ETHNOECOLOGY OF THE OZARK HIGHLANDS' AGRICULTURAL ENCOUNTER

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Throughout the twentieth century, many farm families in the Missouri Ozarks, USA, significantly changed their practices or abandoned agriculture as an occupation altogether. Researchers, farmers, and the general public assume the shift was an inevitable process of increasing economic efficiency. This article utilizes ethnoecology to demonstrate the importance of the overlooked cognitive aspects of agricultural modernization and to elucidate contemporary agricultural heterogeneity in the Ozark Mineral Area of southeast Missouri. Research included two years of participant observation, agro-ecosystem analysis, and ethnoecological and semi-structured interviews to document Ozark farmers' perceptions of their farming environments and their agroecological practices. While some farmers' perceptions of their farming environments have changed with agricultural modernization, removing traditional morality from agricultural decisions, other farmers maintain traditional practices within their agroecological landscape. (Agricultural modernization, ethnoecology, Ozarks, traditional knowledge)

During the first half of the twentieth century, industry and government orchestrated political, discursive, and educational stratagems to modernize traditional agricultural operations in the United States (Berger 1971; Campbell 1962; Hurt 2002; Magdoff, Foster; Buttel 2000; McConnell 1959; Saloutos and Hicks 1951). Throughout that time, the Ozark highlands experienced significant decline in subsistence and commercial agriculture (Blevins 2002; Davidson 1996; Rafferty 2001). A concomitant of this modernization process has been the dissolution of communal values. While most Ozark farmers traditionally made agricultural decisions based on a cultural logic grounded in their kinship networks and self-identification as stewards of their land and animals, such values and actions have become quite rare in the present (Campbell 2005). After more than a half-century of agribusiness and university Extension programs promoting more modern business and agricultural practices, some Ozark farmers take a business-only approach to agriculture, omitting agroecological lore from their decision-making. Other Ozark farmers' relationships with local agroecology remain grounded in traditional ecological knowledge (TEK).

RESEARCH CONTEXT

Ethnoecology refers to the study of humans's understanding of their natural environment and the interrelationships therein (Brush 1992; DeWalt 1994; Fowler 1977; Nazarea 1998, 1999). Ethnoecological research has documented the role of power dynamics on environmental perception (Dove 1999; Nazarea 1998, 1999; Peña 1999; Rhoades and Harlan 1999; Richards 1996). Nazarea (1999:9) advises:

ETHNOLOGY vol. 48, no.1, Winter 2009, pp.1–20.
ETHNOLOGY, c/o Department of Anthropology, The University of Pittsburgh, Pittsburgh PA 15260 USA

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Ethnoecology, as the investigation of systems of perception, cognition, and the use of the natural environment can no longer ignore the historical and political underpinnings of the representational and directive aspects of culture, nor turn away from issues of distribution, access, and power that shape knowledge systems and the resulting practices.

Perceptions and land use are situated within the history and politics of a landscape. The decline of self-sufficiency and farming in the Missouri Ozarks is an historical and political process; agricultural modernization "developed" Ozark farmers to the point of assimilation and bankruptcy, out-migration, or stubborn resistance (Blevins 2002; Campbell 2005).

Agricultural modernization epitomizes Weber's (1904) concept of technocratic rationalization; it is characterized by two interrelated tendencies: 1) the institutionalization of technical innovations and organizational progress and 2) the subordination of traditional structures (Leagans and Loomis 1971; McCarthy 1978). Such rationalization consists of a redefinition of all practical issues as technical, and suggests science and technology as the solution to all problems. As traditional power-legitimization configurations dissolve, religious worldviews and mythological explanations "lose their cogency" (McCarthy 1978:37; Weber 1904). Farmers who engage in modernization and follow its logic no longer perceive their environment through former worldviews or cultural logic (Appudarai 1990). However, traditional cultural attributes, perceptions, and practices continue for some Ozarkers (Brady 1990; Nolan and Robbins 1999; Rafferty 2001; Campbell 2005). This article explains some of the variability in Ozark farmers' perceptions of their farming environments.[1]

THE OZARK MINERAL AREA

The Ozark Highlands region of northern Arkansas, southern Missouri, and northeastern Oklahoma, USA. exhibits geographic and sociological characteristics that distinguish it from surrounding areas. The geology consists of karst topography, characterized by sinkholes, caves, and numerous springs; as groundwater permeates the limestone and dolomite, it dissolves the stone and washes much topsoil away with it. Therefore, despite the abundance of fresh water sources, the rocky, shallow soils in much of the region provide marginal opportunities for intensive row-crop agriculture (Rafferty 2001). Ozark inhabitants have historically reflected the key geological characteristic of their landscape: ruggedness. They chose to settle in the Ozarks and frequently built their homes in the hills rather than the valleys, because they wanted to be left alone. Geographers refer to the region as a "semi-arrested frontier" because the geographic isolation allows for the persistence of traditions and avoidance of government regulation (Brady 1990; McNeil 1995; Rafferty 2001). Distinguishing characteristics of native Old Stock,[2] Ozarkers include their sense of place and suspiciousness of outsiders, "furriners," whether from another country or any neighboring city or state (Massey 1978; Randolph 1931; Campbell 2005). Many Ozarkers, especially farmers, express immeasurable pride in their ancestors' self-reliance (Deane 1975; McNeil 1995; Rafferty 2001; Randolph 1931; Campbell 2005). As parts of the Ozarks have experienced substantial out-migration of natives and in-migration of retirees and back-to-the-landers, they have

come to resemble the generic United States. The more remote, rugged regions, however, continue to support the "semi-arrested frontier" appellation (Blevins 2002; Rafferty 2001). One such "semi-arrested" region is the field site for this research, the Ozark Mineral Area (OMA), which is situated in the eastern ranges of the Missouri Ozark Highlands, where significant mineral deposits attracted some of the earliest European settlements (Rafferty 2001).

