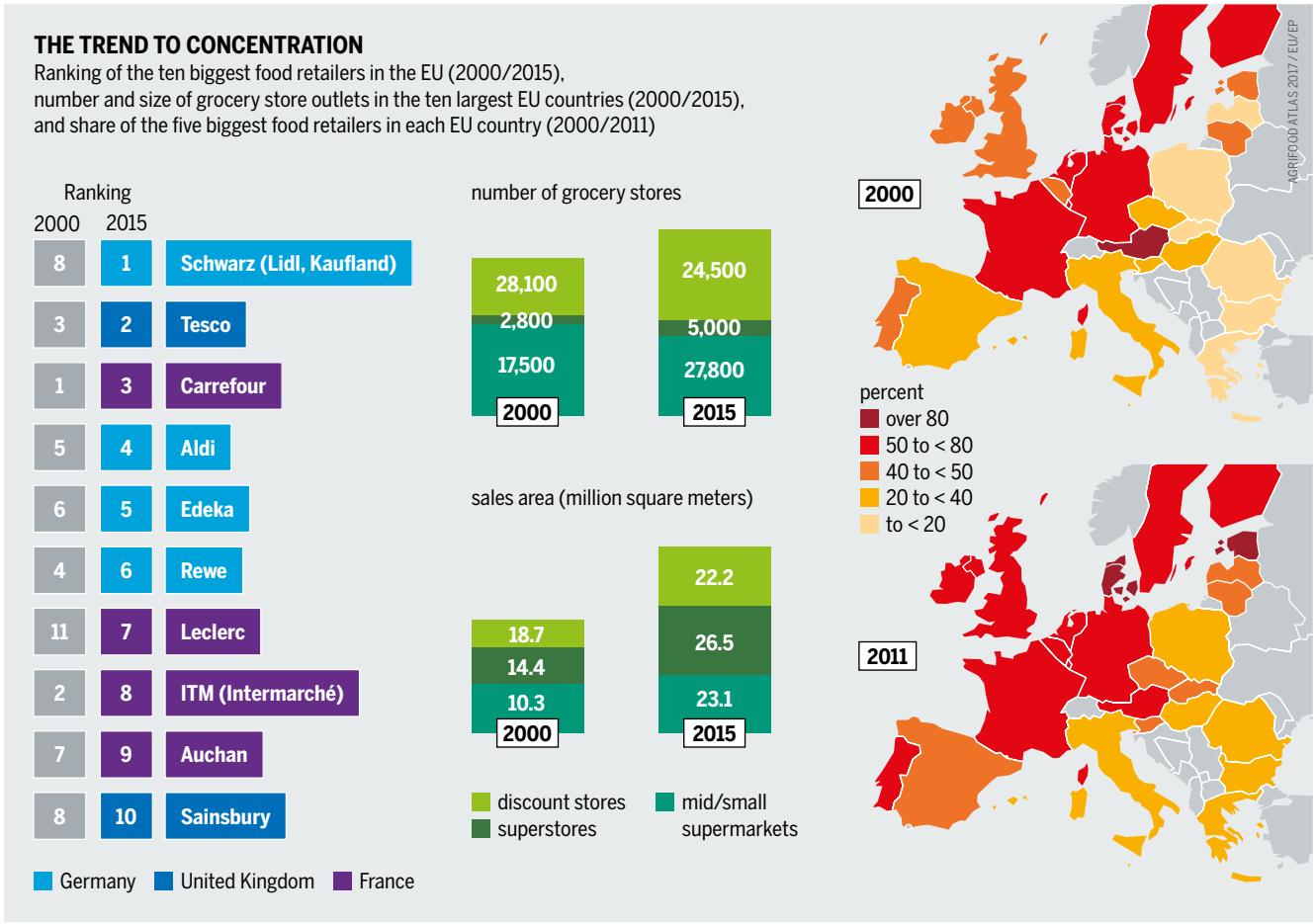
Governments in these countries are increasingly facilitating the building of supermarkets and are deregulating their investment regimes in order to attract international retailers, incentivize modern food retailing, and stimulate growth. In less than 20 years, supermarkets have boosted their market share from 5 percent of all retail sales to 50 percent, first in Latin America, and then in Southeast Asia.

This process is currently under way in China, and is just starting in India and Eastern Africa. In South Africa, supermarket chains already play a prominent role. Around 65 percent of all retail food sales, and 97 percent of all "formal" retail food sales (those where the customer gets a receipt), are thought to be made by one of the "Big Four". Shoprite, the biggest, operates in more than 16 African countries.

The supermarket spring tide in these regions normally occurs in three distinct waves of products. The first tends to be in packaged or processed foods, such as canned meat and vegetables as well as dry items like rice and spices. The second wave is in semi-processed foods, such as fresh milk and pre-packed fresh meat. The third is in fresh fruits and vegetables. This supermarket revolution occurs at the expense of traditional shops and markets.

While retailers start by purchasing from local wholesale markets, they quickly shift to buying directly from a small number of "preferred suppliers". They gradually exclude small local producers from their supply chains, and rely instead on large domestic and foreign farms that achieve high economies of scale, meet the supermarkets' quality standards, and accept responsibility for postharvest activities – such as packaging – so they can remain on the supermarkets' list of preferred suppliers.

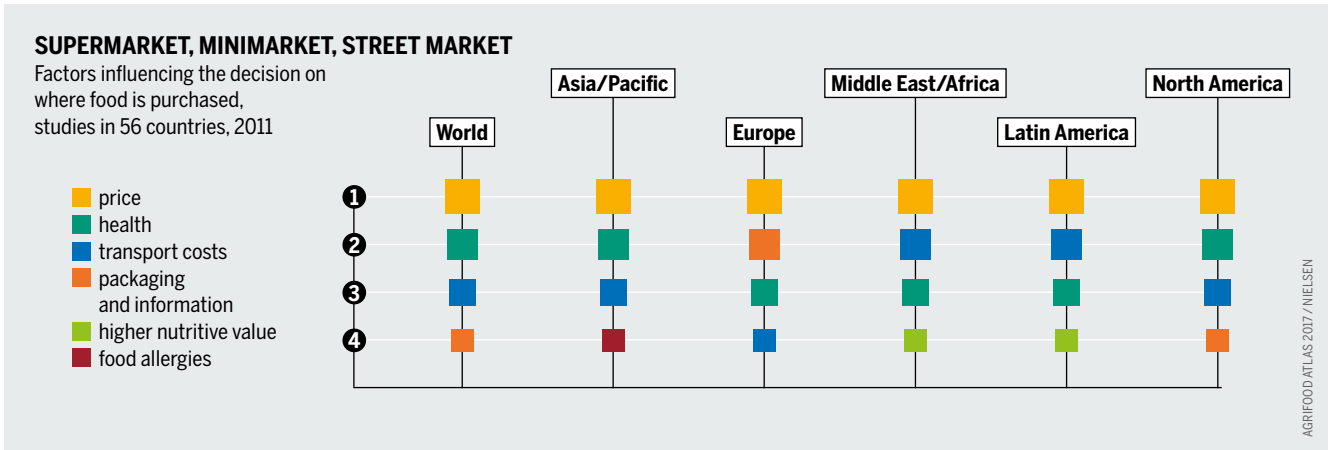
All the biggest grocery chains are based in the USA or Europe – and they are expanding throughout the world



The pecking order of the top grocery chains is changing rapidly. While they compete with each other, their total market share is growing

Supermarkets derive a great deal of their market power from their size. The bigger the market share, the more control the supermarket chain has over food distribution. It can extract preferential terms from suppliers, and it can boost its own margins. Pressure on suppliers is exacerbated by unfair buying practices: suppliers have to pay retailers for shelf space and contribute to the cost of opening new stores and advertising. The suppliers in turn pass on this pressure back up the supply chain to producers. In producing countries, suppliers oblige their workers to work longer hours for less pay. At the same time, these practices strengthen their power, as small-scale producers and family farms are muscled out of the market. They cannot hope to compete by volume. Some supermarkets have sections for locally grown food, but these make up a very small part of their total turnover and do not disclose anything about the size of the farm and the quality of production. By favouring medium- and large-scale farms, retail chains often thereby promote industrial agriculture. ●

Cheap, cheap, cheap: retailers know what attracts customers. Their business model depends on squeezing prices in every direction



CHEMICAL SPRAYS, BUT HUNGER STAYS

Industry says it can feed the world. But total food production is not the issue; access to food is. The key solution is to fight poverty.

Industrial, corporate-driven food systems have failed to deliver food security for everyone. And they will not be able to do so in the future either. That is because food systems severely harm both nature and the people on whom they depend. Many agribusiness firms claim that they can "fight hunger" simply by producing more food. But that is far too simplistic and misleading.

Historically, industrial agriculture has delivered large increases in production for major crops. Between 1961 and 2001, regional per-capita food production doubled in Southeast Asia and the Pacific, and in South Asia, Latin America and the Caribbean. It did so largely on the back of high-yielding irrigated crop varieties grown in highly specialized monocultures, boosted with lots of synthetic fertilizers and pesticides. These developments have lifted many farmers out of poverty and paved the way for better diets. Per person and per day, we produce more calories than ever before. But this achievement also masks major problems.

First, hunger has not disappeared. In 2017, there are still 815 million people who are undernourished around the world. A large part of the problem is related to the uneven distribution of food, which is in turn tied to poverty and so-cial exclusion. Industrial food systems have tended to exacerbate inequalities rather than resolving them. Independent food producers – mostly smallholders – and farm workers account for more than half of those who go hungry today. Industrial agriculture is not helping them, and in many places it is making them even poorer – by depriving them of markets, expropriating their land and water, and polluting their soil. The key question is not, therefore, how to boost output. The discussion should instead focus on how to improve the living conditions of the poorest, including through agriculture, to ensure they have access to income and adequate nutrition.

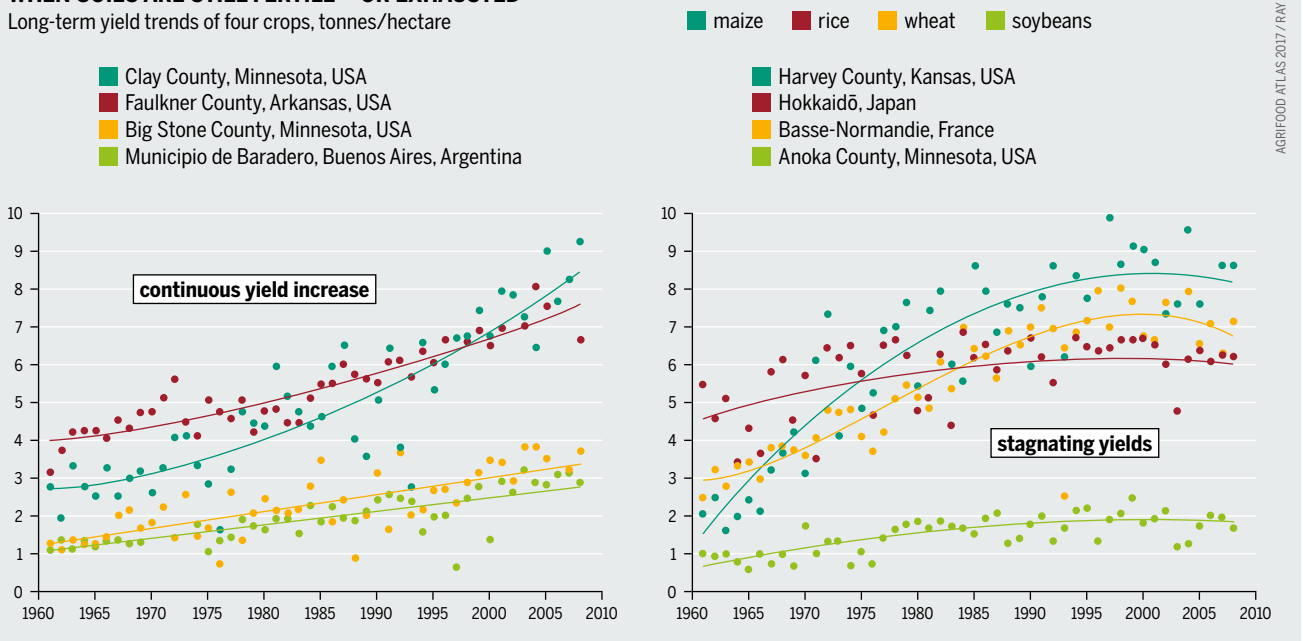
Second, because the efforts have concentrated on increasing supply, little has been done to improve efficiency. An enormous waste of calories is the result. The global harvest of edible crops is today equal to around 4,600 kcal per person per day. But only around 2,000 kcal per person are actually available for consumption.

