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Vegetarianism

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Synonyms

Ethical vegetarianism; Moral vegetarianism

Introduction

Vegetarianism is the practice of excluding meat from one's diet. Vegetarians avoid consuming any animal flesh, including fish and fowl. Some vegetarians eat eggs and/or dairy. Others, vegans, refrain from eating any animal products and subsist on an entirely plant-based diet, typically consisting of vegetables, fruits, grains, nuts, seeds, and legumes.

Vegetarians can also be distinguished based on their reasons for abstaining from eating meat. Some do so for reasons of personal health. Others avoid meat for economic reasons or because they have an aesthetic dislike of its taste, smell, or appearance or because their religion prohibits its consumption. But still others, "ethical vegetarians," do so for moral reasons. In keeping with the ethical focus of this encyclopedia, the remainder of this essay will

be concerned exclusively with ethical vegetarianism (also called "moral vegetarianism").

While a great variety of arguments in support of ethical vegetarianism have been presented over the years, most of them are based on one or another of three fundamental ethical concerns. One set of arguments contends that the practice of eating meat causes the unnecessary suffering and premature death of animals and that vegetarianism better promotes animal welfare and is more respectful of animal rights. Another set of arguments maintains that meat consumption leads to poor food distribution and exacerbates world hunger, evils that would be greatly ameliorated by the widespread adoption of a vegetarian diet. A final set of arguments seeks to establish that the production of meat, in radical contrast to plant-based agriculture, leads to environmental degradation on a massive scale and is consequently unsustainable.

An Animal Welfare Argument

Perhaps the most influential argument for vegetarianism based on animal welfare considerations rests on the premise that it is wrong to cause pain to a sentient being without having a sufficient justifying reason. The claim is not that causing pain is *always* wrong but rather that it *tends* to be wrong, all else equal, and thus requires adequate justification. While inflicting pain on others can be justified if it is necessary to do so in order to

bring about some important good (as when a surgeon performs a painful procedure in order to restore a patient's health), it cannot be justified if the good to be gained is small, so that it is disproportionate to the amount of suffering it is supposed to justify, or if that good could quite easily be brought about by alternate means that would not involve the infliction of suffering. Still less can the infliction of (disproportionate and/or unnecessary) pain be justified when those who receive it do so involuntarily.

The application of this argument to the issue of vegetarianism is straightforward. On modern factory farms, meat animals are caused involuntarily to suffer terribly. The justifying reason is that people eat the animals, and this benefits human beings both by nourishing them and because of the enjoyment they get from the taste of the animals' flesh. But ethical vegetarians argue that people can nourish themselves every bit as well on a vegetarian diet as they can on a diet that includes meat and, further, that while the restrictions inherent in vegetarianism do entail the elimination of some tastes from one's diet, the vegetable kingdom still provides an almost limitless variety of satisfying and tasty eating experiences. Thus, on this view the justifying reason for the pain visited on animals is reducible to the marginal benefit in taste one can derive from including meat in one's diet as opposed to restricting oneself to plant-based foods. It appears unlikely that such a small benefit could possibly justify such a large-scale infliction of suffering.

In the past, this reasoning was sometimes challenged on the basis of the claim that meat is essential to a healthy human diet and thus that the good to be gained by causing animals to suffer is not a trivial one, but rather the vital value of good health. (George 2000 presents a variation on this argument.) But ethical vegetarians counter that there is now a scholarly consensus, acknowledged even by such mainstream organizations as the US Department of Agriculture and the American Dietetic Association, and that optimum health can be achieved while eating an exclusively plant-based diet. Indeed, the latter organization (which changed its name in 2012 to the

Academy of Nutrition and Dietetics) issued an official position statement on vegetarianism in 2009, in which it concluded that "appropriately planned vegetarian diets, including total vegetarian or vegan diets, are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases. Well-planned vegetarian diets are appropriate for individuals during all stages of the life cycle, including pregnancy, lactation, infancy, childhood, and adolescence, and for athletes" (Craig and Mangels 2009, p. 1266)].

Another way to challenge the argument is to assert that animals are significantly less vulnerable to pain than are human beings. But this objection, too, has largely fallen by the wayside. In recent years, scientific support has been steadily growing for the conclusion that mammals and birds experience pain much in the same way that people do. Evidence supporting this conclusion comes from observation of the behavior and physiology of these animals, as well as from evolutionary theory. When animals are cut, burned, subjected to blunt force trauma, or forced to undergo other treatments that might be presumed to be painful, they tend to respond with bodily movements and vocalizations that are similar or identical to those produced by human beings in the same circumstances. These responses are muted or nonexistent when the animals have been treated with a local anesthetic, just as is the case with humans. Moreover, the more our knowledge of the underlying physiology of human pain increases, the more we find analogous anatomical structures (a nervous system and sensory receptors) in animals. Direct manipulation of these structures produces behavior consistent with the hypothesis that the animals feel pain, and neurological investigations suggest that the same parts of the brain are involved in pain processing across species. Finally, evolutionary theory points out the extraordinary usefulness and survival value of a capacity to feel pain. Such a capacity alerts an organism at once if it is being burned or cut and motivates it to remove itself immediately from this threat to its bodily integrity and well-being. This point harmonizes with the more general point that animals

benefit from having a strong and sharp sensory awareness of their (often hostile) environment. Indeed, while humans pride themselves on being more intelligent and rational than are any of the other animals, it is clear that they often lag far behind other species when it comes to the power of their senses. Hawks and many other birds have much better eyesight than humans do. Dogs greatly exceed people when it comes to the sense of smell, as do a great variety of animals with respect to powers of hearing. There is no reason to assume that the capacity to feel pain is the one sensory skill that is more highly developed in humans than in other mammals and birds.

But even if one concedes that animals are capable of great suffering, it hardly follows that the processes by which meat is manufactured actually cause such suffering. And indeed, many people assume that cows, pigs, and chickens lead safe, happy lives on family farms until they are, relatively quickly and painlessly, slaughtered. However, whatever the truth about meat production may have been in the remote past, now the overwhelming majority of meat animals spend their lives on factory farms, where the nature of their treatment is determined by economic considerations, rather than by concern for their welfare. The following is a short, and very far from comprehensive, list of the painful experiences to which meat animals in factory farms are routinely subjected.

- Most male cattle, sheep, and pigs are castrated without anesthesia. Tails of cows and pigs and beaks of chickens, all of which are sensitive body parts, are also removed without anesthesia. The reason for proceeding without anesthesia is not that factory farmers are sadists, but rather that anesthesia is expensive. (This point applies to all of the examples listed here.)
- Male chicks are of no use in egg factories. Consequently, those that are born there are immediately killed. They are thrown into plastic bags and crushed or suffocated or are tossed live into wood chippers.
- Animals are crammed into tiny cages, where they spend their entire lives, often without

enough room to turn around, let alone walk or run. Frequently, there is no (or only inadequate and infrequent) removal of feces, with the result that the animals must continually stand in their own waste.

- Dairy cows are kept in a nearly constant state of pregnancy. The resulting veal calves are removed from their mothers and fed a diet that results in anemia. The dairy cows, which would otherwise have a life expectancy of about 20 years, are fed a special diet that prematurely destroys their health but which, in the short run, maximizes their milk production. After 6 or 7 years of such production, they are slaughtered.
- Nor does the slaughterhouse provide a quick and merciful release from the horrors of the factory farm. In recent years, small slaughterhouses have given way to huge, high-speed facilities, each capable of slaughtering more than a million animals per year. Animals to be slaughtered are hung upside down and brought to the slaughterer on conveyor belts. This process frequently results in a broken leg in the case of heavy animals, such as cows and pigs. The slaughter line does not slow down for these injured animals. The animals' throats are then cut, and they bleed to death. The speed of the operation is such that before they have time to bleed out or even to lose consciousness, many of these animals experience being immersed in scalding water or having their legs cut off and their skin removed. The Federal Humane Slaughter Act requires that animals covered by the act be rendered unconscious prior to having their throat cut. But chickens, turkeys, ducks, and geese are not covered by this act, and in any case it is generally not enforced. So a great number of animals go through the throat-slitting process fully conscious. Often they must stand in line, waiting their turn, as they watch those ahead of them in line being slaughtered. Their reaction suggests that they understand what they are seeing well enough to grasp what is in store for them.

The most widespread and influential of the strategies for criticizing the argument under consideration, however, is simply to deny to animals

a moral status weighty enough to entail that human beings can ever be morally obliged to sacrifice their own interests to those of animals or to abandon traditional and customary practices out of respect for their rights or welfare. Those who take this line generally try to defend it by appealing to ways in which human beings differ from other animals. The usual tactic is to point out that animals, unlike humans, lack rationality (Aristotle 1989; Aquinas 1989), self-consciousness (Kant 1989), linguistic facility (Descartes 1989), the ability to understand the concept of a “right” (Cohen 2001; White 1989), or something else of this sort and then to argue that they therefore lack the very thing that is necessary in order to be the sort of entity that can make serious moral demands on people.

This approach has been subjected to several important objections. One, which has come to be called “the argument from marginal cases,” is based on the observation that many human beings, such as infants and those who suffer from some sort of mental impairment, may also lack whatever characteristic is held to be necessary for inclusion in the group of morally significant beings. Should moral rights to infants and to the mentally enfeebled therefore be denied? One could, of course, get around this problem by setting the bar low enough to allow all human beings in. But that would also let in pigs. One could keep the pigs out by raising the bar, but that would keep many humans out as well. To solve the problem by using inconsistent standards for humans and for animals would be to abandon the claim that one has found a standard that justifies treating the two classes of beings differently.

Critics of ethical vegetarianism have attempted to refute the argument from marginal cases in at least three ways. First is to insist that the features characteristically possessed by members of the group to which an individual belongs are of greater moral relevance than the features possessed by the individual in question, so that all humans get full moral rights by virtue of the skills and attributes of typical members of the species (Cohen 1991). Second is to suggest that we can supplement a high, individually based standard of inclusion into the realm of full moral status with an

appeal to the natural sympathy of human beings for less fortunate members of their own species (Warren 1991; Steinbock 1978). And third is to claim that it is intuitively obvious, or self-evident, that human beings are entitled to vastly greater moral consideration than are any other animals, so that no argument is necessary (Narveson 1987; Coady 1990).

