



The 'art' and 'science' of handcrafting cheese in the United States

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Drawing on ethnographic research conducted in the United States, this article demonstrates how American cheesemakers articulate the work of handcrafting cheese as a balance of 'art' and 'science', where art refers to aesthetic creativity and an intuitive ability to interpret observable conditions as a guide for contingent practice, while science refers to the accurate measuring of those conditions as well as meticulous record-keeping and hygiene. Artisanship thus entails a blend of subjective and objective practice and accounting, characterized here as the application of synaesthetic reason. Mutually defining, art and science in the crafting of cheese are far from mutually exclusive. And both are embedded in larger cultural contexts. Artisanship must also acknowledge market-based tastes and cultural understandings of acceptable form.

Here is a deceptively basic recipe for making cheese: heat milk; sour it by adding bacterial cultures that convert milk sugar (lactose) to lactic acid; add an enzyme (such as rennet) to coagulate the fermenting milk. Once the milk has set into a gel-like substance, use long blades to cut the curd into pieces, separating out the watery whey. Mold and salt the curds. Endless variations on this theme – from choice of goat's, sheep's, or cow's milk, to selection of added bacterial cultures, to timing the steps of the cheesemaking process, to consuming a cheese while fresh or after having aged for months or even years – result in hundreds of varieties of cheese. But what distinguishes an *artisanal* cheese from its industrial counterpart?

Artisan cheesemaking is flourishing in the United States, with the number of artisan producers more than doubling, to near 450, since 2000. According to the American Cheese Society, a non-profit organization of small-scale manufacturers, academic consultants, retailers, and tyrophiles:

The word 'artisan' or 'artisanal' implies that a cheese is produced primarily by hand, in small batches, with particular attention paid to the tradition of the cheesemaker's art, and thus using as little mechanization as possible in the production of the cheese.¹

In this formulation, attention to a tradition of cheesemaking art is said to obviate reliance on mechanization. At the same time, open-ended qualifiers – *primarily* (not exclusively) by hand, in *small* (how small?) batches – acknowledge that artisan cheesemaking is not strictly

artistic. As anthropologists Deborah Heath and Anne Meneley argue, contemporary artisan foods rely solidly on technoscience, a modern arena of practice that 'transcends the conventional association of science with knowledge and technology with manual production'.² Very few cheesemakers today eschew the enhanced predictability of seeding milk with freeze-dried, laboratory-isolated strains of known bacterial cultures. At the same time, microbiological assessment of pathogenic risk guides scrupulous hygienic practice in milking parlors and cheese rooms.

Through ethnographic research in the United States, I have found that artisan cheesemakers consistently describe their craft practice as a balance of art and science. In their formulation, *art* stands for creative expression (emblemized by such fanciful cheese names as Hooligan or Fat Bottom Girl) as well as an intuitively interpretive grasp of one's materials, while *science* refers to empirical observation and measurement, disciplined attention to record-keeping, and steps taken to ensure product safety. Many regard scientific knowledge – of milk chemistry, acidification, microbial succession in rind development – as a crucial means of understanding how 'nature' behaves in a way that can complement the customary 'tradition of the cheesemaker's art'. Indeed, many cheesemakers confided to me that they wished they knew more science than they did. At the same time, they are well aware that objectivist accountings of milk, fermentation, and cheese development may result in improved practice and product only if the cheesemaker *interprets* his or her data successfully, a feat described repeatedly as an *art*. Subjective, sensory apprehension and tactile, bodily knowledge are understood to be synergistic with the rational objectivism required to make and record careful observations of how milk and curd behave under specific circumstances. I will call this constitutive element of artisanship *synaesthetic reason*.

Here, I draw from participant-observation in cheesemaking workshops and from ethnographic interviews with American artisan and farmstead producers to explore how cheesemakers perceive and seek to enact a balance of art and science in producing safe, recognizable, yet distinctively artisanal cheese. Between 2004 and 2008 I interviewed 44 cheesemakers, representing roughly one-tenth of artisan operations in the U.S., during site-visits to cheesemaking dairy farms and creameries in California, Wisconsin, and New England.³ What it means to negotiate art and

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¹ <http://www.cheesesociety.org/displaycommon.cfm?an=1&subarticlenbr=51>.

Accessed August 28, 2010. The definition was developed by committee in the late-1990s.

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² Deborah Heath and Anne Meneley, 'Techno, Technoscience, and the Circulation of Comestible Commodities: An Introduction', *American Anthropologist* 2007; 109(4): 593–602, p. 594.

³ Research was supported by the Wenner-Gren Foundation for Anthropological Research and by the Massachusetts Institute of Technology.

science provides much of the vocabulary through which cheesemakers struggle to articulate the tacit elements of their craft. This calls attention to the hybrid constitution and ambivalent status of artisanship in an industrial era, an ambivalence that is most clearly defined in the marketplace. While keen to open niche markets exploring new tastes, the U.S. cheese market comes with high expectations for product consistency and decidedly low tolerance for risk of food-borne illness. Although cheesemakers often speak of their own and their colleagues' inclinations towards either the art or the science end of things as a matter of personal inclination, artisan subjects are inescapably constituted within regulatory and market formations.

Between art and science: developing a feel for the curd

Inescapably, artisanal cheese is defined against the industrial: according to the American Cheese Society (quoted above) it is made more by hand than by machine, in small batches compared to industrial scales of production, using recipes and techniques developed through the practical knowledge of previous artisans rather than the technical knowledge of dairy scientists and industrial engineers. Designer David Pye's distinction between craftsmanship and ordinary (i.e., industrial) manufacture adds analytic legibility to this opposition. Whereas industrial manufacture ensures a certain, standardized outcome, in craftsmanship, according to Pye, 'the quality of the result is not predetermined, but depends on the judgment, dexterity, and care which the maker exercises as he works'.⁴ Craftsmanship entails a 'workmanship of risk' in which product quality is 'continually at risk' throughout the manufacturing process. Such risk can be introduced from human error or from flaws occurring in the raw materials used. Industrial manufacturing seeks to obviate both sets of errors by deskilling production and by standardizing materials.

