Teea Kortetmäki

Agriculture and Climate Change

Ethical Considerations

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Preface

Food and nutrition are among the most fundamental human needs. Their impacts are visible in the lives of human and nonhuman beings all over the world; agriculture is one of the most employing professions in the world; and most of the land area in human use is in food production. Eating is both vital and highly socio-cultural, letting humans express their identities, cultural affinities, and emotions such as care and joy. Food nurtures the body, the mind, and social relations, and can be a source of great enjoyments. Eating also connects humans with the rest of the natural world: all animals eat, and many forms of life are eaten by others. Access to food is not equal, however: a great number of people in the world lack secure access to adequate and nutritionally sufficient food. In addition, despite the vitality of food, the economic viability of farming has been in decline relative to other forms of economic development,[1] due to which working poverty is common among farmers even in wealthy countries and threatens the feasibility of agricultural work. Farmers' mental health problems (Hagen et al., 2019) challenges their long-term well-being and capacities to adapt to changing societal and environmental conditions. Thus, the future of food production cannot be taken for granted, and challenges related to agricultural practices and eating raise numerous ethical questions regarding both human and non-human realms. Climate change adds an

[1] The entrepreneurial income per family work unit in farms is less than half of the average wages in the economy, in EU-28: https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agricultural-farm-income_en.pdf . In Switzerland, the relative income is a bit higher; the avg farm income is 43,700 CHF per family member in 2014 compared with c. 59,000 CHF annual salary income per capita in 2014 (https://www.ceicdata.com/en/indicator/switzerland/annual-household-income-per-capita). For the farmer poverty in Switzerland, see Contzen & Crettaz 2019.

extra layer to these questions. Climate change impacts will threaten agricultural production, food security, and food quality around the world and require large-scale adaptation measures in agriculture. Simultaneously, the significance of food related climatic emissions calls for systemic transformations that will change how we eat and will have far-reaching socioeconomic and cultural impacts.

What are the ethical implications of considering agriculture and climate change together?

The Swiss Federal Ethics Committee on Non-Human Biotechnology (ECNH) has commissioned this report in order to examine the ethical issues that arise at the intersection of climate change, climate action, and agriculture. The main focus of the report is on agriculture and food production although it will also take a look at other (industrial world) food system activities that significantly determine how, where, and by whom agricultural practices are or can be carried out. Other food system activities also affect the distribution of the benefits, burdens, and risks related to agricultural transformations that are necessary in the face of climate change. Some place-specific facts are provided specifically regarding Switzerland, but I believe that interested readers from any regional background will find this report relevant and providing ample food for thought.

The ECNH funded the work that resulted in this report. The work began in November 2020 and generated the first outline of the report in February 2021, an interim report in May 2021, and the final report in August 2021.

Acknowledgements I am thankful for the ECNH Committee for ordering this work. I also want to thank the Committee members for the feedback during this process, and my colleagues Mikko Puumala and Helena Siipi (University of Turku) for their insightful comments on the manuscript. Special thanks to the ECNH Executive Secretary Ariane Willemsen for both feedback and assistance with the practical matters.

Tips for the busy readers

Sections 1 and 2 comprise the heart of this report and the summarising table (Section 2.11) gives an overview of these issues, supported by Section 4 (Conclusion). I also recommend Section 3.7 on the role of empirical sciences and the ethics-science-policy interface.

1 Introduction

1.1 Agriculture and climate change: two-way impacts

1.1.1 How agriculture impacts on climate change

Greenhouse gas emissions from food system[2] activities are responsible for 21 – 37 % of human-induced climatic emissions, according to the recent IPCC estimates, depending on how land use impacts are taken into account (Mbow et al., 2019). Thus, significant emission reductions are needed to avoid dangerous climate change. This entails that significant emission reductions are also needed throughout food systems, from agricultural production to consumption and food waste – "from farm to fork", or "from seeds to waste". Food systems also cause significant non-climatic environmental impacts. They are among the main drivers of biodiversity loss, freshwater withdrawal, eutrophication, and nutrient pollution. Consequently, the overall environmental sustainability transition is urgent in food systems to nurture human health and environmental sustainability in the future (Willett et al., 2019).

To spotlight a particular problem, animal-based food production is estimated to cause up to half of food related climate emissions, or perhaps even more (Poore and Nemecek 2018; Springmann et al., 2018) due to methane emissions (from ruminants) and the land use impacts of grazing and feed production. Consequently, the research community has recently made several calls for a shift towards more plant-based diets, especially in societies dominated by "Western diets" with high consumption

[2] A food system includes food supply chains (from input to farm to fork and waste), and the drivers and outcomes of such activities (see Glossary for details).

of animal-based foods[3] (e.g., Poore and Nemecek 2018; Springmann et al., 2018; Willett et al., 2019). This makes the situation particularly challenging for countries like Switzerland where approximately 60 % of farms are specialist grazing livestock farms and more than 80 % of farms are either animal-based or involve a significant number of animals relative to farm size.[4]

1.1.2 How climate change impacts on agriculture

Climate change will have significant direct and indirect impacts on food systems, especially farming, around the world. Direct impacts mainly refer to increased mean temperatures, changes in the average precipitation rates, and the increasing frequency of weather extremes (storms, floods, drought periods, abnormally wet periods). Indirect impacts include, for example, degrading water availability, increasing animal and plant diseases and pests, the disruption of food-related ecosystem services such as pollination, and impacts on food and energy price due to supply disruptions. The overall global impacts of climate change on food availability, supply security, safety, and equal access to food are estimated to be very detrimental: climate change will impair global food security in numerous ways (IPCC: Mbow et al., 2019). While rising atmospheric CO_2 contents may also have some positive impacts on plant growth, this does not change the big picture.

However, the impacts of climate change on agriculture and food production vary a lot regionally. For example, cooler climatic regions in Northern Europe as well as some mountainous areas are likely to witness significant changes, some of which may also be beneficial. Specifically in Switzerland, cultivation may become viable at higher elevations due to a lengthening growing season and increasing mean temperatures; on the other hand, relatively dry regions may suffer crop declines due to declining summer precipitation or

[3] The global map for meat supply per person: https://ourworldindata.org/grapher/meat-supply-per-person – although "Western diets" is a common term, some non-Western countries also consume lots of meat.

[4] Swiss Agriculture Pocket Statistics 2018 https://www.bfs.admin.ch/bfs/en/home/statistics/catalogues-databases/publications.assetdetail.5287765.html

increased temperature stress (Henne et al., 2018). Climate change is also projected to strengthen heavier winter precipitation, which may cause large-scale floods and topsoil losses with detrimental impacts on Swiss food production (Fuhrer et al., 2006).

Regional variation in the impacts of climate change suggests the question of where food will be produced in the future and how the globally increasing risks (the manifestation of which may vary greatly from year to year and region by region) are to be managed. There is an unavoidable disparity regarding farmers' abilities to reduce emissions and adapt to climate change: the "luckiness" of different agricultural regions varies greatly, and even more so in a changing climate. Climate change is a bad luck lottery, anyway: winners are those who lose the least.

1.2 Agricultural and food ethics

Food ethics, broadly speaking, deals with any normative questions that arise regarding food practices and food system activities and related phenomena in our communities.[5] Agricultural ethics, food ethics as the ethics of eating, and food justice are interlinked subfields in food ethics, yet they have practically become partially distinct realms of research (and civil society activism) that I will describe next. Subfields also address many overarching questions, such as how extensively food related morally relevant matters can/should justifiably be regulated by public measures and whether food production can be approached as any commodity production in ethics or whether it should be addressed as a very special kind of good.

Agricultural ethics concerns normative issues related to agricultural practices and policies. There is notable issue overlapping

[5] Normative reasoning involves legal aspects but the two are not the same. Legislation regulates matters that are considered morally important (such as rights, duties to respect and fulfil rights, and rules regarding the appropriate treatment of other people and nonhumans). Legislation, however, also covers many issues that are grounded on conventions rather than moral norms (such as traffic rules). Furthermore, numerous morally important issues are not regulated by legislation; the extent to which legislation should govern them is subject to continuous debates. I will not examine legislative aspects here because I lack the required expertise.

between agricultural and bioethics, veterinary and animal welfare ethics (regarding the ways of using, treating, and modifying animals in food production), and – more recently – between agricultural and environmental ethics. The topics of agricultural ethics have always been informed by topical subjects and developments in the world: for example, the rapid emergence of biotechnological solutions aligned agricultural and bioethics closely in the 1990's. Unlike in bioethics, however, interdisciplinary work in agricultural ethics is still in its infancy and few works in the field make frequent use of references from the agricultural sciences (Thompson 2015b, 82).

Food ethics as the ethics of eating studies the normative dimensions related to what and how humans eat. Initially, food ethics was considered primarily as a study of food consumption activities: the morality of individuals' conducts and of "eating ethically" with relation to different morally relevant aspects (Thompson 2015b, 82–83) and food values.[6] This also includes the moral permissibility of eating nonhuman animals.[7] The origins of the ethics of eating date back to philosophy in Ancient Greece. Works in this subfield used to focus on the food choices of individual actors, rather than more system-wide processes. Approaching eating in this individually oriented way is still relatively common in food ethics and has evolved over time into very nuanced questions (such as whether vegans have an obligation to eat roadkill). Studying the individual conduct of eating, however, tends to overlook the systemic approach and related interdisciplinary information (Kortetmäki and Oksanen 2021). Recent food ethics research has begun to pay more attention to the prior narrowness and is generating new streams of more

[6] Regarding values relevant to food choices, a major distinction is between non-instrumental values (X has value for its own sake, regardless of values or uses it has for others) and instrumental values (X has value because of some of its properties that are valuable for others). Instrumental values may be classified as, for example, economic and utility values; recreational and aesthetic values; scientific value; religious and spiritual values; and life support values. Intrinsic value bearers are morally considerable for their own sake.

[7] Hereafter "animals" for simplicity.

systems-oriented and interdisciplinary contributions (see especially The Oxford Handbook of Food Ethics by Barnhill et al., 2018). Although it is sometimes appropriate and important to focus solely on the conduct of individuals as moral actors, a systemic approach is very important in the context of climate change and agricultural and food ethics.

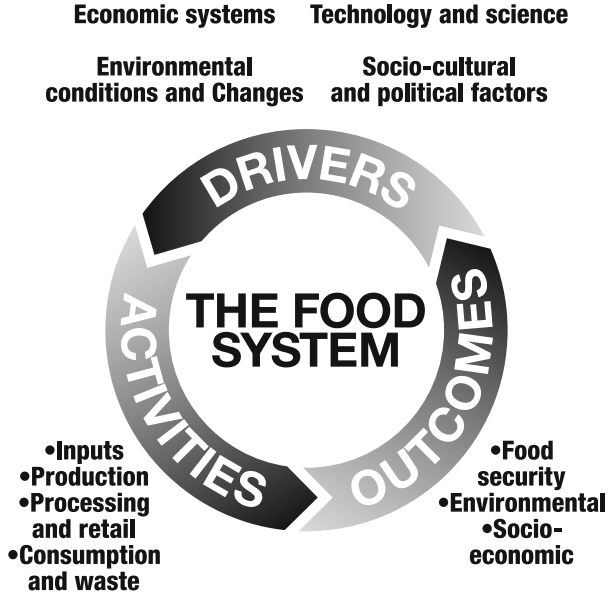

Figure 1. Food system drivers (top), activities (left), and outcomes (right). Figure by Riina Tykkyläinen.

Food justice, instead, has a strongly systemic and political orientation. Its focus is on structures and processes regulated by public and private institutional actors at multiple levels, from municipalities to states and from international political bodies to transnational corporations: how do these activities influence people, various groups and communities,[8] and their lives in relation to

[8] Sometimes also nonhumans.

each other? Food justice research has developed largely along its own lines, distinctly from the mainstream of food ethics.[9] Food justice considerations are indeed ethical: they concern normative questions about what is just (right) and unjust (wrong) treatment of people by institutions. While justice as an attribute of conduct can in philosophy refer to both individual and institutional actors, contemporary food justice focuses on institutions just as social justice research generally does (see Glossary: Justice / Relationship to ethics). A great deal of food justice research is empirical, case based, and focused on community movements who articulate their experiences of particular injustices and make claims / act for their correction, often via grassroots initiatives such as community gardens, farmers' markets, and school food initiatives (Glennie and Alkon 2018; see also Gottlieb and Joshi 2013). (In ethics, the articulated experiences of injustice are subjective claims of what is unjust; whether they actually concern experiences that are unjust, is another matter.)[10] Macro level-oriented food justice research examines how the present food system structures and governance dynamics produce systematically an unequal distribution of food system related benefits and burdens, patterns of discrimination and oppression, and rights violations. The relationship between food justice and other strands of food ethics resembles the relationship between environmental justice and ethics: the former has criticised the latter as privileged "white middle-class activism" that neglects the concerns of the disadvantaged groups of other cultural or racial backgrounds (Bullard 2000). Similarly,

[9] Some recent collections on food ethics such as The Oxford Handbook of Food Ethics (Barnhill et al., 2018) contain contributions on food justice, too.

[10] Metaethical views on the relationship between subjective and objective claims differ. Universal moral realists believe that moral arguments can have universal truth value: the (f)actually right and wrong is separate from what subjects may believe. Relativists hold that moral right and wrong are culture- / community-sensitive matters and are true yet only within a particular cultural context. Some accounts of relativism suggest that relativist moral systems can have universal constraints. Subjectivists argue that moral truths are relative to each subject's individual beliefs, although beliefs may be wrong if they are grounded on misinformed beliefs, for example. All views allow the revision of moral views, nevertheless.

food ethics has been criticised for neglecting social equality aspects and features such as race and ethnicity as if contemporary ethical reasoning was neutral in those respects, while it is not (McBride III 2018). This is implicit, for example, in contributions that criticize veganist reasoning, not due to the coherence or plausibility of its ethical argumentation, but due to the neglect of social considerations and the resulting contribution to perpetuated social injustices and exclusion (Mares and Peña 2011; Harper 2011). This sometimes-troubling relationship has delayed the integration of food justice and ethics camps. I consider this as the main reason why food justice theorising is not as mature as food ethics theorising in philosophical terms; meticulously theoretical-conceptual takes on food justice are indeed relatively new (e.g., Dieterle 2015, Gilson and Kenehan 2019, Barnhill et al., 2018). Non-philosophical food justice research and movements can, nevertheless, make important points that ethics should take into account when the aim is to address normative questions that emerge in the real-world mess of intersecting ethical problems such as climate change, food injustice, and global inequality. It is also important to understand the levels where challenges can be addressed with individually right action and where collective and coordinated action is required. This distinction manifests in mundane contexts. Increased awareness about the impacts of different food choices can make me act more ethically right in a grocery store but may not help me promote food justice. I cannot state by purchasing that the price for the product should be distributed differently in the supply chain; or that the minimum standards for sustainable production should be raised to erase greenwashing; or that companies should improve the conditions of their workers.[11]

[11] For example, buying Fair Trade coffee implies a "vote" for change. Yet, the Fair Trade price premium may leave producers with a smaller share of the final product price when other supply chain actors collect more of the added value (Valkila & Nygren 2009), twisting profit distribution even more. This is *not* an argument against buying Fair Trade products (that may still leave farmers better off) but demonstrates how buying even the "fairness-promoting products" may not correct related distributive unfairness in the system.

1.3 Climate ethics

Climate ethics and justice as domains of academic research emerged in the rise of public climate change awareness. Reasoning in climate ethics can cover both climate change and acting upon it (mitigation and adaptation, geoengineering). The main topics of inquiry concern the distribution of responsibilities and duties for climate action with a focus on mitigation, the justification of the allocation of responsibilities, intergenerational considerations, and the compensation of harms. Whereas climate ethics has focused much on the duties of individuals to reduce their emissions and behave rightly as consumers and perhaps as voters, climate justice is more interested in the relations between different institutional actors and processes and the patterns of systemic, repeating inequalities, oppression, and issues related to rights, which may be generated or worsened by climate change – or, sometimes, climate mitigation.[12] In this report, for the reasons described above, I use the term climate ethics to include justice considerations, unless stated otherwise.

The layered unjustness of climate change lays the ground for climate ethics. Climate change results from the aggregated impacts of fossil fuel based economic development, the beneficiaries of which are largely different than those communities who are among the first to suffer the detrimental impacts of the resulting climate change (Gardiner et al., 2010). Many of the communities first hit severely by climate change are less resourced to adapt to climate change because of prior inequality in the course of fossil-based global economic development. Consequently, especially communities with developed economies and the people therein (as well as people with high climatic impacts in developing economies) are morally obliged to reduce their climatic emissions drastically and rapidly to prevent future harm. The mitigation of forthcoming harms is an obligation to the present vulnerable communities and

[12] Two examples demonstrate the distinction. The seminal book *Climate Ethics: Essential Readings* (Gardiner et al., 2010), mentions *justice* less than five times outside the bibliography. *Climate Justice: Vulnerability and Protection* (Henry Shue) mentions *ethics* less than five times outside the bibliography.

to future generations[13] – and, many add, to nonhumans (either as individual beings or as, e.g., endangered species) who suffer from the impacts of climate change. Rich discussion on the most justifiable way to allocate climate action related burdens has yielded the well-known responsibility distribution principles in climate ethics: the polluter pays principle, the beneficiary pays principle, and the ability to pay principle.[14] Responding to climate change requires both mitigation and adaptation: while the impacts of climate change can be significantly lessened by emission reductions, many future harms are already unavoidable.

Recent contributions in climate justice have also paid attention to the impacts of climate change mitigation, noting the risk of "triple injustice" for poor communities and low-income groups even in wealthy communities. Triple injustice means that (1) the least well-off people are deprived of the conveniences and benefits brought about by high-carbon lifestyles and economic development. (2) Yet, they suffer more from the impacts of such activities, which do not benefit them, and (3) they may also bear the greatest relative burden of the negative impacts of climate mitigation, by facing increased material poverty and lesser mobility opportunities caused by strict climate policies (Gough 2017). (3b) Some of the least well-off are also among the low educated people who likely suffer most from the unemployment impacts hitting carbon-intensive industrial sectors that often employ low-educated people (Morena, Krause and Stevis 2020). The topic concerning the third layer of injustices raises the questions that are nowadays called the "just transition" challenge: how can the transition to low-carbon communities be made without causing more social injustice?

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[13] There are also objections to the idea of obligations to future generations. However, the moral obligation for climate mitigation is strongly grounded even without reference to future generations. The impacts of climate change are already witnessed in some regions, are also in the most vulnerable food production areas (Mbow et al., 2019), and the present children will experience decades of accelerating harms from climate change.

[14] For a short introduction to principles, see https://plato.stanford.edu/entries/justice-climate/#BurdSharQues.

1.4 The methodological approach in this report

This report reflects, systematises and synthesises the state-of-the-art works regarding ethical issues in the context of climate change, climate action, and agricultural and food matters. The report represents interdisciplinarily and empirically informed applied ethics (see Glossary: Empirically informed ethics) within this context. Although the work mainly comprises a systematic overview of the existing research instead of conducting completely new analyses, existing literature and claims made therein are approached critically. The parts where I take my own position or conduct new ethical analyses or argumentations are clearly indicated. The application of the existing literature is supported with the methods of applied ethics and political philosophy, such as conceptual analysis, parity of reasoning, and reflective equilibrium (see Glossary). Similarly to many other disciplines, there is no consensus about the single best method in ethics. The multiplicity of methods supports methodological triangulation that increases the reliability of the research.

The available scientific empirical information is an important source of evidence for ethical reasoning and also influences the way in which problems are to be framed and approached in ethics. While much of moral reasoning is grounded on moral principles or premises that many moral philosophers defend as universal and timeless, the application of such principles or the development of new, food system specific arguments that yield final conclusions are neither timeless nor universal. They must remain open to new scientific information and understanding that may require the revision of premises and conclusions. A strongly empirically informed approach is typical for bioethics (e.g., Takala et al., 2009) but has not become mainstream in agricultural and food ethics (Thompson 2015b), at least – as I want to specify – regarding the empirical information on food system level relations, interactions, and dependencies. The increased information about food systems' climate emissions, their origins, and the overall impacts of food system activities and changes in the system should be taken into account in ethical reasoning and also influence how ethical questions are framed, such as when it is necessary to look at food systems as a whole to identify the morally required,

permissible, or prohibited actions (Kortetmäki and Oksanen 2021). The approach also relies on non-ideal ethics (see Box 1).

Research in food ethics and food justice often differ in their framing, methodology, and literature. Whereas research on food ethics utilises the tools of (applied) ethics in moral philosophy and draws on the knowledge in psychology and animal biology, food justice applies political philosophy/theory methods and draws on political studies, human geography, and social theory/sociology, for example. Because of the wide-ranging topic of this report and because all questions of justice are also questions of ethics, the report will be inclusive of different methods as they have been discussed in the different strands of relevant literature.

The decision to follow the mainstream of food ethics and food justice research in this report implies that when ethical questions address fairness or equality related to rights and corresponding obligations or other fundamental entitlements, they are treated as matters of food justice, while in other cases they are treated as matters of food ethics more generally. Liberal justice theorising also can be said to take place "before other values and conceptions of right and good": one condition for (liberal) justice[15] in a society is that it protects the equal prospects of citizens to pursue different conceptions of a good life. In this way, justice implies the institutionalised protection of the fundamental interests of citizens (and other recipients of justice) to have equal opportunities to pursue their kinds of good life insofar as that does not undermine the equal opportunity of others to do the same.

[15] Liberal justice is typically contrasted with communitarian justice (see Glossary: "Justice").

BOX 1
A step deeper: on ideal and non-ideal theories

A common distinction between the ideal and non-ideal theories of justice actually contains many differentials: 1) a distinction between theories assuming full compliance vs. partial compliance of moral agents; 2) a distinction related to the feasibility of a theory ("utopian vs. realistic" theories of justice, including the sensitivity to empirical facts); and 3) the distinction between "end-state theories" describing the perfectly just world and "transitional theories" that focus on how the present world should be improved and how the actions in the present world can be evaluated in terms of justness. (Valentini 2012.) In the context of climate change and agricultural and food ethics, the following points make non-ideal theorising particularly relevant.

First, human-caused climate change and the over 25-year history of global climate negotiations without sufficient mitigation achievements implies a state of affairs that manifests only partial compliance of moral agents in the moral obligations related to avoiding/reducing climate emissions. The partial compliance state of affairs also means that to achieve sufficient outcomes from the action, at least some actors in some situations need to do more than what would be their fair share in the case of full compliance (Caney 2016). For example, John Rawls has explicitly stated his theory of justice as a full compliance based ideal theory and that, in questions concerning real-world injustices and their resolutions, "…we must ascertain how the ideal conception of justice applies, if indeed it applies at all, to cases where rather than having to make adjustments to natural limitations, we are confronted with injustice. The discussion of these problems belongs to the partial compliance part of nonideal theory" (Rawls 1971, 351).

Second, agricultural activities are heavily influenced by climatic factors and climate change will influence and change these conditions even more in the future, albeit in partly unknown ways. It is therefore important to consider feasibility restraints ("ought implies can") that cannot be reached with lay knowledge or armchair reasoning.

Feasibility restraints concern both achievable states of affairs and the costs of discharging one's moral duties. An example of unfeasibility in achievable states of affairs, the provision of food security solely by local food production, will be increasingly hard and likely impossible almost anywhere in the world of increasing climatic risks; it could be a goal in some ideal account of food justice but not in non-ideal accounts that take feasibility conditions into account. The actual costs of discharging moral duties, in turn, may need to take into account not only the physical im-/possibility of acting in a given way but also the economic, bodily, social, and timewise considerations: discharging a given duty may, for example, cost so much money or time that one is unable to fulfill a number of other duties or one gets exhausted over time due to the demandingness of the sum of duties (for a thorough examination of the problems of the "ought implies can" assumption in ethics, see van Ackeren & Kühler 2016). Third, the unjustness of the present world implies that some measures that would be unacceptable in a perfectly just world are acceptable and even demanded in the non-ideal present conditions. Affirmative action ("positive discrimination") is an example. This also concerns the status of disadvantaged food system actors, some of whom may need distinctive affirmative measures instead of impartial difference-blindness as a principle of equal treatment.

In the aforementioned cases, non-ideal theorising is empirically more informed than ideal theorising: attention is directed towards correcting the pressing ethical problems first, taking into account the side effects and restraints for different courses of action.

1.5 Values in food systems: a descriptive typology

Different types of values – both moral and other –have been presented in discussions concerning values in agricultural production and eating. The below presented typology in Table 1[16] describes values that may be considered relevant by actors who conduct or reject, propose or oppose, and reflect upon how food systems can respond to climate change in morally right or good ways (when things are morally required, they are morally right; numerous other things are morally good, when they may improve the lives of those conducting the action or other parties affected). The way in which values are related to considerations in ethics are discussed in Box 2.

The vitality of food manifests in *human needs and health related agricultural values* and, indirectly, as values related to profitability and sustainability. While the profit-oriented and productionist values are nowadays criticised from the sustainability viewpoint, following the frequent hunger and food insecurity periods in human history, it was only reasonable that the years of great crop success were the best reason for community-level celebrations. The importance of food as a vital good is also reflected in the *values related to being a good farmer,* where the ability to produce good yields again and again and to become better in managing one's fields and their particularities are important (for being a good farmer, see Section 2.7). The importance of farmwork, in turn, is reflected in values that concern *rights and social justice for workers*. These highlight the requirements of decent working conditions and terms.

[16] Typology is based on a quick review: a Web of Science search with patterns: agric* AND (value* OR ethic*). The most relevant results that explicitly addressed agricultural values (in plural) were examined to create a list of values that was systematised thematically. References include Aiken 1984, Burton 2004, Chiles et al., 2018, Chrispeels & Mandoli 2003, Piso et al., 2016, and Ward & Lowe 1994. Empirical literature was complemented with three key works in food justice: Cadieux and Slocum 2015 (meanings of food justice), Gottlieb & Joshi 2013 (a seminal book), and Gilson & Kenehan 2019 (a philosophically grounded collection with climatic orientation).

