

CCA ADVANTAGE

*The Voice of the Certified Crop Adviser Program
American Society of Agronomy
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Executive Director's Annual Report

By Luther Smith, ICCA Executive Director

The year is rapidly coming to a close, and 2003 has been filled with exciting new opportunities and changes for the CCA Program.

TSP: It started off with a new opportunity for CCAs: becoming a Technical Service Provider (TSP) with USDA.

This project was not completely new for CCAs, but it took on a new emphasis with the passage of the 2002 Farm Bill and a new look. CCA signed a Memorandum of Understanding (MOU) with USDA in February paving the way for CCAs to continue as TSPs (formerly called Third Party Vendors under the 1996 Farm Bill) in nutrient management, pest management and residue management. The door was now open and CCAs had an opportunity to provide new and/or enhanced services for their customers.

Payment rates were announced in August with some confusion as to how much a CCA would get paid for a practice.

We need to realize that the payment rate for a particular practice is dependent upon how the state and county NRCS offices ranked the importance of the practice in relation to water quality and environmental improvement and the geography where the practice is going to be implemented. That is why the rates for a particular practice vary, in some cases greatly, between states and counties.

The other factor is that the payment rate was never intended to cover 100 percent of the invoice for the technical assistance. You have to think of it being similar to a cost share approach.

The original price for the technical assistance needs to be negotiated between the CCA (TSP) and the landowner with the understanding that part of the cost can be recovered by the landowner from USDA. This does not prohibit CCAs from charging what they deem appropriate for their service. USDA does not dictate what CCAs can charge for their services.

Being or becoming a TSP is still a great opportunity for you as a CCA. It has increased the value of your CCA certification. You will need to evaluate what the demand is for the service in your area and this will help determine if you need to offer the service or not.

One other thing to consider is that being a TSP will allow you to develop even closer ties to your customers. If your customers believe they need the service and you do not

want to provide it, someone else will. It's an opportunity, no more, no less. What

you do with it is up to you, but I would encourage you to at least check into it.

To get registered as a TSP, first visit your local USDA service center and establish a user ID and password. Then

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Luther Smith
ICCA Executive Director



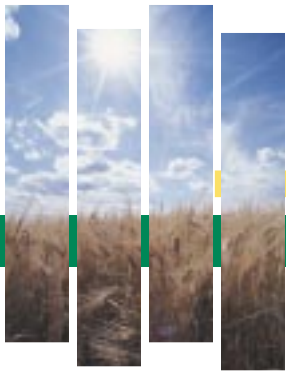
One of the highlights of the CCA year was its signing of the Memorandum Of Understanding (MOU) with USDA's Natural Resource and Conservation Service. Here, ICCA Chairman Tom Bruulsema, left, confers with NRCS Chief Bruce Knight.

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go to the Web site *TechReg.usda.gov* and complete the certification agreement. This will activate your file in the TSP system and allow USDA to recommend you to growers when asked. It will also allow you to complete TSP-related work.

To check out the cost share amounts for a particular practice in your area go to <http://www.tsp-nte.nrcs.usda.gov/>. Remember, some practices in certain areas were not considered high priority, so there may not be any cost share dollars or very few.

As of Sept. 15 there are 1,137 certified TSPs and 975 pending, for a total of 2,112 TSPs throughout the United States. Illinois leads the country with the highest number of TSPs, followed by Minnesota, Iowa, Missouri, Wisconsin and Indiana. There are 58 businesses and 101 agencies that are certified or pending TSP designation. The Midwest, followed by the Southeast, leads for the number of TSPs by geography.

In our discussions with USDA-NRCS we were told that one of the biggest areas of demand is for CCAs to do Comprehensive Nutrient Management Plans (CNMPs) — not just the nutrient management portion of the plan, but the entire plan. We will also be evaluating potential training opportunities with USDA, determining where the needs are and how best to develop the training and the best delivery methods.

CEUs: The ICCA Continuing Education Committee (CEC) was very active in 2003. The CEC recommended that the ICCA Board adopt a new document that would guide the approval of continuing education programs. The new Educational Areas Document will replace the exam performance objectives document as the guiding tool for CEU content.

