Grass Clippings

pasture research you can use

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UW Extension • UW-Madison Center for Integrated Agricultural Systems and College of Agricultural and Life Sciences • UW Agricultural Research Stations

In this issue

Overcoming summer slump?

I was doing a bit of Internet research on summer slump and was amused to find that we graziers do not have a corner on the concept! It is a recognized phenomenon in a wide cross section of society, lamented upon by the art world, educators, sports, and religious interests as well as in a variety of industries including business, travel, information technology, and real estate. Explanations, excuses and ideas for overcoming the summer slump abound on the Internet—and from the variety listed, I'd say that summer slump must rank right up there with "cabin fever" in its impact to sufferers!

Despite the tendency to slow down with the heat and humidity, as graziers we know that now we need to look past summer slump and into our fall grazing window.

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Hill mustard, an invasive mustard on the move in southwestern Wisconsin

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Hill mustard (*Bunias orientalis* L.) is a non-native, invasive weed found only in a few locations in Wisconsin. This plant was first documented in Wisconsin in 1958, but recently has been spreading rapidly throughout the southwestern part of the state. It inhabits a wide range of habitats, but is typically found in CRP fields, along roadsides, and in other minimally disturbed areas. Once established, this plant forms a monoculture of hill mustard plants. It is also called Turkish rocket, Turkish warty-cabbage, warty cabbage, and warted bunias.

Hill mustard is native to southern Europe, but has invaded most European countries. Within the United States it is present within several eastern states including Virginia, Michigan, and Wisconsin. The University of Wisconsin-Madison Herbarium documented the original infestation in Green County west of the intersection of County Highway N and Buehler Road (north of Monroe approximately 3 miles). An inspection of all roads in the vicinity of this site in 2005 found than most hill mustard infestations are within five miles of the site of its original appearance. Recently, additional infestations were found in Lafayette County, indicating its ability to spread long distances. Further monitoring is needed to determine if hill mustard is present in other counties and to further pinpoint known infestations in these two counties.

Identifying hill mustard

Leaves on mature plants can be 12 or more inches long (basal leaves) and become progressively smaller up the stem. Leaves are lanceolate, which means they are highly lobed with sharp points.

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Now is the time to stockpile forages where you can, and this issue has a nice article discussing the practice of stockpiling. Weeds are a concern for many interests across the state and our Extension Weed Scientist, Mark Renz, has offered pertinent information on a couple of new weeds to look out for.

With a summer drought across many parts of Wisconsin this year, graziers in some areas will have less ability to stockpile than others. Still, all of us can begin thinking about how this year has gone for our farms so far, consider our options to improve our grazing management, and write down our observations to "stockpile" for further pondering this winter when cabin fever threatens to overtake us.

Rhonda

Grass Clippings features grazing-related research news from the University of Wisconsin and beyond.

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Hill mustard ... *from page 1*

Stems are erect, 10 to 45 inches tall, and are branched in the upper region where flowering begins. A key characteristic of hill mustard is the "warty bumps" (tubercules) on the stems which are easily felt by running your finger over the stem surface. Leaves may also have tubercules and these structures give rise to the name "warty cabbage." Both leaves and stems are somewhat hairy.

Flowers have bright yellow petals, are very fragrant, and are borne on dense racemes.

Fruits are ovate, irregularly warty, 0.25 to 0.4 inches long, contain 2 to 4 seeds, and are borne on stalks about 0.5 inch long.

Taproots on older plants are at least 1 inch in diameter and appear in clusters of multiple thick roots. The central part of the root is often partially rotted away.

Seedlings have long, oval cotyledons up to 1 inch long. The first true leaves are round to ovate and entire. Subsequent leaves are arranged in a rosette, are slightly toothed, become very long, and have a rough feel and prominent veins.

Similar species: Hill mustard resembles yellow rocket but is easily distinguished by its leaf shape, stem texture, height, and fruits. Yellow rocket leaves do not have pointed lobes and are hairless, unlike hill mustard which has toothed and hairy leaves. Yellow rocket stems never have the warty bumps found on hill mustard. Additionally, yellow rocket tends to be shorter and it flowers before hill mustard. The fruits of the two species are also quite distinct, with yellow rocket forming a narrow pod with many very small seeds while hill mustard has tear-shaped pods with few seeds.