But a different objection to the usual arguments against assigning significant weight to the interests of animals is that there is no obvious reason why rationality, the ability to talk, and other advanced cognitive skills should be granted such extraordinary moral importance. A more plausible candidate for this role is sentience, that is, consciousness and the ability to perceive, feel, and have subjective experiences. Notice that it is difficult to see how one could harm or violate the rights of a being that is not (and never has been and never will be) aware of anything, a being that feels nothing, and a being that has no concern about or interest in what happens to it. So sentience appears to be a necessary condition for moral standing. Conversely, it is not at all difficult to see how one could harm or violate the rights of a sentient being that cannot reason or speak. Torturing it for no good reason would seem to do the trick. Indeed, it is unclear on what grounds one could be justified in disregarding the feelings, interests, and preferences of a being that has them. So sentience appears also to be a sufficient condition for moral standing. This is not to say, of course, that it is never morally justifiable to do something that hurts someone or that goes against someone’s wishes. But it is to say that the fact that an action will hurt some entity that can hurt, or that it will go against the wishes of some entity that has wishes, is a reason of some moral weight to refrain from doing that action. One needs a justification for hurting an entity that can hurt, and it is far from clear that the entity’s lack of some higher cognitive capacity will generally count as such a justification. “Because she can’t talk, it is morally permissible to rip her skin off while she is alive and conscious”; “because he can’t reason, it is OK to castrate him without anesthesia” – these appear to be non sequiturs.

A final objection is that it makes no sense to try to justify unequal treatment of different sentient beings globally, across a wide range of different practices, on the basis of one or a small number of different characteristics that distinguish those beings from one another. The reason is that each such characteristic will be relevant only to a few different kinds of conduct but will be utterly irrelevant to others. The fact that A is a musical virtuoso and B cannot play a musical instrument at all is a good reason to treat A differently from B when both apply for a job with the local symphony, but it does not provide a good reason to treat them differently when they both show up at the hospital suffering from the same illness. Similarly, while the fact that a pig cannot read is an excellent reason not to grant it admission to study at the local university (and thus to treat it differently in this case from the human applicant who reads well), it is far from clear in what way it is relevant to the issue of whether it is morally justifiable to force the pig, unlike the literate human, to submit to the factory farm and slaughterhouse conditions described above.

A World Hunger Argument

Malnutrition is the largest single cause of death for infants and children in developing nations, killing about fourteen million children each year. One argument for vegetarianism is that meat eating contributes substantially to this crisis, because animal agriculture produces food inefficiently. In order to receive just one unit of protein from meat, one has to feed a meat animal roughly 20 units of protein. (The caloric input-to-output ratio is approximately ten to one.) Similarly, it requires 20 times as much land to feed a meat eater as it does to sustain a vegan. If the same amount of grain that is fed to livestock in the United States alone were instead given to human beings, it would provide two loaves of bread per day to every person on the planet. By contrast, raising animals for food consumption requires so many resources that it would be impossible to feed the world on a meat-based diet.

Defenders of meat eating generally concede that meat is an inefficient source of protein and of calories and that a large-scale conversion to vegetarianism would substantially increase the world's food supply. But they often counter that the real problem underlying world hunger is poor distribution, rather than simply a shortage of food. Since the present system, which includes a great deal of meat eating, still generates more than enough food to go around, they argue that a call for vegetarianism is unwarranted. What is needed, instead, is simply better distribution of this already abundant supply.

Ethical vegetarians counter this rebuttal with an argument that meat eating contributes significantly to the food distribution problem. Their argument is that meat agriculture is winning the economic competition for a limited resource, namely, the world's supply of grain fields. Farmers in developing countries can make more money selling meat for export to wealthy nations than they can selling plant-based food locally, to customers who generally cannot afford meat. Thus, millions go hungry while observing that land, right where they live, is used for grazing, rather than for growing grains for human consumption. Where the demand for meat in the wealthy countries disappears, it is likely that some of the farmers in the developing nations would return to the production of plant-based food, which they would have to sell at significantly lower prices, thus facilitating better distribution to impoverished locals.

An Environmentalist Argument

Another argument for vegetarianism is based on the premise that the mass production of meat through modern factory farming methods is environmentally unsustainable. According to a report of the Food and Agricultural Association of the United Nations (2006), the livestock industry contributes on a "massive scale" to air and water pollution, land degradation, climate change, loss of biodiversity, and other forms of environmental degradation. The following is a brief and incomplete bill of particulars:

- Factory farming consumes extraordinary amounts of energy, soil, and water. For example, one needs 2,500 gal of water in order to produce one pound of beef, as opposed to 155 gal to produce the same quantity of wheat. 80 % of the total consumptive use of water in the United States goes to meat production.
- Factory farming leads to the introduction of toxic chemical residues into the food chain and into waterways. Farm animals produce two billion tons of waste each year worldwide, with cattle accounting for one-half of that total. Animal waste, unlike human sewage, is not treated to kill pathogens. The manure, in conjunction with the runoff of water used to clean farm buildings and equipment (plus pesticides and other agricultural chemicals), pollutes waterways, soil, and air. Meat production causes 80 % of all water pollution, with animal dung alone causing twice as much water pollution as all other industrial causes combined.
- Animal waste emits methane, a greenhouse gas, which, in conjunction with the extensive use of fossil fuels in factory farming, leads to ozone depletion and contributes to global warming. Meat production accounts for more of the world's greenhouse gas emissions than does the combined activity of all vehicles of transportation (including all cars, trucks, buses, trains, ships, and planes).
- Factory farming causes topsoil loss from grazing, destruction of habitats of many species of wild animals and plants, deforestation and desertification from the clearing of land for grazing, and the destruction of ecosystems.

Many of these ecological costs of the meat industry are currently being passed on primarily to poor people in developing nations. Others seem destined to burden future generations.

Literature

There is a vast literature on ethical vegetarianism. The following is a brief and highly selective annotated list of some of the most important and influential works.

Before the word “vegetarian” was coined, in 1847, those who refrained from eating meat were frequently called “Pythagoreans,” in reference to Pythagoras, the sixth-century BCE Greek philosopher and mathematician. While none of the writings of Pythagoras have survived, several of his arguments against eating meat are quoted by the Roman poet Ovid in his epic poem *Metamorphoses*, completed in the year 8 CE.

The Greek philosopher Plutarch, in his essay of around 120 CE, “On the Eating of Flesh,” endorses the Pythagorean position and vigorously defends it against criticisms. For example, in response to the argument that eating animals is justified by the fact that animals eat each other, so that in eating them we are only treating them as they treat others, Plutarch points out that “it is certainly not lions and wolves that we eat. . . ; on the contrary, we ignore these and slaughter harmless, tame creatures without stings or teeth to harm us” (Plutarch 1999, p. 28).

The classic book-length ancient essay defending ethical vegetarianism is Greek philosopher Porphyry's *On Abstinence from Animal Food*, which appeared around 268–270 CE.

In 1892, Henry S. Salt published *Animals' Rights*, which influenced Gandhi, George Bernard Shaw, and Tolstoy, among others. Salt is also believed to be the first person to publish an article about animal rights in a philosophy journal (“The Rights of Animals,” published in *Ethics* in 1899).

Rupert H. Wheldon's *No Animal Food*, published in London in 1910, is the first book advocating veganism (though the term would not be coined until 1944).

Ruth Harrison's *Animal Machines*, appearing in 1964, is the first work to expose the horrors of factory farming.

In 1971, Francis Moore Lappé published *Diet for a Small Planet*, a best seller. It was the first major book to argue that feeding grains to animals in order to produce meat is grossly inefficient and leads to global food scarcity. She urges conversion to a plant-based diet as the best way to combat world hunger.

The single most important and influential philosophical work promoting vegetarianism and other significant changes in our treatment of

animals is the Australian philosopher Peter Singer's *Animal Liberation*, published in 1975. Singer defends vegetarianism primarily on the grounds that contemporary methods of meat production produce unnecessary suffering on a massive scale, both to animals and to humans.

Another influential book is philosopher Tom Regan's *The Case for Animal Rights*, which appeared in 1983. Unlike Singer, Regan argues that the exploitation of animals is morally wrong in principle and not merely contingently wrong because of unfavorable consequences.

John Robbins's *Diet for a New America* appeared in 1987. This book argues for vegetarianism based on the harm that meat eating causes on four fronts: animal suffering, world hunger, human health, and the environment.

The Sexual Politics of Meat, by Carol J. Adams, was published in 1990. It is the most important work criticizing meat production and consumption from a feminist standpoint.

Created from Animals: The Moral Implications of Darwinism, by philosopher James Rachels, also appeared in 1990. Rachels points out the ironic fact that many contemporary secularists, who at the theoretical level fully accept the Darwinian view that we are descended from, related to, and only quantitatively different from the rest of the animal kingdom, fail to adjust their moral views and practices accordingly and instead behave as if they accepted literally the book of Genesis's assertion that animals were put on Earth by God for the express purpose of being used by human beings.

John Lawrence Hill's *The Case for Vegetarianism*, a comprehensive treatment of ethical arguments concerning vegetarianism, was published in 1996.

Gail Eisnitz's *Slaughterhouse*, which documents that animals in major American slaughterhouses are skinned and dismembered while still conscious, appeared the following year.

Animal Rights: A Philosophical Defence, by Mark Rowlands, was published in 1998. It defends animal rights from the perspective of John Rawls's famous theory of justice. Rawls suggests that fair social policies will be the ones that we would choose if we had no way of

knowing whether we, due to our particular circumstances, would be favored or disfavored by them. The question he asks is that if we were choosing behind the "veil of ignorance," so that we did not know whether we would be born black or white, male or female, rich or poor, healthy or sick, and so forth, what social policies would we choose? Rowlands extends this approach to the question of our treatment of animals. He argues that if we did not know whether we would be born human or cow or pig or chicken, we would want vegetarianism to be the rule. The possibility of having the benefit of eating meat (if we were lucky enough to be born human) would not be worth the risk of being raised on a factory farm and then slaughtered and eaten (if we were born a cow or pig or chicken). Being a human or a nonhuman animal is not a matter of choice. So we don't deserve to exploit animals, and they do not deserve to be exploited. The current exploitative situation is unjust.

Michael Allen Fox, who had been an ardent critic of philosophical arguments for animal rights, changed his mind completely and published *Deep Vegetarianism* in 1999.

Dominion: The Power of Man, the Suffering of Animals, and the Call to Mercy, by Matthew Scully, appeared in 2002. The book is highly unusual in that, while most animal rights defenders are to be found on the liberal left part of the political spectrum, Scully is a conservative Christian – a former editor of the *National Review* and a former speechwriter for George W. Bush. He argues that the famous "dominion" passages in the book of Genesis do not license contemporary meat eating. Scully reads those passages as saying that we are entitled to use animals only if we need to and then only if we do so in as kind and compassionate a manner as possible. He then argues that, whereas many people in biblical times may have needed to eat animals in order to survive, very few contemporary people are in that situation. With regard to the second provision, he points out that nothing in the Bible anticipates that animals might be treated as they are on modern factory farms.

Food for Thought: The Debate over Eating Meat, edited by Steve F. Sapontzis, was

published in 2004. It is a comprehensive anthology, which considers vegetarianism and anti-vegetarianism from a variety of perspectives with regard to issues of health, animal welfare, and the environment.

David Kirby's *Animal Factory*, the most up-to-date book-length work on conditions on factory farms, appeared in 2010.

