CCA ADVANTAGE
The Voice of the Certified Crop Adviser Program
www.certifiedcropadviser.org

How to Cope With a Declining Client Base

By Dan Kelly

As more and more small farms throughout the country are consolidated into larger and larger operations, Certified Crop Advisers (CCAs) may feel they are faced with an almost overwhelming struggle to maintain their own business profitability.

This land control shift has caused a host of challenges for crop input retailers and crop consultants, foremost of which is a loss in revenue, noted **Jeff Farkell**, CCA, senior agronomist with **Central Ag Consulting**, Brady, MT.

"Maintaining revenue is a mounting problem," Farkell said. "Just because the remaining operators are farming more acres does not mean that they have us consult on more acres. So essentially, we lose that revenue and there is more competition for the farmers who do use crop consultants. I'm still searching for a way to combat this. Right now I am concentrating on providing good customer service and hope they stick with me.

"The industry has lost farmers to work with and not too many younger people have the opportunity to farm. Some states have cost share programs to assist young farmers in getting started. I'd like to see more of that."

OPPORTUNITIES

While there are certainly challenges to be overcome, some in the industry have found the shift to be ripe with opportunity.

Phil Needham, CCA, manager at **Miles Opti-Crop** in Owensboro, KY, said large farmers have needs that must be matched by their retailer. "In short, farmers of today are like a general practitioner," Needham said. "They manage grain, equipment purchases, farm labor, FSA offices, crop insurance, landlords, lending institutions and many other activities. The bigger they get, the more they need help with seed, chemical and fertilizer service or agronomic recommendations.

"This is where a company like ours can take the ball and run with it, as we can provide agronomic recommendations based upon sound agronomic research, plus we can supply and apply the crop inputs in a timely fashion."

There are also practical benefits for retailers whose clients are primarily large farmers. "Larger farmers also present logistical benefits," Needham said. "Instead of dispatching a sprayer to four different farms in a single day with four separate billing events and recommendation conversations, one farmer may be all the sprayer works on that day. The larger farmers usually expect improved buying power, but there are logistical benefits to assist offsetting these."

These benefits can be a formula for success. "From my perspective, if the customer base is declining, it presents many opportunities and efficiency benefits to companies like ours to be able to service and support the reduced number of larger growers," Needham said.

*Miles Opti-Crop's **Phil Needham,** CCA, and his colleagues have introduced Europe's intensive wheat production technique that has more than doubled yields in his market area. Here he is shown in a Kentucky field which yielded 120 bushels per acre.*

Farmers must remain focused, though, he cautioned, saying it is easy for farmers to stretch themselves thin with the innumerable and impressive options currently on the market.

"Some growers are struggling with the basics of crop production and are thinking about investing money in precision agriculture technology. Farmers like new equipment and new technology, but they can only take advantage of it financially if they can create the potential at seeding time. Many growers are overlooking the basics when it comes to variety selection, seed placement, seeding depth, seed spacing in the row and other decisions," Needham said. "Yield potential is lost in many of these examples before the crop emerges out of the ground. No precision agriculture software or hardware will provide a significant financial return on investment if these fundamentals of canopy management are overlooked."

The challenges currently facing crop input retailers are daunting, yet not overwhelming. Even though their farming customer base may be shrinking, the industry continues to find opportunities for growth.

CCA Update

EARN 12.5 CEUs AT ASA ANNUAL MEETING

The American Society of Agronomy 2005 Annual Meetings are being held in Salt Lake City, UT, Nov. 6–10, 2005. The following CEUs have been approved for CCAs. Complete program, registration and housing information are at *www.asa-cssa-sssa.org/meetings/acs.*

A-9 DIVISION

Nutrient Efficiency in Production Agriculture, Nov. 7, 2005, 8:30 a.m., 3.0 Nutrient Management

Improving Phosphorus-Use Efficiency in Production Agriculture, Nov. 8, 2005, 8:00 a.m., 3.5 Nutrient Mgmt.

Emerging Nutrient Technologies, Nov. 9, 2005, 8:25 a.m., 1.0 Crop Management and 2.0 Professional Development

A-8 DIVISION

Integrated Crop-Livestock Systems for Profit and Sustainability, Nov. 8, 2005, 7:50 a.m., 3.0 Nutrient Mgmt.

