



# CCA ADVANTAGE

The Voice of the Certified Crop Adviser Program  
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## Seven Keys for CCAs to Retain



By Mark Faust  
Echelon Management  
ph: 512/248-5555  
e-mail: MFaust@ClevelC.com

**T**he first secret is right there in the title. Are your employees just hired and paid to do a job or do you **involve** them (like a true teammate) in the growth of the company? Here are a few keys to being sure you retain your best and continually improve their performance:

### Two to Four Times a Year Have Each Employee...

- Identify for which of the organization's top objectives they are responsible for delivering results. (We're assuming you have a clear list of organizational objectives identified and circulated to your team; if not, then how can you expect your team to focus? Ask for our free "Strategy Handbook" if you need help.)
- Evaluate their performance.
- Clarify and prioritize their objectives for the next quarter.
- Define what they like most about their role.
- Define what they like least or wish they could change as well as ideas for improvement.
- Identify what measurable activities, if improved in quantity or quality, will most improve their progress toward accomplishing their chief objective (sales, service, production, etc.). This is their Critical Success Factor, i.e., the activity in which you will help coach them toward improvement.

Most people do a good job of identifying the above points. Some will need a bit of coaching through the process, but the exercise causes a re-focusing on what is critical in their day-to-day work as it ties to the overall objectives of the organization.

### OBSERVE AND PRAISE CHARACTER

Another key in retaining your best is recognition not of their performance, but of their character – and spending

more time catching your people doing things right rather than correcting mistakes.

Why is it important for a leader to "praise" character rather than achievement?

- When a person is praised for achievement, others who helped make that achievement possible will tend to be bitter that their efforts were not recognized or rewarded.
- Achievement is based on skills or abilities that vary from person to person. When the focus is only on achievement, many members on the team, although they may be essential to the team's success, are forgotten or not obvious to the process.
- Everyone, regardless of position, should develop character.
- There is longer-term benefit from praising character over achievement. It has been shown that people often tie their self-esteem to achievement. Their achievements may vary month to month for a variety of uncontrollable reasons. Their character is something that can and should always be in good form. People who tie their self-esteem to their purpose of having good character will always be more stable.
- You (the leader or teammate) influence the service of your team based upon what you praise. When you commend one person for being punctual, they all are motivated to continue and even improve that character quality.

A key focus of management is to free up its team to focus more time on what they do best, their talent, and less time on the "adminis-trivia" that companies too often get caught up in

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Luther Smith  
American Society of Agronomy  
ph: 608/268-4977  
[lsmith@agronomy.org](mailto:lsmith@agronomy.org)



## and Recruit Great Teammates

creating to keep people “in line.” Your job as a leader is to eliminate the distractions and unimportant activity that take your people’s focus off reaching the objectives.

### FINDING THE BEST

How do you find the best? First define exactly the character and results you want from a new hire — or any employee for that matter, just like what you’ve asked them to do above. When you place ads or inform your team and contacts that you are looking for a new hire, you don’t want to say, “We are looking for a field technician.” This is a title some of our clients use for their sales folks. Instead you want to say that you are looking for someone with the gift of being able to see a lot of people, listen to their problems and propose the best solutions that will help your customers make more money.

The point is that you describe the talents that you are looking for and say less about your company. Too many want ads focus on the company, benefits and “ideal background” when what you most need to identify is a talented person who will enjoy and be challenged by the work you will provide.

How does one conduct an effective interview? The four question areas to cover in an interview are summarized in the table below.

Finally, always be recruiting. The best performers are often not looking for work and thus when you most need a new hire, the best candidate will not be looking at the want ads. Many of the top managers we’ve seen have meetings every week with prospective hires, despite the fact that they may not consider hiring the person for many months or even a couple of years. It often takes a dozen or more interviews to find an excellent candidate.

Whether it’s retaining talent or recruiting, it comes down to defining success and recognizing and rewarding the character that improves the right activities and ultimately success.

