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Overcoming history: attitudes of resource professionals and farmers toward silvopasture in southwest Wisconsin

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Abstract In the Midwestern US, both forestry and agriculture advisors have advocated against combining trees and livestock for more than 50 years. This established stance poses a potential barrier to the adoption of silvopasture, an agroforestry practice that integrates grazing with trees. We conducted three focus group interviews in southwestern Wisconsin, two with foresters and agriculture professionals, and one with farmers to assess their attitudes toward silvopasture. Although resource professionals were reluctant to endorse livestock access to woodlands, they were cautiously interested in exploring silvopasture as a means to improve the management of grazing in wooded areas and as a management tool for savanna restoration. Foresters, agricultural professionals, and farmers identified similar potential benefits and concerns associated with silvopasture, and requested better information on establishment, economics, and best management practices for silvopasture in the Midwest. Their questions and concerns provide direction for future silvopasture research and outreach efforts in the Midwest.

Keywords Silvopasture · Agroforestry · Farmers · Resource professionals · Attitudes · Midwest

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Introduction

Regions that support both active forest management and livestock production are good candidates for silvopasture—an agroforestry practice that combines forestry and grazing (Clason and Sharrow 2000). However, resource professionals in the upper Midwest and elsewhere do not promote silvopasture. Indeed, expert advice in our region for over fifty years has been to separate livestock from trees (Ahlgren et al. 1946; Baughman et al. 1993; Curtis 1959; Guise 1950; University of Wisconsin Extension 1952). Yet experience with silvopasture from other regions suggests that under the right conditions and management systems integrating trees, pasture, and livestock can bring ecological as well as economic benefits (Garrett et al. 2004).

In silvopasture, three core components—trees, livestock, and forages—are all actively managed. Ideally, these components complement each other, yielding greater net income or reducing economic risk compared to either the livestock or the forestry enterprise alone (National Agroforestry Ctr 2008). Notably, short-term income from livestock can supplement long-term returns from forest products (Garrett et al. 2004; Kallenbach et al. 2006). Research from the Southeastern United States indicates that when livestock production is the primary enterprise, tree shade can reduce heat stress in grazing cattle, resulting in higher milk production or greater weight gain (Brantly 2013; Karki and Goodman 2009; Kendall

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et al. 2006; Tucker et al. 2008). Another potential benefit of silvopasture for livestock enterprises is better forage growth at the beginning and end of the grazing season and during midsummer heat spells (National Agroforestry Ctr 2008).[1] Where timber is the primary focus, some studies in southern states have found increased timber growth in silvopasture systems, possibly due to the thinning and fertilization conducted to improve forage production (Ares et al. 2003; Clason 1999).

Many definitions of silvopasture specify that it is not just "cows in the woods" but requires intentional, integrated management of trees, forage, and livestock (University of Missouri Ctr for Agroforestry 2013; Brantly 2014). Moreover, silvopasture can be an "inherently sustainable system" that increases biological diversity, protects water quality, and reduces soil erosion (National Agroforestry Ctr 2008). However, qualifications are needed because some farmers and ranchers give livestock access to woodlands without much management, which can adversely affect current and future timber crops, as well as soil and water quality. Foresters and ecologists have long observed that domestic livestock can significantly damage woodlands. Notable impacts include browsing and trampling tree seedlings, soil compaction and erosion, and even damage to large trees (Abbott 1954; Curtis 1959; Dambach 1944; Hays et al. 1949). These concerns have led both foresters and agricultural professionals in Wisconsin (the focus of this study) and other Midwestern states to strongly discourage grazing in woodlands for at least fifty years (Abbott 1954; Baughman et al. 1993; Guise 1950; University of Wisconsin Extension 1952).

Nevertheless, woodland grazing remains common. In Wisconsin, for example, about 472,000 acres of woodland were pastured in 2012, while open pasture occupied roughly one million acres (Table 1). That is, woodlands provided nearly one-third of the pasture area in the state. However, the vast majority of these grazed woodlands were not consciously managed as silvopasture; in the 2012 agricultural census only 109 Wisconsin farms reported practicing either silvopasture or alley cropping (another agroforestry practice included in the same census question), less than one percent of the 11,586 farms that reported having pastured woodland (NASS 2014a, b). Other states in the region report similar levels of woodland grazing and silvopasture (Table 1). In the absence of other information, one might assume that these woodland pastures are unmanaged. However, about 40 % of Wisconsin beef farmers and more than 20 % of dairy farmers practice rotational grazing (Paine and Gildersleeve 2011a, b; Taylor and Foltz 2006), and it is possible that a portion of pastured woodlands are at least managed to provide rest periods between grazing events.