OLD-FASHIONED FARMING AND MODERN AGRICULTURE

Self-sufficient Ozarkers gained intimate awareness of their Ozark locality through enculturation and experience. They acquired TEK, traditional ecological knowledge (i.e. environmental, ethnobotanical, indigenous, local, and rural people's knowledge)—that allowed them to endure in the marginal Ozark landscape by observing their social and natural environments (Alcorn 1995; DeWalt 1994; Ellen et al. 2000; Nolan and Robbins 1999; Sillitoe 1998). Ozark farmers understood the limitations of the Ozark landscape and they anticipated drought. They paid close attention to wild species, their own animals, and other ecological features for signs of stress, blight, or other forebodings, and acted accordingly to prevent overexertion of their land or animals. They depended on wild resources, in addition to their domesticated species, to sustain themselves and their animals. Abundant fresh water allowed them to turn livestock out on the open range.

Sustainable natural resource management systems, like the pre-industrial Ozark agroecosystem, are regulated on ecological and cultural feedbacks that do not necessarily correspond to the "vocabulary or even the logic of modern science" (Hornborg 1996:49; Rappaport 1968, 1979). "Because knowledge can never replace respect as a guiding principle in our ecosystemic relations, it is adaptive for cognized models to engender respect for what is unknown, unpredictable, and uncontrollable, as well as for them to codify empirical knowledge" (Rappaport 1979:100–01). But modern rationality does not allow for the "unknown, unpredictable, and uncontrollable" (Scott 1998). Instead of working with and paying attention to the existing environment and fine-tuning the agricultural approach to match the natural contours of the land, climate, soil, and topography, modern agriculture attempts to modify the environment to fit the needs of the seeds, inputs, and machinery (DeWalt 1994). Modern industrial agriculture prescribes a universal predetermined method (Berry 1997; Scott 1998). The encounter between Ozark TEK and agricultural modernization resulted in varied, modified, and heterogenous perceptions of and practices on the biophysical environment.

METHODS

The research, completed in two years (2002–2004), was carried out in a rural Ozark community of approximately 500 people in Iron County, Missouri, surrounded by National Forests, State Conservation lands, and farms. Research included participant observation, surveys, semi-structured interviews, and formal ethnoecological interviews in the spring and fall with 51 farmers[3] within a three-county radius.

Table 1
Ethnicity and Age of Farmer-Participants

Ethnicity	<45 Years	45–70 Years	>70 Years	Total
Old Stock American	5	13	10	28
German	4	10	4	18
N/A Non-Local	2	3	0	5
Total	11	26	14	51

The formal ethnoecological interviews included Thematic Apperception Tests (TATs) and Semantic Differentials (SDs) (Bernard 1995:305–6; Nazarea 1999:13). I documented present-day agricultural practices through variations of Conway's (1985) agroecosystem analysis: crop, livestock, and technology inventories; and participatory field plots. I did content analyses of Farm Journal magazines from the 1960s and 1980s, dividing their contents into agriculture-related advertisements and articles, and then coding them by themes. Qualitative data sets, surveys, semi-structured interviews, and TATs were tape recorded, transcribed in their entirety, and entered into N Vivo where I coded and analyzed them according to attributes and themes. Content analysis and coding agricultural media was also conducted in N Vivo. I entered and analyzed quantitative data sets collected from surveys, SDs, TATs, and livestock, crop, and technology inventories in SPSS 10.0.

PERCEPTIONS OF THE AGROECOLOGICAL ENVIRONMENT

Nature and Wild Plants

Throughout the twentieth century, agricultural media, university Extension programs and pamphlets, and agri-corporate propaganda portrayed wild plants as obstacles and nuisances, as weeds rather than as possible medicine, animal forage, or salad ingredients (Campbell 2005). When asked to rank "nature" and "wild plants" on the SD, 92.2 percent rank the former positively. Rankings of the latter varied, with 17.6 percent ranking "wild plants" negatively and 13.7 percent ranking it neutral. Discrepant rankings of nature and wild plants reflect ideological changes in the local perception of wild plants.

While Ozark farmers of the past perceived wild plants as useful, contemporary Ozark farmers vary in regard to their utility. Approximately 75 percent of farmer-participants born and raised in the Ozark region maintain a belief in wild plant utility, while about 8 percent have lost that perception. The three non-local, non-intergenerational farmers who ranked wild plants as "very useful" are members of the Missouri Organic Association (MOA). Their "outlier" responses reflect a distinct ideology from both traditional local wisdom and modern technocratic rationality. When figuring non-"organic," non-local farmers' perceptions of wild plants, approximately 60 percent view them as "somewhat" or "very" useless and only 14 percent rank them

"useful." The only farmers who perceive wild plants as "very useless" were not reared in farm families. Intergenerational farmers raised in the Ozarks, opposed to non-local, non-intergenerational farmers, maintain a belief in the utility of wild plants.

Table 2
Ranking of "Wild Plant" Utility by Intergenerational Farming Experience

Raised Farming	Very Useful (1)	Somewhat Useful (2, 3)	Neutral (4)	Somewhat Useless (5, 6)	Very Useless (7)	Total
Yes	11	18	6	4	0	39
No	4	1	3	2	2	12
Total	15	19	9	6	2	51

Old Stock Ozark farmers experienced troublesome years when droughts destroyed their crops. In those years, they supplemented the small amount of surviving crops and livestock by foraging for plants and hunting animals to procure sufficient food for their families. Berkes (1999:95) proposes that social groups respond to times of need through the development of a conservation ethic, an "awareness of one's ability to deplete or otherwise damage natural resources, coupled with a commitment to reduce or eliminate the problem." Elders and community leaders pass this conservation ethic to subsequent generations to ensure that when they endure lean times, they will have preserved their natural resource base. Ozark farmers who experienced the agricultural depressions of the late nineteenth and early twentieth centuries developed a similar ethic. The utilitarian values of Ozark farmers consist of a heightened awareness and use of the resources that the natural surroundings offer and may explain the retention of a perception of wild plants as useful. Ozark farmers related their parents' and grandparents' difficulties and how foraging and communal agricultural activities alleviated the burden (Campbell 2005).