*Echelon Management works with firms to improve organizational performance and improve sales. Faust can be reached at 513/248-5555 or via e-mail to: MFaust@ClevelC.com.*

THE QUESTION AREAS	WHAT TO LISTEN FOR
<p><b>Question Area 1:</b> Give me a quick overview of your position and your company, and describe your most significant accomplishments?</p>	<p>Ask for the past two or three jobs, listen for personal energy and impact! Use fact finding to get lots of examples and details — when, why, how, impact, results and time frame. Ask about their best bosses and worst, and why.</p>
<p><b>Question Area 2:</b> What are your career objectives? 10-year, 3-year, 1-year. When have you most enjoyed your work and what would your ideal environment be?</p>	<p>Discern their overall career objectives and core talents. Ask about their favorite and least favorite positions. Does this match up to what your team may need in the future? Can they be happy and productive in your company?</p>
<p><b>Question Area 3:</b> One of our key performance objectives is _____ (describe objective). Tell me about your most significant comparable accomplishment?</p>	<p>Look for job-specific competency — get details to minimize exaggeration — anchor each major performance objective with a past accomplishment.</p>
<p><b>Question Area 4:</b> If you were to get this job, how would you go about _____? (describe performance objective)</p>	<p>Look for adaptability and ability to contribute in a new environment — ask about their top two or three objectives.</p>



## CCAs Written Into Arkansas Law

**Editor's note:** Do you feel agricultural consultant licensing is/is not needed in your area? Should the CCA Program be more proactive in seeking this type of legislation?

E-mail your thoughts to: [lsmith@agronomy.org](mailto:lsmith@agronomy.org).

**T**he Arkansas CCA Board of Directors is celebrating the successful completion of a project started five years ago. Together with the Arkansas Agricultural Consultant Association, the Arkansas Plant Board, the Arkansas Crop Protection Association and a group of independent consultants, the CCA Board worked to craft and pass into law mandatory licensing. The new law recognizes CCA training, testing and certification.

"We had a wake-up call when another group introduced a licensing law but failed to get it enacted," said **Blake Foust**, chair of the Arkansas CCA Board of Directors. "It isn't too often an industry asks to be regulated, but we wanted to make sure we had a law that enforced the necessary standards without putting good consultants out of business."

The Arkansas Agricultural Consultant Law becomes effective August 2005 and the clock will begin to tick for CCAs who have one year to become licensed. After one year they will have to retest and meet the new licensing requirements of the law.

A copy of the new legislation can be found at [www.arkleg.state.ar.us](http://www.arkleg.state.ar.us) and enter Act 857. For more information on the committee and legislative process contact Foust at [blakefoust@sbcglobal.net](mailto:blakefoust@sbcglobal.net). An article on the new law was also included in the spring 2005 *AgProfessional* magazine.

### URGENT — KEEP CONTACT INFO UP TO DATE

If you received an e-mail with the new CCA News Brief in May and June, all is well and we have your correct e-mail address. If you didn't get it, please go to the CCA Web site and provide or correct your address. Go to [www.certifiedcropadviser.org](http://www.certifiedcropadviser.org) and click on Update Address in the green sidebar. You will need your certification number.

E-mail has become an increasingly important and cost-effective method to communicate with you. Keep in mind that if we had a national or regional emergency and needed to communicate with you quickly, e-mail would be the method of choice.

### CCA BUSINESS CARD TEMPLATE

A business card template with the CCA logo is now available on the CCA Web page. Just download the MS Word document and type your information over the existing type. Print them yourself on business card perforated paper or take to your printer. Find it at [www.certifiedcropadviser.org](http://www.certifiedcropadviser.org) and click in the green sidebar on Promotional Materials.

### CCA Program Corner

By Jeff Kisiloski, Technical Affairs Coordinator,  
Canadian Association of Agri-Retailers

**W**ith the adjournment of the fall 2004 meeting, the Prairie CCA Board welcomed **Norm Flore** as the new chair. He has been with the program since its inception in 1996 and has contributed greatly to its success. His goals as chair are to further the growth of the program in the Prairie region and to increase the value of it for all CCAs. The Board also extends its heartfelt thanks to outgoing Chair **John Heard**, who provided exceptional service during his term. The Board looks forward to his continued support as past chair.



Norm Flore

In a continuing effort to raise awareness for the program, and create value for its members, the Prairie CCA Board is proud of its recently updated Web site: <http://www.prairiecca.ca>. It is a great starting point in dealing with a variety of CCA-related items, including general awareness and membership issues, as well as a place to find potential employment opportunities and promotional materials. It also contains several links to helpful agronomic sites for users seeking information on a wide range of issues. Whether one is diagnosing a crop production problem or simply looking for information, the Prairie CCA Web site is the source.

