CHAPTER 4

BUSINESS INFLUENCE IN THE AGRICULTURAL SECTOR

Vertical Integration within the Agricultural Sector: the European dimension

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Abstract

This paper provides a basic understanding of the issue of vertical integration within the agricultural sector, and the influence this has on prospects for maintaining a harmonious relationship between agriculture and biodiversity. It examines what is meant by vertical integration and demonstrates a link between corporate strategies for vertical integration and the development of biotechnology. It raises the issue of political independence and policy control over the agri-food industry and addresses the relationship between vertical integration and trade patterns. Examples show how local problems elsewhere in the world are linked to the European dimension of vertical integration. Three core issues are: the relationship between government and the private sector; the consequences of oligopoly in the agro-industry; and the location of statutory control over the global dynamics of trade in seed, feed and primary agricultural commodities.

Introduction

Although there is considerable interest in agriculture as a means for promoting biodiversity and sustainable rural development, this multiple functionality of agriculture may increasingly depend on actors who have no direct interest in local economic welfare and who are not necessarily influenced by national land use and social development policies. These actors are the ones controlling markets and technology worldwide. In fact, when considering the role of governmental authorities in guiding the direction of agricultural practice within the recent historical period (Potter 1998), it is possible to deduce that government policy is reacting to, not leading, the evolution of agricultural markets and technology.

Government policy is designed as if the farmer were the principal agent in the agricultural production system, and certainly farmers respond to signals from government when this will give them a degree of freedom from the other influences on their production practices. But the reality of farming is that prices for agricultural commodities are low, and in order to secure financial resources the farmer is committing himself to his future production strategy through forward contracting; he sells in advance a certain quantity of an agricultural commodity at a fixed price. There is very little difference between a farmer and hired labour in the definition of production strategy when the agent on the land – the ‘farmer’ – is operating under contract or simply taking orders from an industrial manager.

What are ‘the other influences’ referred to above? Except in the case of ‘hobby’ farmers, a farmer is an economic agent, who seeks to identify a particular production range that he has an adequate knowledge – and interest – to pursue, and for which he can recognise adequate market outlets. In principle, he will seek to maximise his net revenue by controlling the relationship between the primary factors of production (seed, land and its quality, machinery) and the variable factors of the production process (inputs and labour). To the extent that he loses control over any of the primary or variable factors of his production process, he loses independence in his agricultural production strategy; and to the extent that he has no market outlet to choose from, he equally loses his autonomy of action.

It would only be through ignorance that the importance of ‘the other influences’ on the primary
and variable factors of agricultural production could be discounted, as well as the crucial matter of market outlets. This is why taking into account the issue of the vertical integration of agri-industrial food production systems has to be the critical focus of a strategy to promote biodiversity through agriculture. Taking wheat and bread as an example, if the seed stock, fertilisers and pesticides, grain elevators and bulk transport facilities, bakeries and distribution systems to the supermarkets are all part of one multinational firm, where in this chain can an individual farmer try to exert some influence on the price of what he buys and what he sells, and where can an individual government try to have some initiative in regulating production standards and product quality? The margin for manoeuvre is tight indeed.

Whether the interest is biotechnology and genetic manipulation of seed stock, or food quality, and therefore the production chain as a whole, the source of influence on decisions made by farmers is shifting from the farmstead to the corporate boardroom. This situation has already been documented (see Heffernan 1999) and the conclusion can only be that there is little point in trying to exercise a regulating influence on agriculture and biodiversity through public policy with leverage over the individual farmer if it does not at the same time have leverage over the other sources of influence. The dilemma is that public policy, at the present time, has little or no real fulcrum for leverage over multinational organisations which dominate the agricultural production system.

This is why, strange as it may seem at first, that the mission of an organisation founded to further the safeguard of nature and natural resources at the international level has to include in its scope of intervention those activities which will be likely to contribute to the proper operation of multinational agri-food industries. The context is global, and there are many stakeholders. IUCN is perhaps among the best suited organisations to encourage a common effort by all stakeholders to examine a wide range of possible measures, and to adopt those measures which are called for, so that agricultural production systems can both ensure social welfare and be ‘biodiversity friendly’. Not all stakeholders have the same power in economic and political circles, so the role of IUCN can be both that of mediator and porte-parole.

Several pathways exist. The first is to examine the food production chain from human health and animal welfare perspective: How many years of research are necessary to decisively demonstrate how safe for the human organism genetically modified crop material is? What is the toxicity of plant material modified to contain molecules which have pesticide qualities, that is, are composed of molecules which are toxins? What is the implication for human immune systems when antibiotics are systematically incorporated in animal feed? How do stress factors associated with closed livestock sheds affect animals? What is the implication for fertility of all species ingesting crop-related material when a terminator gene has become introduced into the DNA structure of a plant?

A second pathway is consumer awareness raising. What is the value to the producer of an agricultural commodity, compared – for example – with the shelf price of the delivered commodity (fruit) or a processed food derivative (coffee)? What is the nutritional status of organically produced food or of fresh products compared with those with a long delivery channel (and what is the energy balance of produce delivered from nearby compared with produce delivered across a continent or even the globe)?

A third pathway is political and economic. How can a government assure the welfare of its citizens when global commerce is regulated according to standards in which environmental norms are not considered as an explicit regulatory feature? How can an individual government promote sustainable development when a substantial part of the value of agricultural produce does not circulate in the same locality, but is siphoned off to the corporate centres of the multinational companies involved with an entire agricultural production chain from seed to shelf? What are the implications for democratic decision-making processes when there is lack of transparency in corporate affairs due to an the absence of full disclosure, and when public reporting of actuarial data regarding corporate structures and markets is not required?

A fourth pathway is technological. What is the difference to soil quality (organic structure and tilth) according to the way the soil is cultivated? What is the impact of irrigation systems on local and regional aquifers, and what are appropriate crops and agricultural practices for dry climates? How do different types of machinery design differ in environmental impact: soil compaction, noise, operating pollution?

These several pathways of analysis indicate that an integrated approach to comprehending agricultural production will shift the interest of an international organisation such as IUCN from looking at piece-meal aspects of a complex reality. What is the advantage of advocating individual government
financial support for a cluster of extensive livestock farms in an outlying rural area without at the same time advocating a European Union policy on the location of agricultural commodity production that will avoid intensive irrigation in climatically dry regions or the draining of wetlands in climatically temperate zones?