Industrial cheesemaking today refers to a fully automated process of computer-aided manufacturing. Recipes are programmed into computers and cheesemaking proceeds uninterrupted, according to a pre-scripted plan, in closed vats that restrict milk and curd from view (let alone smell, feel, or taste). Factory workers attend the transformation of milk into cheese at a hygienic remove while cheesemaking knowledge and skill materialize away from the factory floor, in research and design and in quality control. To begin, industrial processing filters out organic variables by denaturing milk: pasteurizing it to kill off microorganisms, standardizing butterfat content, and homogenizing the size of fat globules – and, before that, breeding animals year-round to blend early/late lactation milk.⁵ Industrial cheese looks, feels, and tastes the same from one batch to the next in large part because so much work goes into standardizing the milk used from one batch to the next – and because quality control imposes uniformity on the finished product. Inconsistent batches are melted down to be reconstituted as processed products.

Making cheese 'by hand' is a tricky, uncertain business. The 'tradition of the cheesemaker's art' to which the Amer-

ican Cheese Society contrasts industrial automation reaches back to the pre-industrial practice of farm women who transformed their cows' perishable milk into cheese as a matter of routine domestic labor, whether or not they enjoyed proficiency in the art of their highly particular, idiosyncratic craft. Then, as now, handmade cheese is of varying quality. The apparent arbitrariness of farm-women's cheesemaking success was precisely what the nineteenth-century advent of centralized cheese factories meant to overcome, while the efficacy of tacit knowledge in the hands of an especially skilled cheesemaker is what twenty-first century reformers, like their nineteenth-century counterparts, strive to capture through objective means.⁶

Artisan cheese begins with minimally treated milk. It may be and often is made from pasteurized (heat-treated) milk, but otherwise milk is rarely homogenized or standardized and is often produced by animals bred seasonally. I have visited farmstead operations where warm milk flows from udders directly into the cheese vat. Milk composition is affected by animal fodder and health, as well as by climatic and weather conditions.⁷ 'Seasonality' in cheese may be expressed through shifts in biochemical composition between early and late lactation milk, as well as through beta-carotene and butterfat levels influenced by the fresh hay, pasture grasses, and browse eaten by cows, sheep, or goats. Cheesemakers respond to and work with milk as a dynamic substance. As milk changes, artisan cheesemaking changes. Echoing Pye, a seasoned Wisconsin cheesemaker said this about his work: 'It's something that you got to keep the constant watch on to make a consistent product. There's more room for error because you're doing it yourself instead of being mechanized. That, to me, I think is one of the biggest factors of being artisanal'.

Inherent to artisan cheesemaking is a tension between allowing natural variation to flourish (according to Pye, this generates the craft 'quality' that industrial fabrication lacks) and maintaining sufficient control over fermentation and ripening such that the end result is a recognizable, safe, and tasty food. Dairy scientist Paul Kindstedt puts it this way: 'The challenge for the farmstead cheesemaker is to strike the right balance between art and science. The goal should be to achieve the appropriate level of control to ensure safety and consistently high quality while at the same time giving nature enough free rein to encourage the diversity and uniqueness of character that make artisanal cheeses special'.⁸ On this view, artisan production entails calibrating one's intervention in fermentation and coagulation at a delicate mid-point between total domination – Pye's 'workmanship of certainty' – and letting bacteria run wild, risking a possible biohazard and/or unpalatable and unmarketable cheese.

To strike this balance artisans learn how to work *with*, rather than against, such 'natural' variations as may be introduced by seasonality, ambient temperature and hu-

⁴ David Pye, *The Nature and Art of Workmanship*. London: Studio Vista, 1968, p. 7.

⁵ Peter Dixon, *The Art of Cheesemaking*. In *American Farmstead Cheese: The Complete Guide to Making and Selling Artisan Cheeses*, Paul Kindstedt, ed. White River Junction, VT: Chelsea Green, 2005, pp. 198–199.

⁶ Sally McMurry, *Transforming Rural Life: Dairying Families and Agricultural Change, 1820–1885*. Baltimore: Johns Hopkins University Press, 1995.

⁷ Paul Kindstedt, *American Farmstead Cheese: The Complete Guide to Making and Selling Artisan Cheeses*. White River Junction, VT: Chelsea Green, 2005.

⁸ Kindstedt, *American Farmstead Cheese*; 2005, pp. 37–38.

midity, herd health, and inconsistency in human practice. The trick, as a Wisconsin cheesemaker said to me, is to: ‘observe what happened today and predict it may happen tomorrow, and from those predictions you may make adjustments’. Objective assessment of carefully observed environmental and material conditions – temperature, humidity, milk acidity, curd pH, etc. – and meticulous record keeping (e.g., how much time the curd took to set before being ready to drain from the whey) are crucial because the idea is that one can and will return to these notes to compare observed phenomena from one day to the next, one season to the next, in order to trouble-shoot a failed batch or to reverse-engineer a successful one.⁹ In view of practitioners, this objectivism is a key aspect of the ‘science’ of cheesemaking. Here, artisan and industrial cheesemaking differ more in degree than in kind, with the variables to track more numerous and given more play in artisan manufacture.

