CHAPTER FOUR

THE MAKING OF MODERN INDUSTRIAL AGRICULTURE IN THE UK

In this chapter I seek to trace the dynamics and processes that have facilitated, over a period of time, the expansion of science into the countryside. In the first part of this chapter I provide some insights into the nature of this agricultural paradigm that was to displace indigenous, locally defined, and traditional rural knowledges and practices, and that subsequently became known and accepted as conventional agriculture in the UK. I seek to identify the key characteristics of the paradigm's knowledge system and its producers as well as the type of practices that it justifies and provides reason for. In the second part I seek to identify the driving forces behind this new paradigm and the modes of intervention that administered and promoted its implementation in the countryside. In the third part I examine the effects this new agricultural knowledge system has had for the farmer, as well as for the wider social, cultural, and natural environment.

4.1. The Modern Industrial Agriculture Paradigm

In this part I seek to identify the dominant agricultural regime of truth and the correlating practices that are granted legitimacy by this regime. I explore who is charged to produce agricultural knowledge, the appropriate techniques and methods

described to acquire knowledge, the legitimate agricultural discourse that emerges as a result, and the farming practices to which it provides justification. Where relevant, I will also describe the old farming paradigm and its practitioners that were to be replaced.

4.1.1. Its Knowledge System

Three types of knowledge play a central role in the transformation that was to displace the traditional, locally particular knowledges that rural dwellers possessed, namely the perceptual knowledge of the external world, scientific knowledge and technical knowledge.

Keith Thomas, in his study on changing attitudes towards the natural world in England between the sixteenth and nineteenth centuries, documented this paradigm shift with regard to the first type of knowledge, the *perceptual knowledge of the external world*. He described how the traditional, or *popular*, knowledge system was replaced by a modern, *learned*, type, in which its holder was more detached from and objective towards the natural world than had previously been the case. The traditional, popular knowledge system subscribed to "the ancient assumption that man and nature were locked into one interacting world. There were analogies and correspondences between the species, and human fortunes could be sympathetically expressed, influenced and even foretold by plants, birds and animals."[1] Thomas argued that country-dwellers possessed a vast lore about the healing properties of plants which

[1] Keith Thomas, *Man and the Natural World: Changing Attitudes in England 1500-1800* (London: Penguin, 1984), p.75.

demonstrated their "practical knowledge of and dependence on the plant world."[2] The vocabulary and language was highly symbolic and reflected the close relationship between humans and Nature.

The modern or learned knowledge system, on the other hand, discarded this and instead adopted an approach that not only separated humans from Nature, but also promoted the acquisition of a particular type of knowledge that could be used to master Nature's properties, namely scientific knowledge. The rise of scientific knowledge was accompanied by the eradication of the old vocabulary, as Thomas explained:

> Vulgar names were an obstacle to science. 'Those who wish to remain ignorant of the Latin language,' said John Berkenhout in 1789, 'have no business with the study of botany.' A decade or so later, the farmers who still used 'vulgar, provincial names' to identify the pests which attacked their crops found themselves unable to communicate with the naturalists, who did not know which species they were talking about. In the nineteenth century there was a brief, sentimental attempt by John Ruskin and some other gardening writers to revive or invent English names for garden flowers and wild plants. But by that time the learned world had permanently discarded the language of ordinary discourse.[3]

The universal standardisation of names in the Latin language was important to the scientists since it allowed for their research findings to be recognised and communicated internationally. The same process, however, caused the displacement not only of a particular, local vocabulary but also of the correlating perceptual knowledge of the external world, one that considered humans to be an integral part of Nature and Nature sensitive to human action.

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[2] Ibid., p.72.
[3] Ibid., p.87.

> [B]y eroding the old vocabulary, with its rich symbolic overtones, the naturalists had completed their onslaught on the long established notion that nature was responsive to human affairs. This was the most important most destructive way in which they shattered the assumptions of the past. In place of a natural world redolent with human analogy and symbolic meaning, and sensitive to man's behaviour, they constructed a detached natural scene to be viewed and studied by the observer from the outside, as if by peering through a window, in the secure knowledge that the objects of contemplation inhabited a separate realm, offering no omens or signs, without human meaning or significance.[4]

A similar transformation took place in the development of those knowledges specifically related to the food cultivation and production processes. Here, too, scientific knowledge was to rise in status, causing the displacement of traditional farming knowledge and practices, as the remainder of this section seeks to illustrate.

Early agricultural research was an uncoordinated enterprise, carried out by committed individuals in their spare time.[5] According to Christable S. Orwin and Edith H. Whetham, "[t]he modern farming of 1850 owed little to the work of agricultural scientists but a great deal to the farmers and landowners who experimented, adapted and published the results of applying new ideas in their business."[6] It was the introduction of the Technical Education Act in 1889 that marked the beginning of *professional* research. However, it was not until the Development Commission was set up in 1909 that agricultural research received financial support from the state, the objective of this research being the development of agriculture "by scientific means."[7] A memorandum sent by the Board of

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[4]Ibid., p.89.
[5] E. John Russell, *A History of Agricultural Science in Great Britain, 1620-1954* (London: George Allen & Unwin Ltd., 1966), pp.64/471/473.
[6] Christable S. Orwin and Edith H. Whetham, *History of British Agriculture, 1846-1914* (Newton Abbot: David & Charles, 1971), p.28.
[7] Cmd. 6433, *Report of the Committee on Post-War Agricultural Education in England and Wales*, chairman: The Rt. Hon. Lord Justice Luxmoore, P.C. (London: HMSO, 1943), p.12.

Agriculture to universities and agricultural colleges in 1911 stated that institutions "should devote themselves to the solution of more difficult problems which demand not merely skill and experience in agriculture, but special scientific knowledge and training."[8]

These developments re-directed the nature of agricultural research as well as farming practices. Early agricultural research was carried out to establish and record facts, the main aim being the improvement of farming practice. The farmer observed, and the researcher explained and accounted for any irregularities.[9] At this stage a close relationship between the researcher and the farmer existed. This was to change and scientific knowledge became detached from the farmer and farming practices, as E. John Russell argued:

> [T]he scientist proceeds direct to the study of the soil, the plant or the animal, or the relations of one with the other. The purpose is to gain knowledge: whether useful or not is quite immaterial….
> The modern research workers in agricultural science are in the dilemma that they are no longer familiar with the problems of the farming community, while their science is becoming so difficult that it can no longer be fully understood by farmers or indeed by any but specialized experts.[10]

The opportunity to advance knowledge related to the cultivation of food was thus taken away from the farmer and placed exclusively in the hands of expert scientists. It became the role of scientists to advance knowledge in the field of agriculture. A first implication of this development was that the farmer now had to rely on externally acquired scientific and technical knowledge. No longer could he or she actively contribute or even direct agricultural development. Instead, the farmer's role was to

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[8] Ibid., p.14.
[9] Russell, *History of Agricultural Science*, 1966, op. cit., note 5, pp.58/59/472.
[10] Ibid.,, pp.483/482.

become, as the De La Warre Committee saw it, one of "the intelligent *use* of up-to-date knowledge and techniques" and the *application* of scientific principles "in day-to-day farming."[11] The result of this development was, as Richard Mabey argued, that people living in what he calls the planned countryside, i.e. those parts of the countryside that have become subject to modernisation and rationalisation, "have largely forgotten a lot of the wisdom that traditionally would have been attached to these places. For instance, the knowledge of flora and fauna, an understanding of how crops grow without the assistance of chemicals, and knowledge of field rotation."[12]

Secondly, because of this detachment of scientific research from the land and from farming, advances in agricultural science were now guided by the principles and assumptions underlying scientific knowledge production. Agricultural science is essentially reductionist, objective and quantitative in nature. Reductionist research was directed towards understanding the parts that make up a plant, for example. When faced with the problem of pests and diseases, agricultural scientists tended to investigate the causes and thus treated the symptoms, rather than seeking to develop a healthy system. This led to the development of antibiotics, pesticides and fertilisers. Overall, scientific agricultural research was to acquire knowledge that aimed for what Herbert H. Koepf et al. called an emancipated agriculture. Emancipated agriculture seeks to be independent; it seeks to "free itself from a number of constraints that 'naturally' rule plant and animal life."[13] This has had profound implications for agricultural practices. Prior to the scientific revolution taking place in the field of

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[11] Cmnd. 614, *Report of the Committee on Further Education for Agriculture provided by Local Education Authorities,* chairman: The Rt. Hon. Earl de La Warr (HMSO: London: 1958), p.6. Emphasis added.
[12] Richard Mabey, 'A Village Voice', in *Resurgence,* No. 202 (September/October 2000), p.25.

agriculture, farming depended and relied upon the knowledge and understanding of natural processes, such as fertility, reproduction and pest-predator relationships. Scientific and technological advances have helped to overcome this dependency. Today, fertilisers, pesticides and biotechnology relieve farming from being subject to natural constraints. In fact, by seeking a better understanding of the parts, reductionist science ultimately aims for knowledge that can be used to control the natural processes. The discovery of the double helix structure of the DNA molecule illustrates this point, since it is presented as

> one of the truly great scientific advances of this century. The enhancement of our knowledge and understanding of fundamental life processes that resulted from it opened the way to unprecedented possibilities *of acting on the heart of living organisms*. A new domain of scientific endeavour was to derive from this: biotechnology … now making … possible *the scientific and industrial exploitation of the properties of living matter*.[14]

Rather than working with Nature, scientific agricultural research aims at overcoming and being independent of these natural processes. Furthermore, the quantitative nature of the scientific inquiry meant that agricultural scientists "have tended to regard more output per acre or more milk per cow as an indicator of their success,"[15] rather than the taste of food or its nutrient value. Also, scientific findings were considered to be universally applicable which resulted "in the development and commercialization of

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[13] Herbert H. Koepf, Bo D. Pettersson, and Wolfgang Schaumann, *Bio-Dynamic Agriculture: An Introduction* (New York: Anthropocsophic Press, 1976), p.3.
[14] Commission of the European Communities, Group of Advisors to the European Commission, *On the Ethical Implications of Biotechnology* (Luxembourg: Office for Official Publications of the European Communities, 1996), p.5.
[15] Berkeley Hill and Derek Ray, *Economics for Agriculture: Food, Farming and the Rural Economy* (London: Macmillan, 1987), p.291.

