A Geographical Analysis of the Cheese Industry in Green County, WI

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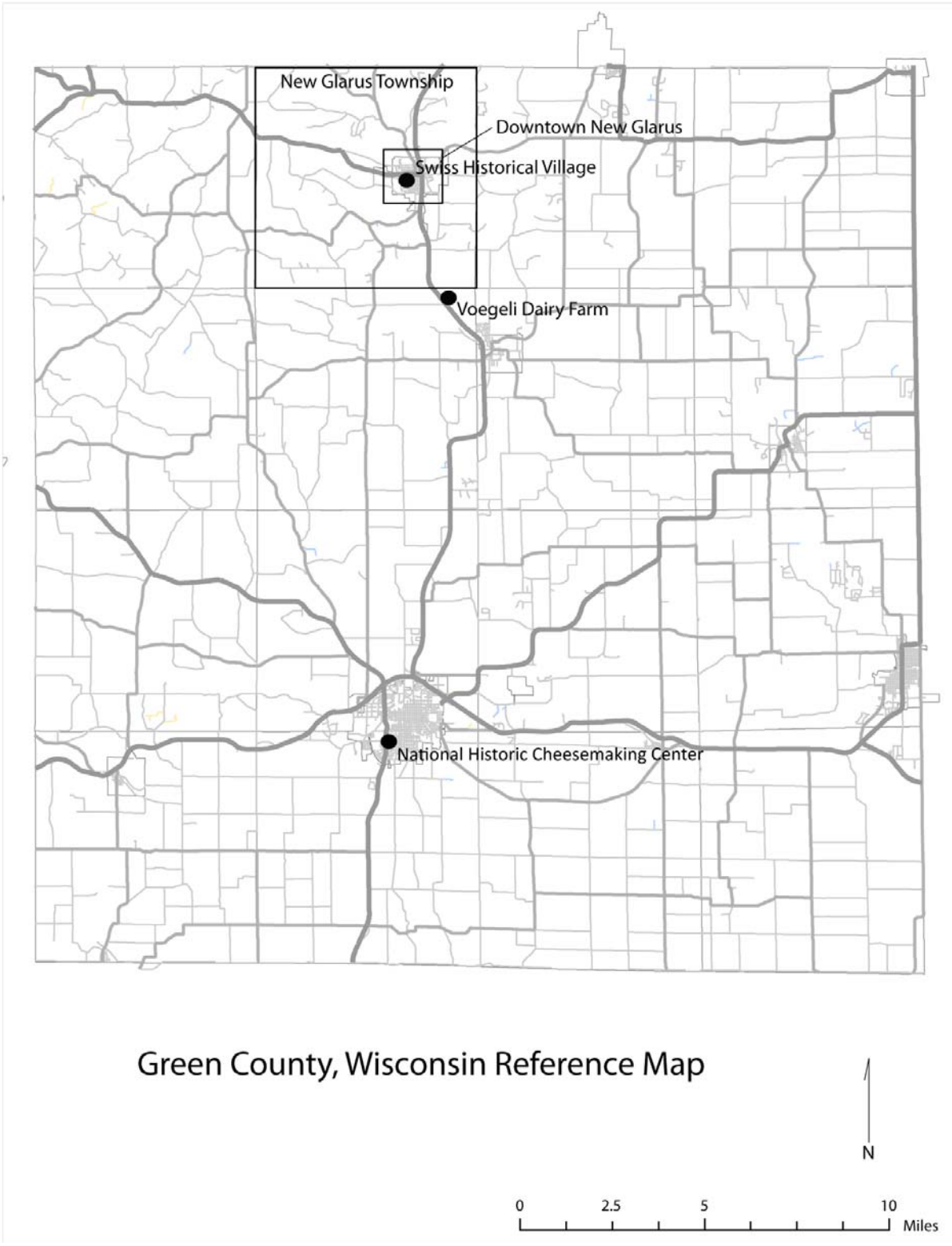
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Voegeli Dairy Farm
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Introduction

The area of Green County, Wisconsin serves as an epicenter for the dairy industry in the state, an industry practically as old as the state itself. Through the hard work of cheesemakers and dairy farmers, Green County maintains its role as a prominent cheese producing region. What is unique about the county's role in cheese production are its cultural practices and economic opportunities that sustain its local cheesemaking. Therefore, we are seeking to determine how the factors of (1) human interaction with the physiographic setting, (2) Swiss cheese and dairy culture, and (3) economic changes in the cheesemaking industry led to the establishment and continued prominence of the Green County cheesemaking industry.

The employment of diverse methodologies was necessary to understand how each factor in the study makes Green County a leader in the cheesemaking industry. Each component was approached using a unique set of methods. Cartographic analysis, personal interviews, and intuitive examination of place and landscape explain Green County's role in cheesemaking. The goal of this document is to geographically analyze Green County's cheese industry by critically examining each of these factors, the techniques used to evaluate them, previous research, and primary data.

As historic as the topic of Green County cheesemaking is, it has been the subject of numerous reviews. One of these texts, though largely viewing cheesemaking from an economic standpoint, mirrors much of the work done in this project, but from a perspective nearly 75 years older. Emery Odell's 1936 piece, *Swiss Cheese Industry in Green County, Wisconsin*, reads off as an intensive history of cheesemaking, dairying, and the people who first established Green County's relationship with cheese. Among its foresights into this project, Odell's text discusses the history of business consolidations that cheesemakers established, reducing cheese factory numbers, yet helping sustain the longevity of the industry (Odell, 1936: 11 and 59-64). Texts such as Odell's served as a guide to the research, as they illustrated the many factors that launched and sustain the local cheesemaking industry.

All of the factors explored in this article are interconnected and are essential to a thorough geographic explanation of Green County's cheese industry. The elements of each factor fluctuate frequently, and react to each other's phenomena. Thus these phenomena both dictate the factors and influence the industry. Without the stimuli of physiographic setting, culture, and economic means working in the region, the cheesemaking industry in Green County as we know it would not exist. Therefore, what makes Green County work as a cheesemaking center is that these three factors are interrelated, and thus each component affects how the others contribute to produce a long-standing cheese industry.

Landscape Analysis: Pre-Settlement Green County

The physiographic setting of Green County played, and continues to play, a large role in the establishment and sustainment of the dairy industry in the area. With a suitable setting for agricultural practices cheesemakers and dairy producers can succeed in their practices more easily. Some of the many attributes that affect farming suitability include the soil landscape, topography, and land cover types. An examination of both historical and contemporary land analyses is necessary in understanding the ability of the landscape to benefit the cheese industry.

Two methods examined the importance of the local physical geography in relation to settlement and agriculture. The first method of these was a look at how the land appeared in portions of Green County before settlement through the surveys by the Unites States General Land Office (GLO). In combination with settler accounts and academic resources, the surveying notes and original land survey maps helped explain how settlement and the establishment of dairying agriculture came to be in the area through the availability of arable land. The second method was the development of a remote sensing-based land cover classification of Green County, explained later in this article.

Interpreting the records from the first land surveys of Green County helped describe how the study area was originally configured in regards to farming. These initial surveys, whose records are available through the Wisconsin State Historical Society, provided an idea of the land cover, hydrology and other physical facets of the area at a time when human disturbance of the landscape was minimal. An analysis of the pre-settlement landscape was feasible with a sufficient examination of the surveyors' results and the valid accounts of both immigrants and academics who either settled or studied the area.

The physical landscape of Green County is a complex and varied landscape, as it contains a portion of the end moraine of the early-Wisconsin glaciation (Martin, 1916: 129). West of the end moraine lay the eastern fringe of the Driftless Area (Martin, 1916: 129). Although this analysis of a crossroads in geologic landscape does not wholly explain what makes the study area receptive to cheesemaking, it does help develop the description of the landscape that Professor Vale describes as a true prairie landscape (1997: 14-15). Vale established his understanding of southwestern Wisconsin's pre-Euro-American settlement prairie-covered landscape by analyzing a small study area near Dodgeville, Wisconsin, approximately thirty miles northwest of New Glarus, Wisconsin. This description of a prairie landscape is similar to the landscapes that the GLO and the first Euro-American settlers found upon arrival in Green County. His work examining the prairie landscape brings the primary land cover type of southwestern Wisconsin into vivid perspective. This prairie landscape eventually found use in dairy farming and indirectly, cheesemaking practices.

Michael Conzen's description of the region's lead mining industry, its fall, and transition into agricultural land use also alludes to the transition that southwest Wisconsin's natural

landscape made in becoming agriculture-friendly. While not discussing the landscape attributes that the area had to offer to farming in fine detail, Conzen does explain simple characteristics on how the area south of Military Ridge is conducive to farming (1997: 177-182). He also explains the development of specialized agricultural practices, particularly the artisanal cheesemaking that occurred throughout the area (1997: 177-182). This text's demonstration of connections between the natural landscape and the agricultural practices of Green County, will serve as a guide in proving the importance of the natural landscape in the upbringing of the cheesemaking industry in Green County.

While the GLO surveying records provided a look at how the landscape of Green County appeared in the 1830s, an important set of limitations were taken into account before analyzing survey results and notes. It was important to recognize that errant recordings and lack of comprehensive results in the land surveying records exist (Knox 2009). Possible inaccuracies in the data derived from the surveys included inconsistencies stemming from generalization, poor surveying and measurements, excessive interpolation, and inappropriate use of cartographic license (Knox, 2009). These potential inhibitors could have skewed conclusions about the characteristics of physical geography in Green County.

Early accounts of Swiss immigrants further indicated their intentions of farming in Green County in relation to the physical landscape of the area. In the text *New Glarus: 1845-1970,* journals and descriptions of the initial migration to New Glarus included a limited description of the farming country around the town during the era of the first Swiss settlements. This resource, however, held the possibility of being less sufficient for understanding the advantages of the Green County landscape as the accounts came entirely from a personal perspective. Likewise,

these personal perspectives included the influences of the times on the authors. When used with caution to the settlers' personal perspectives, the personal stories still aided in understanding the appeal of the land to the immigrants who settled on it.

Through the GLO surveys, a look at the notes on the present-day Township of New Glarus, also referred to as Township 3 North, Range 7 East (T3N R7E), reveals a strong presence of a complex physiographic environment. In the description of the land surveys along section lines in the township, a picture is drawn through surveyor notes. In these notes, the surveyor describes the area repeatedly as being "hilly" and "second-rate prairie," along with notes explaining the presence of sporadic trees (Mullet, 1832: http://digicoll.library.wisc.edu/cgi-bin/SurveyNotes/SurveyNotes-idx?type=PLSS&town=T004N&range=R007E (last accessed 15 December 2009)). This conglomerate landscape of rolling prairies, and what are essentially savannah-type tree settings, is a common pair of land cover types recorded in the earliest land surveys of southern Wisconsin, as exhibited by a map of Green County and its land cover types at the time of the 1830s surveys (see Figure 1). The pre-Euro-American settlement conditions of Green County also give evidence of some of the potential attractions that drew the first significant immigrant base to the area during the mid-19th Century as well as the cheesemaking and dairying lifestyle that came with it.