PROFESSIONAL LIABILITY INSURANCE

The ASA-SSSA-CSSA has a preferred provider relationship with two professional liability insurance vendors.

1. **Pallay, Janich & Pryor, Inc.**

Norma Janich
Pallay, Janich & Pryor, Inc., P.O. Box 600, South Holland, IL 60473, 888/549-8533, *norma.janich@pjpinsurance.com*

2. **Leonard Insurance**

Doug Malcolm
4244 Mt. Pleasant St., NW, North Canton, OH 44720-5454, 800/451-1904, *dmalcolm@leonardinsurance.com*

To obtain a quote in the U.S. please contact Norma or Doug directly.

Leonard Insurance hopes to obtain Canadian licensing.

NEXT CCA EXAM — FEB. 3, 2006

Registration is Oct. 3 – Dec. 16, 2005. Information can be found at *http://www.agronomy.org/cca/exams.html*.

REGIONAL ELECTION RESULTS

The CCA Board Regional Representatives' election results are announced.

Western Region: **Chuck Gatzemeier**, Rocky Mountain
Southern Region: **Conrad Lavender**, Georgia
North Central Region: **Harold Watters**, Ohio

Congratulations to those who were elected and thank you to all who were willing to participate and get involved.

Update From MACCA

By Lynne Hoot, Mid-Atlantic CCA Administrator

The Mid-Atlantic CCA (MACCA) program includes Delaware, Maryland, New Jersey, Virginia and West Virginia. With the exception of New Jersey, the states lie within the Chesapeake Bay watershed and are part of the extensive Bay cleanup efforts that have prioritized non-point source pollution controls, especially nutrient reduction.

Lynne Hoot

When the MACCA program was first developed in 1994 it was an easy decision to make the mandatory state nutrient management programs of Maryland and Virginia part of the regional portion of the exam. Both states had programs that required the certification of nutrient management consultants, provided training to address the program requirements and had shared components.

The willingness of the states to hold their nutrient management exams on the same day as the national CCA exam cemented the plan for a regional program. Since then, Delaware established a mandatory program and West Virginia has a voluntary program, so today only New Jersey consultants need to leave their state to take the CCA exam. A separate one-hour integrated pest management exam rounds out the regional exam, and we now provide Web-based training to accommodate the individuals who take the exam *(www.udel.edu/IPM/ccaindex.html)*.

With 250 individuals certified under the MACCA program, we consider participation to be good. We also need to address the acceptance and recognition of the CCA program in our region.

INCREASING OUR RECOGNITION

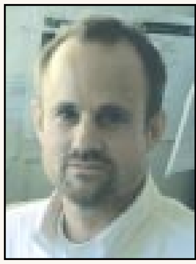
To accomplish this, MACCA has established a grant program to provide grants for projects that will increase the recognition and awareness of the MACCA program; sponsor educational events and endeavors that will recognize MACCA; and expand CEU availability, especially in the underserved categories such as soil and water management. Grant applications are accepted and approved two times a year.

MACCA also sponsors a special scholarship for students in agricultural programs to pay their certification exam fees. One student at each of the region's eight universities that provide an agricultural curriculum is selected annually to receive the award.

We believe that maintaining the involvement of the five regional Farm Bureau organizations in the selection of the "Crop Adviser of the Year" also serves to remind our clients of the value of the CCA program.

What next? Coming soon is the MACCA Web site at *www.midatlanticcca.org.*

Legislative Update



By Karl Glasener
Director of Science Policy
ASA,-CSSA-SSA
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U.S. SOIL SURVEY INFORMATION ONLINE

USDA Secretary **Mike Johanns** announced a USDA Web Soil Survey site that will provide secure public access to the national soils information system. When viewers visit the Web soil survey, they are asked to "define" a geographic area of interest. Once a location has been defined and projected onto the screen, the map can be printed, saved to a computer hard drive or downloaded for use in a geographic information system (GIS).

With this new electronic system in place, Natural Resources Conservation Service (NRCS) plans to phase out the familiar printed soil survey publications. Currently, NRCS has maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site will be maintained as the single authoritative source of soil survey information, *http://websoilsurvey.nrcs.usda.gov/app/*.