This new standard will increase both the quality and content of continuing education programs and at the same time streamline the process for local boards to approve programs. The document was approved and will be fully implemented



The Continuing Education Committee put in long hours to develop the new Educational Area Document that will serve as the guiding tool for CEU content.

by January 2004. You can view this document at www.agronomy.org/cca.

Professional Development CEUs were added to expand your educational opportunities. You can earn up to five CEUs every two years in this new category. There is no minimum requirement, but you can now earn CEUs toward maintaining your CCA from courses such as computer training, business and economics courses, marketing, public speaking, communications and time management, to name a few. You can see more details by reviewing the educational areas document on the Web.

The Board approved a new 30-day post-event time limit for approving continuing education programs. This was done to help improve the reporting of events by vendors. CCAs must also provide their CCA number when signing in or they will not receive credit for the event. This will help ensure that the appropriate person receives the CEUs.

Another area of adjustment was a standardized leniency policy for those who do not earn the required number of CEUs. The requirement is the same, 40 total CEUs with a minimum of five in each of the four categories every two years.

CCAs who earn 35 or more CEUs will now be automatically allowed to continue on into their next two-year cycle but will have to make up the short

fall. Those who fall below the 35 will be dropped from the program unless they petition the Board and had extenuating circumstances that prevented them from meeting the requirement, e.g. military service, extended health challenges or loss of job. The local board will review the requests on a case-by-case basis.

Exams: The ICCA Exam and Procedures Committee (EPC) implemented the new Standard Operating Procedures (SOP) in order to maintain and enhance the overall quality of CCA exams. There are 32 local board exams and one international exam.

The SOP will help keep a consistently high standard for exam development and maintenance across the entire program. Although the exam numbers have declined to more of a maintenance level, about 1,500 exams given in 2003, we still need to maintain a high-quality examination process.

Your ICCA Board and Committees have been very busy in 2003 implementing the new strategic plan with the goal of continuously adding value to your CCA certification. They will continue this effort in 2004 and beyond. There are several new projects in early stages of development, so keep an eye on your "CCA Advantage" and I'll do my best to keep you informed.

Parting Thoughts

By Pat McConnell, CCA, Immediate Past Chairman, International CCA Board

Editor's note: following are remarks given by Mr. McConnell at ICCA's recent Board of Directors meeting held in Ottawa, Canada.

So much has been done during my time with this organization. It is easy to lose sight of the progress when you are closely involved, but it has been significant — from just over three years ago when folks in Washington, DC, did not even know what “CCA” stood for to the situation of today where CCA is recognized as the leading organization for the TSP movement, a respected body representing professionals in the field, and so much more.

These things have occurred for good reason — solid vision and direction from this body and darned hard work by **Luther Smith** and his staff, along with the committee chairmen we have been so lucky to have in place over the past several years. Yet there is so very much ahead of this organization.

New Challenges

There will always be new challenges ahead, and now perhaps more than ever, the successful navigation of the storms ahead will depend on active and dedicated leaders filling the chairs in this room.

It was noteworthy that in the last board elections no incumbent held onto his position on the board. New faces and ideas are healthy for any organization. The challenge is to look for those in our industries or organizations that are willing to lead, not just participate.

I cannot depart without making one last plea for the leadership of our fine organization to keep a long-term perspective and stay focused on the terrain just out of our view, to stay in touch with our

current strategic plan and work to make it better soon.

Yogi Berra said, “You really got to be careful if you don't know where you are going, because you might not get there.”

We have a solid plan in place and a schedule to update that plan next year. It is this kind of leadership and organization that will keep a volunteer group like ours focused, and its staff directed and accountable.

Three words describe what I feel to be critical to our future — standardization, quality and control. That's perhaps better stated as “standardization for the sake of continued quality and control of our own destiny.”

As you and I watch the warp-speed consolidation in our agriculturally related industries and organizations, it is so critical that we look beyond the news of the day, the latest merger, buyout or bankruptcy, to the impact of those events on our program. Yes, there may be fewer folks seeking certification as a result of these changes (although I am not convinced of that), but I see that as the least of our concerns.

Our biggest threat is the declining number of willing and inspired volunteers to run our program. As companies and jobs are combined, not only do the numbers of qualified individuals capable of leading this organization at the local and international level decline, but the responsibilities of these folks increases at the same time.