In the not so distant past, the population had a significant amount of traditional ecological knowledge (Nolan and Robbins 1999). A farmer explains of a former elderly community member:

> He had so much information. He showed me plants, but I can't remember them now. I wish I would have recorded it or written it down. He showed me plants that I could make medicine out of and there was one kind that was good for a bellyache and different remedies for horses and I used a lot of that stuff. Most of the plants, we'd go out in the field and I wouldn't pick them unless I was with him, and he knew exactly what they are, and you could boil this for a stomachache and I used a lot of that stuff and it helped, but I couldn't go out now and pick it. He learned it from life.

While contemporary farmers' ancestors passed much knowledge on to them, the systematic delegitimization of Ozark knowledge resulted in a severe decline in Ozark TEK. An old-time farmer illustrates:

> People have just lost their connection to the land. They've completely lost their connection to the land. People even in this country (region), even in the rural areas, have lost it, they don't know anything about

it. We talked about that with her dad who's sixty-one years old. They're the last generation to know anything about it. Her dad grew up on a little old farm during hard times. But their kids, they grew up where they raised their food and grubbed out a living. But I guess it's a benefit of the prosperity in this country, but now you've got three generations of people, between 1960 and now, they don't know anything about that.

He and his wife then discussed the possible effects of a population without agroecological knowledge:

Him: The scary thing, if some catastrophe happens, how these city people gonna get food if they can't go to the grocery store for some?

Her: They're gonna be huntin' somebody up to help 'em out.

Him: My neighbor says they'll come out here and kill us (laughing). He swears, they'll come out and say, "Look at so and so, look at what he's got. Look at all that." And they'll come out here and kill ya for it and then they'll be like, "Now wadda we do with it now." That's his exact thoughts. "Well, what do we do now? Now that he's gone, the only guy that knew what to do with it, now that he's gone, what do we do now? We've got all this, now what do we do?"

Animal Husbandry

The previously intimate relationship between farmer and animals has changed dramatically (Campbell 2005). Contemporary farmers interact with and perceive their animals differently than previous generations of Ozark farmers. Animals no longer provide labor on traditional farms because they have been replaced by machines. While Ozark farmers consistently stated their affection for the farming lifestyle, and working with animals in particular, some have come to believe in the modern agricultural business model that prioritizes profits over the well-being of animals. They claim that to compete in the modern economy a farmer must increase scale and constantly turn over high numbers of animals. While farmers of the Ozark past perceived the alleviation of animal stress as paramount, both for economic and ethical reasons, contemporary farmers engage in practices that increase the stress of their animals.

Concentrated animal feeding operations (CAFOs) emerged in the mid-twentieth century as industrial agribusiness's primary strategy for raising very large numbers of animals (chicken, hogs, or cattle) in limited space. Various agricultural media urged farmers to "get bigger," insisting that CAFOs represented their only option if they wanted to remain on the farm. Animal stress became an inevitable component of this transition, as this Farm Journal advertisement illustrates:

TYLAN ® provides a new and powerful antibiotic action against serious diseases that can strike your cattle or hogs. . . . Unique and created specifically for agriculture, Tylan delivers a swift, positive, hard-hitting antibiotic activity never before available. . . . Stress conditions under which livestock must be raised today make it easier for disease outbreaks to get started; crowding makes it easier for these infections to spread. . . . (Farm Journal, March 1981)

According to this industrial model, animal stress could only be alleviated through agri-pharm products, such as antibiotics, hormones, and medicated feeds, for which farmers previously had no use. As agri-business and university Extension propaganda and agents

subsidized large-scale operations, farmers adopted the myth of large-scale, specialized efficiency (Campbell 2005).

Around the middle of the twentieth century, the Ringles, a modern family from St. Louis, Missouri, toured the Ozark Mineral Area (OMA) on a family vacation. Enticed by the beauty and cheap price of land, they bought some wooded acreage and built a vacation home. After visiting on holidays each year, the Ringles decided to move into their vacation home permanently and become farmers. At first they emulated the locals, raising free range hogs, but they quickly moved to a more industrial approach. Following Extension and agribusiness guidance, they moved their hogs into buildings and consistently "modernized" their operation by adopting the most recent industrial prescriptions. The Ringles are the last CAFO in the region and are struggling to survive as an agricultural business. They have maintained their operation despite huge drops in the price of hogs, and literally earn pennies on each hog sold. They have managed to endure through extended-family cooperation. About five families, all descendants of the original couple that moved to the Ozarks, share in the work-load and have diversified their operations through heavy equipment contracting and hauling.

The Ringles' agricultural trajectory illustrates the effects of ideological differences between the local population and these transplants. Locals helped the Ringles when they first arrived, but they did not expect them to succeed as farmers. The Ringles have persisted in agriculture because of the industrial diversification of their operation. On the other hand, despite all the obstacles, some local farmers continue to raise hogs outdoors; while these farmers do not make much money, they are not in debt like the Ringles. When the Ringles came up as a topic of discussion during interviews, local farmers spoke of them with a degree of respect, but also with suspicion and sometimes contempt. Traditional Ozark farmers do not see CAFOs and industrial agriculture as farming. They believe farming to be a noble pursuit that involves cyclical agroecological processes. True farmers do not merely raise one product, species, or crop; they cultivate the soil, plant and harvest crops, feed crops to animals, family, and neighbors, and while simultaneously raising animals from birth, farmers care for them, feed them, and selectively harvest them. As another farmer explains:

> The true farmer is fading away fast. All you got now is hobby farmers and weekenders, unless it's a corporation. That's not true farming, that's business, that's all that is—something to make money. I've got nothing against making money, but when you take away what this country was built by, then you're taking away a major part.