NRCS POSTS 2006 WATERSHEDS

Conservation Security Program (CSP) Watersheds, FY2006 map was posted to the NRCS Web site *(www.nrcs.usda.gov/programs/csp)* on Sept.1, 2006.

SPILL RESPONSE

In the wake of Hurricane Katrina, the EPA reminds facilities that the National Response Center is integral to facilities' long-established procedures in preparedness for natural disasters. The Center serves as the sole point of contact for reporting all oil, chemical, radiological and biological releases in the U.S. National Response Center staff is available to take calls 24 hours a day, seven days a week, 365 days a year at 800/424-8802 or 202/267-2675. For more information visit *www.nrc.uscg.mil/nrchp.html*.

CCAs working at or managing businesses storing crop protection chemicals and petroleum products should have a Spill Response Plan in place with local or state reporting telephone numbers. They may also want to include the phone numbers for the National Response Center.

The Center's reports, coupled with the Federal Emergency Management Agency's Rapid Needs Assessment, will help EPA protect public health and the environment. EPA also coordinates with state and local agencies to support affected communities.

Our Teen-Aged CCA Program

By Fred Vocasek, Incoming Chairman ICCA Program
Vice President, Servi-Tech, Inc., Dodge City, KS, e-mail: fredv@servi-techinc.com

Adolescence — that teen-aged time when an individual is no longer a juvenile, yet not quite an adult. An awkward time in many ways, but full of promise.

After all, it was 13 years ago that I sat with a group in Topeka, KS, to organize our state CCA Board — in parallel with 36 other local boards. In my view, the CCA program is full of that adolescent promise.

Adolescents try different things to define their identity (most notably hairstyles and fashions). Some will work, some won't.

Likewise, the CCA program must try things and must accept that some will fail. Establishing a CCA presence in Washington, DC, is a new venture, already sprinkled with successes and setbacks. We will keep trying.

Adolescents learn to accept responsibility and accountability. The USDA Risk Management Agency recently defined CCAs as "experts" for our producers involved in crop insurance claim negotiations. It's a great opportunity, but becoming an expert means becoming legally liable. Our CCA Boards must strive to maintain the quality and consistency that is essential to a responsible certification program.

IMPORTANT STEPS

Adolescents are impatient to grow up, to define their value and worth in the larger world. At our recent ICCA Board meeting, USDA's FSA and EPA representatives met with us to discuss how CCAs might fit into certain programs. A Board member later remarked that it was quite a change to be approached and asked for help. Small steps, but important steps. Steps we need to continue.

Adolescents make new relationships and redefine old ones. We are meeting with other organizations to discuss our common concerns, efforts, and goals. Our traditional organizations and associations are changing as the face of agriculture changes. Our traditional relationships may change as the CCA program adapts to new agricultural realities.

Our teen-aged CCA program has had its growing pains on its way to "adulthood." It's taken this long to have people put the capital "C" on the term "Crop Adviser," recognizing that it is a profession with value.

I look forward to being part of future CCA growth.

Barley, Oat, and Cereal-Pea Mixtures as Dryland Forages in the Northern Great Plains

By Patrick M. Carr, Richard D. Horsley, and Woodrow W. Poland

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.

Cereals are popular annual forages in the northern Great Plains and were harvested for forage from 0.25 million ha across Montana, North Dakota and South Dakota in 1997. Oat is the most popular cool-season cereal species grown for forage in the Great Plains region, particularly in northern tier states. Oat comprised approximately 80% of the cereal area devoted to hay production in 1997 in North Dakota, approximately 90% of cereal in South Dakota and almost 50% in Montana. The remaining area consisted of barley (14%) and rye and wheat cereal crops.

Previous work in subhumid regions indicates barley produces higher-quality forage than oat. Barley had greater nutritive value than oat, triticale and wheat in Minnesota. Barley forage was highest in digestible dry matter (DM) and lowest in acid detergent fiber (ADF) concentrations. Crude protein (CP) concentration was 16 g kg^{-1} greater in barley forage than in oat forage.

The superior quality of barley forage compared with oat and other cereal forages may result from a greater proportion of DM occurring as inflorescence in barley. More than 25% of barley forage DM consisted of inflorescence compared with 20% for oat, triticale and wheat forage across six maturity stages in subhumid regions. The inflorescence was more digestible and nutritious than other plant components. The leaf blade and sheath of barley also had less lignified area than oat.