Why should governments concentrate only on global free trade without addressing the regulation of environmental externalities (which exist, according to economic theory, because of alleged market dysfunction), when the real issue is that markets are not adequate mirrors of environmental considerations (as the existence of aquatic and atmospheric pollution control regulations amply attest)? How do governments intend to treat the issue of sovereign rights, not with inter-governmental institutions but with regard to the pervasive influence of multinational corporate structures on national and local affairs?

Many issues are generated because of intellectual paradigms, and it is these which may be the most strongly entrenched enemy of the rational use of natural resources (Gray 1998). In this regard, IUCN has the intellectual reputation both necessary and sufficient to the task to examine, and contest when appropriate, a received knowledge that is most vigorously defended by those whose interests are served best by invoking liberal economic concepts to hide oligopolistic hegemony in the market place. True efficiency of markets is undoubtedly desirable; but then let them function correctly. Oligopolistic influence in market operations is in itself counter to liberal tenants, and contrary to the interest of individual governments – and farmers.

If in a market the true value for nature conservation can be integrated into agricultural produce, then this is the type of market situation IUCN should encourage; labelling schemes and primary produce price indications, etc., will all be useful instruments. If the market, on the other hand, encourages practices which have a negative balance sheet in terms of the overall use of natural resources, then regulation and land use planning are necessary to orient market response of individual farmers. When markets are controlled by financial structures that are outside the influence of both individual farmer and government alike, then an international governmental response is called for. Finally, when no market exists for an environmental good, such as the conservation of a natural area, then publicly or privately financed incentives may encourage the individual response necessary to maintain it … and then again, maybe not. Some element of change in natural conditions is inevitable, for such is the historical reality of nature itself.

The future of biodiversity within an agricultural context depends on a combined effort by governments and non-governmental organisations, with representatives of farmers and food processors, to address at the international level the need for a mix of financial incentives for land agents – the farmers – and financial controls, along the lines of anti-trust measures when necessary. This will allow markets to operate correctly and governments to intervene when markets do not provide an adequate financial reward for maintaining and enhancing biodiversity in the countryside.

The purpose of this paper is to provide a basic understanding of the issue of vertical integration within the agricultural sector, and the influence this has on prospects for maintaining a harmonious relationship between agriculture and biodiversity. The schema to be followed is to:

- present what is meant by vertical integration;
- demonstrate the link between corporate strategies for vertical integration and the development of biotechnology;
- raise the question of political independence and policy control of the agri-food industry;
- address the relationship between vertical integration and trade patterns;
- give examples about how local problems elsewhere in the world are linked to the European dimension of the vertical integration issue;
- draw ‘conclusions’ which may be used as the basis for discussion within IUCN fora.

Vertical integration

In order to grasp the issue of vertical integration within the agricultural sector, it is necessary to appreciate how two strands of the market economy are spun together. The first is the subsumption of agriculture to capital and the second is the interconnectedness between political and economic forces within the market economy. Our first task is to give flesh to these seemingly dry concepts. As a skeleton, let us first look at what uniquely characterises the relationship of agriculture to biodiversity, which can be summarised in two words: locality and heterogeneity.
Locality and heterogeneity

The surface of the earth is composed of an enormous variety of physical attributes concerning the basic substrate on which agriculture depends, the soil. So each locality where agriculture is practised presents a unique potentiality and a unique set of constraints for farming. Therefore, within the essence of agricultural practice there has been the association of locality and heterogeneity (Van der Ploeg 1992). If one further examines the implication of this association, it becomes apparent that the nature of commerce of agricultural products is in opposition to this association of locality and heterogeneity: at larger scales of economic activity, it is homogeneity which is required in channels of collection, processing and distribution of agricultural products. The requirement of homogeneity is a denial of the inherent essence of farming that has been typically associated with the evolution of biodiversity within Europe.

The stranglehold of huge supermarket chains is driving uniformity and wiping out local varieties of fruits and crops with long histories (New Scientist, 18.12.1999).

Agriculture in the European continent has been a progressive adaptation since 8500 BC of know-how developed in the Near East. This progressive spread of agriculture, from east to west and south to north, has favoured adaptations in farming systems that correspond to regional environmental differences, both in climate, soil structure and topography (Nowicki 1996). The historical evolution of agricultural land use has resulted in a phenomenon quite specific to Europe (Nowicki et al. 1999), in which biodiversity related to agricultural practice at first increased and now is in marked decline (see Figure 1).

There is also a second trend visible in shifts of land use: agriculture becomes both more productive per hectare and, with relative market saturation, requires less space: there has been some shift to pasture and meadow; a greater shift to woodland; and the most significant shift has been to urbanised land (Eurostat 1995). The changes in land use – both through increasing ‘intensity’ of agricultural practice and through the amount of land involved – are accompanied by modification of landscape: field sizes are bigger, hedgerows have been removed, small woods and ponds have disappeared. This combined modification of landscape and land use is detrimental to biodiversity. What is apparent in the diagram above is that biodiversity has increased according to the development of niches, or biological ‘windows of opportunity’, associated with the advent and transformation of Neolithic agrarian technology over millennia. This diversity has begun to collapse relatively rapidly. The variety and geographical particularity of agrarian systems are disappearing, and so is the variety and geographical particularity of landscapes and the biodiversity associated with them.

The expansion of arable land use in the past has also been at the expense of some types of land cover. Forests have been cleared, for pasture, meadows and arable or permanent crops. There have been several cycles of increasing and decreasing arable land use, linked to human population fluctuations, agricultural trade possibilities and the market for timber. The current phase is that of intensification of arable land on a smaller area, accompanied by an increase in the area devoted to a more extensive livestock management. It is possible that this intensification of arable land use is linked to the regulated agricultural commodity market existing in one form or another throughout Europe. The extensification of livestock management may be linked to financial incentives also coming from public policies to support rural areas under economic hardship because of natural constraints on more intensive forms of agricultural land use.
Subsumption of agriculture to capital

What is also apparent is that the increasing importance of capital investment in agriculture has resulted in a negative impact on biodiversity and landscape values. This is linked directly to greater homogeneity in agrarian commodity production through an increasingly standardised production system, and it is also associated with an enlargement and conditioning of fields for the use of specialised machinery and soil amendments. The economist speaks of ‘subsumption of agriculture to capital’ as a way of expressing that all the variable factors of agricultural production are made as predictable as possible – in cost, quality and delivery – so that the production of crops can be controlled as an integral part of various production chains. This is not restricted to the food industry; rape-seed oil, for example, has an industrial use, and flax is a primary material for clothing.