The history of expert advice (i.e., livestock and trees do not mix) poses a challenge to the introduction of silvopasture to the upper Midwest. This challenge is by no means insurmountable: there are numerous examples of natural resources management recommendations being reversed, such as the change from advocating universal wildfire suppression to active prescribed burning for habitat restoration and management (Brose 2014; Langston 1995). Resource managers' attitudes toward grazing on the forested range of the western USA have undergone numerous changes, and in southern France centuries of professional opposition to integrating livestock with woodlands were reversed during the last quarter of the twentieth century (Hays 1959; Rubino 1996). Still, it is likely that resource professionals and farmers may be reluctant to investigate or advocate silvopasture if their past training, messaging, and recommendations consistently opposed any combination of livestock and trees.

Another potential challenge to silvopasture's acceptance by resource professionals is its cross-sectoral nature. Foresters and agricultural professionals in the Midwest have limited professional interactions (Laursen 2013), yet expertise from both disciplines will be needed to develop sound management recommendations for silvopasture. In addition, the historical separation of forestry and agricultural professionals may increase the chance of conflict around efforts to integrate livestock with trees. For example, efforts to promote silvopasture in Missouri in 2002 generated strong opposition from forest and wildlife professionals based, in part, on the traditional opposition to woodland grazing, but also greatly exacerbated by different paradigms, lack of communication, and suspicion between agricultural

[1] Total forage production is higher in open pasture, but the microclimate of silvopasture extends the growing season in both spring and fall and may mitigate the impact of heat and dry spells on forage growth.

Table 1 Total and pastured farm woodland in Wisconsin and surrounding states

State	Census year	Woodland pastured acres	Total woodland acres	Permanent pasture acres	# Farms with woodland pasture	Percent farm woodland pastured	# Farms with silvopasture or alleycrop
Illinois	2012	207,875	1,449,212	873,778	6381	**14**	35
	2007	265,759	1,428,922	887,274	7126	**19**	
Iowa	2012	347,743	1,165,549	1,906,410	7565	**30**	13
	2007	399,613	1,193,303	1,914,924	7961	**33**	
Michigan	2012	110,065	1,175,893	419,450	4641	**9**	38
	2007	125,897	1,196,212	376,625	5100	**11**	
Minnesota	2012	439,332	1,641,521	1,271,242	10,172	**27**	62
	2007	527,233	1,862,251	1,469,816	11,617	**28**	
Wisconsin	2012	472,079	2,526,754	1,034,738	11,586	**19**	109
	2007	526,008	2,920,214	1,065,814	13,614	**18**	

Grazing of farm woodlands in the upper Midwest ranged from a low of 9 % of farm woodland acres in Michigan to a high of 30 % of farm woodland acres in Iowa in 2012. Fewer than 1 % of those farms report practicing silvopasture

From Table 8, "Land Use" and Table 43, "Selected Practices" 2012 Agricultural census. NASS (2014a, b)

professionals, and foresters and wildlife managers (Arbuckle 2009).

In this exploratory study, we sought answers to two research questions:

1. What are farmers' current approaches to integrating livestock with trees?
2. What do resource professionals and farmers think about silvopasture as a management approach, and what factors influence their attitudes towards silvopasture?

These questions set the stage for a qualitative investigation that depended primarily on focus group interviews of farmers and resource professionals working in southwestern Wisconsin.

Methods

Given our limited knowledge of farmer and professional sentiment toward silvopasture, we selected an exploratory qualitative approach. A qualitative approach allows respondents to identify important points and seek and provide clarification. Focus groups are an appropriate approach when the goal is "insights into the attitudes, perceptions, and opinions of the participants" and for "complicated topics where opinions or attitudes are conditional" (Krueger 1994). We chose focus groups over individual interviews for two additional reasons. First, we were interested in the interaction between foresters and agricultural professionals, since agroforestry requires both areas of expertise. Second, Wisconsin farmers who practice rotational grazing often discuss issues and learn from peers at pasture walks and winter meetings, and we hoped a group discussion would give us a sense of how silvopasture might be received in the larger grazing community.

For this exploratory inquiry, we conducted three focus groups. Two focus groups included agricultural and forestry professionals, while the third included farmers. The discussion in the first group surfaced all the points raised by the subsequent two groups, indicating that we had reached theoretical saturation (Krueger 1994). Our study was focused on a limited geographic area, which also limited the population of potential focus group participants. In detailing the methods, we describe our sampling and recruitment, questions and interview format, and data analysis.