An account from one of the first Swiss scouts on the quality of the land in the nearby vicinity of New Glarus captures the importance of the hilly, arable, and slightly forested land that was surveyed little over a decade earlier. In Judge Dürst's account, he states that the land around New Glarus "contains, for the most part, fertile soil," and "enough woodland" (Dürst, from Brunnschweiler, 1845 and 1970: 166-167). Dürst also goes on to comment that "the mountains

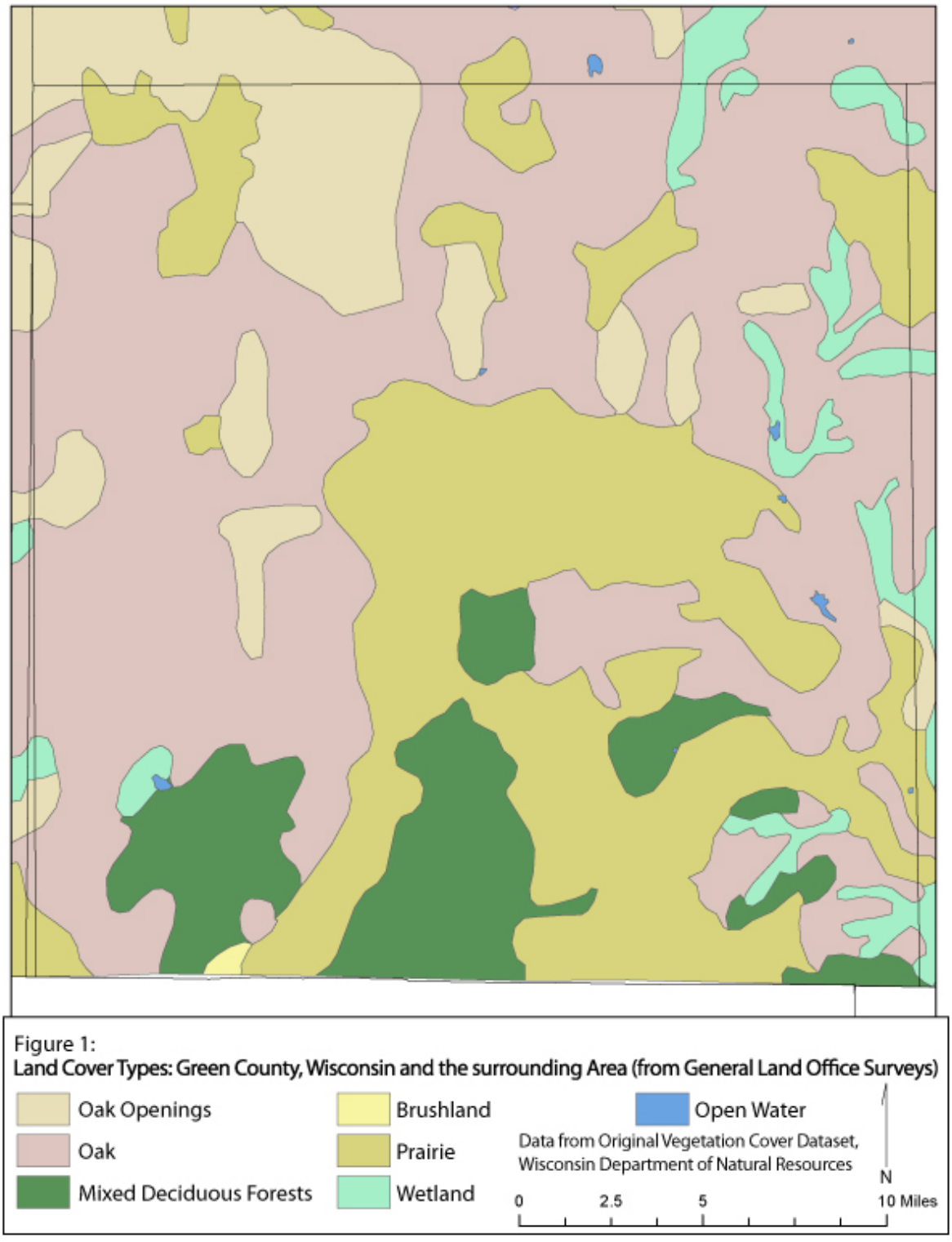


Figure 1:
Land Cover Types: Green County, Wisconsin and the surrounding Area (from General Land Office Surveys)

close-by...will be advantageous for sheep raising" (Dürst, in Brunnschweiler, 1845 and 1970: 166-167). Although shepherding did not remain a chief industry in the Township of New Glarus, this observation on Dürst's part does indicate a desire to start an agricultural industry around New Glarus, which occurred, and continues to occur as the dairying and cheesemaking industry throughout Green County.

The Township of Washington, located immediately south of the New Glarus Township in Green County is another area in Green County dominated by a mixed prairie and lightly wooded landscape (Mullet, 1832: http://digicoll.library.wisc.edu/cgi-bin/SurveyNotes/SurveyNotes-idx?type=PLSS&twp=T003NR007E (last accessed 15 December 2009). While much of this township serves as agricultural land, the individual dairy farms, which serve as building blocks of the cheesemaking industry, use the landscape to their advantage in their pursuit toward a successful farming enterprise. One such successful dairying venture exemplifies this: the one-hundred and fifty year old Voegli dairying operation.

Landscape Analysis: The Dairy Farm

The success of the dairy farm generates a firm foundation upon which cheese production relies. Therefore, an analysis of how the Voegeli family's Swiss dairy farm has functioned in its past, and how it continues to function provided an overview of the essential aspects of any properly run dairy farm. A vast majority of the research conducted in order to explain the most essential aspects of a functioning dairy farm were centered around a thorough analysis of the architectural structures on the farmstead. This analysis was conducted through the application of repeat photography. Historic Voegeli family photos dating back to the 1890s were compared to a series of present day photos produced by the researcher, which provided evidence of the adjustments

made to the farm. The intention of the Voegeli family farm case study was to assess the functional properties of a typical dairy farm to develop a clear teleological explanation for the productive assistance that efficient dairy farms play in cheese production. For, without the cow, and its dairy farmer, there would be no cheese.

The research for this portion of the geographical study was conducted with the assistance of previous works using similar intuitive analysis of spatial surroundings and worked landscape. Selected writings from Carl Sauer (Sauer, 1931 and 1963) and Ingolf Vogeler (Vogeler, 1997) were helpful in order to develop a format in which to study the culturally impacted landscape that was, as Sauer liked to refer to it, ‘worked’ land (Sauer, 1931). Sauer, the father of morphological landscape research, laid much of the groundwork for his revolutionary style of landscape interpretation in his own work that intuitively described the spaces in a Swedish city (Sauer, 1963). Even though his work illustrates how a differing setting from rural Green County operates, it serves as a suitable basis for which to design and conduct similar morphologic and chorologic studies of place. In his work he describes the urban structure of a Swedish city through the architectural design and function of buildings by focusing on the geometric form and materials used. Through his investigation, and his work done on important historical background of the place, he concludes that the design of the buildings and their composited material were chosen in order to avoid future fire disasters (Sauer, 1931, 29-49).

These conclusions are significant due to the manner in which he came to his conclusions. At no time did he do additional work beyond intuitive observation, and setting the place of study in a historically influential context. Therefore, if his work proves vital to the understanding of place, than similar research on dairy farms will prove equally valuable to a complete

appreciation for the process of cheese making and the role cheese has played, and continues to play, in Green County. Sauer's famous culturally geographical work, then, serves as a strong foundation for this topic's descriptive analysis of human formed places because the research did rely on intuitive observation and contextual description of the workings of Green County's landscape.

Vogeler's research, on the other hand, strikes a much more similar note to the topic of this study. His work described the cultural landscape of Wisconsin's dairy farms through a description of common dairy farm structures. Like Sauer, and the work done in this study, Vogeler approached his research from an architural-based standpoint. For example, he points to the improvement on the 'form' of the dairy barn by the 1920s. At this point the traditional gambrel-roofed barn had become obsolete because the round-roofed barn included more loft space for hay storage. Therefore, this design was better equipped for dairy farming (Vogeler, 1997, 416). What is most important to the nature of this research, however, was the connection that could be drawn between the worked landscape's facelift (due to changing architectural design) and the desire of the farmers to change the form. Through the observation of the worked landscape by dairy farmers and an intuitive examination of their structures, an open window reveals an opportunity to explain the cultural influences on dairy farms in Green County.

When Jost Voegeli established his farm in the 1850s his family was small. There were few hands to assist in the daily chores on the dairy farm, but there was also less need for them considering 'Jost could only afford a handful of cows at this time, none of which were the Brown Swiss cows' (Alice Voegeli, Personal Interview, 20 Nov. 2009). As time pressed on, and the Voegeli family's business became more profitable, Jost continued to accumulate more cows.

Consequently, the need for more help around the farm grew as well. The Voegeli family grew, and so the house needed to expand along with them.

What was originally a small and rustic log cabin home (see Figure 2) like the structure preserved at the Swiss Historical Village museum in New Glarus, increased to a rather large home in order to fit the entire family. The expansion of the house occurred on top of and around the original log cabin. In this way, the house grew along with the family to accommodate them and their need to man the farm. The transformation resulted in what can be seen in the far left of the oldest copy of the Voegeli family farm photo (see Figure 3), which was taken during the final decade of the 1800s. Without the additions to the Voegeli home their family would not have been able to function as efficiently as necessary for life on a dairy farm.

Figure 2. Original log cabin from Swiss settlement in New Glarus, WI (photo courtesy of Geygan, 2009)

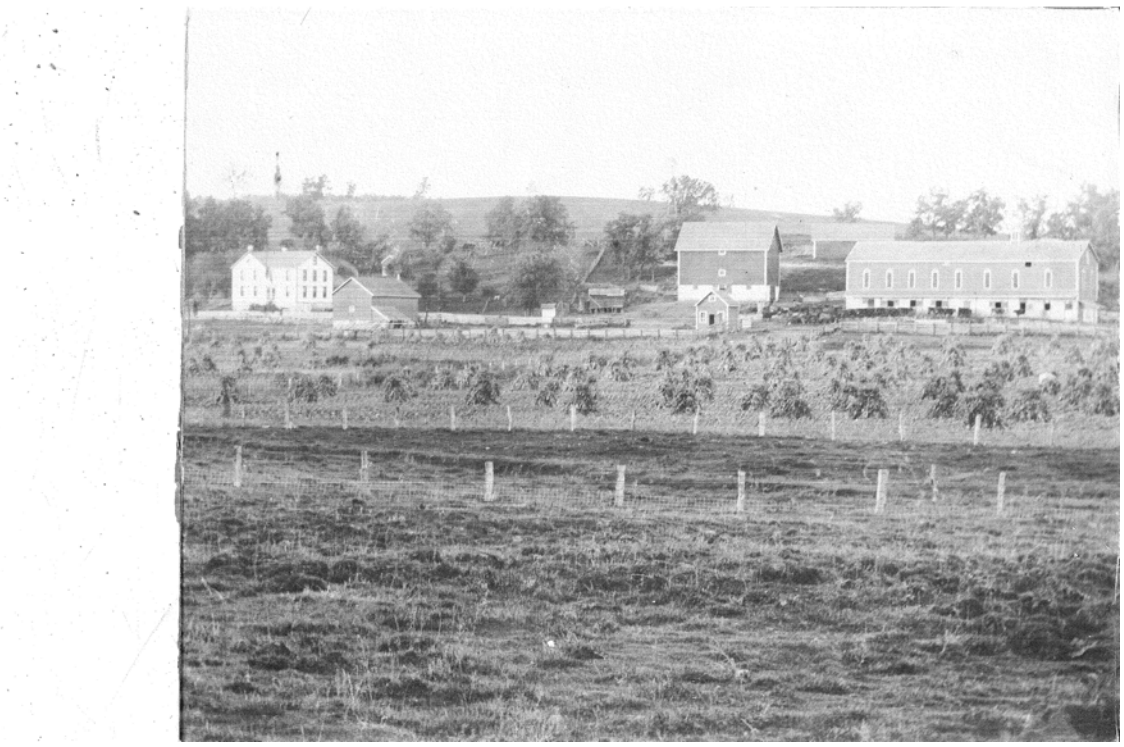
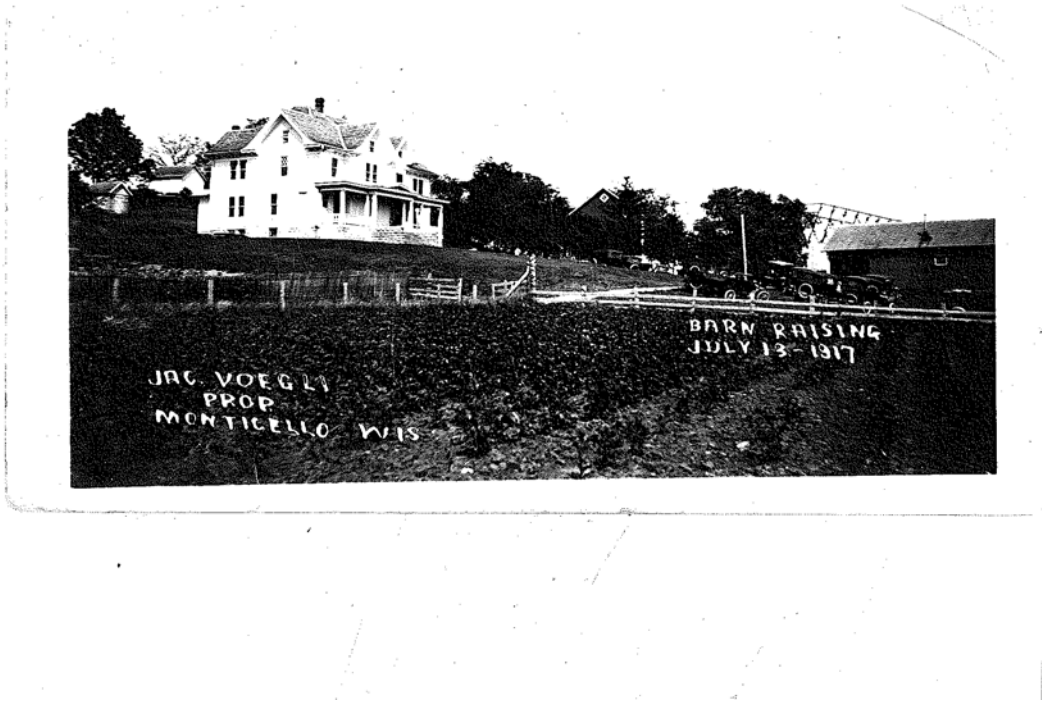


Figure 3. Circa 1890 photo of the Voegeli farmstead. Developed original home seen at far left. Pre-1917 milking barn at right. (photo courtesy of the Voegeli family)

Today a new building has replaced the previously expanded family house. The new structure was raised in the beginning of the 20th century. Proof of this is seen in the visibly evident change that occurred on the property between the earliest documented photo of the farmstead, and a photo taken during July of 1917 during the raising of the new milking barn (see Figure 4). This photo includes the new home in the foreground, just off to the left. The new farmhouse is of sufficient size to support a large family that would have been especially necessary to work the farm during a time when mechanized tools were uncommon, unattainable, or non-existent. Also, as seen in the photo, the new structure includes a large front facing porch. It has served as something of a 'hearth and a place of congregation for the family since its construction', especially after a long days work on the farm. Interestingly, this seems to have

been a ‘common practice by many of the Swiss dairy farmers in Green County’ (Alice Voegeli, Personal Interview, 20 Nov. 2009).