One of the site's key features is the online CEU application form. It is the first of its kind in North America and is a great asset for hosts planning an event. Within a few minutes, all of the required meeting information can be entered and electronically submitted for approval. Event hosts can even attach files, such as agendas or speaker biographies. This online form not only facilitates the process, but also vastly improves turnaround time without the paper shuffle.

For all individuals interested in becoming CCA accredited, the Web site has all the information they need. It outlines the four "E's" of the program: Education, Exams, Ethics and Experience. The Prairie Board would like to encourage all members to visit the site and provide feedback on the content to the provincial CCA representatives by using their contact information on the Web site.



## Executive Director's Report



By Luther Smith  
CAE, Executive Director – CCA  
ph: 608/268-4977  
e-mail: lsmith@agronomy.org

**T**he summer has been hot and dry here in southern Wisconsin. Hopefully you have enjoyed a productive growing season. Earlier this year, the ICCA Marketing Committee conducted a satisfaction survey to better gauge how the program was doing. I'd like to highlight a few of the responses, with a more in-depth article to follow in a future Advantage.

The survey confirmed some expectations while helping us to evaluate others. "Conveys a sense of professionalism" and "personal sense of achievement" are the top two reasons the survey respondents gave for maintaining their certification. The next highest reasons are "support uniform standards for the industry" and "continuing education." About 89% of the respondents indicated that they were highly or somewhat likely to maintain their certification for the next five years, while only 77% would recommend the program to someone else. Loyalty can be equated to the "satisfied customer." One of the best marketing tools is a customer who recommends your product or service to others. Farmers telling other farmers how great you are or how great your products are will help expand your business. Customer testimonials make great advertising copy. Though these numbers are good, we continue to focus our efforts on how to improve them.

Speaking of advertising, the program's efforts in marketing were rated low. The survey told us that there was only a 33% satisfaction for the ICCA Program's marketing efforts and only a 20% satisfaction for the local programs. We definitely need to improve here since the survey also told us that marketing you as a CCA to farmers was considered a high priority. The marketing committee has been working in this area and you will be seeing more in the future. We have always considered growers as our number one audience for promotional efforts. Reaching them often enough to have a positive impact with limited resources has been the ongoing challenge. Your ideas and suggestions are always welcome. In fact, we received many of them from survey respondents.

We are listening! One of the items that came through was the need to change the format and content of CCA Advantage. Shorter, more concise articles on crop/pest information and business management-related information were mentioned. The CEU article and quiz will remain since many found that useful.

Change is the only constant, and you will be seeing more of it. Have a great harvest season!

## Legislative Update



By Karl Glasener  
Director of Science Policy,  
ASA-CSSA-SSSA  
ph: 202/408-5382  
e-mail: karlglasener@cs.com

**T**he Senate and House Agriculture Appropriations committees have both proposed cutting the 2002 Farm Bill conservation program FY2006 appropriations. The House proposed \$478.5 million in cuts and the Senate \$390 million. The president proposed a \$392.5 million cut.

**Conservation Security Program (CSP):** The Senate Appropriations Committee passed full uncapped funding to return the program to 2002 Farm Bill levels. The House bill proposed limiting CSP funding to \$245 million, well below the president's budget request of \$274 million.

**Farm & Ranch Land Protection Program:** In the Senate bill full funding of \$100 million is provided, but the House bill provides only \$73.5 million.

**Wetlands Reserve Program:** Perhaps the biggest cut was aimed at this program. The Senate bill provides for only 150,000 acres, slightly below the House bill's 154,000 acres. The president requested 200,000 acres.

**Wildlife Habitat Incentives Program:** House and Senate propose steep cuts the House approved \$43 million, the Senate \$47 million. The authorized level is \$85 million.

**Environmental Quality Incentives Program (EQIP)** would be funded at \$1.017 billion (the same as 2005) by the Senate bill. To raise EQIP funding to \$1.052 billion the House bill imposes deep cuts for other conservation programs.

### MEETINGS

#### 2005 White House Conference on Cooperative Conservation

The conference is scheduled Aug. 29-31, 2005, in St. Louis, MO. Its purpose is to obtain and share input on approaches Americans are taking to steward and conserve natural resources. Details about the conference are at [www.conserva-tion.ceq.gov/about.html](http://www.conserva-tion.ceq.gov/about.html).

