Chapter 8
What Philosophers Can Learn from Agrotechnology: Agricultural Metaphysics, Sustainable Egg Production Standards as Ontologies, and Why and How Canola Exists

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Abstract Agriculture is defined normatively and, as such, is an area of research and practice where values are an inextricable constituent of research, where facts and values elide, and normative constraints generate new ethical categories. While discussions of normativity are part and parcel within agricultural ethics and play a prominent role in ethical discussions, I suggest that other areas of agricultural philosophy such as agricultural metaphysics or ontologies present valuable case studies for philosophical discussion. A series of case studies focusing on how products are classified, graded, and measured illustrate conceptions of existence, causal relationships, and practice-oriented notions of category-making distinctive of agricultural practice. The first of these case studies shines a light on the process of knowledge integration in agriculture. I show how innovative integration, a process discussed within socially sustainable egg production, is an ineliminably normative process. The second case study, and the main focus of the chapter, concerns the normative role of agricultural standards. I discuss how standards and classes in use within egg production systems and the development and measuring techniques make AA eggs and transformed a highly toxic oilseed rape (used as a machine lubricant) into the non-toxic food-grade agricultural commodity, canola. I contend agricultural products like eggs, peanut butter, and canola oil are constituted by prescribed standards (like AA eggs and double-zero canola) that define not only the product, but also the activities related to its production and the practices that producers perform. Because standards and standardization define the categories of not only agricultural products but also agricultural practices, I suggest standards and standardization are best understood as "ontologizing activities."

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8.1 What Philosophers Can Learn from Agrotechnology

The title of this chapter: "What philosophers can learn from agrotechnology" is a riff on Thompson's (1984) paper in *Agriculture and Human Values* "What philosophers can learn from agriculture" (his 4th published paper). In it he writes:

> the mission of agricultural research permeates its definition. It goes to the root concept of agriculture itself, and, as such, is more than just a question of academic freedoms. Agriculture is typically taken to involve the production of food and fiber, which is a human good, and insures against the evils of famine and pestilence. The data base for agricultural science is pre-selected by normative constraints: production of human goods and avoidance of human evils. (Thompson 1984: 18)

The normative character of agricultural research, what Thompson points to in the first sentence, "the mission of agricultural research permeates its definition" permeates not only agricultural research but of course agricultural practice, agricultural policies, and all talk about agriculture. Agriculture is defined normatively and, as such, is an area of research and practice where values are an inextricable constituent of research, where facts and values elide, and normative constraints generate new ethical categories. While discussions of normativity are part and parcel within agricultural ethics and play a prominent role in ethical discussions, I'll suggest that other areas of agricultural philosophy such as agricultural metaphysics or ontologies present valuable case studies for philosophical discussion. A series of case studies focusing on how products are classified, graded, and measured will illustrate conceptions of existence, causal relationships, and practice-oriented notions of category-making distinctive of agricultural practice. The first of these case studies will shine a light on the process of knowledge integration in agriculture. Relying on the socially sustainable egg production project, I will show how the process of innovative integration discussed is ineliminably normative. The second case study, and the main focus of the chapter, concerns the normative role of agricultural standards. I discuss how standards and classes in use within egg production systems and the development and measuring techniques make AA eggs and transformed a highly toxic oilseed rape (used as a machine lubricant) into the non-toxic food-grade agricultural commodity, canola.

I contend agricultural products like eggs, peanut butter, and canola oil are constituted by prescribed standards (like AA eggs and double-zero canola) that define not only the product, but also the activities related to its production and the practices that producers perform. Because standards and standardization define the categories of not only agricultural products but also agricultural practices, I suggest standards and standardization are best understood as "ontologizing activities."

While the first part of my title makes explicit reference to "what philosophers can learn from agrotechnology," the second part following the colon "agricultural metaphysics, sustainable egg production standards as ontologies, and why and how canola exists" is meant to entice not only philosophers interested in either their food or their metaphysics, but anyone interested in thinking about food categorization, standard-setting, and how that impacts how their food is made.