Farming has become a business as in any other commercial and industrial sector, relying for survival on the capacity to generate a net revenue from the costs of production (capitalisation in land and machinery, and the regular use of inputs: seeds, fertilisers, herbicides and pesticides) and the income from the sale of the agricultural commodities on the market. Already in the past century there has been a considerable replacement of labour costs through capitalisation in machinery, and the result is an increasing level of loans taken out by the individual farm units to obtain the required capital. In this sense, capital penetrates into the organisation of farming enterprises, and the need to raise output to reimburse the borrowed capital increases the dependence of farmers on upgrading the technological support to their farming enterprises (therefore reinforcing the cycle of borrowing and repayment of capital). This situation is figuratively referred to as a financial and technological treadmill ... and the consequence is the implicit transfer of farm management decision making to those who control the external capitals, in terms of both of machinery and financial resources offered to the farmer (Goodman and Redclift 1985, Marsden et al. 1987).

Indebted farmers or those under some other form of pressure are more dependent upon relations with both finance capital and, by virtue of higher levels of farming intensity, with agricultural input firms. But few farmers have yet been reduced to the role of the propertied labourer akin to that of a manager or worker of a productive process completely subsumed to outside capital (Winter 1986, p 253).

In terms of agricultural and biodiversity, the increasingly industrial character of agriculture means that the specificity of locality and the potential for heterogeneity are no longer relevant considerations within farm management strategies. This is why European governments have sought to protect or promote specific agricultural practices favourable to local contexts through policies of a regulatory nature.

The possibilities and limitations of a regulatory approach within Europe

A significant shift in agricultural production has occurred over the past 25 years, and the features of this shift are well documented in a recently issued compendium of information on agriculture published by the European Commission (‘Agriculture, Environment and Rural Development: Facts and Figures’). Considering the effect of this shift upon rural areas, in terms of employment and environment (in particular, with regard to biodiversity and landscape), a renewal of policy instruments concerning agriculture and rural development is already taking place, both at the European and national levels.

Even if the economic horizons of the rural economy extend further than the immediately perceived presence of agricultural activity, the ‘green’ economic sectors (agriculture and forestry taken together) cover 76% of the EU terrestrial territory: permanent crops 4%, arable land 24%, permanent grassland 16% and wooded areas 32%. Many registered farmers are also involved in woodland management, and the separation of the agricultural and forestry sectors is no longer critical for an understanding of the driving forces behind rural land use change, the influence of the agricultural sector in this process, and the implications for biodiversity and landscape.

The financial mechanisms of the Common Agricultural Policy have encouraged the production of cereals, oil seed and protein crops through the establishment of intervention prices in the market for these commodities that guaranteed a minimum price for sales. The establishment of quotas, particularly for milk, encouraged the meeting of maximum authorised delivery levels at the minimum possible expense. The conjugation of these two factors alone explains the decline in permanent pasture across the EU in those areas where it has been possible to increase the output of
product (milk) per unit of production (the cow) through genetic selection and protein enrichment of the diet. The latter leads to an increase in cereal production for feed and the conversion of grassland to high-protein maize silage.

When coupled with the increasing demand for meat, fertile areas have been increasingly devoted to the production of feed grains and silage, encouraging the seed selection making possible the extension north of the 45th parallel of both wheat and maize, localised in the fertile and temperate valley and plateau areas of the EU. In the handicapped regions a shift from pasture has not been possible, but the demand for grain and silage has also followed the same tendency as elsewhere. This leads to improved internal markets for grains as well as to the local practice of grass silage, using the plastic-cover technology, even in the valleys of the mountain areas where before only hay was taken off the fields.

While permanent grassland has decreased by 12% in the past 25 years, arable land has increased by the same amount. The process has not been a one-to-one phenomenon, but rather a complex pattern of specialisation in which many agricultural commodities have become localised in the particular regions best suited for them. The ‘mixed arable’ and ‘mixed livestock’ categories of farms have decreased (in number and surface area), marginal permanent crops have been removed (in particular vineyards producing low-quality wine, where vines have been grubbed up for other uses or returned to fallow), and the land under fodder has extended northwards.

Genetic selection and mechanisation have both played their part, and with the increasing commodity specialisation has come the trend for an increasing economy of scale in operations, meaning larger fields per crop and larger farming units. This reflects a financial necessity to lower costs per unit of output in order to successfully cover the depreciation costs of the sophisticated machinery, allowing both savings in production costs and the possibility to increase output per hectare. To the extent that machinery specialisation is correlated with basing a farm plan on a restricted range of commodities, there is also a tendency for repeating crops in the same field: a survey in France noted that for 1995 the successive cover under maize was 47%, wheat 14%, sunflowers 11% and potatoes 8%.

Translating these trends into straight-forward observations is simple: the variety of field sizes and crop types has disappeared, where ecologically rich permanent grasslands and field borders, along with the availability of labour that went into maintaining agricultural features (such as hedgerows) which create the habitat structures associated with biodiversity richness and landscape character in many parts of Europe. The rural economy has changed, and so have the landscape features which are a reflection of it. Not only have landscape features disappeared, but there is a long list of ecologically disruptive consequences, ranging from depleted soil organic material and minerals to depressed and/or polluted water tables; these also have direct consequences on the food chain and habitat conditions for innumerable species. The loss of local cultivars and ‘rustic’ species of domestic livestock in the process of increasing uniformity should not be forgotten either. Successive cover rather than rotation of crops accounts for increasing problems with pests, requiring ever larger doses of pesticides.