… universally applied products".[16] An abstract taken from Orwin and Whetham's *History of the British Agriculture* will illustrate that advances in agricultural technology towards universalisation and standardisation were in fact not continuous or linear, nor did they originate from farmers and farm practices. Instead, the type of new agricultural technology that was developed forced agricultural practices and farm structures to change and adapt. Orwin and Whetham will be quoted in length:

> Mr Ransome, firm of Suffolk implement makers … employed nearly a thousand craftsmen on the manufacture of ploughs, subsoil ploughs, scarifiers, harrows, drills, rakes, rollers, mole ploughs, threshers, winnowers, seed dressers, feed mills, chaff and turnip cutters. He, his father and grandfather had each in their generation experimented, adapted, invented and improved the basic tools, so that ploughs, for instance, were available in more than 300 varieties, tailored to suit the variety of soils, crops and local preferences….
> In spite of the variety of implements available and their progress towards perfection noted by Mr Ransome, there were in 1850 still large numbers of farmers who preferred the old-fashioned tools inherited from their fathers. The new implements cost good money and their iron frames were brittle; their movable parts were quickly worn and the hand-forged replacement seldom fitted well. Broadcast sowing, hand weeding, the sickle and the scythe were still generally used on many farms…
> To be effective and economic, the new implements required a new system of farming – large level fields with straight hedges and wide gateways, and with no boggy patches and land-fast stones. It is not surprising therefore that the new implements and the new type of farming were to be found mainly on the eastern side of the country … and farmed in large units.[17]

The technological knowledge that accompanied the agricultural revolution, and the type of technology it developed, from its outset encouraged, and was geared towards, large-scale, standardised farming patterns. Today, key agencies within the agri-establishment continue to embrace this particular agricultural knowledge system that

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[16] Rod J. MacRae, Stuart B. Hill, John Henning, Guy R. Mehuys, 'Agricultural Science and Sustainable Agriculture: A Review of the Existing Scientific Barriers to Sustainable Food Production and Potential Solutions', in *Biological Agriculture and Horticulture,* Vol. 6 (1989), p.177.

the agricultural revolution institutionalised and which subsequently has become accepted as the norm. The emphasis on sound science and its aim of controlling Nature are reflected in a report to the Royal Agricultural Society of England:[18]

- Science and logic can be the only determinants in addressing the situation in relation to a competitive agriculture. (para.201)
- …it must be said that science and the technologies which emerge from science advance man's ability to survive and influence the natural environment to be less hostile to him. (para.138)

The same attitude prevails in political institutions, both at national and the European level:

- In delivering these objectives [MAFF] will … ensure that policy is informed by high quality scientific research and development[19]
- Thanks to scientific research and development, there is a constant improvement of crops and breeds of animals, machinery and techniques which mean that the factors of production can be combined more and more efficiently and at lower real cost.[20]
- … as in every field of present day activity, in agriculture too, scientific research is one of the most effective means of bringing about technical and economic improvements in production.[21]

In the subsequent section I will now describe the changes to farming practices that have accompanied the transformation in the agricultural knowledge system.

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[17] Orwin and Whetham, *History of British Agriculture*, 1971, op. cit., note 6, pp.7/9/10.
[18] Royal Agricultural Society of England (RASE), *The State of Agriculture in the United Kingdom: A Report to the Royal Agricultural Society of England*, prepared by a study group under the chairmanship of Sir Derek Barber (Stoneleigh, Warwickshire: Royal Agricultural Society of England, 1991).
[19] Cm 4212, *The Government's Expenditure Plans 1999-2000 to 2001-02* (London: MAFF, 1999), para.1.44.
[20] Commission of the European Communities, 'Adjustment of the Common Agricultural Policy', in *Bulletin of the European Communities*, Supplement 4/83 (1983), para.14, p.6.
[21] Mr Vetrone, Debates of the European Parliament, 1973-1974 Session, 'Regulation on the Coordination of Agricultural Research', Report of Proceedings from 13-16 March 1973, Sittings of Friday, 16 March 1973, in *Official Journal of the European Communities,* Annex, No. 160 (March 1973), p.141.

4.1.2. Its Practices and Values

The advance of scientific knowledge into rural Britain changed agricultural practices fundamentally. Deborah Valenze describes how this transformation affected the dairy industry in England at the beginning of the second half of the eighteenth century. Her study revealed that the advances of science affected traditional food production and consumption patterns, and the role women played within these patterns in particular. The transformation from the old to the new paradigm brought to light "a conflict between customary ways of working associated with the agrarian world and a newer, rational notion of production informed by commerce and capitalism."[22] Scientism accompanied the shift from butter and cheese making as the "mystery of the dairywoman's art" to an enterprise based on "the reality of rational science."[23] Valenze explains how the development of scientific knowledge in the dairy industry marginalised traditional methods of cheese production and hence the work and knowledge of women.

> The new discourses both boosted and absorbed the force of market demands for dairy products … In an attempt to assure such regular quality production, the new agriculture allied itself with empirical discourse aimed at attaining "true", repeatable results. The assumption that an absolute, scientific truth existed in dairying, which could be achieved through repeated experimentation and standardized measurements, introduced a new hierarchy of authority that would alter the social relations of the dairying farm and community … Against the erratic practices of traditional husbandry, the new agriculture posed technique that was observed, recorded and repeated in the best empirical style. Dairying was particularly susceptible to the printed dimension of the agricultural revolution, for it represented customary, unrecorded methods of farming *par excellence*. Dairying was seen as an art rather than a science; as a consequence of its reliance upon apparently incalculable procedures,

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[22] Deborah Valenze, 'The Art of Women and the Business of Men: Women's Work and the Dairy Industry: c.1740-1840', in *Past & Present* (1991), p.143.
[23] Ibid., p.163.

> as well as its irregular results, dairying belonged to an occult branch of husbandry. Before the eighteenth century, very little record has been made of dairying methods … Through the writing and dissemination of these texts, male practitioners redefined the art of women and appropriated it as their own.[24]

These changes in the knowledge system affected farming practices in general. "Farmers able to deal with complex ecosystems using recycling and feedback mechanisms are replaced by those who are able to manage more linear processes,"[25] Geoff Tansey and Tony Worsley argued. S. B. Hill used the example of assessing food quality to visualise the linear approach that was to guide modern industrial agriculture as follows:

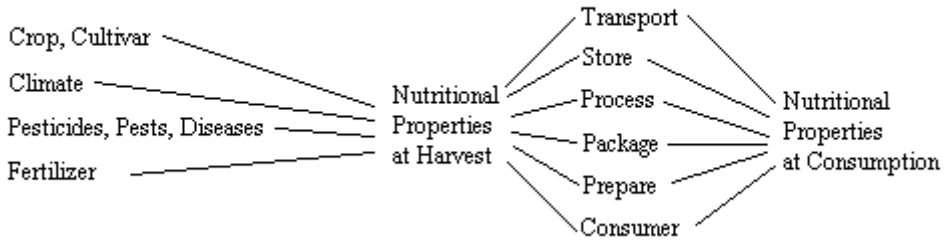

FIG. 8: Linear Processes in Modern Industrial Agriculture[26]

The ability to control the environment was facilitated by the advances made by science. Farming was no longer required to rely on natural processes alone but was now able to control and overcome these very processes by making use of man-made inputs and the technical advances made. Today, over 300 kilograms of chemical

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[24] Ibid., pp.152/153.
[25] Geoff Tansey and Tony Worsley, *The Food System: A Guide* (London: Earthscan, 1995), pp.86/87.
[26] S.B. Hill, *Soil, Food, Health and Holism*, Ecological Agriculture Projects Research Paper No. 2 (Ste-Anne de Bellevue, QC), quoted in MacRae et al., 'Agricultural Science and Sustainable Agriculture', 1989, op. cit., note 16, p.178.

fertiliser are applied per hectare in the UK.[27] As N. Jules Pretty and Rupert Howes write:

> Pesticides have replaced biological, cultural and mechanical methods of controlling pests and increasing predators; inorganic fertlizers have substituted for livestock manures, compost and nitrogen-fixing crops, information for management decisions comes from input suppliers, researchers and extensionist rather than from local sources; fossil fuels have substituted for locally generated energy sources.[28]

New agriculture production methods no longer work with natural processes but instead seek to master and control these. Indeed, the farm as a microcosm is representative of the changing attitude that was to affect the relationship between people and Nature throughout modern societies. Farming, to conclude, "has moved away from a close understanding of the natural environment in which it operated, to an attempt increasingly to control the environment."[29]

The following abstract illustrates how advances in biotechnology have helped the farmer to overcome the natural weaning off periods in piglets and calves by adding enzymes to the feed of their animals. Enzymes in the feed improve the *feed conversion efficiency* because piglets and calves can be weaned off earlier and poorer quality feed can be fed without the animal experiencing any side-effects when digesting this feed:

> Young pigs are weaned at around 4 weeks of age but their digestive systems do not mature until they are about 10-12 weeks old. This results in an inefficient use of the feed and digestive disorders as well as an increased waste problem … [T]he addition of a mixture

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[27] Richard Buckley (ed.) *The Future of Farming: What Price the Food We Eat? Understanding Global Issues* (Cheltenham: Understanding Global Issues, 1997), p.4.
[28] N. Jules Pretty and Rupert Howes, *Sustainable Agriculture in Britain: Recent Achievements and New Policy Challenges*, Research Series Vol. 2, No. 1 (London: International Institute for Environment and Development, 1993), p.8.
[29] Tansey and Worsley, *The Food System*, 1995, op. cit., note 25, p.97.