#### Farm Bill Forums

USDA Secretary Mike Johanns has announced that USDA will hold a series of public forums through the rest of this year to obtain input for the development of the 2007 Farm Bill. Updates and information on location and times are on the Farm Bill Forums Web page [www.usda.gov/farmbill](http://www.usda.gov/farmbill). Comments can be e-mailed to [FarmBill@usda.gov](mailto:FarmBill@usda.gov) or mailed to Secretary of Agriculture Mike Johanns, Farm Bill, 1400 Independence Avenue, SW, Washington, DC 20250-3355. All public comments must be submitted no later than Dec. 30, 2005.



# Nutrient Input and Removal Trends for Agricultural Soils in Arkansas

By Nathan A. Slaton, Kristofor R. Brye, Mike B. Daniels, Tommy C. Daniel, Richard J. Norman, and David M. Miller

### 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 nutrient management, read this article, fill out the attached exam and mail the tear-out form, along with \$10, to the American Society of Agronomy.

**A** fundamental component of developing nutrient management strategies is to determine the balance between nutrient inputs and outputs to identify areas where soil nutrient inputs are greater than removals. Nationally, many of these areas coincide with regions having concentrated animal production. Water quality issues related to hypoxia, eutrophication or both in the Chesapeake Bay, northern Gulf of Mexico and Bosque River have implicated animal and row-crop agricultural enterprises as significant sources of nonpoint nutrient pollution.

In 2003 Arkansas ranked high among U.S. states in agricultural production: first in rice, second in broilers, third in turkeys, fourth in grain sorghum, fifth in cotton and ninth in soybeans. However, the overall nutrient balance for the various regions in Arkansas with distinctly different agricultural enterprises is poorly documented. Although the excess nutrient problem in northwestern Arkansas is well documented, it has not been adequately quantified or categorized into components.

Therefore, the primary objective of this manuscript is to describe the balance between the predominant inorganic and organic agricultural nutrient (i.e., N, P and K) sources and the amount of nutrients removed by harvested crops for nine geographically defined districts in Arkansas. Additionally, the nutrient balance for specific land use management practices will be evaluated by the major commodities produced in each district to assess whether soil-test P and K should increase, remain static or decrease. This information will assist in developing solutions to nutrient management issues.

### MATERIALS AND METHODS

A number of literature references and statistical resources were used to assess the nutrient balance within Arkansas for the 5-year period from 1997 to 2001. Arkansas was divided into the nine geographic districts used by the Arkansas Agricultural Statistics Service (AASS). Crop and animal production data were used to quantify soil nutrient removals by harvested crops and nutrient inputs from animal production. Because crop yields,

hectares in production, animal populations and production practices often vary among years, 5-year mean data will be used.

Nutrient removal was determined by calculating the nutrient content of the seven primary crop commodities produced in Arkansas – corn, cotton, grain sorghum, oats, rice, soybeans and wheat. Nutrient removal was calculated by multiplying annual grain production by the grain concentrations of N, P and K. Nutrient concentrations from the USDA Natural Resources Conservation Service (NRCS) were used. We assumed all nutrients contained in row-crop straw and stubble residues were returned directly to the soil and harvested portions of each crop were not returned directly to the soil.

To allocate hay hectareage to each district, the 1997 Census of Agriculture county hay production estimates were totaled, and the proportion of the state hay hectareage was calculated for each county. In turn, these proportions were multiplied by the AASS (2003) estimate for state hay hectareage and the average hay yield to calculate total hay production. Total hay production for each district was estimated by summing respective county production. Pasture hectareage for each district was also obtained from the 1997 Census of Agriculture and assumed to be constant.

Total inorganic fertilizer nutrient sales for N, P and K were summarized by county and district from 1997 to 2001. We assumed all inorganic fertilizer nutrients were applied to soils used for agricultural purposes within Arkansas. Estimates of the nutrient content from broiler, turkey, dairy and swine production were added to N, P and K contents from inorganic fertilizers for total N, P and K content. Nutrients in beef cattle manure were ignored since a large proportion of them is obtained from forage and deposited directly to pastures during grazing rather than being collected or stockpiled.