The recognition of the relationship between rural economy and non-agricultural vegetation structure is not new; indeed the CAP reforms of 1992 were intended to palliate the ‘missing market’ forces that had under previous economic circumstances been associated with ecologically beneficial land use practices on the farm. Certainly Council Regulation No (EEC) 2078/92, the agri-environmental regulation, has been successful in raising awareness. One in seven farmers are enrolled in an agri-environmental programme, which in one form or another covers 20% of farmland (in comparison with the 15% targeted for the year 2000 under the 5th Environmental Action Plan). As of the end of 1999, there have been 133 agri-environmental programmes submitted by member states, and in the same period there have been 218 modifications of approved programmes, suggesting that the complexity of the relationship between agriculture and the environment should not be underestimated.

Rather than dwell upon the shortcomings which the initial experience with agri-environmental measures has highlighted, it is interesting to observe the move by the Commission to adopt a horizontal approach for dealing with environmental considerations within the context of rural development, in which the agricultural sector remains a primary but not an exclusive actor. This continues the timid experiment made under Council Regulation No (EEC) 2080/92 (the Community aid scheme for forestry measures in agriculture) in which landowners other than farmers are eligible to receive assistance with environmentally valuable forestry practice. But the farming community remains the principal target for enlistment in rural development initiatives under
The matter is more complex, however, for some of the responsibility lies within the monopoly that large food distribution chains enjoy within the food commodity market structure, and thus on their control of the prices offered to suppliers. As an example, in some countries the distribution chains have horizontally organised meat delivery to the consumer, through ownership of slaughterhouses and transportation facilities to the retail outlets. There is no parallel pathway to the consumer, and no choice of market entry for the producer.

When power and wealth join hands …

The principle of good governance is to protect the interests of the governed, so that they can maximise their opportunities of choice and action. For this reason, the interconnectedness between political and economic forces will always remain a subject for civic concern, as the desire for wealth incites powerful ambitions to control the political processes which have an influence on its distribution. Although the ‘invisible hand’ of the market is in theory the ultimate determinant of how the means of production circulate and wealth accumulates in society, the more visible joining of hands where power and wealth are concerned has been amply attested to by various examples which have come to public attention of subversion of public moneys or of conflicts of interest between politicians and corporate managers. Indeed, the political nature of market structures has to be recognised, and the fact that political orientations will be influenced by economic interests.

If the principal focus of political conflict, at either domestic or international levels, concerns who gets what, when, and how, and setting out the rules and framework of the market in large part determines just this, then political interaction is the means by which economic structures, in particular the structures of the market, are established and in turn transformed. (Underhill, 2000, p. 4). Understanding the global political economy therefore involves overcoming orthodoxy and understanding markets and political authorities as part of the same, integrated ensemble of governance, not as contrasting principles of social organisation.

It is in this context that the issue of vertical integration of the agricultural sector must be placed, and therefore the phenomenon of subsumption of agriculture to capital. For control of the agricultural sector is control over basic human needs for food.
and clothing, and when the tendency of capital is not only monopolistic but oligopolistic, this entails both a conscious curtailing of competition and the integration of the factors of production through an influence over governmental processes. Vertical integration of the agricultural sector from seed to shelf also has, it must be noted in passing, a significant advantage in establishing a competitive hegemony, for there is a reduction of transaction costs at each step in the production process.

The issue of the interconnectedness between political and economic forces becomes particularly acute when examining the issue of biotechnology and its impact upon biodiversity when associated with farming practices. But first, it is now appropriate to give a more detailed description of what ‘vertical integration’ within the agricultural section means.

Vertical integration in the agricultural sector

Within a market economy, there are ‘five basic control problems of capitalistic production and accumulation: control over labour, supplies, technology, capital, and distribution/consumption’ (Ruigrok 2000, p. 326). The response, dating to the 1920s in large corporations such as Ford, has to been to integrate all these production attributes under the control of a unique management structure, the ‘in-house’ solution. But the globalisation of competition between firms means that management of these attributes must be more flexible to take advantage of economies available through increased competition at each level of the production process, and to provide greater strategic choice of which components of the production attributes should remain under direct company management control. This explains the simultaneous selling off of certain activities to create independent firms and the buying up of others, which has been common in the 1990s.

With regard to agriculture, the requirement for food product distribution companies has been to ensure a standard level of quality, respecting both consumer preference and regulatory measures, the latter in particular with regard to human health. The production of broiler chicken in the US, for instance, will normally be entirely controlled within one company, with only the pullets being ‘farmed out’ to agricultural enterprises specialised in rearing the fowl from chicks to birds for slaughter 90 days later. The laying hens and egg incubation systems, the shipping and the meat processing will be all under single ownership, and the provision of medical supplies will be provided to the farmer along with specifications as to when to use which treatments.

This type of industrial relationship between capital and labour has begun to be extended to other domains. It is already prevalent through both vertical integration and forward contracting arrangements for many commodities: eggs, meat (chicken, turkey and hogs), milk, and speciality crops (Coleman and Skogstad 2000). The move by large corporations to strategically choose complementary enterprises to exercise integrated control has brought a new variant of this relationship, involving biotechnology. It is not only the production of seed and the processing of maize in several industrial products – ranging from flour to starch – which is under unified corporate management control (see Figure 2), but the types of plant treatment products required.

Strategic association of complementary enterprises occurs in two ways: alliances and other forms of negotiated agreements for a specific period of time, and out-right purchase. The latter is far more evident than the former, and the association between chemical products and seed production is well known from examples such as Monsanto, Dupont and Dow Jones. When a company such as Monsanto moves into life sciences and acquires patents in genetically modified seed stock, the goal is to extend the value of its investment in a proprietary herbicide such as Roundup, for which the Roundup Ready canola, cotton and soybean seed stock had been specifically adapted.

The planned merger between Monsanto and American Home Products would have created a USD 96 billion ‘life sciences’ company, according to the information on Monsanto’s web site in 1998, combining pharmaceutical (human and animal health) products with nutritional/food ingredients and agricultural products. In any case, Monsanto has continued with an acquisition campaign aimed at seed producing companies, as witnessed by the following news brief from the Economist of 18 July 1998:

Monsanto, an American biotech firm, will pay $525m to buy Plant Breeding International, Cambridge, a crop-breeding group, from Unilever, an Anglo-Dutch multinational.