Practitioners widely view the complex observational and interpretive process of reading present conditions in light of past experience as ineffable; eventually, moving from observation through evaluation to practice comes to be a matter of tacit knowledge. Consider, by way of analogy, Michael Polanyi’s classic example of tacit knowledge: riding a bicycle.¹⁰ A person can successfully ride a bicycle without being able to articulate precisely how or why. Tacit knowledge for Polanyi is an aspect of *techne*, the practical knowledge of how to make or do something, that Aristotle, in *Nichamachean Ethics*, distinguished from *episteme*, or disinterested theoretical knowledge about what something is. Harry Collins extends Polanyi’s bicycle illustration to tease out the implications for studying tacit knowledge in action.¹¹ What Polanyi describes – that one is able to ride a bike without grasping the physics behind it – is, according to Collins, really bike-balancing. It is another thing altogether to understand how one rides a bike *in traffic*:

One might ask of a bicycle rider, ‘Why did you cross the junction in front of that car coming from your right?’ He or she might reply: ‘I exchanged glances with the driver.’ But this does not provide a repertoire for junction-crossing since the context is so crucial; it depends on the country in which the bike is being ridden, along with an estimate of the moral integrity of its inhabitants and the particular car driver in questions; it depends on whether the rider has a child on board, and, of course the nature of the glances.¹²

If bike-riding is fully embedded in a social milieu, cheesemaking is fully embedded in an entire ecology of activity that scales from the microbial to the human. Myron Olson, a Wisconsin cheesemaker with some thirty years experience, said to me:

Over the years, [the] milk has changed. The feed that farmers are feeding has changed. During the year, the milk changes. So you’ve always got to be aware that there are changes that occur. So you look at pHs, you look at the acidities, you look at the make-up of your milk. So you’ve got to – you can’t just have a formula and figure that’s going to last you for ten years or until you’re ready to retire. If you do, you’re not going to be making good cheese. So it is a constant watching, a constant looking.

In order to problem-solve or reverse-engineer a batch of cheese, the artisan engages all his or her senses to interpret and evaluate seemingly objective data.

I call this *synaesthetic reason*, bringing together cross-sensory apprehension with reasoned analysis. From Vermont to California, cheesemakers described the ability to move from observation through interpretation and evaluation to contingent practice as developing ‘a feel’ for the milk and curd: ‘part of the artisan feel of it is knowing your milk, knowing what cultures complement your milk, what rennet compliments your milk, how to manipulate that’. This is knowledge by personal acquaintance, a more particular way of knowing than abstract epistemic knowledge that something is so.¹³ Patty Karlin, a small-scale cheesemaker in California, said to me:

Cheesemaking is a funny thing because any person who is a good cook [can make cheese] – one time. . . . So what goes wrong? The weather changes, the humidity changes. You have to be able to smell, taste, and feel the cheese. Every batch of cheese, I put it into my hands, I squeeze it, and I know [i.e., recognize] by the imprint of my fingers if that’s going to be an aged cheese, or a fresh cheese, or a soft cheese. . . . The *curd* for those different cheeses is different. So having that *feeling* is something that is hard to teach.

That feel is metonymic for knowledge generated through nearly all of the senses – sight, smell, touch, taste. Subjective, sensory knowledge is required to make objective knowledge work in craft practice, which is why excellence in artisan skill is described in terms of virtuosity rather than expertise.¹⁴

Artisan cheesemakers describe the tacit ability to gather and interpret sensory data and apply it practically as the *art* of making cheese. Their embodied practice moves between what is sensed (apprehension through sensory input and subjective evaluation) and what is being sensed (the empirical conditions and materialities that are manipulated through tweaking a recipe but also through prior orchestration of the ecologies of milk production). Art and science represent the subjective and objective angles from which cheesemakers triangulate on the moving target of a particular vat of milk’s transformation into cheese on a

⁹ This recalls what James Scott describes as *metis*: “the ability and experience necessary to influence the outcome – to improve the odds – in a particular instance.” James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press; 1998, p. 318.

¹⁰ Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago: University of Chicago Press; 1958.

¹¹ Harry Collins, Tacit Knowledge, Trust and the Q of Sapphire. *Social Studies of Science*; 2001, 31(1): pp. 71–85.

¹² Collins, Tacit Knowledge; 2001, p. 116.

¹³ J. H. Leshner draws a relevant distinction in Plato’s *Theaetetus* between *gnosis* (“knowledge by acquaintance”) and *episteme* (“knowledge that something is the case”). This sense of *gnosis* well captures the artisan’s knowledge of materials – in the case of cheesemaking, knowing one’s milk and curd and how it behaves under given conditions. See J.H. Leshner, ΓΝΩΣΙΣ and ΕΠΙΣΤΗΜΗ in Socrates’ Dream in the *Theaetetus*. *The Journal of Hellenic Studies*; 1969, 89: pp. 72–78.

¹⁴ “As in any craft,” writes Tim Ingold, “the skilled maker who has a feel for what she is doing is one whose movement is continually and subtly responsive to the modulations of her relation with the material.” Ingold, *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*. London: Routledge; 2000, p. 357.

particular day. A first-generation cheesemaker said of the process of learning to read the objective data – temperature, pH, time it takes for curd to set, etc. – that he faithfully collects throughout each batch of cheese, ‘It becomes an art when you’re sensing with your senses and trying to predict changes in that cheese based on history. And you’ve taken it from raw data to sensory: the eyes, the nose, the taste, the feel. All of your senses, and then there’s probably the sixth sense. You can’t even – [it’s] just intuition’.