Figure 4. The Voegeli household is seen in the far left. The milking barn frame is seen being raised in the background in the right of the photo. (Voegeli)



Another building on the Voegeli family farm that has undergone significant changes throughout the farm’s history is the milking barn. In the farm photo from the end of the 19th century (Figure 3) you will find the milking barn to the far right. This building was erected around 1870, and remained on the property until 1917’ (Alice Voegeli, Personal Interview, 20 Nov. 2009). It had eight westward facing doors, and large windows. Each window provided natural sunlight to illuminate the interior of the barn as the sun set over the rural landscape at the end of a hard day’s work. Certainly this would have been a necessity since there was ‘no electrical lighting in the original milking barn’ (Alice Voegeli, Personal Interview, 20 Nov.

2009). Also, these windows would allow for air circulation within a barn that was typically filled with numerous cows. Not only would the air circulation make the smell within the barn more tolerable, but on hot summer days the cows and farmers would have been happy to retreat to a more comfortable interior. While keeping the cows comfortable may not have been a necessity for the operation of a dairy farm, it certainly makes milk production a more tolerable task for the animal and dairy farmer.

The eight doors of the barn served as the entrance of individual stalls in which cows would enter for milking. There architectural design, too, was made in order to accommodate the daily rigmarole of farm labor and interaction between the farmer and his cows. Each door was just wide enough for a grown cow to enter, but not so wide that the animal would have been able to shift around too much (see Figure 5). Therefore, the proper size of the door and stall were important for an efficient, and easy milking process where the farmer would not have to deal with the frustrations of an unruly cow. Though this design was imperative for the portion of the daily routine when cows would be taken in for milking, cleanup afterwards would have been rather burdensome. The only way to clean the milking barn would have been to enter each stall from the exterior of the barn through one door at a time. Since each stall was cleaned individually, the need to exit and reenter with cleaning tools for each separate stall would have been time consuming, tiresome, and unproductive – three unwanted annoyances that no hard working farmer would ever want to hear of. This inconvenience, however, was resolved with the erection of the farm's current barn.

Figure 5. Original Voegeli milking barn with a portion of the herd in foreground. (Voegeli)

In 1917 the milking barn that stands prominently on the Voegeli property was designed to replace the obsolete and inconvenient barn of the 19th century. This barn was designed in such a fashion as to make the daily routine and tasks of dairy farming less of a struggle for the Voegelis. The new barn includes only a single alley in which the cows enter for the milking process (see Figure 6). The lone alley, around which the 'milk line' sat, was created with the intention of streamlining the cleanup process after the cows have finished milking. Since the barn's construction, no longer would the farmer face the monotonous hassle of cleaning individual stalls. Instead, the single alley could be quickly and easily cleared of any mess left by the cows. The eight doors on the west side of the barn were not completely left out of the design though. Considering the enormity of the new barn, two doors remained as part of the design primarily for the convenience of the farmer to enter and exit. As an additional convenience, these doors were kept large enough for cows to be brought in or out of the barn as well. In place of the doors that

were excluded from the new barn, windows were added. Sunlight now enters the barn at the first floor rather than the second, which increases the light level inside the barn, and thus the ease of work is improved, especially in the modern ‘milking parlor’ that includes a sunken center alley (see Figure 7).

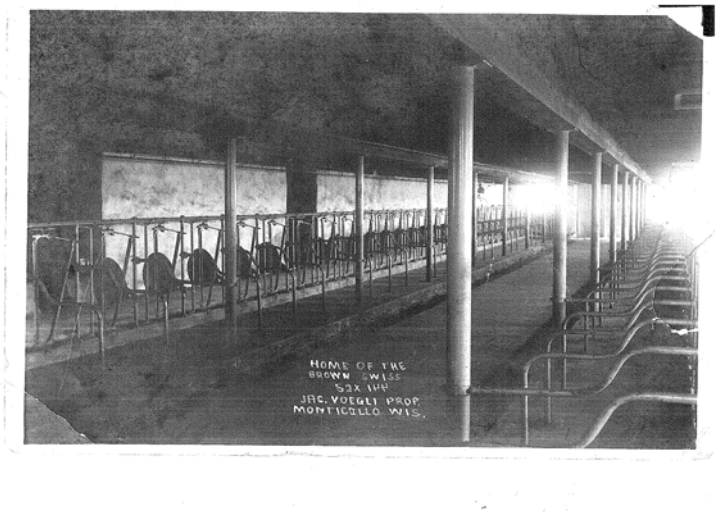


Figure 6. This is the milk line as it was built including the single alley in 1917. (Voegeli)

Figure 7. Miking parlor as it has existed since 2007. (Geygan, 2009)

Naturally, the reason for the sunken center floor of the milking parlor was created intentionally, just as seemingly every other portion of the barn was. The utility in the dropped floor is in the simplicity that it provides for the milking crew that mans the milking process. The cows are stood on the perimeter of the alley while the farmers work in the center, sunken floor. The reason for this falls on the need to attach the milking mechanism to the cow utters for milking. If the farmer is already standing several feet lower than the cow, then this facilitates a more efficient, and less back-aching milking process. In addition, as states previously, the sunken floor is further improved by the first floor windows that assist in the illumination of the space. Still, other sections of the 1917 milking barn serve the Voegelis and dairy farmers with similar milking barn designs well.

The upper level of the milking barn has always served as the farm's main storage space for hay feed. The creation of the larger milking barn, however, made the hay storage process quite a bit easier. A large hay crib in the upper level of the barn is capable of storing mass quantities of hay compared to the relatively small crib of the previous barn. This renovation in particular was essential to the success of the dairy farm given the 'increased reliance on haylage for cow feed' (Alice Voegeli, Personal Interview, 20 Nov. 2009) through the winter months. The advantages stemming from the storage of hay in the milking barn do not end at the fact that this loft would provide an ideal location to store massive amounts of hay under the protection of a covered barn. In addition, the location of the barn on the property is positioned on the center of the portion of the farm used for cow cultivation. The utility of having all of this hay in a central location shortens the time and distance to move haylage when its use is required. Here in lies the question of how to access the stockpile of hay in order to move it.

With the advent of the new barn came the increased capability for mechanized tools to enter the upper, hey storage level of the barn. The limited space in the older barn would have made moving loose hay balers did not enter until the late 1940s') (Alice Voegeli, Personal Interview, 20 Nov. 2009) into storage a cumbersome event. The new barn on the other hand provided sufficient space to move hay into storage easily. Part of the newer, and larger milking barn's design included a pulley system set on rails. Horses would be used to lift hay from the back of wagons with the pulley system before the farmer 'tripped' the system to drop the hay. Only after the late 1940s did balers enter the picture, at which time the Voegeli's large barn doors, and strength of the structure were still perfectly suited for the heavy machinery required to move weighty hay blocks into storage.

One of the greatest and most intelligent plans for the utility of the Voegeli farm revolves around the accessibility of the upper level of the barn. Jost Voegeli knew the plot of land he selected would be perfect for the formation of a dairy farm given his Old World knowledge surrounding the dairy farming process and practices. After all, dairy farming in his former Alpine homeland has always played an integral role in Swiss life. Jost knew that dairy farms ought to be built on a mountain side, and though the Green County topography doesn't nearly match the scale of the Swiss Alps, it does afford farmers a few hills. The reason for Voegeli's placement of the barn was based on the need to make the second floor of barns, and therefore the stored hay, accessible. Therefore, Jost used his knowledge of 'bank barns' to build his farm into the hillside upon which the family farm exists.

Bank barns hold a strong relationship with the topography of the landscape. A "mutually constitutive" relationship between man-made structures and the land has been common practices for the Swiss since their settlement to Green County. As is the case with so many Swiss farms in the area, Voegeli built his barn *into* the embankment rather than building on flat ground (see Figures 8-11). But the role the hillside and barn play on one another does not end there. Their reliance on one another, the hillside as an environmental feature and the barn as a socially constructed feature, defines a mutually constitutive relationship. 'The social, and the environment emerge together and transform together' (Woodward, 2009) The barn relies on the hill for its foundation as well as utilitarian entrance to its second floor, while the hillside's identity becomes less of a natural feature in the landscape, and more of an extension to the barn itself. In this way it can be seen that we, as humans, are always engaged with nature. 'The way we think is fundamentally linked to nature' (Woodward, 2009).

This decision didn't only save flat land for the cultivation of crops, but it also increased the accessibility of the barn's upper level. By building the barn into the hill side, the upper floor is essentially accessed from the ground. This way mechanized tools (and wagons prior to machines) can be easily moved into the upper level of the barn. Therefore the farm does not have to struggle with the troublesome and potentially dangerous use of a ramp to reach the upper level with modern machinery. This trick-of-the-trade must have proven to be quite functional, for the Voegeli family later used it in the design of two of their structures. It was used again in the construction of the 1917 milking bar, as well as in the design of the maternity barn in order to create additional space for hay storage.

Figure 8. View of the embankment behind the milking barn, as approaching the rear. (Geygan, 2009)

Figure 9. View of the backside of the milking barn as it rest on the hillside.

Access to hay crib through open doors. (Geygan, 2009)

Figure 10. The maternity barn from the front. (Geygan, 2009)

Figure 11. The backside of the maternity barn as it rests in its hillside. (Geygan, 2009)

There was at least one development made to dairy barns after 1917 to make the transportation of milk more convenient and efficient. In the earliest pictures of the new Voegeli milking barn there was no milk house attached to the north end of the barn (see Figure 12), but later the Voegelis adjoined a small structure called the milk house (see Figure 13). Imaginatively, this structure received its name from its function. The 'milk house' serves as a milk storage center for the farm. It is also where milk trucks park in order to retrieve, and ship the milk produced on the farm. In this way, the milk moves from the cow to the milk house, through the tools of the milking parlor, for storage in several large milk containers. Milk trucks will connect a hose to these milk containers in order to extract the milk. Therefore, this building provides a quick and easy method for moving milk from the hands of the Voegeli's into the hands of milk distributers who will eventually do business with cheese makers all around the country.