Biology: Hill mustard is described as having either a biennial or perennial life cycle, but observations in Wisconsin suggest most plants behave as perennials. This plant is considered an aggressive invader in Central Europe (Steinlein et al., 1996). Researchers in this region believe its successfulness is due to its ability to establish rapidly and displace desired native species (Dietz et al., 1996). Adult plants can survive for many years, but populations appear to spread from seed as young seedlings are observed the following year along the leading edge of the infestation near parent plants (Dietz, 2002).

Control: Few methods of managing this plant have been tested. Mechanical methods are effective at preventing seed production if plants are mowed before seeds are produced. As soon as yellow flowers are seen, plants must be cut to prevent seed production. Additional mowing is necessary if plants resprout and flower later in the summer. We do not know if repeated mowing will kill established plants but mowing will help prevent the plants from spreading.

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Stockpiling pasture

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The concept of stockpiling is simple. Rather than cutting, drying, and storing hay to feed in winter, you grow pasture forage until frost and let the animals harvest their own feed as late into winter as weather conditions allow. Most classes of livestock can graze through as much as eight inches of snow and are comfortable in much colder temperatures than many people imagine. However, like everything in pasture management, stockpiling is more complicated in practice. Successful stockpiling requires planning, timing, and luck.

Why stockpile? The first and most obvious reason is that it replaces mechanically harvested, stored feed with the cheapest feed we can produce—pasture. It should save money. The second reason is that it can improve pasture utilization the following season by staggering spring and early summer grass growth. Fifty percent or more of pasture growth occurs during the 'spring flush.' Making hay off some acres is the most common way to deal with this over-abundance. The idea behind stockpiling is that winter grazing of some paddocks can help stage paddocks to accumulate forage at different rates in spring.

Successful stockpiling

There are three primary factors in stockpiling success: fall moisture, fall nitrogen availability, and winter weather conditions. Clearly, there is some risk involved, since we have no control over two of the three factors. In comparison, when you make hay for winter feeding, you have the greater cost of mechanical harvest but somewhat less weather risk, especially if you can store the hay under cover. The right amounts of nitrogen and moisture will maximize the amount and quality of stockpiled forage going into winter. A mid-August application of 50 pounds of nitrogen per acre will satisfy the nitrogen requirement, but timely rainfall is equally important.

Under typical Wisconsin conditions, an acre of stockpiled pasture will yield between one-half and one ton of forage after frost.

Once the forage has been stockpiled, its availability and quality depend on snow cover and temperature conditions throughout the winter. The longer it is out

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Hill mustard... *from page 2*

Tillage can dislodge the roots of hill mustard from the soil. No information is available as to how effective tillage alone is at managing this plant, but observations indicate that additional management methods will be required to effectively control this species. Establishment of desired vegetation after tillage is essential as hill mustard plants maintain a large seed bank from which plants can establish. It is expected that desirable vegetation that is appropriate for the area will compete with hill mustard and reduce its dominance.

Herbicides are currently being evaluated on hill mustard populations within Wisconsin. Preliminary results suggest that this plant is sensitive to glyphosate, 2,4-D, and metsulfuron, but more information about long-term control is required. Due to the large seedbank any management practices should include the establishment of desirable plants that will allow for selective management of this plant for several years.

References

Dietz, H. 2002. "Plant invasion patches – reconstruction pattern and process by means of herbchronolgy." *Biological Invasion* 4: 211-222.

Dietz, H., T. Steinlein, P., Winterhalter, and I. Ullmann. 1996. "Role of allelopathy as a possible factor associated with the rising dominance of *Bunias orientalis* L. (Brassicaceae) in some native plant assemblages." *J. Chem. Ecology.* 22: 1797-1811.

Steinlein, T., Dietz, H., and I. Ullmann. 1996. "Growth patterns of the alien perennial *Bunias orientalis* L. (Brassicaceae) underlying its rising dominance in some native plant assemblages." *Vegtatio* 125: 73-82.

Stockpiling pasture... *from page 3*

there in the field, the more quality and quantity will decline. Stockpiling for spring is a much more questionable proposition than for fall.

What does the research tell us?
Beyond these general principles, what else should we know? Luckily, a comprehensive study was conducted in 1996 and 1997 in Wisconsin at Arlington, Lancaster, and Marshfield. The study looked at seven grass species, three harvest dates, and four nitrogen treatments at these three sites. The grass species were late orchardgrass, early orchardgrass, quackgrass, reed canarygrass, smooth bromegrass, tall fescue, and timothy.