The CP concentrations of barley and barley–pea forage were superior to those of oat and oat–pea forage in a study at Dickinson, ND. Factors in addition to CP concentration are important in determining the nutritive and economic value of forage. Energy, digestibility and mineral concentrations are required for comparisons between barley and oat grown in the region.

Barley forage yield has been equal or superior to forage yield of oat in subhumid regions, whether grown alone or with pea as a companion crop for alfalfa establishment. Barley forage yield has been inconsistent compared with oat in the northern Great Plains. Data suggest cultivar selection may impact barley forage yield in semiarid regions. Comparison of a diverse group of barley and oat cultivars may be justified to verify these results.

Intercropping pea with cereal crops is practiced to enhance forage CP concentration compared with cereal sole cropping.

The impact of intercropping pea with cereal crops on forage DM yield has been inconsistent. Results of a study in 1998 suggest that the cereal component should be seeded at a sole crop or heavier rate if the goal of intercropping is maintenance of forage DM yield compared with a cereal sole crop in the northern Great Plains.

Our objectives were to determine in a low-soil-N environment in the northern Great Plains: (1) if forage yield and quality of barley were superior to oat; (2) the effect of cultivar selection on forage yield and quality; (3) the relative contribution of stem, inflorescence, leaf blade and leaf sheath to yield; and (4) the effect of intercropping with field pea on forage yield and quality.

Field experiments were conducted under dryland management during 1999 and 2000 at Dickinson, ND. The experiments were located on a Farnuf loam in fields where foxtail millet was grown the previous year. Low amounts of less than 15 kg N ha^{-1} as nitrate occurred in the 0- to 60-cm soil depth, but moderate amounts, or approximately 20 kg P ha^{-1} occurred in the 0- to 15-cm soil depth before establishing the field experiments in both years. Nitrogen and P fertilizers were not applied to reflect the common practice of forgoing fertilizer applications when growing cool-season annual forages in the region. Nine barley, five oat and one pea cultivar, along with two barley–pea and two oat–pea intercrops, were included in the study.

RESULTS AND DISCUSSION

Forage Yield. Dry matter production averaged 3.84 Mg DM ha^{-1} for oat cultivars compared with 2.91 Mg ha^{-1} for barley cultivars included in this study. Dry matter production of barley cultivars developed for grain production was 1.05 Mg DM ha^{-1} less than oat cultivars developed for grain production and 1.17 Mg ha^{-1} less than oat cultivars grown for forage. Differences in DM production were not detected, but significance was approached between barley cultivars grown for forage and oat cultivars grown for forage or developed for grain production. Previous work in southwestern North Dakota indicated that DM production generally is lower for barley compared with oat in the northern Great Plains in high soil N environments. Conversely, DM production has been equal or superior for barley compared with oat in subhumid regions.

The contributions of stem, inflorescence, leaf blade, and leaf sheath to DM yield were 20%, 44%, 14% and 22%, respectively, for barley and oat in this study. A similar composition of barley plant DM was reported in a study in 1995. Conversely, a greater proportion of barley DM consisted of stem and leaf sheath in other studies. Inconsistencies in the composition of barley forage DM reported among studies may result from differences in harvest timing. Small changes in crop development stages can alter plant fraction composition of forage DM significantly. Harvest timing as related to crop development stage can affect forage composition more than other management considerations.

Intercropping oat with pea increased DM production compared with an oat sole crop, regardless of cultivar selection. Intercropping barley with pea increased DM production compared with a barley sole crop when cultivars developed for grain production were grown in a sole crop but not when cultivars developed for forage production were grown. The pea component contributed from 40% to 50% of total DM of intercropped forage, depending on cereal crop species and cereal and pea cultivars comprising the mixture. Results of this research indicate that intercropping pea with barley and oat can enhance forage DM in low-soil-N environments. In contrast, previous research indicates that DM yield is not enhanced and may be reduced when pea is intercropped with cereals under high-soil-N conditions.