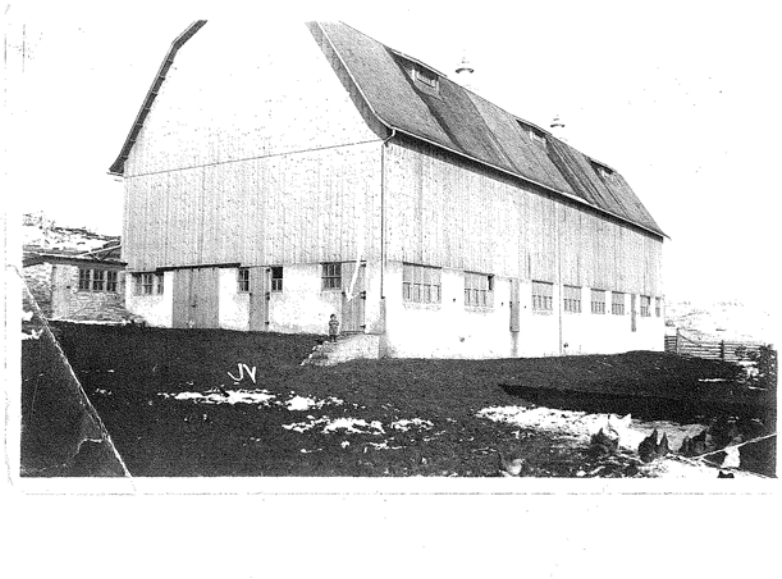


Figure 12. Wall on the far left of the barn was an extension of a tool shed, before the construction of the milk house. (Voegeli)

Figure 13. Small structure in center of frame, attached to milking barn is the present day milk house. (Geygan, 2009)

There remains one final portion of the dairy farm which is of great importance to the production of milk. That is the manner in which silage is stored in order to feed the cow herd through the winter months, and maintain milk production in the cold season. As can be seen by the historical photos, silos did not exist until well into the 20th century (see Figure 14 and Figure 15). The entry of silage on the dairy farm was a significant change in the daily routine on the dairy farm. This is true for several reasons. First, the use of silo towers is 'a difficult task' (Alice Voegeli, Personal Interview, 20 Nov. 2009) to say the least, but silage use is now necessary to maintain consistently high milk production so dairy farmers tolerate them. While storing silage in silo towers is not unusually difficult, the extraction of silage can be an overwhelming and frustrating task. The machine used to unload silage is "difficult to use, and expensive to fix," and unfortunately 'it breaks quite often' (Alice Voegeli, Personal Interview, 20 Nov. 2009). Secondly, silos store the necessary fodder for the herd to eat throughout not only the winter months (as was usual at the beginning of silage use), but now during the entire year. For this

reason it is unsurprising that dairy farmers typically place their silos as proximal to cow feeding areas as possible. For example, the loafing barn, which is newly constructed and located opposite the milking barn from the silo towers, is a common place to allow cows to literally ‘loaf’ about, and eat as often as they please. In addition, the use of a regulated feed allows the dairy farmer to maintain milk production. For these reasons silage has become a standard and assumed part of maintaining a dairy farm.

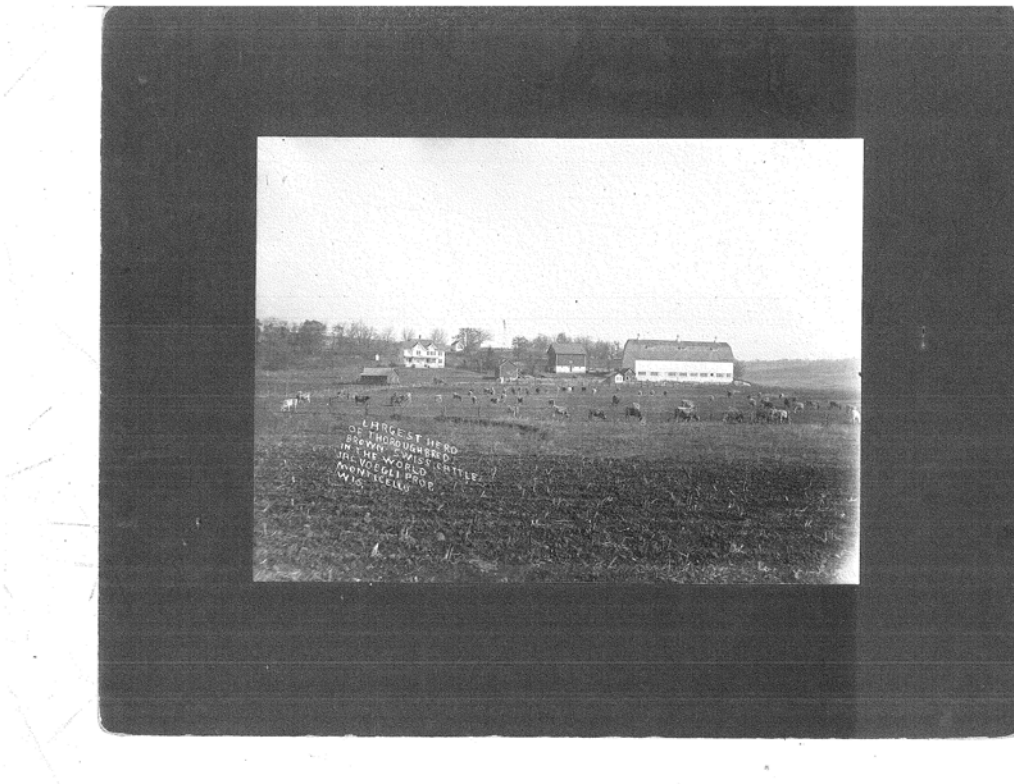


Figure 14. Voegeli farm without silo towers. This photo dates beyond 1917

As evident by the presence of the new milking barn. (Voegeli)

Figure 15. The three primary silo towers currently located on the Voegeli farm,

Situated behind the milking barn seen on left. (Geygan, 2009)

Fortunately for dairy farmers, improvements have been made to the process of silage storage and removal. Recently the convenience of ground silage storage has been realized and implemented. Unlike the silo towers that soar upwards, beyond even the tallest of barns, ground silage is working its way into becoming the next most common sight on dairy farms. Ground silage is recognizable by its long, lumpy form strewn across expanses on the farm. They are almost always covered by white, plastic tarps to preserve their contents (see Figures 16 and 17). These tarps are normally secured by placing large tires on top of the silage piles to hold down the protective plastic tarps (see Figure 18). This improved method for silage storage seems to have offered dairy farmers a reliable alternative to the aggravating and expensive maintenance required of silo tower use. Since ground silage is easier and cheaper to use, silage can be distributed more effectively to the herd, a necessary part of running a dairy farm for a vast majority of modernized milk production operations.

Figure 16. Several ground silage lines. (Geygan, 2009)

Figure 17. Ground silage storage is easily accessible. (Geygan, 2009)

Figure 18. Large truck tires secure silage tarps. (Geygan, 2009)

As did so many other dairy farmers in Green County, the Voegeli family realized the potential use of the milk they produced upon their arrival to Wisconsin. Like Swiss dairy farmers before them, 'they used a portion of their milk production to make their own cheese. In fact, many dairy farmers in Green County, including the Voegelis, initially owned their own cheese making hut' (Alice Voegeli, Personal Interview, 20 Nov. 2009). In the earliest photo of the Voegeli family farm the cheese hut can be found just to the right of the old farmhouse. It was here that Jost Voegeli would have made his own cheese in traditional Swiss style. A majority of

the cheese produced by farmers would have been for the consumption of the family, but excess cheese would generally be sold off. To sell that cheese, Jost would have loaded up his horse drawn buggy, and trotted into New Glarusor Monticello to find avid buyers of the homemade cheese. It was in this fashion that Voegeli could be sure none of his hard earned milk would go to waste, nor would it go unappreciated. This practice, that was customary among first generation Swiss dairy farmers in Green County, soon faded away due to economic expansion in the cheese industry and opening of cheese factories across the county. No longer would dairy farmers need to produce their own cheese. They could focus on milk production – an increasingly profitable business of its own – since cheese factories began to demand more milk of local dairy farmers.

The accumulation of various pieces of Old World knowledge exported from Switzerland to Green County by way of the Swiss migrants, in addition to advancements in dairy farm technologies have offered Green County an advantageous position among other cheese making regions. For without the success of the dairy farmer there would be no cheese.

Landscape Analysis: New Glarus

Rather than focusing on the functionality of the New Glarus landscape, as was done in the landscape analysis of the Voegeli dairy farm, an analysis of the decisions made in the workings of the land was the focal point of this segment. The intent of this analysis was to reveal the continuing Swiss influence on the people and cheese industry in Green County. This was a logical direction to take the geographical analysis of New Glarus given the town's massive amount of local pride for its Swiss heritage. For example, the town is self-dubbed "America's Little Switzerland," due to its deeply historical Swiss origins. It was this town that welcomed some of the first Swiss immigrants to the United States in 1845 (Tschudy, 1995: 6), and it was

their presence that lifted the cheese industry off of the ground. Much of their Swiss influence pervades throughout present day life in New Glarus, though life certainly isn't the same as it was 150 years ago. Evidence for this resides in New Glarus's current primary economic drive. Today, visitors to "America's Little Switzerland" find a town that relies on tourism rather than Swiss cheese making. Nevertheless, the importance of traditional Swiss cheese making is emphasized through numerous visual presentations of this historically significant town's pride.

As was the case in the Voegeli farm case study, much of this analysis was accomplished through the use of photographic evidence and intuitive observation. Some of the photographs revealed ways in which the town presents itself in a fashion fit for the tourism industry. Diverse evidence exemplified the persisting influence of the cheese industry on the town, and conversely, how the town continues to embrace the cheese industry. Still further evidence of the cheese industry's influence was found in the ever evolving landscape of New Glarus. This included the role of milk production in Green County, and its history in New Glarus. In order to aggregate the found evidence of relational ties between the town of New Glarus and the cheese and dairy industries into the formulation of an accurate depiction of the place, the researcher perceived the developed landscape. For this to remain accurate to the story of New Glarus and Green County, the perception of place was set in historically, and currently relevant contexts. With these prepared methods of analysis, then, the researcher developed a complete description of the interacting phenomena of the cheese industry, and the Swiss people.

Similar to the preparation for the Voegeli farm landscape analysis, a thorough analysis of the New Glarus landscape required reference to previous work in similar styles. Again, the use of Sauer's style of intuitive examination of human worked land was used to initiate a qualitative

analysis of the area. The research took account for all aspects of the town formed by man when considering the affects that specific structures across the landscape played in influencing the residents and visitors to New Glarus. This study, though, diverged from research on the dairy farm for their different functionalities in Green County – one a direct player in the production of cheese, and the other a supporter of the traditional Swiss cheese industry. For this reason, the use Vogeler's inspection of the architectural design incorporated in Wisconsin dairy barns was not useful. Other forms of previous work on the New Glarus landscape, then, were used to supplement Sauer's approach to culturally significant geographical effort.

Among these works, writings from Millard Tschudy, Phyl Anderson, and Rosa Gruenewald were of assistance to ensure an accurate study of New Glarus' Swiss history and continued influence on the cheese industry. Additionally, previous works by Frederick Hale and Steven Hoelscher were reviewed but it was less than applicable to the study of the cheese industry in New Glarus. The works of Tschudy and Anderson focused on the evolution of New Glarus through the decades since the town's establishment in 1845. Helpful information from these authors covered knowledge pertaining to the people of the New Glarus Township, and their acts on the development of the land, because their historical influence continues to emerge in New Glarus today.

Rosa Gruenewald's account of Swiss people in Green County, and their role in the cheese industry proved helpful as a work that effectively described the nature of people in Green County, and how they interacted with the dairy and cheese industries. While this is very interesting work, the focus of this text was more of a diary of events in Gruenewald's home than an analysis of the interaction of people, so it was merely helpful as a strong foundation from

which to understand the background of Green County's people in the cheese and dairy industries. If it had been a study of the specific interactions between humans and the industrial landscape specific to Green County, it would have been pertinent to the research in this project. Nevertheless, it was an interesting report of the ties and ethnic roots Green County's people share with the cheese industry.

The Swiss Historical Village museum is a prime example of how New Glarus continues to embrace its Swiss heritage and traditional trades. Included among these traditional trades is cheese making. The Swiss Historical Village re-presents New Glarus as it would have operated through its diverse traditional crafts and trades during the years immediately following the Swiss immigrants' settlement in Wisconsin. The museum exemplifies the components of daily life as they were in this time period through a series of old-time craft demonstrations. One of the more prominent examples is the 1890's era cheese factory. New Glarus' Historical Society uses this operational factory to present how traditional Swiss cheese factories worked upon the inception of Swiss life in Green County. During Harvest Festival, professional cheese makers, such as Master Cheese Maker Bruce Workman of Edelweiss Creamery, donate their time to present how cheese was made in the traditional style using original and recreates original tools.

Inside the representation of a traditional cheese factory, the New Glarus Historical Society has gathered all of the necessary tools and contraptions for a 19th century cheese maker's factory. 'Each contraption that formulated a ready-to-operate traditional cheese factory is included in this structure' (New Glarus Historical Society President, and museum curator, John Marty, Personal Communication, 28 Nov. 2009). These include a small hatch that milk enters the factory through, a container into which the milk was stored briefly for weighing and record

keeping, a record keeping register, a trough that would poor the milk from this counting-container into the Swiss copper kettle, a wooden swing arm that holds the kettle, and a stone and brick fire place (see Figures 19 and 20). In addition, tools such as the wooden Swiss cheese wheel in which the cheese is formed, and the Swiss cheese harp, which is a necessary tool in the cheese making process are found in the recreated cheese factory.