A net loss of 600 kcal occurs after harvest, for example through spoilage and storage losses. Another 800 kcal are lost in the distribution system and in households. Even more – 1,200 kcal – are fed to livestock. The Stockholm International Water Institute published these figures in 2008. Updating them and adding in the effect of fuel crops would

In some regions, the negative effects of industrial agriculture can already be seen in production levels. Elsewhere yields are still rising

WHEN SOILS ARE STILL FERTILE – OR EXHAUSTED

Long-term yield trends of four crops, tonnes/hectare



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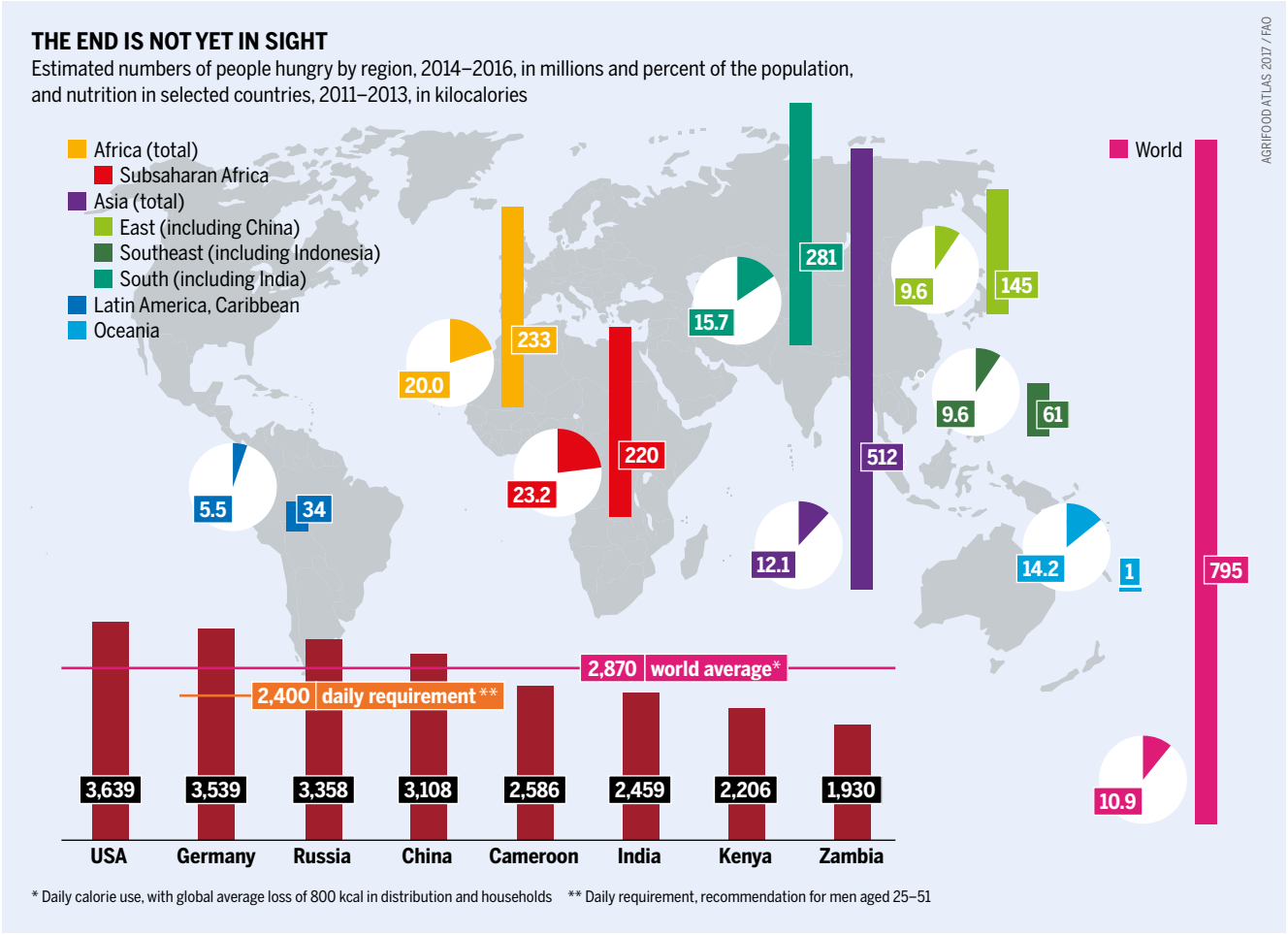


demonstrate even greater inefficiencies. So while the Food and Agriculture Organization of the United Nations says that 60 percent more food will be needed by 2050 to satisfy demand, it would be better to work out a plan for a fairer distribution of the supply.

Industrial agriculture handicaps the ability of current food systems to feed the world because it overexploits the ecosystem; it is a significant cause of land degradation. More than 20 percent of agricultural land worldwide is now classified as degraded, with degradation progressing at an alarming rate of 12 million hectares a year, equivalent to the total agricultural land of the Philippines.

In addition, intensive pesticide use brings major risks for long-term productivity: pests, weeds, viruses, fungi and bacteria are adapting to chemical pest management faster than ever. Farmers intensify the use of chemicals in order to maintain their production levels. Often this means recourse to additional chemicals. The vicious circle of increasing pesticide use and increasing resistance brings mounting costs for farmers, as well as further environmental damage.

These impacts have already taken their toll on agricultural productivity. In recent decades, yield increases for key crops in industrial cropping systems have started to plateau in various regions of the world; for instance, for maize in Kansas or rice in Hokkaido, Japan's northernmost island. A meta-analysis of yield developments around the world from 1961 to 2008 found that in around one-third of the areas growing maize, rice, wheat and soybeans, yields either failed to improve, stagnated after initial gains, or even fell.

More than a quarter of people suffering from hunger live in Africa. Malnutrition there has risen noticeably in the last 20 years. Everywhere else it is falling

The business model of the agrochemical companies and industrial agriculture plays an important part in these trends. The problems occur because the system relies on specialized producers and uniform products, leading to dependence on chemical inputs. For every increase in productivity achieved on this basis, there is a price to be paid sooner or later, somewhere or other, directly or indirectly, either by those who practise industrial agriculture or by others who are affected by its fallout.

Industrial agriculture also harms the environment through high greenhouse emissions and lower biodiversity, both of which further undermine future food production.

If we widen the lens to socio-economic sustainability, the impacts of industrial agriculture are equally problematic. Food systems are failing food producers themselves. Many small farmers and farm workers, especially women, struggle to grow enough to eat or a surplus to sell. They lack access to credit, technical support and markets – and face volatile prices for what they grow and buy. Industrial agriculture can sustain neither the environment nor producer livelihoods. It cannot feed the world. Changes in rice production in many parts of the world show that agroecology offers an alternative: diversified farming systems that produce high yields without damaging the environment and are in tune with the social systems in which they are embedded. ●

MEAT

HERD INSTINCT

They are largely unknown to the public, but they dominate the world's meat supplies. Much of the beef, pork and chicken we eat is controlled by just a handful of big firms.

Well-known giants such as Monsanto, Cargill, Bayer and DuPont dominate the global seeds, cereals and agrochemicals markets. They often symbolize the corporate takeover of the world's food system. But another powerful cluster of businesses remain hidden from public scrutiny: the companies that control the production, processing and trade of beef, poultry and pork worldwide.

According to the Institute for Trade and Agriculture Policy (IATP), the "Global Meat Complex" is a highly concentrated, horizontally and vertically integrated web of corporations that control the inputs, production and processing of huge numbers of animals. Some of these corporations occupy all major links in the global meat chain. Cargill, the best known, is a chief supplier of feed grain, the world's second-biggest feed manufacturer and the third-biggest meat processor in terms of food sales. Others, like CP Group from Thailand, New Hope Liuhe and Wen's Food Group from China, and BRF from Brazil, are leading feed manufacturers and meat processors in their own right.

This type of agribusiness has soared over the last 40 years, especially since 2000. JBS, Tyson Foods, Cargill and Smithfield, now part of WH Group from China, are the world's largest meat-producing corporations. The Brazilian firm JBS alone processed over ten million tons of dressed carcasses in 2009–10. This represents more than the combined total of the companies ranked 11 to 20. Each corporation uses a combination of several strategies including mergers and acquisitions of other companies, vertical integration of their supply chains, product diversification, wholesaling and retailing, and lobbying of governments for trade and investment deals to ease access to foreign markets.

The sheer power of these companies obscures the fact that only 9.7 percent of all the meat produced in the world is traded internationally: most companies produce for domestic consumption. However, the top ten global meatpackers dominate the sector, and the top three (JBS, Tyson Foods and Cargill) all have food sales that are at least twice those of numbers 4 (Smithfield/WH Group) and 5 (BRF, formerly known as Brasil Foods).

Each of these corporations expanded by buying out smaller companies, creating a situation where livestock raisers had very few buyers and were forced to accept whatever price the corporation dictated. The livestock raisers responded either by expanding production dramatically, cramming lots of animals into a limited space, or by abandoning livestock keeping altogether. In the United States, 85 percent of beef processing is controlled by just four companies. In Canada, up to 90 percent is controlled by two corporations (JBS and Cargill). European farmers have suffered a similar fate. In 2010–11, according to the industry research firm Gira, the top five meat firms in Europe were Vion (Netherlands), Danish Crown (Denmark), Tonnies (Germany), Bigard Group (France) and Westfleisch (Germany). Half of the beef and veal production in France, nearly two-thirds in Germany and over two-thirds in the United Kingdom were captured by four or five market players.

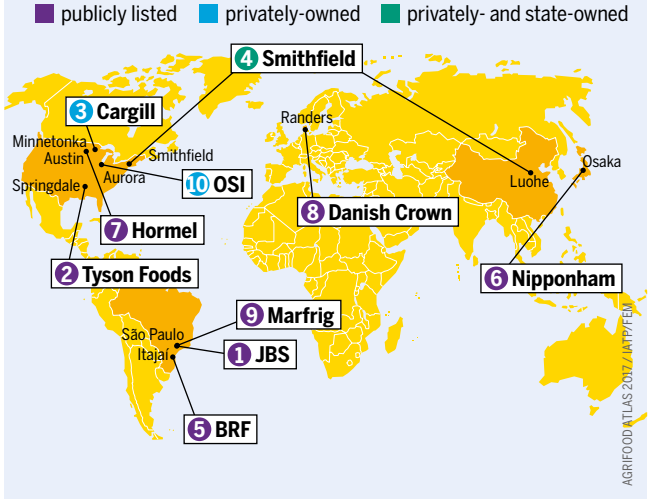
New economic developments are adding to the corporations' fortunes. The EU is set to produce and export a record volume of red meat in 2017. In the case of beef, this is because European agribusiness successfully lobbied the EU to eliminate the region's dairy quota. With no limits on milk supplies, dairy prices have plummeted, driving out many small producers. As dairy farmers continue to sell off their cattle, the EU's beef production has increased. At the same time, pork traders see new export opportunities. The EU has been the world's biggest pork exporter since 2013; buoyed by rising Chinese demand, EU exports reached record levels in 2016. Yet another record is likely in 2017.

But the farmers do not benefit, instead only the same few companies cash in on the sales. In 2013, Smithfield Foods, an American company with extensive European operations, was bought out by the Chinese Shanghui Group (later changed to WH Group). Its subsidiaries in Poland and Romania are now profiting from China's increasing demand. WH Group also controls nearly three-fourths of Shuanghui Development.

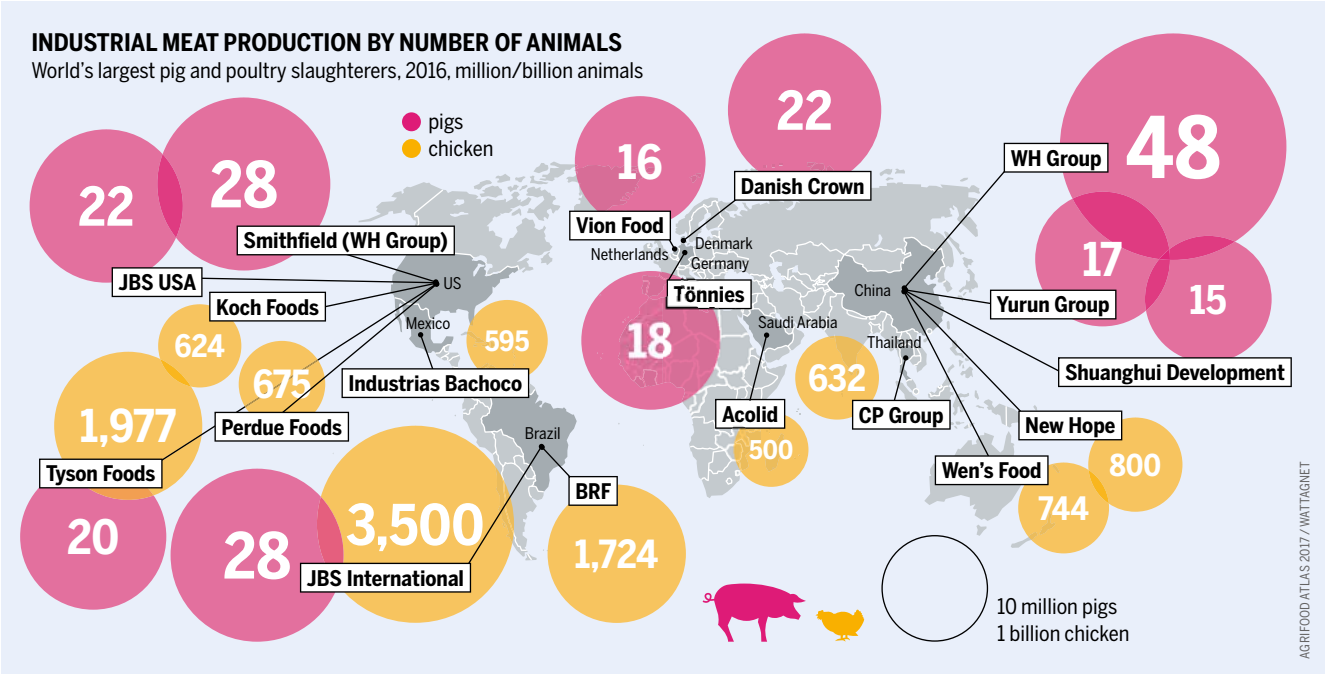
The poultry sector is the fastest-growing meat segment globally. In 2017, Brazil, the United States and the EU ac-

TOP 10 GLOBAL MEAT PROCESSORS

Food sales of transnational corporations, 2016, billion US dollars



For nearly a decade, almost the same group of corporations has dominated the list of the globally most active meat companies



counted for nearly 77 percent of the world's poultry exports. The same handful of companies (JBS, Tyson, BRF) profits from the expansion in trade. Leasing competitors' facilities and bidding wars are key strategies to get to the top, and stay there. When the French Groupe Doux – once Europe's largest poultry producer – floundered in debt in 2012, JBS stepped in to operate Doux's Brazilian operation, Frangosul. JBS was previously limited to beef in Brazil – this leasing arrangement enabled it to penetrate the Brazilian poultry and pork markets. In 2013, after a series of further leases and acquisitions, JBS's poultry division was significantly strengthened with the creation of JBS Foods. Products from these plants end up in supermarkets in Europe and elsewhere.