> of enzymes [to the feed] is reported to give better … feed conversion … The use of enzymes also permits lower cost feeds to be substituted which further boosts profitability.
> In mature pigs perhaps 15-20% of the feed energy is wasted as the pig does not produce enzymes capable of breaking down the plant fibres. With cheaper feeds the wastage is higher. Addition of enzymes [to the feed results in] lower feed costs, since lower grade feeds can be used. The use of enzymes also reduces feed storage charges since these enzymes enable fresh [cheaper] barley to be fed rather than storing it until the components causing the digestive problems have disappeared.
> [C]alves are weaned before their digestive systems are fully matured. Traditionally, skimmed milk is used as a replacer feed but the use of enzymes with vegetable proteins and cereals allows the farmer more flexibility in the feeds used and an earlier weaning from the skimmed milk.[30]

The goal of higher efficiency and increased productivity, aided by scientific advances, has also changed the way farm animals are kept. In the poultry sector, between 1948 and 1960, the percentage of free-range laying hens fell from 88 % to 28 %, and by 1975 the figure was down to 3.5 %. In the same period, the percentage of battery units went up from 8 % to 37 % and by 1975 it reached 92 %. These changes were facilitated by the development in new building designs, as well as the ability to buy additional feed and high energy minerals and vitamin supplements.[31]

Over the same period, a decline in on-farm diversity set in. Under traditional farming patterns a great variety of different breeds existed, with each breed being adapted to the locality in which they were kept. As a result of intensification, animals could be kept indoors and in a controlled environment. The farmer was freed from these natural constraints and was now able to opt for the type of breed that would guarantee the biggest output in terms of milk or meat. As a result a great

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[30] DTI, BMB Initiative, *Industry: Animals Feeds*, Factfile No. 9 (Teddington: BMB Initiative, 1995).
[31] Mike Soper, *Years of Change* (Ipswich: Farming Press, 1995), pp.210/211.

variety of breeds disappeared.[32] Since 1892, for example, 26 breeds of farm animals have become extinct with the pig industry today being dominated by just two breeds.[33]

Moves towards intensification, promoted by Government policies, have also affected farm structures. With the availability of external inputs, farms ceased to be self-sufficient:

> Mixed farming was an important safeguard against the devastation that could be caused by the failure of a particular crop through disease, drought, frost or pest infestation. Keeping animals was not only useful for milk and meat but also because animal dung was a valuable fertiliser. Some crops were grown as animal feed for the winter. Horses or oxen were used for working the farm. Local suppliers (blacksmiths, etc.) provided all essential equipment. Farming communities were essentially self-sufficient, producing their own seed, fertiliser, animal fodder and handtools. Nothing was wasted in the traditional farming system, which mirrored nature's own approach to the recycling of organic matter." [34]

Modern agriculture, on the other hand, is intensive. It embraces industrial features, such as the monoculture of crops, the commodification of animals, the factory-type farming of livestock as well as dependency on chemical external inputs. These transformations were also accompanied by a growing standardisation, as the example of plant seeds will illustrate. Before 1939, Richard Buckley reminds us, thousands of different varieties of cereal crops were grown world-wide. These varieties had adapted to local conditions, in that they were highly variable in their yields and in their resistance to drought and pests. The same applied to types of fruits and vegetables. Different varieties were to be found in different regions.[35] However, EC and national legislation introduced a ban on the sale of unregistered seed varieties. The aim of this

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[32] Colin R.W. Spedding, *Agriculture and the Citizen* (London: Chapman & Hall, 1996), p.80.
[33] CPRE and WWF, *Growing Greener: Sustainable Agriculture in the UK* (Report for Council for the Protection of Rural England and World Wide Fund for Nature, June 1996), p.36.
[34] Buckley, *The Future of Farming*, 1997, op. cit., note 27, p.2.

legislation was to ensure seed uniformity and authenticity. Yet many small growers cannot afford to pay the annual register cost for a seed, which is in the area of about £400 a year, as Simon Hickmott, a horticulturist with the Heritage Seed programme at the Henry Doubleday Research Association pointed out. Once a seed is not registered its sale becomes illegal. Over the past three decades, this regulation has driven hundreds of old varieties of vegetables from the catalogues. The market is now dominated by a few multinational companies.[36]

Changes in agricultural practices were accompanied by changes in the food distribution pattern. Today, farmers produce for the global market rather than for local consumption. A greater variety of exotic products is available in British supermarkets and shoppers can now buy fruit and vegetables out of season. As a result, food is transported long distances with the average supermarket trolley of food purchases having travelled over 3,000 kilometres.[37] Secondly, farmers are no longer dealing with the consumer directly but are selling their products to a retail chain or a food processor plant. Traditionally, farmers and consumers knew each other. Trade was built on interpersonal relationships and local knowledge. Word would spread if a farmer cheated or sold poor quality produce. Today, this link is broken. Instead, the state stepped in to mediate any irregularities. This resulted in an increase in regulation and bureaucratisation. To ensure the quality of marketed plants and seeds, eggs and horticulture products, the government has set up the *Plant Health and Seeds Inspectorate*, the *Egg Marketing Inspectorate*, and the *Horticulture Marketing*

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[35] Ibid., p.4.
[36] Michael Hornsby, 'Vegetable 'Library' Sows the Seeds of Rebellion', in *The Times*, 4 July 1992, p.7.
[37] Supermarket chains are members of the British Road Federation. George Monbiot, 'Organic Food Pollutes the Atmosphere', in *The Guardian*, 5 November 1996, p.17.

Inspectorate.[38] One of the measures introduced following the BSE crisis, for example, was the issuing of passports to cattle. The *British Cattle Movement Service,* responsible with the issuing of *cattle passports,* was launched in September 1998. The *State Veterinary Service* was set up which has to be informed of all BSE cases, while *Divisional Veterinary Managers* ensure that routine visits to farms are carried out, of which 50 per cent must be carried out by a *Veterinary Officer,* while the remainder may be carried out by a *trained Animal Health Officer* or *Senior Animal Health Officer*. Furthermore, to prevent fraud, *in-office manual and computerised checks and on the spot inspections* are applied as control mechanisms. And to avoid irregularities under the CAP farm-based schemes a *management information system collects key data and enables performance to be assessed against EU requirements*. MAFF has also appointed a *fraud contact officer*.[39] As a result, as Barbara Adam pointed out, farmers today require "high levels of bureaucratic skills in order to be able to deal with the tremendous amount of paperwork necessary to take advantage of the numerous (and continuously changing) subsidies and policies designed to even out the risks of modern farming."[40]

Finally, supermarkets require uniform and standardised products. As Joanna Bythman reports, until the early 1990s, UK retailers dealt only in Class 1 (no defects) or Extra Class (superior and visually perfect) products with the result that growers got approximately 50 per cent of their crop accepted by supermarket chains. Growers were thus forced to produce perfect-looking crops. In order to comply with these demands, growers had to make use of chemical inputs. Furthermore, supermarkets

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[38] Cm 4212, *The Government's Expenditure Plans* (1999), op. cit., note 19, para.1.74-1.80.
[39] Ibid., para.1.87-1.89.

expected growers "to operate a zero tolerance for insect and fungal attack" which forces growers to use pesticides prophylactically.[41]

Underlying these transformations in food production and distribution patterns is a distinct set of values, those of competitiveness, productivity and economic efficiency. These values have determined policy recommendations of various key agencies within the agri-establishment, as subsequent quotes illustrate:

- Detachment from any natural constraint: "If Community agriculture is to succeed – as it should – in expanding its exports and maintaining its share of world markets, it must increasingly accept the market disciplines to which other sectors of the Community's economy are subject. In this dynamic approach, *which rejects any Malthusian limitation of agriculture's potential*, the accent must be placed more and more on production at a competitive price … It cannot be the Community's aim to stop the development of its agriculture."[42] (European Commission).
- Profit-oriented farmer: "The farming creed includes the requirement to make a profit, without which there can be no agriculture in a capitalist society. It is, in fact, the first requirement from which all else stems."[43] (Royal Agricultural Society of England).
- Competitive: "To encourage an internationally competitive and environmentally sensitive UK agriculture… (Government White Paper on Sustainable Development)[44]

Efficiency and competitiveness are also the criteria that guide agricultural research, as the annual reviews of government funded R&D reveal. They state that the aim of agricultural research is "to advance scientific knowledge relevant to agriculture … in order to increase the efficiency of industry".[45] More specifically, research aims "to maintain and improve the competitive position, efficiency and productivity of the UK

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[40] Barbara Adam, 'Industrial Food for Thought: Timescapes of Risk', in *Environmental Values,* Vol. 8, No. 2 (May 1999), p.223.
[41] Joanna Blythman, 'Beauty's Only Skin Deep', in *The Guardian*, 28 September 1996, p.44.
[42] Commission of the European Communities, 'Adjustment of the Common Agricultural Policy', 1983, op. cit., note 20, p.7. Emphasis added.
[43] RASE*, The State of Agriculture in the UK*, 1991, op. cit., note 18, para.204, p.52.
[44] Cm 2426, *Sustainable Development: The UK Strategy* (London: HMSO, January 1994), para.15.21, p.111.

agriculture". It seeks "to ensure that the producer has available to him appropriate structures, machines, and mechanisation systems and that knowledge is available to use these in the most efficient and effective manner".[46] The 1991 report of then Agricultural and Food Research Council (AFRC) specifically omitted the objective of advancing scientific knowledge relevant to agriculture. Instead, the Council now seeks to provide an internationally competitive research and training base to advance knowledge "in support of enabling technologies for national wealth creation", "to inform effective policy making" and "to provide highly trained manpower for the private and public sectors".[47]

In this drive towards efficiency and competitiveness other values such as animal welfare are only taken into consideration if they do not compromise economic goals. The 1990 MAFF report states that "Research is also directed to diseases which have significance for the welfare of farm livestock, and other aspects of animal welfare including alternative production systems, improved transport and handling systems, and building design. *Particular emphasis is given to changes* which reduce pain and suffering *without affecting efficiency of production*. Special importance is laid on diseases which have implications for human health."[48]

These economic principles and values, however, derive from the specific perceptual knowledge of the external world to which the modern industrial society subscribed and which subsequently guided the way economists perceived the economic system, namely in a mechanistic manner. Yet as H. Thoben pointed out,

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[45] Cabinet Office, *Annual Review of Government Funded R & D 1983* (London: HMSO, 1984), p.14.
[46] Ibid., p.14.
[47] Cabinet Office, *Annual Review of Government Funded Research & Development 1991* (London: HMSO, 1991), p.110.