In discussing these cases, an additional aim of this chapter is to highlight some metaphysical and ontological issues which philosophers could, but have not yet engaged. In doing so, I will aim also to add additional support to Thompson's claim—which is as true in 2023 as it was in 1984—that: "the limits of what philosophers can learn from agriculture, if extant, are not yet visible" (Thompson 1984: 19).

8.2 How Should We Think About Agricultural Products—Like Eggs?

If we are interested in talking about products—like eggs—we might first ask: How *should* we think about agricultural products and the production systems that generate them? Speaking directly to this question, Thompson and colleagues in the animal sciences worked on a socially sustainable egg production project with the PSA; (NB: philosophers of science, nope not that PSA[1]), the Poultry Science Association. The aim of the project was to conduct a holistic and integrated systematic review of knowledge around laying hen production practices. The resulting publications included evidence-based papers in five areas: (1) hen welfare; (2) economics; (3) food safety and quality; (4) public attitudes; and (5) environmental impacts. In a series of papers published in the journal, *Poultry Science*, Thompson and colleagues (Swanson et al. 2011a, b; Thompson et al. 2011; Thompson 2014) lay out an integrated assessment tool for sustainability. The aim of developing this tool is to require:

> some method for combining or at least in some way reflecting [the] different values discussed above [of hen welfare, economics, food safety and quality, public attitudes and environmental impacts into the assessment]. Because each dimension of sustainability represents one or more types of value determination, taking values that reflect distinct scales and classes of value into account becomes one of the main challenges for decision making. (Thompson et al. 2011: 2107)

Swanson, Mench, and Thompson provide both the ethical justification for and explanation of the implementation of what they refer to as "innovative integration".

8.2.1 Innovative Integration

Innovative integration relies on a systematic approach to evaluate multiple values. They explain that the purpose of the approach is to facilitate and validate "real-world" data on how production efforts perform, the costs relating to laying hen production practices, the environmental and economic impacts, and cost–benefits of any alterations to the egg production system (Swanson et al. 2011a: 227–228). They argue

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[1] It is worth noting that the Poultry Science Association was founded in 1908 (at Cornell University, Ithaca, New York) and the Philosophy of Science Association in 1933 (at Michigan State College of Agriculture and Applied Science, East Lansing, Michigan, what is now Michigan State University).

that only by identifying these characteristics and impacts can any future alternative approaches to production be successful. This is because any successful alternative will, to be successful, rely on how it facilitates open discussion, nurtures the possibility of public trust, and includes within any discourse about possible alternatives any concerns raised by those publics affected. An innovative integration does not merely include all bits of information from all stakeholders affected in a systematic way. There are many approaches referring to themselves as a “systems approach” that aim to do just that. What Swanson and colleagues stress, is that in order for an approach to both discover, accurately represent, and incorporate different stakeholder values into a framework for how to develop sustainable production practices, the positionality of those involved (e.g., consumer groups, animal welfare groups, food banks, food retailers, and egg producers) also needs to be included. This is because the environmental, cultural, and economic contexts of engagement inform, shape, and give meaning to these values. Normative coordination is not just a matter of zippering together different norms and values that arise from different stakeholders like merging two lanes of traffic into one. It needs to also include information about the contexts within which these norms and values arise. Large industrial farms and small family farms possess different scales of production, manage land and equipment in different ways, rely on different types of relationships, and implement different types of succession plans. The norms and values that develop within industrial farms and small family farms reflect these different scales and types of relationships. A means by which these diverse norms, together with scales of production, decision-making strategies, and production values can be integrated with others in different agricultural contexts is needed.