We used a purposeful, information-rich sampling approach; that is, rather than attempting to select typical interviewees randomly, our recruitment process targeted "key knowledgeables" who could be

expected to provide in-depth, information-rich responses to our questions (Mertens and Wilson 2012; Patton 2015; Orne and Bell 2015). We included individuals from three categories of silvopasture stakeholders: foresters, agricultural professionals, and farmers. For recruitment we relied on a modified snowball sampling approach, beginning with recommendations from an advisory group that included local landowners, agricultural educators, forestry and agriculture faculty and graduate students from University of Wisconsin Madison who have conducted research in that area, and a forester. In addition, we invited attendees at two public events to participate in the focus groups. The first event was a meeting of the Driftless Forest Network, a consortium of government, business, and non-profit groups involved in forest management in the Driftless Region, and the second event was a pasture walk attended by farmers and landowners interested in grazing. We also asked the participants of the professionals focus groups to suggest additional individuals for the farmer focus group. We applied two screens to focus group participants: all focus group participants had to work in the Driftless Region of southwestern Wisconsin, and farmer participants had to graze livestock as part of their farming operation. One of the professionals contacted declined to participate without providing a reason, and four of the professionals and three farmers contacted were interested in participating but not available on the dates of the focus group interviews.

For the two professional focus groups, there were a total of ten participants: eight in the first and two in the second. Of the ten, five participants were foresters, four were agricultural professionals, and one was a regional planner. In terms of employers, four worked for state or federal agencies, two worked for Cooperative Extension, three worked for non-profit organizations, and one worked for a cooperative. Five were male and five were female, and length of time in their professions ranged from 6 to 41 years. All self-identified as white or Caucasian.

The farmer focus group included seven farmers. All were male. Three of the farmers were under 30 years of age and had been farming between 3 and 7 years. The other four farmers were over 40 with decades of farming experience. Four were dairy farmers, two raised beef, and one raised sheep and goats. All self-identified as white or Caucasian.

Each focus group included a script of five or six guiding questions or question clusters (see Appendix). The questions were developed based on extensive input from the advisory group. Given the two distinct samples (i.e., professionals and farmers), the scripts were adapted to each. To help participants distinguish between pasture with trees, open pasture, and grazed woodland, we used visual aids (Fig. 1).

As to data analysis, interviews were manually coded from the audio recording, using a grounded theory approach (Mertens and Wilson 2012). That is, recorded comments were initially coded without predetermined categories, and then grouped into themes based on the codes. For the professionals we also noted based on voice recognition and notes taken during the interview whether each coded comment came from an agricultural professional, a forester, or the planner. Detailed coding was performed by one researcher, and overall categories were verified by the second researcher present at all the focus group interviews.

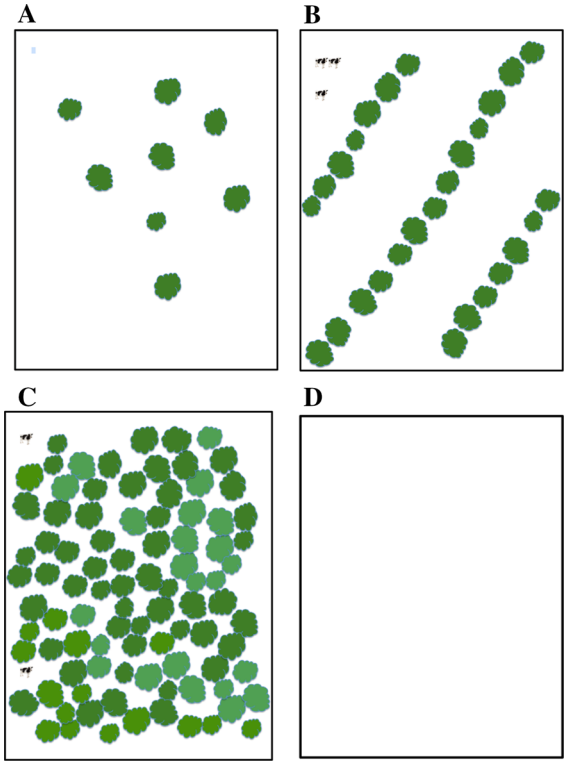

Fig. 1 Visual aids used in all focus groups to help participants distinguish between open pasture, pasture with trees, and grazed woodland. Cards **A** and **B** depict "pastures with trees;" **C** depicts grazed woodland, and **D** depicts open pasture

Results

Coding yielded five key themes that highlight similarities and differences among professionals and farmers with respect to their perceptions of silvopasture: (1) current practices, (2) potential benefits of silvopasture, (3) concerns about silvopasture, (4) land ownership patterns affecting silvopasture, and (5) management recommendations. The tabular results reflect the three primary subgroups in our sample: farmers ($n = 7$), agricultural professionals ($n = 4$), and forestry professionals ($n = 5$). Though the regional planner is excluded from the tables, this person's views are reflected elsewhere in the analysis. The purpose of the focus groups was to surface topics of concern and begin to understand how and why they are important, rather than to quantify how widespread those concerns are. In addition, in the dynamic of the focus group discussion agreement was frequently expressed non-verbally. Thus we do not attempt to quantify how many individuals within each subgroup brought up a specific concept.