They have more on their plate, more balls to keep in the air, more at stake. Simply put, money and time get tight in these organizations! Organizations are “leaning the mixture” to get peak performance out of their people and capital.

State and provincial boards begin to find it difficult to fill chairs, details are overlooked, service declines and the value of the quality of the program is destined to follow. In some cases associa-



**Pat McConnell, CCA,
Immediate Past Chair**

tions or other groups that have helped manage local CCA programs watch their traditional sources of revenue erode within the ag sector.

“Lean the Mixture”

Staff is cut and they begin to lean on the CCA program more for a source of income and provide less in return. This is not meant as a criticism, and it is no one's fault or intent to see quality decline and costs increase. It is just the reality of the situation and it is going to get worse. It would be irresponsible of us to assume we can continue to effectively serve our registry, which represents the companies and organizations in agriculture, without experiencing or initiating our own level of consolidation and streamlining. We, like them, need to “lean the mixture.”

Much has been accomplished already due to the hard work of **Don Hershman**, **David Davis** and their committees, along with Luther and others, but we have a long way to go and not as much time as we would like to have.

I will sorely miss my CCA friends, but I will not miss the five-hour Seattle to Detroit or Chicago cattle car ride! I applaud each of you for your willingness to serve an organization that is so critical to the future of agriculture and the parts we all play in it.

I challenge each of you to step up when the time is right and lead all or part of it as well. It has been an honor.

Continuing Education Self-Study Course

Crop Management



Potential of Forages to Diversify Cropping Systems in the Northern Great Plains

By Martin H. Entz, Vern S. Baron, Patrick M. Carr, Dwain W. Meyer, Samuel R. Smith, Jr., and W. Paul McCaughey

Earn one CEU!

All CCAs may earn up to 20 Continuing Education Units (CEUs) per two-year cycle as board-approved self-study articles which will include CCA Advantage articles. The CCA CEU logo (above) marks all pre-approved material, with the CEU value indicated by the number in the middle. To receive one CEU in crop management, read this article, fill out the attached exam and mail the tear-out form, along with \$10, to the American Society of Agronomy.

Forage production in the northern Great Plains (NGP) involves cultivated and native pasture and hay production. The area dedicated to cultivated forage crops in the Canadian prairie provinces (Manitoba, Saskatchewan and Alberta) and U.S. states (North Dakota, South Dakota and Montana) totals 7.8 million ha of cultivated hay and 3.8 million ha of cultivated pasture. Many farmers and ranchers use cultivated forages to complement the native rangeland in this region.

Forage is produced in the short growing season and fed during the remainder of the year. Hay is the predominant winter feed. The winter feeding period for beef cattle in western Canada is widely reported to exceed 200 days per year. Approximately 10 percent of forage production is used for dairy cows in the region.

Alfalfa is the main forage legume and is grown on 61 percent of cultivated forage hayland in the U.S. NGP. Alfalfa's role in grazing systems is increasing. Other forage legumes are also grown

where alfalfa is not adapted. Many grass species are used in cultivated forage systems and many annual C₃ and C₄ plant species are used to fill gaps in the feed supply. Forage seed production is also an important industry. The percent of arable cropland rotated with forage ranges from 5 to 15 percent in the region.

Objectives of this paper are to (1) review agronomic, economic and environmental benefits and risks of diversifying cropping systems with forage crops; (2) identify means to enhance the positive attributes of forages in NGP cropping systems and to make forages a more important component of the cropping system; and (3) highlight research challenges.

Rotational Benefits of Forages

Yield Benefits. Many NGP researchers have reported rotational yield benefits from perennial forages. A long-term (1912–1956) study at Fargo, ND, found that wheat yields were 50 percent higher from land previously cropped to alfalfa for three years than from land previously cropped to nonlegumes. Similar results are reported from other studies.