At the heart of what makes artisan cheese artisanal is reflexive, anticipatory practice guided by synaesthetic evaluation of how the materials (milk, curd, cheese) are behaving and developing in a particular instance, as understood in light of past experience.¹⁵ After years of practice, cheesemakers who ‘go by feel’ may no longer be able to articulate what it is that gives them the feel that it is time to cut the curd or drain the whey.¹⁶ As proficiency is gained, watching and seeing become habituated – not by virtue of repetition, but by acquiring a reflexive feel for strategic action under contingent circumstances. Developing a feel for how to develop ever-shifting curd into a self-similar cheese is like riding a bicycle in traffic.

Today, as in the nineteenth century, not all commercial artisans enjoy the same proficiency in feeling the curd. A handmade cheese is not by necessity a well-made cheese. The goal of acting on the basis of trained sensory apparatuses – sight, hearing, smell, taste, touch/tactility, temporality – unites as artisans a heterogeneous group of producers. America’s current artisan cheese ‘renaissance’ dates to the late-1970s as an offshoot to the back-to-the-land movement. Following in the wake of hippie homesteaders, rural entrepreneurs and early retirees seeking a lifestyle change looked to cheese as a means to the end of making a living (or sustaining a retirement) by working the land. Foodies wanting to create and not just consume quality foodstuff have made the most recent debut into artisan cheesemaking. Such newcomers can only marvel at the skill of second- and third-generation cheesemakers working in 80- or 100-year-old artisan factories that resisted automation – Wisconsinites such as Myron Olson, who cures bricks of Limburger using a schmear culture that has been going continuously since the 1920s, or Sid Cook, who grew up in a cheese factory and has surely won more awards than any other cheesemaker at the American Cheese Society competition. Widmer’s Cheese in Theresa, Wisconsin still uses the same masonry bricks that the current owner’s grandfather used 80 years ago. Back in high school, such men apprenticed with master cheesemakers and worked their way up in the trade. It is quite a different proposition for the new generation of cheesemakers to attend weekend workshops hosted by land-grant universities and community colleges or to hire European consultants to aid them in moving from stovetop to com-

mercial cheesemaking.¹⁷ Tacit knowledge cannot be conveyed through brief workshops and consultancies; instead, fledgling cheesemakers acquire objective tools (thermometers, pH meters, spreadsheets) and a weighty appreciation for the interpretive art of making use of such tools – not once, but dynamically over the course of a season or a career.

Hands and other tools

Artisan cheese is ‘hands-on’. But making cheese by hand does not mean working with nothing but one’s hands. Tools are required: vats or kettles in which to heat milk and cook curd; paddles or ladles for stirring; knives or other devices with which to cut curd; implements for removing curds from whey; forms or molds for shaping wheels of cheese; weights or presses for expelling whey. In these tools are found a range of technological sophistication. Understanding the centrality of synaesthetic reason to artisan cheesemaking helps to adjudicate a contentious question among producers: how much technology might a cheesemaker adopt and still be considered to be working ‘by hand’. Does it matter whether a pneumatic press or lengths of PVC tube filled with food-grade salt are used to express whey from curd (Figure 1)? Matter to what? To the resulting taste and texture of the cheese? (probably not). To the operation’s start-up costs? (decidedly). To the self-identity of the cheesemaker as an artisan? (likely).

Consider the mechanical stirring device (Figure 2). For those who have adopted the labor-saving technology there is no turning back. Commenting on the 16-A battery that powers a stirring arm affixed to his vat, a Vermont cheesemaker told me, ‘I’m not going to be out here stirring curd for 45 min. That’s my chance to open mail’. Keeping one eye on the thermometer, he can turn his attention to cheese orders, bills, and payments. After years of manual labor the technological promise of alleviating bodily strain gains increasing appeal. Mary Keehn, former back-to-the-lander and founder of Cypress Grove Chevre in Arcata, California, has introduced a number of automated technologies out of concern for her employees’ physical well-being as well as a business owner’s imperative to cut costs (including workmen’s compensation); as her business expanded her priorities shifted. Today she is less concerned with whether her cheesemaking process still counts as ‘artisanal’ than in how her business contributes to the community through little-league sponsorship and food donations, and in how it sustains the families of goat dairy farmers on the outskirts of town as well as of the Central American employees who pack curd and package wheels of Humboldt Fog. Considering artisanship as a mode of production – a business enterprise entailing many tasks beyond the making of cheese – sheds broader light on artisan practice.

Jon, a Vermont cheesemaker, was looking to upgrade to a mechanized agitator, explaining that hand-stirring curd in his 4000-pound (465 gallon) capacity vat ties up an hour-and-a-half of labor each day – ‘While you’re stirring, you’re thinking about all the things that need to get done’ but that you cannot get to being tied to the vat. Yet, ‘one thing I

¹⁵ Erin O’Connor writes similarly of a different craft, ‘Proficient glassblowers have often said that glassblowing is not about blowing the perfect piece of glass, but coming up with effective solutions to all the problems that consistently present themselves in the process of glassblowing. They nudge towards the idea that non-reflective anticipation is the force of proficiency.’ O’Connor, *Embodied Knowledge in Glassblowing: The Experience of Meaning and the Struggle Towards Proficiency*. *The Sociological Review*; 2007, 55: 126–141, p. 137.

¹⁶ Polanyi, *Personal Knowledge*; 1958.

¹⁷ See Heather Paxson, *Cheese Cultures: Transforming American Tastes and Traditions*. *Gastronomica*; 2010, 10(4): pp. 35–47.