Material needs and health	food security human health
Rights and justice for workers	livelihoods in rural areas adequate working conditions and pay intellectual property rights self-reliance meaningful work, pride in it rights for nonhuman labour
Social justice	equity between generations procedural justice socio-cultural justice (recognition)
Values related to "a good farmer"	good yields and attractive crops or animals good farmer: can read/learn from the past good farmer: productionist view
Productivist values	good yields and attractive crops or animals good farmer: can read/learn from the past good farmer: productionist view
Productivist values	profit maximization profitability/economic viability
Community-oriented values	community connectedness continuity (succession, traditions) attachment to land
Environmental values	ecosystem sustainability instrumental values (utility) of nature the intrinsic value of nature the moral value of animals (land) stewardship over generations naturalness/"preservationism"

Table 1. Commonly articulated values with relation to agricultural activities

Decent work conditions are important both for the farmers' sake – it is morally wrong to make anyone work in indecent conditions – and instrumentally: as long as food production requires human

work, it is important to find people who choose that work voluntarily. This is already a challenge in many regions as can be seen in the already high, and still climbing, average age of farmers. Is there any other profession where subsidies targeted for "young practitioners" are defined to include people up to 40 years?[17] Agricultural work is also closely tied to rural environments, which explains why *community-oriented values* are frequently listed among agricultural values, as factors that contribute to the meaningfulness of work. Finally, *environmental values* are becoming increasingly focal in many agricultural discussions. Of course, local sustainability has already been pivotal in agriculture: successful farming can be carried out over generations on a farm, but this is not possible if one spoils the land or destroys soil fertility. However, the significant environmental impacts of farming that reach far beyond the farm (and nation state) boundaries are the issues that relate to the alarming global environmental changes. Environmental values also raise the question about the moral status of cultivated land and raised animals.

Table 2 depicts values commonly associated with food properties (Lusk and Briggeman 2009). In general, they answer the question as to what makes food good (broadly speaking). The grouping of values (by me) demonstrates how values relate to different food system aspects. Food values are highly relevant for food system activities because they also signal consumer expectations and what people are ready to pay for, and pay more for (when able to do so).

Sensory food properties bear indirect moral significance. They are relevant for the *prima facie* obligation of respecting consumer autonomy as the right to self-determination regarding food choices according to one's valuations. Consumer autonomy may be undermined, for example, by restrictive policies that cause the unavailability/inaccessibility of desired products, or insufficient information that prevents consumers from identifying options that conform with their values (Siipi and Uusitalo 2011). *Bodily impact* related properties bear direct moral significance because they may be a matter of harm or benefit: unsafe food can be highly harmful, even lethal, either instantly or in the long term.

[17] The "starting stage subsidy for young farmers" in Finland is a case in point.

Sensory properties	Taste Appearance
Bodily impacts	Safety (for consumption) Nutritional contents
Socio-economic and cultural values	Price (affordability) Convenience in use Traditionality
Process-related properties	Naturalness (in production/processing) Origin Fairness (in supply chains) Environmental impact

Table 2. Food values (Lusk and Briggeman 2009)

Socio-economic and cultural values are shaped by cultural (including market related) constituents and significantly influence what counts as good food, a satisfactory meal, or as superior or inferior quality. Affordability is a socioeconomic and morally significant value in that it allows anyone to achieve good nutrition regardless of income; however, affordability is determined by multiple factors beyond food systems[18] – a point that is particularly relevant given that the *average* household expenditure for food in the EU and in Switzerland is around 12–13 %. Low prices are subjectively valued for other reasons too: lower commodity prices enable people to access a wider selection of consumption commodities and lifestyle choices (although the assumption that more is better indefinitely regarding the number of choices is itself problematic[19]). Convenience and traditionality values have similar moral relevance as sensory food properties. Food justice is also argued to require respect for the possibility to follow the food traditions of one's community in a

[18] The affordability of food also depends on the price of other necessities (such as housing and energy costs) and on, for example, social policy measures to support low-income households.

[19] Research on the topic has been popularised by Barry Schwartz: *The paradox of choice.*

changing world (e.g., Gottlieb and Joshi 2013; Heyward 2017). The moral obligation of non-interference and respect for the self-determination of communities is also highlighted in food sovereignty (see Glossary) related claims for justice (Whyte 2018). Although not listed by Lusk and Briggemann, novelty may also be found a valuable property of foods or meals, especially by people wishing to explore different cuisines and cultures around the world or experimenting with new things ("neophilia") as a way to enrich one's life.

Process-related properties can have a direct moral significance, although it is not fully agreed which properties are relevant for considerations about what is morally right and which are matters of personal conceptions and valuations. Process-related properties are also linked to the values introduced in the previous table since they concern how, where, and by whom food has been produced, processed, and sold. The fairness and environmental impacts of production processes are widely agreed to be morally significant because they concern whether some (human or nonhuman) parties have been harmed or treated disproportionately in supply chains and how the benefits and burdens in food system activities are distributed. The naturalness and origin of food, instead, are debated regarding their relevance for ethical considerations. To my present understanding, their moral significance is indirect and reliant on empirical facts that may depend on circumstances. While many food justice authors and movements emphasise the importance of locality for justice (e.g., Alkon and Agyeman 2011; Cadieux and Slocum 2015), the problems of the local from the viewpoint of equality, social justice, and environmental sustainability have also been pointed out (DuPuis and Goodman 2005; Kortetmäki 2019b) and moral philosophical research in food ethics has rarely produced argumentation in favour of locality as a directly morally significant property of food.[20] The same goes for naturalness, which has several meanings (Siipi 2013) and variations in degree, due to which it is hard to construct

[20] The significance may, of course, be indirect: for example, if honesty and transparency in food production and processing activities are viewed as morally right and demanded (e.g., in order to respect consumers' right to know how their food has been produced in order to make food choices that represent one's personal values), this may generally imply the superiority of shorter and, therefore, often more local supply chains.

a coherent normative argument in favour of or against naturalness as such. However, the importance of such values to some consumers requires paying attention to these values also in the course of climate action.[21]

BOX 2
A step deeper: on the relationship between values and moral obligations

Moral, as well as other, values can give rise to moral obligations, which guide action. The negative duty not to harm others (when harm is avoidable) and not to use other persons as mere means are among the most widely agreed examples. For example, the agricultural value of land stewardship and other environmental values can be interpreted to generate negative duties such as "do not harm the health and integrity of agricultural land". This would in practice involve negative duties to abstain from using chemicals and practices that would undermine soil health. However, as Section 2 will reveal, the practical application and translation of even a simple negative duty into action is not always straightforward.

Actions may also be guided by positive duties (to actively do something). The above-mentioned value of land stewardship also implies action-demanding positive duties to maintain land quality as fertile and arable for future farmer generations by, for example, consistently monitoring land quality, responding to changes, and conducting some extra practices that require additional work yet promote land and soil health. Positive duties often leave it open how the duty is to be discharged, and the final choice of action may be guided by values with indirect moral significance. The following, slightly simplified example of argumentation concerning the economic viability of farming further illustrates the connection between moral and other values:

[21] The criticism of so-called ultra-processed food is frequent especially in food justice and food sovereignty discourses and in public, where famous authors like Michael Pollan have popularised the matter of eating "authentic" food.

P1. Humans are morally considerable beings (ends in themselves).
P2. Humans are severely harmed if they cannot satisfy their nutritional needs.
C1. Therefore, the opportunity to satisfy one's nutritional needs is morally important.
P3. Farming is crucial for the satisfaction of human nutritional needs.
C2. Therefore, the continuation of farming practices is morally very important.
P4. Farming is labour-intensive ("hard") work.
P5. The continuation of practices that involve hard work is most effectively supported by keeping such practices economically viable sources of livelihood.
C3. Therefore, societies should ensure that farming remains an economically viable profession.

Only P1 is a premise that employs solely moral values. Other claims are of an empirical nature and /or employ other types of values, from the nutritional value of food to, finally, the importance of economic value considerations in reasoning about agriculture. The economic value is desirable not only because of the general instrumental value of economic production for subjects benefitting from it but because of its impacts on the opportunities of humans to have their basic needs satisfied. The argumentation also involves several assumptions and implications that are not explicitly articulated: P1, for example, implies that humans cannot be treated merely as means. Therefore, it is morally impermissible to meet the objective articulated in C3 by exercising slavery as a solution for doing labour-intensive work.

2 Tensions between agricultural, food, and climate ethics

2.1 The nature of the problem

Different spheres of societal action generate numerous moral and other value related demands for food system activities. Different spheres generate and emphasise different societal objectives that are categorised in the figure below, according to the domains of concern. Overlapping demonstrates how different sources of demands also generate similar demands. (The figure is illustrative: in reality, synergistic and conflicting overlapping can happen between any of the spheres).

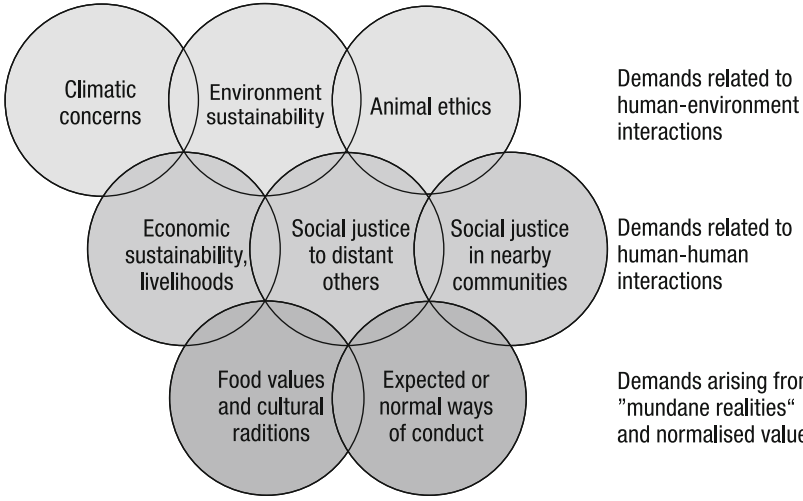

Figure 2. Different spheres of demands and objectives regarding agricultural and food system activities. Food security is included in social justice. (Figure is created by me as one result of this report.)

This report takes the sphere of climatic concerns as its starting point. The moral obligation to significantly reduce human-made climatic emissions and, as the IPCC recommendation to avoid dangerous climate change suggests, to reach net zero emissions around 2050 (Mbow et al., 2019), creates transformative demands for agricultural and food practices. Climatic obligations also come with an emphasis on the urgency of action. Temporal urgency is one of the main reasons for the emergence of tensions between the morally obliged effectiveness of climate actions,[22] on the one hand, and the fairness of climate action (in other respects), on the other (Ciplet and Harrison 2019). The multifaceted impacts of climate change and climate action make an integrationist approach – the consideration of climatic issues in conjunction with other spheres – important (Caney 2016). Of course, an integrationist approach increases the likelihood of identified tensions and conflicts due to the consideration of a much greater number of issues at once. Reasons for the arising tensions relate to the dynamics and multiple objectives of food systems activities. The making of moral judgments at the level of food system activities involves translating general ethical principles into actual contexts of application and choosing which principles are most appropriate in different contexts. This requires not only capacities for sound ethical reasoning but also good empirical understanding about food systems activities, interrelations, and the relative climatic impacts of different activities. In other words, it is not possible to separate ethics from its empirical premises.

[22] Effectiveness is relevant for climate justice: postponed or ineffective mitigation will magnify harms. The IPCC (2018) report demonstrates the significant difference between limiting global warming to 1.5°C or to 2.0°C. For example, 300 million more people will likely be exposed to harms from yield declines in the 2.0°C scenario.

BOX 3
A step deeper: on the origins of tensions

What explains the "tension tendency" in the integration of climatic and food related considerations?

First, food systems function in the conditions of existing global (and other level) inequalities. Because of the various interlinkages, an activity that may be right in terms of given criteria in place A may inflict or sustain harm, in terms of the same criteria, in another place. For example, the re-localisation of food systems in place A increases the livelihood opportunities in A but comes at the cost of reduced contribution to livelihoods in place B. If A is a wealthy industrialised country with a diversified economy and B is a developing country whose economic activity and livelihoods rely greatly on agricultural exports, the harm to B may be of greater significance than the benefit to A. These problems are ethical dilemmas in the sense that while they can be solved, no solution is free from harm to some of the involved parties (be that harm social, environmental, economic, or socio-cultural). The unavoidability of the harm relates to the existing structures and imbalances.

Another reason for tensions is the place-/context-specific relativity of material inequalities that relate to food system activities. Many criteria for justice are relative if justice is understood as the equal standing of the members of a society and as their equal opportunities to strive for well-being. For example, the demands to be able to participate in social life on a par with others, to satisfy one's basic needs, and to take care of one's family are highly differentiated in terms of material resource needs in different communities. Especially those authors who pay attention to gender and/or environmental issues in justice pay attention to these differential needs and vulnerabilities (e.g., Nussbaum 2006; Schlosberg 2007; Fraser 2009). Even if the idea of basic needs is universal, requirements for their satisfaction is relative to living circumstances (Nussbaum 2006). Local prices are adjusted with relation to the average standard of living and GDP in a given region. This generates globally huge disparities in income and price levels.

Disparities, in turn, enable global supply chains where wealthier countries benefit from the cheap raw material and labour costs (the systematic use of cheap labour is called global labour arbitrage) in low-income countries. This, in turn, creates income sources for the developing countries yet simultaneously aggravates global socio-economic disparities by letting the wealthier countries maintain and increase their material standard of living much more cheaply than what this would cost in a less unequal world. On the other hand, due to the higher standard of living in wealthier countries, the rising price of any raw materials for basic commodities hits the low-income groups first in the wealthy countries and the well-off people will be the last one to be influenced by attempts to correct the skewed composition of global trade relations.

Many tensions also arise from the structural nature of food injustices. This means that injustices result from complex supply chain relations and interconnections that are hard to avoid or change due to the existing system structures and problematic interconnections (some of which I described above). Structural injustices are produced through social processes that are not themselves necessarily morally blameworthy yet, in aggregate, have unjust side effects (Kortetmäki 2019a). Even purchasing food directly from a local farmer may contribute to the harm-inflicting social processes in ways that are not perceptible or knowable for ordinary people. Often, acting ethically implies making choices between more and less significant bads (of course both can also cause more or less significant goods). The problem of structural injustice is different from the point that some of the "normalised practices" that are not perceived as blameworthy in subjective assessments may nevertheless be blameworthy according to an ethical analysis. Food practices manifest the dominant, often deeply embedded food values and cultural traditions some of which – while also producing lots of joy and satisfaction and experiences of value – are harmful or otherwise unjustified from the normative viewpoint. This concerns, for example, the normality of raising animals for food in industrial conditions.

2.2 Climate mitigation and food security

Food security is a state where "all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 2006). This involves four pillars: food availability, access to food, utilisation (food safety and adequate conditions for storing and preparing food to retain its nutrient content), and the stability of the aforementioned conditions. Because food security relates to the satisfaction of a vital human need, the impacts of climate change and climate action on food security are of crucial ethical importance.

Climate change impairs food security already, and impacts are predicted to worsen significantly, as climate change aggravates the situation. Direct and indirect impacts have been shown to hamper all aspects of food security (Mbow et al., 2019). Food security generates a weighty moral obligation to effect climate change mitigation and adaptation in order to prevent harm to millions of people in the future due to impaired food security. However, emission mitigation activities may also risk food security in various ways (Kortetmäki and Oksanen 2016; Kortetmäki 2019a) that are discussed in this section with relation to the different pillars of food security. For adaptation and food security, see Section 2.3. For the issues that relate directly to the dietary transition to more plant-based diets and food security, see Section 2.9.

2.2.1 Mitigation and food availability

Commonly proposed climate mitigation activities that may be detrimental to the availability or access dimensions of food security include crop-based bioenergy solutions that require arable land and therefore compete with food production (Mbow et al., 2019). Biofuels are an obvious example, though it should be noted that this umbrella term includes a great variety of methods, some of which – waste-based biomethane and residue-based biofuel production, for example – do not compete with agricultural land use. Biofuels also play a

central role in proposals regarding negative emission technologies or carbon dioxide removal and sequestration (see Section 2.2.4).

The risk to food availability stems mainly from the risk that rising energy prices make energy cropping much more attractive to farmers many of whom are on the verge of sufficient and secure livelihoods, in which case farmers may become more likely to choose to produce energy crops for economic reasons – or even to sell edible crops to energy companies for economic reasons.[23] This could significantly reduce the volume of food production. Great inequalities worsen the risk because poor people needing the food are never as solvent as rich people wanting the bioenergy (Thompson 2012). The threat from biofuel crops to food availability depends on numerous empirical factors such as the scale of biofuel production and the types of land used for it, of course. Other emission mitigation measures that could in principle risk food availability involve large-scale reforestation/afforestation, but it is beyond the scope of this report to estimate whether they pose a real risk or not.

What about the livestock: may the reduction of livestock risk food security? I address this issue because I have frequently encountered related concerns[24] "in the field". The argument, in a simple form, goes as follows:

P1. A large share of agricultural land is unfit for edible crops but fit for livestock production (grazing).
P2. Reducing livestock production reduces the area of land that *can* be utilised in food production.
P3. Activities that reduce the area of land utilisable in food production threaten food security.
P5. Activities that threaten food security are morally wrong.
C. Therefore, it is wrong to reduce livestock production.

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[23] This already happens occasionally due to the price spikes, energy price increase, and decline in some food prices for farmers. For example, oat price drop in 2014 in Finland led to the selling of oat for heating energy.

[24] These actors comprise production-focused stakeholders I have met as a part of social scientific and transdisciplinary research and one societal development project around sustainable regional food systems.

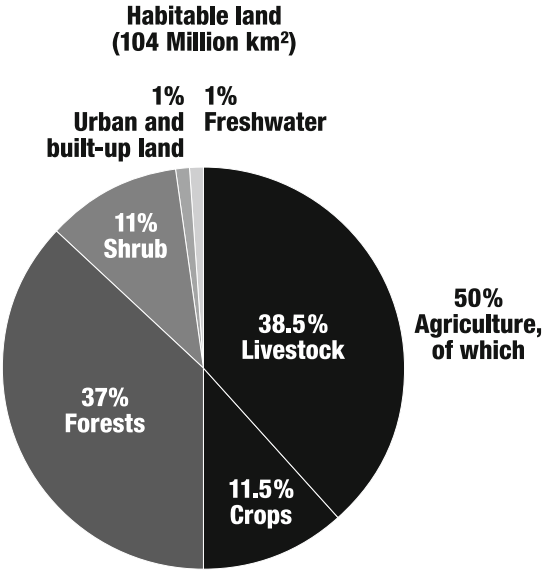

Figure 3. The use of habitable land on Earth. (Figure by Riina Tykkyläinen)

The argumentation states that livestock is necessary for food security because it helps utilise the otherwise unusable land for food production. The problem of the argumentation resides in P3 which assumes that the present land area is needed for producing enough food for humans. This is not the case. Globally, livestock production accounts for c. 80 % of agricultural land use (Figure 3) yet produces only c. 20 % of global calorie supply and a third of protein supply.[25]

[25] Ritchie, H. & Roser, M. 2019: Land Use. In https://ourworldindata.org/land-use based on FAO statistics (Accessed Aug 25, 2021).

While a share of this land is unsuitable for edible crops, a significant share of arable land is presently used for feed cropping (including soy and maize that are mostly used for non-food purposes in many areas).[26] Even if grassland was not used for grazing, the present arable land could feed a much greater number of people than it now does in the presence of large-scale fed-based animal production. Moreover, animal reductions could begin in those supply chains that involve feed cropping. The upshot is that food security does not, generally speaking, constitute a sound reason to object livestock production reductions that are demanded for climatic reasons. It is a different question whether pastoral farming is justifiable in regions that are unfit for other food production. (And the focus here on industrial food systems must be remembered.)[27] Environmental reasons may encourage the consideration of alternative land uses for lands unfit for edible cropping. The afforestation of low-biodiverse grasslands, where feasible, could promote both biodiversity protection and climate mitigation objectives. The reduction of land appropriated for human food production could also improve food availability for many nonhuman species in food webs that require the presence of forest environments.

2.2.2 Mitigation and access to food

Mitigation activities may risk access to food via raising food prices (regardless of food availability). Policies that aim to reduce the use

[26] For example, three-quarters of global soybean production is used as feed; in the US, feed (alongisde with biofuel) is the main use for corn. For soy: Ritchie, H. & Roser, M. 2021: Soy. In https://ourworldindata.org/soy (Accessed Aug 25, 2021). For corn: https://www.ers.usda.gov/topics/crops/corn-and-other-feedgrains/feedgrains-sector-at-a-glance/ (Accessed Aug 25, 2021).

[27] For poor communities in harsh circumstances (such as drought-prone areas), livestock herding may be the only presently feasible way to ensure food availability in the face of frequent crop failures and the lack of resources for acquiring food via other supply channels. Circumstances there may justify animal keeping while requiring reasoning about which animals are the most appropriate choice. This argument, however, is not valid in developed economies with numerous and diverse supply chains and procurement channels.

of fossil fuels by putting a price tag on greenhouse gases (GHGs) through some carbon taxation mechanism are very likely to increase energy and food prices in direct or indirect ways.[28] Price increases hit especially low-income groups even in wealthy countries and may lead to increased food insecurity and/or energy poverty, which can worsen each other. This creates a tension between climatic and social equality objectives. Characteristically, all attempts to address climate change via economic measures encounter the same challenge regarding food and other basic necessities. This is because – although the richest 10 % in the world is responsible for nearly half of lifestyle consumption emissions – basic activities such as housing, eating, and mobility together comprise a majority of human-made GHG emissions (Gough 2017, 150). Food price impacts are also one additional reason provided for the objection to biofuels; yet, it should be noted that higher-profit crops *could* benefit the rural poor, a majority of whom are farmers, and actually improve their food security by increasing income. Nevertheless, controlling biofuel impacts on food prices is difficult and there are no solutions that would benefit all food insecure people because reasons for food insecurity differ in urban and rural areas, as do the remedies (Thompson 2012).

Because economic disincentives to mitigate climate change involve the socially problematic impacts described above, social and climate policy integrating works in social sciences (e.g., Gough 2017) suggest that the raising of carbon prices must always be accompanied with other climate policies. These involve economic incentives for technological and social low-carbon solutions (including climate-smart agriculture and rewards that encourage people to adopt lower-carbon dietary patterns), nudging, and direct regulation prohibiting or restricting harmful activities. Finding the correct balance between these suggestions reveals interesting tensions between what people subjectively endorse and what reasoning in ethics endorses. In public polls as well as in inquiries

[28] Tax impacts may come about through at least three mechanisms: direct carbon taxes on GHG emissions that also influence agricultural GHG emissions; indirect carbon taxation associated with land use and land use changes; and tax incentives that encourage biofuel production with crops that compete with food crops (Hasegawa et al., 2018).

among food system actors[29], mitigation policies that leave actors the greatest freedom of choice are commonly endorsed as the most acceptable. Yet, from the viewpoint of social equality, such measures – mainly price-based incentives – also tend to be more unequal because they influence people in different socioeconomic positions very differently.

2.2.3 Mitigation and the stability of supply

Mitigation actions may also occasionally compromise the stability pillar of food security, although in general, mitigation improves the stability of supply by decreasing the significant threats that climate change poses to the same pillar. The stability of food supply (including availability and access) may be shaken by, for example, energy price spikes with consequent impacts on food production, transportation costs, and market demand for crop-based bioenergy (Kalkuhl, von Braun and Torero 2016). Together, such factors may create situations where food is basically available but not affordable to all. Another potential concern is that increased resource efficiency, which may be pursued to reduce the relative emissions in food system activities, may also reduce agricultural or food system resilience. However, resource efficiency and resilience conflict: maximal resource efficiency also means there is *nothing redundant* in the system, whereas sufficient redundancy is one of the key constituents of resilience in socio-ecological systems (Stockholm Resilience Centre) because redundancy creates buffers and adjustment space for surviving through disruptive shocks, including temporary supply disruptions. Balancing between food security goals and ecological resilience (or socio-ecological resilience more broadly understood) may require context-sensitive ethical frameworks instead of universal approaches (Noll 2019).

[29] Empirical literature on the acceptance of climate policies is rich. Farmers' views are studied, for example, in *Social acceptance of climate change adaptation in farms and food enterprises: a case study in Finland* (Puupponen et al., 2015).

2.2.4 Climate engineering and food security

The slowness and insufficiency of climate action has attracted attention to the potential of large-scale geoengineering or climate engineering as an emergency response to avoid dangerous climate change. Climate engineering is a challenging question from the viewpoint of food justice due to its potentially high (and unpredictable) detrimental impacts on food security (Kortetmäki and Oksanen 2016; Kortetmäki 2021). Climate engineering involves two technically very distinct approaches: carbon dioxide removal and solar radiation management.

Carbon dioxide removal (CDR)

CDR methods are called negative emission technologies: they aim to reduce the atmospheric GHG concentration by carbon sequestration. Methods include biochar, bioenergy carbon capture and storage or BECCS ("advanced bioenergy cropping"), afforestation, and ocean fertilisation. Some of the methods are advanced, larger-scale versions of mitigation activities and reside on the same continuum with emission mitigation, the main difference being the scale of application and the focus on taking back the already caused emissions with carbon sinks (Kortetmäki 2021). Therefore, many although not all CDR methods are no riskier for food security than conventional mitigation measures. Yet CDR is also less effective than solar radiation management geoengineering, in preventing climate change related harms (Kortetmäki and Oksanen 2016). Agricultural geoengineering methods (typically carbon sequestration alongside agricultural practices) are considered as generally low-risk but may of course have other harms. Biochar and bioenergy carbon capture and storage have received the most attention in the agricultural context and are discussed next.