> A consequence of this conception of the economic system as a hypothetical mechanical system was the emphasis on quantitative magnitudes as prices and volumes. A concomitant effect was that the analysis of the economic system took place in isolation of other systems of social activity … The most far-reaching consequence of the mechanistic view is that it leads to the fiction of the '*homo economicus*', by which human behaviour is stripped from all its social-cultural facets and is reduced to the assumption that in economic life man acts in a purely mechanical way.[49]

The application of this particular perception of the economic system to agriculture had various implications. First of all, it triggered a type of agricultural development that was guided by quantitative criteria such as output, volume, and prices rather than qualitative ones, such as diversity, needs or taste. Secondly, agriculture was considered to be detached from other systems of social activity as well as from the natural environment. Economic calculations focused on on-farm productivity, i.e. output per labourer, thus promoting mechanisation and ignoring the fate of the redundant farm worker, the effects for the rural community, farm animals, wildlife, and Nature in general. Thirdly, farmers are presented as being profit driven, emotionally detached from the land and the animals they work with, or the wider social and cultural implications food production has for society. Perceptions and knowledges of the world to which a society subscribes thus correlate with the way in which the society produces food.

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[48] Cabinet Office, *Annual Review of Government Funded Research & Development 1990* (London: HMSO, 1990), p.92. Emphasis added.
[49] H. Thoben, 'Mechanistic and Organistic Analogies in Economics Reconsidered', in *Kyklos,* Vol. 35, No. 2 (1982), pp.294-295.

4.1.3. Conclusion

In this section I tried to reveal the expansion into the countryside of a truth regime, a value system, and attitudes towards Nature generally associated with industrial societies. Agriculture was to become an industrial and economic enterprise whose goal is to maximise financial gains by making the most efficient use of resources. Technology was employed so as to overcome natural processes and conditions and to enhance productivity. The industrial social framework assimilated and incorporated rural Britain into its mode of functioning and thereby introduced a fundamentally new outlook, new attitudes, perception, criteria and practices to farming. Scientific experts and industrial production methods became institutionalised and presented as the agricultural norm, while an outdated and thus not-to-be-taken-seriously status was attached to the traditional notion of farming as an art or a way of life. The displacement of the traditional rural paradigm by the modern industrial paradigm, however, was not inevitable but actively promoted and encouraged by economic and political interests, and the British Government in particular, as I seek to illustrate in the subsequent part.

4.2. Administrating the Paradigm Change

In this part I seek to identify the driving forces behind the new agricultural paradigm and the modes of intervention that administered and promoted its implementation in the countryside. I will show that the type of development agriculture was to undergo was not natural or inevitable. The paradigm change that was to displace traditional, indigenous practices and knowledge was actively encouraged and assisted above all

by the British Government. Here, I focus on how educational and agricultural policies facilitated the endorsement of the paradigm change.

4.2.1. Agricultural Education and Research

A history of pre-war developments in agricultural education was presented in the *Report of the Committee on Post-War Agricultural Education in England and Wales* carried out by the Luxmoore Committee.[50] According to this Report, there was little formal education until the latter half of the nineteenth century. Farming knowledge derived from experience and was handed down from generation to generation. With the passing of the Technical Instruction Act of 1889 agricultural education became formally organised. "In the early stages," as the Luxmoore Report stated, "the emphasis was on the formal course of instruction mainly intended for young people. This was followed by lectures and practical demonstrations to the farmers themselves." Yet in this early period, "[t]here was little inclination on the part of the farmer to seek advice or assistance from the technical staff, and 'scientific agriculture' was still suspect among practical men".[51]

In 1909, with the setting up of the Development Commission, a new stage in the extension of agricultural science was achieved. Financial assistance encouraged new developments in agricultural research as well as the provision of advice and teaching. Underlying this development was the objective of developing "agriculture by scientific means."[52] Subsequently, research institutes became national rather than

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[50] Cmd. 6433, *Report on Post-War Agricultural Education,* 1943, op. cit., note 7.
[51] Ibid., p.12.
[52] Ibid., p.12.

local in character and provisions were made to guarantee the "transmission of the results of research to the farmer."[53] This changed the nature of advice provided by universities and agricultural colleges. These institutions were now encouraged to "devote themselves to the solution of more difficult problems which demand not merely skill and experience in agriculture, but special scientific knowledge and training."[54] In their stead local Committees were charged "to make the provision required for advising experienced farmers on the means to be adopted in applying scientific discoveries to practice".[55] This expansion of agricultural science required highly trained scientists, and thus an upgrade of the education system to bring "into existence of a class of well-qualified specialists".[56] The subjects in which specialist advice was offered fell under the following six categories and reflected the reductionist nature of the scientific investigation:

- Chemistry: Soils, manures and feeding stuffs.
- Dairy Bacteriology: The production of clean milk.
- Economics: Book-keeping, costings and farm management.
- Entomology: The diseases of plants and animals due to insects.
- Mycology: The diseases of plants due to fungi and bacteria.
- Veterinary Science: Animal diseases of general public interest, such as epidemics or cases of high and chronic mortality in flocks or herds, excluding matters within the scope of private veterinary practitioners.

The Luxmoore Report further stated that with "universities being autonomous, their agricultural departments were not subject to any inspection, but in each case where work in connection with agricultural education was done, a block grant was received

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[53] Ibid., p.12.
[54] Memorandum sent by the Board of Agriculture to the universities and agricultural colleges, quoted in ibid., p.14.
[55] Report on grants for agricultural education and research, 1911-12 by Sir Thomas Middleton, quoted in ibid., p.15.
[56] Ibid., p.16.

through the Ministry of Agriculture."[57] In other words, financial incentives were provided to those institutions that complied with the expansion of agricultural education as envisioned by the Government. In 1941, the Agricultural Improvement Council was set up to ensure that advances achieved in agricultural sciences were indeed implemented in the daily farming practices across the country. The Council's objective was "to devise methods for seeing that promising results of research are applied as rapidly as possible to the problems of agriculture and are incorporated in ordinary farming practice".[58]

In 1958, the De La Warre Report examined agricultural education provided by farm institutes in the post-war period. In the light of the "very rapid progress in agricultural research and the application of its results in farming practice," and with "many millions of pounds a year" invested in new machinery, "the industry's need of technical education" to allow its workers "to use and care for it [the new machinery]," was acknowledged by this Report.[59] The Report recognised that

> [f]ull advantage of technical progress can be taken only by farmers and farmworkers who understand the scientific principles underlying agriculture and their application in day-to-day farming. The prosperity of the industry as a whole … and the prosperity of the individual farmer, faced with increasing competition, equally depend on the intelligent use of up-to-date knowledge and techniques.[60]

The need for agricultural education to become adjusted to the needs of the industry was confirmed by the 1966 Pilkington Committee Report. This Report recommended the application of entrepreneurial criteria to agricultural education to keep up with

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[57] Ibid., pp.29/30.
[58] Ibid., p.31.
[59] Cmnd. 614, *Report of the Committee on Further Education for Agriculture*, 1958, op. cit., note 11, pp.5/6.

recent developments in business organisation, marketing and accounting, mechanisation and the specialised needs of ancillary industries. "In an industry in which progress depends, inter alia, on science, the *technologists*, who are qualified to apply scientific knowledge to production, will have an increasingly decisive role to play."[61] Finally, the 1974 Hudson Report stated that:

> Agriculture is a dynamic industry which has experienced, and continues to experience, marked changes in its structure, use of resources, and technology … It is clearly important that changes in education should reflect and keep pace with changes in industrial requirements, if the contribution of education is to remain relevant to the needs of the industry.[62]

These statements clearly indicated that official recommendations and policies considered the task of educational institutions to be the teaching of the latest scientific and technological developments of the industry. The official education policy thus assisted the shift from a "experience-led" agriculture to a "science-led" agriculture, from farming as a way of life to agriculture as a business and industry. The result was a "gradual 'disenchantment' of agriculture – the replacement of intuition by calculation and the elimination of the mysteries of animal husbandry by exposing them to scientific appraisal".[63]

To summarise, in this section I documented that the British Government, at a particular point in time, decided that farmers, and especially the younger generation, should undergo formal agricultural education. Prior to this point, farming practices were passed down from generation to generation and skills were refined as a result of

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[60] Ibid., p.6.
[61] Advisory Committee on Agricultural Education, *Report of the Advisory Committee on Agricultural Education*, chairman: Sir Harry Pilkington (London: HMSO, 1966), p.16. Emphasis in the original.
[62] Joint Advisory Committee on Agricultural Education, *Report of the Join Advisory Committee on Agricultural Education 1973*, chairman: Professor J. P. Hudson (London: HMSO, 1974), p.31.

many years of experience. Each farmer acquired knowledge particular to his or her locality, to the land they farmed, and to the unique local circumstances they faced. Knowledge was not restricted to the immediate process of food production but was diverse and allowed the farmer to accomplish the multiple daily tasks set by rural life.

The type of skills and knowledge farmers are taught in educational institutions, on the other hand, are dictated by the needs of an industry that specialises in food production to saturate markets, first the national and later the Common and global markets. Agricultural education, as defined by the Luxmoore Report, "is mainly vocational in the sense that it is intended to qualify the recipient to carry on his occupation – agriculture."[64] Standardised, universal production methods allowed standardised, universal agricultural education and thus trained farmers, although ultimately placed on farms across the country, to act in concert. By training farmers to apply standardised production methods, by accustoming farmers to the vision of farming as a business enterprise through the teaching of accounting and marketing techniques, the behaviour of farmers became predictable and as such easier to control.

However, agricultural education not only equipped farmers with the necessary skills required by the industry but agricultural education also normalised the perception of farming as an occupation and facilitated its incorporation into the economy. Farmers in Britain, as in other modern industrial societies, have become "individualized entrepreneurs, increasingly absorbed into the class structure of an

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[63] Howard Newby, *Green and Pleasant Land? Social Change in Rural England* (Harmondsworth: Penguin, 1980), p.266.
[64] Cmd. 6433, *Report on Post-War Agricultural Education,* 1943, op. cit., note 7 , p.10.

urban capitalist society".[65] Effectively, farmers through the training they received, were modified to see themselves as a part of the wider economy. And instead of the laws of nature, farmers were now instructed and trained to operate according to man-made laws, guidelines and principles, such as the CAP.