Current practices

The National Agroforestry Center distinguishes between silvopasture and woodland grazing (Brantly 2014), but that distinction was not clearly evident during much of the focus group discussions. We deliberately did not define silvopasture until later in the conversation because we wanted respondents to discuss current practices without being influenced by a newly introduced dichotomy between [good] silvopasture and [bad] woodland grazing.

Agricultural and forestry professionals and farmers agreed that grazing of farm woodlands and of pastures that happen to have trees in them (not planted by the farmer) is a common practice (Table 2). Only one of the farmers had planted trees in or around his pastures, and most of the professionals said they did not know of farmers doing this. In all three focus groups the practices of grazing remnant savannas and woodlands dominated the discussion of current practices. In defining a rationale for the latter practice, each group stressed that Wisconsin's agricultural use-value assessment creates an economic incentive for farmers to graze their woodlots, as it lowers their property taxes.

In Wisconsin agricultural lands are taxed based on their agricultural use value, while all other real property is subject to ad valorem property taxation. Under ad valorem taxation, land is taxed at its highest and best use. Wisconsin's agricultural use-value assessment protects active farmland from high property taxes resulting from rising land values driven by urban and suburban development. Under this law, land in agricultural use is assessed and taxed based on the income potential from normal farming practices. If woodlands are being grazed, they are assessed as the lowest value farmland—forested pasture—and are taxed accordingly (Wisconsin Dept of Revenue 2014; Wisconsin Administrative Code 2015). In the absence of pasturing, woodlands are taxed at much higher rates. Landowners can enroll their land in a separate forestry incentive program (i.e., Managed Forest Law), that places restrictions on use of the property (e.g., grazing is not permitted, nor is leasing), has a minimum enrollment period of 25 years, and still has higher annual taxes than pastured woodlands. The impact of the use-value assessment varies depending on local land values, but in many places, taxes on grazed woodlands are 90 % lower than taxes on ungrazed woodlands that are not in the Managed Forest Law program (Wisconsin Alliance of Forest Owners 2015).

In response to the questions "Do you know or work with farmers and landowners who graze their woods? What kind of management do they do for that? What guidance do you have for them?" resource professionals spoke in general terms about the practice of grazing woodlands, its prevalence in the area, and its potential for negative impacts. However, none of the agricultural professionals or foresters reported any discussion about the management of grazed woodlands with landowners or farmers or mentioned specific farmers who graze woodlands, even though in the course of their work they regularly provide advice on pasture and forest management. Particularly for foresters, the contradiction between forest management recommendations and tax policy causes intense frustration, and their preferred solution would be to change the tax code:

> I'd like for that point to clearly come out of this conversation, that the [agricultural use valuation] law should be changed. There are serious problems with the law diverting people into

Table 2 Current practices mentioned by the different categories of respondents

Current practices	Ag. prof	Forester	Farmer
Woodland grazing	x	x	x
Savanna restoration	x	x	x
Pastures that happen to have trees	x	x	x
Don't know of tree planting in pastures	x	x	
Tree planting	x		x

An "x" indicates that one or more individuals from that category discussed the practice

> doing things that are not necessarily very good land management. And there ought to be a fix to that legislation.

Focus group farmers all had at least some pastures with trees, ranging from paddocks with trees planted just outside the perimeter fence, to grazed woodlands:

> Yes, we have a 40-acre pasture, 30 of which is old pasture which has grown to a thicket stand of walnut with a few oak. The other 10 is mainly [open] fields, which we graze. I try to rotate through the woods twice a year. My goal is to restore the oak savanna areas and be a bit more selective in my northern less productive areas.

We did not directly ask farmers whether they consult with professionals about their woodland grazing, but they were all aware that the practice is frowned upon, and no one mentioned requesting or receiving professional advice about it. During the discussion about problems associated with trees in pasture, one farmer quipped that it was a good thing the local extension agent was not present. Farmers did discuss the importance of managing the timing and duration of woodland grazing to balance goals including livestock nutrition, clearing brush, and minimizing negative environmental impacts.

Benefits of silvopasture

Although an important factor in Wisconsin, agricultural use-value tax assessment is not the only reason that farmers graze some of their woodlands. Neighboring states (Minnesota, Michigan, Iowa, and Illinois) that do not offer a tax incentive to graze woodlands also have substantial land in forested pasture (Table 1).[2] Both professionals and farmers identified a number of potential benefits of woodland grazing or silvopasture aside from tax savings, which further explain why many farmers adopt these practices (Table 3).