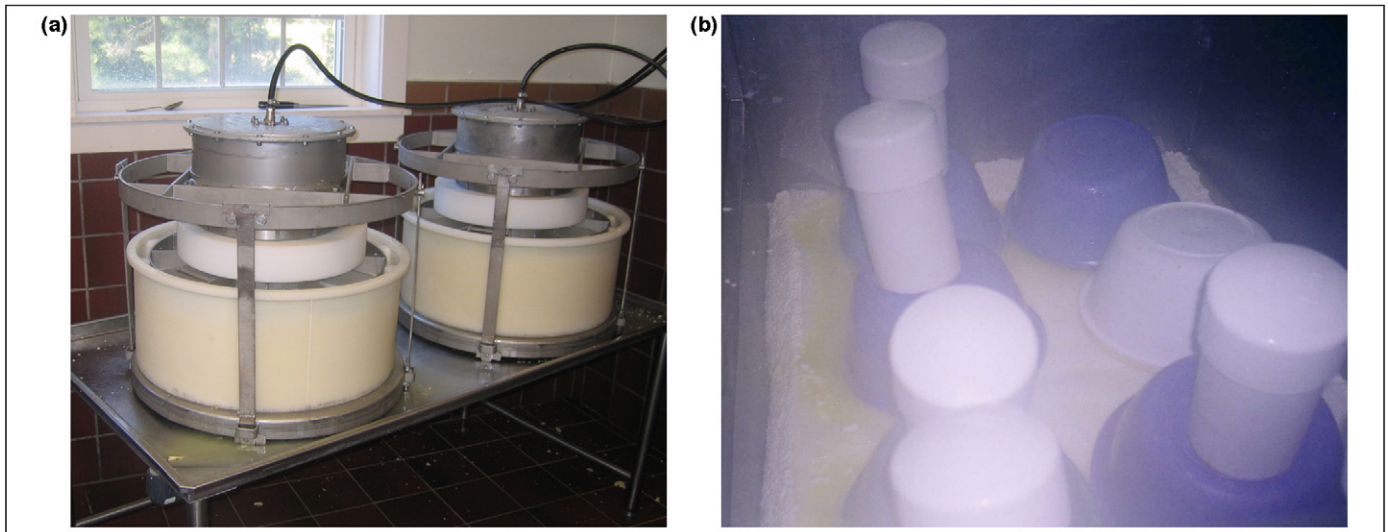


Figure 1. Two means of 'pre-pressing' curd in Vermont: hi- and low-tech. On left: pneumatic press. On right: salt-filled lengths of PVC tube balanced on plastic bowls resting on lengths of plastic pasture fencing. In both cases, the 'pre-pressing' will be cut into smaller pieces of curd that will be shaped into wheels of cheese (Tarentaise and Vermont Shepherd, respectively). Photos by author.



Figure 2. Mechanical stirring arm affixed to a 130-gallon vat. Photo by author.

really like about [hand-stirring] is that I can really watch the curd, can adjust the rate of stirring'. Diana Murphy, a goat dairy farmer and cheesemaker in Wisconsin, said to me:

When I make my Feta or my aged cheeses, I have to be at the vat . . . and I have to get up on a stool to get in there, and I have to stir it [using a hand-held paddle] sometimes for hours. And I set the stirrer down, and I go get a cup of coffee sometimes, and then you come back and the curd is kinda stuck together. So I would *like* to have a [mechanized] stirrer. But on the other hand, I see part of the beauty of what I'm doing is – everything is by hand. I don't need all this special equipment to do it. And I can still come out with a good cheese.

Jon and Diana appreciate stirring with a hand-held paddle because it offers constant, direct engagement with the material being transformed, affording opportunity for reflexive adjustment of speed, vigor, and depth. For Diana,

there is also a certain beauty in creating 'a good cheese' without resorting to fancy equipment. Working by hand connects the mind and body; the hand stands in for embodied skill and practical knowledge. But Diana is not a romantic. There are days when she would just as soon grab a cup of coffee, but the curd will not pause with her. A thoroughly ruined batch ends up on the manure pile, representing a significant loss of capital. Diana realizes that the beauty of her quiet, rhythmic practice is a luxury afforded to her because her business is small. She does not wish for more milk so as to afford to invest in mechanized equipment. Rather, having more milk would mean more work in caring for more animals, resulting in less time to make cheese – thus necessitating a costly equipment upgrade. Would this compromise the beauty of what she is doing? Perhaps – though if the size of her batches or the scale of her operation grew, her aesthetic appreciation might shift to light on another aspect of her craft.

Karen Weinberg, who raises sheep and makes cheese in eastern New York (and whose family is not as dependent on farm-generated income), enjoys a sensual engagement with curd:

My single favorite part of the cheese-making process is stirring curd. I love to do that. I put on a tank top, so I can go up to here [tapping her upper arm]. I just love it. Sheep's milk makes really dense, soapy curd, and it's like folding in egg whites: you have to be really gentle in the beginning, and you really get a sense how the curd changes as the temperature rises and as the whey gets expelled from it. It's just a great learning experience, to get to do that. But you can't be doing anything else while you're doing that, so for the twenty minutes or forty minutes, that's it. I find it sort of therapeutic. You know, I can't answer the phone.

Karen enjoys the sensuous feel of the warm, foamy curd on her arms, a tactile experience augmented by the rich, custardy smell of sheep's milk. The rhythmic motion and



Figure 3. Learning to feel the ‘grip’ of curd in a cheesemaking workshop in Vermont, March 23, 2007. Photo by author.

focused attention of stirring can generate a therapeutic absorption, or ‘flow’.¹⁸ But Karen also regards hand-stirring as a learning experience. When artisan hands touch and feel the curd this is as empirical as it is manipulative – something that the veteran Wisconsinites articulated to me most clearly.