Other examples of the complex international corporate strategy of this multinational giant come from Monsanto’s web site under the heading ‘Recent Transactions’:
Figure 2: The industrialisation of maize
Source: OECD 1979
Spun off Monsanto’s former chemical business to existing shareholders as a new company called Solutia with revenues of $3 billion; spent $1.4 billion to acquire seed companies Holder’s Foundation Seeds (US), Corn States Hybrid Services (US) and Sementes Agroceres (Brazil); other smaller acquisitions in Brazil (pharmaceuticals), Argentina (pharmaceuticals); launched joint ventures with local partners in Argentina (cotton seeds), India (genetically enhanced cotton), and Russia (pharmaceuticals).

The major European and North American multinational companies involved in the food market attempt to create synergies among chemical, pharmaceutical, and animal and plant processing enterprises. The range of elements include not only the production of fertilisers, herbicides, antibiotics, hormones, vaccines and seed stock, but also silos, livestock feed lots, terrestrial and maritime transportation facilities, slaughterhouses and meat-packing units, grain mills and ‘food processing’ factories.

All of these demonstrate a systematic vertical integration in both the plant and animal markets to create production chains from seed or chick to the bread or broiler which appears on the supermarket shelf; perhaps, more appropriately, one can talk of a production chain ‘from gene to jello’, as the new industry is that of food manufacturing. Taking biotechnology as applied to plants as an example, the matter is well stated by the Guardian (24 August 2000):

Biotech crops are ubiquitous, yet few consumers realise it. Here are a few examples of where you can find GMO products: soft drinks (GMO corn to make corn syrup), salad (GMO tomato, soy oil in dressing), hamburgers (engineered yeast in bun, rennet, soy isolates in cheese, delayed-softening tomato in ketchup, soybeans in mayonnaise, genetically altered tomato).

Why such an interest for investment in the food chain? Le Monde Diplomatique, May 1998, gives a good explanation:

Les firmes Pioneer, Novartis, Monsanto, Hoechst Schering-Agro, Rhône-Polenc-Rorer, se livrent en effet, depuis deux ans, à des jeux d’alliances et de rachats, tant du côté des sociétés de biotechnologie que sur le versant agroalimentaire. An cadenassant aussi bien les genes-clés et les variétés performantes que les débouchés alimentaires, elles sont devenues maîtresses des champs... et des assiettes.

The key factor is that costs are internalised, and the only point of ‘price discovery’ is at the point of final sale, as there are no transfer of ownership and resultant transaction costs along the production chain, and all the added value accumulated at each point of transfer in the production cycle is a source of profit to the agro-industrial company. There is an additional issue of monopoly in the food market, and the inherent social blackmail of ‘pay my price if you wish to eat.’

The potential for economic disequilibrium that could be generated by the multinationals of the food industry is highlighted in an article (The Guardian, 19 June 2000) on the implications of GM seeds for developing countries, in which there is a passage presenting the views of Professor Pushpa Bhatrgava, head of the Centre for Cellular and Molecular Biology:

Thanks largely to him, India has some of the best biotechnologists in the developing world, and many of its public agricultural institutes are working on applications for India. He thinks GM will change society, dramatically improving drugs, vaccines, plastics, food preservation, alcohol energy and agriculture.

Where Europeans are concerned about the safety, environmental and consumer implications of GM foods, the debate in India mostly centres on neo-colonialism – who owns and controls the technology – economic dependency and “food security”. The best reason for India developing biotech, he says, is that, if it doesn’t, “the country will be exploited by others in a way that history has not known before”. He has warned for years of the consequences of India becoming “dependent on other countries for ideas, know-how and products”.

And that, he believes, is happening now. “How do you dominate a country where 700 million people are directly dependent on farming? You infiltrate its agriculture. Who controls a country’s food security controls that country”.

In this context, the furore in India caused by the revelation of the existence of a patented ‘terminator gene’ is easily understandable, for it is the radical means by which seed firms impose a restriction on replanting seeds derived from GM plants that have been saved from a preceding harvest.

India has a quarter of the world’s farmers, and 85% of the 700 million people who live off the soil rely on home-grown seed, stored after every harvest. About 575 million barely manage to scrape a living, tilling less that a
Biotechnology and trade

There are several multinational clusters following the same logic as that of Novartis and ADM (such as Monsanto and Cargill); the common denominator is consolidation of food industry interests within global trade patterns. As suggested above with regard to India, such leverage over national agricultural products can be cause for concern, as demonstrated by the recent legal troubles of ADM in both the EU and the US concerning the marketing of lysine and citric acid, and ADM’s increasing market share in ‘new products as Vitamin E and soy isoflavones’ (Heffernan 1999). The reach of such multinational clusters onto the supermarket shelf completes their strategy, illustrated by the fact that the Gerber baby food brand belongs to Novartis, Haldane of the UK belongs to ADM, and FoodBrands Inc. belongs to IBP.

The trade issue is therefore both about (brand-name) products and about market shares of raw and processed agricultural commodities in the human food chain and within an extended market for a wide variety of industrial products (such as those using oils and fibres from derived from plants and animals). To the extent that biotechnology enhances the place of agricultural commodities in the production and trade of an increasingly wide variety of items, biotechnology and trade are together an integral element when considering the extent of vertical integration within the agricultural sector.

Turning to the European dimension of the trade issue, which is also an introduction to later consideration of the relationship between vertical integration and politics, two well-known examples concern the ‘banana war’ and the ‘beef hormone dispute’. An excellent résumé by The Guardian also brings us to the increasingly broader issue of the biotechnology component of the trade issue through the production and marketing of GM commodities:

In the banana complaint, the US argued that the EU was treating its banana growers unfairly because of preferential treatment for exporters in the Windward Islands. Why the US launched a complaint on a product it does not grow may be explained by the half-million dollar donations made to US political parties by Chiquita Fruit, a US firm that is one of the largest Central American banana producers. The WTO later granted authority for the US to impose $200m of trade sanctions against European exporters. Chiquita’s victory could lead to 200,000 small farmers in some of the world’s poorest countries losing their livelihood.

... scientists fear that the terminator gene could make other crops sterile by inadvertent cross-pollination, and threaten the diversity of seed stocks in India, making its farmers slaves to a few strains of imported seed (The Guardian, 6 October 1999).