Biochar is a medium that can be used for sequestering and storing carbon in soil. It has been found to improve soil health, soil fertility, structure, and water and nutrient hold capacities (e.g., Wang and Wang 2019, IPCC 2018). Hence, biochar could benefit agricultural production and thereby food security: the greatest beneficiaries could be farming communities where soil is severely degraded. The improvement of soil especially in those

communities would at its best promote environmental and food justice in the form of restorative justice (Timmermann 2020, Ch. 9) while benefitting overall ecosystem health. The benefits of biochar make it an interesting object of study for advancing food production capacities and improving environmental conditions simultaneously with carbon sequestration. However, biochar also raises questions related to justice in agricultural innovations: for equality, the pressing question is who is able to access and benefit from the innovation (Timmermann 2020, Ch. 4). Biochar is presently very expensive. There is a risk that it becomes a solution within the reach of fortunate communities, which would increase the global accumulation of benefits to the already better-off parties and thereby global inequality in terms of food production capacities and food security. Its high price also invokes the question: who should pay the biochar application in fields? If farmers pay it as an additional production input, there is a major risk that disparities among farmers will increase unjustly and that the economic viability of farming will decrease even further if farmers are not fully compensated for biochar in the food price.[30] Another alternative would be to distribute the costs more equitably among citizens. Including the price of biochar in food prices may seem intuitively straightforward but could undermine the food security of low-income groups through rising food prices. A fairer solution would be either to allocate costs progressively, so that wealthier citizens pay more of the "biochar service", or to link payments to damaging activities according to the polluter pays principle and to redistribute that money to cover the costs of biochar. Notably, the risks mentioned here are not inevitable but depend on the empirical circumstances in which biochar would be applied and are largely up to public policy arrangements (within the limits of feasibility).[31]

[30] This would be considered unjust because the present food justice literature largely maintains that many disadvantaged farmers are not in a disadvantaged position due to their own choices or "faults" but due to the unjust food system and trade structures. That is, the plight of farmers is in many cases an injustice, and solutions that increase disparities among farmers would make the disadvantaged farmers relatively worse off.

Bioenergy carbon capture and storage (BECCS) is another carbon dioxide removal method that has gained increasing interest, especially after CDR was suggested to be necessary for limiting global warming to 1.5°C (IPCC 2018). As compared to biochar, BECCS is more problematic for food security: while biochar may improve the yields of edible crops, deploying BECCS may require high-biomass crops and create competition in agricultural land use. Another threat to food security is the tendency of bioenergy cropping to increase food prices (see also Schübel and Wallimann-Helmer 2021). Because food security generates fundamentally important and top-priority moral obligations, it is not morally permissible to promote land use that would risk food production volumes that are needed for food security (taking into account availability fluctuations and crop failure risks). The basic conclusion would then be that the deployment of BECCS is hard to justify morally because of the risks posed to food security, *unless* it is shown that the exclusion of BECCS poses even greater risks to food security. However, I want to add a further viewpoint from an integrated approach (cf. Caney 2016).

The unjustifiability of BECCS involves the assumption that all other things in the world are equal and the only question on the table is whether deploying BECCS is morally acceptable (or even obligatory) or not. Yet, other things are not equal in the conditions of climate action. As noted, mitigation is suggested to necessitate a significant reduction of animal-based food production. This might free up significant areas of arable land, of which nearly 80 % is nowadays reserved for animal production.[32] Halving animal production could free up to c. 20 million km^2

[31] Feasibility means here that even if the cost allocation was made as fair as possible, it may turn out that biochar in its current forms is simply too expensive in overall terms to be feasibly used in large-scale agricultural practices. Elaboration is needed to address the question whether it would be someone's responsibility (and whose) to promote making very promising yet too expensive solutions (such as biochar and perhaps some types of *in vitro* meat) more affordable.

[32] https://ourworldindata.org/global-land-for-agriculture (original data by UN FAO statistics). Of course, animal-based food needs to be replaced by other foods (except in the case of overconsumption) and population growth increases the land needs also in plant-based production.

of land. If some of this area, especially areas that are unfit for producing edible crops, can be used viably for BECCS (which is a matter of discovery by empirical sciences), the big picture would significantly change. Admittedly, the feasibility of BECCS may nevertheless be restricted by numerous other factors. These include the practical feasibility and cost effectiveness of BECCS in appropriate areas; the overall environmental impacts of bioenergy cropping vs. other land use options such as afforestation; and the difficulty of coordinating land use to ensure that the deployment of BECCS does not undermine food security in low-income communities by attracting farmers there to shift from food to bioenergy cropping. Another question is whether using agricultural land for anything else than food production as long as there is food insecurity in the world means not prioritising food security goals; if this is the case, BECCS can hardly be justified until food security is achieved (Thompson 2012). However, I do not find Thompson's argument fully convincing. First, there *may* be forms of bioenergy whose exclusion does not in any way help address food security issues. Second, if one follows the basic thought that using fields for fuel production is morally wrong when they could be used for producing edible crops, this raises a further and challenging analogy: what about the analogy that feed cultivated on croplands is not much more than fuel for animals?[33]

Solar radiation management (SRM)

Solar radiation management refers to different techniques that can be used to reflect solar radiation back into space to reduce solar radiation energy (and its warming impacts) on Earth's surface. Atmospheric SRM includes aerosol injections, enhanced marine cloud albedo and giant sunshades; surface radiation management can be done by enhancing the surface and vegetation reflectivity

[33] This analogy concerns those forms of industrial meat production where animal farming significantly relies on the use of feed from croplands. By "not much more", I acknowledge that animal production does produce something edible for humans as well (whereas biofuel use only moves humans), yet animal metabolism burns so much of the calories fed to the animal during its life that the conversion ratio from feed to food is very ineffective with most animals.

(albedo). Although SRM has not yet (to my knowledge) been seriously proposed by any globally influential actor, vivid academic discussion and increased funding for SRM research demonstrate that the previously utopic visions may some day in the near future become serious proposals. Solar radiation management, especially by aerosol injections, is generally considered very effective, rapid, and risky: the same adjectives can also be used to evaluate it from the viewpoint of food security (Kortetmäki and Oksanen 2016). The major potential benefit of SRM for food security is its ability to rapidly decrease the temperature increase caused by climate change: the decreased warming would, as such, have beneficial impacts on protecting crop yields and their nutritional contents, which are otherwise harmed by climate change; on the other hand, the simultaneously decreased sunlight impact may nullify the potential benefits (see Kortetmäki 2021 for details). The potential harms and risks from SRM regarding food security are estimated to happen mainly via regionally decreased precipitation, which may impact drought-prone areas. The presently drought-prone regions are at particular risk because of their vulnerability (Kortetmäki 2021). Overall, it is very difficult to predict the magnitude, type, and distribution of SRM impacts on food production and food security. Deploying SRM might harm those who are already harmed in terms of food security; if this is a predictable consequence then conducting SRM would be fundamentally unjust unless the probable alternative futures are even worse (Kortetmäki 2021). This highlights the importance of taking a global and participatory approach to discussing geoengineering and managing related risks, if any large-scale SRM measures are to be proposed. A fair burden sharing would require global insurance/compensation scheme to compensate for disproportionate impacts and to provide alternative supply chain solutions anywhere in the case of geoengineering related crop failures. This does not, of course, erase harmful impacts.

2.3 Climate adaptation and food security

Effective adaptation to climate change helps reduce the risks and avoid harms from climate change to food security. On the other hand,

there are also limits to what can be achieved by adaptation, due to which it is never an alternative but a necessary complement to mitigation. The protection of food security is the primary objective of adaptation in agriculture and food system activities; adaptation can also help preserve agricultural livelihoods and decrease the likelihood of hazardous impacts from disruptive shocks[34] to farmers and rural communities. Adaptation involves both technological and non-technological solutions and is highly place-specific, depending on the predicted impacts of climate change on a given region. (Mbow et al., 2019, Ch. 5.3.) While much adaptation focuses on mitigating the harmful impacts of climate change, another aspect of adaptation in colder climates is the development and utilisation of new crop varieties and methods that become feasible due to lengthening growing seasons, which may also be important for global food security because some of the presently most fertile cultivation regions are highly vulnerable to the harmful impacts of temperature increase and drought periods.

Ethical considerations regarding the impacts of adaptation on food security are, generally, easier than those raised by mitigation. Adaptation measures also tend to be synergistic with biodiversity protection, and adaptation by improving food system resilience increases food system diversification, which in turn supports dietary diversity with positive health outcomes (Mbow et al., 2019, Ch. 5.3). On the other hand, adaptation and mitigation measures may sometimes have conflicting impacts (see Section 2.4.2). Next, I discuss two viewpoints where adaptation and food security need particular consideration: adaptation costs and the ethics of innovation.

The sharing of adaptation costs is a focal normative question. The basic argument, born in the early days of climate ethics, is that wealthier communities (mainly industrial countries but perhaps also wealthy groups within some developing countries) have a moral obligation to fund adaptation. This is grounded on the argument that it is wrong to harm others for one's own gain; yet, if that happens, one owes compensation to the harmed parties (Baer 2010) – an idea that is nowadays also known as the polluter pays principle. This leaves open many details that cannot be explored

[34] Such as weather extremes, related blackouts, and floods.

in the present report.[35] Another question is how much adaptation is enough. Heyward (2017) proposes that the protection of the core cultural identity is the legitimate aim of adaptation, constituting one threshold of sufficient adaptation measures. For example, Inuit food culture, which is largely based on hunting on ice, is now threatened by ice melting and weakening. Heyward's argument would mean that adaptation is sufficient if it lets Inuits preserve their food cultural practices. The idea sounds generally justifiable: having the opportunity to preserving at least some cultural practices is essential for a decent and dignified human life even if it is impossible to determine how much culture is enough. On the other hand, it is already unclear whether there is any way to preserve ice hunting with any feasible measures and how much the preservation attempts can justifiably cost (what if the cost is, for example, the deployment of solar radiation management?). Moreover, entitlement to the protection of any cultural identity or practices cannot go unquestioned. Cultural traditions cannot be claimed as meriting protection if they, for example, maintain oppressive hierarchies or inflict harm on other parties.[36]

Despite ambiguities regarding more demanding thresholds, food security can hardly be questioned as a justifiable minimum threshold for sufficient adaptation. This threshold can also guide resource transfer between parties.[37] The vulnerable communities that have not contributed significantly to previous GHG emissions are, in this view, entitled to compensation or support to the extent that they do not need to pay the cost needed for protecting food security in their communities. The appropriate form of compensa-

[35] For example, how much should the wealthy countries pay to other parties? Or how should governments balance between resourcing their own mitigation, adaptation, and funding the adaptation and mitigation of others, when not all measures are in synergy with each other?

[36] Some food related cultural practices raise difficult questions: for example, what kind of use and treatment of nonhuman animals can be accepted, let alone merit protection, as an important part of cultural tradition?

[37] Food security is, of course, only one relevant aspect of adaptation. Other minimum thresholds that may relate to other welfare needs may set other limits for the minimum level of adaptation.

tion is not necessarily monetary but may also involve other goods that are valuable for adaptation, such as technology, know-how and education, or research resources.

A related argument is that food security can ground a standard of justice-based entitlements for smallholder farming systems in the face of climate change (Wallimann-Helmer et al., 2021). This would also imply that it is unjust to undermine the viability of smallholder farming by requiring farmers to bear a disproportionate burden of the adaptation costs. This requirement may arise either if adaptation costs are distributed disproportionately among farms[38] or if the present economic structures distribute the profit in food supply chains so disproportionately that smallholder farms are left with fewer resources to invest in adaptation measures.

Due to food security, adaptation technologies raise particularly weighty questions for the ethics of innovation and biotechnology. Innovations that may help save lives, avoid health harms, or help avoid other harms that are primarily caused by other parties, generate a particular tension in innovation ethics. It arises between the demands of rewards and fair returns that encourage and reward innovations in the first place, and fair access to innovations (availability and affordability) so that less well-off parties could equally benefit from them (Timmermann 2020). This tension is particularly weighty with relation to food system adaptation that directly relates to the protection of vital interests (food security). Does depriving people of access to innovations that could reduce hunger or malnutrition constitute an injustice and a violation of human rights, as Timmermann (2020, Ch. 4) suggests? The previously made argument that wealthy countries are obliged to support the adaptation of vulnerable communities (at least) until their food security is protected has similar implications as Timmermann's argument regarding innovations that may have crucial value for food system adaptation to climate change: there is an obligation to make such innovations accessible to different communities. This can be done via several means and does not, as such, necessitate any particular solution regarding how innovations for food system adaptation are generally sold; for even commercial markets can

[38] For example, if adaptation requires investment in a set of new technology with a fixed price, the cost is relatively much higher for small farms than for big enterprises.

be required to establish exemptions that ensure equal access to innovations. It is important to note here that the mere consent of both parties to the exchange action does not necessarily mean that exchange is fair. It is unfair, for example, when "People in low-lying Pacific islands may consent to pay a high price for climate change adaptation technologies that come from countries with historically high emissions rates" (Timmermann 2020, Ch. 4.3).

THEME 2: ENVIRONMENT AND NONHUMANS

2.4 Environmental sustainability and climate action

Environmental impacts, both positive and negative, are among the key outcomes of food system activities. This is also reflected in the strong presence of agricultural values (see Section 1.5) including stewardship, preservationism (minimising the impact of farm activities on the nearby non-farmed nature), and ecological resilience. Although climate change constitutes a great environmental concern, climate actions and other environmental objectives are not always in synergy and potential trade-offs easily generate tensions. I will next contemplate tensions between the actions embraced by climate ethics influenced reasoning, on the one hand, and environmentally oriented agricultural and food ethics influenced reasoning, on the other. Animals are discussed in Section 2.5.

2.4.1 Tensions between mitigation and other environmental objectives

The main trade-offs between certain mitigation impacts and other environmental objectives relate to biodiversity and ecological resilience. Because agricultural production as well as other supply chain activities (processing, distribution, retail storage) entail energy and resource use with climatic impacts, any wastefulness in resource use seems futile and increasing resource efficiency is therefore a central mitigation strategy. The endorsement of resource efficiency as a mitigation strategy is further heightened by the fact that it does not require "giving up" anything that is currently of value (contrary

to policies impacting diets or land use). Yet, another important environmental objective and food system attribute is resilience. By definition, resilience requires some redundancy to make a system stand up to different shocks and disruptions better (Stockholm Resilience Centre). Optimised resource efficiency in food systems, however, may come at the cost of important resilience constituents such as redundancy, flexibility, and resourcefulness (Tendall et al., 2015). Moreover, while monocultural cropping is often most effective in terms of GHG emissions per produced food unit, it is more detrimental in many other environmental respects (Gomiero, Pimentel and Paoletti 2011).

The consideration of different environmental objectives together has implications for the ethics of eating. The relative "badness" of different foods based on GHG footprints can yield recommendations that in some cases conflict with other environmental considerations (see also Budolfson 2015). For example, GHG based reasoning about morally responsible eating – which arguably leaves some room for occasional modest meat consumption (Kortetmäki and Oksanen 2021) – would suggest substituting poultry for beef in those occasional moments. However, poultry production relies more heavily on feed cultivated on croplands, including soybean feed that is often used in poultry farms and is a major driver of food production related biodiversity loss (Green et al., 2019). The low price of poultry meat puts pressure on sourcing inputs and conducting production as cheaply as possible, which in turn increases the likelihood of misconduct and encourages participation in global feed supply chains by transnational corporations with environmentally harmful impacts and indecent working conditions. Hence, in an integrated ethical assessment, choosing beef rather than poultry would still promote more good despite its higher GHG emissions. The other side of the same dilemma is that protecting biodiversity with food system activities may involve activities with a higher carbon footprint per food output.[39] Biodiversity considerations also link with landscapes

[39] Livestock grazing in biodiverse pasturelands is a case in point. While this practice is in some regions important for biodiversity conservation and endangered habitat protection, livestock production nevertheless remains a climate-intensive practice and not endorsed by climate focused considerations.

that essentially constitute rural regions and that can, in addition to their ecological and economic significance, also possess aesthetic, recreational, educational, and other cultural values. The protection of rural landscapes may also be considered to be of value for its own sake[40] (potentially arising moral obligations may, however, be overridden by weightier obligations).

Finding the appropriate balance between different environmental objectives in the trade-off situations calls for ethical reasoning and demonstrates the importance of integrated impact assessments of agricultural activities. However, I propose one clear principle for prioritising between conflicting values or objectives. When there is a conflict between socio-cultural values and environmental objectives that relate to the protection or correction of something that is already severely harmed by humans (endangered species and habitats, degraded soils and water bodies), the environmental objectives should be prioritised over socio-cultural ones. There are two reasons for this. First, cultural harms are socially constructed: cultures can be revised to give up some of the present practices without losing the prospects for human flourishing, and this will in any case be needed in the case of harmful and unsustainable cultural practices. Ecological harms, instead, are physically very real for the affected nonhumans and there is a risk of irreversible damage or loss. Second, if nonhuman nature or some nonhuman beings inhabiting it are considered to have moral value for their own sake, the previously stated compensation for harm owed principle (Baer 2010) can be applied to human-nonhuman relations: it is wrong to harm nonhuman nature for the humans' gain; yet, if that happens, one owes compensation to the harmed parties. Protective and restorative measures are, in this view, the minimum humans can do and they create a weighty moral obligation that cannot be overridden by any socio-cultural values.

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[40] This is not straightforward. For example, empirical tests suggest that the public preferences for visually appealing landscapes do not imply the ecological health of such landscapes. From the environmental ethics viewpoint, it would hardly be justifiable to let aesthetic taste steer decisions in such cases for it would mean that aesthetic preferences override ecological health and the prospects for nonhuman life to flourish.

2.4.2 Tensions between adaptation and other environmental objectives

Despite many synergies between adaptation and mitigation, some agricultural climate adaptation measures can also increase emissions or make emission reductions more difficult by, for example, increasing fertilizer use or involving energy-requiring irrigation technology (Locatelli et al., 2015). Irrigation also represents an example of adaptation activity that conflicts with the environmental objectives of improved water management in freshwater scarce regions. Livestock keeping may also promote adaptation by increasing the resilience of food production on the local scale against crop failures, yet it simultaneously slows down emission reductions by sustaining carbon-intensive food production patterns. In sum, adaptation may also counteract or slow down mitigation.

Another trade-off between adaptation and other environmental objectives arises between the promotion of food security and biodiversity in general. At the level of an existing field plot, the same activities often support adaptation and biodiversity: activities that increase resilience often have positive impacts on local diversity. However, the expansion of cropland tends to increase overall food security by improved food availability (e.g., Delzeit et al., 2017).[41] Adaptation objectives may act as a strong incentive for cropland expansion, which would be detrimental for biodiversity in many regions – and for mitigation objectives, when involving land clearance. From the environmental perspective, it is particularly problematic that environmental conditions make farmland expansion often most suitable in highly biodiverse areas (Delzeit et al., 2017).

2.5 Nonhuman animals

The moral status and morally appropriate treatment of nonhuman animals has been a central question in agricultural and food ethics

[41] It should be remembered that food security is often a matter of problems other than food availability; the present global food production could already feed close to 10 billion people.

from several viewpoints, from animal welfare measures and veterinary ethics to animal breeding and the more fundamental question of what (if anything) justifies raising and eating animals in various circumstances. The main stances alongside the continuum of answers regarding the appropriate way to use animals while acknowledging their moral worth can be called humane use and abolitionism; in between these reside "middle-ground" views (Cochrane 2016). Humane use sees it as morally permissible (without further justification) to raise animals for food (and feed) yet acknowledges that this should be done humanely. In that case, ethical considerations mainly relate to concerns of animal welfare and criteria for minimum conditions in which animals can be kept; relevant questions also include the impacts of animal breeding and modification on animal welfare. Abolitionism, instead, rejects the possibility of *any* use of animals for human purposes if it involves ownership and control over animals (domesticated animals are always under control) or killing them (killing is control of a kind, of course). Middle ground views posit that some uses of nonhumans are permissible insofar as the interests of animals are respected, yet these interests are broader than what the advocates of "humane use" recognise: relevant nonhuman interests may, in the most demanding views, be similar to those of human labour, engendering the case of animal labour rights that prohibit killing animals yet may allow some forms of free egg, dairy, and wool production, for example, and employing animals in tasks that utilise their skills or strengths (Cochrane 2016). Truffle hogs and smuggled food revealing customs dogs serve as further examples of permitted animal work in food systems.

In this section, I address animal ethics with a non-ideal approach, in the sense of distinguishing between ideal theory, which describes the morally right end-state, and non-ideal theory, which focuses on stepwise transitional improvements (Valentini 2012).[42] (Some would presumably prefer calling this a pragmatist approach.) Consequently, I focus on how the transformation from animal-based to more plant-based food production – which is also demanded by climatic considerations even without appealing to the moral status of animals – is done and what are the various ethical issues that arise on the way. Another non-ideal assumption in this section is that of partial compliance: How to make things better in

the existing, unjust and unsustainable circumstances, where many actors fail to meet their moral obligations? In my view, addressing these sides of the animal question is very important, yet it also benefits from a systemic rather than individual consumer-oriented approach to ethics (cf. Kortetmäki and Oksanen 2021).[43]

2.5.1 Short-term mitigation achievements and animal welfare

Tensions between climate action and animal welfare differ with relation to different temporal scales. Within the next ten years, the climatic emissions of food systems and agricultural production need to be reduced significantly. However, fully-fledged food system transformations will probably take much longer. In the short term, the question concerns the reduction of agricultural emissions from different sources and also through changes in production practices without the transformation of everything. Dietary transition, for example, is likely to demand more time than technological solutions, changes in farming practices, and food waste management.

The pressure to reduce emissions quickly in agriculture comes with a risk of increased intensification in animal production as one of the quickest available measures, which has been incentivised by attempts to increase the resource efficiency of animal production (as proposed already by Steinfeld et al., 2006 in the influential

[42] For example, even if the most sound ethical reasoning implied that it is (in most cases of average adults) morally wrong to eat meat – and even if this is immediately implementable at the level of an individual consumer – the immediate stoppage of animal-based food production or even reduction to, let's say, one tenth of the present levels – would have hugely detrimental impacts on human food security, livelihoods needed for humans to satisfy their basic material needs, and on the environment (including animals).

[43] For example, the categorical norm of not eating animal-based food products is a plausible moral principle only in an ideal food system that does not cause food waste from animals. As long as (but only as long as) the system and the imperfect action of other moral agents produces food waste, food choices that reduce waste – even if they imply eating animal-based foods – cannot be convincingly argued to be morally impermissible.

Livestock's Long Shadow report[44]; see also Spijker et al., 2019). Intensification reduces the space of animals and impacts detrimentally on their welfare. In some cases, the shrinking space per animal has also led to increased confinement – poultry is a case in point – because otherwise the increasingly stressed animals damage their fellow creatures. The space requirements in animal production are a flagship example of tensions between the objectives of animal welfare and of climate mitigation.

There is also another relatively quick way to reduce food system emissions, which also conflicts with the animal welfare objectives. While population-wide dietary transition is likely a slow process, notable dietary emission reductions can be achieved more rapidly by changing the type of meat consumed without interfering with meat consumption levels. The global mean emissions (kg CO_2eq/100 g of protein) are: 50 for herding beef, 20 for lamb, 17 for dairy beef, 7.6 for pig, and 5.7 for poultry (and 2.4 for the lowest-GHG decile of poultry) (Poore and Nemecek 2018). Shifting the consumption from beef to pig and poultry makes a significant difference for dietary emissions, and because so many value the sensory properties, cultural values, and even some process-related values of meat such as the perceived naturalness (cf. Piazza et al., 2015; see also Table 2), the shift from one meat to another may appear to many consumers much more attractive than a shift to more plant-based eating. The trend towards "poultrier" diets has already been witnessed in several countries before the rise of public discussion on eating and climate change – probably due to convenience, price, and health related reasons. However, this kind of dietary shift has highly harmful implications when examined from the viewpoint of animal ethics. First, the number of individual animals that are being raised and killed for food is multiplied more than tenfold, if poultry replaces livestock. Increasing the number of animals exposed to harm is, other things being equal, morally wrong in any approach to ethics that focuses on the moral worth of individual beings and acknowledges the moral worth of animals. Even if the varying capacity of animals to experience suffering might be worth taking into account instead of mere numeric comparisons (Lamey 2019), the difference in the number of animals is

[44] http://www.fao.org/3/a0701e/a0701e.pdf

too big to be ignored as morally insignificant. Second, the raising of domesticated birds involves many of the ethically worst food production practices (e.g., Lamey 2019). While non-ideal ethics acknowledges that the ideal end state is not to be achieved immediately, the tensions between climate and animal ethics-based considerations emphasise the importance of determining the conditions for morally acceptable directions of change.

On the other hand, the overall value(s) of ruminants may encourage finding solutions that allow maintaining cattle keeping as a dominant agricultural practice. The high emissions of ruminant production may, in that scenario, rather create a testbed for innovations to capture and reuse ruminant methane as valuable energy source. Solutions would likely lead to the increased keeping of animals inside to avoid methane losses (it is difficult to imagine what kind of Michelin suit could enable effective methane capture and storage while animals are grazing outdoors). These kinds of solutions for ruminant emission mitigation would significantly reduce animal welfare by reducing animals' opportunities to move around and exercise species-typical behaviour. Similar technological developments also generate the risk of increasing instrumentalisation of animals, the functions of which become treated as a matter of quantifiable emission or energy sources.

2.5.2 The different visions for animal production

Long-term system transitions or transformations raise a more fundamental question of the role of animals in future food systems, in a timeframe where totally different kinds of food systems are possible. The moral considerability of sentient animals is becoming increasingly recognised. For example, sentient animals are mentioned as worth moral respect in the EU "Constitution", the Lisbon Treaty, and the Swiss Constitution (see also Section 3.5) – although the implications of this recognition for animal production seem so far tangential. Animal ethics researchers have from the start argued that the moral considerability of animals invokes the moral obligation for abstaining from eating meat, or any animal-based products (strict interpretations), or, at a minimum, from producing or consuming industrially raised animal meat (loose

interpretations). Peter Singer (1975; 2011)[45] builds this argument on utilitarian grounds that maximise the overall good among beings with moral worth; his views have left some room for contrasting interpretations regarding whether he defends an obligation to vegetarianism or only to avoid industrial animal production. Another major theoretical tradition, the rule-based (deontic/neo-Kantian) ethics, was applied by Tom Regan (1988) to construct a similar argument for vegetarianism. Regan argues that the inherent value of subjects-of-a-life (nonhuman animals) requires treating them in a way that shows respect for their inherent value. Consequently, meat eating is impermissible as a rights-violation. After these two groundbreaking works, discussion in animal ethics has been rich and nuanced. The mainstream of works in animal ethics objects to the raising of animals for food, although views vary from abolitionism to humane use (see Lamey 2019 and Cochrane 2012 for recent contributions from different angles). These views imply that the future of food systems, at least in industrial communities, would in the long term be animal-free.[46] Contrary views have also been presented, though, and some claim that concern for animal protection means that "burger-veganism", a diet with some beef, would be the best option.[47] Such views would encourage keeping a small number of cattle; although the reasons for this are grounded on sentientist reasoning in the works of animal ethics, the considerations related to biodiversity protection seem to point in the same direction: the most preferable food system would not be totally animal-free but would have some animals. Notably, their number would be a fraction of the present numbers, which also would make meat a rare luxury product.