The intergenerational, local farming population has maintained a devotion to the Jeffersonian agrarian tradition and myth. An Old Stock farmer expresses his belief that the Ringles perceive the goal of farming differently; "I'm here to make a living on it. They're there for a different reason. But I'll add this: the dad retired from Sears and Roebucks where he was an electrician." This statement depicts the local perception that the CAFO is not run by real "farmers," and the profound ideological difference in the region.

Free-range hogs were prevalent in the region until the last three decades, when the practice was abandoned. Farmers' perceptions of farming practices were examined

through the TAT method by showing a picture of a free-range hog farm scene and asking respondents to state what came to mind upon seeing the image. Old timers become especially nostalgic when they see pictures of free-range hogs. I coded the responses of almost 22 percent of participants as: "personal experience," "positive emotion," and "no longer present." Farmers believe that they have been done an injustice by government and agribusiness companies because in the past they raised hogs and earned a fair price. Now, because of consolidation by vertically integrated corporations and government subsidies, farmers lose money raising hogs. Approximately 16 percent of participants responded negatively to the image of free-range hogs because they perceive free ranging as an inferior agricultural method that belongs in the past. Contemporary farmers who were not raised as farmers (non-intergenerational) are much more likely to respond negatively to the image of free-range hogs (see Table 3).

Table 3
Responses to Image of Free-Range Hogs

Response (TAT)	Frequency	Percent
1. Personal Experience	18	35.3
2. Positive (Emotional)	1	2.0
3. Utilitarian	0	0.0
4. Not here/Not now (Past)	5	9.0
5. Negative (Emotional)	3	5.9
6. Economic Rationality	1	2.0
1, 2, & 4	11	21.6
1, 4, & 5	5	9.8
Total	44	86.3
Missing*	7	13.7

*No response to the image.

Half of their responses are coded as "not here or now" and "negative," compared with 6 percent of local, intergenerational farmers. Mr. Ringles' response illustrates the inherent technocratic rationality in the "not here or now" and "negative" reaction to the free-range hog image:

Aahhh, the old days. Little hogs outside, a little brood house, hay bale for bedding—that for us was about 30 years ago. We built the shacks . . . for the sows and ran the boars out with the sows and took care of servicing and breeding and now we AI [artificial insemination] about 90 percent and keep our sows and our gilts and replenish our herd that way. We got to a plateau and we couldn't get beyond that and so we went into PIC (Pig Improvement Corporation) stock and that also makes me think of the erosion we used to have on the dirt lots. The sows, I don't care if you give 'em 20 acres, they can clear that, and if you give 'em two and they'll have everything that's green dead. They chew the bark off the trees, which kills the trees, and I don't care what it is, it could be briars and they'll tear it up. That doesn't happen anymore because in this area in farming, if you're going to do it full time, you have to have a lot of one item. It's the Walmart theory. You market a lot and not a high profit margin. So, you don't have time to

play with chickens or some other small animals running around. You really don't have time to do that. You try to professionalize and maximize and use your knowledge of one or two species and normally that's the large animals, hogs or cattle, 'cause this ground works well for it.

The one advantage we had over what you could call the generational farmer, one who had generations of farming behind him, was that when we came in, we were not accustomed to farming a specific way. We were used to change, so we constantly updated our methods and let it evolve, whereas the local people were not at all accustomed to change. We used new buildings for farrowing and the other people did it how their fathers had done it and their grandfathers had done it and you still see hogs on dirt out here, but it's still changing yet, and that's probably a thing that will change too. You won't see that much longer. We have gotten used to change and you just work with it, instead of trying to fight it. People want to keep it the way it was, but you can't work with tools that are 30 years old and make it today. It's all about staying on the technological edge.

The CAFO owner's experience in technocratic rationality delimits his strategy as the only rational one. He perceives free-range methods as belonging strictly in the past and believes that the only appropriate agricultural strategy involves continuous adoption of the most recent scientific and technological innovations.

Traditional Ozark farmers have a different perspective. They consider CAFOs in violation of several tenets of their belief system. First, CAFOs accumulate waste in one location (point-source pollution in ecological terms). Second, CAFOs create an unnatural situation whereby animals that belong in contact with their ecosystem are forced to exist on an artificial surface (concrete) for their entire lifetimes. Third, the CAFO approach is not diversified and therefore precludes sustainability. Fourth, CAFOs aim for quantity, and quality is therefore lost, not only in the taste of the meat, but also in the agricultural lifeway. A younger, modern farmer from a well-respected farm family expresses his thoughts about confinement and the effects on food quality:

Well, the eggs—there's not anybody that don't know that when chickens run outside and pick up bugs and eat grass, the eggs taste the best. They absolutely taste the best, that's just like letting these hogs out on these feed floors, always did say that a hog running out on the dirt will always taste better than that mass produced. They just go through all kinds of different foods and nutrients. They chew on rocks and everything, sticks, whatever. It's a need. They feel a need for something. I'm not against confinement because we had some hogs confined. I'm not necessarily against confinement at all, if you get big, what do you do? You're gonna have 1,000 sows, and raise 20,000 pigs. You can't have that many hogs running in the country, the EPA would have you shut down. . . . Could you imagine with that many hogs? There wouldn't be a blade of grass nowhere.