In areas where water seriously limits crop productivity, inclusion of perennial forages can reduce crop yield in following crops due to forage-induced drought. A study in west-central Saskatchewan determined that available soil water in spring was lower after a two-year alfalfa crop than in a continuous grain rotation. A full year of fallow was insufficient to fully replenish the soil profile with water in the alfalfa system relative to the grain system. In wetter areas of the NGP, these water-depleting characteristics of alfalfa and other perennial forages are often viewed as

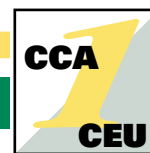
desirable. Grazing management and plant species impact soil water availability and potential evapotranspiration. Perennials begin to dewater soil as soon as growth begins in the spring, whereas annuals only begin to reduce soil-available water when ground cover has been achieved.

Soil Nutrient Status. The N benefits of forage legumes grown in the NGP have been documented by many workers. A 1997 study in dry, subhumid southern Manitoba determined that net N additions of an alfalfa hay crop were 84, 148 and 137 kg ha⁻¹ in the first, second and third years of the stand, respectively. This suggests that relatively short-term alfalfa stands could maximize N input.

Several researchers evaluated the N benefits of single-year dual purpose — hay and late-season forage regrowth plowdown systems. One study reported a fertilizer replacement value of legume (cut for hay and regrowth fall incorporated) equivalent to the addition of up to 150 kg N ha⁻¹ on continuous wheat.

Forage legumes, especially in hay systems, remove large amounts of minerals from the soil. For example, in a long-term study (1958 to present) at Indian Head, SK, inorganic soil P levels were 37 kg ha⁻¹ in continuous fertilized wheat, 27 kg ha⁻¹ in continuous unfertilized wheat and 21 kg ha⁻¹ in the unfertilized forage-containing rotation. Forage-based rotations that include pasture systems, where nutrients are recycled to the soil, are less nutrient exhausting than hay systems. This may be particularly so in the moister, northern area of the NGP.

Soil Quality. Many non-N benefits of forage in a crop rotation are attributed to



improved soil quality. This is especially important because NGP soils have undergone serious degradation since the early 20th century. Many improvements in soil condition by forage have been attributed to greater soil C in forage-based than in annual crop systems.

Perennial pastures provide a large litter base and root system that promotes greater storage of C in the soil compared with annuals. In short-term pasture sequences in the moister NGP, a study in 2002 estimated that total C contribution (roots and litter) for perennials was 2.7 times more than for annuals; contribution of roots and litter was 1.5 times greater with light than with heavy grazing.

Research in 1986 studied the dynamics of soil microbial C and N in two systems: wheat-fallow and wheat-oat-barley-forage-forage. They found that the five-year rotation contained 38 percent more N and 117 percent more microbial N than did the wheat-fallow system. In addition to increasing long-term soil biological fertility, N additions to NGP soils are also known to increase soil aggregation. Therefore, both the C and N additions from forages reduce soil erosion potential.

Pests. Weed suppression with forages, especially perennial hay, has been documented in various NGP studies over the past 50 years. A 1963 study described results of a long-term crop rotation study at Brandon, MB, where wild oat dockage (i.e., percent of yield consisting of wild oat seeds) in grain crops averaged <1 percent in forage-containing rotations and 15 percent in continuous grain or fallow-grain systems. In a survey of Canadian prairie farmers, 83 percent reported fewer weeds after alfalfa vs. grain rotations, with good suppression of wild oat, green foxtail and Canada thistle.

A study in 2000 found that even single-year forage crops provide significant weed control benefits. It concluded, "The ideal annual forage system for weed management should combine the early-season vigor of a biennial crop, the continuous competition of a long-season crop and the intense midsummer competition of a C₄ crop. Therefore, a combination of two, or possibly more, crops grown together may be required."

Economic Benefits. The most comprehensive economic analysis of forage-based cropping systems used information from long-term crop rotation studies at Indian Head, Scott and Melfort, SK, to determine input costs, net returns and income variability associated with forage-based and annual grain crop-based rotations. Cost of production for forage-based systems was lower than for continuous grain production but higher than a wheat-fallow system. Net returns tended to be more stable across a range of crop prices for the forage-based systems than for annual systems. Adding a two- or three-year forage phase into the six-year crop rotation decreased income variability significantly more than crop insurance.

The question of what minimum length of a forage hay crop is economically optimal was partially addressed by a 1986 study that reported that two- or three-year forage stands in a six-year rotation are economical. Other NGP research suggests that alfalfa and other forage legume monocultures should be terminated after four or five years for maximum economic efficiency. Most forage stands in dryland regions are currently maintained for at least seven years.