Future Trends

There is very little public debate or discussion about the ethics of eating meat. There is no general sense that public intellectuals or politicians are under any obligation to offer arguments in defense of slaughtering animals for food. On the other hand, the practice of vegetarianism has been on the rise for several years, and contemporary teenagers and young adults appear to be more interested in it, and more open to considering it as an option for themselves, than are people of any previous generation. These trends, coupled with the continued worsening of the world hunger problem and of threats to the environment (especially global warming), seem likely to move the issue of vegetarianism closer to the center of public discourse than it has ever been in the past.

Summary

The practice of eating meat is traditional and customary in many cultures, and it is supported by some major religious texts, including the Bible. Moreover, millions of people find significant enjoyment in eating meat. But throughout history there have always been figures who have criticized this practice and who have urged, instead, that people should adopt a vegetarian diet, that is, one that excludes meat. These "ethical vegetarians" offer three main kinds of arguments, claiming that meat-based diets, in contrast to vegetarian ones, cause unnecessary suffering to animals, contribute to world hunger, and harm the environment. While ethical vegetarians constitute a small (but steadily growing) minority of the population, it seems likely that current trends,

such as the escalating degradation of the environment, the increasing global problem of malnutrition, and greater public awareness of the treatment of animals on modern factory farms, will lead to increasing public discussion and consideration of ethical vegetarianism and of its supporting arguments.

Cross-References

- ▶ [Access to Land and the Right to Food](#)
- ▶ [Animal Welfare: A Critical Examination of the Concept](#)
- ▶ [Christian Ethics and Vegetarianism](#)
- ▶ [Corporate Farms](#)
- ▶ [Climate Change, Ethics, and Food Production](#)
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- ▶ [Sustainability of Food Production and Consumption](#)
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Vertical Farms in Horticulture

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Synonyms

Plant factories (Japan); Sky farming; Skyscraper farming

Introduction

Vertical farms are multistory buildings containing an environment conducive to the

growing of fruits, vegetables, and nonedible plants for things such as biofuels, drugs, and vaccines. Vertical farms take advantage of the same technologies that enable high-tech greenhouses to flourish. Vertical farms (VFs) are a form of controlled environment agriculture (CEA).

Since the 1990s, with the development of sophisticated hydroponic, and to a lesser extent aeroponic growing systems, CEA has matured into a commercially viable strategy for the large-scale production of a wide variety of crops (Practical Hydroponics and Greenhouses 2005). Historically, attempts to grow large amounts of vegetables and fruits indoors failed to evolve into commercially successful businesses, due largely to the lack of reliable technologies for growing plants hydroponically. Dr. William Gericke is given most of the credit for improving and further developing hydroponics in the 1930s while working at the University of California, Davis campus (Gericke 1940).

Hydroponics is the science of raising plants in the absence of soil. It typically employs a tubular growing system (usually constructed out of PVC piping) for holding the plants, which delivers a thin film of dissolved nutrients to the roots that are in contact with the liquid phase of the system. Today, hydroponic greenhouses have become highly viable economic ventures. They offer many advantages over traditional outdoor farming practices, the most important being total control of the physical and chemical conditions necessary to insure optimal plant growth and maturation: day/night cycle, temperature, humidity, soluble growing media (e.g., nutrient film technologies), aeration of root systems, pollination, and even quality of taste. By employing CEA with hydroponics on a large scale, many vegetables (e.g., tomatoes, cucumbers, melons, strawberries, green beans, peppers, and a host of leafy greens) are being grown under near ideal conditions, giving maximum yields in shorter periods of time to maturity following germination of seeds, compared to current outdoor farming strategies. In some extreme cases (e.g., lettuces), as many as eight crops a year can be harvested by indoor hydroponic technologies, compared

with just two to three from outdoor farming operations (<http://www.androidworld.com/prod26.htm>). Indoor crop loss is typically less than 10 %, whereas in most situations employing the most up-to-date equipment and methods, crop losses from traditional methods, from time of planting to harvest, can be 50 %, with losses in developing countries exceeding 70 % (<http://www.fao.org/docrep/008/y5800e/Y5800E06.htm>). Since many greenhouse facilities are located on the outskirts of their markets, food miles are greatly reduced, which helps to reduce loss of produce due to manipulation of the harvested plant during the shipping and handling phase of getting it to market. Finally, since none of the plants are grown in soil within hydroponic greenhouses, this approach to food production offers the distinct advantage of being able to be carried out anywhere in the world.

The Rise of Indoor Farming

Greenhouses have existed since the early 1700s, apparently having first originated in England as enclosed wooden structures (http://www.nvsuk.org.uk/growing_show_vegetables_1/origins_greenhouse.php). The advantages of greenhouses were immediately apparent to those lucky enough to have benefitted from living near them, and the idea rapidly evolved into today's modern transparent marvels of agricultural ingenuity. Soil-based agriculture was the first method used in them, and various flowers (e.g., roses, orchids) were the most commonly grown plants until hydroponics expanded the repertoire to vegetables, fruits, and herbs.

Since the 1990s, many commercial greenhouses have become equipped with a wide selection of computer-assisted monitors, rheostats, and pump systems for delivering water and nutrients, insuring optimum conditions throughout each plant's growing cycle, from germinated seedlings to harvestable crops. Europe, North America, Australia, Japan, Korea, and China have thriving greenhouse industries, inside of which are grown an astonishing variety of edible plants. Lagging behind in greenhouse development and implementation are countries

throughout Central and South America and sub-Saharan Africa. Unfortunately, in many of these latter places, especially Africa, greenhouses are sorely needed to help offset the often staggering annual losses of crops due to inclement weather, poor soils, arid environments, and hordes of insect pests, such as locust.

One of the largest commercial greenhouse operations (318 acres) is EuroFresh Farms, located in the desert near Wilcox, Arizona (<http://www.eurofresh.com>). Another unlikely place for growing crops indoors is the urban landscape, but even here good examples of commercial greenhouses can be found, such as Bright Farms (<http://www.brightfarms.com>) and Gotham Greens (<http://www.gothamgreens.com>), both of which are based in New York City.

Thus, if growing food in greenhouses employing state-of-the-art technologies and locating them within a large city, such as New York or London, makes sense from an economic perspective, then why not increase proficiency and output by extending their vertical footprint into several stories worth of production space? That is the essence of the concept of a vertical farm (VF). In fact, that is exactly what is happening in many places throughout the developed world.

Rationale for the Vertical Farm

The idea of growing food crops in tall buildings is not new, most likely originating in ancient times with the hanging gardens of Babylon as a prime example. Nonetheless, growing things that people can eat in that configuration was not forthcoming until recently. The reasons why the idea of vertical farming has taken so long to develop probably relates to the relative ease of farming outdoors in soil. Simply plow up some flat, already fertile land (preferably near a large river), then sow the seeds. Pray for rain, but not too much. Pray for moderate temperatures. Pray for no plant pests or diseases, too.

Agriculture arose in many places, but the most famous one was along the Nile River in Egypt. The Egyptians turned a non-systematized scheme

of planting and harvesting, invented by the inhabitants of the “Fertile Crescent,” into a well-defined science, keeping track of virtually everything that was important in order to insure a good yield. They paid very close attention to the annual rhythms of the Nile. At the same time as the Egyptian dynasties of the upper Nile rose to power, the humble dung beetle became elevated to the status of a revered God, because from where the average Egyptian stood, this lowly creature was observed turning animal waste into an edible plant simply by digging a hole and stuffing a ball of rolled up dung into it! Moreover, another dung beetle emerged along with the new plant the following spring, giving this insect the appearance of being able to create new plant life and live forever. In contrast to the first farmers in the Middle East, Egyptians used animal dung as fertilizer, in addition to the new soil brought to the upper regions of Egypt by the annual flooding of the Nile. The Egyptians became the first people to practice biomimicry (i.e., looking to nature for solution to their problems). But just as in all the other locations at which agriculture arose (e.g., China, Mexico, Borneo), crops occasionally failed, for a multiplicity of reasons. Soon thereafter, the need for Gods (e.g., Osiris, Kokopelli, Hermes, Saturn) that could intervene with these unwanted agricultural outcomes arose, and the incantations recited to elicit their help became a regular part of every farmer’s vocabulary. Luckily, today’s indoor farmers have little need for invoking the blessings of such Gods. Mostly, they pray for lower rates on their electric bills and a guaranteed market for their crops.

The Rise of the Vertical Farm

Throughout the millennia that followed the invention of agriculture (about 10,000 years), traditional farming technologies advanced slowly or not at all. It was not until the chemical synthesis of artificial nitrogen-based fertilizers, made possible by the Haber-Bosch process (Balken 1997), which took atmospheric nitrogen and combined it with hydrogen to make ammonia, and the synthesis of a wide variety of

agrochemicals for controlling weeds, insects, and microbial plant diseases (Müller 2000) that the post-World War II global farming community began to produce more food than the world could consume. As the human population burgeoned under this new agricultural revolution, more land was placed into the production of crops that were destined to feed animals or for the production of value-added products like high-fructose corn syrup and a wide variety of soy-derived products.

Over the next 50 years, aggressive application of agrochemicals to the land, including pesticides, herbicides, and fertilizers, became a regular feature of farming in the developed world. Eventually, agricultural runoff, laden with silt and agrochemicals, began to have a negative effect on the land, with birds (raptors in particular) being the most obviously affected by the overuse of DDT (see Rachel Carson’s book, *Silent Spring*). In many cases, nutrient-rich runoff also drastically reduced the harvest of sea life from estuaries around the world by encouraging algal blooms that depleted the oxygen in the shallow waters of those fragile ecotones. In addition, an accelerating rate of climate change began to alter traditional patterns of weather, adversely impacting the world’s agricultural community, resulting in numerous crop failures due to floods, droughts, and untimely monsoons. By the 1980s, the cause of the increased rate of climate change was obvious to most – increased levels of greenhouse gasses in the atmosphere due to the burning of fossil fuels. Even many of the most outspoken skeptics of the causes of climate change came to admit that the data were overwhelmingly in favor of the conclusions reached by the Intergovernmental Panel on Climate Change (IPCC).

As a direct result of the fourth report on climate change issued by the IPCC in 2007 (IPCC 2014), viable alternatives to traditional methods of growing food (permaculture, hydroponics, aeroponics, aquaculture) began to gain traction as practical approaches to augmenting dwindling food supplies due to crop failures caused by severe droughts and floods. In the 1930s, Buckminster Fuller suggested the possibility of

farming in skyscrapers, as did John Todd (<http://www.toddecological.com>) later in the 1960s, although their suggestions were ignored. It is probable that this was because it was not obvious during 1960 that outdoor farming would be in serious trouble, especially in the United States. By the year 2000, all that had changed. In 2008, just a year after the IPCC report forecasted dramatic changes in the world's food supply, some countries (e.g., Korea, Singapore, Sweden) were politically and financially able to support a demonstration program designed to bring about a paradigm shift in the way they managed their food supplies, including the construction of VF.