Agricultural professionals and farmers stressed the value of shade for livestock. One professional succinctly summarized the benefits:

> Most of the graziers I know that are managing their system utilize those more treed areas as what we call shade paddocks. And a lot of them save those areas for the really hot weather and maybe they're only grazed three or four times a year at the most. Maybe they're only grazed once or twice!

Another benefit of silvopasture and goal of woodland grazing emphasized in all three focus groups was brush control. Both farmers and professionals mentioned the potential of grazing to help manage a variety of invasive species, from non-native buckthorn *(Rhamnus cathartica)* to opportunistic species such as prickly ash (*Xanthoxylum americanum*) and box elder (*Acer negundo*).

> *Agricultural professional:* We've kind of done this sporadically, by accident, but box elder can be pretty tasty…. To me [using grazing to manage weedy species] is one of the parts of agroforestry that people get excited about.

[2] For example, Iowa provides a property tax exemption for forest land over two acres, provided livestock is excluded, and Minnesota has a Rural Preserve Program that provides use-value taxation for forest next to agricultural land enrolled in the green acres use-value tax program (Iowa DNR nd; Reichenbach and Baughman 2011; Minnesota DNR nd).

Table 3 Benefits of silvopasture or woodland grazing identified by the different categories of respondents

Benefits	Ag. prof	Forester	Farmer
Shade—animal welfare	x	x	x
Manage invasives	x	x	x
Savanna restoration	x	x	x
Erosion reduction (vs. row crops or grazed woodland)	x	x	x
Winter shelter—animal welfare	x		

An "x" indicates that one or more individuals from that category discussed the benefit

> *Farmer:* I did my first rotation on a 40-acre old pasture that had been sitting probably 15–20 years. Oak savanna style—lot of prickly ash, lot of walnut, and I just included that in my rotation…. As they got into the woods it was just incredible how they would get into the prickly ash and really grub it down, even all the berry briars, especially when they were nice and succulent still.

> *Forester:* … there's been goat grazing prescribed to get rid of woody vegetation [in natural areas]. So there has been some targeted or specific [managed grazing] stuff going on, but that has been more of a one-shot deal. It's not a perpetual thing.

Each focus group also discussed the potential for using silvopasture to restore savanna habitat. Before European settlement, savanna was the dominant habitat type in southern Wisconsin. After more than a hundred years of fire suppression, less than 2 percent of the original savanna habitat of the Midwest remains, and light grazing may have helped maintain some of the remnants (Harrington and Kathol 2009; Nuzzo 1986). In contrast to the discussion of woodland grazing, agricultural professionals did report working with farmers on savanna restoration through grazing:

> *Agricultural professional:* I'm working with a landowner in Dane County who's working with highland cattle and wants to re-create savanna. And he's got a lot of walnut coming up like weeds and so he's going to try to make a walnut savanna and graze highland cattle in a walnut savanna.

> *Forester:* There are actually quite a few landowners that are interested in restoring the old oak savannah and are willing to put their money where their mouth is. And a lot of people run into problems with that because of the burning or the cost of mowing or that type of thing. Maybe a regime of rotational grazing would be a good alternative to putting fire on the landscape with a private landowner who doesn't know how to do that.

However, there was some disagreement between the agriculture professionals and one of the foresters on the desirability of savanna restoration:

> *Agricultural professional:* It almost seems like you need to go back to the original character of the land, the original habitat, and work from there. Cause you've got this gradation from true woodland to grassland and in between there are a lot of levels of tree cover that can be grazed effectively…

> *Forester:* I would just caution you to say 'the true character of the landscape here.' Because the reason there was so much grassland here is because it was so heavily burned by the native population. This land grows trees if it is not heavily disturbed or burned.

Another potential benefit of silvopasture mentioned by the groups is that it offers a way for marginal land to generate annual revenue that causes less environmental damage than row crops or unmanaged woodland grazing. High grain prices from 2008 to 2013 drove up the cost of agricultural land rents and pushed a number of landowners to convert pasture to annual crops. Focus group participants inferred that this conversion of pasture to row crops in turn drove farmers to use their woodlands for pasture:

> *Agricultural professional:* I've seen a lot of pasture that was pasture my entire life … and

there is a lot of it that's gone and it's… [now in] row crops. And to me, that's been a bigger issue, and I think that's why we're seeing a resurgence of perhaps what you're saying is more damage on wooded-type pastures, along with the use value assessment issue. It's all come to a head. We have a lot less pasture available, because it's been plowed up.