Figure 19. Milk hatch, counting-container,recording register, and milk trough. (Geygan, 2009)

Figure 20. Swiss copper kettle, wooden swing arm, and stone hearth. (Geygan, 2009)

All of these tools are utilized annually during Harvest Festival to demonstrate how cheese is made in traditional Swiss fashion. But, the effort spent on making traditional Swiss cheese during Harvest Festival is not a mere demonstration of how a traditional wheel of Emmental cheese (also known as Swiss) is made. It is an example of how the people of New Glarus continue to embrace the cheese culture of the Swiss people. The New Glarus Historical Society makes a fine presentation of traditional Swiss trades open for the public because they realize the significance of the trade's historical influence better than anyone. After all, many of the members of the Society have spent their entire lives in New Glarus, and most of those members have full,

or nearly full, Swiss blood. The bottom line is that they know what it means to be Swiss, and they want to present what their Swiss ancestors brought to their county that has impacted Wisconsin, if not the entire country. In their eyes, the Swiss influence on Green County led to the evolution of Wisconsin as the dairy and cheese state, so they personify the essential New Glarus culture through the cheese trade brought to Green County by their family.

New Glarus displays its pride in its Swiss heritage, and its role in the formation of Wisconsin's cheese and dairy industries through a presentation of numerous elaborately decorated dairy cow monuments. Strewn across downtown New Glarus are numerous cow statues that exemplify and embrace Swiss traditions. Judging by the prominent locations at which New Glarus placed these cows, the manner in which they decorated them, and the use of the domesticated dairy cow as the model, this series of monuments reinforce the importance of dairy and cheese making to the town; after all, the cow suggests no association more clearly than that to milk production.

A vast majority of these cows are decorated in order to embellish general pieces of Swiss culture, while a few are specifically adorned with cheese or dairy related themes that embrace the industry. Located in the heart of downtown New Glarus, there is a high density of cows representing the Swiss style and cultural tradition. Each of their unique themes matches the Swiss chalet style architecture that has been implemented in this centralized area of town. For example, a couple cows have been given traditional Swiss clothing. One of these stands in front of the Chalet Landhaus hotel, and is visible from Highway 69 while the other welcomes everyone entering downtown New Glarus (see Figures 21 and 22). Their prominent locations

remind all passersby, who include tourists and residents alike, in New Glarus that they are in the midst of people who hold the Swiss heritage dear to them.

Figure 21. Cow monument in Swiss yodeling costume, standing in front of the Swiss Chalet Landhaus on Highway 69. (Geygan, 2009)

Figure 22. Cow monument clad in authentic Swiss formal attire. Located in the heart of downtown New Glarus. (Geygan, 2009)

There are two cows decorated with floral hats. The flower décor these cows adorn represents the traditional garb Swiss dairy cows are given upon the descent from the Alps of Switzerland for the winter months. One of these two cow statues greets visitors to Maple Leaf cheese and chocolate store in downtown New Glarus. A simple association between the traditional Swiss dairy cow and cheese products develops with the intelligent placement of this cow in particular. Considering the well recognized importance of cheese in Green County, the cow may simply serve as a signpost, or symbol, for tourists. In this way, the cow seems to imply the sale of cheese at this location.

Finally, there exists one cow that is not dressed so lavishly. It looks just about as plain as any living Holstein cow in Green County when compared to the other cow statues (see Figure 23. Interestingly, its location does not encourage tourists to view it nearly as often as local residents see it, because it stands on the edge of town, in front of New Glarus elementary school – hardly a place frequented by tourists. Considering its rather plain appearance and the fact that it is out of the way of any common sightseer destination, this cow may be passed by without a second look if it is passed by at all. But it may be this cow that has the largest impact on New Glarus.

Figure 23. Utterly Etter welcomes residents to their place of learning. (Geygan, 2009)

The statue has become an important association with the school, and an everyday sight for many residents of New Glarus. It needs not be decorated so elegantly, for New Glarus locals understand the essential importance of the dairy cow. To New Glarus the dairy cow is a sign of the success achieved by the town's Swiss founding fathers. This cow, then, reminds parents bringing their children to school of their roots, and that the cheese industry has played a large part in the continuing existence of their home. To the school children, on the other hand, the influence of the cow, aptly named Utterly Etter after retired New Glarus School District Administrator Peter Etter, is forming some of the children's first memories and attachments to their home. In various shapes and forms, then, the cow is a symbol of their home because of the early memories its presence attaches it to. So, it teaches the school children not only where they come from, but the statue builds fundamental values that recognize the importance of the dairy cow in a New Glarner's life. Evidently, learning extends beyond the classroom in the New Glarus School District.

Through the interaction between people and the cow monuments a great deal more than simple memories of cutesy cows result. These cows are essential players in the formation of a sense of place for the town of New Glarus. They are symbols of the cheese industry that constantly remind viewers of the role dairy played in the creation of New Glarus Township, Green County, and the state of Wisconsin.

The architectural structures that fill and have filled New Glarus Township also play a role in the identification of this town as a hub for the cheese industry. The earliest beginnings of the cheese industry in New Glarus were introduced by Niklolaus Gerber, a Swiss immigrant, who

saw great potential for cheese as an industry. By 1868 he opened the first cheese factory (see Figure 24). It was a log building constructed at the present Yaun farm in New Glarus Township, and it was used to produce limburger cheese (Anderson, 59, 1976). The original building is not standing today, but Green County has recognized this farm as the first place where cheese was made for sale (see Figures 25 and 26). Recognition of the site was made with the installment of a Green County historical marker on the site of the old factory in 1939 (see Figure 27). Today, little more than this plaque and an open plot of land remain. Despite the fact that the rock and plaque seem to be a forgotten remnant of the past since they hide behind a new fence, the importance of this site to New Glarus, and the entire County is not lost.

Figure 24. Photo of the Freitag Factory. (photo courtesy to the Swiss Historical Village collection)

Figure 25. The plot of land where the Freitag Factory stood. (Geygan, 2009)

Figure 26. Green County Historical Marker on the Yaun family farm. (Geygan, 2009)

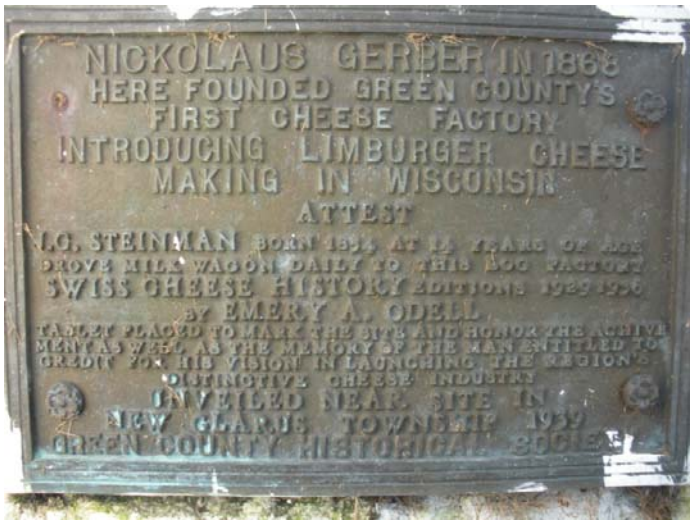


Figure 27. A close look at the Green County Historical Marker, recognizing Gerber. (Geygan, 2009)

In addition to the Green County's commemorative efforts to emphasize the importance of cheese to this area of Wisconsin, everyday architectural design reminiscent of the primitive cheese factories also pervade and define the New Glarus community. Numerous 19th century cheese factories used a unique architectural form, characterized most prominently by its 'broken' roof line (see Figure 28 for example). Within the section of the structure under the broken roof

line design, fully functional cheese factories, which included all of the necessary tools for cheese production, were housed (refer to Figures 19 and 20). This portion of the complete architectural form was often (but not always) adjoined to living quarters belonging to the family that operated the household cheese factory. There is little doubt that the integrated house/factory represented far more than a purely functional decision by the architectural designer. Cheesemaking households found great importance in cheesemaking, which is evident by their preference for this architectural variety.

Figure 28. Jaggi family cheese factory. Architectural design is reminiscent of typical architecture in present day New Glarus, (Wisconsin State Historical Society, Division of Visual Archives, Image ID: WHi: 68181)

This architectural form can still be found scattered throughout the neighborhoods of New Glarus (see Figures 29-32). The asymmetric roof line is an easily distinguishable structure, and therefore serves as a constant reminder to locals who recognize the cheese factory design. It is interesting that these old cheese huts are rarely used for anything more than storing yard equipment or transformed garages now. Today, these buildings stand as representations of the evolving cheese industry in Green County. Whereas these buildings were used to make cheese, "on a small scale, mainly for home consumption" (Tschudy, 1995: 24), they now remain as ghosts of the past. Certainly fewer and fewer people recognize them as former cheese houses -

the true spirit of the town. Even though these buildings are not highlighted for the tourist industry, their importance to the community doesn't wane. The asymmetric roof line remains a symbol of the town's past, and the fact that they have stood the test of time defines the landscape, and thus defines New Glarus. Likewise, today's maintained dairy agricultural land cover represents the desire for dairy and cheese production.

Figure 29. Broken roof design in New Glarus.

(Geygan, 2009)

Figure 30. Broken roof design in New Glarus.

(Geygan, 2009)

Figure 31. Example of broken roof design detached from house. Presently used as garage. (Geygan, 2009)

Figure 32. Broken roof design found being used for a farm tool shed. (Geygan, 2009)

Landscape Analysis: Green County Agriculture Today

In order to understand the continued presence of a dairying agriculture and cheese production in Green County, it is vital to observe land use and cover in the present. To address this idea, an examination of recently-captured satellite imagery of the study area helped formulate a classification of land cover types. This classification estimated the areal extent of agriculture in the county while delivering a quantitative figure estimating how much of Green County is composed of agricultural land. The extent of the agricultural land cover type in Green County is a vital figure in seeing how the landscape itself continues to be a major player in Green County's cheesemaking industry.

Upon obtaining a recent and relatively obstruction-less satellite image of the Green County area made through LANDSAT, analysis using ENVI remote sensing software allowed for a classification of generalized land cover types throughout the study area. This was done with supervised, maximum-likelihood classification, where the classifier used within ENVI

grouped pixels to locate different land cover classes. Computerized grouping of each cluster of pixels with other related pixel clusters formed a generalized classification of the land cover types in Green County, including, agricultural lands, urban and barren areas, forest land, open water, and wetlands.

The land classification process, like any methodology, had its limitations and assumptions. In the supervised classification itself, there was the risk that the pixel classification by the software would be unable to differentiate between different land cover types due to similar electromagnetic responses across the landscape. On the analyst's end, there is the assumption that the analyst was able to successfully differentiate between land cover classes in the study area. Also, the analyst had limitations in the ability to accurately cluster and classify pixel groups. The use of an accuracy assessment of the classification evaluated the effectiveness of the analyst in labeling land cover types and the sufficiency of the classifier in dividing land cover pixels into proper groupings.

The idea of studying land cover through remote sensing of satellite imagery and classification of imagery is not a new topic. Perhaps the most famous among the studies of land cover types in Wisconsin is the WISCLAND Land Cover Map developed by the Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data (WISCLAND) in the late 1990s. This map displays the distribution of numerous land cover types through thirteen generalized groups of land cover types (WISCLAND, 1999). The map itself is a near-perfect example of what a land classification map shows and what limits its effectiveness. At any scale, the level of resolution of a land classification map is limited, as pixels of satellite imagery rarely contain a single land cover type in its areal extent (Schneider, 2009). In this case, groupings of

land cover classes and generalizations of electromagnetic responses among pixels are necessary to complete a readable map of land cover types over an area (WISCLAND, 1999). Another important concept in understanding the limitations of land classification techniques is the fact that land cover classifications become quickly outdated as land cover changes constantly. This limitation prompts the study to obtain the most recent image of the area possible, while considering seasonal and weather conditions over the study area. With these assumptions accounted for, a fairly accurate depiction of the current spread of agricultural land cover in Green County is available for interpreting agricultural land's current impact on cheesemaking in Green County.

In examining the land cover of present-day Green County, a summer 2005 LANDSAT 5 image was obtained through the United States Geological Survey (USGS) Global Visualization Viewer. This image, which covered an area containing most of south-central Wisconsin and some of north-central Illinois, needed sub-setting, and was cut to contain an area composing of Green County and a limited extent of the surrounding area. This image subset was then examined with a supervised classification and, as a result a rough classified map of the Green County area was made.

What resulted from the land cover classification of Green County is an image of a landscape still tied to its agricultural practices. The land cover map displays a wide distribution of agricultural lands in Green County, that is more evident by the land cover type distribution (Figure 33). With nearly two-thirds of Green County labeled as agricultural land according to the classification, the landscape of Green County still appears to be very conducive to the dairying industry and, therefore, its accompanying cheesemaking industry.