Total nutrient inputs attributed to Arkansas poultry production were determined using USDA historic estimates and standard referenced N, P and K nutrient concentrations. Annual nutrient production from dairy animals and swine was determined using the number of milk cows and hogs and NRCS values for excreted dairy and hog manure. Total nutrient input accounts for total inorganic fertilizer sales and production estimates of organic source nutrient content from broilers, turkeys, hogs and dairy animals. Calculated nutrient contents from manure sources represent reasonable estimates from animal-production enterprises in Arkansas that are considered both collectable and transportable.

The net nutrient balance for each district was calculated by subtracting total soil nutrients removed from total agricultural nutrient inputs, with the difference representing either a net deficit or excess. Net nutrient balance was then expressed on an area basis for the categories of harvested row crop, total har-



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vested cropland and total land hectareage in agricultural use. Total harvested cropland included the seven row crops plus hay. Total land in agricultural use was total harvested cropland plus pasture. We assumed all excess or deficit nutrients were uniformly distributed across these categories.

#### RESULTS

The eastern one-third of Arkansas generally has flat to gently rolling alluvial soils. The western two-thirds generally consists of residual soils and widely varying slopes. Topographical constraints are well suited for their specialized agricultural enterprises. Lack of integration between row-crop and animal production presents a potential problem for sound nutrient management, especially in northwestern Arkansas.

During the 5 years from 1997 to 2001, Districts 3, 6 and 9 accounted for 95% of the row-crop hectareage and only 16% of hay and pasture hectareages in Arkansas, and for only 6% of poultry, 0% of turkey, 2% of hog and 11% of dairy populations. The three districts (1, 4 and 7) in the western one-third of Arkansas accounted for 55% of the hay hectareage, 50% of pasture hectareage and only 3% of row-crop hectareage. Animal production was also concentrated in the western one-third of Arkansas with 76% of poultry, 88% of turkey, 85% of hog and 49% of the dairy populations in Districts 1, 4 and 7.

**Nutrient Inputs.** Specialization of row crops in eastern Arkansas and animal agriculture in western Arkansas is reflected by the distribution of inorganic and manure-derived nutrients.

Manure-derived nutrients, especially P, are a significant proportion of the total nutrient sources in Arkansas. Poultry litter accounted for 92%, 96% and 92% of total manure-derived N, P and K, respectively, in this analysis. Due to the relatively low quantity of dairy- and hog-derived nutrients, appropriate management of them can probably be performed close to their points of origin. Efforts to redistribute excess manure-derived nutrients outside animal-producing areas should focus on poultry litter because it is the largest source and usually is collected as a relatively dry material.

The N to P ratio of total nutrients within each district describes an unbalanced nutrient distribution assuming the nutrients are applied to agricultural land within each district. The three largest row-crop production areas, Districts 3, 6 and 9, have a wide total N to P ratio (6 to 11:1). The remaining six districts, which also contain the highest animal populations, have total N to P ratios of  $\leq 5:1$ . The narrow total N to P nutrient ratios combined with the lack of harvested cropland in central and western districts suggest the potential for P to accumulate in the soil assuming animal manures are applied within district boundaries. The N to K ratios for the nine districts ranged from 1.8 to 3.2 with a state N to K ratio of 2.4. The total N to K ratios for each district do not indicate a significant imbalance of N or K. The ratio of total nutrient inputs in Districts 3, 6 and 9 approximates nutrient ratios in inorganic fertilizer blends recommended for crops grown on soils that have low to medium soil-test P and K levels.

**Nutrient Removals.** Districts with predominant row-crop enterprises (3, 6 and 9) removed the largest amounts of soil N

and P. For K, however, districts with a large hay hectareage had slightly higher K removal than District 9. Row-crop agriculture accounted for 94% to 99% of total N, 89% to 97% of total P and 77% to 94% of total K removals in Districts 3, 6 and 9, but only a minor portion of nutrient removals in the other six districts.

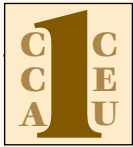
Districts 1, 2, 4, 5, 7 and 8 had total N to K removal ratios of about 1.0, but total N to P removal ratios were 3.9 to 4.9. In comparison, the row-crop agricultural Districts 3, 6 and 9 had wider total N to K (3.4–4.0) and total N to P (6.9–7.4) removal ratios than animal-agricultural districts. Although the narrower N to P removal ratio for western Arkansas districts indicates greater P removal, which may be advantageous, nutrients removed by forage crops are usually fed or recycled on-farm rather than exported outside district boundaries.