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[45] *Singer's Practical Ethics* (2011) is a good example of the revised argumentation in the face of new empirical information: the first version of the book in 1980 is very different from the most recent edition.

[46] It should be acknowledged that the argumentation is meant to concern "ordinary" industrial communities with diverse options for arranging food system activities. Food security may necessitate cattle keeping in some other types of communities with frequent crop failures and poverty that prevents people from establishing or utilising other food procurement channels.

[47] See Lamey 2019 on the review and examination of such "burger veganism".

From the viewpoint of climate ethics, constructing a normative recommendation about the precise role of animals in the future food systems will require more ethical and empirical research to understand the impacts of differently construed food systems from both mitigation and adaptation related aspects. Even if it is known that the current food systems are high-carbon and that the production and consumption of animals should be significantly reduced due to climatic reasons, it would be too quick a leap to conclude that a fully animal-free food system would fulfil the criteria of the best possible, or at least as harmless as possible, food system. The question of an ethically sustainable, low-carbon, and otherwise sustainable and feasible future food system is essentially a systemic question to which contemporary food ethics is not well equipped to answer with its tendency to approach dietary patterns as "list-of-ingredient" matters (Kortetmäki and Oksanen 2021). New methods and conceptual frameworks for resolving these questions will be needed.[48]

One future development that may significantly influence the role of animals in future food systems and diets is *in vitro* meat. In the best case, lab-grown meat (or "meat" – the status is a real philosophical-conceptual question) could be a win-win solution by retaining the possibility for people to enjoy values associated with meat eating yet overcoming the ethical problems of animal production (Lamey 2019). From the viewpoint of animal welfare, this solution would be ethically superior – unless the existence of production animals is considered more valuable for their own sake than the non-existence.[49] Because

[48] The unjustifiability of claiming fully vegan food systems as environmentally sustainable based on the present empirical information does not mean that a fully vegan food system could not be environmentally sustainable: that, however, is a matter of integrated impact assessments at the systemic level rather than a logical conclusion from the problems of animal-based food systems. The potentially relevant concerns include, for example, fertilisation (that could not rely on animal manure in a vegan food system) and the protection of those endangered species and ecological habitats that are tightly associated with traditional rural biotopes and related cattlekeeping (see also Oksanen and Kortetmäki 2021 on biodiversity and veganism).

[49] The question of whether animals have an interest to come into existence, and on what conditions, has generated complex philosophical research that cannot be addressed here.

the main input for lab-grown meat production is electricity-based energy, which can be produced with renewable sources, products can also be made very low-carbon. Admittedly, it is currently uncertain whether, let alone when, lab-grown meat products could reach the stage of entering markets and becoming a feasible mainstream option, even if the demand for meat alternatives is generally rising in the industrialised world. Lab-grown meat also raises questions regarding biotechnology ethics.

THEME 3: WORK AND PAYMENT

2.6 Livelihoods and work

Agriculture is the most employing single profession in the world. Food system is also one of the most significant employing sectors in the industrialised world still, even though the number of people in agricultural occupations has been declining notably over decades. Other food system activities (food industry, restaurants) have become increasingly important employers in recent decades. The livelihood impacts of climate action in food systems are morally relevant, comprising also the heart of the "just transition" discourse, and working conditions and opportunities are central topics in food justice. While there are no signs that climate activities would, as such, reduce the overall number of jobs in food system activities, the quality and contents of jobs may change a lot. The changes brought about by low-carbon transition will influence livelihoods now and in future. This section addresses the impacts of climate mitigation and livelihoods especially as they will be faced by farmers and farmworkers, which is admittedly not the only relevant aspect in food labour ethics.[50] From the viewpoint of individual actions, the risk of too high costs of

[50] In the European context, I would consider the other pressing questions to include the status of the lowest-paid restaurant workers (especially in fast food and low-price restaurants), the status and treatment of immigrant and foreign workers, such as seasonal workforce, in food supply chains, and gender issues.

acting with the highest ethical standard (see the box) also represents one central tension between morally obligated climate action and economic viability that can concern any food system entrepreneur.

BOX 4 (Exemplification)

When acting ethically is too costly, literally: Feasibility and ideal action in a non-ideal world.

Suppose Lisa owns a lunch restaurant in a small town with three other lunch places. All have found their customers and are located close to each other in a relatively small city center. One day Lisa watches a documentary about climate change and suddenly realises how little she has been really thinking about climate change. Quite suddenly, she reads more about the situation and becomes convinced about the moral responsibility of people to act upon climate change and about the urgency of the situation. As a restaurant owner, Lisa understands that she cannot side-line this issue in her restaurant either. After studying more about emission origins, Lisa chooses to transform her lunch place to really low-carbon. She revises the menu to have only plant-based foods because sustainably caught freshwater fish or other low-GHG animal proteins would need to be imported from far away. She gets extra training to make plant-based dishes tasty and creates tasty new dishes. Unfortunately, the small-town customers are not ready for such changes yet. Individuals who feel suspicious about vegetarian food or, after all, want to play it safe and eat their favourites, vote with their feet and choose other restaurants.
Others are more positive about Lisa's efforts and some of them continue visiting the restaurant, and some new faces also appear; however, it turns out that the problem is not only suspicious individuals but lunching groups where the insistence of some people to have meat or fish makes the whole group choose other restaurants that serve omnivorous meals (with a vegetarian option by request, too, to keep the plant-minded members of lunch groups happy) Losing these lunch groups is economically fatal:

Lisa realises that if she continues to serve lunch as responsibly as she is now doing, she will go out of business, and the town will be left with three other places that pay barely any attention to climate change issues. Lisa feels bad about having to either give up the whole business or what she perceives as a moral obligation: do as little harm as possible with your business. She chooses to try to stay in business and introduce some omnivorous dishes back into the menu while keeping vegetarian options at the forefront and investing in their attractiveness. She thinks that although she is now doing more harm than she was doing, she actually helps customers reduce the harm they contribute to: the number of low-carbon lunches eaten in the town remains nevertheless much higher when her place is up and running, even with some compromises.

Numerous situations exist where the consequences of acting in the ethically best possible way (regarding climate change but also with respect to many other issues) are so high – i.e. create a risk of competitiveness failure and bankruptcy – that they cannot be maintained in the long run. In such cases, it is also not possible to demand them from actors except by making an appeal to an arrangement that ensures full compliance (that everyone is on board in making related changes). Without full compliance, an entrepreneur promotes the most good by acting with a lesser standard than in a world of full compliance.

Various "efficiency-equity tensions" may arise between the goal of achieving maximum environmental impact reductions at lowest cost and of ensuring equity between different actors, especially of less advantaged groups (Ciplet and Harrison 2019). Pressures to reduce climatic impacts in food systems may distribute the burden of action very unevenly unless they are given particular attention. First, it is a sort of "brute luck" within food systems that the sheer majority (c. 80 %) of the overall GHG emissions relate to those food system activities that are among the least profitable ones, i.e., also least resourced to make additional investments or take economic risks: agriculture. Second, the carbon intensiveness of present agriculture is determined by historical developments and the geographical and climatic properties of regions. It is largely a matter of "brute luck"

that some regions have chosen those forms of agriculture[51] that now require most drastic transformation, while other actors are luckier in having "inherited" regions and activities that are based on lower-carbon forms of production. The unequal starting point in the shared responsibility for emission reductions is unavoidable.

Efficiency-equity-tensions and the economic pressure to retain competitive advantages within the conditions of emission reduction activities may increase labour injustices. This might happen via many mechanisms. There are already companies who neglect labour issues related to working conditions, exploitation, instrumentalising treatment, coercion, and discrimination (Gottlieb and Joshi 2013; Doggett and Holmes 2018). In the absence of effective monitoring and penalties against injustices, corporations acting wrongly tend to get unjust competitive advantages with their oppressive and exploitative practices that lower labour costs. If climate action raises production costs, actors may become increasingly tempted to ensure their competitive advantage while meeting mitigation demands by continued or extended exploitation, which is increasingly unfair towards those that comply with legislative and moral obligations. Similar attitudes have also been identified among farmers (James and Hendrickson 2008). Moreover, the increasing costs of running operations in climate-friendly ways generates pressure for all actors to find savings elsewhere to compensate the increased costs: this may feed a "race to the bottom". Legal exploitation and oppression are particularly difficult to address: workers may enter employment relations and suppliers sign indecent contracts without visible coercion, yet do so only because in practice they have no other choice for securing or earning their living.

Some of the worst problems concern farmworkers in farms that are owned by giant corporations, and medium/small family farms that are common in Europe are very different operators in this respect. However, efficiency and viability tensions are a reality also at farm level decision-making in the case of self-governed family

[51] The "form of agriculture" here refers primarily to big categories defining the main contents of the production, i.e. livestock rearing, other animal farming, grain production, or fruit and vegetable (including wine) farming. Because a great deal of primary producers indeed continue agriculture as a family business, speaking of "inheriting" certain forms of production can be taken quite literally.

farms and raise questions about the target and focus of action. While climate action supports the long-term securing of agricultural livelihood, the required investments constitute a significant short-term economic risk for farmers who are already at the verge of economic viability or close to that. Another tension is raised by the question of balancing the (often scarce) investment resources between adaptation vs. mitigation. Mitigation is very important for the sake of others. Yet, making a difference to mitigation is indirect and invisible (actions matter at the level of aggregate emissions and the decisions of a single farm do not appear as difference-makers in the big picture). In contrast, adaptation is more important for the sake of one's own livelihood and for providing for one's own family, and directly makes a difference in this respect.

2.7 Farming as a profession and "a good farmer"

Even though food may somewhere in the future be grown outside conventional farms, farmwork in agricultural lands will for quite some time remain the main food production method. Despite technological developments, farming has retained its basic character: working with land and soil, and animals and plants, in order to produce especially edible (as well as some other) goods for human communities. Farming can be considered a professional occupation and professional ethics relevant for its practitioners. Professional ethics is about "what counts as acting well in the context of a professional role"; this is "determined by how well that role functions in serving the goals of the profession, and by how those goals are connected with characteristic human activities" (Oakley and Cocking 2001, 74).

Food security makes farming a crucially important occupational activity – even more important than the work of doctors (who are needed when people get ill, whereas food is needed always). Yet, acknowledging food security as the ultimate aim of farming does not erase ethical tensions that farmers face in the context of climate change. In this subsection, I will look more closely how the demands of professional ethics in farming and moral obligations invoked by climatic considerations on the one hand, and the idea of being a good farmer on the other, may pull in different directions.

Figure 4. Different spheres of demands that may relate to professional ethics in farming.

In general, environmental changes increase competing demands for farming. Farmers are expected to produce food at a quality and cost that allows all people access to safe and nutritious food (and a diverse selection of it) while farmers are simultaneously required to pay increasing attention to the impacts of agriculture on the atmosphere, soil, water bodies, and nearby habitats. The basic tension arises already between the ethics and economic realities of farming: the latter to some extent dictate the actual possibilities of action both in absolute and relative terms (see also Box 4). One of the first philosophical articles on agricultural values (Aiken 1984) identifies a value conflict in discussion by asking whether the ultimate aim of agriculture is to meet the nutritional needs of consumers or to maximize profits. While the question may seem rhetorical and, in this report, I take it that the answer is unquestionably the former (or food security more broadly), the reality of agricultural discourse and policies demonstrates the existence of this tension (Lang and Heasman 2015). The productionist paradigm, the production of greatest yields (as measured per hectare) at lowest

economic costs becomes the main solution to feeding the world. These relate to the fundamental questions regarding the purpose of the food system: some embrace approaching food systems as one industry among others, while others claim that agriculture and food systems are somehow fundamentally special activities and should not be considered as analogous to other production sectors in ethical reasoning. The former view presents an industrial, the latter an agrarian, philosophy of agriculture (Thompson 2015a). These views also influence what it means to be a good farmer.

The core of professional ethics[52] in farming – what makes a "good farmer" – is sometimes simply considered in quite productionist terms, as a matter of agricultural success that manifests in good yields and robust, good-looking crops or animals (Silvasti 2003; Burton 2004). Focus on productivist values may be emphasised more among those who represent a more recent entrepreneurial identity (e.g., Vesala et al., 2007), contrary to conventional farmers for whom food production is about much more than just production, grounded on diverse culturally rooted agrarian values (Barlett 1993; Silvasti 2003; Thompson 2010; 2015a). Culturally rooted values maintain social and ecological ties to the community and land; they endow actors with pride in meaningful work that is characteristically distinct from most other human professions in its foundational importance (agrarian philosophy). In the context of agrarian values, good farming also relates to a harmonious relationship with nature (Silvasti 2003) and values related to sustainability step in "naturally", although their relative weight and contents may vary. The discourse of sustainability catches several values that farmers recognise as central in doing their work well: community connectedness, stewardship, justice, ecologism, self-reliance, preservationism, and health (agriculture that supports human and land health). Simultaneously, economic efficiency is important to maintain farm viability over time. These values, observed in focus group interviews among farmers, may be in tension with one another (Piso et al., 2016) but help understand the aspects of being a good farmer. A good farmer never intentionally harms land or the environment: "According to the cultural model of a good farmer, one would never hurt land or water, because productive land and clean water are the first and essential conditions for continuity. The peasant-orientated

farming style is self-evidently thought to be ecological" (Silvasti 2003, 148–149).

Demands for climate action may raise tensions with regard to the very conceptions of sustainable farming described above. Traditional values in farming indicate the sense of ecological responsibility as internalised in the idea of stewardship and the success of farm continuity over decades or centuries, which has been taken to prove sustainability (Silvasti 2003). The new climate change related considerations and emission reduction demands imply that the practices conducted – and often continued successfully over generations in the same farm – are not sustainable, after all. Unsustainability in GHG terms does not give local feedback: climatic burdens are invisible and aggregate into a global set of overall emissions. It is possible that a farm continued over centuries successfully causes huge GHG emissions. Hence, the new argument from climate change is difficult to digest, because it essentially challenges the way in which visions and ethics of being a good farmer have been built. The very tangible way in which the profession of farming has been built over generations and in which its success and sustainability have been easily observable are now questioned. On the other hand, the farmer identity is also changing. Especially the younger generation of farmers perceive themselves as "entrepreneurs" among other entrepreneurs, which has in some empirical studies been identified as facilitating responding to changing demands in the world, including climate

[52] It should be noted that there is no explicitly developed professional ethics in farming similar to medical ethics, so I use the term here more loosely to denote the presence of a broadly shared moral framework among farmers and that the adherence to that framework is taken as a matter of being a good farmer. I agree with Meijboom and Stafleu (2016) that farming involves numerous ethical questions not all of which can be meaningfully regulated by legislation and that farming is a profession where a certain level of professional moral autonomy, related to resolving arising ethical matters by the professionals themselves, is relevant (Meijboom & Stafleu 2016). A relevant difference from the medical field is, however, that ethical training as a part of farmer training was rare or non-existent at least some years ago, and such training would perhaps be important to increase farmers' competence for exercising professional moral autonomy and develop their professional ethics more extensively in the face of new challenges (such as climate mitigation and adaptation and various novel technologies).

change. Interestingly, and perhaps counterintuitively, a step away from the "agrarian philosophy" may in practice increase readiness to adopt mitigation measures without perceiving them as conflicting with one's existing conceptions of being a good farmer.

Climate change may also undermine one central goal of being a good farmer: being able to pass the farm to the next generation as an economically viable unit. The continuation of farming may be undermined, for example, by climate mitigation obligations that question the very existence of a farm in a given place if it is difficult to conduct low-carbon agriculture in those conditions or to do that in economically viable ways (considering the farm size and required investments for mitigation activities). This is relevant especially in regions with challenging geographical or weather conditions. However, climate change itself will also threaten farm continuity in many regions too, even though adaptation measures reduce such risks.

Farmers have for long been held – or should have been held – in high esteem for their work because of its foundational importance to human communities (cf. Chrispeels and Mandoli 2003). This type of community-originating valuation for the value of one's contribution to the good of the community is called esteem recognition in social philosophy (Honneth 1995). Social esteem is a form of recognition that relates to one's specific traits and capacities, role in the society, and consequent contribution to realising the collectively defined objectives in the community. Esteem recognition is one of the key elements for an ethical societal life and social cohesion, and it focally supports healthy self-relations and integrity (Honneth 1995, pp. 121–130).

However, calls for urgent and effective climate action can (and apparently do) evoke "a blame discourse" where discussion about agricultural GHG emissions overrides the discussion about the importance of agricultural work. According to farmer perceptions, this discourse focuses on blaming farmers and denies esteem recognition for their work, which has now turned from important work into a problem for the planet.[53] The significance of agricultural emissions, however, is merely a statistical finding and a matter of "brute luck",

[53] This finding has been made in several recent Finnish agricultural sustainability projects and their final reports (that are, unfortunately, in Finnish only); related scientific manuscripts are under preparation or in review.

in a sense: it does not deny the value of farming for human communities. Nevertheless, delivering messages that simultaneously recognise the value of one's work while calling for significant transformation in that work to avoid catastrophic and suffering-inflicting consequences in the future, is challenging practically. Pointing out the emissions caused by a given profession may, after all, be also perceived as questioning the very professional ethics of the given field. The problem is largely psychological, yet serious. If communicating climate ethical obligations may deprive actors of professional esteem and recognition, can the general duty of benevolence towards fellow humans invoke a related duty to try to communicate agriculture related climate obligations in an esteem-supporting manner?[54] Related to this, acknowledging the local and situated knowledge of farmers in the context of climate action is proposed as a matter of procedural justice and recognition (Loo 2019) and could provide an avenue ahead. Approaching the mitigation demands via the inclusion of farmers and an updated version of professional ethics in farming could help build a constructive discourse that implies discussing *with* farmers rather than about (or even *against*) them.[55] On the other hand, the practical question of how to take local knowledge into account in climate action planning remains an endeavour that will require experimenting and learning.

While the increasing technologization of agriculture has been prominent already before climate change entered the discussion, it is worth noting shortly how technologization for climate mitigation and adaptation may influence farm work. Climate mitigation is commonly agreed to require at least some technological developments in agriculture.

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[54] In my view, it would help to distinguish more clearly the *primary* purposes of a profession, esteem for them, and the *unintended side effects*. Consider an analogy: researchers studying climate change mitigation do very valuable work yet it may be that their active participation in international conferences causes a huge climatic footprint and that something should be done to the research community practices that *assume* frequent flying as a part of being a good (successful and influential) researcher.

[55] I thank one of the interim report readers for this very valuable remark.

Precision agriculture[56] is among the new solutions that have been introduced with high hopes for both reducing emissions and adapting to climate change. Three ethical concerns are particularly pressing with increasing technologization: 1) unintended side effects of new solutions (cf. discussion on the risks of GM); 2) the disproportionate access to and therefore unequal benefitting from new technologies among farmers (see Timmermann 2020);[57] and 3) the loss of the meaningfulness of work resulting from the change in the work contents (e.g., from "hands-on-clay" activities to digitalised work without direct contact with field or animals). The first two concerns are discussed shortly in Section 2.10. I will now discuss the third, the meaningfulness of work, which closely relates to agency.

Having a sense of agency, an experience that one is capable of making different choices and acting upon them, is among the most important capabilities in a dignified human life and a central constituent of human well-being (Nussbaum 2006; Gough 2017). Having a sense of agency may be among the most important contributors to the experience of farm work as meaningful, despite the fact of how hard and low-paid it is. The sense of agency has made even agricultural work meaningful over time and been the source of professional pride (Ward and Lowe 1994). Thompson (2015a, Ch. 4) suggests that even poor smallholder farmers enjoy much greater agency compared with their urban fellows who are equally poor yet also fully dependent on others in their income, employment, and resource provision. For the same reason, the decreased need for labour in agricultural work is not necessarily always desirable from the ethical viewpoint: the possibility for people to do work that is meaningful and provides room for self-development is also important by providing everyone the opportunity to contribute to the common good by work (Timmermann and Félix, 2015).

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[56] Precision agriculture (also called satellite farming or site specific crop management) includes, for example, the utilisation of satellite data to enhance the context-sensitivity of cultivation practices regarding fertilizer and pesticide use with the aim to optimise the agrochemical input use for each field plot.

[57] This is the case if the cost of adopting new beneficial technology poses a barrier to its adoption to other than the best-off farmers.

While highly technical jobs can certainly provide such experiences for many people as well, those experiences are very different from attributes commonly linked with agricultural work: working with land, enjoying the joys (and burdens) of hard physical work, interacting with nonhuman nature, and working in an environment that provides rich input for all senses yet lacks the features of a hectic and often constantly disruptive industrial or office working environment. If farm work loses such attributes and becomes mainly comprised of (inter)acting with intelligent machinery and data, it is worth questioning whether farming is anymore farming in the sense it used to be, and whether this has implications that should be given attention in ethical considerations. The loss of the meaningfulness of work has also been noted in public catering, where increasing technologization has replaced traditional cooking work with simple unpacking and heating (Pudas 2020 [a thesis]).

Of course, farming has not been a static profession even before climate change began to impact the fields. Many of the visions of future farming – including new (almost) "landless" ways to produce foods and highly digitalised smart farming solutions where human labour is barely needed – have long been envisioned, demonstrating the desire to free humans from the need to do hard or "dirty" work, to decrease the labour-intensiveness of food production, and to be able to produce food anywhere without arable land. Climate mitigation and adaptation related needs have probably encouraged technological innovations, however. Whatever the final motivation for various innovations is, the whole farming profession may be changing radically over time to the point where there no longer is farm work as we now conceive it, at least in the industrial food systems.

Is agricultural work as a human-conducted activity so valuable that there are ethical reasons for preserving the opportunity for people to do it also in the future (and what are those reasons)? Paul B. Thompson (2010; 2015a) suggests that the agrarian philosophy, which "sees agriculture not simply as a technological platform but a set of human practices and social institutions that fulfil a wide array of crucial functions, some of which may not even be fully understood or appreciated" (Thompson 2015a, 253) is essential for the resilience, sustainability, and social justice within food systems. In the agrarian philosophy of food, there may well be ethical reasons for protecting

some of the present features of agricultural production systems and farm work, instead of aspiring to a future where food production takes place in laboratories and automatically operating greenhouses and greenwalls. This view would imply the obligation to preserve knowledge, resilience, and diversity in food production to ensure greater prospects for successful food production and food security in future conditions (which are unknown).

THEME 4: WHERE, WHAT, AND HOW FOOD IS PRODUCED

2.8 Local food

Perhaps one of the most challenging tensions arises between the values related to supporting local production and the objectives of low-carbon transition in food systems (Kortetmäki 2019b). Local food has been frequently embraced as the best way to address social justice related ethical concerns in food systems. In addition to the basic point that procuring local food supports local livelihoods and regional economies, local food production can increase supply chain transparency and the profitability of farming by reducing the number of supply chain intermediaries sharing the added value.[58] These reasons are used to bolster arguments for increasing the localisation of food systems for greater food justice (e.g., Alkon and Agyeman 2011; Gottlieb and Joshi 2013; Cadieux and Slocum 2015). Local food is also frequently advocated as environmentally just, because it keeps the environmental impacts of agriculture in the same place where food is eaten, rather than shipping them far away; climatic impacts, of course, cannot be localised.

Local food has also been constantly embraced as lower-carbon because of lesser food miles, and the environmental superiority of

[58] On the other hand, it is also notable that – at least according to my own experiences in several countries – products sold in short supply chain specialising marketplaces (e.g., farmers' markets) are generally significantly more expensive than the products sold in grocery stores, due to which they may be only in the reach of the better-off consumers.

a short-distance food is a common consumer perception (Siegrist, Visschers and Hartmann 2015). However, food miles are a poor indicator for climate emissions because transportation generally contributes only little to overall food emissions, one estimate being 11 % (Weber and Matthews 2008). Approximately three-quarters or four-fifths of the emissions are generated in agriculture: therefore, it is the dietary choices that matter most (Weber and Matthews 2008; Poore and Nemecek 2018). In some cases, local food chains may even have higher transportation emissions because of non-optimal and small-scale logistics.[59] Ironically, the consumers driving with their family-sized car to farmers' markets on the other side of the town to buy local fresh vegetables and responsibly produced local tenderloin may well leave the greatest climatic footprint with their shopping basket.

The main tension regarding locality and climatic objectives is that presently produced local food (or most of it) may be carbon-intensive. In such cases, supporting the present local food production does not promote climate mitigation activities but may do the contrary by entrenching the present agricultural modes of production and encouraging further investments therein (Kortetmäki 2019b). Big investments in carbon-intensive food production are particularly problematic because they tend to create structural lock-ins to certain production sectors at the farm level: highly specialised animal production facilities can rarely be rendered to serve totally different forms of agriculture, and highly indebted farmers cannot make new investments required for greater transitions. It is therefore hard to vote with one's wallet in favour of low-carbonised local food production if the production presently relies on animal-based products. *Local low-carbon food* could help meet many social and climatic objectives simultaneously, yet requires macro-level public action and financial redistribution to equip agricultural actors with

[59] The differences are demonstrated in the Finnish assessment of the ecological impacts of local food (Räsänen et al., 2014). The transportation impacts of ineffectively transported local faba bean were 0.73 kg CO_2eq/product kg (41 % of the total temissions of 1.79 CO_2eq/product kg), whereas the transportation impacts of local salad were below 0.15 CO_2eq/product kg. For local non-dairy beef, transport impacts comprised less than 1 % of the climatic impacts; the share of primary production was 99 % (of the total emissions of 41.6 CO_2eq/product kg).

capacities to engage in the required changes and to even out the disproportionate burden sharing (discussed in the beginning of this subsection).[60] Therefore, expecting localisation to resolve social and climatic objectives simultaneously is problematic (Kortetmäki 2019a; 2019b).

Low-carbon local food production may be a difficult objective for regions with cold climates or high altitudes that make edible crop production unfeasible. These regions have brute luck in the context of mitigation demands. However, justifying carbon-intensive local food production on the grounds that carbon-intensive food production is the only practically viable form of agriculture in the given region is, according to my reasoning, unfounded. The reason for this can be derived from a more general argument. Consider a practice P that can be done in more or less harm-inflicting ways. If P can be exercised in the setting S, be that a particular factory or region, only in the harm-inflicting way, practice P must be abandoned in the setting S unless abandoning it causes greater harm. For climate-burdening agriculture in places where it is the only viable form of production, the question is: are the harms from abandoning climate-burdening agriculture in that region greater than harms from the continuation of agriculture, given its climatic impacts? This may to some extent be a question of scale of production,[61] yet it generally appears to me that food security related reasons usually comprise the only sufficiently weighty justification for continuing such agricultural practices. There may be situations where relying on local production is the only way to food security.