From the point of view of the farming community, market presence in Europe and North America is often assured through cooperatives; and even these enter into the structure of alliances which form the agro-industrial clusters operating at the international level. One of the major agro-industrial clusters is Novartis (genetics, seed stocks and chemicals) and ADM (grain handling and processing). ADM has a major stake in A. C. Toepfer, one of the leading grain trading firms in the world market, and thereby via corporate agreements can claim to have EU partners that are among the 12 of the largest farmer cooperatives in the world, allowing ‘ADM to process 45% of the commodities entering Eastern Europe from the West in 1993’ (Heffernan 1999). Biotechnology is the keystone to a relationship having global dimensions:

The Novartis/ADM connection is ... important because Novartis – while truly a global and powerful company with substantial sales in chemical, seed, animal health and human nutrition products [including Gerber baby food] – lacked access to further processing in either grain commodities of food products. Novartis will need ADM’s grain handling and processing web to be able to guarantee producers using their seed stock a downstream market. ADM, on the other hand, lacked access to biotech and needs Novartis’ genetics, seed stocks and chemicals (Heffernan 1999).

ADM also has a major stake in IBP, the largest beef packer and the second largest pork packer in the US, and through joint ventures has operations in food processing throughout the world; in 1997 IBP even started up a fully integrated pork production and processing facility in China. ADM is also a financial player in the world grain market through its US brokerage firm specialised in currency and grain futures trading.

hectar of land, and would quite simply starve if they had to buy seed every planting season (The Guardian, 6 October 1999).

Even if most of the farmers in India are too poor to use GM seed stock supplied by the major multinationals, an ecological and economic catastrophe is nevertheless a possibility with the arrival of the ‘terminator gene’, for
The row over the EU’s refusal to import beef containing growth-promoting hormones shows how international trade law can challenge public health standards. A WTO ruling against the EU’s assessment of the health risks of cattle hormone treatments suggests that even public safety is under threat from corporate muscle. And now the US accuses the EU of using spurious scientific arguments to slow down the proliferation of GM products (17 August 1999).

The contention that the EU is using ‘spurious’ scientific arguments has been belied by a publication in Nature (vol. 399, p 14, 20 May 1999) demonstrating the decline of Monarch butterflies feeding on the pollen of maize into which a toxoid Bacillus thuringiensis (Bt) has been genetically placed in order to produce a ‘pest resistant’ crop. The same Bt toxin will enter the human food chain when the maize is harvested and processed, albeit normally through an intermediate stage as animal feed. The question remains, however, if bio-accumulation of a molecule having the effect of a pesticide will occur. Research has demonstrated that two out of three green lacewing larvae, natural predators of the targeted European corn borer, died after ingesting European corn borer which had fed upon transgenic maize containing the Bt toxin (Environmental Entomology, April 1998). And what will be the consequences for farmers seeking to safeguard their crop by using GM seeds – or for their neighbours employing conventional Bt phyto-sanitary products as authorised under ‘organic’ produce labelling legislation – when Bt resistant strains of targeted pest species develop? A foreshadowing of the extent of damage is the outbreak of the bollworm which developed a resistance to Bollgard® Cotton, destroying a large part of the cotton crop in the Southwest of the US in 1996 (Lappé and Bailey 1999).

Although the different types of risk associated with GM plant and animal production is outside the scope of the vertical integration issue, it is worthwhile to note that caution has been requested by statutory agencies, such as English Nature, concerned about the wildlife implications of genetically modified organisms in agriculture, in particular with regard to two major potential effects: gene introgression (the accidental or deliberate introduction of novel genes into native species) and changes in crop management (resulting from the widespread commercial use of GMOs) (Report to the House of Lords, UK, European Communities Committee, enquiry into the regulation of genetic modification in agriculture, June 1998). The changes in agricultural practices which biotechnology encourages is no minor concern, for intensive agriculture and the loss of grassland (and heaths) with the generalisation of silage has brought one out of eight European butterfly species to the verge of extinction; the risk is that ‘the situation would worsen as the countries of central and eastern Europe joined the EU and abandoned their traditional agricultural practices’ (The Times, 9 December 1999).

The fact that there may be a risk of unknown proportions involved, as biotechnology becomes integrated into the food chain, has fully entered the debate on liberating trade in agricultural products; and it has taken five years to negotiate the Biosafety Protocol to the Convention on Biological Diversity (CBD), agreed to on 30 January 2000. The issue has been whether the ‘precautionary principle’ advocated by the CBD could be used as a method of trade protectionism. In order to protect trading rights the WTO had up to this time required that safety bans be backed by ‘sufficient scientific evidence’. There remains the issue of labelling, which the Protocol does not touch upon:

Farmers and traders won’t have to segregate products containing GMOs. The US argued that segregation would cost billions of dollars because GM varieties make up half of the nation’s soybean and a third of its maize crops (New Scientist, 6 Feb 2000).

In response to this situation, the EU has regulated that agricultural commodities containing more than 1% of GM material must be labelled as such (Council Decision of 25 June 1999). Another decision, from 1990, regulates the introduction of GM seed stock within the EU. Yet both of these legal instruments are becoming increasingly difficult to regulate and to monitor because of the omnipresence of GM material within the trade cycle. In terms of maize seed, the EU obtains two-thirds of its seed stock from the US, and the refusal of US authorities to impose labelling on GM exports means that GM seed can enter the EU agricultural system without importers being aware of the situation. This has already occurred with regard to GM rape, which has been planted on 4,700 ha in the UK, 600 in France, 500 in Sweden and 400 in Germany (The Guardian, 18 May 2000).

GM labelling itself has become a causus belli between the EU and the US, precisely because of the implications for trade:

Washington has warned the EU that it is considering making a formal complaint to the World Trade Organisation in Geneva on the grounds that labelling GM products is unfair discrimination against US goods and therefore
a restraint of trade. The US says it will ask the WTO to impose sanctions against EU exports if GM labels are not removed from supermarket shelves. …

A spokeswoman for the US food and drug administration, which insists that only nutritional information should be on the label, said: “This is getting extremely serious. We regard requiring GM labelling as economic fraud. Our view is that we would not have allowed these products on the market if they were not safe, they are the same as non-GM food, so they do not require a label. In fact, to label them is trade discrimination and therefore wrong.” (The Guardian, 31 July 2000).