**Net Nutrient Balance.** The net nutrient balance is the difference between total nutrient inputs and removals with a positive value indicating an excess of nutrients in the state or district. The calculated nutrient balance is affected by inorganic fertilizer sales, animal populations, harvested crop area and crop yields. Districts 3, 6 and 9 had net balances that were negative or near zero for N and P and positive for K. For districts in central and western Arkansas net balances for N and P were positive and negative for K. Inorganic P fertilizer sold accounted for 35% to 88% of total P removal for districts in central and western Arkansas. Therefore, a major portion of the poultry litter would have to be transported outside these western districts to establish a balanced situation for P.

**Net Nutrient Distribution.** The net nutrient distributions suggest the extent of nutrient accumulation or depletion on an area basis for three specified land uses. In Districts 3, 6 and 9, row crops represent 79% to 96% of the area used for crops, hay and pasture. In contrast, most land area in the western two-thirds of Arkansas is used for hay and pasture. In general, row-crop hectareage in Districts 3, 6 and 9 is sufficient to prevent accumulation of N and P in the soil and with current usage should not result in rapid soil depletion of these nutrients. The net balance for K is positive but not excessive and would probably maintain plant-available soil K considering that some K is lost via surface runoff, erosion and leaching.

A near-zero or net-negative balance for nutrient distribution does not mean nutrients like N and P cannot contribute to nonpoint-source pollution. Rather, a near-zero balance between nutrient inputs and removals means nutrient-management practices during this 5-year period would maintain, but not rapidly enrich or deplete, soil nutrient contents.

Data show that K may be limiting forage and crop production in several districts in central and western Arkansas. However, the net nutrient balances per unit of land for N and P were positive. Assuming the district row-crop, hay and pasture hectareage estimates are representative and nutrients are applied within each district, all animal-producing districts have excess N and P, which will increase soil N and P when applied exclusively to land used for agricultural purposes. This is especially important considering that most soils used for warm- and cool-season grass production in Arkansas already have adequate Mehlich 3-extractable P levels that do not require additional P fertilization for forage production.



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Arkansas soil-test data show the median Mehlich 3-extractable P for established warm- and cool-season grasses increased by 2.5 mg P kg<sup>-1</sup> yr<sup>-1</sup> between 1995 and 2002. The median Mehlich 3-extractable P concentration has not changed appreciably for soils used to produce row crops, which are grown primarily in Districts 3, 6 and 9. Mehlich 3-extractable K has remained relatively constant for all crops, increasing only 0.50 to 0.55 mg K kg<sup>-1</sup> yr<sup>-1</sup>. Thus, the median soil-test P and K concentrations determined by crop tend to support information from the nutrient distribution assessment.

### DISCUSSION

Our data show that poultry production produces the majority of excess collectable and transportable N and P in western Arkansas. Most of the poultry litter is applied to pastures and hay fields near the poultry houses to meet the N requirements of hay and forage crops. Long-term application of poultry litter to a limited land area that also has a limited capacity to remove P from the soil in the form of harvested crops eventually leads to accumulation of soil P.

Inorganic fertilizers are used almost exclusively as the nutrient fertilizer sources for row-crop production in eastern Arkansas. Organic nutrient sources are seldom applied there because of the great distance between animal and row-crop production.

The low economic value of poultry litter as a fertilizer nutrient source is believed to prohibit its transport to the primary row-crop production area. A 1992 study proposed the fertilizer value of poultry litter ranged from \$22.10 to \$31.42 Mg<sup>-1</sup> for several crops in Virginia based on estimated litter application rates to meet crop N, P and K fertilizer requirements. Based on litter removal, storage and transportation fees, the study concluded that litter could be transported from 127 to 262 km before the net worth of the inorganic fertilizer value of the litter was exceeded. Based on that study's data, transportation of broiler litter from western to eastern Arkansas would not be economically feasible. However, less tangible positive effects of poultry litter on soil quality in row-crop areas, such as improving soil water holding capacity and lowering bulk density to potentially better seedling emergence, more than likely add value to poultry litter.