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[60] A burden that is equal for all in absolute monetary terms may be highly disproportionate in relative terms. An example: if emission mitigation in a dairy farm requires setting up a biogas factory for the processing of manure, the price of the investment and keeping its operation economically viable may be insurmountable to the smallest family farms that operate in isolation, whereas for bigger dairy farms or conglomerates of cooperating farms within a single location the burden is much smaller in relation to their resources.

[61] Careful examination would be required to determine whether and to what extent small scale actually can be an excuse. This is similar to the point why small countries are not exempted from climate mitigation duties just because they are globally so much smaller harm-inflictors compared to China.

Another exemption may concern places that basically lack other opportunities for livelihoods: the loss of agricultural employment could result in impoverishment, consequent food insecurity, and reduced well-being. From the livelihoods viewpoint, the geographical and topographical differentiation of agricultural regions poses a challenging question: if local food production can provide viable livelihoods only when it relies on high-emitting products, such as livestock, what is the acceptable climatic cost of securing such livelihoods?

Finally, I want to extend this examination with some remarks about a topic that has not yet been much discussed in food and climate ethics: the importance of cosmopolitan thinking in the face of climate change. From the viewpoint of adaptation and resilience, decentralising food production would potentially help distribute and minimise the risks from climate change to food production in overall terms. This supports maintaining food production viable diversely, around different types of regions, and would imply the existence of local/nearby agriculture in many communities. Yet, it may not actually imply the locality of food systems. Climate change driven harms on agriculture are so unpredictable in spatial and temporal terms that the spatial distribution of risk should serve the global food security objective first; satisfying preferences for eating locally are of secondary importance. Communities all over the world should be entitled to meet their dietary demands via alternative supply channels if their ordinary channels fail due to climate change induced crop failures. Hence, cosmopolitan thinking suggests a new kind of networking as an obligation to other humans around the world. Thinking about adaptation actually also questions the favourability of making a food system as fully local as possible. A food system that relies almost solely on local production is highly vulnerable to climate change driven weather extremes, drought periods or floods, and heatwaves that may cause locally devastating crop failures and risks to food security.

2.9 Dietary transition

2.9.1 The necessity of dietary transition

The composition of average Western diets is pivotal for climate change mitigation in food systems. Human-caused GHG emissions should be approximately halved in ten years, by 2030, and reach net zero around 2050 to avoid dangerous interference with the climatic system (IPCC 2018). Food system activities account for a quarter or even a third (including land use impacts) of human-made emissions (Mbow et al., 2019), and animal-based food production accounts for approximately half of the food system emissions (Poore and Nemecek 2018) despite providing less than a fifth of the global calorie supply. Therefore, meeting the obligations to avoid dangerous climate change very likely necessitates a dietary transition towards more plant-based diets and reduced consumption of meat and dairy products (e.g., Poore and Nemecek 2018; Springmann et al., 2018; Willett et al., 2019). Dietary transition has also been put forward by researchers as a way to reduce the harms of diets to biodiversity and public health (see aforementioned references), yet climate ethics alone would suffice to create a weighty obligation for dietary transition. Although in food ethics dietary obligations are traditionally treated as matters of individual choice, the numerous challenges regarding the easiness and possibility of consumers to transform their diets and make climate-wise choices (see e.g., Kortetmäki 2019b and Ankeny 2019) or express their opinions through markets (see also Section 3.6) imply that the responsibility cannot be simply individualised to consumers. Making the low-carbon transition in food systems in a just way is also a matter of public governance and the establishment of related food policies (Kortetmäki 2019b).

The need for dietary transition to reduce food systems' climatic emissions raises several ethical concerns and potential tensions. It should be noted that dietary transition is sometimes inaptly narrowed into a question of meat eating and its climatic (and health) impacts, although the consumption of cheese is also a big concern in GHG terms[62] and because it is strongly linked to meat production. This is

[62] According to a meta-analysis, cheese has the third highest mean GHG emissions among commonly consumed food items, after beef and sheep meat (Poore and Nemecek 2018).

practically relevant for most European countries where cheese consumption per capita is ranked among the highest in the world. It is also philosophically relevant for arguments regarding dietary obligations.[63] Next, I elaborate tensions that may arise (and have been brought up in public discussions) between the dietary transition demand and other food related values and food system objectives.

2.9.2 Dietary transition and food security

A dietary transition to more plant-based diets has potential to improve overall global long-term food security (de Boer and Aiking 2011) via increased food availability. Low-processed plant proteins are also superior in terms of protein/price ratio (due to which legumes are among the key protein sources in many developing countries), which means that demands for dietary transition are unlikely to impair access to food among low-income people. In nutritional terms, a dietary transition is estimated to have positive impacts on public health (e.g., Willett et al., 2019) in general (this claim does not of course rule out varying consequences at the individual level). What matters ethically is that people have the opportunity to achieve a diet comprised of safe and nutritious food that supports active human life; whether people choose or not to do this is another matter.[64] Hence, dietary transition for mitigation mainly provides synergies with food security related objectives. Nevertheless, there has also been strong opposition to dietary changes in the public discussion, and – putting aside the matters of taste (everyone should

[63] Much of the food ethics literature regarding dietary choices has focused on eating animals and, consequently, discussed vegetarianism. Some environmentally concerned arguments in food ethics have also referred to vegetarianism without considering the impacts of dairy production. Actually, even from the solely animal-interested viewpoint, the argument for vegetarianism (rather than veganism) is highly problematic because almost all forms of dairy and egg production necessitate raising a large number of animals to be killed.

[64] I want to raise this point because some people, indeed, may "choose" a diet with lower nutritional quality if, for example, in some situations have to make their choice between a nutritious food with some ingredients a person has aversion to, and a non-nutritious yet tasty or familiar alternative.

try the utterly delicious Indian curries, though, before saying a word of prejudice about "tasteless beans"!) – the discussion reveals one point that requires a lengthier ethical reflection on the impacts of dietary transition to food security.

According to the institutionalised definition of food security, the available and accessible food must not only be safe and meet dietary needs but also *"food preferences"*. The more-than-biological nature of food raises complex questions regarding what kinds of foods should be available for all at all times to fulfill the above criterion (Kortetmäki 2016). To elaborate the implications of this detail, it is useful to understand how food preferences – which are by definition not needs – may justifiably have a place within the definition of a basic entitlement. Justification for the preference criterion can be captured most adequately with examples related to belief system originated, categorical dietary norms. They commonly arise from both ethical and religious grounds and are "negative", or norms of abstinence, that are required for the adherence to the ethical or religious system one has chosen (Kortetmäki 2016). Adhering to such norms may be highly important for personal identity and integrity, and requiring a person to break such norms – for example, requiring a Muslim to eat pork or an ethical vegetarian to eat beef – demonstrates disrespect for one's personal integrity and autonomy. Hence, the belief system-based norms of abstinence with high individual ethical importance must be respected in an appropriate definition of food security. Negative preferences do not generate tensions with relation to dietary transition and food security. For food security, it suffices to ensure that abstinence from particular foods does not exclude the opportunity to reach a nutritionally adequate diet while still having some room of choice. (Kortetmäki 2016.)

What about positive preferences? Can access to particular foods, such as certain traditional foods, types of protein (be it poultry, fish, or dairy), or local specialities, be essential for the "preference aspect" of food security? Some interpretation of this idea gains support from food justice literature. The deprivation of the opportunity to continue traditional food practices, such as the loss of traditional corn varieties and tortillerias due to the US entrance into Mesoamerican food markets or the necessity to abandon caught salmon-based diets due to river toxins in indigenous communities represent cases depicted as food injustice in research literature. If

the idea of the food preferences addition in the food security definition is to guarantee that food security is respectful for different (ethical and traditional) worldviews, it could be argued that the right to enjoy and participate in cultural traditions could constitute a justifiable claim for some positive food preferences. In the context of dietary transition, this is relevant regarding meat (especially red meat). Can socio-cultural considerations regarding "preferences" require retaining the possibility to have meat on one's plate even when it is not nutritionally necessary? Can access to meat be justifiably claimed (and how often) as a part of an adequate diet? How far can meat-like plant-based products or *in vitro* meat be considered as satisfactory replacements?

From the philosophical perspective, it seems that *in vitro* meat would be the best way to resolve these problems by ensuring access to what really is in functional terms meat, without compromising the objectives or obligations created by climatic and animal ethics considerations (Lamey 2019). The problem is that nobody knows when (or if) the lab-grown meat will become an accessible option. Tensions will, hence, in any case be ahead. Because the present dominant practices of meat consumption are in the mainstream food culture considered as perfectly acceptable or even "natural, normal, necessary, and nice" (Piazza et al., 2015), claims for "the right to meat" have already been made as a response to the calls for dietary transition – for example, even the prime minister of Spain proclaimed in autumn 2021 the irresistibility of a perfect pork chop and criticised Spain's consumer affairs minister for the campaign that called for *reducing* meat consumption for environmental and health reasons.[65] However, it is clear from the food security viewpoint that even if the food security definition is considered to justifiably include some positive food preferences related to food traditions, this is not an argument against dietary transition that calls for reducing the consumption of animal-based products. The question about the threshold (how much access can meet positive preferences), admittedly, will require further ethical elaboration. An important remark here is that while much of the discussion has focused on red meat, cheese is an equally important issue from the

[65] https://www.theguardian.com/world/2021/jul/08/spanish-ministers-eat-less-meat-plea-meets-resistance (Accessed Aug 30, 2021.)

climatic viewpoint in cheese-loving countries with long traditions of cheese preparation, and it is necessary to reflect upon tensions that arise between the related cultural traditions and the moral obligation for significant emission reductions (and other aspects that need to be considered, such as animal ethics and livelihoods).

2.9.3 Does dietary transition require compromising other food values?

Diverse values associated with food (see Table 2) may generate conflicts in the course of dietary transition. The right to self-determination requires that one be not prevented from choosing what one wants to eat, insofar as these choices do not harm others in a morally significant way. This kind of negative liberty is viewed as one of the central entitlements in Western societies.[66] Because the aim of climate mitigation is to reduce the harm inflicted on others, this generally means that people do not need to have freedom to eat foods with high carbon footprints – though the "do not harm" threshold is complex to determine in the context of dietary choices (e.g., Kortetmäki and Oksanen 2021).

Because food values influence what people choose to eat and how they perceive "eating well", understanding the appearance of dietary transition in the light of such values helps identify better (and worse) ways to promote dietary transition and ways to increase its social acceptance. Tensions may arise between changes implied by the dietary transition and the commonly embraced food values related to naturalness, taste, price, convenience, and tradition. It should be noted, though, that a comparative study on food values (Lusk and Briggeman 2009) did not find tradition significant relative to other food values. The relative weight and implications of food values are also culturally context-sensitive. This question is significant for ethics because respecting consumer autonomy can be regarded as a *prima facie* moral obligation: if a dietary transition can be achieved in several ways and some of them retain consumer autonomy without compromising anything of greater moral importance, it is better to choose one of those ways.

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[66] The universality of the self-determination principle and its centrality in moral philosophy has also been questioned as demonstrating a Western perspective.

The most pressing question that has already caused heated debates in the public discussion concerns the replacement of animal-based food products in more plant-based diets. I assume here that any viable replacement must satisfy nutritional needs at the dietary level and contribute to the reduction of dietary GHGs.[67]

Animal-based foods can be replaced with

a) plant-based proteins, in un-/low-processed forms: legumes, wholegrains, nuts, and seeds[68]
b) plant-based proteins that resemble animal-based products, such as "mince" and strips/balls made out of, e.g., wheat, oat, pea, soy protein, or their combinations
c) other than protein-rich plant-based foods, such as grains and low-GHG vegetables and fruits.

Although animal-based proteins could often be replaced with totally different, lower-protein foods such as grains and vegetables while meeting nutritional demands,[69] this third strategy has attracted relatively few advocates in public discussions. This is probably due to the socio-cultural significance of, and learned "craving" for, distinctly identifiable protein sources as a part of a satisfactory meal. Cultural contingencies are here remarkable: in many South and Southeast Asian cuisines, for example, strongly spiced stews

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[67] The "Planetary Health Diet" (Willett et al., 2019) provides a concrete example of such a diet in detail.

[68] In some regions, sustainably caught fish could also substitute for terrestrial animal proteins with GHG reductions equal to those achieved with plant-based substitutes. Because this option is, however, scarcely available and the protection of fish population viability restricts scaling it up, I will not address it here.

[69] The current protein intake often exceeds nutritional dietary needs in industrial countries, including Switzerland, where the average protein intake is between 64–98g/d, 1.5–2-fold compared to the requirement of c. 40–52g/d (Ernstoff et al., 2020). Consequently, animal-based foods can be quite easily replaced with foods with no or low protein contents without compromising nutritional requirements in this respect. I will not make more detailed nutritional considerations, however, since this report is about ethics and not nutrition.

(served with rice, bread, or noodles) comprise the common dish form in which protein is present as small bits and pieces, as legumes or small pieces of meat, in a richly spiced sauce. It is easier to substitute or reduce meat in such dishes without altering the sensory experiences of eating in any noticeable way. Nevertheless, to return to the mainstream preferences and conventions in the industrial world and Europe in particular, I will next focus on the replacement strategies that rely on plant proteins.

The use of un-/low-processed plant proteins such as legumes may be perceived as compromising the sensory properties and convenience values related to food preparation, because these products are very different from the presently dominant animal-based protein sources. The replacement of meat by legumes often changes the sensory properties of food in all respects, implying a compromise with values associated with good food, and culturally loved traditional foods and dishes. (People who like trying new foods and cuisines make an exception.) Consequently, for many people a simple shift "from beef to beans" may appear as "giving up" many of the values associated with good food.[70] Empirical findings about food preferences and willingness to shift to more plant-based eating support this view. It is therefore worth exploring whether dietary transition could be made in other ways that imply less tension with the common food values.

The response to this question has manifested itself as a market trend in many industrial food systems: the increasing emergence of processed plant-based products that mimic animal-based products in taste, texture, and cooking properties. Product innovations utilise a wide variety of raw materials and processing techniques, and innovations enter the markets all the time. These products are often framed as a way to achieve climate-friendlier and/or

[70] As noted elsewhere in the report, moral obligations related to preventing dangerous climate change (even if they imply significant dietary changes) are in ethical considerations weightier than food values with indirect moral relevance. My purpose is not to focus on that point in this subsection. Rather, I elaborate on the tensions that may arise, in order to increase understanding about the least tension-invoking and thereby most widely accepted solutions, which is important to ensure the effectiveness of climate action.

animal-friendlier (and sometimes healthier) diets without giving up the values and enjoyments associated with animal-based foods, which is also demonstrated in product slogans such as "Impossible Foods: Meat made from plants". The appeal to retain the sensory, cooking, and convenience-related properties of cooking and eating well sells a promise of the lessening of conflicts between food values and dietary transition. On the other hand, these products evoke a new value conflict with relation to the value of naturalness. The "naturalness" of food is, in itself, a highly philosophical and surprisingly complex matter (Siipi 2013). Nevertheless, processes that turn ingredients like peas, oat, and soybeans into meat-mimicking, heat-and-eat ready products undoubtedly involve processing. Empirical findings demonstrate a notable divergence of opinion on whether this kind of "unnaturalness" is a disvalue or of any relevant concern insofar as food safety and some health considerations are taken. The new developments are welcomed by many, yet strongly objected to by those who advocate "authentic" or "natural" food.

Non-philosophical food justice literature also involves strong criticism for processed food (e.g., Gottlieb and Joshi 2013). In my understanding, the criticism stems primarily from the association of processed food with transnational giant food corporations that are unjust and unsustainable in many respects: they use their significant economic and political power to lobby profit-driven interests over social, health, and environmental considerations; their subcontractors often have indecent working conditions; supply chains controlled by giants tend to have unjust distribution of benefits and burdens; and the unjust and unsustainable practices enable such cheap products that especially the disadvantaged groups are all too easily exposed to the detrimental health impacts of the processed "junk food" produced by these corporations. If these points held true for the plant-based protein supply chains, it would be easy to agree that the strategy for dietary transition with "as little friction with food values as possible" would involve very high moral costs (sacrifice of other goods of moral value). However, to my present knowledge – based on several years of empirical observations also from the social scientific viewpoint on food system transitions – the novel plant-based proteins differ greatly from products that have initially invoked the "anti-processing" arguments in food justice discourse.[71] Consequently, it would be too hasty and empirically

ungrounded to simply infer that new plant protein products, because they are processed, are a bad solution (from the normative viewpoint) for promoting dietary transition.

One final question regarding the relationship between dietary transition and food values relates to the value of unhealthy eating: should people also have the opportunity to eat unhealthily, if one wishes? Addressing unhealthy eating requires nuancing between different forms of unhealthy eating in order to find policy balance with effective public health policies, while demonstrating respect for what is valuable in the experiences of unhealthy eating (Barnhill et al., 2014). The question can also be linked with the discussion on food security and food preferences. It is, therefore, important to reflect openly on what is essential for food security in terms of food preferences. Nevertheless, values related to unhealthy eating do not appear particularly problematic for dietary transition: climatic reasons do not rule out unhealthy products, and there are suitable solutions for unhealthy enjoyments also among the plant-based products.

2.10 Biotechnology and climate action

Biotechnology refers to technology where living organisms, parts of them, or biological systems are used to create or modify products in agriculture or other food supply chain activities. Here, I use biotechnology to cover *modern* biotechnology processes, including

[71] The initial arguments (see e.g., chapters in Alkon & Agyeman 2011) target cheap, high-calorie and low-nutrient foods that increase diet-related health harms and produce only few adequate jobs and little profit for other than business owners (since such food often originates from the big transnational food corporations). Food justice literature also links processed food with unequal access to fresh food. In the US, low-income residential areas lack fresh food selling groceries yet host liquor stores, fast food restaurants and mini markets that offer easy access to cheap unhealthy food. However, the case of novel plant-based proteins is different from such concerns in all related respects. Products are produced in companies of all sizes, have often adequate nutritional values (to suit even state-supported school meals with high nutritional standards in Finland). Their use is also restricted, ironically, considering the initial criticism of processed food, because of their higher price.

genome editing and other forms of genetic engineering, food production methods such as *in vitro* meat, and new, industrialised and high-technological forms of food processing that render some raw materials into new forms (to improve sensory properties, structural properties, or digestability, for example).[72]

Biotechnology is suggested to support mitigation and adaptation significantly. The different main types of biotechnology solutions that are commonly discussed as relevant for climate action are categorised in the table below.

[72] "Ancient biotechnology" methods such as fermentation have been used for thousands of years to produce wine and tempeh (often called a "novel plant-based protein"!), for example. Because biotechnology ethics is focused on novel technological developments, the focus is here on modern biotechnology applications (such as using fermentation to create protein out of air, patented recently by a Finnish company SolarFoods).

Type of biotechnology, with relation to climate action	Example(s)
Mitigation by plant modification	Plant breeding with genome editing to create varieties that produce greater yields with equal/lesser production inputs
Mitigation by animal modification	Animal modification (by genome editing) to, e.g., reduce methane emissions or to improve feed digestion properties
Mitigation by waste related biotechnology	The conversion of waste into food, feed, biofuels, and chemicals with biotechnology
Mitigation by food processing solutions that promote dietary transition	Industrialised processes for advanced fermentation or the creation of plant-based proteins, protein from air, *in vitro* meat
Adaptation by plant modification	Altered crop varieties that stand climatic stresses (e.g., drought) better and are less prone to plant diseases or pests Altered varieties the nutritional contents of which do not decrease by warming
Adaptation by animal modification	Animal modification (by genome editing) to make animals less prone to diseases and other stresses increased by climate change
Local impact alleviation by biotech. crop albedo enhancement	Altered crop varieties with higher albedo to reduce the temperature increase related harms from climate change locally
Carbon sequestration by soil biotechnology	Soil biome enhancement to increase carbon uptake

Table 3. The main types of biotechnology solutions for climate mitigation and adaptation.

The present report cannot do justice to the rich literature in the ethics of biotechnology, agriculture, and food. Hence, I restrict the examination here to those points that are particularly relevant in the context of climate change and with the aim to illustrate how the

climate change viewpoint may influence the ethics of biotechnology. Interested readers are also directed to more detailed sources of related information. Any form of modern biotechnology raises calls for ethical consideration of the following topics that are not dealt with in great depth here:

- Risks, uncertainties, and precaution (suggested further reading: Munthe 2017)
- Impacts on ecological and human health (Lappe and Bailey 2002) and on work (Section 2.6)
- Social justice, e.g., the distribution of benefits and costs, equal access (Timmermann 2020)
- Regulation, monitoring, and decision-making (Ankeny and Bray 2018; Timmermann 2020)
- Responsible research and innovation (Timmermann 2020)
- Consumer autonomy and right to know (Lappe and Bailey 2002; Siipi and Uusitalo 2011)

2.10.1 Emission mitigation solutions

Emission mitigation by biotechnology has the greatest potential when it concerns activities with the highest emissions that is animal and feed production.[73] The relevance of biotechnology for emission mitigation in animal production is high. This is because of the identified tensions between climatic objectives and other agricultural and environmental objectives. The latter view particular forms of cattle farming as the best form of animal production from the biodiversity, land use, and food system resilience viewpoints, and the least objectionable form of animal production from the animal ethics viewpoint. If biotechnology could help reduce the climate emissions of cattle farming and thereby resolve the tensions between climatic and other food system objectives in this context, this would make the integration of climatic considerations into agricultural and food ethics easier. One potential benefit from

[73] Recent estimates state that methane, related to enteric fermentation and manure, accounts for more than 40 % of livestock production related GHG emissions and is by far the most significant source of emissions (Herrero et al., 2016). Feed related emissions can be reduced by decreasing the emissions in feed production or by increasing the feed conversion effectiveness of animals.

such solutions would be that they would lessen unequal positions caused by "brute luck" to those regions where harsh conditions have led to the presence of cattle-dominated agriculture that now faces much greater transition demands from mitigation pressures than luckier regions with diverse or grain-/vegetable-based agricultural production systems. (It should be noted, though, that emission reductions are a distinct question from when, where, and to what extent cattle keeping is morally permissible from other moral viewpoints.)

Animal modification to mitigate GHG emissions, for example by modifying their digestion to reduce ruminating related emissions, raises similar ethical questions as animal biotechnology in general. From the viewpoint of consequentialist ethics, the implications of animal modification to the animals themselves and their welfare is the main concern and has been discussed for long (e.g., Holland and Johnson 1998). Another concern is that the increased use of technology in animal agriculture, be that biotechnology or precision livestock farming, may increase the quantification and objectification of animals (Bos et al., 2018). The modification of animals also raises non-consequentialist and fundamental questions about whether modification respects animals and their integrity even in the first place (Holland and Johnson 1998) and whether modification that changes the characteristic features of animals is morally acceptable, even if it may promote their welfare (Kramer and Meijboom 2021). The last mentioned question may become increasingly important when climate change increases the spreading of various diseases that may inflict suffering on animals. In addition, the impacts of animal modification on food security and on farmers may also be important to consider; it is presently quite unclear how agricultural biotechnology for mitigation would impact them. The questions of risk will be here highly relevant, if any of the modification practices is considered as a potential risk for the safety of food from animals, for example.

Plant modification by genetic engineering can contribute to emission mitigation when plants are modified to give greater yields on the same land area with the same or lesser production inputs than before. This idea grounds the argument that genetic engineering promotes food security (see Rosset 2002 for a critical analysis). In the case of plants, impacts on the plants themselves are rarely considered as morally relevant as such (since plants are not

considered as having subjectively experienced well-being),[74] yet numerous other questions remain relevant. I suggest that the most important questions concern food security and justice. The "Green revolution" innovations that have been advanced to also promote food security have rarely benefitted the poor or have done so with a notable delay only after the forerunners have already collected the most profitable fruits of the innovation (Thompson 2012, 352). Attention should also be paid to ensuring that yield increases do not take place at the cost of food safety or nutritional values. The viewpoint of environmental ethics calls for attention to the expected and possible environmental impacts of cropping modified plants; questions regarding risks (including "the unknown unknown"), and risk management and harm prevention and reversion are important.

While biotechnology debates often focus on genetic engineering in agriculture, biotechnology is also used in other supply chain stages. One particularly relevant topic here regards the use of biotechnology to create products that promote the dietary transition to more plant-based diets (see Section 2.9). Biotechnology can be utilised, for example, to create more digestible plant proteins; to remove or add particular characteristics to the raw materials to make products more attractive; and to produce *in vitro* meat. Because food industry biotechnology does not target the living plants or animals, some of the related ethical questions do not arise in the food-processing context. Because the target audience of "biotechnology for dietary transition" would mainly be the industrialised Western community consumers with carbon-intensive diets, the main food security related concerns relate to food safety, utilisation (nutrition), and questions regarding consumer autonomy.[75] One

[74] However, the proponents of biocentric environmental ethics posit that each living organism is morally considerable as a living individual. This raises the question whether plant modification shows the required respect for plants. However, approaches that locate such intrinsic moral worth with each individual subject run almost immediately into severe problems and are therefore not discussed here.

[75] Novel protein solutions also raise numerous other questions regarding, for example, the just distribution of benefits and burdens in food industry and the access to novel foods that may be only in the reach of wealthier consumer groups; these are generally related to all products regardless of whether biotechnology has been utilised or not in their creation.

condition of consumer autonomy relates to the availability of products choosing which correspond with the consumer's ability to make decisions according to their beliefs and desires (Siipi and Uusitalo 2011, 151). Biotechnology in product development for dietary transition might promote consumer autonomy by enabling consumers uphold their conventional tastes for "meat-like" products while reducing or stopping meat consumption (see also Kortetmäki 2016).

Another potentially significant domain of biotechnology application in food systems concerns emission mitigation by re-processing waste into utilisable raw materials. As I see it, this domain raises the least number of ethical considerations: waste is something that is currently unavoidable and is a disvalued side effect of food system activities. Reducing waste by either preventing it or by turning waste material into something valuable may be highly relevant given that approximately a third of the food produced in the world is not getting eaten but is lost either by food loss or waste (Mbow et al., 2019). Consequently, treating it with biotechnology does not require interference with the presently valued material (food and non-food outputs from agriculture) or subjects who are morally considerable (at least animals).[76] Questions regarding innovation justice and the potential side effects of innovations on humans, animals and nature remain relevant, nevertheless.