Environmental Benefits

Reduced Nitrate Leaching. Perennial forages can scavenge nutrients from greater soil depths than annual crops because of their deep root systems. The long-term study at Indian Head, SK, found that a three-year alfalfa-bromegrass crop in a six-year crop rotation reduced buildup of subsoil NO₃.

Using no-till vs. tillage to terminate alfalfa crops improves the synchrony of N release from alfalfa and uptake by following cereal grain crops, thereby reducing the risk of NO₃ leaching from perennial alfalfa. The role of perennial forages to extract deep-leached NO₃ is becoming more important as large-scale livestock production increases.

Critical Wildlife Habitat. Forage crops play an increasingly important role in providing critical habitat for many species. These programs have evolved to use locally adapted native grass species, often in a sculpted seeding system.

Carbon Sequestration in Soils.

Carbon sequestration in cropland seeded to perennial grasses averaged 1.1 Mg C ha⁻¹ yr⁻¹ over a five-year period in a survey of land under the Conservation Reserve Program in the U.S. Because of their deeper root systems, perennial forage plants can place C deeper into the soil system than annual plants.

New Opportunities to Diversify Crop Rotations With Forages

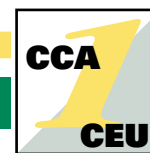
Intensification of Forage-Based Crop Rotations. Because total forage acreage is not likely to increase dramatically in the future, the best approach for increasing exposure of arable lands to forage benefits is to cycle forages through the crop rotation more quickly. While minimum alfalfa stand lengths to achieve weed control, N, subsoil NO₃ extraction and economic benefits are five years or less, forage stand length is currently over seven years in the region. Therefore, the potential exists to use the existing forage hectareage more efficiently by shortening forage stand length and moving forages from field to field more rapidly.

No-Till to Enhance Cycling Forages in a Rotation.

Forage seedlings are especially vulnerable to soil moisture deficits because the small seeds are sown near the soil surface. Conventional seedbed preparation results in dry seedbeds and increases the risk of erosion. No-till forage establishment increases soil water available to germinating forage seeds and increases establishment success, especially when post-seeding precipitation is absent. The long-term crop rotation study at Indian Head, SK, is now conducted under no-till, and since this change, alfalfa-bromegrass establishment has improved greatly.

Most forages in the NGP are seeded with a companion crop. Companion crops tend to reduce forage establishment and first-year forage yields and sometimes even second-year yields. However, most workers agree that use of companion crops is economical.

Most producers currently use some tillage to terminate forage stands, a significant investment of time and machinery. Use of herbicides instead of tillage to



terminate alfalfa has been shown to increase soil water conservation and grain yields in following crops. No-till seeding of winter cereals into herbicide-killed forages has the advantage that winter cereals use the limited water supply more efficiently than spring cereals. Other benefits of no-till alfalfa termination include fewer weeds in subsequent crops due to less soil disturbance.

Expanded Role for Annual Forages.

Annual forages play an important role in the feed supply. In addition to supplying winter feed (e.g. silage), annual forages are being promoted as a means to extend the length of the grazing season. Traditional annual forage species in the NGP include barley, oat, fall rye and wheat. Triticale has outperformed traditional cereals in semi-arid regions of western Canada and Montana. Annual forage mixtures, while typically not enhancing yield, can enhance quality and greatly improve seasonal dry matter distribution.

It is generally accepted that perennial pastures are the least expensive feed sources for the beef cow herd. However, novel annual forage systems can fill a void at specific points in the livestock enterprise, resulting in significant savings for the entire enterprise. Motivation for novel pasture systems stems from the fact that (1) conventional pasture systems cannot keep up with the demands of cows, calves or stocker cattle, all of which are gaining in size and weight; (2) it is less expensive to overwinter beef cows conventionally if they enter the winter feeding period in good body condition; and (3) it is cheaper to feed some classes of livestock (e.g. beef cattle) on pasture than in dry lots.

Low-cost cereal straw and chaff are a vast potential feed source for gestating beef cows in the NGP. In Alberta a study estimated that 1.2 tons of straw or 2.2 tons of chaff are required to winter a 450-kg cow. Oat and barley straw are generally considered to have a higher feeding value than triticale and wheat straw.