If GM food was as anodyne as the spokesperson for the US food and drug administration claims, then it would be unreasonable for Scientific American to specifically address the issue ‘Do the risks of genetically modified crops outweigh the benefits?’ (5 July 1999). No conclusion is given, and the opposing arguments are set out. But the fact is recognised that:

In Britain, for example, a recent study showed that 30 of the leading food processors had either stopped, or were going to stop, using genetically modified ingredients. The latest among them is Northern Foods, one of the largest producers of fresh food products in the UK. Meanwhile, Paris-based Groupe Danone, the third biggest food producer in Europe, announced that it wouldn’t use genetically modified ingredients. And both Unilever, the Anglo-Dutch company, and Switzerland’s Nestle stated that they would limit or ban the use of genetically modified ingredients in selected countries (Scientific American, 5 July 1999).

This situation of strong dichotomy between the agro-industrial push for GM products in the world market and the European withdrawal from the use of GMOs will create tensions within trade that may result in commercial conflict among richer countries, but will also leave its mark in the relationship between the richer and the poorer countries. The major multinationals that are committed to promoting GMOs, along with the other derivatives of biotechnology, will concentrate their efforts of market penetration on societies less able to construct the social defence mechanisms as have been established within Europe (how many people in the world have access to a web site such as www.greenpeace.fr in which there is a downloadable PDF file listing food products which contain and do not contain GM material?).

### Trade and bio-piracy

It is one matter to control seed stocks: a problem in resource availability could eventually be handled by creating parallel systems of provision – even if it would take several years, however, to free the EU from its dependence on importing maize seeds from the US. It is another matter to control the genetic structure encapsulated within seeds, for to defy legal proprietary rights would result in sabotaging the international structure of legal agreements in all domains (including trade, of course). Therefore there is some cause for concern that existing laws in the EU and the US allow the patenting of genetic structures, now that novel forms are made possible by biotechnology, as well as the possibility to accurately map genomes. The link between trade and what has become referred to as ‘bio-piracy’ is well illustrated in the following passage, written during the period leading up to the aborted WTO trade negotiations in Seattle:

The US and Europe insist that corporations should be allowed to patent all plants and animals despite existing international laws and understandings which provide for protection of natural resources.

India, Malaysia, Zimbabwe and other African and Latin American countries have accused the US and Europe of ‘bio-piracy’. The Indians are particularly worried because US and European corporations have started to patent their traditional herbal medicines.

In heated backroom talks in Geneva designed to iron out differences before the inter-governmental meeting, Mike Moore, the head of the organisation responsible for setting the world’s trading laws, is reported to have dismissed developing countries’ objections by saying that the WTO overrides all other international treaties.

The US/EU proposals would force all countries to broaden their patenting laws, but the developing countries are resisting strongly. They say that patents on all life forms should be excluded from the negotiations of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement which is scheduled for renegotiation in the talks. …

The problem which the US must overcome is that the patenting proposals clash with other international laws [notably the CBD]. Another sticking point is agriculture, with the rich countries trying to force a further opening up of
markets to their goods. The developing world, say India and others, must be allowed to protect and support their farmers up to the point of self-sufficiency. (The Guardian, 22 November 1999)

Bringing the double issue of trade and bio-piracy back into the focus of the European dimension of vertical integration within the agricultural sector is rather straightforward: what would happen to the commercialisation of Roquefort cheese if the bacteria responsible for the proper fermentation of sheep milk were to be patented by a European – or even US – agro-industrial multinational company? Where would control over this very culturally identifiable product lie? What would be the rights of the cooperatives in southern France currently producing the primary product? In whose interest would marketing decisions, that effect the competition between different sorts of speciality cheeses, be made?

It is hard to argue that this could not happen, if one considers the following passage from a communiqué jointly released by RAFI, the Berne Declaration and the Gene Campaign in January 2000:

In September 1997 a Texas-based company, RiceTec Inc., won a controversial US patent (No. 5,663,484) on Basmati rice lines and grain. RiceTec’s Basmati patent has become widely known as a classic case of ‘biopiracy.’ Not only does the patent usurp the Basmati name, it also capitalises on the genius of South Asian farmers who have for centuries selected and maintained Basmati rice varieties that are recognised worldwide for their fragrant aroma, long and slender grain, and distinctive taste (RAFI Communiqué Issue #65, www.rafi.org).

Biotechnology and politics

The relationship between the commercial interests behind biotechnology and politics is not only of an indirect nature when major multinational corporations make contributions to the political campaigns in democratic countries. There is a direct relationship between decisions regarding the public financing of research in biotechnology and the commercial application of such research. When on 16 May 2000, the UK multinational AstraZeneca reached agreement with the inventors on the commercial control of a Vitamin-A fortified rice strain, it pocketed the total public sector investment that went into the production of this strain (RAFI News, 20 June 2000). The same issue came up in the United States with the patenting of the ‘Terminator Gene’, as related in an article by The Christian Science Monitor (31 July 1998), entitled ‘Terminator Seeds Threaten 10,000 Years of Farming History’:

Terminator seeds generated particular controversy because the US Department of Agriculture (USDA) contributed to the breakthrough.

‘Here we are using taxpayers’ money for a company that can afford to do the research,’ complains Henry Shands, assistant administrator for genetic resources at USDA’s Agricultural Research Service. Because Congress has kept the service’s research budget essentially flat in recent years, government researchers are scrambling for funding.

‘We see more and more of our scientists go out and compete for grants and try to get money from industry,’ Shands says. ‘And that makes us more beholden to industry.’ One of the biggest dangers is that as corporations pour increasing amounts of money into genetic research, public funding could dry up.

There are three interconnected threads in the problematic posed by the relationship between public and private funding in agricultural research. First, to what extent does public research money contribute to private profit making? Second, to what extent are public science research agendas set by the research interests of private companies, according to their commercial strategies? Third, to what extent does the presence of private money for research dissuade public policy masters to reduce both public research budgets and, thereby, the guarantee of the intellectual independence of their research staff?