4.2.2. Agricultural Policy

Britain since the 1940s has witnessed, as Terry Marsden et al. have identified, "a more intensive development of agriculture [which] was encouraged as part of a shift towards a mass consumption economy and greater dependency on domestic food supply, for strategic reasons linked to the UK's declining military and economic strength."[66] The policy incentives of a cheap and secure food supply, following the experience of food shortage and rationing during the war period, and a reduction in the balance of payments deficit[67] triggered the abandonment of the laissez-faire approach towards agriculture. Instead farmers became subject to close government intervention and regulation in the post-1945 era. Growing government intervention in agriculture is exemplified in the increase of employees in the civil service of the Board of Agriculture/Ministry of Agriculture from 136 full-time staff in 1902, to 2,160 in 1923, and 17,000 in 1950.[68] As B. A. Holderness stated:

> The history of British agriculture since the second world war has been inextricably bound up with government. Even the vocabulary

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[65] Hilary Tovey, 'Milk and Modernity: Dairying in Contemporary Ireland', in Harry K. Schwarzweller and Andrew P. Davidson (eds.), *Dairy Industry Restructuring*, Research in Rural Sociology and Development, Volume 8 (Amsterdam: JAI, 2000), p.48.
[66] Terry Marsden, Jonathan Murdoch, Philip Lowe, Richard Munton, Andrew Flynn, *Constructing the Countryside* (London: UCL Press, 1993), p.44.
[67] Cmnd. 6020, *Food from Our Own Resources* (London: HMSO, 1975), para.25, p.8.
[68] Ken A. Ingersent and A.J. Rayner, *Agricultural Policy in Western Europe and the United States* (Cheltenham: Edward Elgar, 1999), p.4. The Ministry of Agriculture was established in 1923.

> of the industry has become increasingly bureaucratic … Intervention has been a fact of life in agriculture since 1940[69]

In order to achieve the aims of increased home production and the reduction of imports, the Government's overriding concern after the war was to protect agriculturally productive land. The countryside was to be reserved for agriculture and thus preserved from urban development, a sentiment encapsulated in the 1947 Town and Country Planning Act. Yet because agriculture was considered to be of strategic importance, it was exempted from planning controls. Instead, the Scott report suggested, agriculture expansion should be achieved through government economic incentives.[70] The 1947 Agricultural Act became the basis for British agricultural policy in subsequent years. Its objective was

> promoting and maintaining, by the provision of guaranteed prices and assured markets … a stable and efficient agricultural industry capable of producing such part of the nation's food as in the national interest it is desirable to produce in the United Kingdom, and of producing it at minimum prices consistently with proper remuneration and living conditions for farmers and worker in agriculture and an adequate return on capital invested in the industry.[71]

In order to increase agricultural output, the government provided grants and subsidies towards the costs of drainage and the application of lime,[72] and to carry out measures of farm improvement, including payments for filling in ditches and removing hedges,

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[69] B. A. Holderness, *British Agriculture Since 1945* (Manchester: Manchester University Press, 1985), p.12.
[70] Nigel Curry, *Countryside Planning: Look Back in Anguish*, An inaugural lecture delivered on 28th April 1993, Cheltenham & Gloucester, p.4.
[71] Agricultural Act 1947, in *The Public General Acts and the Church Assembly Measures of 1947* (London: The Council of Law Reporting) Vol. II, Chapter 48, para.1, p.1053.
[72] Agricultural Act 1937, in *The Public General Acts and the Church Assembly Measures of 1937*, (London: The Council of Law Reporting), Chapter 70, Part I, para.95-97. Reconfirmed in Agricultural (Miscellaneous Provisions) Act 1954, in *The Public General Acts and Church Assembly Measures of 1954* (London: The Council of Law Reporting), Chapter 39.

banks and "other like obstructions to cultivation".[73] The government also provided payments for the ploughing up of grassland[74] and the purchase and application of fertilisers.[75] In 1973, a number of fertiliser manufacturers received long-term contracts to obtain cheap North Sea gas to help curb production costs.[76] Again, the availability of cheap artificial fertiliser removed the farmer from the need to keep animals for natural manure, and the availability of pesticides from the need of natural pest control through traditional crop rotation. Besides, subsequent agricultural acts guaranteed government contributions to as much as ¼ of the costs for long term improvements of agricultural land, and 10 per cent towards expenditure on fixed equipment, agricultural tractors and harvesters respectively.[77] The Government also insulated farmers from market conditions to encourage specialisation and monocultures. In the knowledge of guaranteed prices and assured markets farmers could abandon mixed farming as a strategy of avoiding market uncertainties.[78] Furthermore, landowners and farmers were conditioned, or disciplined, to comply "with the rules of good estate management" and "the rules of good husbandry"; failure to do so could result in supervision orders and dispossession.[79] According to Philip Lowe et al., between the introduction of this provision in 1947 and its repeal in 1958, 5,000 farmers were placed under supervision orders and 400 were dispossessed, one farmer for failing to

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[73] Agricultural Act 1957, in *The Public General Acts and Church Assembly Measures 1957* (London: The Council of Law Reporting), Chapter 57, Part II, para.18, and Second Schedule, point 10. This figure was increased to £ 90 million in 1963.
[74] Agricultural (Ploughing Grants) Act 1952, in *The Public General Acts and the Church Assembly Measures of 1952* (London: The Council of Law Reporting), Chapter 35, pp.770-772.
[75] Agricultural (Fertiliser) Act 1957, in *The Public General Acts and Church Assembly Measures 1957* (London: The Council of Law Reporting), Chapter 15, p.540.
[76] Hill and Ray, *Economics for Agriculture*, 1987, op. cit., note 15, p.352.
[77] Agricultural Act 1967, in *The Public General Acts and the Church Assembly Measures of 1967* (London: The Council of Law Reporting), Vol. I, Chapter 22, para.30-32.
[78] John Bowers, 'The Economics of Agribusiness', in Michael J. Healey and Brian W. Ilbery (eds.) *The Industrialization of the Countryside* (Norwich: Geo Books, 1985), p.38.

make a full productive use of downland, nowadays protected by conservationists.[80] In other words, pressure was exercised upon farmers to conform to the new image of agriculture as modern, industrial and productive. Under these conditions, "farmers had little option but to … carry through the second industrial revolution."[81]

Similarly, farmers were disciplined to keeping accounts and to enrol in formal education. Measures and grants to improve and modernise farms under an EC directive, for example, were only made available "to suitable farms" where the farmer

(a) practises farming as his main occupation;
(b) possesses adequate occupation skill and competence – the criteria referring to the standard of agricultural training received or to a minimum period of farming experience or to both
(c) undertakes that from the start of the development plan he will keep accounts…
(d) draws up a plan for the development of the farm business…[82]

Jonathan Murdoch and Neil Ward, although not referring to this directive in particular but to account keeping in general, argued that the purpose of this type of state intervention was "to modify the attitudes of small farmers themselves … in line with the requirements of accounting procedures. Farmers were to be encouraged to see their farms as 'modern businesses' which should be run efficiently, with efficiency measured by methods of accounting."[83] The keeping of accounts was thus a form of self-regulation and self-monitoring introduced in the farming sector. Farmers "were integrated into forms of calculation and normalization that sought to ensure that they

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[79] Agricultural Act 1947, op. cit., note 71, Part II 'Grants for Farm Improvements and Amalgamations', para. 9-16, pp.1058-1069.
[80] Philip Lowe, Graham Cox, Malcom MacEwen, Tim O'Riordan, Michael Winter, *Countryside Conflicts: The Politics of Farming, Forestry and Conservation* (Aldershot: Gower, 1986), p.41.
[81] Ibid., p.43.
[82] Council Directive 72/159 of April 7, 1972 'On the Modernisation of Farms', in *Encyclopedia of European Community Law*, Volume C, VII, Part C13, article 7 and 8.
[83] Jonathan Murdoch and Neil Ward, 'Governmentality and Territoriality: The Statistical Manufacture of Britain's 'National Farm'', in *Political Geography,* Vol. 16, No. 4 (May 1997), pp.319/320.

saw themselves in ways that were akin to the statistical representation"[84] of farming as a business. In other words, farmers were encouraged to see figures, numbers and accounts, rather than living soils, living plants, living animals, and living consumers. Emotional attachment to the locality, the land and farm animals was thus discouraged and suppressed. The type of information collected from farms in the post-war period comprised, for example:

(a) Details of the purchases of livestock and livestock products, of payments for seed, fertilisers, labour and other outlays made in the process of production;
(b) Details of the acreage, production and sales of crops; the sales of livestock and livestock products and of other items produced on the farm;
(c) A record of births and deaths of livestock;
(d) An opening and closing inventory of crops, livestock, machinery and equipment.[85]

The hard core principles and ideas of the new agricultural paradigm, productivity and efficiency, can only be pursued in large-scale structures and agricultural policies were subsequently geared towards the development of such structures. Large-scale, intensive, entrepreneurial and industrial farming was to become an essential feature of the new agricultural paradigm and as such accepted by the British agri-establishment as normal and natural. The National Farmers Union recognised the need to adapt its organisation to these trends:

> Our organisation must be seen to be reflecting members' business interest, and to be speaking on behalf of the whole industry ... The number of full-time farmers are falling and the average size of the full-time holding will increase. This means we shall have a smaller membership base in future – and our members' requirements will change as they operate on a bigger scale.[86]

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[84] Ibid., p.321.
[85] Cmd. 6421, Committee of the Privy Council for the Organisation and Development of Agricultural Research, *Agricultural Research in Great Britain* (London: HMSO, 1943), p.86.
[86] 'The NFU in the '90s', in *British Farmer*, Vol. 7, No. 3 (April 1991), p.12.