Most Ozark farmers do not believe in restrictions on farmers, but neither do they believe that a true farmer should amass as many animals as contemporary CAFOs confine in buildings. Traditional farmers believe in the superiority of animals raised on land, yet industrial agricultural media, institutions, land-grant universities, and businesses influence their subjective interpretation. They consistently refer to contemporary, corporate, industrial agriculture as "too big" and believe this is a symptom of the profit motive that currently drives agriculture. When shown the TAT image of a cattle feedlot, they responded in various ways. Some expressed dismay at the scene, relevant to the aforementioned belief that animals should not be amassed in such numbers for health and ethical reasons, but many displayed no negative emotion, simply stating matter-of-factly what they saw. Their responses reflect an increasing desensitization

to, and acceptance of, animal stress as an inevitable component of contemporary agriculture.

While some old-time Ozark farmers spoke out against CAFOs, represented by approximately 17 percent who reacted negatively to the feedlot image, many were resigned to the economic rationality of the practices (see Table 4). A farmer responded to the image, saying:

> I see a big feed lot. First, I see a bunch of white cattle, which tells me they ought to be black, from a marketing standpoint. It's been so ingrained with the certified Angus beef and all that. The guy is giving up a lot of profit potential by not having the right kind of cattle there. I see big ag., big money investment, somebody that's bore with a big auger, that's going to try to make a lot of money on each little item. The guy that owns a trucking company and has a thousand trucks, each truck don't make him but 1,000 dollars a year, but that's a million dollars. So that's what I see there. He's got a thousand head of cattle and each one may make him 10 bucks. Right now, he's gonna make 250 dollars, make him rich, but this time next year you might be losin' that.

Table 4
Coded Responses to Image of Free-Range Hogs by Farm Experience

Raised Farming	Personal Experience	Positive	Not Here/ Not Now	Negative	Economic	1, 2, & 4	1, 4, & 5	Total
Yes	18	0	3	1	0	10	2	34
No	0	1	2	2	1	1	3	10
Total	18	1	5	3	1	11	5	44

SOCIOCULTURAL PERCEPTIONS

Agricultural Extension

Through the first half of the twentieth century and beyond in some counties, Old Stock farmers distrusted formal education, especially agricultural Extension (Blevins 2002; Randolph 1931). Yet, in interviews many ranked Extension as useful and helpful. Old Stock farmers seemed unaware of the hostility their ancestors felt toward the first Extension agents, the arrogant outsiders that belittled their "backward" ways and beliefs. Compared to other ethnicities in the Ozarks, Germans hold formal education in high regard (Gerlach 1976). But, surprisingly, the German subset was the only one that ranked university Extension negatively. German farmers who ranked Extension negatively have a predominately technocratic worldview and approach their agricultural practices as a business. They feel that Extension is superfluous because it no longer assists them. Extension has become obsolete for the agriculture industry and the government no longer receives pressure from corporate interests to maintain it (Wolf and Wood 1997). It was necessary and useful to agribusiness in the past because it disseminated technocratic rationality, and therefore, farmer dependence on agricultural inputs (Campbell 1962; McConnell 1959). Now, commercial farmers feel dependent on agribusiness technology to stay out of bankruptcy, so they rely on agribusiness for their

information (Wolf and Wood 1997). Modern farmers in the study corroborated this point:

There are other places other than Extension that are on the cutting edge now. And you go there. We go to the industry and we worked with people based out of Columbia [University of Missouri]. There are some folks up there at MU. We go up there to work with veterinarians and their pathology department for animals and it was interesting to work with them.

An older farmer explains the contemporary irrelevance of Extension:

They've given me advice. I wouldn't say it's good, but it all depends on the guy. There's . . . a guy. He's not really an agent. He helps these small farmers supposedly, and it has to be city farmers, one that's in the business ain't really gonna, you can get more information from the industry and such than from them [Extension]. They have to make a job for themselves.

Researcher: So, they're not really useful to the large-scale farmer?

No, no, he goes to the feed store or corporation. I'm not sayin' they all do that, but that's where most the information comes from. The people sellin' the feed, sellin' the products know more than the Extension. That's the deal of Extension, they've got a place, I guess, but. . . . They used to be depended on. Not very much anymore.

Through modernization, farmers have become dependent upon agribusiness, not only for inputs, but also for knowledge.

Most farmers ranked "Extension Agents" favorably on the SD, but in-depth interviews revealed a more nuanced perception of university Extension and formal education in general. Traditional farmers rarely listened to Extension agents, and if they did, they scrutinized the recommendations, gleaned only useful ideas from the suggestions, and cautiously experimented with those ideas to test their validity (see Rhoades 1989). A Baptist farmer-preacher symbolizes the traditional perspective on working with Extension:

Nope, I've never fooled with any farm deals that they had because most of 'em didn't coincide with what I wanted to do. One guy come here and wanted to go in my fields and take soil test and I say, "Why!?" He said, "Well, we're trying to compare." I said, "No, if it's something the government's doing you just don't take no soil test off mine." And he said, "Well, you'll have to." And I said, "I don't have to! I'm payin' taxes on this and you just stay out of there!" Then they come back and they want to know how much hay I cut off this acre and that acre and how much could I have cut if I hadn't a pastured it. I said, "I don't see that that's any of your business." And they said, "Well, we'll have Mr. so and so come see you and you'll pay a fine or go to jail." And I said, "I'm ready, you send 'em." And I haven't seen any of 'em since. But, that's just exactly what they told me.

While past Ozarkers harbored hostility towards arrogant outsiders, contemporary farmers' criticism is tempered and mild. Farmers frequently cite examples of friends, neighbors, or relatives who engaged in modern agricultural endeavors and failed, being forced into bankruptcy and out of farming. When farmers adopted industry recommendations of high investment, input-intensive agricultural approaches, their operations usually failed. Examples of modern failure reinforced traditional beliefs in the inferiority of exogenous knowledge and its application in the Ozark agroecosystem. The following

Old Stock farmer's account colorfully illustrates the inappropriateness of modern approaches on the rugged Ozark landscape, and the reinforcement in traditional Ozark farmers' minds that "newfangled" ideas were not superior to local time-tested agricultural knowledge:

Researcher: Did you work with Extension?