Farmer exchange:
When I first got here I was just shocked…. The whole hillside corn and beans, and no buffers…. There's no residue out there, there's no nothing. You get a heavy rain, and it's going to be "shwoosh".
It's getting worse. I took a drive yesterday, and it's amazing how many of these pastures [have been converted]—they took that one out; now this one's sprayed; it just gets worse every year. Don't you wish corn would go down to two dollars again?
I do. That's what they need.
I remember bitching most of my life thinking cheap corn is cheap milk, and now I'm thinking (snaps fingers) 'See where these guys are going crazy with this expensive corn.' I've seen enough.

Later in the conversation a young farmer noted that he and other beginning farmers can only afford wooded, marginal land:

These pastures that we're dealing with, wooded pastures, they're probably not your most productive land. Obviously, we'd like to have hayfields and nice, straight lines, but it's what we have to work with, so to be able to manage it and get something out of these places and turn it back into production is a huge transition.

Thus farmers and resource professionals saw silvopasture as offering a structure to improve management of woodlands and other farmland that is currently poorly managed.

Forester: I think we've hit on a major focal point here, is that people are going to—certain amount of the agricultural producers out there are going to graze the woodlands, and that's just economic. It's just economics. It's going to happen. So, we should look for those opportunities that we can decrease the environmental impact based on that.

Concerns

At the same time, all the focus groups touched on a number of concerns about woodland grazing, as well as potential concerns about promoting silvopasture. Many of the concerns were brought up in the context of current practices of woodland grazing. However, a few comments touched on the possibility that promoting silvopasture might be seen as an endorsement of woodland grazing and thus might result in an increase in that practice and associated negative impacts. Other concerns, such as the observation that having trees in a pasture makes haying and fence maintenance more difficult, apply to well-managed silvopasture (Table 4).

Both foresters and farmers noted that the beneficial ability of livestock to control invasive species can also negatively affect desired species.

Forester: On the note of using goats and other grazers for invasives control I think there's been some trepidation among forest managers about using that tool. Because with the great job they do knocking back invasives they are also non-discriminating against the tree species. So the … great white oak and red oak and walnut and hickory resource you have there is also knocked back, just as well as the buckthorn. So that's something to keep in mind. If you're really looking at regenerating the forest.

Farmers discussed the same range of problems associated with woodland grazing and concerns about silvopasture that foresters and agriculture professionals identified. For example, agriculture professionals expressed concerns about pastures with only a few trees, because livestock are likely to crowd beneath a single tree, trampling the grass and depositing most of their manure in that one location:

From a grazing management perspective we tend to discourage producers from grazing or setting up paddock[s] that have a single tree in them because the animals tend to concentrate for shade, and then a lot of the nutrients are applied right around the tree and you get a bare spot.

Table 4 Concerns about silvopasture and woodland grazing

Management and resource concerns	Ag. prof.	Forester	Farmer
Soil erosion and compaction	x	x	x
No tree regeneration	x	x	x
Damage to trees	x	x	x
Cattle bunch up under single tree (manure, mastitis, compaction)	x		x
Quality and amount of forage in woods	x		x
Tree form		x	x
Invasive species (reed canarygrass, garlic mustard, multiflora rose)		x	x
Management challenges (fence maintenance, ability to mow)	x		x

An "x" indicates that one or more individuals from that category discussed the concern

The farmer focus group discussed the same concern:

> I've had problems with single trees in pastures. If you've got one tree the dairy cattle they'll all stand under it. We've got one across the road over there that we have to fence them out of because absolutely every time they bunch under that tree somebody'll lay down and get mastitis.

Finally, for the resource professionals there was some concern about blurred boundaries between silvopasture and woodland grazing, or about appearing to condone woodland grazing in any way. For example, one agricultural professional had recently turned down a request to speak about silvopasture at a regional grazing conference, as it might be construed as an "official" endorsement of woodland grazing:

> We were asked to do a presentation on grazing in the woods …. And we denied it. We didn't want to get into that. Because we didn't want to show, as an agency, that we were allowing or even wanting people to graze the woods.

Land ownership patterns

One issue that surfaced repeatedly in all three focus groups was changes in land ownership and how those changes might affect adoption of silvopasture. Land tenure issues included ownership consolidation and access to land, as well as the skills and attitudes of the landowners.

> *Forester:* Land ownership has changed in my county for sure over the last 30 years or more. The increasing trend over the recent 10 to 15 years is we have a lot of non-resident landowners or we have a lot of professionals with jobs who own the land as an investment or as a recreational property, versus 30 years ago when I came down here… it was a 30-acre or an 80-acre small… dairy farm. And the land use and the characteristics of the ownership have changed very significantly.

There were concerns that absentee landowners would not have the time or expertise to manage silvopasture properly, and that renters would not be motivated to do the type of long-term management silvopasture requires:

> *Agricultural professional:* But to me, the biggest threat really has been the shift in landownership patterns, because we have a lot more people who are renting land now than ever were before. When you have a rental, even if you have a longer term rental agreement, you don't own that land. It's a different perspective.