There were three harvest dates. The first harvest was taken just after the first killing frost (October). The second harvest was taken in early winter (December). The third harvest was taken in early spring prior to greenup (March).

There were four nitrogen treatments. The first two treatments were either 0 or 60 pounds nitrogen per acre applied on August 1. The third treatment was 90 pounds nitrogen per acre applied after first spring cut and 60 pounds nitrogen per acre applied on August 1. The fourth was 40 pounds nitrogen per acre applied before spring cut, 50 pounds nitrogen per acre applied after spring cut, and 60 pounds nitrogen per acre applied on August 1.

Harvest dates
The first sets of plots were harvested after the first killing frost in October. Across all sites and all species, the N-fertilized stockpiled pasture yielded 1.24 tons of dry matter per acre (t/a). The non-fertilized plots averaged a yield of 0.72 t/a. Averaged across all sites, grass species, and nitrogen treatments, yields from stockpiled plots harvested in December (0.95 t/a) and March (0.80 t/a) were lower than the October harvest. Between October and March, there was an approximate 50% loss in dry matter through decomposition and leaching of carbohydrates.

Nitrogen effects
Sixty pounds nitrogen per acre applied on August 1 increased fall yield of the stockpiled forage by nearly 75% over unfertilized plots at all sites, averaged across harvest dates and grass species. Spring and summer nitrogen applications affected summer yields, but had no beneficial effect on fall forage regrowth. So, if you're going to stockpile, nitrogen applied in August is essential for good fall growth.

Species response to stockpiling
Species rankings were generally the same across all harvest sites and dates. Either tall fescue or early-maturing orchardgrass ranked highest in yield at each harvest date and site. The late-maturing orchardgrass usually ranked third. Yields (t/a) ranged across the species as follows: tall fescue, 1.41; early orchardgrass, 1.35; late orchardgrass, 1.24; timothy, 1.17; reed canarygrass, 1.09; smooth bromegrass, 0.96; and quackgrass, 0.95. These are yields cut at grazing height (3 to 4 inches). Actual animal intake, of course, varies with management, livestock type, and pasture composition.

Forage quality
Forage quality levels for this research were significantly lower than what is observed by farmers who routinely stockpile pasture. Nitrogen application resulted in an average crude protein (CP) increase of one percent across all grass species, but did not affect digestibility (DG) of the forage significantly. October forage quality with added nitrogen averaged 11.6% CP and 73% DG. Crude protein levels declined up to 2 percentage points between October and December, but did not decline consistently between December and March. Digestibility values declined an average of 3 percentage points between October and December, and another 5 percentage points between December and March.

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Stockpiling pasture... *from page 4*

Several graziers who have tested stockpiled forage report quality levels similar to what they observe in spring and early summer, with protein levels in the upper teens and low twenties and reasonably good Relative Forage Quality (RFQ) values. It is unclear why the study values were so much lower, although one can speculate that management or weather conditions may have contributed.

Best species

Tall fescue performed best for stockpiling. It is remarkably well adapted for stockpiling because of its more uniform distribution of growth over the season. It accumulates biomass well in late summer and fall, and its stiff, waxy leaves seem to hold up better than average over the winter. Early orchardgrass was next highest in yield, and was higher in CP and similar in DG to tall fescue. The late orchardgrass usually ranked third. Timothy and reed canarygrass both had average yields and average levels of CP. However, the digestibility of timothy was among the highest, while reed canarygrass had among the lowest digestibility levels. Smooth bromegrass and quackgrass had the lowest yields and higher than average protein levels. Digestibility of smooth bromegrass was relatively high, while quackgrass DG was uniformly low.

Staggering spring growth?

Many people talk about the role of stockpiling in managing the spring flush. The theory is that stockpiling rather than grazing in the fall allows the plants to store root reserves which will then contribute to faster greenup and growth in spring. Because the forage is grazed after growth has stopped in fall, root reserves should remain intact the following spring to contribute to more vigorous growth. Non-stockpiled paddocks should green up more slowly because they've gone into the winter with no root reserves. This makes intuitive sense and it may actually occur under some circumstances, but this study did not provide evidence to support these assumptions.