Adding Value to Beef and Dairy Products.

Additional benefits may be derived from increasing forage content in rations of higher-performing ruminants. These benefits may be economical, as in

low-cost rations for beef production and new health-related markets for beef and dairy products. Pasture finishing of beef cattle may be a viable option to some producers. Research since the 1950s has shown that pasture-finished beef is feasible although problems with meat quality and consumer acceptance, such as off-flavor and discolored fat, have occurred. Other niche markets may develop for forage- or predominately forage-finished beef on the basis of enhanced human health. Forage-based rations are linked with relatively high concentrations of conjugated linoleic acid and omega-3 fatty acids in meat and dairy products. While omega-3 fatty acids appear to have a role in preventing many age-related diseases, their role in mitigation of coronary heart disease has been most extensively studied and verified.

Alfalfa in Grazing Systems. Over the last 10 years there has been a threefold increase in pasture hectareage where alfalfa is the primary component. Twelve to 15 percent of alfalfa stands are currently grazed on a regular basis or at some point in the life of the stand. Alfalfa provides the perfect combination of high forage digestibility and protein for pasture-based finishing systems.

With proper grazing management, yearling steers can gain as much as 1.5 kg head⁻¹ day⁻¹. Reported daily steer gains in pure orchardgrass and tall fescue range from 0.69 to 0.79 kg head⁻¹. Animal rate of gain is improved in alfalfa-grass pastures when alfalfa contributes as little as 35 percent to the sward. However, there are two reasons that alfalfa has not been traditionally used for pasture: poor persistence and bloat. Progress is being made in developing bloat-reducing cultivars and through management strategies, chemical feed additives and other treatments. Tremendous progress has also been made in breeding cultivars that are grazing persistent.

Novel Grain-Forage-Livestock

Systems. A novel forage-based cropping system has been used successfully for decades in Australia, where self-regenerating subterranean clover and annual medic are grown in pasture-grain systems. There has been considerable interest in adapting these systems to the NGP.

Forages in Organic Systems. A survey of organic farms in Manitoba, Saskatchewan and North Dakota showed that 30 to 40 percent of their land was seeded to alfalfa or other perennial forages at any one time. Interestingly, forage hay yields on organic farms were higher, on average, than on area conventional farms, suggesting that organic farmers pay close attention to forage management.

Future Research Challenges

Almost all aspects of forage production require further research. One challenge is crop development. Because there are so many plant species in NGP forage systems, maintaining breeding and selection programs for all of them is difficult. Few trials of cropping systems now under way in the NGP include forages. Without proper documentation of forage benefits in contemporary cropping systems, it will become increasingly difficult to visualize the potential of forages to diversify NGP cropping systems.

Nutrient cycling is very different in pasture vs. hay systems. However, little attention has been paid to this area of study. Also, the impacts of nutrient cycling on intensive pasture in moist areas is different than for dry areas, just as long-term vs. short-term grasslands differ and legumes and grasses differ.

There is a great need to investigate the role of forages at the systems level where all or several components of the soil-crop-livestock system are considered together. Taken alone, the forage component is often less valuable, but its presence in a cropping system provides great stability and profitability to the whole system. Because benefits are sometimes subtle and do not manifest themselves immediately, research needs to be conducted long term.

Editor's note: Content was adapted from the paper "Potential of Forages to Diversify Cropping Systems in the Northern Great Plains," which was published in Agronomy Journal Vol. 94, March-April 2002, and is courtesy of the authors Martin H. Entz, Vern S. Baron, Patrick M. Carr, Dwain W. Meyer, Samuel R. Smith, Jr. and W. Paul McCaughey.



Get a CEU!

This exam is worth 1 CEU in **Crop Management**. An exam score of 70% or higher will earn CEU credit. The International CCA program has approved self-study CEUs for 20 of the 40 CEUs required in the two-year cycle.