Vertical Farms: Anticipated Advantages

There are numerous advantages to farming indoors in the modern greenhouse, and the VF improves on the theme of the high-tech greenhouse in several ways. First, it immediately increases the yield per acre of any crop by multiples based on the number of floors the VF has. A typical greenhouse can outproduce a similar-sized outdoor farm for the same crop by a factor of anywhere from 4 to 10, depending upon the specific crop in question (personal communication, Gene Giacomelli, director of the CEA program at U. Arizona). By doubling or tripling the growing space in a VF, this factor will also go up accordingly.

Second, having VFs inside the city limits can result in a significant reduction in food miles (i.e., the distance between the place that produces the food and the places where it is consumed) (National Resource Defense Council 2007). Shortening that distance will save on the use of fossil fuels and lower the amount of greenhouse gasses in the atmosphere. Each year, traditional farming in the United States consumes some 10 % of the fossil fuels (Heller and Keoleian 2000). As VFs come on line and gain in popularity, it is hoped that one of its intended consequences will be to significantly lower that percentage.

Third, VFs contribute to job creation. A plethora of activities are required at many

levels to insure that the VF functions at maximum efficiency: managing the seed germination facility (e.g., nursery), transplanting seedlings into the VF, procuring and managing resources (e.g., water, nutrients, growing systems, lighting systems, automation, etc.), monitoring plant growth and development, developing pollination strategies, harvesting, distributing the harvest to local green grocers, and managing waste-to-energy protocols and quality control (DNA-based laboratory surveillance for plant pathogens and arthropod pest control). Other job requirements include IT personnel, human resource management, and business office personnel. These are but a few of the more important tasks awaiting a new work force in the newly emerging vertical farm industry. Community outreach, education, and a business center could also be considered after the basic operations of the VF become established.

Fourth, if and when urban agriculture in all its variations, including rooftop greenhouses and stand-alone VF facilities, becomes the norm for supplying the bulk of fresh fruits, herbs, and vegetables to those who choose to live in cities, then some land currently dedicated to farming could be allowed to return to its original ecological setting. In most cases, this means the reforestation of hardwood forests (<http://www.hubbardbrook.org>) that once stood where fields of corn and soybeans now grow. If enough land could be restored by benign neglect, then trees would once again become an important factor in the sequestration of atmospheric carbon dioxide (Ross 2009). This could have a significant impact on the rate of climate change, slowing it down enough to allow more time for us to adjust to the inevitable rise in the Earth's temperature. This might seem like wishful thinking to some, but if nothing is done to reverse deforestation (Ross and Pervaze 2010), then the Earth will soon be stuck with a runaway climate regime, for which there is no solution.

Finally, food-borne illnesses due to contamination of harvested produce (e.g., listeria, salmonella, *E. coli* strain 0157) can be avoided by employing clean technologies linked to indoor farming. Furthermore, the lack of direct contact

of harvested produce with farm animals using CEA greatly lessens the chances of contamination during the shipping and selling of crops grown indoors.

In the beginning, VFs will undoubtedly be very expensive to construct, own, and operate, with operating costs strongly linked to energy use. As more come on line, however, these costs will decline in all aspects of construction and operation, including the most daunting single item, energy requirements, for operating them. This is particularly relevant with respect to the amount of electricity needed to power LED grow lights. Today, the most efficient LED systems that produce both red and blue wavelengths of light are around 28 %. Experts in the field of high-tech greenhouse science estimate that this percentage needs to be around 60 % efficient to encourage the average venture capitalist to invest in a vertical farm. At that level of energy efficiency, profitability is clearly a real possibility. As an aside, the theoretical limit of efficiency for LED light is an astounding 100 %, so expectations are high that the magic number of 60 % efficiency is only several years away from the consumer market.

Existing Vertical Farms

In 1999, the idea of farming in tall buildings was taken on as a subject in a class taught at Columbia University. It evolved within a few years into an annual classroom exercise, exploring all the major issues associated with making vertical farming practical. The projects resulting from that course were posted on the Internet (<http://www.verticalfarm.com>) and received a large number of submissions for designs of vertical farms, many of which were added to the web site (see Google Images – Vertical Farm). In 2010, a book was published on the subject, *The Vertical Farm* (St. Martin's Press, New York), even though there were no vertical farms up and running at that point. Within a year, however, vertical farms had become a reality in Korea, Japan, Singapore, and the United States.

Republic of South Korea

The vertical farm established in Suwon, Korea, in May of 2011 is financed by the South Korean governments' Rural Development Administration and operated under the leadership of Choi Kyu-hong (www.youtube.com/watch?v=83f_q_9yW5k). Construction was completed in March of 2011. It is three stories tall (Fig. 1) and grows mainly leafy green vegetables. It derives 50 % of the energy needed to support a robust LED grow light system (Fig. 2) from an array of solar panels located along the side of the building and a supplemental geothermal system. The VF features an automated rack system for moving plants from the top of the VF to the harvesting area. The VF has two main functions. Its primary mission is to serve as a research facility to further the general development of the concept of vertical farming and to improve the energy efficiency of indoor farming in multistory buildings. Its secondary goal is to serve as a site for testing the viability of various seeds that are stored in the much larger national seed bank building (Fig. 3) located adjacent to the VF.

Japan (Kyoto): Nuvege

Nuvege is a commercially successful "plant factory" housed in a single, very large building that resembles a 747 passenger jet hanger (Fig. 4) (www.nuvege.com). It occupies some 30,000 horizontal square feet, but within that space, Nuvege utilizes over 57,000 square feet of vertical growing space. LED grow lights and hydroponics are used in combination to produce leafy green vegetables of several kinds. They are currently expanding their Kyoto operation to include vertical farms in Tokyo and some as yet unspecified locations within the United States.

There are many other "plant factories" scattered throughout Japan. As of 2012, there were an estimated 50 such facilities, with over half of them taller than one story in height. Many more are planned over the next several years.

Singapore

Sky Greens (www.skygreens.com) is a commercial vertical farm located in Singapore

Vertical Farms in Horticulture,

Fig. 1 Vertical farm in Suwon, Republic of South Korea



Vertical Farms in Horticulture, Fig. 2 Inside the vertical farm in Suwon. Note the abundant use of LED grow lights

that produces leafy green vegetables (www.youtube.com/watch?v=yHkYp_az7Iw). Jack Ng started the building prototype in 2009 as a public-private partnership between Sky Greens and the Agri-Food and Veterinary Authority of Singapore.

Chicago, Illinois: The Plant

The Plant is a three-story vertical farm located within the city of Chicago (Fig. 5) (<http://www.plantchicago.com>). It is housed in a retrofitted abandoned meat processing (smoking bacon and related products) plant that produces a wide variety of edible crops and tilapia. Plans are in place to install an efficient waste-to-energy system using biogas from an anaerobic digester. According to its executive director, John Edel, The Plant should be off the energy grid of Chicago once the digester is up and running sometime in 2013.

There is a large vertical farm complex on the campus of Texas A&M University, sponsored by DARPA and operated by the Texas Plant-Expressed Vaccine Consortium. It grows genetically engineered tobacco plants to manufacture viruslike particles for use in an influenza

Vertical Farms in Horticulture,

Fig. 3 National seed bank of Republic of South Korea in Suwon



Vertical Farms in Horticulture,

Fig. 4 Nuvege vertical farm, Kyoto, Japan



vaccine (see and listen to This Week In Virology, episode 47, Vertical Vaccine Farm, for details as to how this system works). It can produce some 1, 500 doses of vaccine from a kilogram of plant material. Commercial vaccine producers use chicken eggs for the same purpose. Each egg yields only one dose of

vaccine. The advantages of such vertical farms for the production of other products useful in human medicine (e.g., insulin, antibodies of varying specificities, clotting factors) will become more obvious as the need for these products becomes more acute over the next 20 or so years.

Vertical Farms in Horticulture, Fig. 5 The Plant vertical farm in Chicago



Planned Vertical Farms

In 2012, Plantagon (www.plantagon.com), a private corporation owned and operated by the Onondaga Nation of New York state (www.onondagation.org), announced plans to build a 17-story version of a vertical farm in the town of Linköping, in southern central Sweden, in collaboration with the Swedish government. Groundbreaking, began in the spring of 2012, kicked off this ambitious venture. It is not known how long it will take to complete the building, but it will probably be finished within a year. Plantagon intends to grow many varieties of Asian leafy green vegetables as their initial commercial offering to the consumer.

Jackson, Wyoming

Vertical Harvest plans to construct a three-story vertical farm in Jackson, Wyoming (www.verticalharvest.org). They are in fund-raising mode as of September 2012. Their goal is to raise enough funds to qualify for a Wyoming business grant. If they succeed, they plan to grow tomatoes, strawberries, lettuce, and microgreens. Vertical Harvest is a for-profit corporation.

Summary

The concept of vertical farming has already evolved from a classroom activity in 1999 to the construction of vertical farms. It is anticipated that as Earth's climate continues to change over the next 20 years, adversely altering the global

agricultural landscape even further, the establishment of large numbers of indoor farms inside the city limits will become a significant contributor to the urban food supply. When this occurs, then food-borne infectious disease outbreaks and food shortages will be greatly reduced.

Cross-References

- ▶ [Civic Agriculture](#)
- ▶ [Food Risks](#)
- ▶ [Food Security](#)
- ▶ [Resource Conflict, Food, and Agriculture](#)
- ▶ [Slash-and-Burn Agriculture](#)
- ▶ [Sustainability of Food Production and Consumption](#)
- ▶ [Water, Food, and Agriculture](#)

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Vertical Integration and Concentration in US Agriculture

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Synonyms

Consolidation; Globalization; Industrialization

Introduction

Vertical integration is the process whereby one firm merges with another firm from which it buys inputs or to which it sells output. Concentration reflects the degree of horizontal integration and defines the extent to which a firm has competitors. The food system in the USA has become increasingly integrated and concentrated during the last 100 years. Economists have long argued that economic factors – most notably economic efficiency – largely explain the increase in vertical integration and concentration in the agrifood industry (MacDonald et al. 2004), but others implicate the exercise of market power and changes in antitrust policy enforcement as explanations (Carstensen 2008; Hendrickson and Heffernan 2002). Concentration and integration (hereafter simply “consolidation”) in the food system raises a number of important ethical issues for farmers, agribusiness firms, and

consumers. These ethical issues are derived from the fact that concentration fundamentally defines and limits the choices or options for most people. Everyone eats and thus has a stake in the food system, but many people also work in the food system providing labor, management, and capital. It is how members of society respond, or are forced to respond, to limited options that forms the basis for many of the ethical problems we observe in the food system. This entry describes the trends in consolidation within the agrifood industry and highlights a number of important ethical issues and their implications arising from industry concentration.