Farmer: No, not much. They had book learnin' and I was always on the. . . . Well, I ain't throwin' off on nobody that's got a education. You got to have it now, but they had a lot of ideas that just didn't seem to work. That nephew of mine . . . he went to the University of Missoura for three or four years. He got a degree in agriculture. Boy, he come back and he was gonna cut a fat hog. He wanted me and my brother to go in with him and form a corporation and all this and all that and I thought about it a little bit and I told him, "Well, I tell you what, I'm just gonna wait a little bit and see how things go." In about five years he went under. I'm telling you that thing was big money. But he couldn't sweat it out of this ground. This ground down here isn't heavy enough, good enough, to grow enough bushels per acre to compete. . . . There was a lot of 'em that went under. They bought a lot of stuff and then they couldn't make the payments. The interest was pretty high then and the interest just ate 'em up. . . . I just had a gut feeling that the way he was talking, he was gonna try to get too big too fast. . . . He lost what he had worked and saved up all his life. He lost all his land.

Modern Equipment and Agrichemicals

Ozark trappers want to participate in the larger political economy, but their simultaneous connection with their marginal landscape and traditional value system problematizes such participation (Brady 1990:72). Ozark farmers experience a similar incongruity with modern agriculture. The scale required is not possible in the Ozark hills and using agrochemicals is seen as destructive to local ecology and humans. "Too big, too expensive" are common reactions among Ozark farmers when prompted with conventional agriculture in the United States. Many believe that the scale required to participate in contemporary commercial agriculture precludes Ozark farmers because it is inappropriate for their landscape. As one farmer responded to the image of a combine: "Whoooey. That's a hundred and thirty-thousand dollar combine. That's not for this country."

Ozark farmers are bitter that they can no longer participate in the U.S. agricultural system. When they view an image of a combine, they are torn. They simultaneously see a symbol of farming and large-scale agriculture and the embodiment of that which restricts their participation in farming as a livelihood. They also see that which indebted either themselves, their friends, and/or their neighbors, and drove some local farmers into bankruptcy and to abandon farming altogether.

Farmers invariably referred to the use of agrichemicals as a "necessary evil." "Necessary" because of the influence of technocratic rationalization and the belief that agrichemicals are necessary in contemporary commercial agriculture. "Evil" illustrates the belief that synthetic agricultural products, both because of their possible damage to the natural environment and their prohibitive cost, conflict with their traditional value system of frugality and reverence for the natural world. When farmers responded to an image of a rig spraying a chemical on a field, 26 percent told of personal experience with agrichemicals, 36 percent stated that they were not appropriate in the Ozarks because

they do not grow monoculture crops that require them, and 29 percent spoke negatively about agrichemical use.

Many farmers referred to personal experience and attached little emotion to the image, whereas others had bitter experiences, such as the death of loved ones from excessive exposure to agrichemicals or leakage into their wells. Regardless of their experiences, most intergenerational farmers perceive agrichemicals as useful. Given the right circumstances, such as a serious infestation that threatens an entire crop, agrichemicals are extremely handy. The majority of Ozark farmers regard agrichemicals as "useful," with 45 percent ranking them as "very useful" and another 35 percent ranking them as "somewhat useful." Only seven of 51 respondents (14 percent) rank agrichemicals as "useless." Four of these seven respondents were not raised as farmers. Four of 12 non-intergenerational farmers perceive agrichemicals as very useless, compared to less than 3 percent of intergenerational farmers. Only one of the 28 Old Stock farmers rank agrichemicals as "useless" and 25 of 28 rank them as useful. These numbers indicate that Old Stock Ozark farmers especially, in addition to Ozark farmers raised in a farming lifestyle, have learned to regard everything, even that which they may consider "evil," as potentially useful.

Folk Wisdom

In a paradoxical way, traditional Ozark farmers maintain openness to all potentially useful ideas and resources, as for example with wild plants and agrichemicals. Technocratic rationality, on the other hand, renders obsolete any options, knowledge, or resources that originate outside of it (Appadurai 1990; Habermas 1986). A young farmer and agriculture teacher, whose father studied agriculture at the University of Missouri, related a story that juxtaposes the local open belief system with closed technocratic ideology. When asked, "Has anyone ever tried to teach you any of these Ozark folk wisdoms? . . . Did your grandpa castrate by the signs?" He responded:

> My grandmother did, so grandpa did whatever grandma said. So, yeah, they always castrated by the sign and dehorned by the sign and weaned by the sign and dad and I always thought it was a bunch of bunk. Then, a few years ago, well, our time is very valuable, so we just do it whenever we both have a free weekend. Well, we used to. We lost a couple and grandpa said, "That's because you didn't do it by the signs." So, ever since then, we've done it by the sign and we haven't lost anything.

This respondent is a modern farmer who farms as a business and as a lifeway. The agricultural modernization movement was in full swing when his father studied at the University of Missouri and subsequently indoctrinated his son. Despite their belief in science and technology as agricultural guides, that an alternative existed in their community forced them to heed the agroecological knowledge of their ancestors, even though the technocratic rationality of their modern agricultural training deemed it "bunk." Ozark non-farmers like to think that the signs exist strictly in memory, in the backward past of the region. Ozark farmers, however, believe in the signs because they utilized them throughout their lifetimes and experienced their efficacy.

Table 5
Responses to Image of Cattle CAFO

Response	Frequency	Percent
1. Personal Experience	10	19.6
2. Positive (Emotional)	2	3.9
3. Utilitarian	0	0.0
4. Not here/Not now (Past)	12	23.5
5. Negative (Emotional)	9	17.6
6. Economic Rationality	5	9.8
1, 4, & 5	1	2.0
Total	39	76.5
Missing*	12	23.5

*No response to the image.