In fact, Simon Gourlay, President of the NFU, argued *against* structural change "if it decimated large-scale agriculture merely to guarantee the future of small-scale farming."[87] Small farms do not make sense from the standpoint of the new agricultural paradigm; they appear ineffective and outdated. Proposals to reverse such structural trends as part of a CAP reform, for example, were immediately rejected. John Gummer, speaking in response to the MacSharry proposals which aimed at supporting family farms, argued that this would "turn farms into museums" and "make farmers curators of an increasingly outdated structure." Support for "small and inefficient" farms, he maintained, would "hold up the *natural changes* that have been a feature of farming ever since it began."[88] However, the transformation to modern industrial, large-scale agricultural practices, was not as natural or normal as Gummer would like to make us believe. First of all, such structural developments are only natural to this particular agricultural paradigm but would make no sense if judged from an ecological agriculture standpoint, for example. Furthermore, these developments towards large-scale structures required the disciplining of farmers by imposing supervision orders, threatening with dispossession, and allocating grants and financial assistance. As Howard Newby pointed out, and as I tried to illustrate in this section,

> These changes have not been haphazard, nor are they the result of some immutable natural law, but the result of policy decisions quite consciously pursued. A large and complex network of institutions has been erected in the public sector in order to effect the transformation that post-war agricultural policy ordained.[89]

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[87] 'Small Farm Action Vital', *in British Farmer*, Vol. 3, No. 2 (March 1987), p.2.
[88] Hansard 14 April 1991 (London: HMSO, 1991), Hansard 18 April 1991, (London: HMSO 1991), quoted in Tracey Clunies-Ross and Nicholas Hildyard, *The Politics of Industrial Agriculture* (London: Earthscan, 1992), p.5.
[89] Howard Newby, 'The Economic and Social Context of Farming and the Countryside Environment', in F.A. Miller (ed.), *Agricultural Policy and the Environment*, CAS Paper 24 (Reading: Centre for Agricultural Strategy, 1991), p.19.

Two addition facts need to be presented for why this particular type of development has taken place in the agricultural sector and not any other. First of all, Jonathan Murdoch and Neil Ward argue that "agriculture was 'brought into being' as a formal economic sector by statistical techniques".[90] The introduction of the Farm Management Survey (FMS) not only encouraged farmers to keep and provide a particular set of information, but

> the way the survey data was then analysed yielded particular representations which became accepted *as* the sector. For instance, all the sampled farms in the FMS had to be *full-time* farm businesses; that is, commercial farm enterprises where the occupier was *mainly* concerned occupationally with farm work and management. This focus on full-time businesses emanated from the idea, derived from agricultural statistics, that the farm structure in Britain should be 'rationalized', and based upon 'viable', 'commercial' and full-time farm *businesses* even though, in actuality, many farms included diverse types of economic activity which integrated them into other aspects of the rural economy.[91]

As a result, agricultural policy was geared towards this vision of what a farm should look like and paid little attention to the different type of farms and production methods that prevailed in Britain. "And the more British agriculture hurried down the path of modernization, the more effective the state's statistical representations of the agricultural territory became."[92] Today, it appears, agricultural policy remains informed by this early vision of a full-time, assuming male-dominated, business. The Council Regulation on organic production, for example, is addressed to the male farmer, referring to "*his* undertaking", "*his* contribution", demanding that "*He* must

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[90] Murdoch and Ward, 'Governmentality and Territoritality', 1997, op. cit., note 83, p.313.
[91] Ibid., p.315.
[92] Ibid., p.321.

provide the inspection body with any information deemed necessary…".[93] This regulation remains ignorant not only of the invisible work on the farm carried out by women and children, but also of the fact that the founder of the Soil Association, Lady Eve Balfour, was in fact a woman and that organic food production, processing and selling has a much higher proportion of women than conventional farming.[94]

A second argument for why agricultural policy was geared towards large-scale, industrial production was that the key players representing the farming constituency, as Richard Body argued, were large farmers themselves:

> Now, you might suppose that a *nation* of farmers would speak up for farmers of all kinds, and particularly for the small farmers who form the large majority. In reality, no one has any significant influence in the NFU unless he is a member of its council. To serve on the council, a member must leave his farm to travel down to London most weeks in the year and there sit on committees and perform other duties which are likely to take two or three days a week. Small farmers cannot do that; they are too busy sitting on their tractors or milking their cows…
> So the NFU Council has gathered to itself men less aware of the day-to-day realities than most farmers, and less sympathetic to them. Being the larger farmers – having 1,000 acres or more is not unusual for an NFU Council member – they have, almost by definition, been the beneficiaries of the system which has amalgamated tens of thousands of small farms. These are the men who have enjoyed the lion's share of the grants, subsidies and tax allowances; they have worked the system; and they have prospered.[95]

In the subsequent part I will now examine the wider effects the adoption of this new agricultural paradigm has had for the social, cultural and natural environment.

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[93] Council Regulation (EEC) No 2092/91 of 24 June 1991 on Organic Production of Agricultural Products and Indications Referring thereto on Agricultural Products and Foodstuffs, in *OJL* 198, Vol. 34, 22 July 1991. Emphasis added.
[94] Phillip Inman, 'Organic Heroes Who've Changed the Way We Shop', in *The Guardian*, 11 December 1999.
[95] Richard Body, *Our Food, Our Land: Why Contemporary Farming Practices Must Change* (Londond: Rider, 1991), p.139. Quoted in Tansey and Worsley, *The Food System*, 1995, op. cit., note 25, p.90.

4.2.3. Conclusion

In this section I tried to illustrate that the revolutionary changes the UK agriculture was undergoing were not natural or inevitable. The modern industrial agriculture paradigm "is not the inevitable outcome of an evolutionary process of modernization of a previously 'uncivil' or traditional world, but the outcome of a struggle between two contending projects of modernity".[96] At a certain moment in time, the industrialisation of agricultural processes "have begun to become economically advantageous and politically useful."[97] The power associated with the scientific knowledge system colonised and expanded into the countryside; it served economic interests while it disenfranchised ordinary farmers. Educational and agricultural policies provided social control mechanisms not only to institutionalise these changes, to make them lasting and to make them seem natural but also to deprive farmers of their autonomy by increasing their dependence on external inputs, regulations, and man-made laws. Agricultural and educational policies manipulated the farmer's "gestures" and "behaviour", so as to increase the farmer's forces in economic terms of utility while at the same time diminishing these same forces in political terms of obedience, to paraphrase Foucault.[98] I will describe its effects in more detail in the following section.

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[96] Hilary Tovey, 'The Co-operative Movement in Ireland: Reconstructing Civil Society', in Hilary Tovey and Michel Blanc (eds.), *Food, Nature and Society: Rural Life in Late Modernity* (Aldershot: Ashgate, 2001), p.337.
[97] Michel Foucault, *Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, edited by Colin Gordon, translated by Colin Gordon, Leo Marshall, John Mepham, Kate Soper (New York and London: Harvester Wheatsheaf, 1980), p.98.
[98] Michel Foucault, *Discipline and Punish: The Birth of the Prison*, translated by Alan Sheridan (London: Penguin Books, 1977), p.138.

4.3. The Effects of the Modern Agricultural System

4.3.1. Its Impact on the Environment

The environmental effects of modern farming practices have widely been recognised and documented. In his survey of air photographs, Oliver Rackham illustrated that "almost every aspect of it [the historic landscape] has been lost since 1945 … The commonest cause has been destruction by modern agriculture".[99] Between 1949 and 1984, there was a loss or damage to 95 per cent of lowland unimproved grassland, 80 per cent of calcareous grassland and 40 per cent of lowland heath.[100] The number of lakes and ponds in Britain decreased from 470,000 to 330,000 between 1945 and 1990. The introduction of watering holes for livestock as a result of changing farming practices rendered natural ponds redundant.[101] Between 1947 and 1985, 621,000 kilometres of hedgerow, that is 22 per cent of the total, were lost, and thus homes to birds, mammals, cover for plants, and a windbreak to stop soil erosion.[102] Between 1984 and 1990, an additional 53,000 miles of hedgerows were lost, accounting for one-fifth of the total.[103] The intensification of agricultural practices has also resulted in the loss of 97 per cent of meadows in Britain and thus an important source of plant diversity.[104] These changes resulted in a loss of local distinctiveness, a reduction in

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[99] Oliver Rackham, *The History of the Countryside* (London: Phoenix, 1997), p.25.
[100] Nature Conservancy Council, *Nature Conservation and Agriculture* (London: 1977), quoted in Clive Potter, *Against the Grain: Agri-environmental Reform in the United States and the European Union* (Oxon: CAB International, 1998), p.29.
[101] CPRE and WWF, *Growing Greener: Sustainable Agriculture in the UK,* 1996, op. cit., note 33, p.113.
[102] Tracey Clunies-Ross, Nicholas Hildyard, 'Industrial Agriculture: The Unsustainable Face of Farming', in Ronald Jones, Martin Summers, Ed Mayo (eds.) *Sustainable Agriculture for Eastern Europe*, Vol. III (New Economic Foundation, January 1996), p.12.
[103] Michael Hornsby, 'Farmers Paid to Preserve Hedges', in *The Times*, 21 July 1992, p.8.
[104] Buckley, *The Future of Farming*, 1997, op. cit., note 27, p.4.

many natural features, more open landscapes and the trend towards large fields and farms.[105] It also resulted in a loss of biodiversity in terms of species and habitat loss, causing food chain disruption and a simplification of the ecosystem. Wildflowers, farmland birds, butterflies and bumble bees are disappearing in the countryside, with 24 out of 28 farmland bird species being lost between 1970 and 1990. This destruction of the British countryside is generally connected to the exemption of agriculture from any planning control:

> This has contributed as much as anything else to the despoilation of the environment of the countryside not only in respect of aggressively productive agriculture and forestry sectors that have mangled the open landscape through the removal of field boundaries, linear coniferous planting and so on, but also in respect of the erection of large industrial farm and forestry buildings that owe little to their setting in terms of size, design, siting, layout or materials.[106]

During this period of agricultural intensification, a loss in on-farm diversity has also occurred. During the twentieth century, some 75 per cent of the genetic diversity of agricultural crops has been lost. Only about 150 plant species are now cultivated, of which just three supply almost 60 per cent of calories derived from plants.[107] In the UK, three varieties account for 68 per cent of early potatoes planted. Four wheat varieties account for 71 per cent of wheat area.[108]

The danger entailed in such monoculture practices can be illustrated at the example of the potato blight that struck in May 1845 and decimated Europe's potatoes. For 250 years all the potatoes grown in Europe descended from two original

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[105] CPRE and WWF, *Growing Greener: Sustainable Agriculture in the UK,* 1996, op. cit., note 33, p.37.
[106] Curry, *Countryside Planning,* 1993, op. cit., note 70, p.5.
[107] Jules Pretty, *Regenerating Agriculture: Policies and Practice for Sustainability and Self-Reliance* (London: Earthscan, 1995), p.75.
[108] Ibid., p.77.