Attention to these different social, economic, cultural, and technological influences on values within egg production requires an innovative integration strategy. An innovative integration approach is a *normatively coordinated* systems approach, one which by design retains the contextual elements which make the diverse valuations of the various stakeholders make sense. This is because an innovative integration approach is defined in terms of the normative contexts within and across which agricultural production takes place. Planning alternative laying hen production systems requires critical study of the values and concerns that are present within these production systems and those affected as well as considering these in the context of the causal effects of any future adoption of these alternative systems. One way to pursue a planning strategy that systematically integrates diverse values is to actively attend to potential changes in different categories of influence within the production system environments which will inform and shape values in the future.[2] For instance, a future laying hen production system may be developed which furnishes more space for hens to express species-specific behaviors; considers environmental impacts of

[2] Swanson and colleagues suggest a framework for future planning that investigates the hen laying production system by focusing on six different categories of influence. They refer to their planning strategy with the acronym “INSPECT” of these six different categories: natural, social, political, economic, cultural, and technological (Swanson et al. 2011a, b: 2117).

chicken waste and air quality; ensures egg quality standards are maintained; maintains a living wage for farmers; or ensures the price for eggs remains or becomes more affordable or available for consumers. Considering the variously felt and interpreted influences of society, economics, culture, and technology, these sorts of innovative integration strategies aim to provide a method for conceiving of alternative future systems in the context of normative outcomes. At the same time, they recognize that stakeholders conceive of future systems utilizing different values and from different perspectives to interpret which futures and outcomes could be possible.[3]

Several integrative strategies that resulted from the sustainable egg production project included explicit reference to the role of stakeholders at all levels of discussion and planning for alternative sustainable production practices, four of these are:

(1) Identify an integrative strategy for how to obtain meaningful stakeholder input which includes the diverse values of different stakeholders and attends to the different ways stakeholders' contexts and categories of influence shape what is valued and what are considered possible outcomes.
(2) Develop scenario planning strategies for how to identify priorities for future agricultural research on sustainable egg production systems which were based on goal- and direction-setting developed by stakeholders in light of different plausible future production systems and which values were predicted to be important in the future.
(3) Identify, integrate, and compare diverse values in interpreting public acceptability in the context of sustainable egg production where perceptions of the egg industry may be both the source of social conflict but also the locus of movements for change.
(4) Only by understanding the values and outcomes identified (in 1, 2, and 3) and how they manifest in the production and valuation practices of day-to-day farming, farm management goals, and future goal-setting for alternative agricultural systems, can these values be integrated into a sustainable plan for alternative production practices that is not only followed but publicly supported (Swanson et al. 2011b: 2110).

In the foregoing, some motivation for, and characteristics of innovative integration have been outlined in an effort to show how it can be distinguished from other forms of integration. A secondary purpose for the above discussion was to shine a light on why this form of integration is necessary. In the remainder of the section, I'll make a final suggestion: that innovative integration provides an alternative view of knowledge integration that can be contrasted with those described in philosophy of science which are useful in bringing together—in a meaningful way—a plurality of knowledge systems. Perhaps the most widely discussed and arguably most successful is Mitchell's (2003, 2020) "integrative pluralism."

[3] The collaborators also evaluate different strategies to facilitate innovative integration of different values as well as how these different strategies shape the articulation of these values and information shared by different stakeholders. They evaluate some of the most common approaches, including quantitative, participatory, deliberative, and informal decision making (Swanson et al. 2011a, b: 2111).

Mitchell's integrative pluralism focuses on the partiality of scientific representations and concepts. Models and theories represent the world, but they always do so in a way that is incomplete. Given this partiality, *real* objects can be best understood as being represented in many different theories which may themselves pick out concepts that do not travel well from one theory to the next (Mitchell 2003: 182–187). Even descriptions of things like causal interactions may be dependent upon how we interact with the entities we perceive to be standing in causal relationships as well as upon models we use to represent their causal powers.[4] As such, Mitchell argues that there is a plurality of knowledge-generating models/theories, and although these pertain to the products and processes in the world, the models and representations that scientists devise are "structured by both metaphysical complexity and features of [these] representations of that complexity" (Mitchell 2003: 9).