The upshot regarding biotechnology and mitigation must be done in several pieces. First of all, given the width of biotechnology solutions, they cannot of course be lumped together in assessments. Second, the obligatory nature of emission mitigation in agriculture and food system activities does not as such justify *any* single method for emission reductions. Sufficient emission reductions in agriculture can be achieved in numerous alternative ways. Hence, merely being able to contribute to emission mitigation does not justify the use of biotechnology if there are any reasons against using it. According to my present understanding, the objections are the least as regards food waste and as regards the processing of food ingredients with the modernised versions of ancient biotechnology in order to create food products that promote dietary transition – food processing, of course, raises ethical issues

[76] Some exceptions may apply. For example, if biotechnology relates to enhanced waste prosessing with insects, questions regarding insect ethics arise.

regarding the properties of the end products (safety and nutrition) but these can be assumably tested and thereby monitored. These technologies are also mostly "unleaky" in a sense that their use can be confined, controlled, and stopped or reversed in the case of undesired or unexpected consequences.[77] The modification of living entities, animals and plants, is much more complex from the ethical viewpoint. The assessment of related solutions must take into account the moral status of the modified entities and the ethical implications of their moral status (e.g., whether modification violates their dignity). Questions regarding the known and unknown consequences of modification are particularly pressing when biotechnology constitutes a "leaky technology" that may spread, for example, by wind pollination. Uncontrolled spreading may in some cases undermine the right of other nations to decide about their agricultural practices. From the viewpoint of climatic considerations, I propose that the key topic in need of careful attention concerns ruminant modification because of the significance of ruminants both for the present agricultural systems and for the agricultural climatic emissions.

2.10.2 Adaptation supporting solutions

Adaptation assistance by biotechnology could be highly relevant to food security in the face of increased climate change induced stress on agriculture. Biotechnology based solutions could alleviate risks to food availability by creating crops that remain yield levels by being less prone to heat, drought, and/or diseases and crops or food products that are less prone to spoilage. Biotechnology could also promote the utilisation pillar of food security by enabling the creation of varieties that are not prone to nutritional degradation due to increased temperature, which is a challenge

[77] Some exceptions may apply. For example, insect-based bioconversion – the mass breakdown of food waste during which insects produce valuable commodities (e.g., lubricants, fertilizer, pharmaceutical compounds, or insect protein for feed) – uses living insects. This generates a risk that waste processing plant leakage introduces insects as a novel species in the nearby environment, which may in worst case have highly detrimental ecological impacts. (Insect-based bioconversion also evokes questions of insect ethics.)

already regarding many staple crops (see also Kortetmäki 2021). It has also been estimated that local *albedo enhancement* (which is a climate engineering technique if applied on a large scale) with more reflective crop varieties could cool local climates seasonally up to 1°C in Europe and North America, which could benefit the utilisation and availability pillars of food security be lessening the local harms from increased temperature (Kortetmäki 2021).

The use of biotechnology for adaptation raises a number of points with high ethical relevance. First, because protecting food security is among the weightiest moral obligations regarding food system activities, the consideration of biotechnology as an additional tool for adaptation to climate change will in any case require careful ethical examination. While ethical debate regarding GM and food security has been active for long (e.g. Rosset 2002), the magnitude of the risks posed by climate change to food security calls for updating reflections with new counterfactual information: what are the risks of applying biotechnology, compared with the risks of not applying it, in the world of climate change? However, such a consequentialist approach alone is insufficient for evaluating biotechnological solutions in the face of climate change, for biotechnology use may imply the violation of the rights of other communities or the modified animals. Moreover, the fundamental question related to adaptation with biotechnology is whether and how far it is morally permissible to adopt the approach of "fighting risks with other risks". Because the greatest harms from climate change will fall on the most vulnerable communities (and the most vulnerable groups within less vulnerable communities), those groups have a moral right to be heard in any decisions that may impact them – even if the expected impact is positive in comparison with the baseline scenarios.

2.11 The summarising table

Type of (potential) tension	Example forms
Theme 1: Food security	
Mitigation – food security	Biofuel crops <> food availability Carbon taxation <> access to food Price fluctuations <> access to food Resource efficiency <> resilience
Geoengineering – food security	Biochar <> access to food, biochar access BECCS <> food availability, access to food Solar radiation man. <> food availability
Adaptation – other food system objectives	Adaptation <> mitigation Resource allocation Innovation encouragement <> access
Theme 2: Environment and nonhumans	
Environmental sustainability	Mitigation <> Biodiversity Mitigation <> Resilience
Nonhuman animals	Intensified production <> animal welfare "Poultrification" <> animal welfare Innovations <> respect for animals

Type of (potential) tension	Example forms
Theme 3: Work and payment	
Livelihoods and work	Mitigation <> continuation of agriculture Mitigation <> viable livelihoods Mitigation <> justice for workers Short-term gains <> long-term benefits
Farmwork and professional ethics	Mitigation demands <> traditional conceptions of sustainable farming Climate discourse <> professional esteem
Theme 4: Where, what, and how food is produced	
Local food	Present local production <> Mitigation Retaining agriculture in many regions <> Mitigation demands Tradition <> Transformation
Dietary transition	Diets as usual <> mitigation "Old" plant proteins <> some food values (esp. sensory properties, convenience) "New" plant proteins <> some food values (esp. naturalness, non-processing)
Innovations and biotechnology	Mitigation-supporting innovations <> animal welfare and respect for animals Fighting climate risks <> new risks from innovations Innovation encouragement <> access Technology <> meaningful work
Food democracy	Inclusiveness <> (climate) effectiveness Democratic <> well-informed

Table 4. Key topics requiring attention at the intersection of climate action, agriculture, and eating

3 Navigating tensions: different ethical approaches

Different ethical theories and approaches[78] have been established and developed to answer what we ought to do in various situations. However, when tensions emerge, there are interests, claims, or other morally relevant factors that may pull in different directions regarding the answer. Section 2 described such tensions in the context of climate change, climate action, and agricultural and food system activities. Some tensions are easy to resolve and the morally right action or decision can be identified easily. It is simply a matter of acknowledging that no solution is win-win for all parties or all interests, but the different moral weight of different claims or interests is nevertheless easy to determine. In other cases, however, tensions are more complex and may yield moral dilemmas requiring careful ethical consideration.[79]

How to address the tensions and challenges identified in this report? In this section, I shortly introduce how different ethical approaches can be applied to navigating the tensions that arise

[78] "Gig theories" comprise consequentialism, deontology, and virtue ethics, and their variants. Approaches can also be less comprehensive and provide, for example, a conceptual framework to address ethical questions. Approaches can either guide action or simply provide tools for identifying and discussing ethical issues in a given context (e.g., Mepham 2000 provides a matrix for the analysis of novel foods as an example).

[79] Moral dilemma is a situation where the decision-maker must take several interests into account but is able to honor only one/some of them at the cost of others (Kvalnes 2019). Some moral dilemmas are false: forces pulling in different directions are mere temptations or social pressures (when, for example, a policy-maker may know what is the morally right thing to do but feels that it may not be accepted by voters) (Kvalnes 2019).

from the various objectives and obligations related to climatic, agricultural, and food matters. The section is suitable for both the proponents of ethical monism and ethical pluralism.[80]

3.1 Utilitarianism

Idea. Utilitarianism focuses on the consequences of an action: the right action is the one that maximises the overall good (the greatest good for the greatest number). Different approaches prefer different measures of good to be maximised (usually well-being or interest/preference satisfaction; see also Glossary: Utilitarianism). The preferences of every subject have equal moral weight in counting the overall good: everyone is equally important. Utilitarianism considers the relevant consequences of alternative actions and their impacts on the welfare/interests (or some other measure of utility) of morally significant parties. As an example, consider the tensions that may be raised by agricultural climate activities that threaten the economic viability of farming by causing additional economic burdens. Animal ethics has developed utilitarianism by building a strong argument that because all sentient animals are capable of experiencing pleasure and pain, they should be taken into account in the utilitarian calculus regarding what action is right (Singer 2011).

Example. The utilitarian calculus for resolving the best course of action is quite similar to the conventional cost-benefit analysis in economics. Yet, what counts as a cost or a benefit in utilitarianism comprises a much broader category. Moreover, utilitarianism considers the impacts of actions on future generations (usually with some provisos)[81] and animals, which is not very common in conventional cost-benefit calculations.

[80] Ethicists who embrace moral monism defend a single ethical theory applicable to all ethical problems in whatever sphere of life – though they disagree about the best theory. Those who embrace moral pluralism hold that different approaches fit different situations. For example, when the aim is to pay attention to the status of the disadvantaged and vulnerable actors in the face of climate policies, one may prefer justice- or right-based approaches; the ethics of eating, in contrast, may best be discussed with other approaches.

Utilitarianism makes a strong case for climate change mitigation: the good that follows from the continuation of emission-intensive activities is very small in comparison with the harms from climate change to present and future humans and nonhumans. Utilitarianism allocates a greater burden of emission reductions on actors who are currently better off, because the utility reduction caused by giving (let us say) a dollar away is much smaller for the rich than for the poor; this kind of accounting also takes into account the relative hardships caused by a certain level of climate action (Singer 2002, 42). Climate policy planning must therefore pay attention especially to the impacts of climate policies on the worst-off: the policies must not cause the greatest burden to them (Singer 2002, 42-43) – this would be the case with climate actions that would expose vulnerable groups to food insecurity. In food ethics, utilitarianism points out that culinary preferences are of secondary moral importance and cannot override the fundamental interests of animals to avoid the suffering inflicted on them by industrial food production. Consequently, utilitarianism provides a strong backing for the promotion of dietary transition on both climatic and animal-concerned grounds, even if the transition implies the loss of opportunities for some culinary enjoyments.

Addressing the tension between mitigation obligations and the livelihood of animal farmers with utilitarian methods involves identifying all relevant matters (and subjects) to be included in the utilitarian calculus. On the one hand, the livelihood and well-being of animal farmers will be put to the forefront because farmers generally represent a less well-off group. If farmers are on the verge of economic viability, the burden on them from mitigation demands may be heavier relative to placing similar demands on entrepreneurs who are better off. On the other hand, whenever animal production inflicts double harm – high GHG emissions and harm to animals – it is very difficult to justify its continuation as a source of livelihood to one person (who could be offered another occupation) or as a source of food to several people (whose

[81] The interests of future generations cannot be given equal moral weight: the number of people existing somewhere in the future is so multifold compared with the present population that any interests of the present population would be overridden. Hence, the ethics of discounting is a central field in climate ethics.

food-related needs can be satisfied by other means). Of course, creating a proper calculus for this situation would likely need to include a great number of other benefits and harms that may follow, including impacts on the welfare of affected humans, on domesticated and non-domesticated animals, and so on.

Utilitarian reasoning can help identify nuances that make a difference in action. For example, while it is important to reduce animal-based food production significantly in order to sufficiently reduce food system emissions, utilitarianism raises the point that mitigation activities should first target farms where the "welfare costs" of giving up animal production are smaller. As a starting point, reducing emissions from farms where the present farmer is about to retire soon would help avoid harms to the presently conducted livelihoods. It would also be helpful to start the transition from regions where farmers have the best alternative livelihood opportunities that allow giving up or reducing animal production while either shifting to plant-based crops or to getting income from other income sources; agritourism is an example of this.

Those who find the basic idea of utilitarianism plausible yet calculations for every single action unfeasible, rule-based utilitarianism offers an alternative. It does not assess single actions but aims to create rules for the best action, answering the following question: Which rules for action would promote the greatest overall good? Such rules could also, then, be applied to moral dilemmas regarding food system activities in the face of climate change.[82] While simpler, rule-based utilitarianism also loses the sensitivity to context-specific conditions included in the act of utilitarian reasoning. Based on my own observations while conducting empirical research on just transitions, I am convinced that sensitivity to contextual details is important in resolving the tensions appropriately.

Advantages and shortcomings. A central advantage of utilitarianism is its ability to nuance complex questions into the integrated assessment of numerous differentiated impacts of different relative weights. This can bring much needed detail for impartial comparisons and help overcome situations that are stalemate from the

[82] Such rules may also contribute to the creation of principlist responses (see the separate section below).

viewpoint of less nuanced principles or interests. Utilitarianism is also well applicable to policy-making processes where different actors call for raising different interests into consideration: in utilitarianism, they can be aggregated into an overall cost-benefit calculation. Utilitarianism also avoids sticking to rules that may be intuitively very plausible at first sight yet turn out problematic in complex situations.[83]

Utilitarianism also has shortcomings as a tool for resolving tensions. First, utilitarianism is, in principle, meant to assess acts according to all relevant consequences. This is intuitively compelling with classical philosophical thought experiments; however, the applicability of these thought experiments to real-world cases is actually very problematic (Wilson 2016; see also Box 5). Actually, the question "Which action promotes the greatest overall good?" to issues such as climate action in agriculture turns out to be very difficult to answer. Utilitarian climate ethics has also been prone to the problem of inconsequentialism. My individual decision to take a flight or buy a cheeseburger does not make a deciding difference to total emissions compared with not flying or buying a cheeseburger; why should I change my behaviour, then? Or, because the actions of a small farm are quite indecisive for the overall emissions, why should it pay any attention to its agricultural emissions? Justifying the emission mitigation duties of any single actor is challenging in this light and even more problematic since the costs of not buying a cheeseburger are direct and immediate to me, just as the costs of giving up animal production are direct and immediate to animal farmers.[84]

Another problem is that since utilitarianism focuses on the highest overall good to the greatest number, it does not suggest absolute limits for permissible harm to minorities insofar as the overall good is increased. Human and animal rights constitute a particular concern

[83] A typical example of such an exception is that the moral rule "do not lie" is commonsensical. Yet, in the case when a Nazi soldier knocks on one's door and asks whether there are any Jews hiding in the apartment (and there are), it is quite obviously morally right to lie in order to save the lives of the Jews. Philosophical literature offers numerous examples of when (for example) stealing, lying and killing can be morally permissible or even required if one ought to minimise serious harm to others.

[84] Convincing responses have also been made to inconsequentialism, although they cannot be dealt herewith.

in this respect: a utilitarian cost-benefit calculus may merely support mitigation activities that violate some rights,[85] which I find potentially alarming, especially in the context of biotechnology applications. As a related point, utilitarianism as a form of a cost-benefit calculation has been criticised as disrespectful for the integrity of subjects of a life, including human and nonhuman animals (Regan 1988), regardless of whether the consequences of the calculus happen to be beneficial to them. The demandingness of utilitarianism in its idea of taking all relevant consequences into account also raises the question of how to balance between the short-term and long-term consequences of actions.[86] One response to demandingness is rule-based utilitarianism; another is to ethically establish sound reasons for determining which type of consequences are to be included in assessments and which ones should be left out.

3.2 Principlism and duty-based ethics

Idea. Deontological (duty-based) ethics posits that an action is right when it conforms to the related moral norms, be they rules (duties) or principles. In bioethics, principlism has become a prominent

[85] Some utilitarians respond by saying that having some fundamental rights in legislation and ensuring respect for them promotes so much overall social trust and cohesion that having them in place increases the overall utility: rights have a utilitarian justification.

[86] The demandingness of utilitarianism relates to the great number of things to be taken into account (vis-à-vis, for example, rights-based approaches). The assumption is that there are many more consequences that may happen to someone's morally relevant interests than there are identified obligations or rights. Of course, approaches are different. For example, Peter Singer's argumentation for vegetarianism based on sentientism is sound and not too demanding yet deliberately narrow by simply considering the impacts of the process on the meat-eater and the factory farm animal individual. Nevertheless, food supply chain activities have numerous other socio-economic and environmental impacts that also have different degrees of moral importance (climatic emissions, employment and other economic impacts; environmental safety impacts of factory farming; and so on).

approach to analysing ethical issues. Principlism rejects the direct deduction of case-specific recommendations from high-level ethical theories.[87] Instead, reasoning relies on the more specified mid-level moral principles. The justification for the mid-level principles is grounded in the idea that they can be agreed upon without committing to a particular high-level ethical theory: one can arrive at and agree upon the principles from different theoretical grounds (Arras 2017).[88] In bioethics, there are four broadly established mid-level principles (Beauchamp and Childress 2019):

1. Respect for autonomy (recognition of an agent's own capacities and perspectives),
2. Beneficence (helping others further their important and legitimate interests),
3. Nonmaleficence (avoiding causing negligent harm to others), and
4. Justice (treating equals equally).

Principlist reasoning, while not always called principlism, is also common in climate ethics. The principles for the fair sharing of emission mitigation responsibilities and burdens are a flagship example: the polluter pays principle, the ability to pay principle, and the beneficiary pays principle. These have been proposed, in varying relative weights and combinations, as key principles for resolving the question of how to share the mitigation burdens (e.g., Page 2008).

Example. To help proportion the numerous claims of farmers and other food system actors regarding just climate actions, the work of establishing principles is also currently being carried out in the context of climate change mitigation and food justice (Tribaldos and Kortetmäki 2021). The list of principles and more specific criteria for just decarbonisation in food systems will help address

[87] This generally refers to the "grand ethical theories" regarding the criteria for rightness of an action (consequentialist, rule/duty-based, and virtue-based approaches).

[88] The authors who co-established the principles (Tom L. Beauchamp and James F. Childress) also represented two distinct high theory backgrounds.

arising tensions by demonstrating which claims and concerns should be given particular attention and priority (and why this is the case). The preliminary draft list (Tribaldos and Kortetmäki 2021) highlighted the following principles for making food system decarbonisation just: 1) The right to food; 2) The fair distribution of income, value and innovation in the food chain; 3) The distant communities' right to retain food security and livelihood opportunities; 4) The promotion of environmental quality, soil health and biodiversity; 5) The right of people to determine their own food systems and participate in decision-making; 6) Recognition (socio-cultural) justice, especially, respect for indigenous and local knowledge and cultural diversity, and respectful treatment of non-human animals and 7) Capacity development to support the equal opportunities of different kinds of actors to engage in and adapt to required changes. For example, the reduction of animal-based food production would, according to this list, be best carried out in places where it does not undermine anyone's right to food and where livelihood opportunities and opportunities for decent work and payment can be easily secured by other means. Simultaneously, capacity development would be required to help farmers shift to plant-based production and diversified income sources, or to educate themselves for new jobs; moreover, to ensure principles 5 and 6, the decision-making process should involve participatory engagement in order to identify the place-specific and cultural factors that would be the most important to be secured if possible. For example, regions with numerous livelihood opportunities, suitable conditions for diversified cropping or small towns with only relatively aged and soon retiring animal farmers would be the best places to begin the transition to enable a longer transitional period in regions where the transition is harder.

For food systems, a tailored set of principles or criteria is useful because it supports the incorporation of a sufficiently broad scope of issues in ethical considerations. A general principlist list (cf. the four principles of bioethics above) would not ensure attention to all actors, activities and aspects that are relevant; therefore, reasoning based on such a general list may be unjustifiably narrow-minded, given the importance of integrated, multi-issue considerations in climate justice (Caney 2016). Section 3.4 in this report also demonstrates why, for example, a single principle for "justice" would not

be very useful to address the complexity of equality-related considerations in the context of climate action, agriculture and food system activities.

Advantages and shortcomings. Mid-level principles are applicable in a pluralist society and can bring together views from different approaches at the high theory level.[89] Moreover, principles can either be applied in a top-down manner to establish relatively simple tools for ethical reasoning or as tools for reflective exercises (see Glossary: reflective equilibrium). Yet, principles do only part of the work even in the best case. First, different principles may suggest conflicting resolutions for action, which will need to be resolved with other tools. Second, very general principles (bioethics principles) do not tell which factors are morally relevant in the given question. The more complex set of principles and criteria for a just food system transition (discussed above) aims to answer this challenge.

[89] Of course, a number of issues remain open regarding how the principles are to be interpreted in different circumstances and what kinds of more specified principles are derived from them, since the mid-level principles are quite general in their nature and, for example, the "treating equally" raises the further question: equally by what measure?

BOX 5

A step deeper: how far can "The Pond/The Drowning Child" thought experiment stretch?

Let me demonstrate the problems of applying Singer's convincing and relatively simple thought experiment to the real world here shortly. In the essay *Famine, affluence, and morality,* Singer (1972) posits the following thought experiment: "… if I am walking past a shallow pond and see a child drowning in it, I ought to wade in and pull the child out. This will mean getting my clothes muddy, but this is insignificant, while the death of the child would presumably be a very bad thing." It is self-evident for many that one ought to save the child. Singer points out that if we agree with that obligation, we also have a moral duty – analogously – to give our money away (to charity or other humanitarian institutions) to help people in famine or other miserable conditions *until* giving one more dollar would mean, for us, sacrificing something of comparable moral significance. Taking this kind of duty seriously would make the life of almost anyone in the wealthier countries look very different.

However, to make the argument applicable in the real world based on an analogy implies two assumptions: that the real world case has the same normatively relevant features (as the thought experiment) and that the causal structures are similar in the thought experiment and the real world case. At first sight, we could make an analogous case to argue why we ought to contribute to emission reductions regardless of how guilty we are for the climate change as such, if we are the ones who are able to act and save the vulnerable parties.

In the real world food system activities, cases are much more complex than the Pond experiment case. Therefore, the applicability of a moral principle that has been derived in the context of "the Pond experiment" is not necessarily applicable at all in the reality. Analogously (and imaginatively) speaking, a "real-world Pond" would be crowded by numerous children at risk of drowning (making it impossible to save all); the rescue work may put other people at risk by necessitating risky techniques; or accessing the pond to save the child may require making an entrance payment to a person who actually uses the money to maintain practices that keep the pond unsafe.

(Vivid further examples can be found from the Philosophy Bites podcast: "James Wilson on Real World Ethics".) Finally, the very focus of the very example – what we should do regarding one child – may actually be mistaken. This is exemplified with the "Upstream Story" that has come in many forms: There is a large river with a high waterfall. At the bottom of this waterfall hundreds of people are working really hard, trying to save children who have fallen into the river, many of them drowning. As the people along the shore are trying to rescue as many children as possible one individual begins to run upstream. One of other rescuers yells: "Where are you going? There are so many people that need help here!", to which the other person replies: "I'm going upstream to find out why so many children are falling into the river."

3.3 Virtue ethics

Idea. Virtue ethics focuses on assessing character traits: which traits are virtuous, which are vicious; and which character traits does a particular kind of behaviour reveal or express? Whether character traits are virtuous depends on which goods and values are considered important to manifest in action in different spheres of life. For example, the virtues of compassion, temperance and honesty have been listed as central for reasoning about our dietary choices (Hursthouse 2011). Virtue ethics can either be integral to other approaches to ethics – for example, the four principles of bioethics can also be interpreted as virtues – or constitute an alternative approach on its own (Sandler 2013).

Example. Applying virtue ethics to agricultural and food ethics means thinking through relevant virtues as action- and choice-guiding traits: how would a virtuous person (or collective)—let us say a person with benevolence, integrity, temperance, compassion and honesty (and so on)—act in the given context? This requires the identification of relevant virtues first. There is no established set of environmental or food-related virtues. Yet humility, courage, benevolence, temperance, perseverance, integrity and wonder have been broadly acknowledged as virtues embraced by practically

all environmental virtue ethicists (Sandler 2013). Regarding food, virtue ethics has mostly focused on individual consumption. Simplicity has been proposed as one important virtue regarding environmentally sustainable food consumption that can also contribute to human flourishing (Gambrel & Cafaro 2010). Vegetarian practices have been linked with (at least) the virtues of compassion, temperance and honesty (about the conditions of industrialised animal production) (Hursthouse 2011). The virtue ethics approach has been applied to the case of agrarianism and farming to make the claim that virtue ethics can also concern collectives as virtuous actors, at least regarding entities such as family-run farms (Sandin 2012).[90]

For example, how would virtues guide decision-makers in prioritising between supporting the livelihood of local animal farmers (whose farming conditions enable only animal production) vs. reducing GHG emissions drastically and rapidly in order to mitigate disastrous climate change? Or how does virtue ethics help reason about biotechnology innovations? Are virtues sufficiently unambiguous to provide guidance for navigating societal challenges? Courage may, on the one hand, call for bold and rapid climate action to save future generations, vulnerable communities and the numerous endangered species; yet, compassion, on the other, may call for not hurrying action due to the situation of farmers who face viability challenges even without large-scale mitigation demands. Virtues such as integrity and honesty rule out some courses of action, but (at least I see) it is hard to see how environmental virtues such as compassion, courage and temperance would help resolve the aforementioned questions. To my knowledge, no virtue ethicist has so far addressed these very questions.

Advantages and shortcomings. Virtue ethics is praised for its focus on the positive visions of right action and on human flourishing, rather than on prohibitions and suffering; its intuitive appeal lies in everyday situations where the wrongness of an action is often articulated as wondering "what kind of person does that?" (e.g., Hursthouse 1999; Sandler 2010; 2013). However, even though

[90] Unfortunately, the mentioned contribution is too short to provide much grounding for further reasoning.

justice is one of the cardinal virtues,[91] virtue ethics tends to have an individual orientation, and its ability to address societal issues can be questioned. Virtue ethics has been criticised for its incapability of saying much about difficult ethical questions, such as abortion or euthanasia (Louden 1997). Dilemmas in the context of climate change and agriculture may not be easily resolvable by virtue-based thinking. On the other hand, at the moment of writing, a related research project on virtue ethics and biotechnology is ongoing and may produce answers to this question in the future.[92]

3.4 Justice-based approaches

Idea. Justice-based approaches focus on how different arrangements and actions promote or hamper the equality of citizens (and other recipients of justice). Sufficientarian or minimum justice approaches are relatively common in non-ideal, or "feasibility-oriented", social justice theorising, where the aim is to set an attainable minimum for a just society, instead of the hardly attainable ideal of full justice in all respects.[93] Sufficientarian justice "requires that everyone get an adequate (or sufficient) amount of specified goods (needed for a

[91] Prudence, justice, fortitude and temperance.