When ‘hands are in the vat, feeling the curd’ – one cheesemaker’s streamlined definition of artisanal manufacture – they are not merely accomplishing the manipulation that industrial manufacture effects with robotic machines. Hands are evaluating the curd through touch, feel – grasping in the metaphorical sense of apprehension as well as the tactile sense of holding in one’s hand. In determining artisanship, it is less important *what* a cheesemaker uses to stir the curd – a bare arm or plastic paddle or mechanical device – than *how* a cheesemaker determines *when* to begin cutting the curd and when to stop stirring it. Does one go strictly by the clock, according to a fixed recipe? Or does one plunge hands into vat to feel, and evaluate, the ‘grip’ of the curd? (Figure 3).

Artisan tools are tools that afford synaesthetic evaluation and reflexive engagement with the materials at hand – that afford a workmanship of risk.¹⁹ When guided by a craftsperson’s experienced, subjective assessment of material conditions, the use of mechanical equipment might count as artisan practice. Art critic Peter Dormer writes,

craftspeople can be defined generally as people engaged in a practical activity where they are seen to be in control of their work. They are in control by virtue of possessing personal know-how that allows them to be masters or mistresses of the available technology. . . . It is not craft as ‘handcraft’ that defines contemporary craftsmanship: it is craft as knowledge that empowers a maker to take charge of technology.²⁰

¹⁸ On the psychological state of “flow” see Mihaly Csikszentmihalyi, *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play*. San Francisco: Jossey-Bass, 1975.

¹⁹ James Gibson writes, “The theory of affordances rescues us from the philosophical muddle of assuming fixed classes of objects, each defined by its common features and then given a name. . . . You do not have to classify and label things in order to perceive what they afford.” Gibson, *The Ecological Approach to Visual Perception*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.; 1986, p. 134.

²⁰ Peter Dormer, *The Culture of Craft*. Manchester, UK: Manchester University Press, 1997; p. 140.



Figure 4. An acidity titrator in the cheeseroom of Jasper Hill Farm, Greensboro, Vermont. Photo by author.

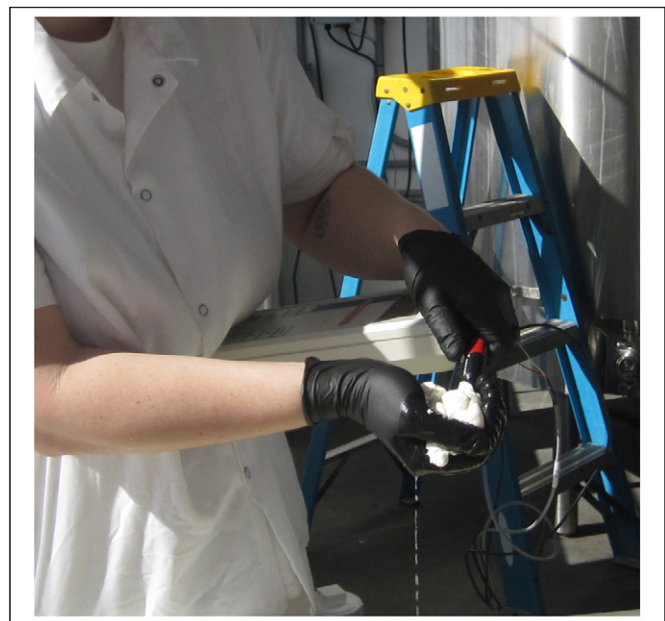


Figure 5. Testing pH using an electric probe, Jasper Hill Farm, Greensboro, Vermont. Photo by author.

The enskillment of artisan producers includes learning to use tools in a way that extends the mind/body into the environment.²¹ Such tools include not only cheese knives or harps for cutting curd and various implements to aid in stirring, but also devices to enhance one’s understanding of the contingent materiality of milk, curd, and cheese: thermometers, acidity titrators, pH meters, and computerized spreadsheets for data collection (Figures 4 and 5). Arms, hands, and noses are other such tools that must be trained, enskilled. One cheesemaker told me admiringly of an Italian colleague who could feel when the milk was ready for starter cultures to be added, saying, ‘His hands are accurate as a thermometer’.

Taking me on a tour of the Wisconsin factory he recently retrofitted to make big-wheel Emmenthaler, Bruce Workman pointed out the control panel of a computerized

²¹ Ingold, *Perception of the Environment*; 2000.

system that regulates milk flow and the addition of bacterial cultures. He has programmed the computer to alert him when sufficient time may have passed for milk to curdle or for the curd to ‘cook’ sufficiently – and then to pause. Nothing further happens until Bruce gets his hands in the vat and feels, smells, evaluates the curd. Once he has determined that it is time for the next step, he pushes a button and things proceed. The way Bruce uses automated machinery disrupts its ‘mechanical objectivity’, to borrow a term from historians Lorraine Daston and Peter Galison, referring to ‘the insistent drive to repress the willful intervention’ of the knower in ascertaining the objective truth of objects of nature.²² As if to head off potential complaints that his computer system might cross a line beyond artisan fabrication into industrial, Bruce stressed that he purchased the equipment, used, from a school in Switzerland. Indeed, those two or three cheesemakers I visited who use computer-programmed equipment legitimated it by explaining, ‘this is what everyone in Europe uses’, implicitly claiming that being European itself confers artisan authenticity to a method of manufacture.²³ Such domestic producers (as Cypress Grove) are among those most widely recognized as making artisan cheese – the production volume that warrants and enables imported equipment purchases is also what gets cheese into restaurants and specialty supermarkets nationwide.