In contrast to Mitchell's integrative pluralism, the innovative integration strategies discussed in the context of the socially sustainable egg production project provide an alternative model which may also provide additional support for why integration is necessary when there are a plurality of different sources of information, models, producers, scientists, or interlocutors. The distinctive feature of the innovative integration strategies is also the justification for their use. The justification for innovative integration is defined in terms of the normative nature of agriculture and its mission. That is, innovative integration itself is normatively defined in agricultural discussions and understood differently according to different stakeholder groups, e.g., producers, agricultural economists, consumers, environmentalists, and agronomists. Innovative integration is a process of integrating the normative knowledge of diverse stakeholders that is itself devised from the outset as a goal-oriented process. While the discussion here focuses on integration of values in the agricultural context, it seems likely that innovative integration of values within other contexts—engineering, economics, medical science, and pharmacology as well as other areas of research often described as "applied sciences"—may also rely on normative-centered or normatively-led integration methods of information of the form: *if you want to achieve x, and you think that you are in situation y, then you should do z,* what George Henrik von Wright refers to as "technical norms" (von Wright 1963, 1983).

8.3 Thinking About Standards

Innovative integration of different knowledges, practices, and values provides an additional conception of integration in use. It highlights the normative nature of integration especially in multivalue and multiple interest stakeholder systems. Another critical exchange where embedded value judgments can be found is within the discussions surrounding agricultural standards and the setting of standards. Returning to the question heading this section: How should we think about agricultural products?

[4] Included within Mitchell's integrative pluralism are: the integration of mechanical rules, unification of theories, and integration of explanations.

How standards are defined in these discussions often relies on normative considerations for how to develop that standard which rely on a variety of embedded values as well as sets of assumptions about the nature of reality, the appropriate classification of entities and processes, what is normal or "natural", what constitutes change over time, and what can be conceived of as necessary or even possible, or so I will show in the remaining sections.

Standards determine how, why, and according to what practices and measures we think about agricultural foodstuffs like eggs as products. For instance, the United States Department of Agriculture (U.S.D.A.), Standards, Grades and Weight Classes for Shell Eggs defines these standards as well as their implementation and applicability. The highest class is Grade AA, and the lowest B. Class is judged in terms of quality which is determined by the size of air cells within the egg; absence of blood spots or serious yolk defects; the low presence of *checks* (small cracked portions of shell or missing parts of the shell that have not punctured the shell membrane and are not leaking or likely to lead to a leak); and a minimum of what are called "leakers" and "dirties" (see Table 8.1). All terms that describe the shell and state of the egg are defined within the standard. "Dirties" are unbroken eggs that have prominent stains, feathers, or other debris stuck to the eggshell. "Leakers" have broken or cracked shell membrane and so are leaking or will likely leak. According to the U.S.D.A. Standards, Grades, and Weight Classes, an AA quality egg is defined as one where:

> the shell must be clean, unbroken, and practically normal.[5] The air cell must not exceed 1/8 inch in depth, may show unlimited movement, and may be free or bubbly. The white must be clear and firm so that the yolk is only slightly defined when the egg is twirled before the candling light. The yolk must be practically free from apparent defects" (U.S.D.A. 2000, §56.201).

At least 87% of the eggs need to be of AA quality and not more than 5% B quality (U.S.D.A. 2000).

Standards do not just apply to agricultural products that come whole, like eggs. They also apply to products that include—or in the case of peanut butter—mostly include—a certain type of foodstuff (e.g., peanuts). Peanut butter is graded as either U.S. Grade A or U.S. Fancy; U.S. Grade B or U.S. Choice; or Substandard. U.S. Grade A/U.S. Fancy is assessed in terms of consistency, flavor, aroma, and perhaps surprisingly, color (U.S.D.A. 1972b). But, unlike eggs, peanut butter has an additional standard supplied by the National Institute for Standards and Technology (NIST) (see Image 8.1). The Material Measurement Laboratory of NIST lists, among its other standards, SRM 2387—peanut butter. This is a different sort of standard—it is what the NIST calls a "reference material."