[92] https://www.nwo.nl/projecten/viveni191f010-0

[93] As regards feasibility, individuals and societies are different types of entities. Even though ethics generally holds that "ought implies can", it is difficult to know precisely what a society can do in terms of outcomes (although a process, such as establishing a new law, is known possible). For example, a fully just distribution of economic benefits and costs in a society would be practically impossible. The reasons are: (1) Other criteria of justice (e.g., individual liberty) create distributive inequalities all the time. (2) Identifying and correcting all distributive inequalities is unfeasible because of the number of transactions and events in the society. (3) Public policies almost always have unanticipated consequences, some of which are unjust to some. (4) The possibility to achieve justice is also influenced by international events, developments and agreements with other states. Global trade agreements, for example, restrict nations from acting in ways that would condemn some injustices (by, for example, prohibiting the import of products whose production processes are unjust).

decent and dignified life), such as what is required to meet basic needs, and that aiming at equality beyond that sufficiency threshold is not an appropriate focus" (Brock 2018). Minimum justice provides criteria for prioritising the most important demands and wants: minimum-justice-related entitlements matter most while other inequalities or trade-offs, such as unequal or risked opportunities to enjoy local wines in a mountainous scenery or travel to see the world, are overridden by demands of justice.[94] Different accounts have proposed partly different answers to the question of *what* everyone should have enough, and how much is enough for justice in the sufficientarian sense. I will next address two major approaches to sufficientarian justice to demonstrate how they may help address the conflicting claims and interests.

Needs-based approaches. A state is just when it provides its citizens equal prospects to achieve well-being or a dignified life. However, what constitutes well-being? Since people have limitless desires and expectations that increase when the standard of living rises, subjective ideas of well-being easily exceed environmental sustainability limits in industrialised societies. Hence, an environmentally sustainable conception of well-being must be grounded in non-subjective measures such as universal basic needs. The satisfaction of universal basic needs is required for well-being[95] and is therefore a fundamental entitlement (Gough 2017). This is called a needs-based approach to justice. Regarding food, it requires ensuring that citizens get to satisfy their food-related basic needs and that agricultural and food workers get a decent payment that suffices for satisfying material needs that are usually satisfied with income resources in the given society.[96] It is not a matter of justice whether people are equally able

[94] This may sound trivial but has radical implications when the people in plight in distant poor communities are taken into account. Another question is the "distribution order of goods", the order in which the entitlements of people should be met when there are many people under the sufficientarian threshold.

[95] This rules out the definitions where the set of needs would include only biological needs for staying alive.

[96] This depends on other societal provisions: if, for example, occupational education is free, there is no need to be able to pay the tuition fees from one's (or household's) income in order to get an adequate occupation.

to access all the enjoyments available in food markets or whether some benefit more than others from climate-action-related innovations insofar as all actors are able to satisfy their basic needs. Access to the current range of eating opportunities is not a matter of justice, not even if the capacity to exercise autonomy, which requires some options to choose from, is a basic need (Gough 2017). Intergenerational justice necessitates effective climate action to protect the possibilities of future generations to satisfy their basic needs (Meyer and Pölzler 2021), which means that emission reductions (and adaptation measures) must be prioritised over the present generation's non-basic needs and wants until sufficient emission reductions are achieved to secure the prospects of future generations to achieve well-being.

The capabilities approach. Another prominent approach to sufficientarian justice is Martha Nussbaum's version of the capabilities approach. It focuses on the actual opportunities (capabilities) of human beings: what is a person actually able to do and to be? According to Nussbaum, there are central capabilities that are necessary for pursuing any conception of a dignified human life, whatever the person-specific conception of a dignified or good life involves. Consequently, a just society must protect and promote central capabilities. They include: 1) Life of normal length and worth living, 2) Bodily health, 3) Bodily integrity, 4) The use of senses, imagination and thought, 5) Feeling different emotions, 6) Exercising practical reason and forming one's own conception of the good life, 7) Affiliation with others, including nonhumans, and self-respect, 8) Living with concern for or in relation to other species and the natural world, 9) Play and 10) Political and material control over one's environment. (Nussbaum 2011, 33–34.) The scope of examination can be expanded to include sentient animals.[97] The capabilities approach evaluates climate actions in relation to their impact on central capabilities. In mitigation, we ought to choose a sufficiently effective set of climate actions with minimal harm to the central capabilities. The focus on opportunities to act emphasises that there are often many ways to achieve key functions for a dignified human life. Attention must also be paid to the potential "lock-in" or dependency-creating impacts of actions. For example, if new

[97] The focal set of capabilities is not the same for different kinds of beings, of course.

technological solutions make farmers dependent on the products and practices embraced by a transnational corporation, this kind of dependence may violate their capabilities regarding political and material control over their environment or the exercising of practical reason freely in farming.

Advantages and shortcomings. Justice-based approaches help resolve tensions, especially when all claims are not related to basic entitlements, needs or central capabilities. Conflicts beyond basic entitlements can be left for markets where people can express their preferences. Sufficientarian approaches leave significant room for value pluralism (by focusing on the necessities of realising and expressing the values one embraces). Hence, they can generate public acceptability for climate actions that restrict individual freedoms or available choices in consumption. The capabilities approach has a particular advantage: by focusing on what subjects can actually do with certain resources, it takes into account differentiated needs and vulnerabilities with particular context sensitivity. This could make the approach fruitful when the aim is to consider the impacts of climate action on agriculture in different regions. On the downside, the notions of universal basic needs or capabilities (or their interpretation in practice) still remain open to contestations. What counts as a need, or when are central capabilities satisfied regarding, for example, culturally central practices? Food security demonstrates this complexity by raising questions regarding food preferences (see Section 2.9). Which types of foods should remain available and accessible to all in the name of basic entitlements (cf. Barnhill et al., 2014, Kortetmäki 2016)? Or what if, for example, some communities claim pastoral farming as fundamental for their cultural conception of a dignified life?[98] Various determination-regarding responses have been provided to keep sufficientarian justice approaches viable. Another main shortcoming is that justice approaches are not well equipped to address conflicts between either fundamental

[98] This may conflict with the future humans' entitlements to a safe environment (due to the climatic or other environmental impacts of the practice) or with non-human animals' entitlements if they are interpreted to reject the given form of animal farming.

entitlements or between various agricultural and food values.[99] In such cases, additional tools, such as consequentialist reasoning may be needed (Ilea 2008).

3.5 Rights-based approaches

Rights-based approaches also relate to justice thinking. Justice requires respecting, protecting and fulfilling the equal rights of all. Rights-like principles are often (albeit not always) considered to have particular moral significance that cannot be overridden by other reasons without exceptional justification.[100] Rights urge climate action: dangerous climate change violates the rights of a large number of people and communities. On the other hand, the urgency of mitigation does not mean that any climate action would be in harmony with rights (e.g., Roht-Arriaza 2009). Questions about the relationship between rights and climate action have also gained foothold in the just transition discourse, including, for example, labour rights in the face of large-scale job losses in communities built on the coal industry (Morena, Krause and Stevis 2020).

Example. Rights determine the limits for justifiable climate actions in agricultural and food system activities and may also

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[99] A possible response: if the dominant (Western) dietary patterns may jeopardise the satisfaction of needs of future generations due to high GHG emissions, the preference aspect of food security needs to be rethought and redefined or, after all, not considered as basic need. For example, the preference aspect could be interpreted through a negation: meeting nutritional needs should not require eating foods, the avoiding of which is required by one's preferences—whether related to religious, ethical or other reasons (see also section 2.2 in this work.) Prioritarianism could also help identify the right solution: if we pay particular attention to those who are presently worst-off, which of the alternative solution is the most justified?

[100] Rights can be judicial and/or moral; many moral rights have become legally confirmed; and human rights represent the most fundamental establishment of rights.

evoke duties to act to fulfil rights. Limits, for example, prohibit measures that may undermine food security or deprive communities of their livelihood and subsistence opportunities. The latter might justify the protection of agriculture in some rural regions (however, agriculture is rarely the only available source for livelihood). When there are tensions between different interests, a rights-based approach calls for comparing whether prioritising one set of interests over another is more respectful for rights.

A much-debated question is whether nonhuman animals should also be granted rights. The positive answer has been defended and nuanced in animal ethics. In common articulations, animals are claimed to have at least the right to avoid suffering that would be inflicted by certain food production methods. Accepting this claim would imply a ban on many industrialised animal production systems while perhaps permitting for example small-scale henhouses for backyard egg production (e.g., Cochrane 2012). The change would likely have a significant impact on food system emissions too (and livelihoods, admittedly). Views have been more divergent regarding whether animals also have a right not to be killed or not to be raised for the purpose of being killed for food. The Swiss Constitution, Article 120, also takes animals into account by recognising the dignity of living beings, and the Animal Welfare Act recognises the protection of the dignity and welfare of vertebrate animals but leaves the above noted questions untouched.[101]

Advantages and shortcomings. Rights-based approaches provide a strong answer to what should be prioritised (rights over other interests), and, in the case of legal rights, the ability of right-holders to claim for their rights judicially strengthens their binding force. Another advantage is that a broad set of rights have been almost universally accepted and subscribed to, which is a significant

[101] Constitution: https://www.fedlex.admin.ch/eli/cc/1999/404/en The Swiss Animal Welfare Act: https://www.fedlex.admin.ch/eli/cc/2008/414/en The Act states animal dignity and welfare as important aims but neither says anything about killing animals nor rules out intensified animal production (according to the present interpretation). Hence, the Act seems to justify human-based utility to override animal considerations quite easily.

pragmatic advantage for the legitimacy of rights-based approaches. However, rights-based approaches have also been criticised for neglecting contextual and cultural differences.[102]

In the context of this report, rights-based approaches may lack tools for addressing most of the conflicts that arise in the context of climate change, climate action, and agriculture. In the case of food systems and climate action, the questions of interpreting the precise content of rights and balancing conflicting claims for rights are not easily resolvable. For example, land use impacts in agriculture are a significant GHG source and effective mitigation may necessitate strong restrictions on the use of especially organic lands; yet, restricting agriculture on such lands may violate the right to property and to have control over one's property.[103] Also, the right to development[104] may conflict with climate policy instruments. While insufficient mitigation leads to the violation of the rights of many vulnerable communities and their members, a single restrictive mitigation policy can perhaps never be justified as *necessary* for avoiding climate-related rights violations. This creates a risk that those who resist climate policies with an appeal to rights always win conflicts, which in turn may lead to overall ineffective climate action. Other measures are, therefore, likely needed to effectively address the complexities that arise in the context of climate action.

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[102] Especially, communitarian approaches to justice (see Glossary) criticise rights-based approaches on "being falsely universalistic" and neglecting the contextual and cultural differences.

[103] Because land grabbing and illegal land appropriation from, for example, indigenous communities have been among the gravest environmental injustices and rights violations in the colonial history, it is understandable that land rights affecting climate strategies easily get strong objection.

[104] The right to development is an inalienable human right by virtue of which every human person and all peoples are entitled to participate in, contribute to, and enjoy economic, social, cultural and political development, in which all human rights and fundamental freedoms can be fully realized. https://www.ohchr.org/en/professionalinterest/pages/righttodevelopment.aspx

3.6 Deliberative vs. market mechanisms

Democratic societies offer two main avenues for navigating amidst different interests and valuations regarding food system activities: the market and public sphere.[105] When decisions and resolutions are left to markets, the assumption is that free markets allow consumers to express their preferences and values, and competing market actors help optimise the responses to consumer preferences. Markets "resolve" tensions simply by yielding plural options so that each consumer can presumably act according to their own values and preferences and vote with their wallets. A market-based avenue is also associated with the maximisation of freedom of choice. In markets, individuals can make their choices from the available options without deliberative or coordinated collaboration, whereas the public sphere comprises coordinated and deliberated collaborative action. While markets often bring to mind retail in food supply chains, agriculture also operates partially within the private sector (while partially within the public sector when it is supported by agricultural subsidies and related regulations): almost all exchange activities in agriculture take place under the market logic, from the purchasing of seeds, fertilisers and machinery to the selling of products via various distribution channels.

Leaving tension resolution to markets in the case of many agricultural and food system activities is morally problematic. Unable to explore the topic here in depth, I summarise the key issues based on my reading from food justice and food system literatures. 1) Even if markets necessitate some moral norms such as property rights and abstinence from coercion (at least in principle)[106] to

[105] An alternative to democracy would be technocracy, where these issues are resolved by the experts of the given issue. Many democratic societies have also some technocractic spheres of action, admittedly. In a highly technocratic society, philosophers would be the likely experts of moral questions. Readers interested in the critique of technocracy may find Jeffrey Friedman's book, *Power without knowledge: A critique of technocracy,* and Loo (2019) on procedural justice in food systems useful.

[106] An example of legal market-based coercion is that a disadvantaged party may, in practice, have no choice but to sign highly disadvantageous contracts, for not signing would make it even worse off. Hence, the signing of the contract is principally voluntary but de facto not (see also Timmermann 2020).

ensure cooperation, markets, by no means, guarantee a sufficient consideration of morally relevant matters or the protection of vulnerable parties.[107] 2) Market logic parallels issues of different moral significance. A weightier issue may simply "lose" because it concerns a lesser number of people. Consider Claim A, that all coffee producers in developing countries should get a fair payment and support for getting their children educated instead of working (the latter now happens because of the indecent payment), vs. Claim B, that all consumers in the country should be given a chance to access a variety of goods, including coffee, regardless of their income. The latter claim insists on keeping coffee prices as low as possible. Resolving this tension via markets means offering consumers a selection to express their choice about whether A or B matters more. Certified options are offered to those who think that Claim A is weightier. However, most of the coffee enjoyed in the industrial world[108] is still produced without guaranteeing fair compensation. Coffee producers are a minority against a cheap-coffee-yearning global consumer majority. 3) Embracing market-based solutions often falsely assumes that citizens can equally express their preferences in markets. Yet, "voting" is highly unequal (the number of votes correlates with one's wealth), votes for responsibility are mainly in the hands of well-resourced actors (e.g., Kortetmäki 2019a) and voting for particular choices also depends on product availability determined by nearby retailers.[109] In sum, there are strong grounds for the argument that the resolution of the most impactful issues should not be left to markets but subjected to public decision-making. The difficulty of supporting climate action

[107] Problems in the previous and contemporary market activities demonstrate the significant ethical risks of leaving conflict resolution to markets. Historically, markets have been "alright" with slavery and various forms of human and resource exploitation. The magnitude of contemporary market wrongdoings, such as modern slavery (for food, see e.g., Gottlieb and Joshi 2013), child labour and animal abuse, suggest that the market sphere still lacks strong norms that would rule such activities out.

[108] Approximately 25% of global coffee production is certified according to some responsibility standards. Some countries or retail companies may have chosen to sell only certified coffee.

via markets, especially regarding shifts in agricultural production contents or methods (we cannot buy something that does not yet exist), also demonstrates why food-related climate solutions necessitate public deliberation (Kortetmäki 2019b).

Decision-making in the public sphere can be more or less deliberative and raises, in ethical terms, the question of procedural justice: the fairness and inclusiveness of decision-making processes. Practically all accounts of justice consider procedural justice important, for citizens ought to have equal opportunities to participate in deciding how the common rules for societal life and institutions managing, supporting and monitoring such rules are arranged. Food justice and food sovereignty discourses have actively claimed for greater food democracy and the power of local communities to determine their own food production systems (e.g., Alkon and Agyeman 2011; Whyte 2018; see also Gilson and Kenehan 2019). Public deliberation can at best produce legitimate, well-informed decisions where the knowledge, views, and values of different parties have been carefully considered to find the overall best solution. Yet, two issues require particular attention in public decision-making: first, the equality of participation, and second, ensuring that increased procedural justice does not lead to less just outcomes because of widespread misinformation or bad understanding about the contents of decision.

Formal equality of participation, including, for example, the equal right to vote in elections or in pre-determined polls, does not guarantee procedural justice since it allows the dominance of powerful voices and marginalisation of others in decision-making (Loo 2019). The significant economic and political power of the biggest transnational food companies in food system governance (e.g., Clapp and Fuchs 2009) creates a risk that decisions are, in practice, made by private companies and their powerful

[109] Although it is often possible to ask the retailer to order a particular product in the store, having only one or a few consumers rarely suffices to keep the product on the shelf. I have numerous personal experiences regarding trying to get particular (in my view great!) products from local or small companies to our local grocery store: one batch is ordered but supply is discontinued due to insufficient total sales.

representatives rather than by citizens and policymakers.[110] Strong lobbying may lead to such outcomes even if politicians make a formal decision. Participatory opportunities may also be unequal due to resource disparities. The least well-off people are often the most vulnerable to policy impacts, yet they also tend to lack resources to have a say: struggling through daily challenges is demanding enough. Farmers on the edge of viability, small entrepreneurs overburdened with work and low-income households are among groups that may require special attention in this respect. Justice calls attention to listening to vulnerable and marginalised groups, and also to the future generations and nonhumans incapable of voicing their claims themselves.

3.6.1 Food democracy, just outcomes, and effective mitigation

Because democratic decisions are typically majority decisions, procedural justice does not guarantee just outcomes, although alleviating the above-described resource disparities and ensuring the consideration of vulnerable groups lessens these risks.[111] Climate action in agriculture and food systems raises numerous trade-offs, the resolving of which may create unjust outcomes, not only due to procedural inequities and the diversity of interests that may conflict (Ciplet and Harrison 2019) but also due to the lack of sufficient information or understanding about the problem. It is important, of course, that participants *understand* what they are deciding about and what the expected consequences of the actions they vote for are. Yet, experience shows that, for example, the risk assessment and management related to novel technologies may be very complex for non-experts to understand. The same concerns climate change and agriculture even if people at a general level comprehend what climate change is about. Empirical

[110] An example of this is the Australian National Food Plan creation, where the initial focus on broad sustainability reduced to emphasis on economic sustainability; this was promoted forcefully by the food industry, which was a very active, well-coordinated participant in the plan creation process (Trevena, Kaldor & Downs 2015).

[111] The fundamental basic rights are usually protected in the constitution, which cannot be changed easily.

studies have repeatedly found that consumers overrate the environmental impact of transportation and packaging and underestimate the environmental impact of meat consumption (e.g., Siegrist, Visschers and Hartmann 2015). This implies a risk that even environmentally well-intentioned initiatives, when based on public deliberation on the matter, end up favouring the present production structures and high-GHG diets instead of mitigation (Kortetmäki 2019b). It is a question of psychology as to whether and how easily the provision of additional information would change public perceptions significantly in these respects, but it would be naive to make the mistake of a philosopher and assume that people are perfectly rational and change their opinion immediately when they are provided with new scientific information. In any case, while there is nothing logically contradictory between food democracy and effective climate mitigation, there is a risk of bad decision outcomes. This may also concern the application of novel solutions in agricultural production, which may require a deep understanding of both technologies and agricultural practices. Because participatory decision-making is nevertheless constitutive of practically any conception of social justice and democracy, climatic obligations require societies to think how to create participatory processes that support participatory deliberation yet also utilise new scientific knowledge and expertise effectively in decision-making processes. There are also pragmatic reasons for addressing climate change with democratic means: participatory processes can increase policy acceptance and engagement in climate action.

3.7 The role of empirical sciences in navigating tensions: the ethics-science-policy interface

Many questions in agricultural and food ethics are strongly linked to empirical matters, and changes in empirical information or conditions influence ethical reasoning (premises and thereby conclusions) significantly. Therefore, the consideration of systems-wide empirical information is important for making ethical reasoning sound and precise in the context of climate change (see Kortetmäki and Oksanen 2021 for an example). A further way in which empirical information can be useful concerns

navigating the tensions described in Section 2. I will next contemplate how ethical analysis can utilise empirical sciences to advance reasoning at the intersection of climate change and agricultural matters. I will also consider the impact on the other direction: What role should ethics play in advancing empirical agricultural sciences and food system studies?

Assessing the differences of degree vs. differences of kind. The climatic impacts of food system activities, from agriculture to dietary patterns, are a matter of empirical inquiry. These results essentially determine the status of different food choices and agricultural production practices from the viewpoint of climatic impacts and climate ethical obligations. Because of methodological developments, results develop and "improve" all the time; hence, related ethical reasoning should also be self-updating. This also demonstrates why climate-oriented food ethics cannot bind itself to fixed food-ingredient categories like the "traditional" ethics of eating dietary does (Kortetmäki and Oksanen 2021; see also Budolfson 2015); from the climatic and dietary viewpoint, no single food item can be categorically impermissible.[112] It is important that ethics rely on empirical information to understand when the moral rightness of an action is a matter of degree—acting right is about avoiding exceeding the threshold of harm—and when it is a matter of kind, i.e. an action is right or wrong as such (regardless of the scale or magnitude of action). The grounding of moral principles with a pragmatist mindset, that is, by choosing the most comprehensible and effective way to frame moral norms, would also benefit from behavioural scientific information about how individuals comprehend and adhere to

[112] Ethical desirability refers to choices the moral rightness/goodness of which is measured at the aggregate level, here as the total emissions of one's all food choices. A single food choice never makes the whole diet morally right or wrong in climatic impact terms (Kortetmäki & Oksanen 2021). The term "ethical desirability" can be, however, used to describe the carbon footprint of a single food product, since eating low-impact food products is more desirable in order to ensure meeting the dietary obligation of staying under the threshold of causing harmful climatic emissions by one's diet. In some other contexts, ethical desirability may refer to choices that are permitted yet supererogatory (not obliged).

different types of guidelines. Empirical moral psychology can be valuable for the justification of restrictive public policies.

Integrating the systemic view into agricultural and food ethics. A majority of food ethics has focused on either interactions between particular types of agents, such as human and nonhuman individuals, or on linear supply chain thinking, such as how eating meat means that animals are raised for food. However, food-related activities take place within food *systems,* and the consideration of a systemic viewpoint, in some cases, makes a big difference. One example is the food choices that are morally impermissible in "supply chain based reasoning" (eating a piece of meat requires raising and killing an animal) by constituting the end point in morally impermissible supply chains (from an industrial farm to the meat-eater's fork). However, systems-oriented reasoning can make such actions permissible, or even ethically good (though not perhaps obligatory), because the systemic viewpoint can differentiate when choosing to eat a particular food product may influence the demand for problematic actions and when not, while also taking into account the non-ideal reality. Consider two cases. First, it can be ethically sound to choose to eat any food to prevent it from going to waste (Kortetmäki and Oksanen 2021). Second, it may also be ethically sound to sometimes make a non-ideal choice because the cost of making (what would generally be the ideal choice) would, in those circumstances, have significant opportunity costs: for example, even though one basically adhered to a vegan diet considering it as their moral obligation, it can be morally sound to choose a non-vegan option if asking a vegan version resulted in significant waste of raw materials in a restaurant (because, for example, the present lack of demand would make most of the package contents go to waste), or if getting a vegan choice required lots of extra driving with a fossil fuel-powered vehicle to obtain the ingredients for a single meal. The systemic viewpoint relates to making morally right choices in a non-ideal world, and that is where empirical sciences provide important information about the relative climatic, environmental and social costs of different options.

Counting the costs of "doing nothing". One specific aspect is that empirical information is the necessary source of evidence for counting

the ethically relevant costs of alternative actions, including the costs of business as usual or doing nothing about climate change. This kind of counterfactual reasoning is very important in the context of agricultural and food-related climate mitigation and adaptation discussions. The proposed solutions for climate action should not be compared against an assumed "no-action, no-cost" scenario but against a "no-action, high-cost" scenario with significant predicted environmental, social and economic costs from climatic harms that will worsen over time. Climate economics employs the concept of the social cost of carbon, which means the economic costs of an additional ton of CO_2-eq. emissions (Nordhaus 2017). In a similar manner, thinking about the *ethical cost of carbon* is the counterfactual basis against which the potential negative impacts of any climate-action-related solutions should be compared.

Identifying climate-action-related harms that can be alleviated by other policies. Many ethical tensions arising between climate action and agricultural and food system objectives are pragmatic in the sense that they can be alleviated with appropriate policy solutions. One example is the tension between the protection of livelihoods in a region presently dominated by carbon-intensive economic activities (such as keeping livestock or coal mining). New economic activity and livelihood sources can be generated via different policy means, and empirical information provides information about the potential of different ways to create/nurture economic diversification in the region. Therefore, the case-specific interpretation of the "climate action should not undermine the livelihood opportunities in any region" kind of principle for justice in climate action needs to be accompanied with empirical information. If there is a foreseeable harm from climate action that can nevertheless be prevented, alleviated or appropriately compensated while taking the action, the mere existence of a foreseeable harm does not justify rejecting the given course of action.

3.7.1 The input from ethics to empirical climate change, agricultural, and food system studies

It is also important that ethics influences empirical sciences at the junction of climate change and agricultural and food practices, in

ways that reach beyond the "basic task" of research ethics. First, ethical reasoning can provide a valuable contribution to the whole research community for deciding research priorities in conditions where research resources (financial, human, and time-wise) are always insufficient for doing all possible research: what are the most pressing questions and problems regarding which we would need improved understanding and knowledge? What are the "injustice hotspots" where tensions between different societal objectives are so difficult that research attention is needed to find ways forward? What are the issues and groups that are made visible or invisible by particular choices of funding, framing, and communicating research, and how to ensure that different communities are able to benefit from the research results? How does the research construct nonhuman animals in the context of decarbonisation (is animal agency recognised, or are production animals reduced into a quantifiable "mass" that is perceived primarily as a source of climate emissions and nutritional resources)? The constant need to reflect upon these issues calls for the increasing integration of ethicists in interdisciplinary collaboration.

4 Conclusion

This report explored the intersection of climate change, climate action and agricultural and food ethics. Climate change will impact agricultural production and vice versa. Climatic impacts such as temperature increases, precipitation changes, permafrost melting and the increased likelihood of weather extremes will impact food production significantly and, mainly, in negative terms, even though some cold regions may also benefit from temperature increase. On the other side, food system related emissions—mostly of agricultural origin—comprise up to 21%–37% of the total greenhouse gas emissions caused by human activities. Consequently, both emission mitigation and adaptation to climate change are very important to keep food systems running and to meet the ethical obligations that arise with relation to food security, on the one hand, and climate change, on the other. In addressing these issues, the report focused on industrial food systems, especially in European conditions.