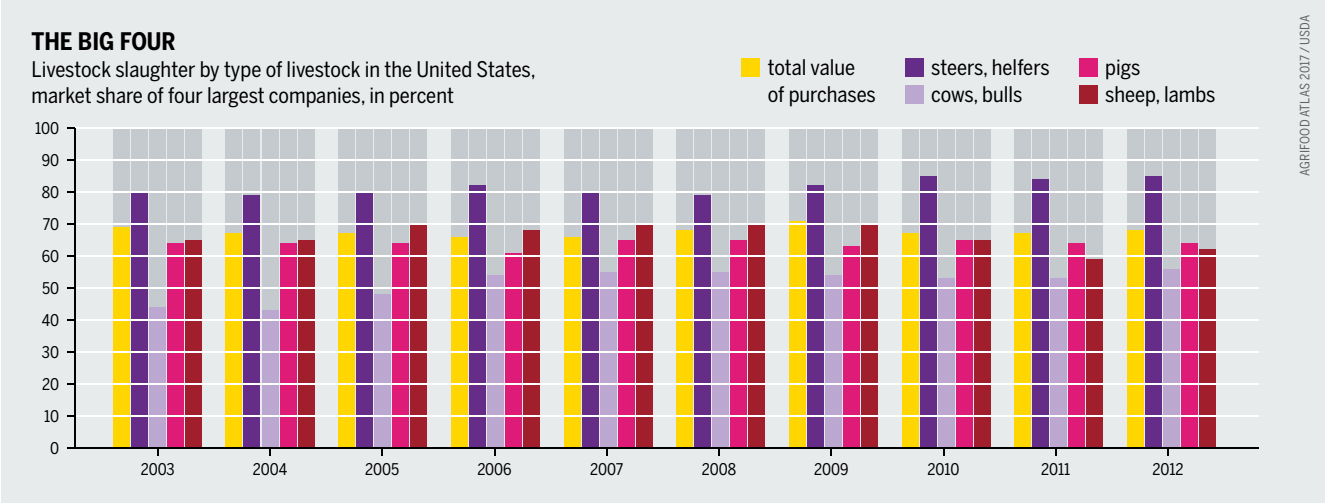
Such expansion, however, has real societal costs. In 2016, the German organization Christian Initiative Romero (CIR) started a campaign on chicken nuggets targeting major German supermarkets such as Rewe, Edeka, Lidl, Netto and Aldi. This campaign highlights the slave-like conditions of the poultry workers in JBS and BRF's supply chains.

Highly concentrated: The top four meatpackers in each sector of the industry account for between 55 and 85 percent of the animals slaughtered

The world's largest abattoir capacities for domestic consumption or exports are located in China, the United States, and Brazil

Since October 2016, nearly 40 countries have faced a new wave of highly pathogenic bird flu that has killed people in China. The flu decimates both wild and farmed bird populations – costing farmers and the public millions of dollars and increasing the risk of the deadly disease jumping to humans.

The environmental impacts of this industrial meat production system include pathogenic bird flu, antibiotic resistance, land, water and air pollution, as well as climate change. Without government support through public funds and policies that allow these practices to continue, the phenomenal rise of these meat giants would not have been possible.



ALTERNATIVES

LOOKING FOR A NEW WAY

Agroecology is a successful concept which promotes farming methods that are attuned to local ecosystems. It is already used for growing rice worldwide.

The globalization of food production through multinationals has created a physical and psychological distance between consumers and farmers, i.e., between what we eat and where it comes from. Food arrives packaged on supermarket shelves with little trace of its rural origins. But more and more people are questioning this dominant food system; they are critical of how industrialized food is produced and how little we know about it. A growing movement of pioneers around the world is working to change the way we produce and consume food. They are trying to make our food systems more socially just, environmentally friendly and independent from big corporations – from farm to fork.

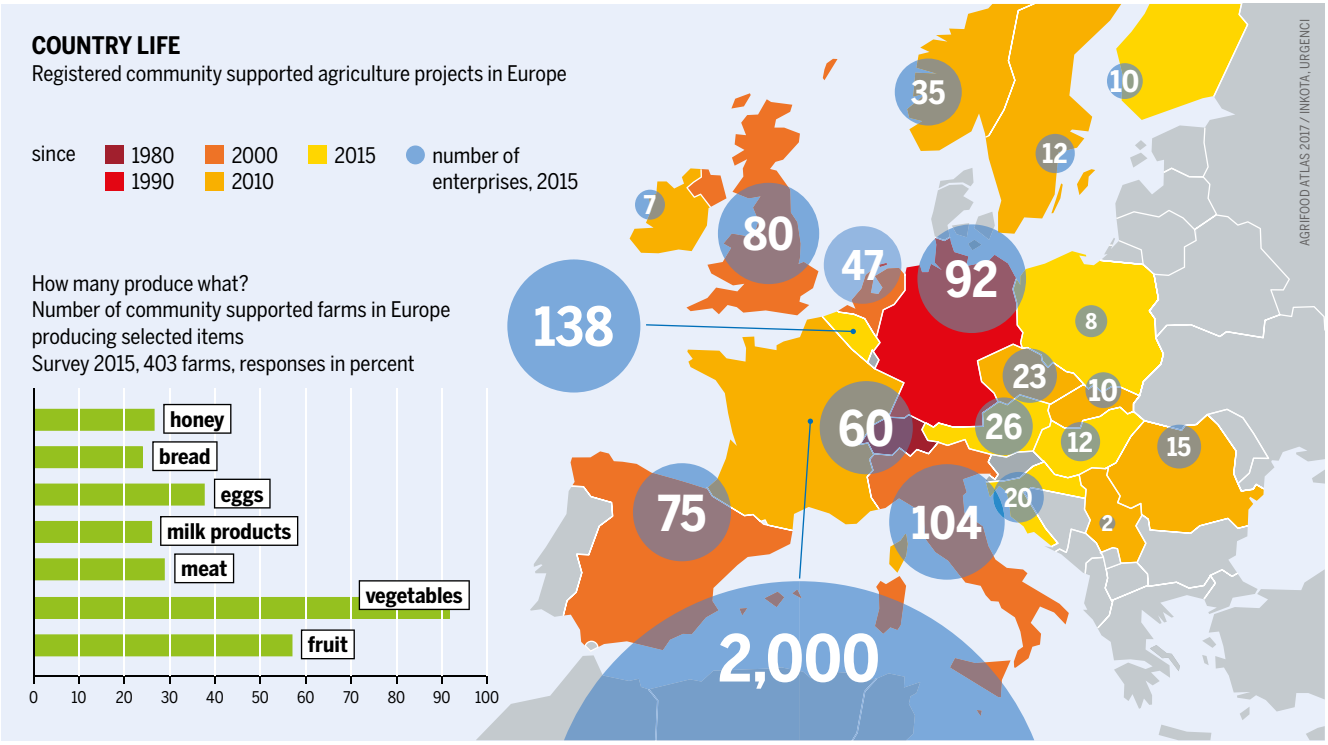
The idea of agroecology is not new: farmers and social movements have for decades been working on more environmentally and socially friendly alternatives to industrial agriculture. Now, research institutions, civil society, the United Nations and a few governments are starting to adopt this concept. In the 2015 Declaration of the International Forum for Agroecology, social movements agreed on the principles and methods to achieve this vision. But it still has a long way to go before it becomes mainstream.

Agroecology is often confused with ecological farming or sustainable intensification – an approach that aims to produce more with fewer resources. But agroecology is more, and different. It questions the logic and power relations that underpin current agricultural production. It instead promotes small-scale farming that is attuned to local ecosystems. It is not only a set of agronomic techniques; it is a political, social and transformative process. It offers tools that give people the right to define their own food, agriculture, livestock and fisheries systems, and the policies that affect those systems as part of an international movement. It seeks not to fine-tune industrial agriculture but to replace it: not conformation but transformation.

The agroecology approach imitates and optimizes natural processes by using local resources effectively, and by recycling nutrients and energy on the farm. This reduces the farm's dependence on purchases from big agricultural corporations. Industrial fertilizers are not needed to keep soils healthy: plant residues, manure and trees provide the soil with the nutrients it needs. Instead of pesticides, mixed crops keep pests under control. Crops are grown together with plants that either repel unwanted insects or attract useful ones. This "push–pull" method is widely used.

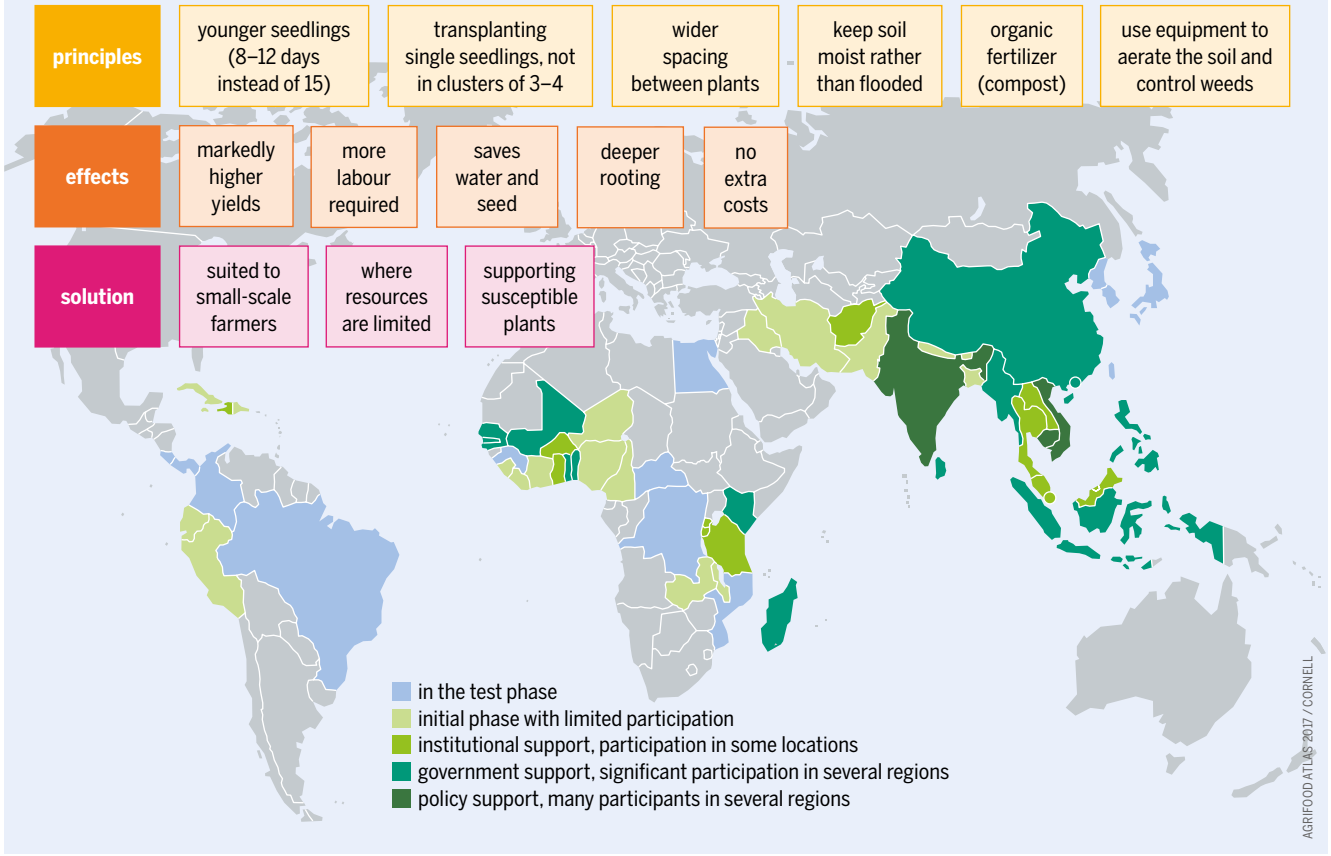
Rather than buying hybrid seed from corporations, farmers produce their own seed, improve it and distribute it through seed banks and exchange networks. Their seeds are well adapted to the particular environment and

In France, the smallholder movement AMAP has attracted a huge membership. Farmers sign contracts to supply customers over a period of several months of a year



SRI – AN ALTERNATIVE TO THE GREEN REVOLUTION

The "System of Rice Intensification": tender loving care for rice plants and the soil



SRI has many social and ecological advantages, especially in the face of climate change. The approach is spreading quickly

climate in each place, and maintains high agrobiodiversity on farms. Agroecological methods are well-suited to small farmers as they are adapted to local conditions. The System of Rice Intensification is an example of the agroecological approach. Rice seedlings are transplanted at a wide spacing to promote root growth. Instead of continuous flooding, the paddies are inundated intermittently to a shallow depth; weeds are controlled mechanically.

The System of Rice Intensification is practised by ten million smallholder farmers in over 50 countries in Asia, Africa and Latin America. Yields are 47 percent higher than in conventional farming, and the method maintains soil fertility over the long term. Organic matter fertilizes the soil and supports microorganisms. Instead of growing a single crop in a continuous monoculture, farmers grow several crops at the same time in a field, or one after another. This provides different sources of food and income and reduces the risk of crop failure.

Consumers can become independent from big corporations too. Across the world, various initiatives connect consumers to farmers. In Europe and the United States, "community supported agriculture" offers an alternative to buying food in the supermarket. Consumers and producers get together and plan what to grow on the farm. The harvest and risks are shared. Consumers do not think of themselves as consumers, but as co-producers. They cover part of the risk of production, enter into long-term purchase commitments, and pay fair prices. In Europe, some 2,800 such initiatives supply half a million people with food.

Many weekly farmers' markets in urban areas do not rely on intermediaries. In the global north, farmers sell locally produced food directly to consumers. In the developing world, markets supported by local authorities allow farmers to sell produce grown in an agroecological way. Farmers in Bogotá, the capital of Columbia, earn 25 percent more profit at such markets, even though the prices are 30 percent lower than in the shops.

Other initiatives in both developed and developing countries bring actors in the food chain together to realign their local food system. Such "food policy councils" play an important role in various countries: Canada, the UK and the USA. They act as platforms for civil society, local companies, scientists, politicians and local governments. In Toronto, the food policy council agreed on a plan to increase farmers' incomes, provide more school meals and promote health education. In Germany, four such initiatives are active now.

Similar initiatives exist in the developing world. In 1993, the National Council for Food Security in Brazil helped develop a national school nutrition programme supported through a public procurement policy. Every day it provides 45 million children and young people with food, grown mainly on smallholdings. Jointly shaping local food supply chains can make them sustainable and democratic, freeing producers and citizens from the chains of agribusiness.

INVESTORS CARE ABOUT GROWTH – NOT ABOUT THE GROWERS

Speculators are increasingly placing their bets on agriculture. Capital flows into stock exchanges are exacerbating price fluctuations in agricultural commodities – to the benefit of funds and banks.

Rules that once restricted excessive financial speculation on farm commodities have been loosened time and again over the last two decades. As a result, finance powerhouses now shape the global food system to an increasing extent. Since the early 1990s, the US Commodity Futures Trading Commission gradually relaxed rules that limited speculative trade in wheat, soybeans, and corn (maize) futures contracts. By 2005, those limits had been expanded by a factor of 10, 15 and 35, respectively. Futures trading involves buying and selling quantities of commodities today at a specific price for delivery at some future date. Finely tuned, such financial instruments can make a big difference to prices and profits.

As a result of these regulatory changes, banks including Goldman Sachs, Morgan Stanley and Citibank as well as other financial actors can now sell new kinds of financial securities. Commodity index funds, for example, typically track the prices of a bundle of commodities traded on futures markets, including agricultural commodities, and are subject to scant state oversight. Funds that focus entirely on agricultural commodities and firms have also emerged.