It has been the public investment in agricultural research which has provided the major breakthroughs in hybridisation of maize, for example, and so has contributed to the prosperity of the agricultural community, both in the US and in Europe. The independent yeoman farmer, so much valued in Europe along with the tradition of the family farm, has in fact benefited enormously from the work of public agricultural research stations. Although perhaps the mechanisms are different, there may be a double pressure for the collapse of the independent farmer: intellectual property rights on plant and animal genetics, and thereby control over the entire food processing chain by private corporate interests, through vertical integration within the agricultural sector. This situation might also herald the demise of the personal relationship with the countryside which has safeguarded Europe’s natural heritage.
Looking to the future

Vertical integration within the agricultural sector is a phenomenon which has been taking shape for almost half a century, and the European dimension is not that much different from the reality confronting agricultural communities elsewhere. The mechanisms are technical, scientific, financial and political. Loss of control over agricultural is loss of control over the countryside.

What, then, remains to be debated? First and foremost, the relationship between government and the private sector:

- Who has control over the research agenda relating to agriculture?
- What is the justification, in terms of social utility, for establishing private property rights over genetic structures?

Second, the consequences of oligopoly in the agro-industry:

- When does it become justified to consider anti-trust measures to regulate the influence of private interests within the food production chain?

Third, the location of statutory control over the global dynamics of trade in seed, feed and primary agricultural commodities (both plant and animal):

- Are individual governments able to regulate the impacts of multinational strategies?
- If an inter-governmental seat for the regulation of global trade exists (the WTO), should it also have responsibility for affairs related to life sciences; or should a superior jurisdiction – perhaps under UN auspices – be established?

These issues are not purely scientific, nor are they purely economic, nor are they purely social. The fact that they are intimately interrelated means that if the IUCN is to be a proponent in the debate, which must occur, it has to be willing to take positions which are based in all three domains. In the modern world, science and policy go hand in hand.

Finally, the European dimension of vertical integration in the agricultural sector must be understood as having a global influence.

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Discussion Points from the Session – Business Influence in the Agricultural Sector

**Vertical control – questions, concerns and future directions**

- “We have cheaper and cheaper food, yet greater environmental demands on agriculture. What was possible before, when prices were higher, is no longer possible. Something must give.”

- “How we can we redirect the global system so that we get the benefits of biotechnology while eliminating the negatives?”
  
  “It is a global scale issue and concerns the relevant research agendas. Products must be developed using public money so that no return on investment is needed.”

- “Agro-industry has direct and indirect control over the farm. Can this change?”

  “Presently, niche marketing is the only way, for example, organic agriculture. But organic farming is not the complete solution as it is good for soil, but not a complete solution for biodiversity.”

  “The ability for farmers to get out of the multinational grasp will depend on capacity building of farmers – social and community level work.”

  “Yes capacity building is vital as multinational corporations have a huge advantage in information provision and lobbying and this balance needs to be corrected.”

  “Dialogue with large corporations is needed to show them they have a responsibility and to work towards solutions, otherwise a regulatory approach is needed.”
Invasion of Alien Seeds: Alien Species and Genetic Erosion of Indonesian Native Food Crops

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Abstract

Due to multinational advertising, a centralist agriculture policy, a lack of promotion of native crops and a lack of control on imports, many Indonesian people are now consuming alien food species. Consequently, local farmers are forced to plant alien species and native crops are becoming extinct.

About 80% of the food sold in Indonesian supermarkets and even traditional markets, especially in West Java, come from alien species. This demonstrates the wide gap between Indonesia’s native richness of biodiversity and the actual condition of the market.

Many Indonesian people now consume food coming mainly from alien species. For example the Sundanese, one ethnic population living in the west of Java, have a traditional dish called lalab, made of fresh leaves and other part of plants such as fruits, nuts, and even flowers that are eaten with the main course/rice. Until ten to fifteen years ago, lalabs were prepared out of native cultivated plants, or picked directly from wild plants. However, eating habits soon changed, and nowadays lalabs are mostly composed of alien species with little variety. Many of the plants that were formerly used for lalab have become extinct. Suriawirya in his book titled ‘Lalab’ (1987), wrote that ‘not one species used for lalab in the past is included in those consumed today’. As a consequence, Indonesian farmers are forced to plant alien species.

The concept of organic farming or ecofarming does not yet include enough indication on the use and development of native species, a case all the more important as it is related to the sustainability and conservation of native species and the environment they are part of. If organic farmers mainly grow alien species because of market demand, native species would be lost to the community.

Fewer and fewer native plant seeds are sown in Indonesian farms, and as a consequence many native plants have been lost. Just to quote a few documented cases; 1,500 varieties of native rice, about 30 varieties of mango and about 30 varieties of banana are reported to be extinct.

Why is this happening?

1. The development of new lifestyles in which people see produce coming from outside Indonesia as better than their own resources. This phenomenon is more evident in big cities. Just by looking at vegetables and fruit in supermarkets, it is easy to find that most of them are alien species. Native species are seen as second rate, although they are cheaper than alien fruits. This attitude is spreading also to traditional markets, especially in big cities.

2. Centralistic agriculture policy.

3. Lack of promotion of Indonesia’s native food crops due to the lack of local entrepreneurs and to the overwhelming promotional power of multinationals. The case of bananas in West Java is a good example of this trend. West Java is the largest producer of bananas in Indonesia. Many species of banana are planted here by locals, but one alien variety of banana was imported and sold in some of supermarkets. Within one year the high promotion of this banana by the producer influenced the consumers choice to the extent that consumers practically stopped buying native varieties of banana. Now, a smaller quantity and variety of native bananas are being sold in supermarkets because of insufficient consumer demand.

4. Lack of control on plant and animal imports.
What does YPBB want to do?

1. Research:
   a) Research on the impact of alien species on native ecosystems. A small amount of research is taking place on *Passiflora* sp. in the region of Gede Pangrango National Park, West Java.

   b) Research on the human activities that have resulted in the promotion and spread of alien species.

   c) Research on the status of alien species spread in Indonesia.

   d) Policy research related to the invasion of alien species and devaluation of native species.

   e) Research on people’s perception about native versus alien species, to understand ways for promoting native species products.

2. Education, campaign and action:
   a) Promotion of native products, such as short messages on radio programmes about the uses of native species and the problems with alien species.

   b) Environmental education at city parks.

   c) Planting native species in city parks and in schools, or in private gardens.

   d) Promoting local resource-based development and entrepreneurship.

3. Developing a database of native species products and a programme to assist in the development of community-based native species production.

4. Policy dialogue and advocacy to promote proper policy framework and implementation, supporting alien species alleviation and the promotion of native species.