Forage DM yield was maintained by intercropping barley with pea compared with an oat sole crop. These results suggest that barley–pea intercrops may be substituted for a monoculture of oat without sacrificing DM yield in low-soil-N environments. The substitution of barley–pea intercrops for an oat sole crop may be advantageous when quality of intercropped forage is superior, if barley and pea are easier to obtain than oat, or if other factors favor use of the intercrop. Forage DM yield was greater for an oat–pea intercrop than barley–pea intercrops, indicating that oat–pea intercrops would be favored to barley–pea intercrops in low-soil-N environments if the goal of intercropping is to maximize forage DM yield. Similarly, previous research indicated that more DM was produced by oat–pea intercrops than barley–pea intercrops in high-soil-N environments in the northern Great Plains.

Differences in DM yield were not detected between barley cultivars developed for grain or forage production or between two- and six-rowed grain barley types. Differences in DM yield also were not detected between oat cultivars developed for grain production and cultivars grown for forage or between hull-less and hulled grain oat cultivars. These results suggest that cultivar selection within small-grain species may not be important in low-soil-N environments, possibly because lack of N eliminates the potential for differences in DM production between low- and high-yielding cultivars that can occur under high-soil-N conditions.

Forage Quality. CP concentration averaged 90 g kg^{-1} in barley forage compared with 61 g kg^{-1} in oat. Likewise, other studies concluded that CP concentration of forage generally is greater for barley compared with oat. However, the impact of growth stage differences on CP concentration of cereal forages often is greater than the impact of the crop species and cultivars compared.

Forage CP was 35 g kg^{-1} more concentrated for barley–pea intercrops compared with a barley sole crop and for oat–pea intercrops compared with an oat sole crop. Forage CP was 74 g kg^{-1} more concentrated for barley–pea intercrops compared with a monoculture of oat and 10 g kg^{-1} more concentrated for oat–pea intercrops compared with a monoculture of barley. Our results suggest that intercropping pea with barley or oat can enhance the CP concentration of forage compared with a sole crop of either cereal species. The results indicate that intercropping pea with barley may be preferred to an oat sole crop in low-soil-N environments since forage CP concentration is superior for the intercrop and DM yield is maintained. Similarly, intercropping pea with oat may be preferred to a barley sole crop since forage DM yield is superior for the intercrop and CP concentration can be maintained.

Nitrogen yield was similar between barley and oat in our study, indicating that the higher concentration of CP in barley forage compensated for the lower production of DM compared with oat. A study in 1970 found that CP yield was greater for oat when oat and barley were harvested at the milk growth stage, whereas CP yield was greater for barley when both crops were harvested at the dough stage. That study indicates the ranking of barley and oat for N yield is transitory and depends on the growth stage of crops when harvested, but additional research may be needed to justify those conclusions using modern production methods and germplasm.

Nitrogen yield was 32 kg ha^{-1} greater for barley–pea intercrops compared with a barley sole crop and 37 kg ha^{-1} greater for oat–pea intercrops compared with an oat sole crop in low-soil-N environments. Conversely, forage N yield was unaffected by intercropping in previous research under relatively high-soil-N conditions. Intercropping cereal crops with pea may be advantageous because of the biological N-fixing ability of pea under low-soil-N conditions.

Nitrogen yield was greater for barley–pea intercrops compared with an oat sole crop and for oat–pea intercrops compared with a sole crop of barley. Hence, intercropping pea with either barley or oat enhances forage N yield compared with growing either cereal species as a sole crop. No difference in N yield was detected between barley–pea and oat–pea intercrops, suggesting that the relatively high CP concentration of pea forage compensated for the relatively low yield of barley–pea intercrop compared with oat–pea intercrop.

ADF concentration averaged 35 g kg^{-1} lower for barley forage compared with oat forage while NDF concentration averaged 34 g kg^{-1} lower in barley forage. Forage ADF and NDF concentrations were lower for barley cultivars grown for forage compared with oat cultivars grown for forage and for barley cultivars developed for grain production compared with oat cultivars grown for forage. Differences in forage ADF concentration were not detected between barley cultivars grown for forage and oat cultivars developed for grain production, nor were differences in forage NDF concentration detected between barley cultivars grown for forage and oat cultivars grown for grain or for forage. Our results suggest that cultivar selection may impact relative ranking of barley and oat for forage NDF concentration.