The market for these new investment products has grown rapidly in recent years. Between 2006 and early 2011 – a period that spans the depth of the global financial crisis – the total assets of financial speculators in agricultural commodity markets nearly doubled from US$ 65 billion to US$ 126 billion.

Speculation has played a significant role in the increased demand for investment products linked to agriculture and farmland. In the US wheat futures market, for example, financial speculators accounted for 12 percent of the trade in the mid-1990s; in 2011 this share rose to 61 percent. Today it is thought to be around 70 percent. Pension funds invest in agriculture-based securities in order to pay retirement benefits to their members. Their holdings shot up from US$ 66 billion in 2002 to US$ 320 billion in 2012.

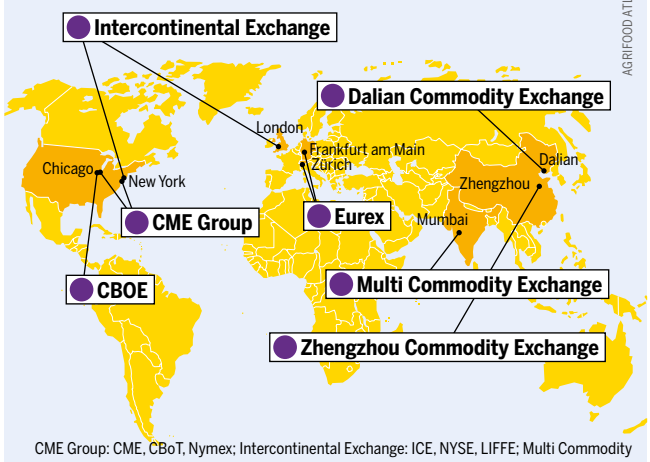
Hundreds of agriculture-linked investment funds are now in operation, controlling billions of dollars of assets. One of the largest is the DB Agriculture Fund, launched by the Deutsche Bank. This fund manages over US$ 700 million in assets, including maize, soybeans, wheat, coffee and sugar. In 2007, BlackRock, one of the world's largest investment firms, established an Agriculture Index Fund that invests in assets such as commodity futures, farmland, agricultural input firms, as well as food processing and trading companies. Its shares include Monsanto, Syngenta, Tyson Foods, Deere and Co, and ADM. This fund is worth more than US$ 230 million.

Many commodity-trading companies, such as Cargill, Bunge and ADM, have their own financial investment arms. These companies play unique dual roles, both as sellers of investment products, and as buyers of agricultural assets. They are of central importance because their decisions on whether to store or sell a product can influence prices, and as such they can greatly benefit from the new financial markets.

The narrative of a growing world population and limited resource base is attractive for large-scale institutional investors, including insurance companies, pension funds, investment funds, hedge funds, and university endowment foundations. They deal with huge sums and typically have a passive-investment strategy: they purchase low-maintenance financial assets and hold them for long periods, expecting prices to rise.

Exchange traded funds are one such vehicle. They involve a type of security that is listed on a stock exchange and whose composition reflects an exchange index, such as the Dow Jones index or the agricultural index of a futures exchange. In addition, hedge funds invest money directly in the agricultural sector on behalf of large-scale investors. An example is Edesia, a hedge fund worth US$ 2.7 billion in 2013 that is owned by Louis Dreyfus Company, a farm-commodity trader.

FUTURES MARKETS FOR FARM COMMODITIES
Large exchanges, selected, 2016



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CME Group: CME, CBoT, Nymex; Intercontinental Exchange: ICE, NYSE, LIFFE; Multi Commodity Exchange: MCX; Dalian Commodity Exchange: DCE; Zhengzhou Commodity Exchange: ZCE

Accurately predicting the weather, harvests and prices is the core business of agricultural exchanges. The aim is to reduce price risks

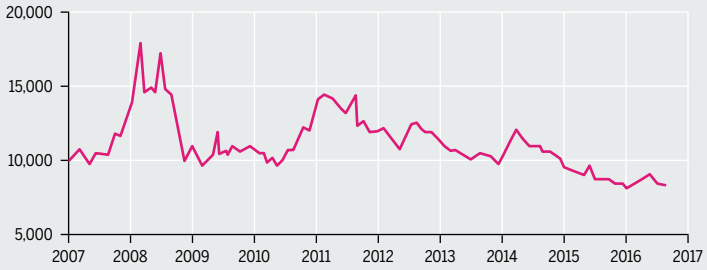
SPECTACULAR GAINS – AND LOSSES

Example for structure and performance of an Agricultural Fund

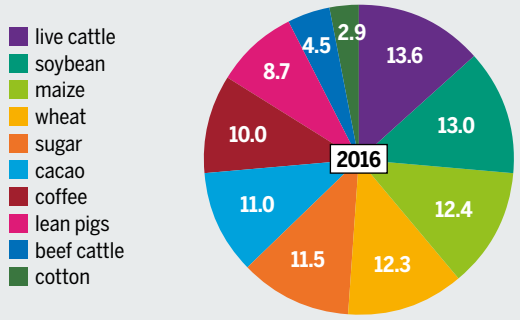
AGRIFOOD ATLAS 2017 / INVESCO

The PowerShares DB Agricultural Fund (DBA) manages US$ 742.56 million in investors' capital. Founded in 2007 by the Deutsche Bank, it was sold in 2014 to Invesco, an investment advisor.

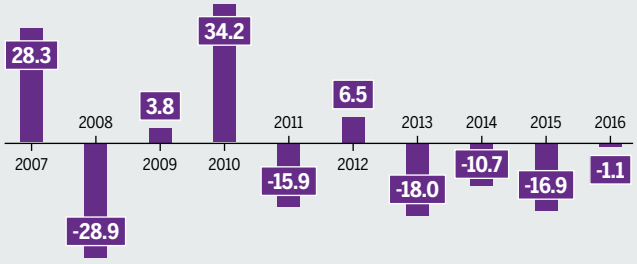
Value of an initial investment of 10,000 US dollars



Fund composition, 25.11.2016, in percent



Performance in comparison to the authoritative S&P GSCI Agriculture Index, difference in percent



Fill a basket with commodities, buy the right securities, build a fund from them, and then sell the shares – that is how an index fund works

The United Nations Conference on Trade and Development (UNCTAD) says that financial investment in agricultural commodity markets pushes up food prices and makes them more volatile. That benefits corporations such as Cargill, which continually buy and sell commodities. But it can spell disaster for people who spend a high proportion of their income on food, as do many people in the world's poorest countries. Farmers also face greater uncertainty if food prices become more volatile.

Financialization – the influx of capital investors who have nothing to do with the commodities they are trading in – has also contributed to a wave of land acquisitions since the late 2000s. This is the specialty of agricultural land funds: their shareholders can invest in agricultural production without having to purchase either commodities or land. One such specialist fund is TIAA, which manages retirement assets for employees of universities and non-profit organizations. It began investing in farmland in 2007 and now manages US$ 6 billion in such assets worldwide. Big land investments often aim to set up large-scale industrial farming operations that harm the environment and deprive small-scale producers of their rights to the land.

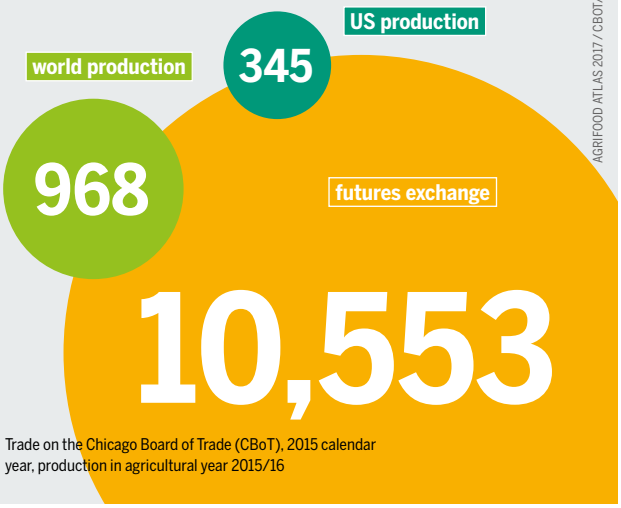
After the explosion in agricultural prices after 2006 and through the 2008 financial crisis and its aftermath, politicians in both the United States and the European Union have tried to introduce stricter regulations to curb speculation in the agricultural sector. But these efforts have been stalled by intensive lobbying and resistance from financial firms and large commodity traders. Investments in agricultural commodities declined somewhat after 2013, as oil prices and interest rates fell, fuelling investments in agricultural firms and agricultural equities index funds, alongside continued interest in farmland. After several years of losses in agricultural commodity markets, investors began to move back into that sector in 2016. ●

An ever increasing financial game: in 2015, futures trading in maize was 30 times the size of the US harvest and 11 times the world's

SOLD, RESOLD, AND SOLD AGAIN

Maize production and futures contracts, millions of tonnes, 2015/16

AGRIFOOD ATLAS 2017 / CBOT/WORLDOFCORN



Trade on the Chicago Board of Trade (CBoT), 2015 calendar year, production in agricultural year 2015/16

WORKING CONDITIONS

PILE IT HIGH, SELL IT CHEAP

Labels on supermarket packaging trumpet all kinds of concerns for people and nature. But most have little impact on the miserable conditions endured by farm and plantation workers.

Useful, easy-to-understand information on food packaging increases consumer trust – as any marketing specialist knows. For supermarkets and global food companies, customers' brand loyalty is a glittering prize. They know that price, taste and appearance are not enough to persuade shoppers to part with their cash: how the food is produced is also important. Concerned consumers want to be confident that animals and nature are treated gently, and that workers earn a fair wage and enjoy good working conditions.

In addition to official standards, special labelling on product packaging can assuage consumers' concerns too. Food processors and traders use a plethora of seals and certificates to assure potential buyers that the contents of a package are safe to consume, are produced in a sustainable way, or support social development. Hundreds of labels designed to appease consumers can be found on supermarket shelves around the world.

But labels developed by the industry itself are controversial. They may reflect the firm's image strategy, but do not ensure changes to the product, its effects on the environment or the working conditions of the people who produced it. One example is the "RSPO" labels. RSPO stands for the Roundtable on Sustainable Palm Oil. Rainforest is often cleared to establish oil palm plantations. In response to complaints about their use of palm oil, the breakfast-cereal maker Kellogg's, the food giant Unilever and many other companies use certificates issued by the RSPO to label their products. Some companies have even set up their own rules to protect the forest. However, the RSPO has been repeatedly criticized for certifying suppliers that are involved in illegal logging, the expulsion of indigenous peoples and the draining of peatlands.

A different approach is possible. The model for meaningful labels comes from the social justice movement. Since the 1960s, social, church and ecology groups in Europe and the United States have been signing direct contracts with smallholder farmers. The aim of these contracts is to make certain that the smallholders receive a bigger share of the value of the end product. One such label, "Fairtrade", is particularly widespread. Its fixed purchase agreements help ensure stable incomes for farmers, but it hits its limits when it comes to working conditions on plantations. The agreement specifies compliance with the minimum wage set in the specific countries but may be far below a living wage or the amounts paid into other types of employment.

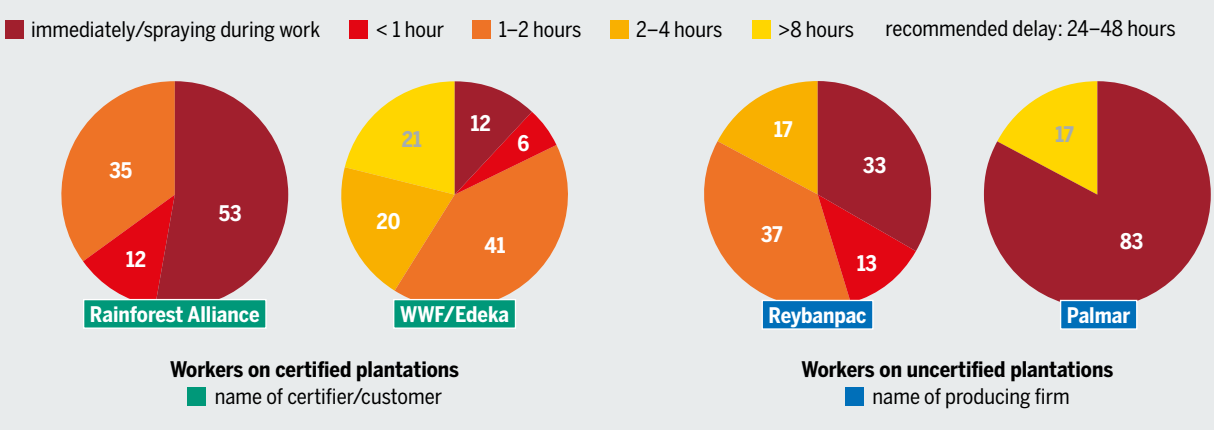
There is often a wide gap between advertising and reality. By using the Rainforest Alliance label, German supermarkets such as the discounter Lidl suggest that their bananas and pineapples are produced in a sustainable manner. But surveys in Ecuador and Costa Rica have found that the working conditions on Rainforest Alliance-certified plantations are catastrophic. This form of label abuse is known as "greenwashing".