However, the integration of climatic considerations and related objectives into agricultural and food ethics invokes new challenges and moral dilemmas. Section 2 introduced these questions from different thematic perspectives. It demonstrated that tensions between climate action and related objectives, and between agricultural and food practices and related objectives, arise because of the new objectives set for food system activities due to climatic obligations. Section 2 identified the following topics as requiring particular attention:

- food security;
- trade-offs between climate action and other environmental objectives in agriculture, especially biodiversity and resilience;
- trade-offs between climate adaptation and mitigation;
- the impacts of climate action on nonhuman animals in agriculture;
- the impacts of climate action on farmers and farmworkers;

- conflicts between the implications of dietary transition, food values, and local food;
- ethical issues that arise in the context of innovation and biotechnology ethics.

Putting emission mitigation demands together with other agricultural objectives is particularly challenging. Agricultural activities generate most of the food-system-related emissions, yet the declining profitability of farming and the relatively weak status of many farmers in terms of economic and other resources means that they are among the least resourced food system actors to invest in significant transformations in their practices. Moreover, there are many factors in agriculture that are matters of "brute luck"—i.e. they have not been freely and consciously chosen by the farmer—that influence farm-level emissions, the range of available mitigation and low-carbon production opportunities and the costs of climate action. These factors relate to the climatic and geographical conditions, as well as the history of a farm that has often determined the production sector inherited by the present farmer.

One of the most tension-generating issues is animal-based agricultural production. It is presently estimated to account for approximately half of all food-system-related emissions, and especially ruminant (as well as other livestock) production has been found to be highly GHG-intensive activities. This puts great pressure to reduce animal-based agriculture and for dietary transition towards more plant-based diets; dietary transition, notably, has also been recommended for public health reasons. Simultaneously, however, ruminant production represents a form of agriculture that can be viably conducted even in harsh and nonarable conditions. Moreover, certain forms of pastoral farming are the only form of animal production that is acknowledged to have positive biodiversity impacts, while animal production generally is a major driver of biodiversity loss. Tensions that arise between animal production and climatic considerations have been addressed especially in Sections 2.2–2.5 and Section 2.8. This tension may also give rise to particular aspirations regarding biotechnological solutions to reduce emissions in animal production (see Section 2.10).

Section 3 provided a short exploration of how the discussed trade-offs and conflicts can be addressed with a variety of ethical

approaches. Four points are worth noting when the tensions are brought up to be addressed. First, resolving tension requires identifying (and acknowledging) the variety of issues that are simultaneously at stake and the range of actors who may be impacted by decisions. Second, ethics is needed to carefully evaluate the relative moral importance of the conflicting objectives or claims and to rank them in order of importance; ethical approaches differ in their advantages and shortcomings in this task. Third, pragmatically speaking, it is important to consider the different ways of deliberating and resolving the arising tensions. Social justice provides strong reasons for public deliberation and participatory inclusiveness in addressing the issues of as broad a significance as climate actions hold in agriculture and food systems. However, the complexity of the questions at hand and empirical misperceptions create a risk of ill-informed and thereby bad or wrong decisions unless determined measures are taken to create decision-making processes where both public and expert involvement is appropriate.

Fourth, conflicting claims can be remedied by trying to negotiate the least *unacceptable* ways of achieving sufficient emission mitigations, simultaneously with discussions about where compensation is needed for the losses caused to some actors due to, for example, land use restrictions. The ethical reasoning in the context of climate change should beware of the so-called *Nirvana fallacy,* an informal argumentation fallacy assuming that the problem would have a perfect solution and therefore solutions with any problems can be justifiably rejected. Such argumentation has sometimes been used to oppose any climate policy that is estimated to have some negative impacts on some activities or actors in society. However, neither there will nor need be perfect solutions in addressing the situation where the no-action scenario has the most harmful consequences. What matters is the acceptability of different solutions compared with other solutions, and that making these comparisons and evaluations is informed by both empirical facts and adequate moral reasoning that ground good decision-making. This report, I hope, also contributes to that aim.

5 Glossary

Conceptual analysis: methodology that examines a given question by analysing the concept(s) that are relevant for addressing the question. Conceptual analysis often considers the necessary and sufficient conditions for the application of the given concept, such as which factors make an animal sentient or a diet carbon intensive. Conceptual analysis can also, for example, point out unjustified uses of a concept, which in turn may influence ethical argumentation, legislative interpretation or public discussions utilising that concept.

Empirically informed ethics: ethics where empirical information plays a stronger role than "minimum" (what is unavoidable in all human thinking). In modest ethical empiricism, empirical results are an important source of evidence for ethical reasoning; in the strongest version, normative ethical questions are empirical questions, which would make ethics mainly a matter of sociological inquiry. Within the philosophical modest form of empirically informed ethics, the significance of empirical information is greatly a matter of degree; "empirically informed ethics" tends to refer to approaches that utilise empirical information in their reasoning more than average approaches. In the context of food ethics, for example, a relevant difference between conventional food ethics and empirically informed food ethics is the question of whether the whole food system and its relations are taken into account as relevant premises for making judgments on the moral acceptability of different choices (see Kortetmäki and Oksanen 2021 for an example).

Food sovereignty: a norm that defends the self-determination right of collectives (and their governments) over their food system activities (Whyte 2018). Established by the La Via Campesina

movement and their Nyéléni Declaration, food sovereignty as an agricultural and peasant community activism originated in South America and created an alternative to the food justice activism that originated in North America. For similarities and differences between food justice and sovereignty, see Cadieux and Slocum (2015). Food sovereignty can also be described as one norm that should inform the conception of food justice (Whyte 2018, 346).

Food system(s): a food system comprises the whole that determines what, how, where, when and by and for whom food is produced, processed, distributed and consumed. This includes supply chains from farm to fork (or from seeds to waste) but also the drivers that influence food system activities—the relevant economic, political and sociocultural factors, agreements, and such—as well as the outcomes of the food system (food security, environmental and socio-economic outcomes). Food systems can be looked at different scales that are interlinked and overlapping: it is possible to talk about regional, national and global food systems.

Justice/relationship to ethics: justice refers to ethical matters that concern how individuals or groups (sometimes including nonhumans) are treated in relation to each other: just treatment is something due to each of them. Justice is, thematically speaking, internal to ethics, and in some (especially continental) discussions, justice is labelled under social ethics.

In practice, research literature on justice and ethics is partially diverged, probably as a result of increasing specialisation in research. Moral philosophy deals with numerous ethical questions, of which justice has become a prominent research topic in political philosophy and theory. Some approaches consider political philosophy simply a part of moral philosophy that studies how societies should be organised, while others consider political philosophy as having its own point of departure that sets out from the actual features of political life and focuses more on the very political terminology, framework and legitimate foundations for various authoritative constraints in society (Larmore 2013). The latter, politically and often problem-oriented approach is also strongly connected with social justice movements and disciplines studying those movements (e.g., human geography and sociology). The

different emphasis of justice and ethics, despite similar core themes, has resulted in partially divergent methods, discussions and research literature. Environmental and food justice researchers also generally discuss more with people oriented toward political philosophy and theory, linking with their frameworks and literature, while food ethics is more aligned with moral-philosophy-oriented people and less infused with material from other disciplines and ongoing civil activism in society.

Justice/communitarian: liberal justice is typically contrasted with communitarian justice. Communitarian approaches criticise the assumption of universality as a starting point for theorising the conditions of a just society. They also often criticise the assumed neutrality of "liberal justice" that, according to the criticism, is actually based on the non-neutral and non-universal Western conception of a human individual (Sandel 1998). Instead of equal individual liberties, communitarian approaches emphasise that moral judgment always depends on "the language of reasons and the interpretive framework within which agents view their world, hence that it makes no sense to begin the political enterprise by abstracting from the interpretive dimensions of human beliefs, practices and institutions" (Stanford Encyclopedia of Philosophy: Communitarianism). Communitarian approaches allow the recognition of a certain universally shared minimal moral core, such as the most fundamental human rights, which is not yet sufficient to guide the ordering and operation of a just society and is thereby complemented with communitarian-based considerations of right.

Non-ideal and ideal theories: see Box 1 in the main text.

Parity of reasoning: A method in ethics where the conclusion of an argument A is achieved by finding an analogous (structurally similar) argument B with an accepted/known conclusion, and the conclusion for B is derived with a similar logical structure from the premises. Often, B is also constructed as a thought experiment where the conclusion is intuitively clear. An example of the parity of reasoning is Peter Singer's famous argument that because we are morally obligated to save a child drowning in a pond when the saving does not cost us anything of equal moral significance, we

are also morally obligated to give aid to the world's poor through charity if the costs of giving aid to us are of less moral significance.

Prima facie holds unless something more important overrides it: a *prima facie* obligation holds unless some other weightier obligation overrides it.

Principlism: an approach to bioethics (or other applied ethics) that utilises mid-level principles for reasoning about practical ethical problems. Mid-level principles are derived from the so-called "high theories" (utilitarianism, deontology, etc.) and act as interpretation-requiring guidelines for the moral evaluation of ethical problems. Principlism as the main approach in bioethics is suggested to be appealing in a pluralist society because mid-level principles can be embraced by different high theories, including utilitarianism and deontology (Beauchamp and Childress 2019). Principlism can be conjoined with, for example, the reflective equilibrium method, which establishes a bi-directional relationship between case examination and the principles: both may revise each other, rather than a simple deductive application of mid-level principles to particular cases.

Reflective equilibrium: a method in ethics that aims to bring the moral principles, considered moral judgments, relevant scientific background theories and ethical intuitions about particular cases in a coherent alignment with each other (this process is also called coherentism). Identified incoherences between these call for revising some of the judgments or principles. Since the introduction by John Rawls, reflective equilibrium has been used widely in practical ethics and can even be considered as a sort of "default method" in ethics as well as in non-academic moral disputes (Räikkä 2009). Sometimes, approaches that take context-specific empirical conditions into account are specified as utilising wide reflective equilibrium.

Utilitarianism: the approach according to which morally right action is the one that maximises overall good. Utilitarian approaches differ regarding how the "good" is defined: it may denote utility, well-being, preference satisfaction, and so on. Approaches also

differ regarding which consequences (actual or expected) are considered and for whom, and how the maximisation of the good is calculated. While classical utilitarianism considers relevant harm as a matter of pleasure and pain, theoretical developments have nuanced the view from such a hedonistic perspective toward more welfare-oriented directions, and many nowadays endorse welfare as the good to be maximised (this of course leaves a lot of room for debating the best measure of welfare). A central distinction is also between act consequentialism, which focuses on evaluating the moral rightness of actions, and rule consequentialism, which focuses on establishing rules, the following of which would maximise the overall good (even if following the rules occasionally has undesired impacts). From the viewpoint of agricultural and food ethics, the most significant theoretical feature in utilitarianism is the inclusion of sentient beings in the sphere of subjects whose welfare, interests or pleasure and pain ought to be given equal regard. This has significant consequences for the moral permissibility of different dietary choices and food system practices. While climatic considerations in agricultural and food ethics almost always refer to some consequences (the impacts of climate change), this does not mean that any climatic reasoning on agricultural and food ethics would be utilitarian.

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Other books in this series:

Andreas Bachmann
Nanobiotechnologie
Eine ethische Auslegeordnung
2006

126 Seiten
BBL-Artikelnummer:
810.001
ISBN: 978-3-905782-00-4

Die Nanobiotechnologie verfügt über ein enormes Potenzial. Dies lässt sich anhand von breiten (möglichen) Anwendungen in der Biomimetik, Medizin, Landwirtschaft und Ernährung («Nano-Food») verdeutlichen. Das Buch legt die in der Literatur diskutierten ethischen Aspekte der Nanobiotechnologie dar. Es handelt sich hierbei um die Aspekte Risiken für Mensch und Umwelt, Gerechtigkeit («Nano-Divide»), militärische Anwendungen, Datenschutz, Nanomedizin und Enhancement. Es liefert keine Antworten, sondern soll helfen, die Diskussion über den ethisch angemessenen Umgang mit der Nanobiotechnologie besser zu strukturieren.

Jürg Stöcklin
Die Pflanze
Moderne Konzepte der Biologie
2007

77 Seiten
BBL-Artikelnummer:
810.002
ISBN: 978-3-905782-01-1

Die Schweizerische Gesetzgebung verlangt, dass nicht nur bei Tieren, sondern auch bei Pflanzen die Würde der Kreatur geachtet wird. Bei Tieren gibt es gewisse Anhaltspunkte, worin ihre Würde besteht. Bei Pflanzen stellt sich die Frage, welche ihrer Eigenschaften Würde begründen könnten. Das Buch befasst sich aus der Sicht der modernen Biologie mit Pflanzen und deren Unterscheidung von Tieren. Auch wenn sie sich in ihrer Organisation grundsätzlich unterscheiden, so sind sie sich hinsichtlich ihrer zellulären Strukturen und dem Grad ihrer Komplexität doch sehr ähnlich. Das Buch beschreibt die Fähigkeiten von Pflanzen, Informationen aus ihrer Umgebung aufzunehmen, zu speichern und darauf zu reagieren. Vor diesem Hintergrund wird argumentiert, dass die Unterschiede zwischen Pflanzen und Tieren lediglich gradueller Natur sind. Aus biologischer Sicht kann keine Höherentwicklung von Tieren im Vergleich zu Pflanzen postuliert werden.

Andreas Brenner
Leben
Eine philosophische Untersuchung
2007

192 Seiten
BBL-Artikelnummer: 810.003
ISBN: 978-3-905782-02-8

«Was ist Leben?» Zunächst wird gezeigt, warum diese Frage so schwierig zu beantworten ist und warum auch die Biowissenschaft wenig zur Aufklärung dieser Frage beiträgt. Im Unterschied dazu beschäftigt sich die Philosophie seit ihren Anfängen intensiv mit der Frage nach dem Leben. Biophilosophische Theorien des 20. Jahrhunderts greifen auf diese Positionen zurück und machen von unterschiedlichsten Ansätzen ausgehend die Selbstbezüglichkeit von Leben deutlich. Der so gewonnene Lebens-Begriff wird an Entwürfen «Künstlichen Lebens» getestet, z. B. an Projekten der Synthetischen Biologie. Dabei wird untersucht, ob und inwiefern der Lebens-Begriff hier anwendbar ist. Zum Abschluss der Untersuchung wird die Selbstbezüglichkeit von Lebendigem noch einmal aufgegriffen. Jüngste naturwissenschaftliche Beobachtungen lassen sich dahingehend deuten, dass Leben sich in der Stiftung von Sinn und Bedeutung artikuliert.

Benjamin Rath
Ethik des Risikos
Begriffe, Situationen, Entscheidungstheorien und Aspekte
2008

203 Seiten
BBL-Artikelnummer: 810.005.d
ISBN: 978-3-905782-03-5

Welchen Risiken darf eine Person sich selbst und andere aussetzen? «Ethik des Risikos» befasst sich mit der ethischen Bewertung von Handlungsentscheidungen, deren Umsetzung mit Unsicherheit verbunden ist. Im ersten Teil werden die wesentlichen risikoethischen Begriffe definiert und verschiedene Risikosituationen voneinander abgegrenzt. Im zweiten Teil werden drei unterschiedliche Entscheidungstheorien der Risikoethik (Bayesianische Entscheidungstheorie, Maximin-Prinzip, Precautionary Principle) diskutiert. Diese umfassen Positionen, die von einem durch Rationalität geprägten Ansatz reichen bis hin zu einem, der die Vermeidung des worst case anstrebt. Im dritten Teil werden weitere für die risikoethische Debatte bedeutende Aspekte ansatzweise ausgeführt, z. B. die Funktion der Zustimmung und der Kompensation, Individualrechte sowie die Eigentumsrechte an Risiken und deren Verteilung.

Joachim Boldt, Oliver Müller, Giovanni Maio
Synthetische Biologie
Eine ethisch-philosophische Analyse
2009

107 Seiten
BBL-Artikelnummer: 810.006.d
ISBN: 978-3-905782-04-2

Synthetische Biologie hat, ähnlich wie Physik und Chemie, nicht nur die Analyse, sondern auch den Nach- und Neubau ihrer Gegenstände zum Ziel. Mit der Vision von der Erschaffung neuer einzelliger Lebensformen rückt dieses Forschungsfeld Lebendiges in den Bereich technischer Erzeugbarkeit. Die Autoren differenzieren Forschungsfeld und Anwendungsgebiete der Synthetischen Biologie und systematisieren die zentralen ethischen Fragen. Anhand von Metaphern wie «living machine» verdeutlichen sie, wie unklar der ontologische Status des neu geformten Lebendigen werden kann. Darüber hinaus argumentieren sie, dass der Schritt von der gentechnischen Manipulation zur Kreation neuer Lebensformen Konsequenzen für das menschliche Selbstverständnis haben kann. Missbrauchsgefahren werden ebenso diskutiert wie die Notwendigkeit der Prüfung von Risiken einer unkontrollierten Verbreitung synthetischer Organismen.

Bernard Baertschi
La vie artificielle
Le statut moral des êtres vivants artificiels
2009

122 pages
Numéro d'article OFCL/BBL: 810.007.f
ISBN: 978-3-905782-05-9

Ce volume pose la question du statut moral des êtres vivants artificiels. Il est important de déterminer ce statut, car c'est sur lui que nous nous appuierons pour savoir comment nous devrons les traiter et quelles limites la morale imposera à l'usage que nous en ferons. Jusqu'à présent, les êtres vivants que nous connaissions étaient tous naturels, mais si nous produisons des organismes artificiels, ce caractère artificiel aura-t-il un impact sur leur statut moral?

Pour pouvoir y répondre, cet ouvrage commence par préciser ce que signifie l'attribution d'un statut moral à une entité. Puis, défendant une conception de la vie qui se veut en accord avec les sciences biologiques, il examine les différentes significations que prend l'opposition du naturel et de l'artificiel. En conclusion, il établit que le fait qu'un organisme vivant soit naturel ou artificiel n'a aucun impact sur son statut moral.

Arianna Ferrari, Christopher Coenen, Arnold Sauter
Animal Enhancement
Neue technische Möglichkeiten und ethische Fragen
2010

228 Seiten
BBL-Artikelnummer: 810.008.d
ISBN: 978-3-905782-06-6

Die Debatte über ethische Aspekte des «Human Enhancement» wirft auch ein neues Licht auf die wissenschaftlich-technische «Verbesserung» von Tieren. Zwar ist «Animal Enhancement» in vielerlei Hinsicht ein altbekanntes Phänomen. In der Landwirtschaft werden Tiere seit langem gezielt verbessert, und einige Tierversuche lassen sich gleichfalls so begreifen. Während aber die Debatte um «Human Enhancement» stark von der Basisunterscheidung zwischen Heilen und Verbessern geprägt ist, ist diese Unterscheidung im Tierbereich weitgehend irrelevant. Durch aktuelle wissenschaftlich-technische Tendenzen ändern sich aber zumindest die Interventionstiefe und potenziell auch die ethische Bedeutung der Eingriffe. Dieses Buch bietet einen breiten Überblick über Entwicklungen im Bereich der konvergierenden Technologien und Wissenschaften, die für «Animal Enhancement» relevant sind, und diskutiert zentrale ethische Fragen.

Peter Kunzmann,
Nikolaus Knoepffler
Primaten
Ihr moralischer Status
2011

120 Seiten
BBL-Artikelnummer:
810.009.d
ISBN: 978-3-905782-07-3

Die «Primaten» als Tierordnung wurden in den letzten Jahren in ihrem rechtlichen und moralischen Status teils erheblich aufgewertet. Worauf gründet sich diese Neubewertung? Was leisten die ethischen Argumentationen, die ihr zugrunde liegen? Ist es der «Affen» Nähe und Ähnlichkeit zum Menschen, die sie so besonders im Tierreich machen? Oder sind sie ethisch gar nicht mehr als «Tiere» zu behandeln, sondern als «Personen»?

Die vorliegende Studie argumentiert auf dem Grund jener einzigartigen Fähigkeiten und Eigenschaften, die Primaten zu ganz besonderen Subjekten ihres Lebens macht. Von hier aus rechtfertigt sich ihr moralischer Status, ihre Würde, die sich vor neuen technischen Eingriffen zu bewähren hat.

Helmut Segner
Fish
Nociception and pain
A biological perspective
2012

94 pages
Article number:
810.010.en
ISBN: 978-3-905782-08-0

This volume aims to evaluate critically the evidence from biological studies into whether fish possess the capacity for nociception, the sensing of a noxious stimulus, and for pain perception, the awareness of the noxious stimulus. Fish are often considered «primitive», reflex-driven vertebrates, with few cognitive abilities and lacking the neuronal structures and functions necessary for pain perception. Recent research has increasingly challenged this view. An important milestone was reached when the presence of functional nociceptors in fish could be demonstrated. In contrast to nociception, the question of pain perception in fish is still controversially discussed. This volume reviews neuroanatomical, neurophysiological and behavioural evidence for or against the ability of fish to feel pain.

Markus Wild
Fische
Kognition, Bewusstsein und Schmerz
Eine philosophische Perspektive
2012

187 Seiten
BBL-Artikelnummer:
810.011.d
ISBN: 978-3-905782-09-7

Das Bild vom Fisch hat sich durch die Forschung der letzten 20 Jahre erheblich verändert. Fische gelten nicht mehr als Reflexmaschine, sondern als kognitive Wesen. Sie leben in komplexen sozialen Gemeinschaften, können Individuen unterscheiden, ihren Status verfolgen, kooperieren und voneinander lernen. Neben kognitiven Fähigkeiten ist auch das Bewusstsein bei Fischen in den Fokus der Aufmerksamkeit gerückt worden. Fische verfügen über die Voraussetzungen, um Schmerzen zu empfinden. Diese Entdeckung hat zur Debatte geführt, ob Fische wirklich Schmerzen empfinden. Das wirft nicht nur biologische, sondern auch philosophische Fragen auf: Was ist Schmerz? Was ist Bewusstsein? Wie können wir erkennen, ob ein Wesen bewusste Empfindungen hat? Dieser Band diskutiert das neue Bild vom Fisch und argumentiert, dass Fische tatsächlich Schmerzen empfinden.

Daniela Thurnherr
Biosecurity und Publikationsfreiheit
Die Veröffentlichung heikler Forschungsdaten im Spannungsfeld von Freiheit und Sicherheit – eine grundrechtliche Analyse
2014

202 Seiten
BBL-Artikelnummer: 810.012.d
ISBN: 978-3-906211-00-8

Die Frage, ob bzw. wann die Publikation von Forschungsdaten aufgrund deren Missbrauchspotentials beschränkt werden darf, hat an Aktualität gewonnen. Die Studie beleuchtet das Spannungsverhältnis zwischen den Grundrechten der Forschenden einerseits und den Biosecurity-Risiken, die durch die Veröffentlichung heikler Forschungsdaten geschaffen werden, anderseits. Spezifische Herausforderungen für die Abwägung zwischen Freiheit und Sicherheit resultieren aus drei Umständen: Erstens lässt sich die Verbreitung von Wissen nicht auf dieselbe Weise kontrollieren wie jene von tangiblen Gütern. Zweitens liegt die Distribution wissenschaftlicher Erkenntnisse nicht nur im Interesse der Forschenden, sondern auch im öffentlichen Interesse. Und drittens ist die Entscheidfindung mit verschiedenen Ungewissheiten konfrontiert.

Christian Munthe
Precaution and Ethics
Handling risks, uncertainties and knowledge gaps in the regulation of new biotechnologies
2017

79 pages
Article number: 810.013.en
ISBN: 978-3-906211-31-2

This volume outlines and analyses ethical issues actualized by applying a precautionary approach to the regulation of new biotechnologies. It presents a novel way of categorizing and comparing biotechnologies from a precautionary standpoint. Based on this, it addresses underlying philosophical problems regarding the ethical assessment of decision-making under uncertainty and ignorance, and discusses how risks and possible benefits of such technologies should be balanced from an ethical standpoint. It argues on conceptual and ethical grounds for a technology neutral regulation as well as for a regulation that not only checks new technologies but also requires old, inferior ones to be phased out. It demonstrates how difficult ethical issues regarding the extent and ambition of precautionary policies need to be handled by such a regulation, and presents an overarching framwork for doing so.

Otto Schäfer
Digitale Sequenzinformationen
Ethische Fragen der Patentierung genetischer Ressourcen und des Eigentums an digitalisierten Sequenzinformationen
2020

98 Seiten
BBL-Artikelnummer: 810.0014.d
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Dieser Band befasst sich mit dem Eigentum an digitalisierten Gensequenzen und genetischen Ressourcen überhaupt. Verfügungs- und Ausschliessungsrechte an genetischen Ressourcen, sind seit Jahrzehnten kontrovers. Neu dagegen ist die ethische Beschäftigung mit digitalen Sequenzinformationen (DSI), also elektronisch gespeicherten, «immateriellen» Entsprechungen genetischer Ressourcen. Sind sie im Hinblick auf Eigentumsrechte genauso zu behandeln wie genetische Ressourcen im biochemischen Sinne? Im Zentrum der Betrachtung steht das Nagoya-Protokoll mit seinem Grundsatz «freier Zugang und Vorteilsausgleich». Gilt dieser Grundsatz auch für DSI, und wenn ja, wie lässt sich seine Praktikabilität verbessern? Der Autor nähert sich dieser Problematik durch eine philosophisch und vergleichende kulturgeschichtliche Darstellung der nötigen Grundlagen.

Herwig Grimm und Christian Dürnberger
Genome Editing und Gentherapie in der Veterinärmedizin
Ein ethisches Gutachten
2021

217 Seiten
BBL-Artikelnummer: 810.0015.d
ISBN: 978-3-906211-74-9

Dieser Band befasst sich mit Genome Editing Verfahren in der Veterinärmedizin. Er klärt, welche gentherapeutischen Massnahmen zukünftig möglich sind bzw. aktuell angestrebt werden und zielt auf ein besseres Verständnis der Vor- und Nachteile dieser Anwendungen in moralischer Hinsicht ab. Hierbei erfolgt nicht nur eine ethische Diskussion wesentlicher Kriterien und normativer Bezugspunkte veterinärmedizinischer Praxis, es wurde auch eine Befragung durchgeführt: Wie schätzen Expertinnen und Experten, die im Feld der neuen Verfahren forschen, die Entwicklungen in den verschiedenen Bereichen der Mensch-Tier-Beziehung ein? Welche Szenarien erscheinen ihnen in moralischer Perspektive wünschenswert? Welche lehnen sie ab? Das Gutachten zeigt, dass die Diskussion von Genome Editing in der Veterinärmedizin über Fragen des tierlichen Wohlbefindens hinausgeht.