Trends in Agrifood Consolidation

There are many ways to describe the degree to which an industry is concentrated. A common method is to examine the industry’s four-firm concentration ratio (CR4), which measures the total percentage of a market controlled by the industry’s four largest firms. Scholars have documented extensively the increase in concentration in virtually all sectors of the food and agriculture industry (see, for instance, Drabenstott 1999; Hendrickson et al. 2002; Howard 2009). For example, in 1967 the four largest firms controlled one-quarter of the non-poultry animal slaughtering industry, but by 2007 that share more than doubled. In wet milling, the four largest corn milling plants controlled 68 % of the market in 1967, but by 2007 that share increased to 83 %. Similarly, the four largest flour milling firms controlled 30 % in 1967 but increased their share to 55 % in 2007 (see James 2013a for source details).

Table 1 presents the CR4 for several agricultural and food retailing markets in the USA, as well as names of the top firms if known, for a 20-year period between 1990 and 2011. The table reveals several important patterns. First, with one exception (flour milling), the food sectors represented became more concentrated – the top four firms controlled a larger share of the market. Second, the increase in concentration can occur relatively rapidly. For example, the pork

Vertical Integration and Concentration in US Agriculture, Table 1 Four-firm concentration ratios and firm names for selected agricultural input and output industries, and food retailing

Industry sector	1990	1999	2011
Beef slaughter – steer & heifer	69 % • IBP • ConAgra • Excel (Cargill) • Beef America	79 % • IBP • ConAgra • Excel (Cargill) • Farmland National Beef	82 % • Cargill • Tyson • JBS • National Beef
Beef production/ feedlots	n/a • Cactus Feeders • ConAgra (Monfort) • J.R. Simplot Co. • Caprock (Cargill)	1,349,000 capacity • Continental Grain Cattle Feeding • Cactus Feeders Inc. • ConAgra Cattle Feeding • National Farms Inc.	1,983,000 • JBS Five Rivers Cattle Feeding • Cactus feeders (relationship with Tyson) • Cargill Cattle Feeders LLC • Friona Industries
Pork slaughter	45 % • IBP • ConAgra (SIPCO/ Armour) • Morrell • Excel	57 % • Smithfield • IBP Inc. • ConAgra (Swift) • Cargill (Excel)	63 % • Smithfield Foods • Tyson Foods • Swift (JBS) • Excel Corp. (Cargill)
Pork production	n/a • Murphy Farms • Tyson Foods • Cargill • National Farms	834,600 sow capacity • Murphy Family Farms • Carroll's Foods • Continental Grain (incl. PSF) • Smithfield Foods	1,618,904 sow capacity • Smithfield Foods • Triumph Foods • Seaboard • Iowa Select Farms
Broiler slaughter	45 % • Tyson • ConAgra • Gold Kist • Perdue Farms	49 % • Tyson • Gold Kist • Perdue • Pilgrim's Pride	53 % • Tyson • Pilgrim's Pride (owned by JBS) • Perdue • Sanderson
Turkey slaughter	31 % • Louis Rich (Philip Morris) • Swift (Beatrice/ KKR) • ConAgra • Norbest	42 % • Jennie-O (Hormel) • Butterball (ConAgra) • Wampler Turkeys • Cargill	58 % • Butterball (Smithfield/ Goldsboro) • Jennie-O (Hormel) • Cargill • Farbest Foods
Animal feed	n/a	n/a • Cargill (Nutrena) • Purina Mills (Koch Industries) • Central Soya • Consolidated Nutrition (ADM + AGP)	44 % • Land O'Lakes Purina LLC • Cargill Animal Nutrition • ADM Alliance Nutrition • J.D. Heiskell & Co.
Flour milling	61 % • ConAgra • ADM • Cargill • Grand Met (Pillsbury)	62 % • ADM • ConAgra • Cargill Flour Milling	52 % • Horizon Milling (Cargill/CHS) • ADM • ConAgra
Wet corn milling	74 % • ADM • Cargill • A.E. Staley (Tate and Lyle) • CPC	74 % • ADM • Cargill • A.E. Staley (Tate and Lyle) • CPC	87 % • ADM • Corn Products International • Cargill

(continued)

Vertical Integration and Concentration in US Agriculture, Table 1 (continued)

Industry sector	1990	1999	2011
Soybean processing	61 % • ADM • Cargill • Bunge • Ag processors	80 % • ADM • Cargill • Bunge • Ag processing	85 % • ADM • Bunge • Cargill • Ag processing
Grocery	n/a	n/a	42–51 % • Wal-Mart • Kroger • Safeway • Supervalu

Sources: 2011 data is taken from Table 1 in James et al. (2013) and 1999 data is reported in Heffernan et al. (1999). 1990 data is reported in Heffernan and Constance (1990). Sources of individual data are available in each publication

production capacity of the four largest firms nearly doubled in a 10-year period of time. Third, some firms dominate multiple sectors and thus represent both industry concentration as well as vertical integration. Cargill, for instance, produces and processes an array of meats, provides feed, and trades/processes corn and soybeans. Tyson is able to provide a full array of protein – beef, pork, and broilers. Finally, the four largest firms are not the same over time. Some firms dominating their sectors in 2011 were not present in 1990, thus illustrating how quickly firms can come to dominate their industry (e.g., JBS in protein and Wal-Mart in groceries).

These trends in the food system can be illustrated further by examining the current structure of the fertilizers and seed sectors. Taylor (2010) shows that fertilizers for most grain crops are dominated by only a few companies: Yara, Potash Corp, and Mosaic (recently divested by Cargill). Potash and phosphorous production has long been organized in cartels (Blas 2010; Etter 2008), where three cartels are thought to account for 70 % of the global trade in these two fertilizers (Blas 2010). Howard (2009) documents the consolidation of the seed industry after the introduction of commercially popular Roundup Ready seeds in 1996, which were genetically engineered to resist the spraying of Roundup weed killer (see also Moss 2010, 2011; Hubbard 2009). Some estimates show that 70 % of the corn seed market in the USA in 2009 was controlled by two firms, DuPont (Pioneer) and Monsanto, which controlled 59 % of soybean seed (Pollack 2010).

At the global level, UNCTAD (2006) estimated approximately 29 % of 2004 global seed sales were controlled by DuPont/Pioneer, Monsanto, Syngenta, and Limagrain, while ETC Group (2008) claimed 53 % of “global proprietary seed market” was split between those four firms with Monsanto being the leader with 23 % and DuPont at 15 %. Importantly, Monsanto was not involved in the seed industry until the mid-1980s but has acquired more than 50 seed firms since then (several at a cost of more than \$1 billion each) (Howard 2009).

The integration and consolidation observed in US seed and agricultural input markets is not just a US phenomenon. Along with Wilkinson (2002), who documents concentration in Brazilian markets, De Schutter (2010) claims that five grain traders dominate the soybean processing market in Brazil, while a CR2 of 53 % in dairy processing in the mid-1990s caused the collapse of dairy farmer cooperatives. Moreover, since the early 1990s, there has been a rapid increase in the globalization of the protein and grain markets. In this context, globalization refers to the process by which firms come to dominate similar markets but in different countries and geographic areas. For instance, in the 1990s, ADM invested heavily in soybean processing facilities in Paraguay, Uruguay, Brazil, and China (see Heffernan et al. 1999; Hendrickson et al. 2008b). Cargill operates significant enterprises around the globe with grain trading activities in all major ports and significant processing facilities in China, where ADM, Bunge, Cargill, and Louis Dreyfus have

Vertical Integration and Concentration in US Agriculture, Table 2 Top firms in food retailing in the USA

1997	2000	2011
CR5 = 24 %	CR5 = 42 %	CR4 = 42–51 %
Kroger Co.	Kroger Co.	Wal-Mart
Safeway	Wal-Mart	Kroger
American Stores	Albertson's	Safeway
Albertson's	Safeway	Supervalu
Ahold USA	Ahold USA	

Sources: 1997 and 2000 data is from Hendrickson et al. (2002). 2011 data is from James et al. (2013)

become the largest soybean processors (Peine 2013). Constance et al. (2013) noted that Tyson has significant meat operations in Mexico while Smithfield operates pork facilities in Brazil and Eastern Europe; the latter occurred at the same time as rapid expansion and consolidation domestically and internationally (see also Bonanno and Constance 2006; Constance et al. 2003). US firms are not the only dominant players either. JBS, based in Brazil, is currently the world's largest beef packer. Smithfield, the largest US pork processor, was acquired by a Chinese pork packer.

The processes of horizontal integration and globalization have also been very apparent in food retailing. In the 1990s, the food retail industry in the USA consolidated rapidly, primarily due to Wal-Mart's entry into groceries in the late 1980s. By 2000, Wal-Mart was the second largest grocer in the USA (Hendrickson et al. 2002) and is now the dominant firm (see Table 2). According to the *New York Times*, Wal-Mart has over three times the sales of its nearest competitor (Clifford 2011).

Wal-Mart is one of a small number of emerging global grocers that include Carrefour (a French firm that is the second largest general retailer in the world) and Tesco, Britain's largest grocer. Understanding the global reach of food retailers is important because of their control over global supply chains that source food as cheaply and consistently as possible. As Lynn (2006, 2009) notes, Wal-Mart tends to use its market power as a retailer as a tool to negotiate lower prices to producers, manufacturers, and workers rather than forcing consumers to pay higher prices.

Ethical Issues Resulting from Consolidation in the Food System

One of the primary implications of consolidation is that it limits choices in the marketplace. Importantly, the ethical issues that arise because of consolidation are not unique to the food system, as any industry that consolidates creates constraints on existing participants. However, the ethical consequences of concentration in the food system arguably become more important than that in other goods and services because everyone must eat – and on a regular basis. Food is a necessity, which means that the constrained choices of the market can rapidly become a life or death situation in terms of hunger and nutrition. This means that those with more options, or those with greater control over their choices, may actually bear some responsibility for the fates of others. There has been a growing debate among scholars and policymakers about the implications and ethics of industry concentration (see, for instance, James 2013b). The following highlight a number of these ethical issues.

Because industry concentration and integration have been occurring in both farm input and farm output sectors, farmers can feel the effect of constraints the strongest. Hendrickson and James (2005) argue that consolidation has two important and direct effects on farmers. "First, it constrains – as in limits or inhibits – the decisions of farmers by restricting choice options or the types of decisions they can make. . . . Second, it constrains – as in compels or obliges – the choices of farmers by forcing them into the kinds of decisions that they otherwise would not have chosen for ethical or other reasons" (p. 283). Both of these effects can increase the economic pressures that farmers feel and, as a result, create tensions on or even produce an erosion of one's personal ethics (see Hendrickson and James 2005; James and Hendrickson 2008). Constrained choice also has an environmental impact, as it affects how farmers care for, treat, and otherwise manage land. As Stuart (2009, p. 53) finds, "consolidated markets and increasing corporate power in the food system can constrain producer choice and

create ethical dilemmas over land management ... [in that] growers face serious ethical dilemmas and feel pressured by large processing and retail firms to adopt measures they find environmentally destructive and unethical.”