The basic problem is that the food production corporations have always relied on cheap land and cheap workers. In the 1980s and 1990s, the International Labour Organization (ILO), an agency of the United Nations, found that work-

Products with certified labels have to be checked carefully. Trade unions on the ground can demand better working conditions that match the promises on the certificates

WORKING UNDER A CLOUD

"How long after an aerial pesticide spraying do you go back into the plantation?"
Survey of 165 workers on banana plantations in Ecuador 2015/16, responses in percent



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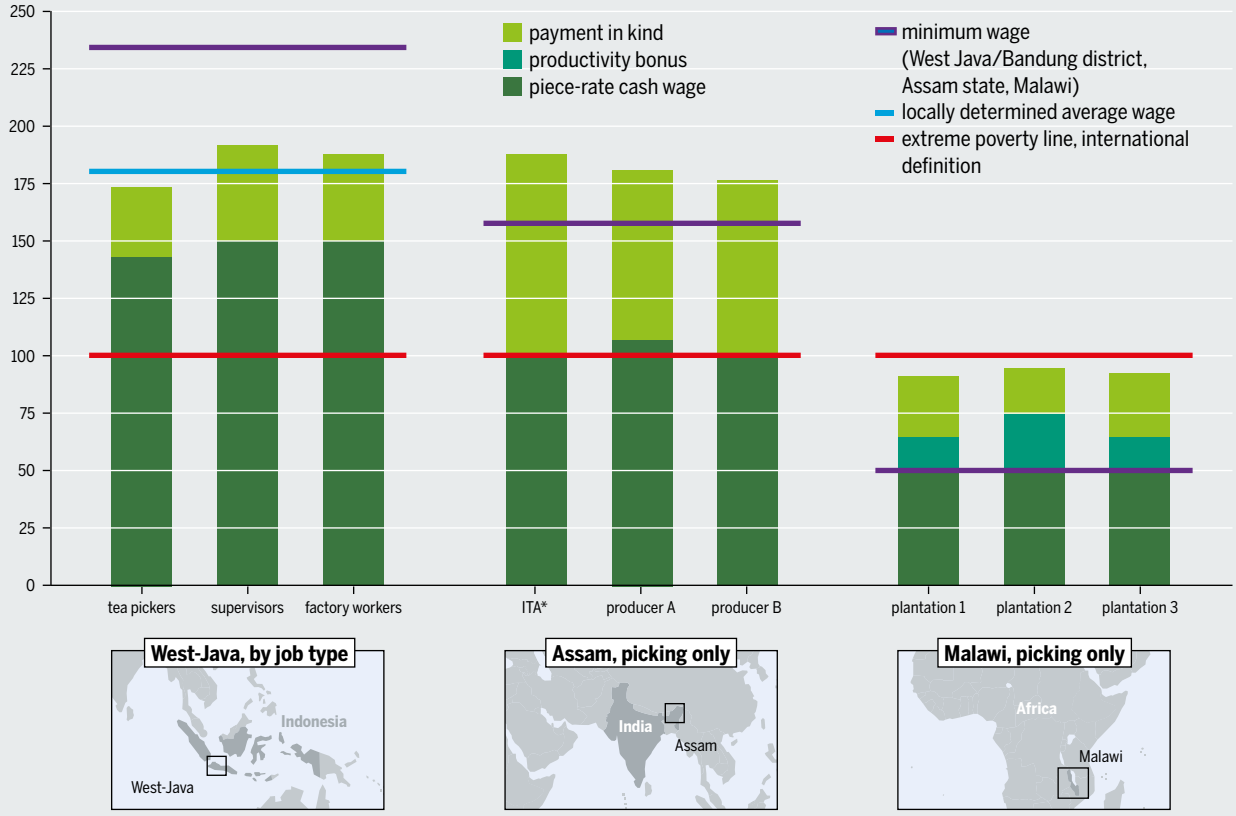
WORKING ON THE HUNGER LINE – THE EXAMPLE OF TEA

Wages on tea plantations compared to official minimum wages and poverty lines, study by the Ethical Tea Partnership, diagram based on World Bank definition of extreme poverty = 100 percent, 2013



AGRIFOOD ATLAS 2017 / MISEREOR

The extreme poverty line below which basic human needs cannot be fulfilled, was at the time of the study US$ 1.25 per day (purchasing power parity).
Calculation basis for Indonesia: 4-person household, two incomes; in India: 4.3-person household with 1.78 incomes; in Malawi: 3.8-person household with 1,17 incomes.
Payment in kind includes accommodation on the plantation. *ITA: estimate of Indian Tea Association

In many countries, tea pickers are among the lowest paid workers – most of them are women

ers in the agricultural sector were becoming more and more impoverished. Even today, the struggle for market share is often fought out at the detriment of the farmers and farm workers – the weakest links in the supply chain. Their share of the end-price of products has declined sharply in recent decades. In 1980, a cocoa-grower received 16 percent of the price of a bar of chocolate. Today it averages around six percent.

Labour-rights violations are the rule in agriculture, not the exception. ILO standards are supposed to protect the rights of workers to organize and form trade unions. They prohibit forced and child labour as well as discrimination on grounds of race or sex. But workers' attempts to organize and enforce their rights are often brutally suppressed. Trade unionists are threatened, fired and even murdered.

As a result, minimum wages are not met, overtime is not paid, and workplace safety is neglected. The breaches of labour law in primary production are particularly drastic: workers are often paid by how much they harvest rather then by the number of hours they work. Women tend to be even more disadvantaged than men. They are more likely to work in informal, seasonal or temporary jobs, and they typically earn lower wages. Many workers are exposed to pesticides: the ILO estimates that between two and five million people are poisoned each year, 40,000 of them fatally. Organic certification guarantees that a product is produced without pesticides – but organic producers are also subject to price competition.

However, the problems are not limited to farms and plantations: working conditions in the processing industry are difficult also. In India, PepsiCo fired trade unionists who tried to organize workers. In Pakistan, a company founded a 'puppet' trade union in order to weaken an independent workers' organization. In Guatemala, Coca-Cola fired the entire workforce of a factory in 2016 and moved production elsewhere. And to cut costs, ketchup producer Heinz cut 7,400 jobs in 20 months after it took over Kraft Foods: 23 percent of its workforce worldwide.

These stories are in direct contrast to the well-paid jobs that the agricultural and food industry also have to offer. Juicy research budgets, made juicier by public funding, ensure high salaries for employees in specialist departments such as food chemistry, genetics, engineering and economics. Fat marketing budgets also sustain the pay of communication and campaign staff. The companies maintain a public presence through their brand advertising and in the shops through their labels. But the labels and packaging are not indicative of how the contents were produced.

WORLD TRADE

IN CONTROL, NOT UNDER CONTROL

International trade deals reflect the interests of the industry. Agrifood corporations want to keep a grip on the steering wheel.

Shifts in economic policies have markedly reduced government control over markets and capital flows. This trend began in the 1980s and accelerated in the 1990s. Along with other sectors, the agrifood industry has undergone two changes: consolidation has led to the emergence of oligopolies of a few large suppliers, and big firms have gotten bigger. Their share of sales in foreign markets has increased, while the relative importance of their domestic markets to their global turnover has declined.

In 2015, the Swiss giant Nestlé generated around 70 percent of its global sales outside Europe and North America. The figure for the Anglo-Dutch conglomerate Unilever was about 75 percent. The effectiveness of their business strategy firms depends on continually opening up new markets. For this to work, cutting or eliminating tariffs and other trade barriers is an asset.

The value of global food exports increased fivefold between 1990 and 2014, while the value of agricultural exports increased fourfold in the same period. This growth was facilitated by a plethora of free trade and investment agreements. Most were negotiated in the wake of the signing of the Uruguay Round of Multilateral Trade Negotiations – the first set of global talks to address agriculture and food – and the founding of the World Trade Organization (WTO) in 1994.

The global agrifood corporations have played, and continue to play, a key role in trade negotiations. They often have privileged access to the official negotiators, and they have made their influence felt. In the Uruguay Round, the US chief negotiator for agriculture was employed by Cargill, a commodities giant, both before and after the trade talks. He was able to mould the framework of the agreement in the interests of his former and future employer.

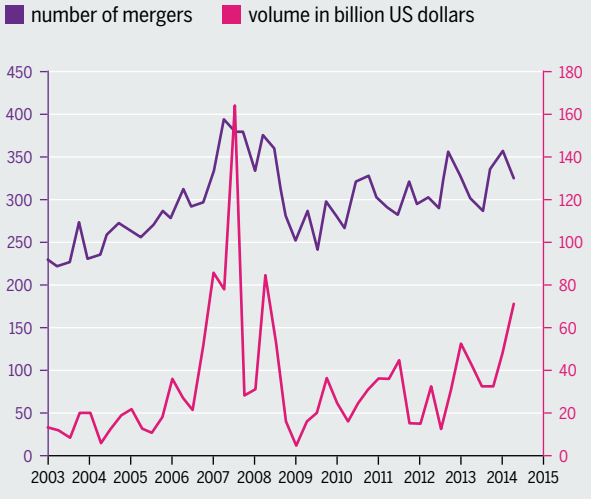
The next set of trade talks was the (unfinished) Doha Round, launched in 2001. Unilever, a global chemicals and food giant, represented the European food and drink industry. The firm urged governments to permit the widest possible opening of markets for goods, services and capital flows within the WTO negotiations. Its representative was appointed the "rapporteur" on agriculture for the Confederation of European Business. The position gave Unilever privileged access to the EU Commission, which negotiates trade agreements on behalf of all the member states. In turn, civil society organizations demonstrated against the free-market agenda, warned about the negative impacts on farming in the developing world, and criticised the opaqueness of the negotiations.

An extensive dismantling of customs and other trade barriers supports the strategy of multinationals to import cheap raw materials and export products to profitable, new markets. Exemptions to free trade limit their advantages. But these exemptions are important for developing countries as they allow them to protect their domestic food production and small-scale producers against cheap imports from developed countries.

World trade is governed by a thicket of rules and agreements. Besides the WTO regulations, there are at least 420 bilateral trade deals, along with more than 2,900 bilateral investment accords. An important element is the "investor–state dispute settlement system", which contains far reaching provisions that give foreign investors exclusive rights to challenge government policies and court decisions, effectively undermining the rule of law. It allows companies to sue a foreign government that has signed the treaty; they can claim damages if the government enforces a new regulation that diminishes their expected profits. Companies can thus undermine public policy objectives such as food security, health, environmental protection and workers' rights. This mechanism has been heavily criticised by civil society

FOOD AS A FUSION REACTOR

Development of worldwide mergers in the agrifood sector, by number and value



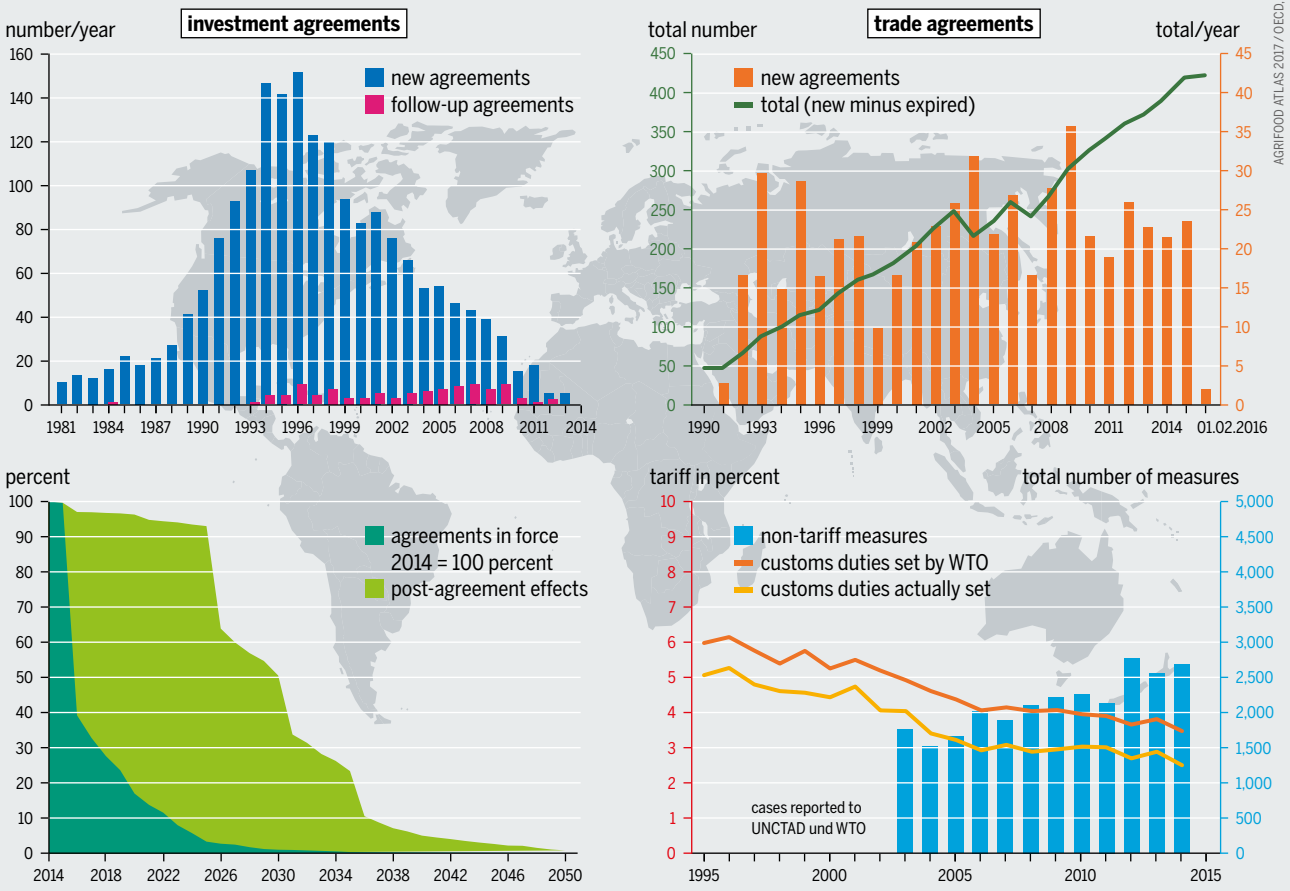
By quarters, excluding agrochemicals sector

AGRIFOOD ATLAS 2017 / RACONTEUR

Rising world market prices promise profits and count as a buy signal. Since the financial crisis of 2008, mergers have almost regained the levels of the boom years

CONTRACTS FOR THE WORLD MARKET

Trends in regional and bilateral investment and trade agreements



Investment agreements:
Globalization goes along with an increase of cross-border guarantees for investors. The decrease in the number of agreements indicates that fewer and fewer gaps remain. Protection for investors often remains in place for decades after the agreement itself has expired.

Trade agreements:
Direct trade barriers are falling. But non-tariff barriers such as regulations and standards that could impede trade are rising. Among these are social and environmental requirements.

Trade and investment agreements are made between states. Their main aim is to promote business interests

and some political parties. The number of such cases has rocketed from a handful of cases in 1995 to at least 767 cumulated claims by the beginning of 2017.

To attract investment, many countries create special economic zones which offer relaxed rules, standards and tax policies. In some countries including Mozambique, Tanzania and India , governments have identified such zones for agribusiness, in the belief that they stimulate agricultural development, new jobs and growth through foreign investment and new technologies. Multinationals are well-placed to take advantage of these zones. For example, Monsanto, Cargill, Nestlé and other corporations are partnering with the Tanzanian government in an investment zone that purports the promotion of small farmers' access to "modern" inputs, but which in fact enables these companies to enter a new market with official support. In this zone, 146,000 hectares of prime agriculture land have already been given to foreign investors, reports the German NGO Misereor.