But there were also comments that in some cases absentee ownership might provide an opening for better stewardship:

> *Planner:* And during a lot of my classes, I talked with more absentee landowners than I do with [resident] landowners…. That's who's coming to the classes. That's who wanted to know to do the right thing. They just bought the property and they want to do the right thing, and to study steps. But the people who actually have been pretty much entrenched in the area have gotten the idea that, 'I have a sense of place. I know

what's appropriate, and I'm okay with it. And my knowledge base is okay.'

Farmers discussed the potential for silvopasture on land owned by non-residents to provide affordable pasture for the livestock farmer and improved recreational and aesthetic value for the landowner:

Older farmer: The key is you probably can't own it [marginal land] and make money. But the rich guy can own it, and you can give him what he wants.
Older farmer: I think that's the perfect answer. If I was a young guy like you guys, that's where I'd be.
Young farmer: That's the thing. We can graze people's back forties that are unproductive and never have to buy a piece of land. If you have a working relationship with a guy who'll give you a 10-, 15-, or 20-year contract.
Older farmer: The key to that is get into a place and give that guy what he wants. And then have an example where you could go to someone else and say 'You know, I could give you this and this and this.'

Management recommendations

Farmers and professionals identified many of the same management considerations for silvopasture (Table 5).

A critical point of agreement was that silvopasture is not appropriate everywhere. Farmers and agricultural professionals noted that open pasture should continue to provide the bulk of nutrition for grazing livestock but that silvopasture might offer supplemental services such as mitigating temperature extremes. All focus groups stated that closed canopy, high quality woods should not be grazed and that more discussion and research is needed on what types of woodlands might be suitable for silvopasture. Farmers and professionals both noted that research on establishing silvopasture in existing woodlands should initially focus on woods that have already been affected by grazing:

Farmer: And if there is already technically not a real good woods anyway, you're not doing a lot of harm.

Forester: Poor pasture and … degraded woods that was pasture at one time and they fenced 'em [livestock] out and it's grown back to shrubs and honeysuckle and that sort of thing. Buckthorn. And so to me that seems like it would be an ideal place [for silvopasture]. It has a few trees in it but they're poor quality.… They like the few oak, the bur oak that are in there. So I think the opportunity is the places that have already been grazed and are already degraded as forests.

In the context of the prevalence of woodland grazing and Wisconsin's use-value tax policy, the idea of establishing silvopasture in farm woodlands dominated the discussion. However, farmers, foresters, and agricultural professionals all suggested that integrating silvopasture into orchards might hold promise, provided food safety issues could be addressed.

Discussion

This exploratory study had two goals: first to gain some insight into what kinds of management farmers

Table 5 Management recommendations for silvopasture adoption

Management recommendations	Ag. prof.	Forester	Farmer
Adjust management depending on site and trees	x	x	x
Site selection: degraded woods, former savanna, possibly orchards	x	x	x
Tree selection (evergreens, light shade)	x	x	x
Manage stocking rate, timing, rest period (rotational grazing)	x	x	x
Consider livestock species (goats, sheep, or beef or dairy cattle)	x		x
Many scattered trees	x		x
Trees in straight lines (fencing, mowing)	x		

An "x" indicates that one or more individuals from that category discussed the recommendation

in southwestern Wisconsin are doing in grazed woodlands, and second to learn what resource professionals and farmers think about silvopasture as a management approach and what potential factors might influence their attitudes toward silvopasture.

With respect to our first research question, our findings suggest that the professional view that grazing woodlands is unacceptable has created a "Don't ask, don't tell" attitude toward the practice. Thus, the resource professionals we interviewed did not provide details about farmer management; rather they spoke in general terms about environmental damage attributed to woodland grazing. Farmers spoke about their own practices but did not report talking to agricultural or forestry professionals or other farmers about how to manage trees in pasture or woodland grazing. The farmers described a range of management practices they followed, such as managing timing and duration of grazing events, to reduce negative environmental or economic impacts from grazing in areas with trees. This is not to suggest that all graziers implement such management, as the focus group farmers were predominantly active members of a management-intensive grazing network, and their practices may not be the norm.

We suspect farmers do not ask agricultural or forestry professionals for advice on woodland grazing because they expect they will simply be told to stop the practice. In turn, professionals do not volunteer management advice for woodland grazing because they fear such advice might be seen as endorsing the practice, as exemplified by the quote from the agricultural professional whose agency declined to present at a workshop on silvopasture.