The trends in consolidation noted above also raise the ethical question of whether there is adequate and fair competition in agriculture. For example, in 2010, the US Departments of Agriculture and Justice held a series of workshops in the USA on the issue of agricultural competition. In these workshops farmers and agricultural producers were invited to voice their opinions on what they perceive as the nature of competition in the agrifood industry. Speaking in the opening session, US Attorney General Eric Holder said, “Is today’s agriculture industry suffering from a lack of free and fair competition in the marketplace? That’s the central question” (USDOJ-USDA 2010, p. 11). Important in this discussion is how adequacy, fairness, and competition are defined (see James 2013a; Thompson 2013; Sykuta 2013) as well as the extent to which economic concerns about efficiency, which economists argue have driven the rapid consolidation in agricultural markets, are compatible or in conflict with moral obligations that industry participants have toward each other, animals, and the environment (Rohwer and Westgren 2013).

Industry consolidation in the food sector also raises concerns about how economic power is shifting toward fewer and larger firms and how such power is not being held in check by countervailing economic, social, or political forces (Levins 2002; Taylor and Domina 2010). For example, James et al. (2013) show how the changing structure of the food sector can increase the dependency that some market participants have on others with whom they buy and sell. Importantly, they show how dependency, defined as being reliant upon someone or something else, cannot always be determined by considerations of industry concentration alone (e.g., by measures of CR4). The reason is that focusing on the market share of the top firms obscures the myriad sets of relationships that farmers, food processors, and others are embedded in when they buy inputs or sell their finished products.

These relationships can have their own sets of local dependencies, which create or transmit power imbalances along value chains. Thus, “entities who rank near the top in CR4 can experience significant dependency advantages on the buying end (e.g. beef packers with a CR4 of 82 % [may extract concessions from farmers and feedlots]) but when selling, the power resulting from differential dependencies is dissipated by the fact that other entities may possess significant buying power relative to them (e.g. Wal-Mart with somewhere between a quarter and one-third of the grocery market [buys beef from the packer and extract concessions from them])” (James et al. 2013, p. 121).

Food consumers, especially those who consider themselves “ethical eaters,” also face ethical dilemmas resulting from consolidation. The lack of transparency in the current food system, where the vast majority of food moves through supermarket and food service outlets, means that it is difficult for consumers to find out how their food was produced, who produced it, and where. These consumers may want to buy foods produced in ways that match their environmental and social values, but with their limited range of choices – if such foods are available at all – they cannot act on their own personal ethics. Moreover, there can be a lack of trust that the food standards and labels used to define their choices really reflect their core values, given the negotiations that occur between farmers, supermarkets, and third-party (independent) certifiers of standards such as humane, sustainable, fair labor or fair trade (Hatanaka et al. 2006).

The ethical eaters described above are often portrayed as elitist and misguided (McWilliams 2009; Lusk 2013). However, they most likely possess the money and knowledge necessary to participate in the existing food system markets – or leave them altogether for new forms of procuring food such as personal production, direct connections with farmers, or processors who farm and produce food in ways compatible with their ethical interests. But many social justice and public health advocates have raised concerns about the quality and quantity of food available to the most vulnerable citizens of society – those

who live in areas, either rural or urban, without good access to fresh, healthy, and safe food with perhaps too much availability of cheap, highly processed, and unhealthy foods (Ver Ploeg 2009; Story et al. 2008). These access issues can be exacerbated by consolidation, which has tended to eliminate smaller retailers and distributors who once served these communities. Moreover, smaller distributors and retailers are at a distinct disadvantage with pricing, given the fact that the largest supermarket buyers may be able to negotiate agreements with suppliers who use economies of scale to supply them at a particular price, but will experience significant diseconomies if the buyer abandons that supplier. Foer (2010) cautions about this “waterbed” effect where one buyer forces a discriminatory low price on a supplier which gains that buyer a competitive advantage, while at the same time, the supplier tries to recoup some profit in selling to other buyers, thereby putting them at a disadvantage in the market place vis-à-vis buyer number one.

Ethical consideration must also be given to the environment. Investment in particular ways of growing and distributing food has been shaped by the consolidation that has happened in the food system. In order to better fit into the globally organized food chains, regions have specialized in production of certain crops or livestock (Lyson 2004), thereby eroding biodiversity and contributing to environmental problems such as nutrient runoff in water supplies, pesticide residues on food and in water, and reduced soil fertility (McIntyre et al. 2008). This compromises the ability of future generations to produce food for their societies.

As smaller farmers, processors, and retailers have been left out of the consolidated food system, the choices that communities can make about social and economic development options are limited by the structure of the food system and the allocation of labor, capital, and management in that system. Since the rise of the modern nation-state system, the availability, quantity, and quality of food have generally been considered a mandate of the government (Friedman and McMichael 1989). However, in the last few decades of globalization, food has moved from

the public arena of the nation state into a private arena of decision making that involves those within the dominant firms, including their management teams, boards of directors, and shareholders. When food moves from the public to the private realm, it becomes a privilege rather than a right, however unevenly that right has been claimed or fulfilled (Hendrickson et al. 2008a). With food a necessity for human life, this means consolidation of the food system affects the basic condition of what it is to be human. This certainly requires ethical thought and response.

Conclusion

Wendell Berry (1990) said, “eating is an agricultural act.” While Berry was imploring consumers to understand their basic connection to agriculture and place, his statement explains the fundamental fact that agriculture is part of a complex food system spanning production, consumption, and waste. Moreover, food is a necessity and needed on a regular basis for all human beings, which makes the ethical implications of our food system structure and choices critical to our functioning as a society. In that sense, the food system is certainly part of our larger social, economic, and political systems and reflects and distills the ethical issues we experience within them.

The structure of the food industry has changed – becoming increasingly integrated and concentrated. Such change created or expanded a number of important ethical issues, most of which are derived from the fact that consolidation constrains the choices that farmers, consumers, and other food participants have.

Cross-References

- ▶ [Private Food Governance](#)

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Virtue Theory, Food, and Agriculture

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Synonyms

Character; Character ethics; Ethical theory; Moral education; Vice; Virtue; Virtue ethics

Introduction

Discussions about the ethics of food and agriculture are replete with virtue and vice language. In agricultural ethics, it is often claimed that farming promotes good character traits – e.g., self-reliance, fortitude, and patriotism – and that virtues such as diligence, ecological sensitivity, and patience are central to good agricultural practice. In food ethics discussions, it is often claimed that character traits such as temperance and compassion are crucial to healthy and ethical consumption, whereas other character traits, such as gluttony and thoughtlessness, are inimical to them. This entry focuses on what makes character traits agricultural virtues and consumptive

virtues, as well as on the role of virtue within agricultural and food ethics.

Section “[Character Traits, Virtue, and Virtue Theory](#)” discusses what virtues are and what makes a character trait a virtue. Sections “[Agricultural Virtues](#)” and “[Consumptive Virtues](#)” focus on the specification of agricultural virtues and consumptive virtues, respectively. Section “[Virtue and Right Action](#)” discusses the ways in which virtue promotes right action. Section “[Virtue Theoretical Ethics](#)” discusses virtue-oriented accounts of right action. Section “[Agriculture and Virtue Education](#)” briefly discusses the view that farming is an effective means of moral education.

Character Traits, Virtue, and Virtue Theory

A *character trait* is a disposition to take certain types of considerations as reasons (or as motivational) for action or emotion under certain types of circumstances. Different people have different character traits if they are disposed to respond differently toward the same types of considerations. For example, a person who is consistently moved neither emotionally nor to action by the suffering of others (when she is in a position to help alleviate the suffering) is indifferent, whereas a person who is empathetic and tries to alleviate the suffering (when in an appropriate position to do so) is compassionate. The two people are disposed regarding the same thing – the *field* of both of the character traits is the suffering of others – however, they are differently disposed (Aristotle 1985). The dispositions that constitute character traits are not merely reactive; they are deliberative and conative as well. It is not just that a compassionate person feels and acts differently from an indifferent person; they understand and reason differently about the suffering of others. Character traits also have a perspectival dimension – they are relevant to how people “interpret” the world. For example, a selfish person is more likely to “see” a situation where there are scarce resources to be allocated as a problem of securing as much as possible for

herself, while a just person will “see” it as a coordination or cooperation problem. A person who is concerned with the welfare of animals will “see” a concentrated animal feed operation as a system of suffering, whereas a person not so disposed might “see” a system of efficiency.

A *character virtue* (hereafter just “*virtue*”) is a well-justified character trait. It is a disposition to respond to considerations in the world in excellent ways. If the suffering of others is bad and one is indifferent to it (or aims to cause it), then one fails to respond well to a morally salient fact about the world. Therefore, cruelty and insensitivity toward the suffering of others are vices, and compassion toward others is a virtue. To paraphrase Aristotle, a virtuous person is disposed to respond to the right thing, for the right reason, and in the right way while also having the right desires and feelings about it (Aristotle 1985). Specifying what counts as “right” for each of these is the central project within virtue theory.

There are several competing virtue theories, but the most prominent ones share this crucial feature: what constitutes right responsiveness is largely determined by the goods and values in the world (and the nature of those values), as well as by the relevant facts about the agent and her situation. According to eudemonistic virtue theorists, such as Aristotle, a virtue is a character trait that a person needs to flourish or to live well (Hursthouse 1999; Annas 1993). That is, flourishing is what is good or valuable, and the virtues are those character traits that are conducive to or constitutive of it. Other virtue theories are more pluralistic in that character traits are also assessed by their relationship to values other than agent flourishing – for example, how they contribute to the flourishing of other people, the welfare of nonhuman animals, the health of the environment, or the quality of social/civic systems (Swanton 2003; Sandler 2007; Treanor 2010). Take, again, the example of compassion toward the suffering of others. On a strictly eudemonistic approach, compassion toward the suffering of others is justified because the disposition is constitutive of (or conducive to) the agent’s living well – for example, with healthy

interpersonal relationship and as a rational person (Hursthouse 1999; Foot 2001). On a pluralistic approach, it is also directly justified by the value of the flourishing of other people (Sandler 2007). (The justification is direct in the sense that it is not mediated by the relationship between the flourishing of others and the flourishing of the agent.) Moreover, because animal suffering is morally considerable (Singer 1975), the disposition to care about and try to reduce their suffering is a part of the virtue.

Because which character traits are virtues depends upon what things are good or valuable in the world, which character traits are agricultural and consumptive virtues is highly sensitive to the appropriate ends of agriculture and consumption. The next section discusses which character traits are agricultural virtues. The section after that discusses character traits associated with virtuous food preparation and consumption.

Agricultural Virtues

One way in which character has been thought to be related to agriculture is that there are certain character traits that dispose a person to farm well or to engage in good agricultural practices. Let us call these *agricultural virtues*. This section addresses what makes a character trait an agricultural virtue before turning to which character traits are agricultural virtues.