The multinationals also lobby for easier capital movement across borders, lower taxes and extended protection for their technologies or brands. A central strategy of big agribusiness firms is to acquire competitors, consolidating the dominance of a small number of companies. Mergers are both horizontal, with direct competitors, and vertical, with suppliers and customers. Developed countries' competition policies have failed to prevent oligopolies emerging in agribusiness markets. Developing countries are starting to create competition authorities and introducing competition law, but progress is slow. At present only 120 countries around the world have competition legislation.

Evidently persuaded by corporate claims that oligopolistic market power in domestic markets is necessary to be competitive on an international stage, governments in the developed world have handled the need for competition in the agrifood sector with trepidation. A further obstacle is that competition policy focuses on the demand side: it aims primarily at protecting the interests of consumers against dominant companies. As long as prices are low, everything seems fine. But the supply side remains unprotected – suppliers such as small-scale farmers, cooperatives and local processors are left vulnerable to domination by the most powerful actors in the value chain. ●

EU LOBBYING

BIG BUSINESS IN BRUSSELS

The crowds of industry lobbyists trying to influence European Union policy often find they are pushing at an open door. They combine legitimate lobbying with underhand methods such as hiring government insiders and publishing quasi-scientific studies. The EU must recognize such tactics for what they are.

The EU quarter in Brussels is populated by some 20,000 to 30,000 lobbyists. About 500 multinational corporations have their own "in-house" lobby offices in the city, and coordinate their campaigns via some 1,500 sectoral federations. Some stage high-profile events, like the Swiss-based giant Syngenta, whose "Forum for the Future of Agriculture" promotes its chemical-intensive version of farming. Others are less publicly active but intervene more quietly, like the US firm Monsanto.

Corporations have many tools at their disposal to influence decision-making. These range from lobby meetings and information campaigns, to the hiring of former government employees, as well as support for and distribution of scientific papers advocating the industry perspective.

EU institutions often give corporations privileged access to intervene in the decision-making process, for instance, the talks on the Transatlantic Trade and Investment Partnership, a proposed trade deal between the EU and the United States. When preparing the mandate for the talks, and during the first two years of the talks themselves (January 2012 to February 2014), 88 percent of the meetings held by the European Commission's trade department were with industry lobbyists. Only 9 percent were with public-interest groups.

Hiring former public officials as lobbyists is a very effective way of fostering direct lines to the government. An emblematic case is Michael Taylor, an American lawyer who has gone through the revolving doors four times during his career, switching jobs between Monsanto and US government agencies like the Food and Drug Administration. In Brussels it is also common practice for lobby firms to recruit former EU officials or politicians. For example, the lobby firm Hume Brophy hired George Lyon, a Scottish Member of the European Parliament, to work on their "parliamentary team" on behalf of agribusiness clients. Hume Brophy is the firm hired by Monsanto to run the "Glyphosate Task Force", a lobby platform aimed at getting glyphosate's licence renewed.

Corporate lobbies occasionally lose battles, too. In 2009, they could not prevent EU politicians from setting strong rules that would outlaw certain groups of harmful pesticides. These rules ban substances that cause cancer or interfere with the hormone system. But after losing the first round, the corporations shifted their focus to undermining the implementation of these rules: their goal was to avoid a ban on their products.

From 2012 onwards, lobby groups like the European Chemical Industry Council (CEFIC) and the European Crop Protection Association (ECPA), with Bayer and BASF at the forefront, did everything in their power to derail the pro-

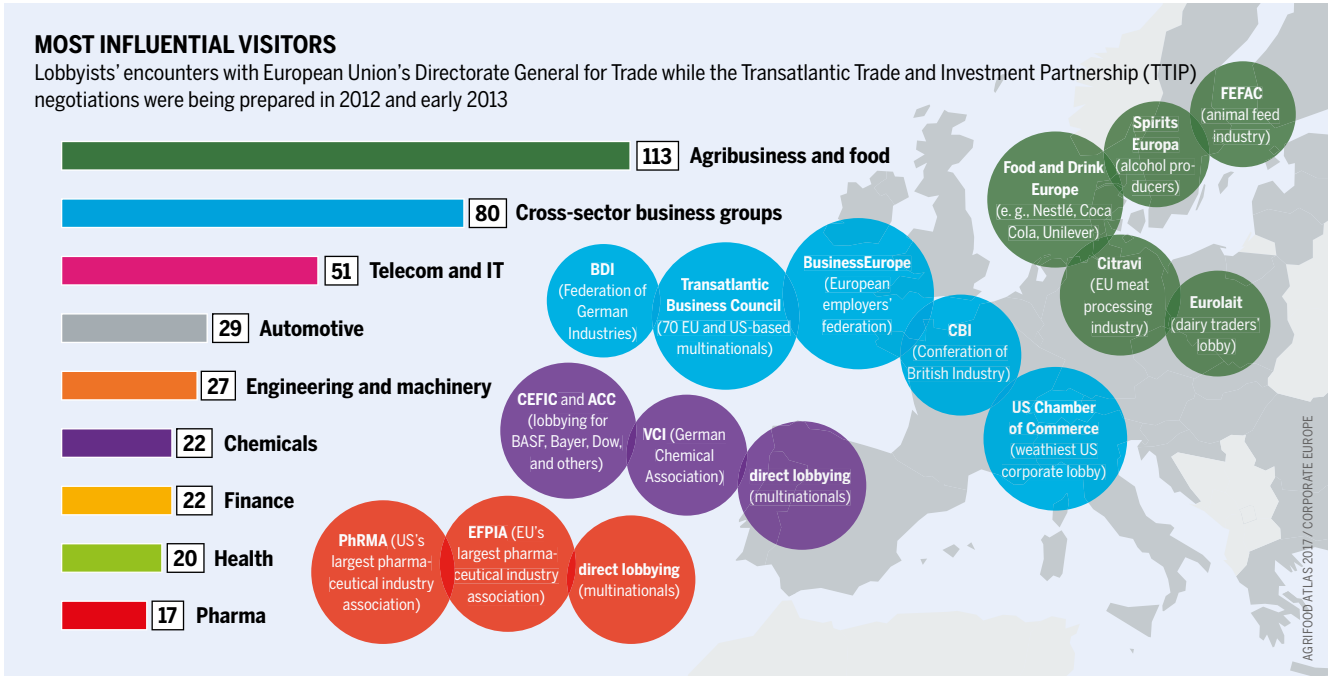
With Monsanto refusing to cooperate with EU lawmakers on their terms, the company's relations with the European Parliament hit a new low

2018 CASTING SHADOWS

US glyphosate trials, attempts for a renewed EU licensing, and Monsanto to be barred from the European Parliament

1. More than 250 lawsuits related to a type of blood cancer allegedly caused by the use of glyphosate in Monsanto's Roundup weedkiller, are pending in California. The first trial is set to start in June 2018.
2. Monsanto documents released by lawyers during the preparation for the trials suggest questionable research practice, inappropriate collusion with officials and "ghostwriting" of research studies that appeared to be independent of the company.
3. The "Monsanto papers" fueled a hearing by the European Parliament's environmental and agriculture commitees with academics, regulators and campaigners.
4. Monsanto decided not to take part in the hearing. It said that the Parliament was not an "appropriate forum".
5. The Parliament barred Monsanto from entering its premises, prohibiting the firm's officials to meet members of parliament, attend commitee meetings or use digital ressources there.
6. The heavily contested EU renewal of licensing glyphosate in the EU was scheduled for late 2017.

AGRIFOOD ATLAS 2017 / GUARDIAN, HUFFPO



A lot of work goes into collecting data on lobbying in the European Union; the Corporate Observatory has put in the effort

cess of establishing scientific criteria to identify which substances interfere with the hormone system. Their campaign funded "scientific" attacks on a major overview commissioned by the European Commission's Environment Department, calling it "junk science": a term invented by the tobacco industry for inconvenient studies showing the harmfulness of products. It pushed for loopholes that would let most of these harmful substances off the hook. It called for an impact assessment to buy time and to scaremonger about economic losses. It mobilized industry-friendly scientists to support their view. As a result, the Commission's proposals on how to regulate these chemicals have serious flaws.

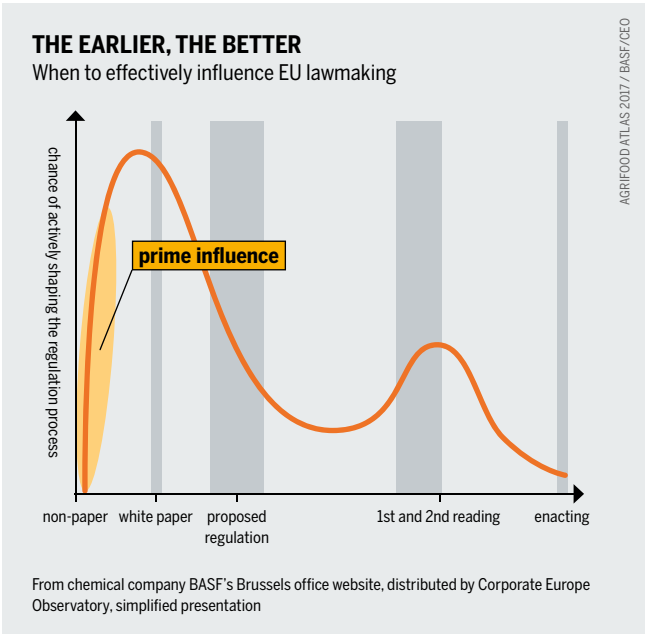
A similar case is the EU renewal of the licence for glyphosate. This chemical is the active ingredient in Monsanto's best-selling herbicide, Roundup, which is widely used against weeds in fields, parks and private gardens and along railways. In March 2015, the World Health Organization's cancer institute classified glyphosate as "probably carcinogenic in humans", which should have led to an EU ban. But the EU agencies maintain it is safe for human health and recommended a 10-year renewal of its licence.

In March 2017, lawsuits in the USA led to the release of hundreds of internal Monsanto documents. These reveal Monsanto's tactic of having studies ghostwritten by the company's own scientists and then getting "independent" academics to "just edit and sign their names". EU regulators relied extensively on one such study (Williams, Kroes & Munro), published in 2000 in the scientific journal Regulatory Toxicology and Pharmacology.

While the European Food Safety Authority put their trust in undisclosed studies for key decisions, the WHO process was completely transparent and reproducible. Only publicly available data were used, and no expert with apparent conflicts of interest could be involved in the drafting. Where someone's expertise was nevertheless deemed important, they were included as an "invited specialist" but could not take part in decision making.

Many serious questions by civil society are raised when it comes to where the power really lies in Brussels when crucial decisions are made. There are many proposals on how to tackle undue industry lobbying and influence over decision-making. A significant precedent was created by the UN framework agreement on tobacco, signed by the EU, that effectively bans lobbying of public health officials by the tobacco industry. Things can change – even in Brussels. ●

Lobbyist's logic: Attempts to influence politics are most effective at the very beginning of a legislative process



From chemical company BASF's Brussels office website, distributed by Corporate Europe Observatory, simplified presentation

CHINA

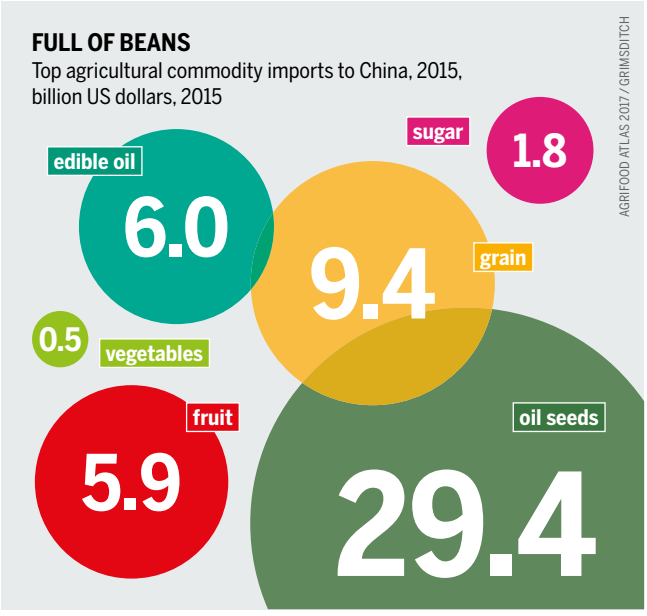
PUBLIC AND PRIVATE COMPANIES ARE REACHING OUT

The world's new economic powerhouse is located in China. Its land investments in Africa and Latin America have attracted headlines, but Southeast Asia is where it is making its influence most felt.

Rapid economic growth has massively expanded China's emerging middle classes and led to significant changes in their dietary patterns. The demand for consumer goods – and especially food – has increased dramatically. The country has 40 percent of the world's farmers but only 9 percent of its arable land, so food security and access to agricultural raw materials have become a top concern. The Chinese government has been pursuing land deals directly, by negotiating with foreign governments, and indirectly, by encouraging domestic companies to establish foreign partnerships.

The 2007–8 world food price crisis, which raised fears of food insecurity and intensified interest in securing foreign resources, led to a spike in Chinese investment in land. The country's huge foreign exchange reserves – which peaked at US$3.8 trillion in 2014 – reflect the fact that it has both valuable economic relationships and the money to invest in foreign land.

China's interest in land investments abroad was triggered after the Second World War, when it ran aid projects in Africa intended to gain political allies and display solidarity with other Third World countries. Many of these projects took the form of small-scale crop research farms that remained under local ownership. As a result, African governments tended to view foreign agricultural investment positively and strongly encouraged it. More recently, Chinese investment has mainly targeted resource-rich countries in the developing world, and has quickly penetrated Africa, Latin America and Southeast Asia.