At the Arlington site, the stockpiled pastures did not accumulate more forage in early spring compared to non-stockpiled pastures. Early spring yields were similar between stockpiled/winter-grazed and fall-grazed/non-stockpiled pastures. At Lancaster, the stockpiled/winter-grazed forage had *lower* early spring yields than the fall-grazed/non-stockpiled plots. Treading during winter grazing might have damaged crowns and negatively impacted spring regrowth. In this case, the stockpiled/winter-grazed paddocks greened up more slowly than the fall-grazed/non-stockpiled paddocks. So, while the order of greenup was different, we still achieved the desired result—staggered spring growth of paddocks to improve pasture utilization.

Putting it all together

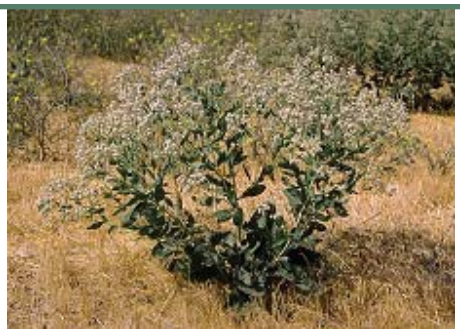
With a small amount of nitrogen and little additional cost, you can get one extra fall grazing by stockpiling some of your paddocks. While stockpiled forage in this study was of relatively low quality compared to fresh pasture, many experienced graziers have been able to obtain higher quality levels with a combination of nitrogen fertilizer, good management, and a little bit of luck. For many graziers, especially seasonal dairymen, extending the season into December is quite feasible and very practical.

Because of the decline in forage dry matter and quality and the logistical challenges of grazing through snow and ice, it is questionable whether we should pursue stockpiling as the primary forage source for lactating dairy cows beyond early winter.

Stockpiling is one of several tools we have to help manage the grass farm's resource base. It is used most effectively on farms with more than one acre of pasture per animal unit (1 AU = 1,000 pound of animal). How many additional acres do you need? A 1,000 pound animal will need approximately 30 pounds of dry matter per day (3% of body weight) or about 900 pounds per month. For each additional month of grazing after frost, you'll need about 0.4 acres for that animal (1.2 t/a x 2,000 lb = 2,400 lb; 900 lb/month ÷ 2,400 = 0.375 acres). For a herd of 100 dry dairy cows, you'll need about 50 additional acres. But start small. As you learn what works with your system, on your soils, and with your climate, you can expand your program. Would stockpiling work for you? There's one way to find out!

Perennial pepperweed, a new invasive mustard, found in Wisconsin

Mark J. Renz, Agronomy Department, University of Wisconsin Extension



Perennial pepperweed (*Lepidium latifolium* L.) is an invasive, creeping, herbaceous perennial weed recently found in Green Bay, Wisconsin. This plant is capable of invading pastures, alfalfa fields, roadsides, and many other upland sites, as well as riparian areas, irrigation ditches, floodplains, and wetlands. Shoots emerge early in the spring, forming a rosette which persists for several weeks. Plants bolt by late spring, producing an inflorescence where flowers will develop. After seed production, flowering shoots senesce, although new rosettes can emerge in the fall in moist soils.

Originally from Europe and Asia, perennial pepperweed can be commonly found throughout many western states, but plants have recently been found invading several eastern and Midwestern states. Concern for large-scale spread is high as perennial pepperweed has the potential to invade natural and managed areas. The population found in Wisconsin was along a disturbed roadside near a large transportation hub for a shipping company. This indicates that propagules are being imported from long-distance sources. Rapid response and eradication of existing infestations are critical to prevent the spread of this invasive weed throughout the entire state.

Identification

- *Stems* are green, semi-woody, and can be numerous. They can range from 2 feet to over 4 feet tall, but senesce by late summer.
- *Roots* can be herbaceous or form semi-woody crowns. Herbaceous roots are often creeping and are responsible for localized spread.
- *Leaves* are smooth and green to gray-green in color. Rosette leaves are 4 to 11 inches long and 1 to 3 inches wide, with long petioles (leaf stems). Leaves on the stem are smaller than rosette leaves and have a shorter petiole.
- *Flowers/fruit:* Small, white flowers form dense clusters throughout the top third of the stems. Fruit are small, round, two chambered pods, 1/16th of an inch long.