DIRECTIONS

1. Read the self-study article on pages 18-20 carefully.
2. Answer the questions by clearly marking an "X" in the box next to the best answer for each question.
3. Complete the self-study exam registration form on the back of this page.
4. Clip out this self-study examination page, fold and place in envelope.
5. Enclose a check for \$10.00 made payable to the American Society of Agronomy, for processing fees. Payment in U.S. funds only.
6. **Mail your self-study exam and fee to:**
ASA c/o CCA Self-Study Exam, 677 S. Segoe Road, Madison, WI 53711. *Please allow 60 days for processing.*
7. An electronic version of this test is also available at www.AgProfessional.com. Go to the Certified Crop Advisers section (lefthand column) and access the "CCA Advantage" link.

Potential of Forages to Diversify Cropping Systems in the Northern Great Plains

November Self-Study Examination

1. The area dedicated to cultivated forage crops in the Canadian prairie provinces and USA totals:

- a. 2.5 million ha of cultivated hay and 1.5 million ha of cultivated pasture.
- b. 3.5 million ha of cultivated hay and 2.8 million ha of cultivated pasture.
- c. 5.3 million ha of cultivated hay and 3.0 million ha of cultivated pasture.
- d. 7.8 million ha of cultivated hay and 3.8 million ha of cultivated pasture.

2. The winter feeding period for beef cattle in western Canada is reported to exceed:

- a. 350 days.
- b. 300 days.
- c. 250 days.
- d. 200 days.

3. In the USA, alfalfa is the main forage legume and is grown on:

- a. 51% of cultivated forage hayland.
- b. 61% of cultivated forage hayland.
- c. 71% of cultivated forage hayland.
- d. 79% of cultivated forage hayland.

4. Inclusion of perennial forages in water limited areas can reduce crop yields in following crops due to:

- a. forage-induced drought.
- b. nutrient depletion.
- c. increased soil moisture.
- d. impenetrable root mass.

5. A recent study in NGP estimated that total C contribution for perennials was:

- a. 2.0 times more.
- b. 2.5 times more.
- c. 2.7 times more.
- d. 3.0 times more.

6. N and carbon additions to NGP soils are also know to:

- a. suppress biological activity.
- b. increase soil aggregation.
- c. limit carbon sequestration.
- d. decrease soil P.

7. A 1986 study reported that in a 6 year rotation, forage stands were economical for:

- a. 1 to 2 years.
- b. 2 to 3 years.
- c. 3 to 4 years.
- d. 4 to 5 years.

8. Perennial forages can scavenge nutrients because:

- a. of their deep root systems.
- b. of their wide and shallow root systems.
- c. of their symbiotic relationship with soil microorganisms.
- d. of capillary action.

Over

Continuing Education Self-Study Test

Crop Management Test (continued)

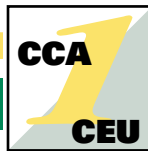


9. Alfalfa has not been traditionally used for pasture because:

- a. of poor persistence and bloat.
- b. of economics and the high cost of alfalfa.
- c. of its nutrient requirements.
- d. of its high linoleic acid content.

10. The use of herbicides to terminate alfalfa:

- a. requires a significant investment of time.
- b. has been shown to increase soil water conservation.
- c. increases the amount of weeds in subsequent crops.
- d. increases soil disturbance.



SELF-STUDY EXAM REGISTRATION FORM

Name: _____
Address: _____
City: _____ State/Province: _____ Zip: _____
CCA Certification #: _____
Credit Card #: _____ Type of Card: Visa Mastercard Discovery Am Express
Expiration Date _____ Name on Card: _____

A \$2 processing fee will be added to all credit card charges, or enclose \$10 check payable to American Society of Agronomy.
X

Signature of Registrant as it appears on Code of Ethics _____
I certify that I alone completed this self-study course and recognize that an ethics violation may revoke my CCA status.

This exam issued November 2003 expires November 2006.

SELF-STUDY EXAM EVALUATION FORM

Rating Scale: 1=Poor 5=Excellent

Information presented will be useful in my daily crop advising activities: 1 2 3 4 5
Information was organized and logical: 1 2 3 4 5
Graphics/tables were appropriate and enhanced my learning: 1 2 3 4 5
I was stimulated to think how to use and apply the information presented: 1 2 3 4 5
This article addressed the stated competency area and performance objective(s): 1 2 3 4 5
Briefly explain any "1" ratings: _____
Topics you would like to see addressed in future self-study materials: _____

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