Farmers who do not believe in the signs tend to be non-intergenerational, German farmers. No Old Stock farmers regard the signs as useless and no intergenerational farmers rank them as "very useless." Over half of the intergenerational farmers perceive the signs as "very useful" compared to 2 of 12 non-intergenerational farmers. Intergenerational farmers believe that following the signs makes weeding easier, weaning and castrating less stressful for their animals, and that this results in less dependence on outside sources. Self-sufficiency and independence have been the most important values of Old Stock Ozarkers, which explains their continued belief in the signs. German Ozark farmers, on the other hand, believe in science and typically reject Old Stock knowledge as backwoods folklore. The example of the modern farmer quoted above, a German, demonstrates that the existence of an effective traditional method can change minds because over 80 percent of intergenerational Ozark German farmers rank the signs as useful.

Table 6
Ranking of Utility of the "Signs"

Response	Frequency	Percent
1. Very useful (1)	22	43.1
2. Somewhat useful (2, 3)	15	29.4
3. Neutral (4)	11	21.6
4. Somewhat useless (5, 6)	2	3.9
5. Very useless (7)	1	23.0
Total	51	100.0

PERCEPTIONS OF HISTORICAL FARMING

Historical farming is the practices, beliefs, and events of the agricultural history of the region. Farmers' perceptions of the historical farming environment provide an opportunity to examine a fundamental tenet of rationalization theory. Farmers who are influenced by technocratic ideology will lean toward the perception that traditional practices and beliefs are obsolete (Dove 1999; Habermas 1986; Kreckel 1985; McCarthy 1978). The opportunity to employ and/or return to traditional ways becomes nonexistent through technocratic rationalization. Farmers' perceptions of agrarian lifeways and beliefs of the past indicate the degree to which they have engaged in, been influenced by, or resisted technocratic rationalization.

Plowing with Animals

An Old Stock farmer made an indicative statement while filling out the semantic differential, "Plowing with Animals," when he said, "Well, if gas got expensive enough, as it's a goin', a gentle horse, a good work horse, would come in right handy." This openness to past options contrasts with the modern paradigm that perceives only the most recent technology as useful. Approximately 50 percent of interviewed farmers rank the utility of the traditional, abandoned practice of plowing fields with animals as useful. Comparatively, 42% of intergenerational Old Stock farmers rank "Plowing with Animals" as "very useful," compared to 15 percent of German and non-local farmers.

While approximately 22 percent of all people interviewed ranked "Plowing with Animals" as "very helpful," approximately 37 percent rank the practice as either "neutral" or "harmful." There are varied rankings of the traditional practice overall. When compared with the fact that over 80 percent rank agrichemicals as useful, the influence of technocratic rationality with contemporary farmers becomes more evident. Agrichemicals originated within the modern knowledge system and have been touted repeatedly as beneficial. Using draft animals, a technology outside the modern knowledge system, has been denigrated as impossible in the contemporary world.

Free-range Chicken Flock

Only half the interviewed farmers keep free-range chickens. This practice has gone by the wayside for several reasons: the extremely low price of store-bought eggs, the increased predation of chickens by raccoons, coyotes, foxes, and other predators, and the loss of knowledge related to their maintenance, slaughter, and preparation. When one farmer looked at a picture of a girl feeding free-range chickens, he gave a common explanation for why farmers abandoned the practice:

> Feeding chickens, yep, we always used to have a small flock of chickens, 20 to 30 chickens every year. It's only been five or six years since we quit having them. They were basically for eggs. They were a nuisance to run wild and it's too much work to keep them penned up and eggs don't cost that much.

The overwhelming majority commented on their personal experience with similar practices, with over 30 percent speaking nostalgically of the practice. Many farmers reminisced about the culture and enculturation involved with the practice. An Old Stock farmer related, "I see that they're letting that kid know that she can be helpful. You can tell that she enjoys watching them pick that up off the ground." His response illustrates that the old agriculture was not merely a business or subsistence strategy, it was a way of educating children about the necessities and values of the agrarian lifeway. Such practices taught children the value of hard work and the source of their meals. Farmers cite the disintegration of these two particular agrarian values more than any other as tragic consequences of modernization.

The modern paradigm characterizes farming practices such as free-range chickens as not rational and outmoded because they do not allow for the scale and control of industrial agriculture. A non-local, non-intergenerational farmer illustrates the technocratically rational response to the image: "We've seen that. That was part of it. That there is an experience that I'm glad has passed. We survived it and we did well at it, but there's much better ways of doing it than doing it out [on the ground] where you have no control." Such a response, however, was an anomaly. The majority reacted positively from experiences recalled. Eggs from free-range chickens continue to be in high demand, in part because the practice has become rare in the region. An Old Stock farmer-preacher who continues to keep free-range chickens explains: "That's changed in the last few years. Nobody has any chickens in this part of the country anymore. People beg us for eggs like they was gold; constantly say, 'if you got any eggs, we want 'em'." Rural people demand free-range eggs because they see a significant difference between store-bought eggs and those from free-range hens. Knowledge or awareness accrued through experience, rather than through formal instruction, leaves an indelible mark on perceptions. As Berkes (1999) and Ingold (2000) propose, perception forms through experience with the environment. Despite notions that the practice of raising free-range chickens is not rational, because farmers' and consumers' previous experiences have yielded satisfactory results, their sensory experience overrides the influence of ideology on their perception.

Religion and Culture

Why have some Ozark farmers retained former practices while others now follow technocratic rationality as an agricultural guide? The findings of this study indicate that the length of time a farm family has been living in the Ozarks and their religious affiliations contribute to their maintenance of traditional beliefs and practices. The Old-Time Protestant denominations, Baptist and Methodist, which remain dominant in this region, assert that no authority should interpret the Bible for an individual. Rather, each believer should come to his or her own interpretation. Rooted in Luther's exposure of Catholic corruption, traditional Ozark Protestants reject outside knowledge systems, including science, as a replacement for religion as the guide to animal and plant husbandry. These conservative Old-Time Protestant religions differ from their liberal Protestant counterparts in their adamant rejection of greed and excessive wealth

accumulation and their belief in the Bible as the "word of God" (Abrams 2001; Balmer and Winner 2002).