introductions in the late 1570s that had no resistance to the potato blight. The potato blight wiped out Ireland's entire crop. As Jeremy Cherfas put it, "The Irish potato famine was the first epidemic enabled by genetic uniformity."[109] There are other dangers, too, as George Monbiot points out. The loss of old varieties "threatens not only to obliterate the past, but also to manacle the future. Just as the idea of widespread organic farming in Britain gains credibility, we are losing the crops which flourish without great doses of pesticide and fertilisers."[110]

Intensive modern farming practices have negative environmental impacts beyond the farm gate. Conventional agriculture makes a wasteful use of natural resources. Jackson reminds us that the source for nitrogen fertiliser is natural gas. As such "[t]he high yields resulting from this carbon transfer from fossil fuels into our major crops somehow obfuscates the fact that we are heavily involved in an extractive economy, an economy which takes out and does not reinvest."[111] Furthermore, as Bill Mollison and David Holmgren pointed out, "In modern food-supply systems, full nutrition and a varied diet are provided by a world-wide transport, storage, and marketing network. This reticulation of food is, of course, more energy-expensive than local agricultural diversity and is only possible due to fossil fuel subsidy."[112]

The use of artificial inputs has also implications for the quality of food that is produced. Ray Wolf argues that "Nitrogen and Phosphorus are so heavily used on conventional farms that the roots of plants are inundated with them, and for a variety

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[109] Jeremy Cherfas, 'Sustainable Food Systems', in Ben Mepham (ed.), *Food Ethics* (London and New York: Routledge, 1996), p.41.
[110] George Monbiot, 'Something Nasty in the Vegetable Plot', in *The Guardian*, 15 August 1996, p.15.
[111] Wes Jackson, 'Ecosystem Agriculture: The Marriage of Ecology and Agriculture', in Patricia Allen and Debra Van Dusen (eds.) *Global Perspectives on Agroecology and Sustainable Agricultural Systems*, Proceedings of the Sixth International Scientific Conference of the International Federation of Organic Agriculture Movements, Volume One (Santa Cruz: University of California, 1988), p.15.

of reasons lose their ability to forage for such vitally needed nutrients as zinc, calcium, selenium, and others. The result is the production of plants that contain mineral imbalances, or outright deficiencies."[113] This ultimately affects the quality of food which we consume. It has been suggested that intensively produced food is affecting us. Modern agriculture produces food that lacks vital minerals, metals and some kinds of fatty acids that are vital in preventing diseases and for the development of a healthy body and brain, especially for the foetus, according to Professor Michael Crawford from the Institute of Brain Chemistry at Queen Elizabeth Hospital for Children, London.[114]

Furthermore, the modern agricultural paradigm has drastically changed the quality of life for farm animals. Traditionally, farm animals lived relatively natural lives. They could walk freely in the open field and eat the food for which their digestive systems had evolved. They had 'social' contact with other animals. The industrial agriculture paradigm re-defined animals as a production unit. Modern farm systems were re-designed to allow vast quantities of food to be produced for human consumption. "Instead of allowing animals to run around in fields, where they build up muscles, their flesh is kept soft by confining them to narrow stalls. Where veal calves are concerned, the meat is more highly priced if it is pale in colour. A liquid, iron-free diet will keep it that way, though such a feeding regime deprives the growing calf of essential nutrients".[115] A similar picture emerges from the diary industry:

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[112] Bill Mollison and David Holmgren, *Permaculture 1: A Perennial Agricultural System for Human Settlement* (Melbourne: Corgi Books, 1978), p.8.
[113] Ray Wolf, 'What is Organic Farming', in Ray Wolf (ed.) *Organic Farming: Yesterday's and Tomorrow's Agriculture* (Emmaus PA: Rodale Press, 1977), p.4.
[114] Nick Nuttall, 'Health of the Nation "Put at Risk by Factory Farms"', in *The Times*, 7 October 1995, p.11.
[115] Buckley, *The Future of Farming*, 1997, op. cit., note 27, p.6.

> The dairy farm is now the scene of the most monstrous of all the routine abominations perpetrated by modern intensive agriculture. Blood and pus are significant components of the milk we drink because mastitis (a cripplingly painful inflammation of the udder) is rampaging through the dairy herd: between 30 and 35 cases per hundred cows are recorded every year. About 30 per cent of the dairy cows in Britain are lame, partly as a result of laminitis. This would feel – according to a leading cattle vet – like "crushing all your fingernails in the door then standing on your fingertips". Agony is the resting state of the modern dairy cow. Both mastitis and laminitis result from the extraordinary stresses placed on the cow by the pursuit of ever higher milk production.[116]

Effectively, agricultural science and modern farming practices subjugate Nature. Nature has lost its intrinsic value and farming "no longer corresponds to the dignified rhythm of the seasons to the extent that it once did."[117] Today, not even grass can grow of its own accord; it becomes an object to be studied and managed. The 1950s were an era "in which grass really began to be regarded as a crop alongside wheat or potatoes. Earlier it had been seen as something that just happened to be there which could be left to its own devices for grazing or cutting for hay."[118] The result was a change in grassland management aided by the technological introduction of electric fencing. Increasingly, during this process of agricultural modernisation and industrialisation, Nature is placed in relations of capitalist production. In other words, Nature has become subject to the dominant regime of truth and its practices.

4.3.2. Its Socio-economic Effects

On the positive side, since the 1940s, modern agricultural practices have produced more from the same amount of land. Wheat yields have increased from an average of

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[116] George Monbiot, 'Agribusiness Uncowed by Suffering', in *The Guardian*, 9 July 1997, p.17.
[117] Newby, *Green and Pleasant Land*, 1980, op. cit., note 63, p.75.

2.1 to 7 t/ha, barley form 2.1 to 5.9 t/ha, potatoes from 17 to 38 t/ha, and milk yields from about 11 pints per day to over 25 pints per day per cow.[119] The UK agriculture industry is among the most product-efficient agriculture sectors in the world.[120] However, these developments have been achieved at immense social costs. In the UK, between 1946 and 1989, the total of full-time and part-time workers on farms fell from 976,000 to 285,000 due to mechanisation. Between 1945 and 1992, the number of farms in England and Wales has fallen from 363,000 to 184,000. Today, the labour force in agriculture in the UK is 2 per cent.[121] In 1997 the Rural Development Commission stated that 42 per cent of rural parishes no longer possess a shop.[122] Today, six out of 10 parishes in rural England have no primary school, and three-quarters no bus service or health clinic.[123] It can be argued that alongside the development of industrial agriculture the general breakdown of social fabric in rural communities has occurred.

Furthermore, consumption patterns no longer rely on local production. Instead, industrial agriculture has increased the variety of foodstuff through regional and international specialisation and trade. This has increased the miles food travels. In 1999, Britain would have exported "111 million litres of milk and 47 million kilograms of butter, while simultaneously importing 173 million litres of milk and 49 million kilograms of butter. Apples will be flown 14,000 miles from New Zealand and

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[118] Soper, *Years of Change*, 1995, op. cit., note 31, p.203.
[119] Pretty and Howes, *Sustainable Agriculture in Britain*, 1993, op. cit., note 28, p.1.
[120] CPRE and WWF, *Growing Greener Sustainable Agriculture in the UK,* 1996, op. cit., note 33, p.42.
[121] Tansey and Worsley, *The Food System*, 1995, op. cit., note 25, p.86.
[122] Cited in George Monbiot, 'Buying up Britain', in *The Ecologist,* Vol. 30, No. 8 (November 2000), p.30.
[123] Steven Gorelick, 'Facing the Farm Crisis', in *The Ecologist*, Vol. 30, No. 4 (June 2000), p.28.

green beans brought 4,000 miles from Kenya."[124] Products are packaged, and as a result, 8.5 million tons of waste food packaging was dumped in 1997 alone.[125] More than 80 per cent of consumers now use supermarkets to purchase their weekly groceries. This means that the money they spend leaves the community. "Nowadays, the supermarkets bulge with imported food … Yet underneath that façade of plenitude is the quiet, insidious transfer of control from the people to the huge, transnational corporations."[126]

One recent study assessed the costs caused by conventional farming practice, such as treatment or prevention costs, environmental clean up costs, and administration costs involved in monitoring environmental, food and health implication. According to this study, these costs amounted to £2.34 billion in 1996 alone in the UK. Of the total of £2.34 billion £1,113 million were arising from the emissions of gases, and £607 million from BSE.[127] The costs of cleaning up the drinking water from the contamination with pesticides amounted alone to £120 million in 1996. Annual pesticide use in Britain amounts to 25 million kilograms, with the pesticide market being valued at £500 million.[128] The above total figure of £ 2.34 billion does not include the cost of research, bureaucracy, nor for public subsidies for farming. As Pretty argues, "we actually pay three times for our food – once, over the counter; twice, through our taxes, which are used largely to support one

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[124] Helena Norberg-Hodge, 'Reclaiming Our Food: Reclaiming Our Future', in *The Ecologist*, Vol. 29, No. 3 (May/June 1999), p.209.
[125] Julian Rose, 'Countryside, What Countryside', in *Permaculture Magazine*, No. 23 (Spring 2000), p.4.
[126] Marian Van Eyk McCain, 'Something Worth Digging For', in *Resurgence,* No. 201 (July/August 2000), p.66.
[127] Jules Pretty, 'The Real Costs of Modern Farming', in *Resurgence,* No. 205 (March/April 2001), p.7. See also Jules Pretty, 'The True Cost of Intensive Farming', in *Living Earth*, No. 208 (October – December 2000), pp.4-6.
[128] BBC, Radio 4, *File on 4*, 30th January 2001.

type of farming; and thrice, to clean up the mess caused by this method."[129] In addition, modern food distribution practices are heavily subsidised, too. This includes "airports, motorways, high-speed rail links, tunnels, bridges and communications satellites that make the supermarkets' global trade possible. We also subsidise the aviation fuel and energy production on which supermarkets depend."[130]