Intercropping pea with barley did not affect forage ADF concentration compared with a barley sole crop while forage NDF concentration was reduced by intercropping. Likewise, intercropping pea with oat reduced the NDF concentration of forage compared with an oat sole crop. ADF concentration also was lower for forage produced by an oat–pea intercrop compared with a sole crop comprised of a forage cultivar but not an oat cultivar grown for grain. Differences in forage ADF concentration were not detected between barley–pea and oat–pea intercrops while NDF concentration was lower in forage produced by barley–pea intercrops than oat–pea intercrops.

Average TDN concentration was 46 g kg^{-1} higher for forage produced by barley compared with oat in this study. Forage TDN concentration was greater for barley compared with oat cultivars grown for forage and greater for barley cultivars developed for grain production compared with either group of oat cultivars. Differences in the TDN concentration of forage produced by barley cultivars grown for forage and oat cultivars grown for grain were not detected. Results of our study suggest that crop species and cultivar selection can impact TDN concentration of small-grain forage.

Total digestible nutrients were 17 g kg^{-1} more concentrated in forage produced by barley–pea intercrops than a barley sole crop and 29 g kg^{-1} more concentrated in forage produced by oat–pea intercrops than an oat sole crop. These data suggest intercropping may be a suitable strategy for enhancing TDN concentration of forage compared with managing the cereal component as a sole crop. No differences were found in TDN concentration between barley–pea and oat–pea forage.

Forage P was 0.77 g kg^{-1} more concentrated for barley compared with oat. P was 0.70 g kg^{-1} more concentrated in barley forage when oat and barley cultivars developed for grain production were compared, but differences were not detected in forage P concentration between barley cultivars grown for forage and oat cultivars grown for forage or developed for grain production. Differences also were not detected in forage P concentration between barley cultivars developed for grain production and oat cultivars grown for forage. Our results suggest cultivar selection may affect the ranking of barley and oat for forage P concentration in some environments.

Forage Ca concentration was 3.64 g kg^{-1} for barley forage compared with 2.98 g kg^{-1} for oat forage. Calcium was 2.78 g kg^{-1} more concentrated in forage produced by a barley–pea intercrop than a monoculture of oat and 3.45 g kg^{-1} more concentrated in forage produced by an oat–pea intercrop than a monoculture of barley. There was no difference in forage Ca concentration between barley–pea and oat–pea intercrops.

Intercropping increased Ca concentration of forage compared with a sole crop of either cereal species in this study. The relatively high concentrations of Ca in pea forage accounted for the elevated Ca concentration of forage produced by intercrops compared with a cereal sole crop. Conversely, intercropping generally failed to affect forage P concentration compared with a cereal sole crop.

Differences in CP, P, and N yield were not detected between barley cultivars developed for grain production and cultivars developed for forage. Forage was lower in ADF and NDF concentrations but higher in TDN concentration for barley cultivars developed for grain production compared with cultivars developed for forage. Similarly, differences in forage quality traits were not detected between oat cultivars grown for grain and cultivars developed for forage or between hull-less and hulled oat cultivars, except for forage NDF concentration.

CONCLUSIONS

Our objective was to determine if forage yield and quality were superior for a diverse group of adapted barley cultivars compared with a group of oat cultivars in the northern Great Plains. Research in other environments suggested forage DM production would be superior for oat but barley would produce higher-quality forage. Forage DM production was greater for oat in this study while quality of barley forage was superior. Our field experiments were located in low-soil-N, unfertilized environments, but similar results were generated previously with relatively high-soil N. Results of these two studies indicate that forage DM yield is greater for oat than barley under a range of soil N conditions in the northern Great Plains, in contrast to subhumid regions where barley has produced equal or greater amounts of forage compared with oat.

Forage CP concentration was superior for barley compared with oat in our study as well as previous studies in the northern Great Plains. However, past research did not compare barley and oat forage for other quality parameters in this region. Our research suggests that P, Ca and TDN are more concentrated in barley forage while ADF and NDF are less concentrated. Differences in forage N yield were not detected in our study or in other environments in previous research, suggesting barley may be preferred to oat if optimizing N yield while limiting DM production is important in forage selection.

Forage DM yield and CP concentrations were optimized when cultivars developed for forage rather than grain production were grown in previous research in the northern Great Plains. However, cultivar selection did not affect forage DM yield and CP concentration in our study. We speculate that differences in forage DM production, CP concentration, and N yield were narrowed between cultivars because of the low-soil-N, unfertilized environments that were encountered. Our results support the hypothesis that cultivar selection may not be an important criterion for maximizing forage DM yield or quality in N-stressed environments, but additional research may be needed.