Using a patchwork of used and new equipment, American cheesemakers are *bricoleurs*, cobbling together pieces of pre-industrial and cutting-edge technologies in often surprising ways. John Putnam uses a mechanical stirrer and powerful pneumatic press, but labors to maintain a ‘mother’ culture (similar to a sourdough starter) in lieu of buying laboratory-isolated commercial cultures and pre-prepared rennet. Peter Dixon uses a mechanized stirrer but a jerry-rigged weighted lever-arm (beam) press weighted by a plastic bottle filled with water. Contemporary artisanship is not a throwback to the past; it is a modern pastiche.

Cheesemakers regard ‘hands-on’ manufacture as what Daston and Galison would call an ‘epistemic virtue’, a standard for practice that is embraced by a community because it is understood to be an effective means of obtaining knowledge and also is consistent with shared ethical values.²⁴ The empirical work of the hands establishes the artisan character of a cheesemaker no less than of a cheese. As Aristotle argued, in evaluating the practical knowledge

²² Lorraine Daston and Peter Galison, *Objectivity*. New York: Zone Books; 2007, p. 212.

²³ Juliette Rogers writes of the French context: “An artisanal cheesemaker is one who keeps close watch and control over the process of cheesemaking, and has the skills to ‘read’ the milk and developing cheese and respond to its changing needs. He molds, unmolds, salts and washes cheeses by hand in small batches, and output is relatively small. The particulars of this definition are in dialectic with the definition of industrial-scale cheesemaking, which is done by machines like conveyor belts, mechanical ladlers, and whey pumps, all orchestrated by computer. They produce large quantities of cheese that has barely come into contact with people. . . . Cheesemakers whose productions hover in the middle are especially touchy about the terminology; one who installed a small but thoroughly automated system in the summer of 2005 dwelt upon the degree of personal control and physical oversight he had over every aspect of the process as he struggled to retain his claims to artisan status.” Rogers, “The Political Lives of Dairy Cows: Modernity, Tradition, and Professional Identity in the Norman Cheese Industry,” PhD Dissertation, Brown University; 2008, p. 21.

²⁴ Daston and Galison describe “epistemic virtue” as “norms that are internalized and enforced by appeal to ethical values, as well as to pragmatic efficacy in securing knowledge.” *Objectivity*; 2007, p. 40.

of *techné*, consideration must be given not merely to the qualities of the product made, but also to *how* the product is brought into being. What dispositions did the maker bring to bear on the making? As a form of reason, *techné* provides conditions for the possible exercise of virtue and excellence.

Artisan *habitus* and market contradictions

How might we evaluate excellence in contemporary artisan cheesemaking? As an anthropologist, I am drawn to pursue parallels between cheesemaking’s synaesthetic, integrated mode of thinking/doing and what French theorists have called *habitus*, an embodied set of dispositions required for social proficiency in a culturally (or professionally) specific field of relations.²⁵ An artisan *habitus* is not so much a matter of ability, but of sensibility. It encompasses a synaesthetic grasp of the materials combined with an ethic of doing a job well for its own sake. In developing Marcel Mauss’s idea of *habitus* as a culturally acquired aptitude or faculty, Pierre Bourdieu borrowed craft-related terms – tact, dexterity, *savoir-faire* – to make sense of how the social realm infuses the individual’s sense of self (what social theorists often call the interface between social structure and individual agency).²⁶ For Bourdieu, individuals are socially conditioned but not in a cookie-cutter fashion; there is room for individual improvisation. In his interpretation, *habitus* names a reflexive feel for strategic action under contingent circumstance. The practice of everyday life sounds a lot like the artisanal making of cheese.

Moving away from American cheesemakers’ own terminology – art, science – I want to turn now to consider the influence of artisans’ lives beyond the cheese room on their embodied practice within it. Because artisan proficiency develops from a habituated knowing-how that entails social as well as technical knowledge, in order to understand *techné* (the practical knowledge of making), we must understand the technologist (craftsperson, artist, designer, engineer) as a social person engaged in relationships and embedded in hierarchies. Such perspective sheds light on a paradox in the construction of quality in American artisan cheese.

As implied by the American Cheese Society definition of *artisanal*, the less technology and technoscience used in its fabrication the greater one might imagine a cheese’s claim to artisanal status – and the higher its cultural capital. But cheeses requiring the least sophisticated technology – fresh cheeses that can be made in one’s kitchen, such as *chèvre*, *mozzarella*, and farmers’ cheese – do not enjoy the cultural cache of, say, John Putnam’s Tarentaise, an alpine-style cheese made in Vermont using a mechanical stirrer and pneumatic press, or the Pawlet that Peter Dixon makes for Consider Bardwell Farm using a mechanized cheese harp to finish cutting the curd. There are a few reasons for this. Use of mechanized technology in crafting a wheel of cheese is not readily apparent to the average consumer from the taste or appearance of an aged cheese that has been cured to develop a so-called ‘natural’ rind; neither do producers

²⁵ Marcel Mauss, *Techniques of the Body*. *Economy and Society*; 1973, 2(1): pp. 70–88; Pierre Bourdieu, *Outline of a Theory of Practice*. Translated from the French by Richard Nice. Cambridge, UK: Cambridge University Press; 1977.

²⁶ Bourdieu, *Outline of a Theory of Practice*; 1977.

advertise it. Moreover, since fresh (un-aged) cheeses require less labor they are priced more affordably, making them available to a wider consuming public.

Meanwhile, the most experienced and proficient artisans do not necessarily make higher-status cheeses that may appear to be more artisanal. Among those cheesemakers I interviewed who most thoroughly embody the artisan habitus described above were several who make mozzarella and other ‘everyday’ cheeses. They include second- and third-generation cheesemakers who inherited their craft from European immigrants who worked in a different culinary landscape than today’s gourmet and locavore scene.