As Image 8.1 shows, SRM 2387 is an actual jar of peanut butter, but one that includes official values for all components, those of potential interest, contaminants, and allergens as well as parameters of these. Also included are any certificate revisions to the standard. The most recent being made 15 January 2020 which

[5] "Practically normal" for either AA or A quality is defined as such: "a shell that approximates the usual shape and that is sound and is free from thin spots. Ridges and rough areas that do not materially affect the shape and strength of the shell are permitted" (U.S.D.A. 2000: §56.208).

Table 8.1 United States Standards and Grades for Shell Eggs

SUMMARY OF U.S. STANDARDS FOR QUALITY OF INDIVIDUAL SHELL EGGS Specifications for Each Quality Factor			
Quality Factor	**AA Quality**	**A Quality**	**B Quality**
Shell	Clean. Unbroken. Practically normal.	Clean. Unbroken. Practically normal.	Clean to slightly stained.* Unbroken. Abnormal.
Air Cell	1/8 inch or less in depth. Unlimited movement and free or bubbly.	3/16 inch or less in depth. Unlimited movement and free or bubbly.	Over 3/16 inch in depth. Unlimited movement and free or bubbly.
White	Clear. Firm.	Clear. Reasonably firm.	Weak and watery. Small blood and meat spots present.**
Yolk	Outline slightly defined. Practically free from defects.	Outline fairly well defined. Practically free from defects.	Outline plainly visible. Enlarged and flattened. Clearly visible germ development but not blood. Other serous defects.
For eggs with dirty or broken shells, the standards of quality provide two additional qualities. They are:			
Dirty		**Check**	
Unbroken. Adhering dirt or foreign material, prominent stains, moderate stained areas in excess of B quality.		Broken or cracked shell but membranes intact, not leaking.***	
* Moderately stained areas permitted (1/32 of surface if localized, or 1/16 if scattered). ** If they are small (aggregating not more than 1/8 inch in diameter). *** Leaker has broken or cracked shell membranes, and contents leaking or free to leak.			

United States Standards, Grades, and Weight Classes for Shell Eggs. AMS 56. July 20, 2000. United States Department of Agriculture. Agricultural Marketing Service. Poultry Programs

Image 8.1 SRM 2387, the standard reference material for peanut butter. From the Material Measurement Laboratory, Standard Reference Materials, SRM Online Request System. (National Institute of Standards and Technology 2020)

includes additions as well as the removal of reference values for certain components, including:

> the removal of certified values for palmitic acid, lignoceric acid, and total saturated fatty acids based on observed instability; removal of reference values for thiamine, riboflavin, niacinamide, niacin, total vitamin B3. (NIST 2020)

Reference materials may seem like some sort of peculiar Platonic ideal—one that actually exists and you can order from the SRM Online System (yes, I have been tempted to do this)—but a Platonic ideal that, if you really wanted to you could eat. But, of course, eating it is not what reference materials like SRM 2387 are for. The standard SRM 2387 is used to calibrate other products that producers and developers wish to be able to refer to as peanut butter, such as a filling for a cookie, pretzel, pastry, or layer in a chocolate bar. These products or product components are those that they wish to be conceived of, advertised, and sold as peanut butter or containing peanut butter. All peanut butter or peanut butter filling, in order to *be* peanut butter and not nut spread or something else, must, according to the U.S.D.A., contain no less than 90% peanuts and no more than 55% fat. If you want to call what you have "peanut butter," then you must make it in accordance with the standard.

8.3.1 Standardization as an Ontologizing Activity

Standards and standardization play a crucial role in agricultural food production as the examples of egg and peanut butter standards show, but do they play a particular theoretical role too? In the next few sections, I'll show how standardization is an important set of concepts and practices that generate new categories of being, what I have called elsewhere, "ontologizing activities" (Kendig 2016a: 1–6; 2016b: 106–107; 2020: 1–5; Kendig and Eckdahl 2017). Agricultural standards and the process of standardization offer a particularly valuable exemplar for scientific metaphysics of a set of ontological categories whose parameterization is normatively defined and redefined over time.