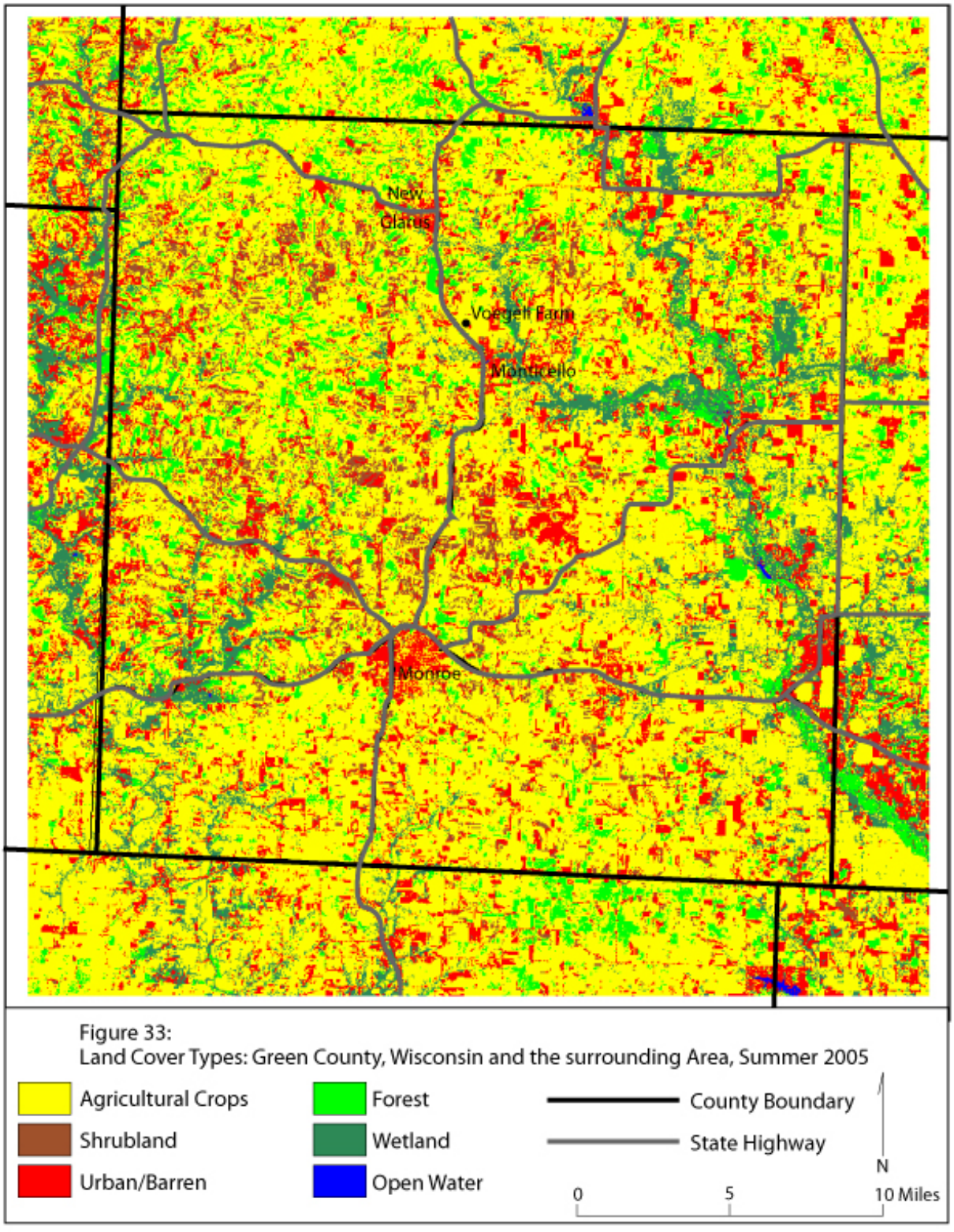


Figure 33:
Land Cover Types: Green County, Wisconsin and the surrounding Area, Summer 2005

With consideration of the errors of the land cover classifier, a significant portion of the lands classed as urban or barren areas actually appeared to be recently harvested or otherwise temporarily bare agricultural land, thus explaining how over fourteen percent of the map was classified as an urban or barren setting. This is most evident on the west side of the land cover image, just outside of Green County itself, but is still prevalent throughout the county. Statistically, the urban and agricultural class-mixing also shows through the accuracy assessment as the agricultural and urban classes show errors of commission and omission with their test sites used to evaluate the quality of the classification. Looking at all land cover types, the land cover classification map had a 78.57% overall accuracy across the study area.

The combination of the expansive agricultural lands mapped in the land cover classification and the farmland accidentally mapped in the urban and barren land cover class imply that nearly the entire geographic spread of Green County is tied to agriculture. This is important to the cheese industry, as much of the crop and pasture land in the county is devoted to the use of dairying operations that provide the cows and the milk to make Green County's cheese. This, in addition to the number of dairy farms in Green County, indicates that the landscape of Green County is still working to support the culturally historic cheesemaking industry.

A Cultural Examination: The People of Green County

A study of the people who play a role in Green County's cheese industry is an integral part of understanding this area. Key players in the development of Green County's cheese industry include dairy farmers, cheese makers, and other people who keep the cheese industry alive. It is important to reveal their cultural attachment to the Swiss because of the original settler's vital

influence upon the entry of the cheese industry to Green County. Also, the knowledge these people contain pertaining to the cheese and dairy industries, in addition to the practices they use in their work is valuable information to the complete understanding of Green County's cheese industry.

Personal interviews with key players involved with the more recent progress of the cheese industry were conducted to reveal and explain Swiss cultural ties to the industry, knowledge of the dairy and cheese trades, as well as the practices utilized in the past and present states of these trades. The overarching intention for conducting these interviews was to, "understand how the landscape is shaped, and how humans interact with it" (Herbert et. al., 2005: 226) via Green County's cheese industry and to develop an accurate representation of the industry itself after a synthesis of the interview data. All of the information used for analysis represented qualitative data, from which qualitative analyses was further drawn.

The personal interviews were conducted in informal settings (living rooms, diners, restaurants, etc) by one of the researchers who followed an organized inventory of categorized questions, and were recorded using hand notes by the interviewer. Each interview began with questions concerning the informant's relation to Swiss heritage and ethnicity. Following this section, informants were questioned about their knowledge surrounding their given field of expertise. Third, a segment of questions relating to the informants' practices in their field were given. In the dairy farmer interview a special group of questions pertaining to the present convention of cattle and embryo sales as they relate to the expansion of dairy farming were asked. Finally, the interview was concluded by asking a general question meant to expose any

ideas relating to how the dairy or cheese industry may be particularly unique compared to the same industries in other places (refer to Appendices A-C for interview questions).

Among human geographers, much study has been done using personal interview in order to develop an understanding for the cultural geography of any number of locations. The personal interview portion of this project leaned on the expertise, and advice of several geographers including Steve Herbert, Jaqueline Gallagher and Garth Myers in *Questioning Geography* to develop a safe method of research. A key principle in "Ethnography and Fieldwork", from *Questioning Geography* determined how the interview process would unfold. It is necessary to recognize that "[the researcher's] conceptions of the world and [his] identity within it inevitably carry over into [his] research" (Herbert et. al., 2005:235). This basic principle surrounding the interview process was followed throughout the research, and was acknowledged in this text as a suitable manner in which to conduct the approach to the research. Without the recognition of this notion, dangers of subjectivity and the inherent existence of situated knowledges between people would have overwhelmingly pervaded the research and analysis throughout the study. This recognition, however, is not meant to ignore the certain values of subjectivity, but it is not necessarily a positive influence on analysis when developing globally accepted forms of perception. That being said, subjectivity was recognized as a potential downfall in this portion of the research. Therefore, the opinion of the researcher was withheld from the analysis of this study to the upmost degree in order to provide as objective an opinion (excuse the oxymoron!) as possible.

The Swiss culture appears to be alive and well in Green County. Even among the non-Swiss people living in Green County, Swiss practices seem to be an important part of daily life.

The Swiss language is known among older generations. Depending on the household they were raised in, it was occasionally the first language learned by New Glarus residents. And on rare occasions non-native Wisconsinites picked up some Swiss in order to work in Green County. For example, Bruce Workman, Master Cheese Maker of Edelweiss Creamery in Monticello, WI moved to Wisconsin in 1971, at which time he tended bar. Knowing some Swiss-German was essential if he were going to sell drinks to the older generations. In addition, it is likely a little Swiss could come in handy for a trip to Switzerland.

It turns out that travelling to Switzerland is quite common among Green County residents. Sitting with Mrs. Alice Voegeli in her living room as she reminisced over a trip to canton Glarus with her husband, Howard, would make anyone jealous. The reason for the adventure was simply, “to see where the Voegelis came from” and ‘to witness the Voegeli family’s roots in dairy farming and cheese making’ (Alice Voegeli, Personal Interview, 20 Nov. 2009). The entire trip was chartered for residents of New Glarus, Monticello, and Monroe to make as a group. Other Green County residents, such as Mr. Ernst Jaggi, a Swiss immigrant and retired Green County cheese maker, have made frequent trips back to their native land for a broad range of reasons including family weddings. Still others who haven’t seen the country yet intend to. For example, Mrs. Mary Ann Hanna, the director of the National Historic Cheese Center, has purchased a ticket for a trip to Switzerland.

Swiss culture plays a large role in the daily routine back home in Green County. Meal time in Green County households regularly consist of Swiss influenced food. Roesti potatoes (similar to American hash browns) are one of the favorites among the Jaggi, and Workman families, while Swiss deserts like Bratzeli cookies are a staple in the Hanna and Voegeli homes.

Of course everyone seems to enjoy a wide assortment of cheeses on a regular basis. In fact, Mrs. Mary Ann Hanna admits she includes “cheese in three meals a day” (Mary Ann Hanna, Personal Interview, 27 Nov. 2009)! Interestingly, the people who have a trained tongue for cheese have a more particular taste. It seems that those who have been directly affiliated with the cheese making industry have a fancy for “cured or aged cheeses” because ‘they gain a sharper flavor’ (Ernst Jaggi, Personal Interview, 27 Nov. 2009). Among those cheeses, a few are used for holidays, or special occasions.

Events such as Mr. Jaggi’s daughter’s wedding in Switzerland, and the general holiday season calls for special cheeses. For instance, Hobelkäse was an important part of the Jaggi family wedding. Like the Emmental (Swiss) cheese, which receives its name from the region in Switzerland from where its production began, that Green County embraces, the Hobelkäse is particularly important for the Swiss people to this day. It is a staple food during ‘times for sharing with those who you care for’ (Ernst Jaggi, Personal Interview, 27 Nov. 2009). Still other forms of cheese are shared among large groups of people such as cheese fondues, like the one that Mr. Workman makes at New Glarus’s annual Oktoberfest.

Other examples of how Green County residents embrace Swiss heritage are through the cultural possessions in their homes. The Voegeli and Jaggi families proudly present their family crests in their homes, sometimes in more than one location. The Voegelis display their crest in their living room, and on a sign at the foot of their driveway to welcome visitors. Swiss family history appears to be quite important to those with Swiss ancestry, so extensive genealogy tables are often attained or organized by Green County locals. For example, ‘Jake Voegeli, the former head of the Voegeli farm, spent a fair some of money on the organization of his family’s history’

(Alice Voegeli, Personal Interview, 20 Nov. 2009). More recently, Mrs. Hanna, has 'devoted quite a bit of time gathering information on her former husband's family history' (Mary Ann Hanna, Personal Interview, 27 Nov. 2009) that leads back to Switzerland. Still, further presentations of Swiss heritage abound in Green County households. Mr. Jaggi 'owns a number of authentic Swiss cow bells which were passed on to him from his uncle'. Now, he is 'sending them back to Switzerland, a few at a time, to be enjoyed by his daughter who lives and works on a dairy farm' (Ernst Jaggi, Personal Interview, 27 Nov. 2009). Mr. Workman, too, owns Swiss memorabilia. His collection of 'antique cheese making equipment was used for traditional Swiss cheese making'. Among these antiques are "cheese hoops, and stirs" (Bruce Workman, Personal Interview, 27 Nov. 2009).