Differences in the percentage of forage comprised of various plant fractions between barley and oat were not detected in our study. We are unable to explain the superior quality of barley forage compared with oat forage on the basis of plant fraction composition, as researchers did in subhumid regions. Additional work is needed in the northern Great Plains to determine if plant fraction composition of barley and oat forage is similar in environments that favor DM production. The impact of timing of harvest on plant fraction composition of forage across the range of growth development stages when barley and oat are harvested for forage should be included in the effort.

Forage DM and N yield were unaffected by intercropping under favorable soil N conditions in previous research in the northern Great Plains. Conversely, forage DM and N yield were enhanced by intercropping in this study. The ability of pea to fix N biologically may have been an advantage in the low-soil-N environments in our study while ability of pea to fix N biologically may have been limited in high-soil-N environments in previous research. Our results support the hypothesis that intercropping pea with barley and oat can enhance forage DM and N yield along with forage CP concentration compared with a monoculture of either cereal crop under low-soil-N conditions when N fertilizer is not applied in the northern Great Plains.

Editor's note: *Content was adapted from the paper "Barley, Oat and Cereal–Pea Mixtures as Dryland Forages in the Northern Great Plains," which was published in Agronomy Journal, Vol. 96, May-June 2004, and is courtesy of the authors Patrick M. Carr, Richard D. Horsley and Woodrow W. Poland.*

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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.

Barley, Oat, and Cereal-Pea Mixtures as Dryland Forages in the Northern Great Plains

October Self-Study Examination

DETACH HERE

1. The most common annual forage crop in the northern Great Plains is
[ ] a. oats.
[ ] b. barley.
[ ] c. wheat.
[ ] d. rye.

2. Compared to oat forage, barley forage is higher in
[ ] a. acid detergent fiber.
[ ] b. neutral detergent fiber.
[ ] c. crude protein concentration.
[ ] d. dry matter yield.

3. A reason to intercrop cereal crops with field peas for forage is to
[ ] a. increase the protein concentration in the forage.
[ ] b. increase the crude fiber concentration.
[ ] c. speed the rate of forage curing during rainy periods.
[ ] d. decrease the rate of soil erosion.

4. Intercropping with field pea as compared to sole cropping resulted in
[ ] a. increased forage calcium levels.
[ ] b. decreased TDN.
[ ] c. increased P levels.
[ ] d. decreased nitrogen yields.

5. The most nutritious parts of barley harvested as forage are the
[ ] a. leaf sheaths.
[ ] b. inflorescences.
[ ] c. leaf blades.
[ ] d. stems.

6. A reason why nitrogen and phosphorus fertilizers were not applied in this study was to
[ ] a. mirror the common practice of not using fertilizers for forages grown in the northern Great Plains.
[ ] b. keep forage yields low to maximize the impact of management treatments.
[ ] c. minimize the impact of fertilizer treatments on subsequent field plot studies.
[ ] d. avoid late-season foliar diseases that are common with the over-application of fertilizers.

7. A factor contributing to the superior forage quality of barley as compared to oats is
[ ] a. barley's superior drought tolerance.
[ ] b. the proliferation of tillers in oat varieties used for forage.
[ ] c. barley's resistance to most foliar diseases.
[ ] d. the relatively larger inflorescence in barley.

8. Under the low soil nitrogen conditions of this study, the dry matter contribution of field peas when intercropped with either barley or oats was
[ ] a. 10-20%.
[ ] b. 20-30%.
[ ] c. 30-40%.
[ ] d. 40-50%.

Over

9. The results of this study contrast with previous research in forages in that

[ ] a. cultivar selection did not affect forage dry matter yield.
[ ] b. oats produced higher-quality forage than barley.
[ ] c. intercropping had little impact on forage quality.
[ ] d. higher rates of nitrogen and phosphorus caused lodging.

10. The relative contribution of the inflorescence to dry matter yield in either oat or barley in this study was

[ ] a. 20-30%.
[ ] b. 30-40%.
[ ] c. 40-50%.
[ ] d. 50-60%.

SELF-STUDY EXAM REGISTRATION FORM

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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 October 2005 expires October 2008.

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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: ______________________________