Some character traits – often called *enabling or cardinal virtues* – are conducive to doing almost anything well. Commonly recognized enabling virtues, in both secular and religious traditions, are traits such as courage, fortitude, thoughtfulness, and temperance. These character traits are considered cardinal virtues because they involve regulation of core emotional, cognitive, and conative responses. If a person lacks self-control, is easily discouraged, reasons poorly, and acts rashly, they are more likely to fail to accomplish their aims than is a person who is temperate, controlled, and deliberate. This is likely to be no different in farming than it is in law enforcement, education, or parenting. These character traits are agricultural virtues but only

because they are human virtues more generally, and agriculture is a human activity.

Not all agricultural virtues are like this. For example, it is crucial to success in agricultural production that a person be ecologically sensitive, at least in a minimal sense. They must respond well to climatic and weather events; they must plan well regarding seasonal timing and changes; they must be attuned to the limits and possibilities of biological productivity. Being well disposed with respect to ecological dependencies, vulnerabilities, and interactions more generally is not something that is necessary for good law enforcement or good dentistry. It is not a general virtue in the same way that is self-control. This does not, of course, imply that ecological sensitivity is a uniquely agricultural virtue: it is crucial to good conservation biology and water management practices as well, for example. But the field or domain of the virtue encompasses agricultural practice, and for that reason, it is properly an agricultural virtue. From this point on, “*agricultural virtue*” refers to virtues of this sort – i.e., non-cardinal virtues that are operative in agricultural practice (i.e., virtues whose field or sphere of application encompasses agricultural activity). Agricultural virtues are character traits that make for good farmers and are conducive to good agricultural practice.

Because agricultural virtues are character traits that are conducive to good agricultural practice, characterizing agricultural virtue is highly sensitive to what the appropriate ends or goals of agriculture are (which is dependent upon the values or goods at stake with agriculture). All agriculture has a common goal of the production of food or commodities. However, that is only a partial account of that at which any actual agricultural practice aims. In fact, there is wide divergence in views about what the aims of agriculture should be. On some views, the goal should be to maximize agricultural outputs or profits. On other views, the goal should be to produce food (or other agricultural commodities) compassionately and sustainably. On still other views, the goals of agriculture include maintaining cultural traditions and practices (Thompson 2010).

Different views on the ends or goals of agriculture support different accounts of which character traits are agricultural virtues. On the view that maximizing output should be the goal of agriculture practice, any element of the agricultural production system that is underutilized is detrimental to accomplishing the goal, and people ought to always be willing to incorporate novel organizational and technological methods for increasing yields. Therefore, if the end of agriculture is maximizing yields, character traits such as efficiency and innovativeness are agricultural virtues. The idea that the end of agriculture is maximizing yields has been referred to as the industrial agricultural model (Thompson 2010). The impetus for it comes from the commodification of agriculture associated with the globalization of food systems, as well as from humanitarian concerns about how to feed a global population of over seven billion people.

The industrial agricultural model is not the only model for agriculture. On some views, both religious and secular, farmers are not only producers of a certain sort of commodity but also stewards of the land and of cultural traditions and communal practices (Shiva 2000; Berry 1997; Jackson 1985). On this view, the end of agriculture is not merely to produce food, but to do so in particular ways – i.e., ways that are consistent with the other values at stake. Agricultural practitioners must, therefore, be sensitive or responsive to a wider (or alternative) array of considerations. As a result, the character traits that constitute agricultural virtue can be quite different than they would be on the industrial model.

Consider, for example, the commitment to sustainability. There is a conception of sustainability embedded in the industrial agricultural model. However, it is a narrow and weak conception of sustainability. It is defined only in relation to agricultural production, and it can be accomplished even if the local resource base is diminished (e.g., topsoil and water), as long as external inputs can maintain productivity. Many people – both producers and consumers – advocate for a broader and stronger conception of sustainability. On this alternative view, sustainability has to

do not only with maintaining or increasing levels of outputs but also with protecting resource bases and ecological systems beyond those directly related to agricultural productivity. Ecological sensitivity of this sort involves being responsive to considerations related to the biological richness of soil composition, greenhouse gas emissions from agriculture that contribute to global climate change, and agricultural runoff's impacts on water quality, for example. A person who is well disposed to promoting robustly sustainable agriculture will respond differently to the same ecological considerations than will a person who is disposed only to maximizing yields. They will take different considerations as reasons for action, will have different affective responses, will adopt different goals, and will deliberate about things in different ways. So, again, which character traits are agricultural virtues is sensitive to what conception of sustainability ought to be adopted in agriculture.

Ecological sensitivity is not a unique virtue in this regard. The same holds with respect to compassion and animals. If the end of animal agriculture is maximizing output, then a disposition of indifference toward the suffering of the animals is justified except insofar as the suffering might affect yields. However, if the end of animal agriculture is to produce animal products with minimal suffering, then compassion ought to be extended to agricultural animals. Those who advocate for compassionate animal agriculture often do so on the grounds that it is necessary because nonhuman animals are morally considerable. That is, nonhuman animals have a sort of value or worth that goes beyond their mere instrumental value to people (Singer 1975). This illustrates, again, the way in which the appropriate ends of agriculture are dependent upon the values involved or at stake in agricultural activities. If only human well-being mattered, the dispositions regarding animals and ecological systems that constitute agricultural virtue would be quite different than if nonhuman animals and/or nature have (noninstrumental) value as well (Sandler 2007).

The possibility of cultural and communal ends to agricultural practices is also relevant to the

specification of agricultural virtue. On many views, farming is a practice not only in food production but also in cultural stewardship. This stewardship can involve maintaining historical landscapes, traditional agricultural varieties, or traditional agricultural methods, for example. Moreover, agriculture-related practices, such as seed sharing, harvest festivals, and cooperative institutions, can be central to maintaining communal ties and cultural traditions. A concern frequently raised about industrial agriculture is that in the drive to promote efficiency, these cultural values and communal relationships are often undercut. As a result, commitment to cultural and communal values or ends is often thought to favor more conservatism in agricultural virtue – for example, greater deliberateness in the evaluation and adoption of new technologies and prioritizing local independence and autonomy. It is for these reasons that those who emphasize community and cultural values in agriculture are often disposed against novel seed varieties patented by transnational corporations, as well as the displacement of local polycultures in favor of commodity monoculture (Shiva 2000; Berry 1997; Jackson 1985).

The foregoing is by no means an exhaustive account of the different views regarding agricultural virtue or the values and ends that are taken to be the basis for their specification. For example, many people believe that human rights, equality, and justice with respect to farm workers/employees and food availability/security need to inform agricultural virtue as well (Gottlieb and Joshi 2010). Nevertheless, it should be clear how and why the answer to the question “which character traits are agricultural virtues?” depends upon the answer to the question “what are the appropriate goals or ends of agriculture?” which in turn depends upon the answer to the question “what good and values are involved in agriculture?”

It should be noted that the answer to these questions need not be the same for all agricultural activities. Different types of agriculture, in different places and under different socioeconomic and ecological conditions, might, quite appropriately, have different ends. Some agricultural

landscapes and practices are richer in cultural significance than are others; some are more central to communal relationships than are others; some have a greater capacity for contributing to food security than do others. This is not to claim that there are no character traits that are conducive to good agriculture generally. As discussed, cardinal virtues cut across all human activities, and there are elements of agricultural virtue that are appropriate to nearly anyone working to produce food. But these more general agricultural virtues are shaped by the particulars of agricultural forms, and their relative salience must be sensitive to socioeconomic and cultural context.

Consumptive Virtues

Just as there are character traits that are more conducive than others to good food *production*, there are character traits that are more conducive than others to good food *consumption* (which includes not only eating but also procurement and preparation). These character traits will hereafter be referred to as “*virtues of food consumption*” or just “*consumptive virtues*.”

As with all virtues, which character traits are consumptive virtues depends ultimately upon the appropriate ends, and so values and goods at stake, of the activity. Arguably, the most important end of food consumption is health. As a result, character traits that are conducive to healthful eating are, all other things being equal, more justified than are character traits that are conducive to eating behaviors that undermine health. It is for this reason that perhaps the most prominent consumptive virtue is temperance or self-control; and the most prominent vice is intemperance or gluttony. If we are not able to control or moderate our food consumption behaviors, then we are much more likely to eat (and drink) more than is healthy for us or to have a diet that does not meet our nutritional needs. (There are also many external factors that affect consumptive behaviors, such as availability and pricing of healthful foods, advertising and marketing, and nutrition education and information.) Moreover, having appropriate desires, emotions,

practical reasoning, and perspectives on food is crucial to realizing many of the prominent social and aesthetic ends of food preparation and consumption. For these reasons, most food ethics would converge on the central importance of temperance and self-control as consumptive virtues.

Of course, food preparation and consumption are not only about nutrition and health. They are also central to culture and tradition, to daily rituals and practices, to social and familial interaction, to identity and connection to place, and to security and power, for example. Moreover, both preparation and consumption can be skilled practices and even art forms. Due to the myriad roles that food plays in human life and culture and the myriad ways it connects us to other people and to social and ecological systems, there is an incredible diversity of virtues whose field encompasses at least some aspects of food preparation and consumption: aesthetic appreciation, gratitude, hospitableness, generosity, justice, compassion, patience, inventiveness, cultural sensitivity, openness, courage, courteousness, perseverance, inquisitiveness, efficiency, thriftiness, tolerance, reverence, and so on. It is not possible here to substantively discuss each of these character traits, but there are several virtues, in addition to temperance, that have become influential in the food ethics discourse in recent years. Some are the same as those that have become prominent (and are discussed above) within agricultural ethics: compassion toward nonhuman animals, ecological sensitivity regarding where our food comes from and how it is produced, thriftiness (i.e., avoiding profligacy) with respect to food waste, and justice with respect to treatment of food workers as well as food security/availability (Singer 1975; Gottlieb and Joshi 2010; Thompson 2010). Moreover, they are thought to be justified on the same sorts of grounds – for example, that nonhuman animals are directly morally considerable and that agricultural workers deserve full respect and rights.

Other character traits are more specific to food preparation and consumption. For example, there has been growing interest in developing simplicity and focality in the practice of food

consumption, cultivating more adventurousness and aesthetic appreciation in the tasting of food, increasing awareness of the context or situatedness of food production, and developing greater self-sufficiency and autonomy with respect to food security (Petrini 2004; Pollan 2007; Gottlieb and Joshi 2010). These consumptive dispositions track food movements – e.g., slow foods, exotic foods, and local foods – since both the movements and the virtues are taken to be justified by the same values. Of course, these virtues, like the movements, are not uncontroversial. They are justified only to the extent that they track well the goods and values within their fields. Simplicity and focality, for example, are thought to promote healthy eating, reduce the ecological impacts associated with one's diet, increase aesthetic and cultural appreciation of food, and promote beneficial social interactions around food. If those goals are well justified and the character traits are in fact conducive to accomplishing them, then they are justified as virtues to the extent that they do so.