Over the last few decades, conceptual and theoretical changes occurring in a number of different fields—from analytic philosophy to philosophy of physics—have been reframed in terms of concept engineering (Blackburn 1999; Eklund 2014; Cappelen 2018[6]; Isaac 2021). Concept engineering includes analyses of the processes involved in making and remaking of concepts, but in contrast to purely descriptive accounts of conceptual changes, it also includes prescriptive analyses of

[6] For some criticisms of the view, see Cappelen (2018). Cappelen argues that many advocates of conceptual engineering are not critical enough of what is taken to be a concept, taking what it is to be a concept as given when what is selected as the conception of *concept* is actually itself in need of further analysis: "those who talk of conceptual engineering as operating on concepts don't start by making choices on [the] smorgasbord [of options for how to think about concepts]" (Cappelen 2018: 141).

what concepts should be. This normative feature is one of the things that makes it distinctive, as the goal is not merely to describe but to correct or improve concepts:

> Instead of describing the representational devices we already have and use, conceptual engineers typically aim to prescribe those we ought to have and use in order to ameliorate our performance at certain tasks (preventing fallacies, promoting group agency, formulating generalizations of explanatory value). (Isaac 2021: 2053–2054)

While the engineering of concepts is very much the focus of conceptual engineering, I'll suggest the wider normative agenda of the conceptual engineering approach is also useful in shining a light on important ways in which the implications of these engineering processes can be understood and explained.

I explain how, by referring to the process of developing a standard. The process of standardization includes the engineering of concepts. Simply put, the engineered concept is the standard which is developed in consultation with governmental entities like NIST or USDA. But along with the engineering of the concept, there is also the engineering of a classificatory ontology. This classification specifies what sort of being the entity or process conforming to the standard is, or what it should be to meet the standard. The standard is the engineered concept and the entity, process or product, the material entity or agricultural process to which the standard applies. Once engineered, the standard can be used to evaluate, measure, grade, and classify those entities or processes which are the target of the standard. In this way, the ontologizing activities of standard-making, standard-setting, and standard-revising do more than generate or reengineer concepts. Perhaps controversially, I argue that standard-making, standard-setting, and standard-revising do even more as they actually *bring into existence* the product for which the standard is made as an agricultural commodity. Agrotechnological standards (like those for egg grades and peanut butter) do not just engineer the concepts and define the terms in use within the standard. Standards provide the conditions of existence of that product so-described, such that if it meets or is engineered to meet those standards, then it exists as that product or material and if it does not, it does not.

In this fully normative process, standards begin by prescribing what should be the case and then once the standards are met and become used within the community, the standard becomes a description, not of what ought to be but what actually exists, how people are behaving in relation to the product, and what products they are developing and processing.

8.3.2 Making Canola

So how do standards facilitate ontologizing activities and effectively bring into existence new agricultural products? To understand how, I'll turn to the grain *canola*[7] and ask how did canola standardization bring about the existence of something that did

[7] Canola oil is used widely in North America as an inexpensive alternative cooking oil to corn or vegetable oil.

not exist as the product, namely canola? The definition of canola from the U.S. Grain Standards Act defines canola in terms of the amount of erucic acid and glucosinolates it has. It is canola if the oil from the seeds of the genus *Brassica*:

> contains less than 2% erucic acid and the solid component contains less than 30.0 micromoles of any one or any mixture of 3-butenyl glucosinolate, 4-pentenyl glucosinolate, 2-hydroxy-3-butenyl, or 2-hydroxy-4-pentenyl glucosinolate per gram of air-dried oil free solid". (U.S.D.A. 1992: § 810.301)

A bit of history of agriculture will help provide some explanation for why canola is defined in terms of its low levels of erucic acid and glucosinolates. Canola was developed through the transformation of the Canadian rapeseed plant (*Brassica rapa* and *Brassica napus*) into what is referred to as "double-zero rapeseed oil." The name "canola" is a portmanteau of Canadian oil. In North America, the rapeseed plant was primarily used in the World War II to produce plant-based lubricants rather than as a food-grade oil due to its high levels of erucic acid and glucosinolates (Busch and Tanaka 1996: 6–8). The purpose of reengineering rapeseed was to reduce the content of these two potentially toxic compounds to make it desirable as an edible oil.