The Old-Time Protestant belief that excess accumulation and greed corrupt and should be avoided resonates with the Ozark tendency to regard industrial agriculture with skepticism and antipathy. Old-Time Protestant farmers believe in temperance and moderation, which they learn from their subjective interpretation of the Bible, and they apply it to their agricultural practices. Old-Time Protestant rejection of outside authority strengthens traditional perceptions and practices based in experience. Over 95 percent of Baptists and Methodists engage in at least two traditional agricultural practices and approximately 64 percent practice four or more (Table 6). Similarly, approximately 60 percent of Baptist and Methodist farmers rank "Planting by the signs" as "very useful" compared to only about 30 percent of all other religious affiliations. Old-Time Protestant farmers have retained belief in the utility of traditional practices, exemplified by their ranking of the utility of wild plants, plowing with animals, and planting by the signs. Approximately 77 percent of Baptist and Methodist farmers rank wild plants as at least "somewhat useful" and none of them consider wild plants useless. Only those of other Christian denominations or those having no organized religion rank wild plants as "useless". Over half the Baptist and Methodist farmers rank "Plowing with Animals" as "very useful" compared to approximately 17 percent of all other farmers. No Old-Time Protestants consider the practice useless, whereas 10 percent of other farmers rank it as at least "somewhat useless."

Table 7
Religion by Traditional Farm Practices

Religion	Traditional Farm Practices				Total
	None	One	2–3	4 or more	
Baptist/Methodist	1	0	7	14	22
Other Christian	5	1	6	1	13
No Organized Religion	3	3	5	5	16
Total	9	4	18	20	51

Old Stock Americans moved to the Ozarks because they wanted an isolated retreat biophysically similar to their homeland, one beyond government authority and pretensions of urban society (Rafferty 2001). Through interaction and intermarriage with Native Americans and through local experience, they became intimately familiar with the agroecology of the region (Jones 2000). Their combination of Appalachian, Native American, and Old World TEK translated well to the Ozark ecosystem. Their misanthropy towards outside authority dovetails with Old Time Protestantism and adds to their suspicion of whole-scale modernization and embrace of tradition.

Old Stock Americans, more than other social groups, believe in the utility of the "signs." The continuity of traditional practices among Old Stock Americans is striking,

with 90 percent engaging in at least two of these, and over 50 percent practicing at least four, compared to 56 percent and 21 percent of non-Old Stock Americans respectively. In the Ozarks, as has been documented among other U.S. farmers, culture influences agricultural decision-making (Barlett 1993; Netting 1974, 1993; Rogers 1987; Salamon 1987).

CONCLUSION

U.S. government intervention, in the form of subsidies, price-fixing, extension services, and modernization programs, has served to obfuscate the efficiency of traditional farm practices by portraying modern industrial approaches as the most universally efficient (Magdoff, Foster, Buttel 2000). Old Stock and Old-Time Protestant Ozark farmers have maintained older perceptions despite the larger national economy defining their actions as irrational. They continue to perceive environmental "affordances," at least in part, because their belief system encourages subjective interpretation (Gibson 1979; Ingold 1992, 2000; Michael and Still 1992). They intimately understand the limitations of their Ozark landscape. Ozark farmers who adopted modern practices engaged a distinct knowledge system, technocratic rationality, which renders all traditional practices obsolete, thereby leaving no options but that which corporate science proffers (Appadurai 1990, Dove 1999). Old fashioned Ozark farmers skipped the agricultural modernization experiment because their experience-based worldview allowed them to see that it was inappropriate in the Ozarks. These Ozarkers still farm ancestral lands, while young Ozarkers do not see farming as a viable option, and many do not value their predecessors' traditional knowledge. As a young farmer/High School agriculture teacher explained:

> I wanted to go to listen to these old-time farmers to find out how they used to do it and get their advice, but there aren't any anymore. The guys that are there are part-time farmers. They may like to be full-time farmers, but they don't have the time and they can't make the money to do that.

As industrial agriculture's economic rationality and subsidization squeezed old-time farmers out of their livelihoods and identities, it simultaneously denied the validity of their knowledge (Bartlett 1993). If farmers cannot demonstrate to their children that they can earn a living through farming, the children will leave the farms for work in other fields. In light of the movement toward "civic agriculture," unlike conventional farmers, Ozarkers could make a living in organic agriculture. But if it does not happen soon, their children will likely abandon the agrarian lifeway for good.

NOTES

1. The agroecological farming environment consists of fields, forests, waterways, livestock, crops, non-domesticated biota, rock outcroppings, soil, and other elements that a farmer engages. The socio-cultural farming environment consists of neighbors, kin, feed store owners, technology, and farm buildings —basically any people, places, or things that serve as sources for farming information, action, or influence. The historical farming environment refers to the farming practices and places that exist in the history of the region; i.e. places, memories, and people of the past that a farmer engages or considers in relation to his/her farming. "Agricultural practices" refers to what a farmer and/or his/her family employs on the

agroecological farming environment, and may include actions upon their socio-cultural environment when it relates to their farming endeavor.

2. Most early Ozark settlers, referred to as "Old Stock Americans" (Gerlach 1976), arrived between 1800 and 1860, primarily from Tennessee, Kentucky, and Virginia. These were primarily Scottish and Irish, but had resided in the Americas for at least a generation. Also figured into the Old Stock mix were Cherokee and other eastern native groups who intermarried with the Euro-American settlers (Jones 2000). Many research participants discussed the importance of Native American ancestors in their agroecological practices and perceptions.

3. Participant names are pseudonyms.

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