More relevant to the dairy and cheese industry, however, are not the Swiss cultural objects they own, but rather the knowledge they possess surrounding dairy and cheese production. Much of this knowledge is passed down from ancestors, and people who practiced their trade. Therefore, shared knowledge that extended father to son throughout the turning of generations contributed inherently Swiss based knowledge. The Voegeli family, for example, has retained much of the knowledge they know and use from their fathers before them. Growing up on a dairy farm will teach you all the knowledge you need to maintain a farm, from cleaning the milking alley, to caring for new born calves, because 'the family shares skills through experience' (Alice Voegeli, Personal Interview, 20 Nov. 2009). For example, Howard Voegeli, who was born in 1930, was "taught how to operate the dairy barn by his father", but in addition he got a formal education in dairy farming when he 'graduated from University of Wisconsin, Madison's Dairy Science program in 1952' (Alice Voegeli, Personal Interview, 20 Nov. 2009). This was a much different experience than that of his father, Jake's, though. 'Jake taught himself

how to work the farm through magazines, and conversation with farmers because of his father's untimely passing' (Alice Voegeli, Personal Interview, 20 Nov. 2009). This is not unlike the manner in which many of Green County's cheesemakers pick up their trade.

Cheesemakers do not necessarily gain all of their knowledge from their fathers. Mr. Jaggi learned most of his knowledge by 'observing and working with cheesemakers', who, "definitely learned from other Swiss" (Ernst Jaggi, Personal Interview, 27 Nov. 2009) in Green County cheese factories shortly after his arrival to Wisconsin. Mr. Workman, too, 'learned most of what he knew from lifelong cheesemakers in Monticello's Northside Co-op' (Bruce Workman, Personal Interview, 27 Nov. 2009), which is now known as Swiss Heritage Cheese. Aside from word of mouth, and experiential learning, cheesemaking knowledge passes on through books. Mr. Jaggi 'was sent a number of cheesemaking books from Switzerland after he began working in one of the Darlington, WI cheese factories in 1960' (Ernst Jaggi, Personal Interview, 27 Nov. 2009). As a modern cheesemaker on the other hand, Mr. Workman was required to go through formal education in order to practice cheese making. He "spent three years earning his Master Cheese Maker license" (Bruce Workman, Personal Interview, 27 Nov. 2009), one of the highest honors for Wisconsin cheesemakers. Despite their drastic differences in training these cheesemakers each learned how to make traditional Emmental cheese to the highest standards.

Between Mr. Jaggi and Mr. Workman, these men know what makes and breaks whether the Emmental cheese wheel turns out to be of high or low quality. Mr. Jaggi acknowledges that Emmental is "hard to make right" (Ernst Jaggi, Personal Interview, 27 Nov. 2009). It is a rather temperamental product. What may seem like minute details in the cheesemaking process may to a common person plays a critical role in the resulting cheese, and this is a big reason why the

trade is called “an art and a science” (Bruce Workman, Personal Interview, 27 Nov. 2009). Everything that goes into the milk, down to the specific bacteria implemented, the cow breed’s milk used, where and how that cow was fed, etc, etc. The list goes on… The important thing to realize is that there is no “recipe” to follow, but rather, the cheese is made to the taste. Just as any chef makes his food to taste a specific way, so does the cheesemaker judge his own product.

Nevertheless, there are several rules to follow through the process. Several variables in the cheesemaking process can drastically alter the end result. Emmental cheese ‘requires the best quality milk in order to produce a cheese with the right amount of holes’ (Ernst Jaggi, Personal Interview, 27 Nov. 2009). Therefore, characteristics such as cleanliness, and whether or not penicillin were used to treat the cow are checked, otherwise the Gruyere may turn out with too many holes, which will not be worth as much, if it is worth anything at all. Also, “you can *only* make real Emmental in a copper kettle” (Ernst Jaggi, Personal Interview, 27 Nov. 2009) due to the effects copper has on the cheese. Interestingly, this authentic Swiss tool is ages old, yet even so many years ago the Swiss got cheese production right. Today we know that the kettle affects the flavor of the cheese because, “a small amount of copper oxide is dispersed in the milk,” which gives the cheese a “sweet nutty flavor” (Bruce Workman, Personal Interview, 27 Nov. 2009). Given the ways knowledge and practices surrounding cheese production have fluctuated throughout the years, and strayed from its roots in Swiss familial learning it is slightly surprising that fundamental values of the Swiss are still held onto by the cheese and dairy industries.

The notion of community based enhancement re-presents familiar practices and interaction among the Swiss from pre-migration, and settlement. It is important to note that this value was, and still is, a common practice for dairy farmers and cheesemakers in Switzerland.

Loyalty among the dairy farmers and cheese industry throughout Green County has proven to enhance their work whether that has been through impacting the work on farms, or in cheese factories, or building, “a tight knit group,” as Mr. Workman likes to cite as a unique, and advantageous characteristic of Green County’s laborers (Personal Interview, 27 Nov. 2009). An example of the work done on the Voegeli family dairy farm provides insight for how community life has enhanced their work. A number of ‘farmer factory meetings’ represents a distinct community where farmers ‘share advice, and get to know each other’ (Alice Voegeli, Personal Interview, 20 Nov. 2009). In these meetings farmers extend a helping hand to fellow dairy farmers whether it is for technical or personal advice. Work on the farm prospers in a healthy setting with sharing of this sort. Other times on the Voegeli farm, the community has come together to contribute to the raising of the 1917 dairy barn (see Figure 34). Without assistance, of course, the growth of the Voegeli dairy farm would have been limited by their previous inadequate barn. The milk output by the family would be small, as would the productive efficiency.

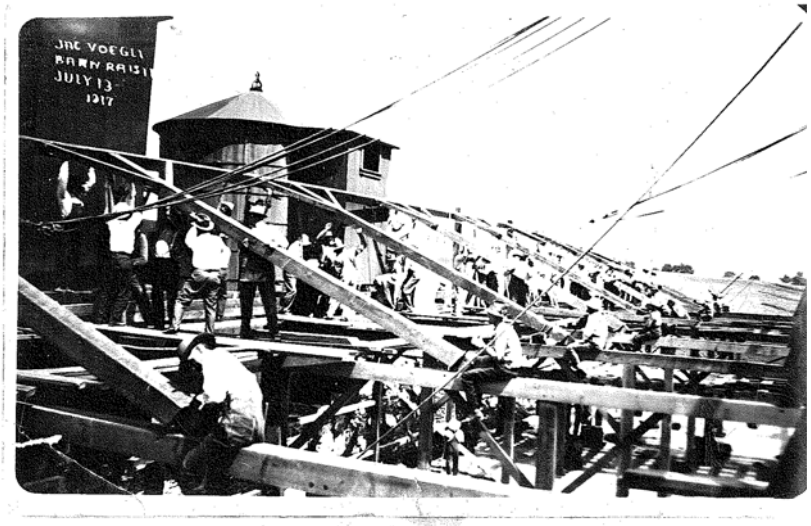


Figure 34. Green County community members contributing to the 1917 Voegeli milking barn raising. (Voegeli)

What may be of even greater pertinence to the cheese industry, though, is that 'area farmers recommended that the Voegelis purchase Brown Swiss cows' (Alice Voegeli, Personal Interview, 20 Nov. 2009). No doubt this played the biggest role in changing the path which the Voegelis followed from that point on. In turn, the cheese making industry in Green County was altered. The compositional traits of Brown Swiss milk make all the difference when its intended use is for cheese production. Several key factors distinguish a good batch of milk from a bad one. First, "butter fat content plays the biggest role," because it determines, "the richness of the cheese" (Mary Ann Hanna, Personal Interview, 27 Nov. 2009). Since most farmers have Holstein cows, the Voegelis have an advantage in the cheese industry market, because "Brown Swiss, of course, are very high in butter fat content compared to Holsteins" (Mary Ann Hanna, Personal Interview, 27 Nov. 2009). These milk qualities, then, have improved the worth and taste in Green County's cheeses. In addition, the physical traits of the Brown Swiss cow make them well-built candidates for the dairy and cheese industries in Green County. The 'strong leg and foot traditionally required of the animal to manage Alpine hills' (Alice Voegeli, Personal Interview, 20 Nov. 2009) benefits them greatly, as it enhances their productive lifespan. While the value of milk is often based on its characteristics for cheese production, this has not always been the case.

For many years, it seems, the direction dairy farms have taken for economic expansion have leaned towards pure quantitative increase in production. In the past, dairy farmers have achieved this through the augmentation of herd size as was the case on the Voegeli farm when

Jost Voegeli established his business. Upon his arrival to his new home in Washington Township, Jost purchased a handful of Brindle cows – 'a mixed breed cow, that was not registered' (Alice Voegeli, Personal Interview, 14 Dec. 2009) – with which he slowly expanded the herd number as he could afford it. Only with creeping success (yet success all the same!) was Jost able to purchase "a lot of Brindle, and probably some Holsteins" (Alice Voegeli, Personal Interview, 14 Dec. 2009) by the time his son, Jake, was running the farm in 1895. It was in this year that the Voegelis bought their first Swiss Brown cows, and things would never be the same for the family.

When Alice Voegeli arrived to the farm in 1954, her husband, Howard, was running a 50 cow operation. The herd continued to grow slowly as the family prospered, and 'by the '80s, the Voegelis had up to 75 or 80 Swiss Brown cows. The farm's prowess within the realm of rearing pedigree level, registered Swiss Browns garnered them much attention. Few other farms could say they had an equally valuable herd. Unsurprisingly, offers for these prize cows rolled in, and the Voegelis began sending their cow's embryos and cattle to high bidding Mexican farms. Thus began the modern story of dairy farm expansion.

Today, the Voegelis ship embryos and cattle to three continents beside North America, including South America, Europe, and Asia. Numerous neighbors followed suit with this practice, and now send their own live Brown Swiss cows, but the embryo market appears to lean heavily on the Voegeli farm. The family has succeeded because they realize the importance of such a global interaction. If you have, 'the right combination between cow and bull genetics, then the market is yours' (Alice Voegeli, Personal Interview, 14 Dec. 2009). Though the implications of such a trade impact global human relationships on a much grander scale than

even the trade network the Voegelis are involved with. This cow, that has provided unmatchable milk for Green County's cheese industry is benefitting people around the globe these days. Once upon a time the Swiss Brown cow was offering its fruit to Switzerland's isolated mountain farmers and cheesemakers. Thanks to dairy farm operations throughout Green County, this cow has made a longer trip than that of the original Swiss immigrants to New Glarus, and their impact on the world-wide cheese and dairy industry will certainly taste success because of it.

Dairying Economics: A Case of Development and Change

Economic phenomena affecting the cheesemaking industry played a role in the expansion of the industry, particularly in moving beyond the local landscape. The advent of different technologies and economic catalysts brought Green County's cheese products into new markets over time. With the presence of numerous factors that changed the market, notoriety, and profitability of cheesemaking, a quantitative analysis of the economy of Green County's cheesemaking was necessary. This allowed an interpretation of, more specifically, the evolution of the number and locations of cheese factories found throughout the county.

A study of critical statistics on the industry including cheese production in pounds, local dairy farms and cows, and additional figures in conjunction with the number of cheese factories in existence across Green County over time serves as the focus of this sector of research. A thematic map was made to display significant movements found through the cheesemaking industry in Green County as results from the statistical data sets, local histories, and cheese factory analysis provide. With this data, observation of the growth of the cheesemaking industry and the adjustments made in both Green County and the outside economic setting was anticipated.

As with any large-scale, story of business, the transition from having a small market to having a large and diverse market for selling cheese products required both a series of events from outside of Green County and economic adjustments within Green County. In its inception, the dairy and cheese industry across Wisconsin replaced a wheat industry as prices for the crop decreased in the mid to late 1800s (Lampard, 1963: 42). Eventually, what began as a small and highly local business of milk and cheese production spread across the region with the arrival and use of railroads, refrigeration, and other technologies (Apps, 1998: 36-38). Outside corporations also became involved in the local industry forming large cheese factories, effectively closing many smaller factories for a small amount of large ones (Zwygart, 2008: 19). This trend continues through both the cheesemaking and milking industries, although many of the remaining cheesemakers and farmers still retain their artisanal roots, as evidenced through the presence of certified Wisconsin Master Cheesemakers in Green County (Green County Development Corporation, date unknown).

The primary data for the economic analysis of the cheese industry came in a number of different sources and forms. Initially, Green County cheese factory data was derived from a variety sources, including a map of approximate cheese factory locations in the county and records on the existence of Green County dairies throughout the 20th Century. The first of these sources, the map recording the location of Green County cheese factories, came from the National Historic Cheesemaking Center in Monroe, Wisconsin. The development of this map was accomplished a group or researchers, led by long-time cheesemaker Doran Zwygart, who examined the records of 215 cheese factories that were in existence in 1925 (Zwygart, 2008: 31). The map and the cheese factories shown, when combined with records on the timeline of cheese

factory establishment were able to generally show when and where cheese factories were existent in Green County through much of the 20th Century.