- *Similar species:* Perennial pepperweed is often confused with another invasive weed called hoary cress (*Cardaria draba*). However, unlike the taller perennial pepperweed, hoary cress stems are less than 3 feet tall and have leaves that clasp the stem and lack an obvious petiole.

Reproduction and spread

Perennial pepperweed can spread either by seeds or perennial roots.

- *Seeds:* Infestations can produce over 6.4 billion seeds per acre annually (Young et al., 1998), but few seedlings are observed in the field. Long distance dispersal is likely primarily from seeds, even though germination events are rare.
- *Perennial propagules:* Plants primarily reproduce from perennial roots capable of generating new shoots. Expansion of populations typically occurs from this method. Populations can spread more than 10 feet from the parent plant each year without disturbance, but if roots are fragmented by tillage or a natural event, spread can increase dramatically (Renz, 2002).

Management

Proactive management is the best approach for controlling perennial pepperweed since large, dense stands are difficult to control. Frequent monitoring is critical to locate new plants before they become established. If new infestations are found, plants should be removed immediately to prevent further spread. If

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Table 1. Herbicides recommended for controlling perennial pepperweed		
Registered for use in:		
Alfalfa	**Pasture**	**Noncrop**
Glyphosate (many) Imazamox (Raptor) Imazethapyr (Pursuit)	Glyphosate (many) Metsulfuron (Escort, Cimarron) 2,4-D (many)	Chlorsulfuron (Telar) Glyphosate (many) Metsulfuron (Escort, Cimarron) Imazapyr (Arsenal, Habitat)

Perennial pepperweed *... from page 6*

possible, include revegetation methods to reduce the possibility of re-invasion after management.

- *Physical/Mechanical/Cultural:* Establishing and maintaining competitive perennial vegetation can dramatically slow the introduction and spread of perennial pepperweed. Established plants are not effectively controlled by hand-pulling, tillage, mowing, or burning as shoots quickly re-sprout.
- *Biological control:* Intensive livestock grazing through the growing season can effectively suppress populations, but once livestock are removed, perennial pepperweed populations quickly recover; therefore grazing should be integrated with other tools. Native insects and diseases have been observed to reduce seed production, but do not appear to otherwise reduce the health of the plant.
- *Herbicid*es: Several herbicides can reduce perennial pepperweed populations, but repeat applications in combination with revegetation are needed to prevent re-invasion (Young et al, 2002). In areas with a dense buildup of thatch, mow or burn old shoots before applying herbicides. Herbicide application timing is critical as herbicides work best when applied at the flower bud stage (Young et al, 1998). If herbicide cannot be applied at the flower bud to flowering stages, mow plants and treat re-sprouting shoots. See Table 1 for a summary of herbicides available for each use. **For all herbicide applications, it is important to read the herbicide label BEFORE making any application, as different herbicides will have different requirements and restrictions.**

References

Renz, M.J. 2002. *The Biology, Ecology and Control of Perennial Pepperweed* (*Lepidium latifolium* L.). *Dissertation* Univ, of California, Davis. Page 129.

Young, J.A., D.E. Palmquist, and R. Blank. 1998. "The ecology and control of perennial pepperweed" (*Lepidium latifolium* L.). *Weed Technol.* 12:402-405.

Young, J.A., C.D. Clements, and R.R. Blank. 2002. "Herbicide residues and perennial grass on establishment perennial pepperweed sites." *J. Range Manage.* 55: 194-196.

Upcoming events

Wisconsin School for Beginning Dairy and Livestock Farmers available at three sites

If you or someone you know would like to own and operate a pasture-based dairy or livestock farm, the Wisconsin School for Beginning Dairy and Livestock Farmers is a great start. The school, part of the UW-Madison Farm and Industry Short Course, began in 1995. One-third of its approximately 200 graduates have gone on to start their own farms and seventy-five percent are farming. In addition to the Madison location, the school will be taught at two additional sites by interactive webcast: the University of Wisconsin-Marathon County campus in Wausau and the Madison Area Technical College in Reedsburg. Students at all three locations can earn credits toward a Farm and Industry Short Course Degree.