But prior to any attempt to breed low erucic acid rapeseed, an instrument that could measure the content of the erucic acid in a seed was needed. Although techniques such as gas–liquid chromatography could be used to measure gasified substances, the device was not useable for analysis of fats like those from oilseed rape. Because of this, the possibility of developing the goal of double-zero rapeseed oil, containing such low levels of erucic acid and glucosinolates per gram that is, was considered to have zero of both, relied on first developing a means to measure it (Busch and Juska 1997: 697–701). The transformation of oilseed rape to canola not only relied on the development of instruments that could measure chemical content, but also on tools for grading and universal quality standards. The transformation of oilseed rape from inedible erucic acid rich to edible double-zero rapeseed relied on standards that included both the normative assessment of rapeseed as suitable edible oil and the development of universal standards by which to judge, measure, and make uniform the quality of oilseed rape. The goal of making the highly variable rapeseed edible effectively generated a new ontological entity through standardization which the name "canola" was applied to distinguish it from rapeseed.[8] In virtue of this standardization—canola became an internationally traded commodity.

In this way, the standardization process is an ontologizing set of activities which are guided by normative assessment of rapeseed as a potential edible oil and measurement tools for grading that do not just tell us when canola is good or bad, tasty or toxic, but have defined the conditions (and normative justification) for the existence of canola as a seed grain and edible oil. The making of canola can be understood to exist through what science and technology studies scholar, Andrew Pickering (1995) has called the "mangle of practice" (a set of open-ended activities and performative interplay of human agency and the agency of machines, instruments, and concepts).

[8] Although "canola" is used in North America, within Europe, "double-zero rapeseed" and "canola" are both used and are interchangeable.

8.4 A Metaphysics of Standard-Informed Agricultural Ethics

Standards do not only bring into existence products such as AA grade shell eggs and double-zero rapeseed/ canola as agricultural products. They also constitute how these products are to be interacted with. For instance, they determine the nature of the activities and interactions that people have with laying hens. These standards may not come from the same place as the standards I have referred to here—some from the National Institute of Standards and Technology; some from the U.S.D.A., some are universally agreed upon, and some in terms of commodities or industry. While standards, like the egg and canola standards, might seem to apply to the product or process for its production as an acceptable agricultural foodstuff, their application in use depends upon the activities and interactions of people. With reference to laying hen production, Thompson and colleagues provide some examples of what sorts of interactions might be prescribed by standards:

> standards may be created for people (proper behavior in handling of birds), processes (cleaning of eggs), products (U.S.D.A. egg standards), and practices (management of poultry houses). However, each of these types implies the other. Therefore, a standard for a person implies standards for the things with which that person works; conversely, standards for products imply standards for the persons who produce the product. (Thompson et al. 2011: 2106)

What this implies is that standards apply to the activities of persons when handling agricultural products, generate normative categories of agricultural products, but also constitute the relationship between product and producer in ways that affect how they interpret their own practices and interactions within the production system. Thompson and colleagues point out that these standards continue to be heeded because they often become wholly internalized:

> standards tend to become anonymous once put into use, once standards are established, it is often difficult to determine who actually established them and under what circumstances. They become so taken for granted as to be considered natural. (Thompson et al. 2011: 2106)

In the remaining, I contend that this apparent "naturalness" is itself a metaphysical commitment to a particular mode of behavior which is not questioned, but used, and justified because either *it works* or *it's the way we do it*.

I argue that the current feeling that *it works* often arises because those routine practices and daily interactions are either explicitly or implicitly those that have been prescribed by the standard. That is, making the judgment "it works" when referring to the use of a particular system of egg production (e.g., caged, floor, aviary or enhanced or enriched cage systems); the choice of feed; maintenance of animal health; and ensuring the laying hen production environment produces eggs that are safe for human consumption often relies on a commitment to maintaining the standard that at once defines the eggs produced as an agricultural product and determines the appropriate processes and practices that are prescribed in the production of them as agricultural products which comply with that standard. In this sense, the judgment that "it works" makes sense only when the standard is assumed to play not only a prescriptive role but also an ontological role. That is, the standard specifies not only the normative conditions under which eggs should be produced and what characteristics an AA egg should and should not have, but it also specifies that once the egg meets these standards, the categorization of what sort of thing it is also effectively changes. It changes from being the product of a hen to a graded AA agricultural product.