Artisan forms and dispositions are further forged in relationship to a developing consumer market. Craft objects, in contrast to fine arts, are meant to be useful. Howard Becker explains, ‘To speak of usefulness implies the existence of a person whose purposes define the ends for which the objects or activities will be useful. . . Defining craft [. . . in this way] implies both an aesthetic, standards on which judgments of particular items of work can be based, and an organizational form in which the evaluative standards find their origin and logical justification’.²⁷ The organizational form shaping American artisan cheese is to a great extent the marketplace; evaluative standards are described in terms of taste, both in the sense of organoleptic, sensory experience and of social distinction.²⁸ Informed by social conventions embedded in a shared political economy, craft and taste are mutually constitutive.

One Vermont cheesemaker described ‘the main job of a cheesemaker’ to me as striving to produce a batch of cheese that matches the vision ‘in your own mind’, but in craft, the image of perfection is not a Platonic form but a customary form. The Italian word for cheese, *formaggio*, like the French *fromage*, comes from the Latin *forma*, or form (most frequently interpreted as the mold used to shape a wheel of cheese, also called a form). To grasp the customary form of a style of cheese it helps to have an accustomed palate. The tradition of the cheesemaker’s art is a sedimented social history that, in the United States, allows for improvisation but does not escape the structuring structure – the formative form – of the retail marketplace. If a cheese is named or described as a Chource it should not more closely resemble a Robiola.

Then again, cheesemakers trade in different marketplaces. I once bought cheese labeled ‘Feta’ at a farmers’ market in rural Maine; the soft balls of fresh, pepper-coated goats’ milk cheese suspended in olive oil spread nicely on crackers, but the cheese may not have fared well in an urban retail shop as ‘Feta’, by which name consumers may expect a firmer, even crumbly cheese with a piquant bite from being aged in salty brine. Vendors at farmers’ markets enjoy the latitude to offer samples of cheese gone slightly (but not harmfully) awry; customers who like the taste can buy it – it hardly matters if the cheese only vaguely meets the promise of its label. In my local cheese

²⁷ Howard Becker, *Arts and Crafts*. *American Journal of Sociology*; 1978, 83(4): 862–889, p. 864. See also Cristina Grasseni, *Skilled Vision: An Apprenticeship in Breeding Aesthetics*. *Social Anthropology*; 2004, 12(1): pp. 41–55.

²⁸ See also Antoine Hennion, *Those Things That Hold Us Together: Taste and Sociology*. *Cultural Sociology*; 2007, 1(1): pp. 97–114.



Figure 6. ‘Reconsider’, a one-off test batch using an established recipe but in a differently sized and shaped mold by Peter Dixon at Consider Bardwell Farm, sold at Formaggio Kitchen in Cambridge, MA. Photo by author.

shop I have sampled unusually colored or shaped batches of otherwise familiar cheese (the outcome of unanticipated mold growth or an error in manufacturing) labeled as a one-off with a play on the name of the not quite realized cheese (Figure 6). Producers who lack close relations with their retail clients or who sell through third-party distributors are particularly pressured to maintain consistency from batch to batch; consistency is arguably the most difficult skill to master in craftsmanship. Following Paul Kindstedt, who suggests that the artisan cheesemaker works to ‘strike the right balance’ between domination of and subordination to the organic agencies of fermentation and mold development, finding this equilibrium poses a particular challenge when, as in the United States, the scale must be calibrated to a consumer market that fetishizes the idea of artisanal exceptionalism while also demanding a reliably consistent and safe product.²⁹

Science as a folk theory of magic

Facing this challenge, what do cheesemakers hope to gain by learning more science? Tracking pH readings and exercising a working knowledge of milk chemistry might shave off months, even years, from the gradual process of acquiring and incorporating practical knowledge into reflexive, embodied practice. Cheesemakers who sell through third-party distributors may be more faithful in keeping meticulous records than those who rely on direct sales. But this is not all that ‘science’ is or can be.

²⁹ Kindstedt, *American Farmstead Cheese*; 2005, pp. 37–38.

Knowing the science behind the craft or, more ambitiously, learning to use science in the service of craft appeals to cheesemakers' sense of wonder about the natural world. *Magic* is a word they evoke frequently to describe the transubstantiation of milk into cheese. Heat some milk, add a little of this, a pinch of that, stir... 'and the magic happens'. Scientific tools and knowledge promise to offer artisans a window onto that magic, giving them a deeper appreciation for the natural processes of which they are but a part. Science for many artisan cheesemakers turns out to be less an instrument to deploy to exert control than a source of humility. The epistemic virtue of scientific knowledge contributes to the making of a thoroughly contemporary artisan habitus. It enhances cheesemakers' sense of wonder about the natural world in an era that has moved from the counterculture of back-to-the-land to the cyber-culture of tracking data using computerized spreadsheets to get back-to-nature.

In contemporary American cheese culture, *techne* is not the devalued other, the constitutive outside, of either

episteme or technoscience. Early twentieth-century anthropologists Bronislaw Malinowski and E.E. Evans-Pritchard described magic as a folk theory of science, with both magic and science seeking to explicate the unknown as well as to provide people with means of intervening in the natural world to further human ends.³⁰ Twenty-first-century artisans speak rather of science as a folk theory of magic, enhancing their sense of wonder and reminding them of the limits of human agency. Mutually defining, art and science in the crafting of cheese are far from mutually exclusive.

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³⁰ Bronislaw Malinowski, *Magic, Science and Religion, and Other Essays*. Glencoe, IL: The Free Press, 1948; E.E. Evans-Pritchard, *Witchcraft, Oracles, and Magic among the Azande*, Oxford: Oxford University Press, 1976.