As discussed above, the multidimensionality and prominence of food consumption in human life and culture give rise to a host of character traits being proposed as consumptive virtues. However, the fact that a character trait is regarded by some group of people to be a consumptive virtue does not make it a virtue. For any candidate consumptive virtue, the extent to which it is in fact a virtue depends upon both whether the ends at which it aims are appropriate and whether it is effective in realizing them. As with agricultural virtue, much work remains to be done on substantively specifying and evaluating which consumptive character traits are virtues and which are vices (Cafaro 2005; Wenz 2005; Sandler 2007).

Virtue and Right Action

The previous sections concerned what makes a character trait an agricultural virtue or a consumptive virtue and provided an overview of some of the character traits that are considered to be important agricultural or consumptive

virtues. This section and the next one concern the relationship between virtue and right action. Characterizing this relationship is another central project within virtue ethics.

As discussed above, character traits dispose people to respond to certain considerations in particular ways. People with different character traits over the same field respond differently (practically, affectively, and conatively) to the same types of considerations. Thus, there is a tight relationship between character and action. People with different character traits over the same field will behave differently within that field because of their different character traits.

For example, consider again the two conceptions of ecological sensitivity discussed above – one that is oriented around sustaining agricultural productivity and the other that is concerned with ecological conditions more generally. Agricultural activities cause, directly or indirectly, 15–20 % of global greenhouse gas emissions. This information will be considered quite differently by a farmer, farm manager, or farm owner, depending upon which type of ecological sensitivity she possesses. The narrowly focused disposition, the one concerned with ecological considerations insofar as they impact productivity, will be concerned about how global climate change might affect agricultural outputs in the future. But she is not likely to see it as her responsibility to reduce emissions, particularly if doing so would require adopting practices or market approaches that would decrease yields or profits. In contrast, a person disposed to a broader conception of ecological sensitivity is much more likely to consider this information as relevant to how yields ought to be produced, and she is likely to be more open to methods and markets that are associated with fewer greenhouse gas emissions. Thus, one way in which agricultural virtue is related to agricultural practice is that it disposes people to respond to considerations in agricultural contexts differently. A compassionate poultry farmer concerned about animal welfare is going to respond differently to the impacts of battery cages on chickens than is a person who is not moved by the suffering of animals and does not consider it to be morally significant.

Moreover, virtues are not merely one among several possible character traits. They are well-justified character traits, dispositions that involve responding well to goods and values in the world. As a result, virtue does not just dispose its possessor to respond differently to situations, but to respond rightly. Virtue is conducive to right action. Agricultural virtue is conducive to acting rightly in agricultural situations. Consumptive virtue is conducive to acting rightly in consumptive situations. Agricultural animals are morally considerable in that their suffering is ethically relevant, and so it is not just that the indifferent poultry farmer acts differently from the compassionate poultry farmer with respect to the use of battery cages. The compassionate poultry farmer acts rightly, whereas the indifferent one acts wrongly, and their different character traits explains (in part) why they do so.

In addition to disposing a person to perform right actions, virtue can help people to identify which actions are right. Sometimes people fail to do what is right, even when they know what the right thing to do is. Situation pressures can be strong and individual weakness (“weakness of the will”) can occur. However, at other times, people are insensitive to what matters in a situation, such that they simply are not able to see clearly what they ought to do. The indifferent poultry farmer does not see that battery cages are ethically problematic and then not care. They may not see them as problematic at all. They may not see what matters in the situation. This is an implication of the perspectival dimension of character traits. Thus, virtue not only disposes a person to do what they see as right; it also helps a person to see what is right.

Another way in which virtue is conducive to right action is through what is sometimes called the *integrating effect of virtue*. Often, right or virtuous activity is seen as involving significance sacrifice. For example, assume that it is right to aim for robustly ecologically sensitive agriculture. Doing so might require adopting more demanding or costly practices, or else might reduce yields. For these reasons, some people might not embrace it. From their perspective, it may look like something that just makes their

work more difficult and less profitable. However, the costs associated with ecologically sensitive agriculture are likely to look quite different from the perspective of a person who already is ecologically sensitive. For her, the additional work is not just one more thing they have to do; it is a crucial component of accomplishing her goals and realizing her values. It may well be part of her self-conception or central to her worldview. Virtue integrates the agent's values and perspectives with right action. This makes it more likely that she will do the right thing.

Yet another way that virtue is conducive to right action is that the sensitivity to values and context (i.e., wisdom) that is part of virtue is often crucial to determining the right thing to do in concrete situations. Many moral philosophers have argued that it is implausible and unreasonable to expect that there is some finite set of rules or principles that can be applied by any moral agent in any situation to determine the proper course of action (Hursthouse 1999). If they are correct, then the wisdom and sensitivity that are part of virtue (including agricultural and consumptive virtue) are in some situations indispensable for identifying right action. For example, it might help agents to see whether they ought to maintain their dietary commitments, such as not eating meat, in the face of important social considerations, such as being a guest for whom a special nonvegetarian meal has been prepared.

Virtue Theoretical Ethics

The relationships between virtue and right action discussed in the previous section focused on the many ways in which agricultural and consumptive virtues dispose an agent to do the right thing. However, it left open the normative framework (e.g., consequentialist, communitarian, or deontological) that provides the account of what the right thing to do is. Some ethicists have suggested that virtue ethics or virtue-oriented ethics may provide an alternative theoretical framework to other approaches to specifying right action. On such a view – hereafter the *virtue theoretic view* – the virtues would be the primary evaluative

concepts of the ethic, and right action would be explicated through them (Sandler 2007). That is, an action would be right not because it brings about good outcomes (consequentialism) or conforms with the moral law (deontology), but because it expresses or hits the target of virtue (Sandler 2007; Hursthouse 1999; Swanton 2003).

Virtue theoretic views suggest that decision making regarding what action or policy to pursue could be done by first identifying which virtues are operative and then determining what they would call for individually and overall. For example, in thinking about whether to include meat in one's diet, one would not look for the relevant moral law or run a utilitarian calculus. Instead, one would consider whether there is any meat available that is produced and procured in compassionate, just, and ecologically sensitive ways (assuming those are the operative virtues). Because right action is explicated through the virtues on this view, providing substantive accounts of agricultural and consumptive virtues and vices is crucial to generating the normative resources for agricultural or food ethics.

Explicitly virtue theoretical approaches to agricultural and food ethics are not the dominant approaches. Rights-based and consequentialist approaches are more common. This is evident in the prominent framing of many food issues as between welfare economics justifications for maximizing efficiency in food production and distribution versus rights-based justifications for the protection of farmers, workers, and community autonomy. But virtue theoretic considerations often arise within the alternative approaches. This frequently occurs in the context of addressing longitudinal large-scale collective action problems. Many agricultural issues – such as those associated with pollution, industrial animal agriculture, and global food security – arise from the cumulative unintended effects of an enormous number of seemingly inconsequential decisions, and they can only be addressed by a very large number of people making seemingly inconsequential contributions to doing so. A person who chooses to adopt a low-emission diet has effectively no impact on global climate change, given the scale of emissions. Similarly, a person

who chooses to adopt a non-factory farmed diet has effectively no impact on the industrial animal agricultural system. Given this problem of inconsequentialism (Sandler 2010; Jamieson 2007), ethicists very often appeal to the normative significance of character. For example, they will argue that it is a matter of avoiding complicity that a person should forego factory farmed meat if they think factory farming is ethically problematic, even if their doing so will have no discernible effect on the industrial animal agriculture system. Or they will argue that it is a matter of integrity that a person ought to unilaterally reduce their individual emissions, even though their doing will have no discernible effect on global climate change. Thus, even when a normative theory is not explicitly virtue theoretic, very often virtue theoretical considerations will be crucial to determining what constitutes right action.

Agriculture and Virtue Education

Thus far, the discussion has focused on what makes a character trait an agricultural or a consumptive virtue, as well as the relationship between agricultural and consumptive virtue and right action (i.e., the role of virtue within agricultural and food ethics). Another way that agriculture has been thought to be related to virtue is that agriculture is conducive to developing good character. That is, agriculture is an effective method of moral education in that it teaches such things as patience, diligence, inventiveness, self-reliance, cultural appreciation, simplicity, and other virtues.

Thomas Jefferson is among the Western thinkers most frequently cited in support of this view, owing to the following passages:

Those who labour in the earth are the chosen people of God, if ever he had a chosen people, in whose breasts he has made his peculiar deposit of substantial and genuine virtue. It is the focus in which he keeps alive that sacred fire, which otherwise might escape the face of the earth. Corruption of morals in the mass of cultivators is a phenomenon of which no age nor nation has furnished an example. (Jefferson 1984, p. 290.)

Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most

independent, the most virtuous, and they are tied to their country and wedded to its liberty and interests by the most lasting bonds. (Jefferson 1984, p. 818.)

These passages seem to suggest that there is a strong relationship between farming and good character (though it has been argued that when put in the context of the works in which they appear, their meaning is not so straightforward (Thompson 2000)). Similar sentiments can be found in the work and life of Henry David Thoreau (Thoreau 1951). However, not all historical thinkers have thought that farming was conducive to virtue. Aristotle thought that it was contrary to it:

The citizens must not lead the life of mechanics or tradesmen, for such a life is ignoble, and inimical to virtue. Neither must they be farmers, since leisure is necessary both for the development of virtue and the performance of political duties. (Aristotle 1900)

Whether or not certain agricultural activities or forms of life are conducive to promoting certain virtues is largely an empirical question. To show that some agricultural form of life is conducive to virtue, one would need to demonstrate, using appropriate social science methodologies, that those who engage in those practices or form of life develop the character traits at issue at a comparatively high rate and that they do so as a result of their engaging in those practices or form of life. (Whether the character traits being studied are in fact virtues depends on the considerations discussed earlier.) Jefferson provides no such evidence, and neither does Aristotle. In fact, there has been very little empirical study of the effectiveness of agriculture as moral education. Until such time as that research is done, claims about the relationship between agriculture and virtue should be taken for what they are – interesting but unsubstantiated speculations (though, in some cases, perhaps plausible ones).

Summary

Considerations related to character play a crucial role in ethics. Substantive specifications of which character traits are virtues tell us what sorts of people we should be. Virtue is crucial to

identifying and motivating right action. And virtue theoretical considerations often play a role in determining what we ought to do. In this entry each of these has been discussed as they relate to agricultural and food ethics. The many respects in which the character ethics of agriculture and food are underdeveloped have also been emphasized. Rigorous substantive specification of the character traits that constitute agricultural virtues and consumptive virtues is rare. The relationship between virtue and right action is often underappreciated. Claims about the relationship between agricultural practice and virtue education are often unsubstantiated. As a result, there remains a great deal of work to be done on virtue ethics within agricultural and food ethics.

Cross-References

- ▶ [Agricultural Ethics](#)
- ▶ [Animal Welfare: A Critical Examination of the Concept](#)
- ▶ [Environmental Ethics](#)
- ▶ [Environmental Justice and Food](#)
- ▶ [Gluttony](#)
- ▶ [Industrial Food Animal Production Ethics](#)
- ▶ [Slow Food](#)
- ▶ [Sustainability of Food Production and Consumption](#)

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