In this way, standards provide a suite of embedded values as well as sets of assumptions about the nature of reality that include the appropriate classification of entities and processes and what is considered to be normal or “natural” or—in the case of USDA egg standards—appropriately egg shaped. That is, standards provide extra-empirical assumptions about the kind of category something belongs to—or should belong to if it is intended to be used for a particular purpose (e.g., sold as an agricultural product and to be consumed by humans)—and the conditions for its existence. These suites of embedded values and theoretical commitments to the categorization of products and prescription of practices inform and direct farmers’ agricultural practices, as it furnishes the frame within which the products and production activities are and should be normatively understood. Together, they constitute a normative metaphysics of standard-informed agricultural ethics that structure how farmers make choices, set economic goals, and identify and evaluate production strategies in normative ways shaped by the standards that apply to them. While Thompson does not explicitly refer to normative metaphysics when discussing the sustainable egg production project, at least insofar as he discusses what should be as well as what is the case, he is engaging in both ethics and metaphysics. For instance, he writes of the shift in impact of standards from a prescriptive to descriptive notion when discussing the adoption of certain laying hen production practices that are guided by standards: “when standards for cages [with] layers were developed, they were recommended as the desired approach for producing eggs; once established and in widespread use, they tell us what is the case” (Thompson et al. 2011: 2107).

How is this metaphysics, you might ask? Standards begin as prescriptions of how producers should interact with their products but later constitute these activities such that the standard becomes a description of them. In this way, I argue, standards and standardization not only ontologize, that is, they actually make the ontologies/classifications of the categories of being of agricultural products and production practices, and they also underpin a standard-informed agricultural ethics.

Any agricultural product that relies on these standards also anchors a particular picture of the prescribed interactions and practices related to its production. These standards not only define the terms within the standard as well as the means by which the standard can be applied, they normatively define the local as well as—in the case of international standards—the global production system. I contend, the value of these standards is contingent on certain tacit metaphysical commitments underpinning judgments of relevance about what sorts of agricultural practices are needed to bring into being a product that conforms to the standard for the purposes that are defined in constructing the standard. This is because judgments of relevance are themselves shaped by standard-setting and standard-making activities. In turn, commitment to standards informs the choices farmers make about what they take to be a valuable product in the first place and guide them in their evaluation of their product in accordance with the standard. These commitments are, as I suggested earlier, also what cause certain inferences to make sense and make those practices seem to *work.*

Questioning the basis of these product attributions requires treating the activities and assumptions involved in standard-making within scientific practice as significant in the articulation of them as products. Doing so enables critical examination of how these ontologizing activities affect the acquisition of practical knowledge, development of agricultural products, and the categorization of the contents of the world. While Thompson is widely known as an agricultural ethicist as well as environmental philosopher, an in-depth look at his work on the sustainable egg production project reveals that there is also more than a nascent mark of the work of a metaphysician of agricultural science in his writings. What I have tried to do in this chapter is to reimagine the *normatively coordinated* systems approach and the standards literature from the point of view of a metaphysician of science. One reason for this has been to highlight how what is discussed as "natural" within standard-abiding agricultural practices and the resulting standard-fitting agricultural products, is often what has been made natural through a suite of ontological commitments to the standard. It is hoped that the discussions of normatively coordinated integration and the prescriptive and descriptive impact of egg and canola standards might be useful to metaphysicians, philosophers of science, conceptual engineering enthusiasts, or others interested in exploring the agrotechnological grounds for what we take to be natural in cases that elide the natural and unnatural and the prescriptive and the descriptive.

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