Yet, within the focus group setting, at least, professionals suggested that they were ready to move beyond the apparent taboo on talking about managing livestock and trees together. Perhaps the confidential nature of the focus group setting allowed professionals to interact with each other in a less-guarded dialogue to discuss and question the established norms and policies of their agencies in a way they may not be ready to do in public. In public settings where professionals fill the role of experts it may be more difficult for them to openly acknowledge areas where they lack knowledge or training, or to challenge the prevailing advice of their agency or discipline. Social context as well as personality may influence people's ability to honor differing views and link their knowledge with that of others (Ashwood et al. 2014).

The farmers who participated in the focus group all expressed interest in silvopasture. While our sampling approach selected for farmers who have experimented with integrating trees and grazing in some way, anecdotal evidence indicates that interest in silvopasture is more widespread. In 2015 and 2016, presentations on silvopasture drew 50–70 farmers and agricultural professionals at the Wisconsin Grazing Conference, and 30 rural landowners at a local whole farm management workshop.

A number of factors influenced attitudes of our focus group participants toward silvopasture. Farmers and agricultural professionals identified shade, management of brush, and savanna restoration as potential benefits; all participants recognized the importance of preventing soil compaction and erosion; and foresters and farmers stressed the challenge of tree regeneration. Key points of agreement among all who participated in the focus groups included a desire for local research and demonstrations of silvopasture, and the recognition that silvopasture is not appropriate for all sites.

All three focus groups identified land ownership patterns as an important factor that might influence adoption and management of silvopasture. While land tenure and access are broader issues for both forestry and agriculture, the combination of short- and long-term time frames required for silvopasture may interact with issues of land ownership and access in special ways. This area of concern had not been anticipated by the researchers, but merits consideration in future work.

Among professionals, the different sectors accepted and built on the expertise of the others, suggesting that there is potential for collaboration between interested agricultural professionals and foresters on silvopasture research and outreach. Indeed, the agricultural professionals and foresters who came together to discuss this topic appeared to actively appreciate the chance to talk across disciplinary boundaries. Still, there were instances where viewpoints diverged, such as around the appropriateness of using information on pre-European settlement land cover to identify suitable silvopasture sites or the potential impact of landowner type on silvopasture management.

Overall, however, there were many points of agreement both within and among focus groups, particularly given the different composition of each

group. We suggest that two social factors helped build this level of agreement. First, as noted above, all the focus group participants worked in the Driftless Region, an area with a distinctive land use history and regional identity. This geographic focus provided a shared framework for the discussion of silvopasture that may have helped transcend the different professional backgrounds of the focus group participants. Second, the non-public nature and research focus of the focus groups may have given participants leeway to move beyond the expected views for their profession.

Conclusion

What do these findings mean for silvopasture in the upper Midwest? First and foremost, we found that despite the history of condemning cows in the woods, at least some agricultural professionals, foresters, and farmers welcome the opportunity to explore silvopasture as a land management approach. The participants agreed that silvopasture would likely improve management for the woodlands that are already being grazed, and raised the possibility of other applications such as savanna restoration. As a practice that is recognized by the US Department of Agriculture, silvopasture may offer a way to move past the current uneasy standoff between resource professionals and many farmers over woodland grazing.

Our findings indicated that an important first step in moving forward will be silvopasture research in the upper Midwest. Questions requiring further investigation include verification of potential benefits and concerns, as well as specific management recommendations. Do livestock benefit from shade even in the cooler climate of the upper Midwest? How does grazing management affect livestock impact on soils in a silvopasture system? What tree species and forage species work well in silvopasture systems on different soils and in different climates? Despite the questions, differing priorities, and the presence of some contested issues, our findings further suggest an interest among foresters, agricultural professionals, and farmers to work together on this topic. Such effort and continued exchange offer promise for increased acceptance of silvopasture in the Midwest.

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Appendix: Focus group questions

Questions for resource professionals

Do you work with or know of farmers and landowners who have trees in their pastures? What kind of management do they do for that? What issues do you see with that management approach?

Do you know or work with farmers and landowners who graze their woods? What kind of management do they do for that? What guidance do you have for them?

Can you think of scenarios where silvopasture would make sense in the Driftless Region?

What do you see as the (one or two) most important constraints or barriers to good silvopasture?

Before we wrap up, do you have a closing question or comment about silvopasture that we have not yet touched on?

Questions for farmers

Looking at these different examples of pasture-tree configurations can you tell me if and how the different types fit into your grazing operation?

Combining grazing with trees introduces additional management issues beyond those of managing open pasture. Can you comment on those issues?

Do you think silvopasture has potential for you and your neighbors?

If you were going to establish silvopasture on your land, what are your guiding management goals and values that it would need to fit into?

We have been focusing on your land. I would like to step back now and hear whether silvopasture fits with your vision of the Kickapoo Valley in general.

Before we wrap up, do you have a closing question or comment about silvopasture that we have not yet touched on?

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