The 17-week course begins in November, meets once a week (except for holiday breaks and field trips), and ends in March. The curriculum covers a variety of topics including farm selection; animal and grass management; and business planning. For more information about the school, visit www.cias.wisc.edu/dairysch.html or call 608-265-6437. To get specifics on the course, scholarships or to get an application contact Tom Cadwallader for the Wausau location at 715-536-0304 or 715-261-1240; or Doug Marshall for the Reedsburg location at 608-524-7727. If you would like to attend an individual session of the school, please contact the local coordinator.

Cheese from the pasture strikes a chord

Consumers like the distinctive taste of cheese made from the milk of grass-fed cows

from News and Events, College of Agricultural and Life Sciences, UW-Madison

Consumers can taste a difference in cheese made from the milk of cows that graze on pasture, and they like what they taste, according to a study by two University of Wisconsin-Madison professors.

That's good news for Wisconsin, where many cheesemakers are betting their futures on distinctive artisan cheeses, and where roughly one quarter of the dairy farms use a managed grazing system.

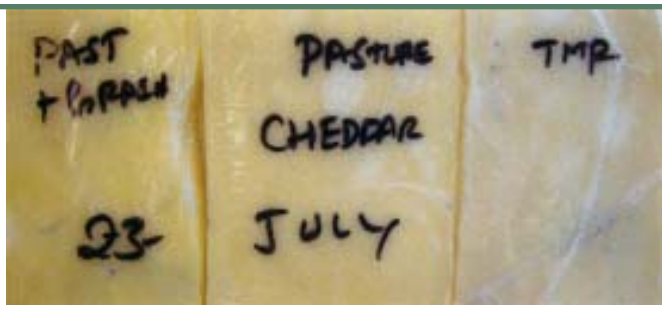
Scott Rankin, an associate professor of food science, and David Combs, a professor of dairy science, recently completed a three-year research project to explore the differences in flavor and other characteristics of pasture-fed cheese. They made and analyzed Cheddar from milk produced under three feeding systems—cows fed exclusively on pasture, cows fed on pasture plus grain, and cows fed on a mixed ration of grains, minerals, vitamins and protein supplements, and alfalfa silage. Each cheese was aged two to four months and then sent to North Carolina to be tasted by a panel of expert cheese evaluators, as well as a consumer taste panel.

The consumer panel tended to give the pasture-plus-grain cheese highest marks for flavor, texture, and overall liking. Forced to say which of the three they liked best, 60 percent chose the pasture-plus-grain cheese.

The expert tasters noted a significant "grassy note" in both pasture-based cheeses, especially in the pasture-only cheese. The mixed-ration cheese had a more buttery flavor than the pasture-only cheese, according to the study. There was also a marked difference in color: The mixed-ration cheese was whitest, while the cheese from cows fed pasture plus grains was the most yellow. Pasture-based cheese was also consistently softer than cheese from the other two treatments.

Rankin says pasture-milk cheese may not be an option for many cheesemakers, because milk from pasture-fed cows isn't available year-round, and it's likely to vary according to differences in weather and growing conditions.

"Most cheesemakers are looking for absolute consistency in the milk they use, because they are producing for a market that demands a very consistent product. If you have 30 trucks coming in, and you need to make a consistent product for a national pizza chain, the milk has to be the same today as it will be a year from now," he says.



Color differences between the cheeses were pronounced, with the pasture-plus-grain cheese the darkest and the mixed-ration cheese (labeled TMR) the lightest.

But for specialized cheesemakers, who often produce cheese in smaller scales for epicurean markets, the findings show that using milk from grazing cows can yield a product with added value.

Rankin says the idea of developing distinctive pasture-based cheese marries the state's strong interest in managed grazing with its marketing strength—novel, fine-tasting cheeses.

"Other states may out-produce Wisconsin in terms of mass production of cheese, because it's less expensive to produce milk elsewhere," Rankin says. "We can't win the battle of mass production. We can win the battle on quality."

The study is summarized in Research Brief 73, "How is cheese from pastured cows unique?," available online from the UW-Madison's Center for Integrated Agricultural Systems at www.cias.wisc.edu or by calling CIAS at (608) 265-3020.

Funds for the study came from the U.S. Department of Agriculture, the Wisconsin Milk Marketing Board, and the Center for Integrated Agricultural Systems. For more information, contact Scott Rankin, UW-Madison Food Science, 608-263-2008 or sarankin@facstaff.wisc.edu