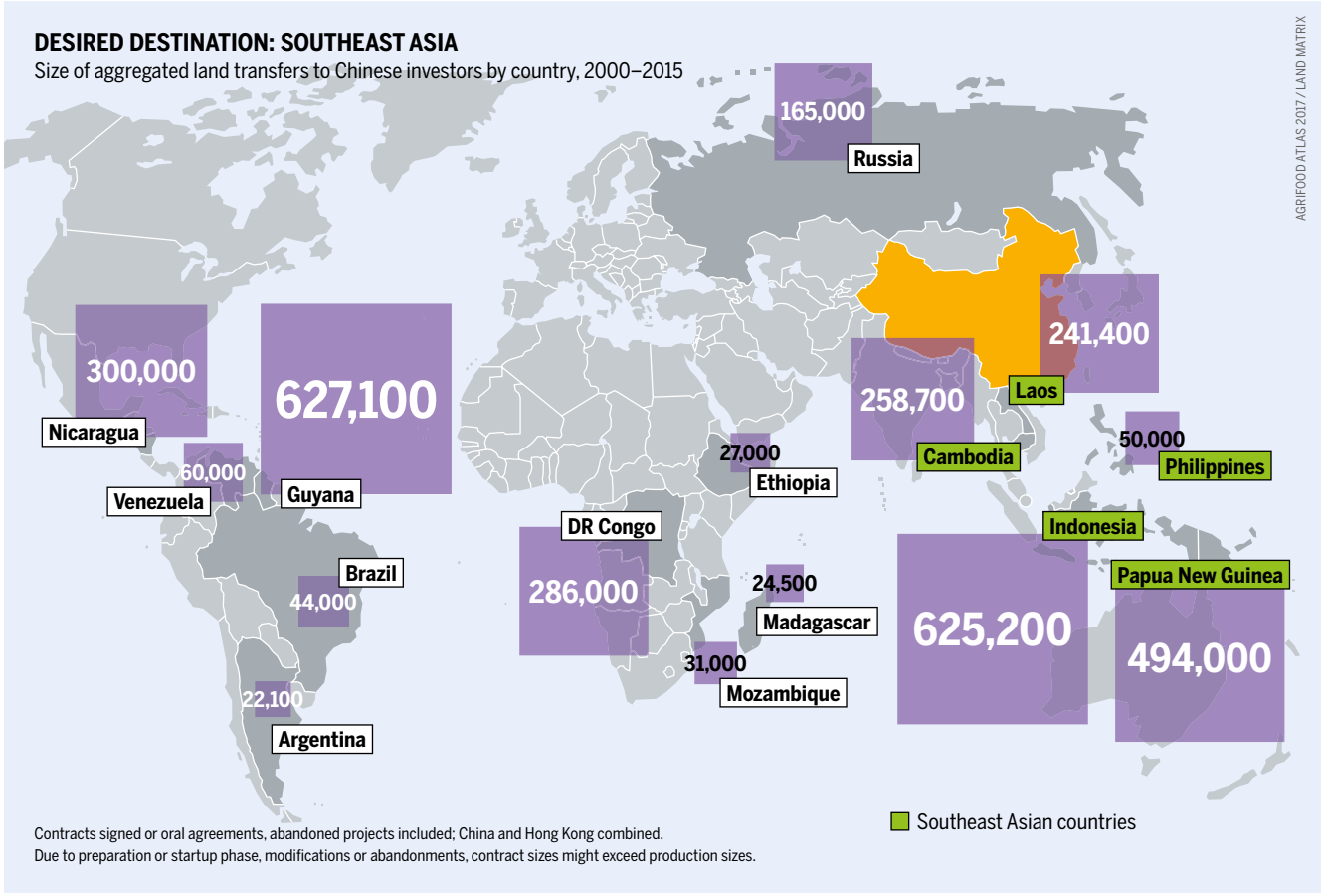
China's 1999 "Going Global Strategy", which centred on aid being mutually beneficial for all parties involved, led to a further expansion of Chinese economic involvement in the developing world. "Going Global" has facilitated a massive surge of Chinese investment in foreign agriculture in the last two decades, especially in Southeast Asia. China is now one of the top three investing countries in Laos and Cambodia – responsible for half of the foreign investment in Laos's agricultural sector, and half of the foreign-owned land concessions in Cambodia. Chinese corporations are among the most prominent investors in the region, reflecting China's emergence as a powerful player in agriculture around the world.

While Chinese investments in land in Africa and Latin America have gained a lot of media attention in recent years, land deals in Southeast Asia have been out of the spotlight. But Chinese investors are increasingly turning their attention to this region. Chinese corporations have invested in millions of hectares in 54 African countries; they have acquired almost as much in just six countries in Southeast Asia: Indonesia, Papua New Guinea, the Philippines, Laos, Myanmar, and Cambodia.

A significant proportion of the foreign investment in Southeast Asia comes from a range of public and private Chinese investors. Overall, Chinese investments, both domestically and abroad, are characterized by careful state-led planning, intervention and regulation. They involve a complex web of public (state and semi-state) and private interests, often making it difficult to determine exactly who is involved and what factors propel a particular land deal. While they cannot reflect the complete picture, online land databases reveal that several prominent Chinese corporations are investing in Southeast Asia, typically in deals involving 10,000 hectares or more.

IR Resources (previously China Asean Resources Ltd.), is an example. The credentials of its staff and advisory board, many of whom hold public-sector or high-level military positions make it clearly evident that this state-owned investment company enjoys direct connections to the central government. It trades in natural resources and is involved mainly in logging, wood processing, as well as rubber and latex production for the Chinese medical sector. Since 2007,

Nearly two-thirds of world's oilseed exports – mostly soybeans – go to China for feed and thus meat production



it has acquired multiple tracts of land of up to 31,000 hectares in Cambodia.

Another case is First Pacific, a national investment company that has amalgamated with several Chinese banks, and has ties with other state-owned investment, telecoms and export corporations, such as China Minzhong Food Corporation. It mainly invests in telecoms, consumer food products, and natural resources. Between 2005 and 2009, it acquired multiple tracts of land in the Indonesian part of Borneo, ranging in size from 5,000 to over 210,000 hectares.

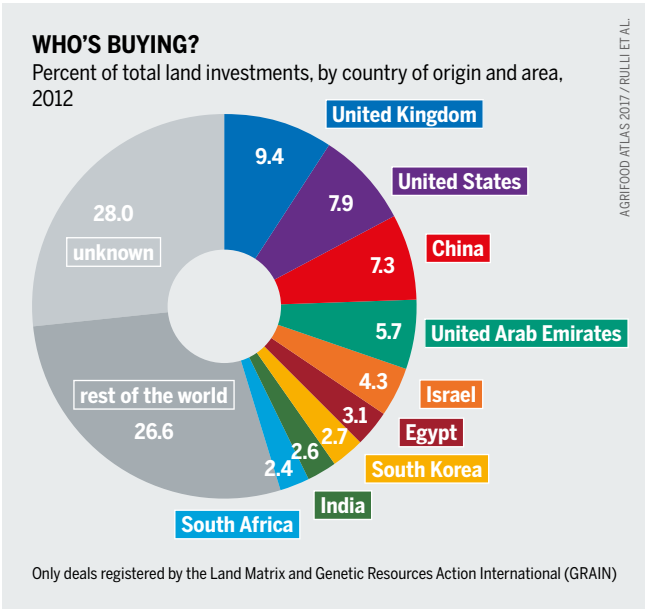
Chinese provincial governments are involved in certain companies. For example, the Yunnan government is the main shareholder in Yunnan Power Biological Group, one of China's top-ten sugar enterprises. It owns 14 subsidiary companies in China, Laos and Myanmar (many of which engage in plantation cropping), and focuses its investment in Myanmar, Laos, and Vietnam, all of which border Yunnan. In 2006, it acquired 37,633 hectares of land in Laos to expand its production of biofuels for export.

An example of a large private investor is ZTE Corporation. Previously state-owned, it has moved into overseas investment and is now China's largest telecoms corporation. Since 2008, it has secured over 100,000 hectares of Indonesian and Lao land for cassava and ethanol production.

The activities of these corporations highlight broader changes in how investors see land due to increasing global commodification as well as the value of land and agricultural products. This is intensified by the growing demand for sustainable energy (such as biofuels), which has made investments in multipurpose "flex crops" (those used for food, feed, fuel and industrial products) increasingly profitable. ●

Half of all Chinese agricultural land acquisitions are transforming parts of Southeast Asia into China's backyards

Research indicates that UK and US land investors are even more active than those based in China



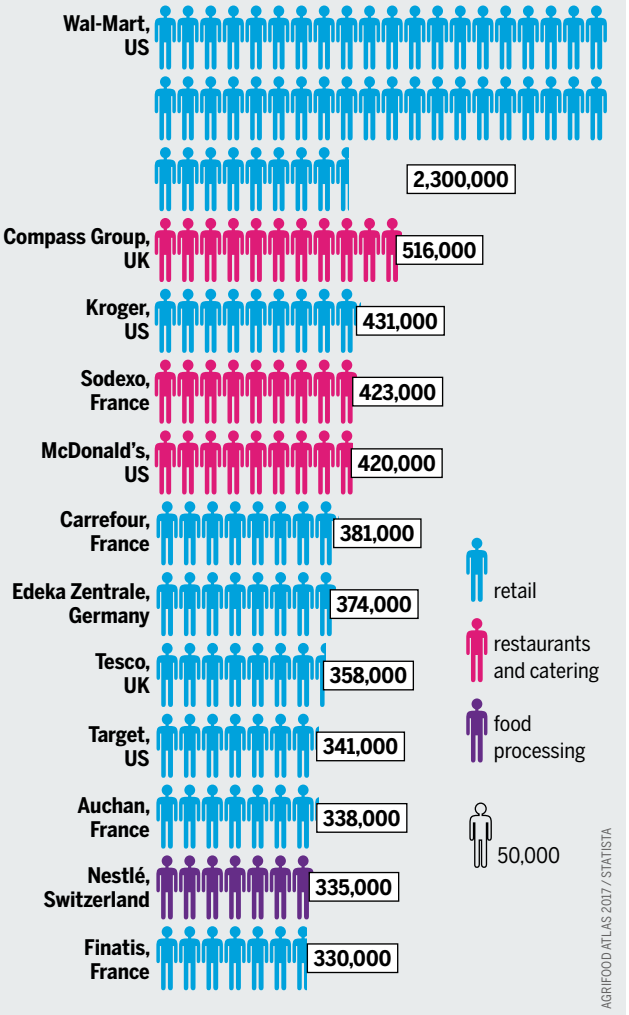
MARKET POWER AND HUMAN RIGHTS

Again and again, corporations fail to respect human rights. Voluntary measures are not enough: we need binding rules.

Governments lay down the framework of agricultural, commercial and consumer policies within which companies operate. The authorities have at their disposal a wide range of instruments with which to influence the national economy and regulate the power of corporations. But government policies are often interwoven with the interests of the corporations – rather than serving the interests of their citizens. As market concentration grows, competition policy becomes increasingly important. National regulations are supposed to hinder the creation of cartels, the misuse of dominant positions and the formation of monopolies – either by prohibiting them or by imposing conditions that companies must fulfil.

POWERFUL EMPLOYERS

Largest companies in food production and distribution by staff numbers



In the USA and elsewhere, competition rules have been weakened since the spate of deregulation that began in the late 1980s. But anticompetitive behaviour often has effects across borders, for example if companies collude to fix prices or secretly carve up a market between themselves. In such cases, it is often the farmers or suppliers in other countries who suffer. With markets concentrated in a few hands in many parts of the agrifood sector, civil society demands a reform of competition laws. Securing approval for mergers in highly concentrated markets should be harder, and the misuse of market power should be curbed.

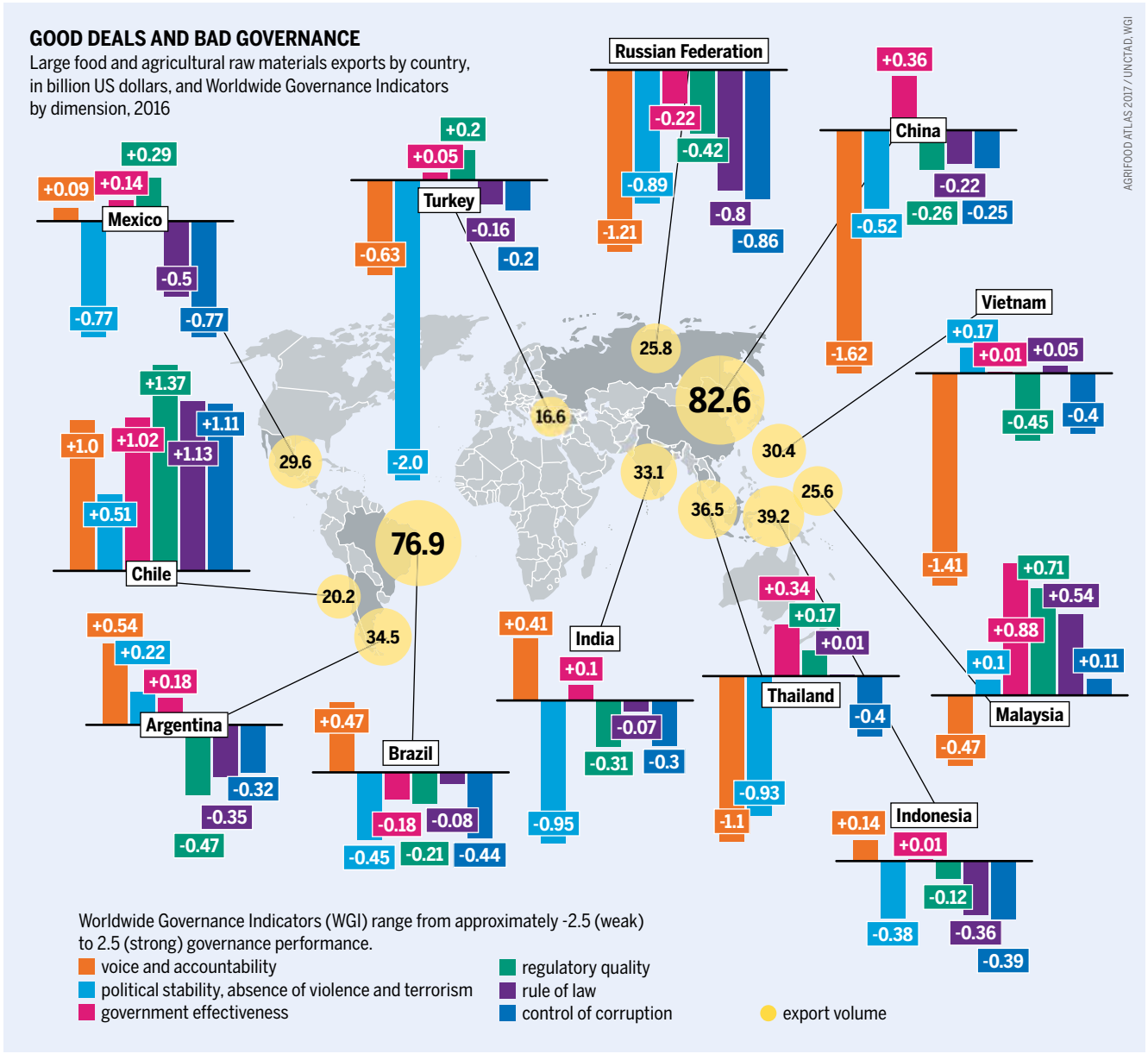
A particular criticism is that competition policy focuses only on the interests of consumers. It is assumed that competition works as long as prices are low. But this is not necessarily the case – competition on quality aspects may result in higher prices. Instead, policy should also strengthen the negotiating position of farmers and ensure the enforcement of social and ecological minimum standards all along the value chain. That includes guaranteeing that wage bargaining generates living wages.