Timeline records serve as the second set of primary data in this survey. With the use of the Wisconsin Department of Agriculture and Green County promotional publications, a listing of dairy plants throughout the state determined the presence and approximate locations of cheese factories in the study area at a temporal resolution of approximately 25 years. Between each of these sources, there was the possibility that the location and temporal data for the cheese factories would not line up over the sequence of the survey. Removal of the insufficient data was needed for the comparison with economic data in this case.

Lastly in the description of primary data available for the economic portion of this article, a variety of accounts of economic events and dairy industry statistics exist at the national, state, and local level. This data is set for investigation. First among these is the Zwygart's chronological account of Green County's cheesemaking industry. In his text, Zwygart lists numerous events that hold an impact on Green County's cheesemaking history (2008: 6-26). This text will be useful for studying the effects of economic events on the cheese factories in Green County. In terms of statistical trends relating to the cheese industry however, the text does not serve much use, instead figures from organizations including the Wisconsin Milk Marketing Board and The Wisconsin Department of Agriculture, among others, provided a basis for statistical examinations. The synthesis of cheese factory information and the cheese industry statistical information provided the dataset necessary for an examination of Green County's cheese factories and cheese production in relation to potential economic events and trends that affected the industry.

The map depicting the historic distribution of cheese factories across Green County tells a simple story (see Figure 35). Over the last 77 years, from 1932 to the present, the number of Green County's cheese factories has diminished greatly. Across the county, both countryside and town-site cheese factories have disappeared from Green County. Approximately ten of these cheese factories were left in the county (Green County Tourism, date unknown: (http://www.greencounty.org/bus_directory.iml?Category=1 (last accessed 16 Dec 2009)). Before that, in the years 1932, 1959, and 1984, the number of cheese factories in Green County split by about half at each year surveyed (Wisconsin Department of Agriculture, Trade, and Consumer Protection, 1932, 1959, and 2004: various pages). Ultimately the number of cheese factories that existed in Green County in 1932 that didn't exist in 1959 was approximately 79, from 1959 to 1984 was 40, and from 1984 to 2009 was 23 (Wisconsin Department of Agriculture and Green County Tourism, 1934, 1959, 1984, and 2009: various paper and on-line sources). This dramatic collapse in cheese factory numbers does not directly relate to a decrease in dairying production on the farmlands however, as milk production numbers in Green County show.

In the last United States Agricultural Census before 1932, taken in 1930, approximately 31,667 milking cows and heifers were working in Green County, producing 30,419,897 gallons of milk (United States Department of Agriculture, 1930: http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/

Wisconsin/cp55045.pdf (last accessed 16 December 2009)). In the years since 1932, the number of milk cows in Green County varied before evening out at about 31,000 in 2008. What is striking about the dairy cows of 2008 in Green County is that despite there being a similar cow

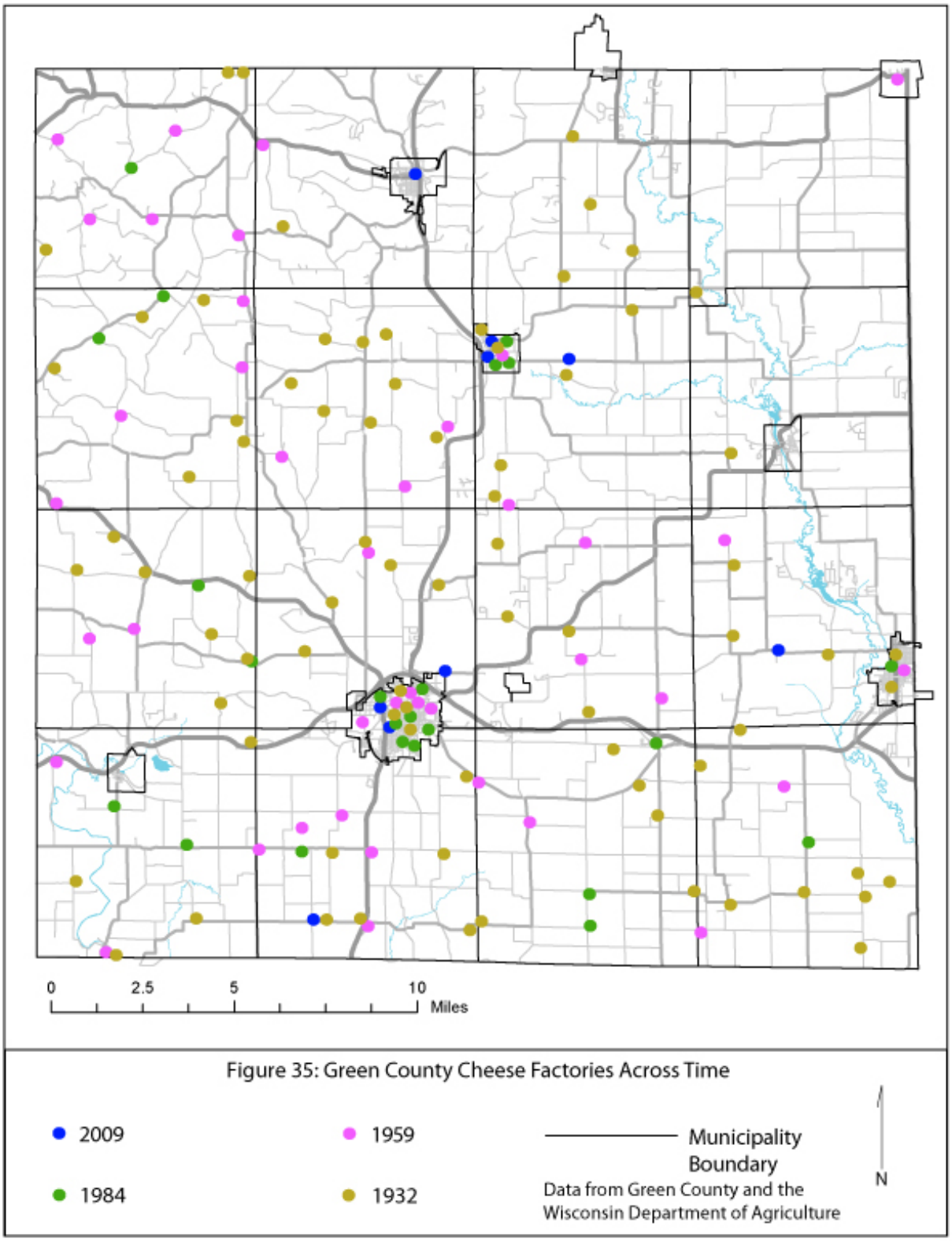


Figure 35: Green County Cheese Factories Across Time

population as in 1932, their county-wide milk production more than doubled to 69,093,978 gallons of milk (United States Department of Agriculture, 2008: (http://www.nass.usda.gov/QuickStats/PullData_US_CNTY.jsp (last accessed 16 December 2009.) This is a testament to what the dairy farmers have done to keep milk production a profitable business over the years, as better feeds, cattle care, and genetics in the dairying industry have improved milk production per cow over time. To keep up their end of the cheesemaking business, the cheesemakers themselves made their adjustments over the course of time to survive in a competitive industry.

The cheesemakers of Green County, past and present have constantly been trying different cheesemaking and business tactics to continue to retain Green County's significant role in the cheesemaking industry. As early as the first half of the Twentieth Century, smaller cheese factories in Green County merged to form larger factories (Odell, 1936: 59). Factory merging is not the only tactic used to keep the local industry alive, as a diversification of cheese production amongst the local cheesemakers plays a role as well. For example, in the case of many Green County cheesemakers, in recent years since 1994 they have sought certification in the Wisconsin Master Cheesemaker program, overseen by the Center for Dairy Research at the University of Wisconsin-Madison (Wisconsin Milk Marketing Board, 2009: http://www.eatwisconsincheese.com/wisconsin/masters/default.aspx (last accessed 16 December 2009). Through this program, many of Green County's Cheesemakers have earned certification in high-quality cheesemaking with a growing variety of cheeses, improving the marketing value of their product, and more importantly, the quality of their products themselves (Wisconsin Milk Marketing Board, 2009: http://www.eatwisconsincheese.com/wisconsin/masters/default.aspx

(last accessed 16 December 2009). In addition, through the efforts of business moves such as consolidation, and attempts at improvement of the art of cheesemaking, Green County's cheesemakers have done much to sustain the prominence of their industry. Dairy farms, such as the Voegeli's have exhibited a savvy for keeping their operations thriving by expanding their options for earning a profit, whether that be through improving milk production per cow, selling additional products besides milk to improve their finances. It takes all of these efforts and more to keep the Green County cheesemaking industry a viable enterprise and a cultural identifier for the people of Green County.

Conclusion

As is the case with so many geographical spaces and places, complex systems need to be recognized and studied if we are to understand their true nature. The case of Green County, Wisconsin's cheese industry is no exception. Therefore, the recognition of many elements that compose the industry and their interconnected and interacting phenomena within this research project's politically bounded region was necessary. Unfortunately, a comprehensive geographical analysis of Green County's cheese industry was impossible considering time restraints. Nevertheless, the research team developed a fairly complete story to explain the unique setting that defines Green County.

First among the sectors used was an analysis of land cover using surveyor notes from the original General Land Office with which we were able to draw these conclusions: Green County was prairie and savannah landscape prior to Euro-American settlement. This served as a sufficient foundation for agricultural cultivation after initial working of the land. Secondly, the

landscape is dominated by rolling hill topography on the edge of the Driftless Area. This provided a sense of familiarity to the Swiss settlers upon their arrival to Green County.

Second, intuitive studies of typical human workings of the landscape explained social/environmental relations in historical and present day contexts. The first of these studies focused on the dairy barn as a space in which human development has evolved through five generations of a Swiss dairy farming operation. An examination of this farm revealed the relationship between dairy farmers and the natural topography, through the development of structures intended to benefit dairy farming practices. The second intuitive landscape analysis focused on the culturally significant workings of the New Glarus landscape. The visible evidence of human workings in New Glarus revealed the Swiss cultural values and ties to the cheese industry in Green County.

Third, a look at the recent land cover situation in Green County to try to understand how the areal extent of dairy farming practices relates to cheese making in the county. What was found, was around two-thirds of Green County's area was devoted to farming as of 2005. Thus, we can conclude that much of the landscape still supports the cheesemaking industry.

Fourth, personal interviews were conducted with the intent to reveal the humanistic perspective surrounding Swiss heritage and traditional cheesemaking knowledge. Through these interviews we know Swiss culture remains a significant part of Green County daily life. It is also evident that present day Swiss cheesemaking practices retain Swiss specific influences.

Lastly, the geographic evolution of cheese factories and their locations across Green County were examined. The trend of decreasing cheese factories reveals that in order to keep the

industry on its feet adjustments from cheese makers were necessary. Business mergers, product improvements, and diversification of available products are some the tools that cheesemakers have used. This has allowed Green County to retain its prominence as a cheese producing region through generations of economic transition.

All of the previously discussed components of this project collectively summarize the geographic setting of Green County's cheese industry. However, the cheese and dairy industries continue to be an ever present and evolving facet of Green County. Just as Bruce Workman said, he "learns something new every day – milk changes on a daily basis, so you're always adjusting" (Personal Interview, 27 Nov. 2009). Same goes for the geographical world. Phenomenological exchanges create constant need to adjust, just as the elements embedded in this research project and Green County's cheesemaking industry do.

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First, among these people include those directly involved with Green County's cheese industry. The members of the National Historic Cheese Making Center in Monroe, WI provided Green County cheese factory data and personal information regarding Swiss cultural ties and cheese making knowledge. The individuals affiliated with this organization to which we would like to extend our finest wishes include Director Mrs. Mary Ann Hanna, and volunteer Mr. Fritz Kopp. Mr. Bruce Workman, Master Cheese Maker and owner of Edelweiss Town Hall Cheese Company in Monticello, WI provided fine insight into the Swiss cultural connections between his personal life and profession. This allowed for

greater interpretation regarding Swiss cultural relevance within Green County and traditional Swiss cheese making. And Mr. Ernst Jaggi, a patron of the Swiss culture and tradition throughout Green County, afforded this project a unique perspective from which to advance analysis in regards to authentic cultural tradition and cheesemaking practices.

Second, a major contributor to the study of functioning dairy farms and the Swiss family dairy farming tradition in Green County requires the most sincere and personal thanks. The knowledge, experience, and cooperation of Mrs. Alice Voegeli, of the Voegeli family dairy farm, was of great importance to the success of the dairy farm landscape analysis and Swiss cultural examination. Without her eager support through numerous visits, phone exchanges, and photographic contributions, this project would not have been successful.

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A final wish of dedication goes out to the people of Green County. For, without their zeal surrounding Swiss heritage, the dairy and cheese industries, as well as their willingness to share their input and familiarity with each of these, this project would have no bearing.

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