Furthermore, the new agricultural regime of truth prioritises scientific knowledge, thereby authorising scientists to speak the truth while marginalising lay people, not to speak of the farm animals concerned. The example of farm animal health and welfare proves this point. The agri-establishment redirected and restricted this debate to the domain of scientific experts, thereby, although recognising their concerns raised, excluding the public and farmers from contributing to the debate, as following quotations from the European Commission, the NFU and the Royal Agricultural Society of England will show:

- In order to be able to draw an *informed scientific opinion* in fields which so closely affect human and animal health … the Commission has set up a Scientific Veterinary Committee … By consulting the *leading European experts* on these matters the Commission will have *an objective basis* on which to work.[131]
- In connection with public health, the *Scientific Committee* have delivered opinions, based on the work of an *ad hoc* group of *scientific experts*, on the use of certain substances with hormonal effects in livestock diets. On the basis of these opinions, which reflect the views of *Europe's most eminent scientists* in this field, the Commission is drawing up proposals for the Council.[132]

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[129] Pretty, 'The Real Costs of Modern Farming', 2001, op. cit., note 127, p.8.
[130] Norberg-Hodge, 'Reclaiming Our Food', 1999, op. cit., note 124, p.209.
[131] On the issue of animal welfare of battery-managed laying-hens. Commission of the European Communities, *The Agricultural Situation in the Community 1981 Report* (Brussels and Luxembourg, 1982), para. 356, p.142. Emphasis added.
[132] On the use of hormone growth promoters in cattle as discussed at the European level. Commission of the European Communities, *The Agricultural Situation in the Community 1983 Report* (Brussels and Luxembourg, 1984), para 285., p.144. Emphasis added.

- Scientific evidence *has to be the criteria* upon which approval decisions are made, and the NFU will continue to argue that this must be the case.[133]
- Progress towards improving animal welfare *must be* science-based.[134]
- The welfare aspects of animal transportation and slaughter give rise for concern, and scientific information which already exists should be used to bring about improvements.[135]

In other words, the scientific discourse empowers scientists while it subordinates the consumer, the farmer and the farm animal. It also allows control over farm animals and farmers.

And finally, as I indicated in previous sections, changes in agricultural practices have had profound implication for the individual farmer. "Farmers are becoming outworkers in an industrialized food production system in which human labour is usually replaced by machines and processes are carried out in controlled, centralized units where possible."[136] Farming no longer constitutes a way of life. Farming is now perceived as an occupation. It is practised in concert across the country. Education and other government interventions have promoted this type of development to take place. Agricultural policy and agricultural education have disciplined the farmer by providing him or her with the necessary skills and attributes to meet the criteria of the industry. They have provided the farmer with the ability to produce commodities for the global market according to the criteria set by external authorities, such as scientists and economists. Farmers were encouraged to consider their produce as commodity and state interventions, such as account keeping, has

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[133] On the use of hormone growth promoters in cattle as discussed by NFU. Peter Fane, 'Action on Hormones', in *British Farmer*, Vol. 11, No. 8 (October 1995), p.22. See also 'UK Fights EC Hormone Ban in Euro Court', in *British Farmer*, Vol. 3, No. 6 (July 1987), p.2. Emphasis added.
[134] RASE, *The State of Agriculture in the UK*, 1991, op. cit., note 18, para.48, p.14. Emphasis added.
[135] Ibid., para/57, p.16.
[136] Tansey and Worsley, *The Food System*, 1995, op. cit., note 25, p.96.

helped to normalise the view of farms as modern businesses. Agriculture today, as Mabey states, is

> … not dictated by the person who lives in the place having a deep-rooted knowledge of what works in that place, but are dictated by schedules given to them by chemical companies. These companies sell them the seed, the fertilizer, the herbicides to protect the seedlings, tell them the time to plant, which field to plant them in, and what rotation they must follow. Farmers are utterly in thrall, not to the local rhythms and inward-looking perspectives that have to do with an indefinable quality of rurality, but to a business schedule delivered from factories and companies.[137]

The farmer no longer controls but is controlled. "Charles de Gaulle once said 'it is impossible to govern a nation that makes 365 types of cheese'. He understood that when food processing is distributed among hundreds or thousands of artisans, it is more difficult to concentrate power."[138] The British Government, on the contrary, has ensured government over its farmers. Today, laws, guidelines, regulations and directives dictate agricultural practices. Farmers no longer know about self-sufficiency, they are no longer aware that a healthy farm can produce anything it needs not only for food production but shelter and energy for the occupants, too. Farmers have traded in this knowledge of self-reliance for dependence, dependence on scientific knowledge and expert advice, dependence on external inputs such as fertilisers, pesticides and seeds supplied by a few multinational corporations, dependence on machines and fossil fuel, and dependence on income through the payment of subsidies. This effectively meant that farmers "had to accept packages of production practices which were to a large extent created outside of and dependent on

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[137] Mabey, 'A Village Voice', 2000, op. cit., note 12, p.25.
[138] Sally Fallon, 'Sausages, Sauerkraut and Cheese', in *The Ecologist*, Vol. 30, No. 4 (June 2000), p.42.

bodies of knowledge inaccessible to local farming communities."[139] Farmers in modern industrial agriculture systems are dependent on multiple factors, and thus controlled by multiple agencies, a process that reflects Max Horkheimer's argument that "[t]he history of man's efforts to subjugate nature is also the history of man's subjugation by man."[140]

4.4. Conclusion

In this chapter I have described the new agricultural paradigm that was to emerge, develop and eventually replace the traditional agricultural paradigm in the UK from the 18th century onwards. New hard core principles, including a new scientific truth regime, were to inform about the aims and objectives of agriculture, the practices to be adopted, and the experts to be responsible for the production of new knowledges, new discourses, new inventions and new technologies. A new set of assumptions, beliefs and values towards food production emerged and identified new problems and new objects in agricultural production processes. The key actors responsible for bringing about these transformations did not reform the existing farming paradigm or co-operate with its institutions and elites in order to bring about change. Instead, these actors embraced a different truth regime, that of modern science, and the correlating social structure of industrial societies. The new agricultural paradigm displaced the traditional paradigm and became accepted as superior and true.

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[139] Hilary Tovey, 'We Can All Use Calculators Now': Productionism, Sustainability, and the Professional Formation of Farming in Co. Meath, Ireland', in Henk de Haan, Babis Kasimis, Michael Redclift (eds.), *Sustainable Rural Development* (Aldershot: Ashgate, 1997), p.129.
[140] Max Horkheimer, *Eclipse and Reason* (New York: Continuum, 1992), p.105.

This transformation, however, was not evolutionary but revolutionary and hence not natural or inevitable but the result of a power struggle. The new agricultural paradigm was supported by the introduction of disciplines that shaped the individual farmer into conforming and complying with the new paradigm. The new paradigm is the result not so much of a farmer-led evolution than of the remolding of farming practices through government-led incentives. Just like their crops, so has a specific type of farmer been cultivated and pruned to fit the vision of a modern agriculture industry. Traditional farmers did not give up their knowledge, practice and control voluntarily but impulses were given in the form of training, education, R&D and what John Bowers called "the manipulation of the economic environment facing the farmers".[141]

The shift to the new agricultural paradigm was materialised in the production of a new agricultural space. Today, large-scale farm structures, the removal of hedges, the sterilisation and standardisation of the countryside, the emergence of out of town supermarkets, the erosion of villages, the closure of village shops, schools, and post-offices, and an increase in transport all make the new agricultural paradigm recognisable. These features render the new paradigm real and visible in space.

However, the key actors in instigating agricultural change and in maintaining its dominant position were not political actors in the traditional sense but also institutions and bodies explicitly associated with civil society, such as the NFU and universities. The NFU and agricultural departments and institutes, just as governmental bodies such as MAFF, take the hard core principles of the modern

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[141] Bowers, 'The Economics of Agribusiness', 1985, op. cit., note 78, p.38.

industrial paradigm as given and as such they all operate within the same social framework of knowledge. Conflicts or disputes that emerge between these actors are over the nature of the protective belt. The scientific knowledge provided by agriculture institutes is thus not neutral or objective since these institutes themselves are part of the dominant regime of truth. Agriculture departments and the experts they have created are authorised by this truth regime to produce the official discourse and to make knowledge claims about agricultural practices. As such, they are essentially tools and vehicles of the power of the scientific agricultural discourse that denies ordinary farmers and other non-experts the right to make knowledge claims. The new knowledge provided by scientific experts justifies those agricultural practices that conform to the hard core principles of a modern industrial agriculture structure. By providing reason and justification for certain types of activities, agricultural scientists shape farmers' perceptions of how to cultivate food and of what 'true' agricultural practices are. Since no knowledge is provided on agricultural practices that do not conform to the hard core principles, such as traditional agriculture, these practices are neutralised, marginalised and ultimately rendered invisible. These practices are considered peripheral, eccentric or outdated. Agricultural scientists, in other words, are part of the truth regime that correlates with the societal structure of modern industrial societies and as such they also function as part of its power mechanism that resulted in the displacement of traditional farming practices.

In this chapter I also described the effects this new agricultural regime has had which raises doubts about the notion of agricultural progress. The new regime changed the nature of the relationship amongst humans as well as between humans and Nature. Between humans, relationships became more impersonal. The link

between the farmer and the consumer was cut and to be replaced by more regulation and bureaucracy. Also, traditional practitioners, and women in particular, were neutralised and rendered invisible by this new truth regime. Their contribution, attitudes, beliefs, values and practices were considered irrelevant or negligible. Farmers were encouraged to change their attitudes towards the natural surroundings. The idea of working with natural processes was replaced by one of domination and control, while farm animals and crops were turned into mere statistics in annual business accounts. The ultimate effect of the new truth regime was the destruction of the countryside, a general breakdown in the social fabric, the emergence of new food scares, and an increase in the control over farm animals, crops and farmers. Ultimately, these were denied the "right to live and blossom and to reach their own individual forms of unfolding and self-realization"[142] because this right was subordinated to the principle ideas and the operational necessities of the social framework of modern industrial societies. In the next chapter I will locate the resistance that occurred against the effects of this agricultural paradigm and in doing so identify the key actors in bringing about real change.

[142] Bill Devall and George Sessions, *Deep Ecology* (Salt Lake City: Gibbs M. Smith, 1985), p.67.