In Europe in recent years, attention has focused on the big supermarket chains. The price pressure they exert is felt all the way back the global value chain. It is a major cause of poor working conditions both in the supermarkets' home countries and in the developing world. The European Commission has investigated the power of the supermarkets and unfair practices in the value chain, and especially complaints from the suppliers. But in 2016 it decided there was no reason to intervene at the European level. It pointed to voluntary measures agreed by the supermarkets and food manufacturers, which among other things planned to set up contact points for complaints by suppliers. But in practice, suppliers have seldom lodged complaints about their own customers – the risk of being blacklisted is too great.

The market power of companies is reflected in their turnover, their influence on prices and in standards they set for their suppliers. These are often so narrowly formulated that they restrict entry to the market, and exclude smaller upstream producers. In addition, big companies gain huge influence in many countries because they employ tens or hundreds of thousands of people, and can therefore shape social and environmental conditions there.

In many countries existing labour, land and environmental laws are not adequately enforced. In such locations, most companies reject any responsibility for compliance with rules that do not exist. The effectiviness of voluntary approaches is limited. Even if appropriate rules exist, they are not applied adequately. This is why civil society has been calling for global rules for businesses since the 1990s. Such rules should be under the auspices of the United Nations.

It is not possible to ascertain the proportion of staff devoted to food sales. But a company's bargaining power can be estimated by the number of people it employs



All selected countries belong to the world's 25 largest food exporters by value. Hong Kong and Macao are included in Chinese exports

In 2003, the former UN Sub-Commission on the Promotion and Protection of Human Rights adopted norms that would have held multinational companies to account. But this initiative failed in the face of opposition from corporation-friendly delegates in the UN Commission on Human Rights. In the aftermath, the "UN Guiding Principles for Business and Human Rights" were developed, and adopted unanimously by the UN Human Rights Council in 2011.

According to these principles, transnational companies should act proactively and with due diligence to prevent human rights violations in their supply chains. They are supposed to consult those concerned and, where appropriate, pay compensation to victims. But everything is on a voluntary basis, and there is no way of penalizing violations. Binding rules at the international and national levels would be preferable to this ineffective system. But so far attempts to introduce such rules have failed.

At the initiative of Ecuador and South Africa, a working group of the UN Human Rights Council has been negotiating a new agreement since 2015, supported by affected communities, human right defenders and activists from the global South. Many civil society groups propose to create an instrument that obliges states to protect human rights outside their own borders. This would require states to take all necessary measures to prevent "their" private actors from violating human rights in other countries.

Civil society also calls on states to mutually provide legal assistance thus making it easier for victims to file complaints of human rights violations across national borders. The aim is to strengthen national courts and to introduce an international mechanism that can hold corporations to account. For states that are particularly dependent on exports of agricultural raw materials, the former UN Special Rapporteur on the Right to Food, Olivier de Schutter, recommends that they disregard the wishes or models of the western states. Instead of designing rules to benefit consumers alone, they should also give smallholders adequate protection against oligopolistic commodity traders. ●

PROTESTS, BOYCOTTS AND RESISTANCE

In many countries, people are resisting agrarian and trade policies that boost the power of the multinationals. Individual companies also come in for criticism.

The world's food production could feed 12 to 14 billion people – nearly double the current population of 7.5 billion. But 800 million – almost one in nine – still go hungry. The majority of the poor live on, and from, the land. They are economically weak, politically marginalized, and their survival is constantly under threat. Despite this, it is the poorest who fight tirelessly against land grabbing, environmental destruction and unjust prices.

Various movements of smallholders and landless people have emerged in developing countries in recent years. Many have their origins in indigenous communities. They fight for land rights against soybean barons, palm oil exporters and mining companies, and against declining prices for their products. But governments often prefer lower prices, powered by cheap imports, because they benefit the urban poor. City-dwellers are more important to those in power than the residents of remote rural areas.

The scarcer and more valuable land and water are for farming, the more violent the struggle. In Latin America, several land rights activists have been killed in recent years. Governments in Ethiopia, Russia, India and China, among others, enforce strict laws that make life hard or impossible for civil society organizations.

Since the 1990s, international networks have formed to link organizations of smallholders, indigenous peoples, fisherfolk, farm workers and other rural groups. They try to influence the agricultural and food policy at the United Nations level. Some 22 international and regional umbrella organizations have joined forces in the International Planning Committee for Food Sovereignty (IPC). The biggest and best-known, with around 200 million farmers from more than 160 organizations in 73 countries, is La Via Campesina, Spanish for "the peasant way". Via Campesina emphasizes food sovereignty and the central role of women in agriculture and food production. It is represented in international policy forums such as the Civil Society Mechanism of the UN Committee on World Food Security (CFS).

The resistance to big agrifood takes on many forms and occurs at all levels. In 2012 in India, around 60,000 farmers and landless people held months of nonviolent protest marches in favour of land reforms. In 2007, other marches had gained the world's attention and facilitated access to land rights for hundreds of thousands of people. Despite this, the promised land redistribution and investments are insufficient.

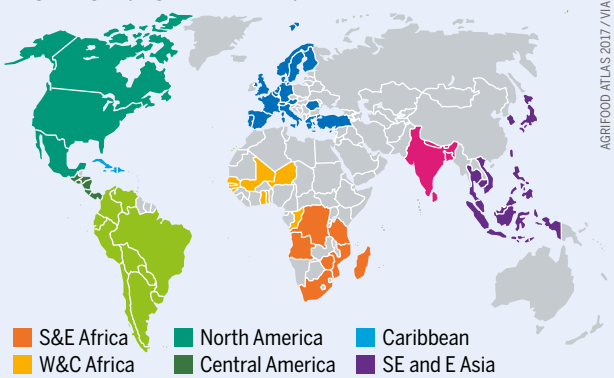
European movements have been successful in their opposition against genetic engineering. As a result of their longstanding protests hardly any genetically modified crops and livestock are raised in Europe. A network of 170 genetic-modification-free regions prevents the introduction of such organisms, and fights against their spread on the political plane. Globally, and especially in the industrial world, NGOs, farmers, and internet platforms such as Avaaz, mobilise support, mount campaigns, organize demonstrations and launch petitions to exert pressure on governments and businesses. In Germany, the network Bauernhöfe statt Agrarfabriken ("Farms, not food factories"), a coalition of 250 citizens' initiatives, prevent 30 factory farms from being set up each year.

All along the food chain, from production to processing and retail, workers are fighting against exploitation and for better working conditions. Workers on the Fyffes group's pineapple and melon plantations in Costa Rica and Honduras protest against pay levels far below the minimum wage. They also resist threats and discrimination against union members, the blocking of collective wage negotiations, and the lack of protection against toxic pesticides. Local workers' representatives demand the right to organize and to conduct campaigns; they are supported by the IUF, a global federation of agricultural trade unions.

Watchdogs such as the Corporate Europe Observatory constantly uncover cases of corporations trying to influence the distribution of farm subsidies, trade and research policy, and government research funding. Cooperation with whistle-blowers and independent media is vital to

A MOVEMENT 200 MILLION STRONG

Regional groupings of La Via Campesina in 73 countries



AGRIFOOD ATLAS 2017 / VIA CAMPESINA

The small farmers' movement La Via Campesina fights for food sovereignty and is the biggest social movement worldwide

NESTLÉ – A COMPANY WITH BIG IMAGE PROBLEMS

Its aggressive marketing of baby formula has been criticized for over 40 years. A look back in time
☐ background ☐ active boycott and ☐ repercussions to the present

1969 Criticism by the United Nations Protein Advisory Group: Advertising "healthy" milk powder in developing countries induces mothers to stop breastfeeding and causes babies to die. Causes: polluted water, non-sterile preparation (diarrhoea), dilution, nutrient deficiency (malnutrition).

Nestlé promotes its milk powder Lactogen via radio adverts, posters and saleswomen dressed as nurses who benefit from sales.

1973 In the magazine article "The baby food tragedy", doctors criticize the aggressive advertising for Lactogen. Nestlé complains it was not consulted.

1974 The British charity War on Want publishes the report "The Baby Killer"; in Switzerland, the Arbeitsgruppe Dritte Welt Bern (AgDW) publishes a German version titled "Nestlé kills babies".

Nestlé sues AgDW for libel but discontinues some of its controversial actions.

1975 Peter Krieg's film "Bottle Babies" appears in arthouse cinemas.

1976 AgDW is fined 300 Swiss francs because Nestlé has not committed a criminal offence. At the same time, the judge describes Nestlé's methods as "unethical and immoral".

1977 The Infant Formula Action Coalition (INFACT) calls for a boycott of Nestlé products. Action groups form around the world in response.

1978 Hearing of the US Senate on the need for a marketing codex.

1979 The World Health Organization and Unicef hold a conference on the subject. The International Baby Food Action Network (IBFAN) is established.

1980 "Nestlégate": An internal memorandum for intensive, systematic action against critics is made public. The World Health Assembly, the highest WHO body, adopts a codex for the marketing of breast-milk substitutes.

1984 The boycott coordinators meet with Nestlé managers. Nestlé accepts some points of criticism. The boycott is ended.

1988 Producers of infant formulas distribute advertising samples in health facilities. In the US, Nestlé actively promotes the product. The boycott is reactivated.

1989 The Wall Street Journal reveals that Nestlé's US advertising agency recommended infiltrating activist groups. Nestlé dissociates itself from the suggestion.

1995 In the UK, the advertising of milk powder as baby food is restricted.

1998 IBFAN receives the Alternative Nobel Prize (Right Livelihood Award).

2000 IBFAN and Unicef (but not Nestlé) take part in a hearing before the European Parliament's Development Committee.

2001/02 Celebrities refuse to appear at festivals sponsored by Nestlé.

Nestlé repeatedly rejects accusations against its milk powder. It says they are unfounded, outdated or based on a deliberate misinterpretation of the codex.

2008 "Nestlégate 2": In Switzerland, it is revealed that three Nestlé staff have been spying on Attac anti-globalization critics who have been working on a book about Nestlé.

2011 After protests in Laos, an independent investigation discovers deficiencies in information material. Labels on milk powder have for years been written in languages that target groups do not understand.

2013 Because of "Nestlégate 2" in Switzerland, Nestlé and the Securitas security service are fined 3,000 francs each in nine cases for invasion of privacy.

2015 The German broadcaster ARD reports on baby milk powder marketing in in the Philippines. Nestlé representatives "only inform people in health centres about their products", the company says.

AGRIFOOD ATLAS 2017 / SPITZECK/WOZ/AM ARCHIVES

improve transparency and gain access to secret negotiations. Trade agreements and the associated rules that make it easier for corporations to expand their market control have also been a target for opposition in both Europe and America. Hundreds of thousands of people have demonstrated in favour of trade policies that impose rules on companies and guarantee people's rights. Millions sign online petitions. One such initiative signed by EU citizens called on the European Union to change its trade policy; it was rejected on technical grounds by the European Commission, a decision eventually overturned by the European Court of Justice.

Resistance to free trade is not confined to the developed world. Imports of cheap chicken parts have almost destroyed poultry production in Cameroon. ACDIC, an activist group, launched a campaign against the "chicken of death" from Europe. It uncovered irregularities in importation and hygiene, and mobilized the media, politicians, consumers and farmers. Success took three years: in 2006 the government restricted chicken imports despite threats from the World Trade Organization.

Consumers also organize themselves. The most successful campaign against a food multinational was to protest against Nestlé's aggressive advertising for baby milk. After a boycott lasting from 1977 to 1984, Nestlé finally changed its behaviour. A World Health Organization rule now regulates such marketing practices, and Nestlé's reputation is damaged to this day. ●

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In the agriculture and food sector, we collaborate with two different types of actors: On the one hand we support rural social movements, grassroots oriented NGOs and scholars that subscribe to the concept of food sovereignty. On the other hand, we support workers organisations and trade unions both in the plantation and farm sector as well as in the processing, beverage and retail sector throughout the food chain. We are convinced that both movements can benefit from further collaboration and deeper exchange with each other to transform social realities on rural areas and create just and sustainable food systems. We find the current agri-food system in a manifold and deep ecological and social crisis, hence broad coalitions and emancipatory approaches are needed are needed to bring about change.

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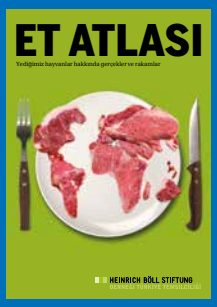

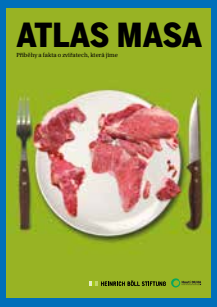

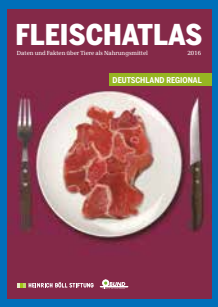

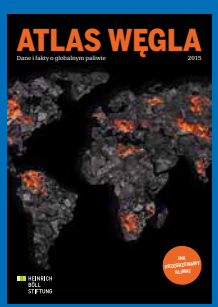

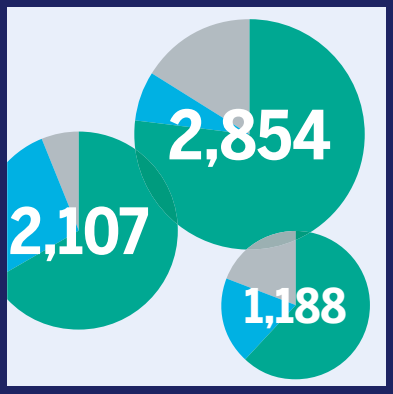

The 50 largest food manufacturers account for 50 percent of global sales.
from BRANDS DOMINATING MARKETS, page 29

Bayer, Monsanto and other mega-mergers: A key sector in agriculture will completely change.
from FROM SEVEN TO FOUR – GROWING BY SHRINKING, page 20

Some say Cargill is not only part of the value chain but it is the chain itself.
from AGRICULTURAL TRADERS' SECOND HARVEST, page 27

When corporations fail to respect human rights, voluntary measures are not enough.
from MARKET POWER AND HUMAN RIGHTS, page 48