If poultry litter transport across districts is not considered, a use other than land application must be developed to sustain the current level of poultry production and in large part the economy of central and western Arkansas. A recent lawsuit settlement between poultry integrators in northwest Arkansas and the city of Tulsa, OK, limits or prohibits poultry growers in the Eucha-Spavinaw watershed in northwestern Arkansas from applying poultry litter or other P sources to pastureland because the runoff is considered to accelerate eutrophication of the city's source of drinking water.

The soluble P in surface-applied manures or inorganic P fertilizers may contribute much more to dissolved P in runoff than the more stable, less soluble soil P. Transporting P and N contained in poultry litter out of critical watersheds is an important step toward decreasing nonpoint-source pollution in central and western Arkansas. The high to excessive soil-test P levels common to central and western Arkansas will eventually decline as additional P is withheld, but for some soils this process may take decades. In the meantime, these soils will

need to be managed appropriately to reduce soil P contributions in runoff and to sustain high forage yields. The NRCS in Arkansas is now preparing P-based nutrient management plans to determine application rates of poultry litter that should help reduce P concentrations in runoff.

Best management practices will also be needed on soils in eastern Arkansas with low to medium soil-test P levels that will eventually receive P, regardless of its source. One advantage of applying poultry litter to land used for row-crop production rather than permanent pasture is that opportunities exist for mechanically incorporating the litter into the soil immediately after application. Soil incorporation may reduce P concentrations in runoff unless soil erosion is excessive and also reduce gaseous losses of N, which will improve the efficiency and value of poultry litter as an N fertilizer.

If the average row-crop yield removes 20 kg P ha<sup>-1</sup> and poultry litter is applied to replace only the removed P (1,400 kg poultry litter ha<sup>-1</sup>), approximately 2.6 million ha of soils with low to medium soil-test P are needed to distribute all the P from Arkansas poultry production each year.

### CONCLUSIONS

There is an excess of N and P in the western two-thirds of Arkansas where animal populations are greatest and row-crop hectareage is least. The greatest excess of N and P exists in District 1, which is farthest away from the row-crop producing area in eastern Arkansas. Nutrients removed in the harvested portion of crops account for nearly all of the nutrients derived from inorganic fertilizers and animal manures in the eastern one-third of Arkansas, which is the predominant row-crop producing area.

This study shows that excessive N is not being applied to row-crop hectareage in the eastern one-third of Arkansas within the Mississippi flood plain. This may well suggest that if N is being lost it is not from excessive application, but perhaps from mismanagement after application.

The results from this assessment may help reinforce the thought that current nutrient application strategies in western Arkansas are not sustainable without the danger of creating and/or exacerbating water-quality issues. Transport of excessive N and P contained in poultry litter outside of the central and western Arkansas districts is needed if the current poultry production levels are to be maintained. If poultry litter is eventually transported to eastern Arkansas, the use of inorganic fertilizers will need to be reduced.

The export of poultry litter from western Arkansas will require prescriptive use of inorganic N and K fertilizers to maintain the productivity of soils used for pasture and forage production in western Arkansas that were previously amended almost solely with poultry litter. Use of inorganic fertilizers on forage hectareage will also require comprehensive educational and research programs for both growers and fertilizer distributors.

**Editor's note:** Content was adapted from the paper "Nutrient Input and Removal Trends for Agricultural Soils in Nine Geographic Regions in Arkansas," which was published in the *Journal of Environmental Quality*, Vol. 33, September-October 2004, and is courtesy of the authors Nathan A. Slaton, Kristofor R. Brye, Mike B. Daniels, Tommy C. Daniel, Richard J. Norman and David M. Miller.



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This exam is worth 1 CEU in **Nutrient 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 22-24 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](http://www.AgProfessional.com). Go to the Certified Crop Advisers section (lefthand column) and access the "CCA Advantage" link.

## Nutrient Input and Removal Trends for Agricultural Soils in Arkansas July/August Self-Study Examination

DETACH HERE

1. A factor associated with areas where soil nutrient inputs are often greater than removal is
  - a. intensive row crop agriculture.
  - b. concentrated animal production.
  - c. proximity to a large urban area.
  - d. Karst topography.
2. Determining the balance between nutrient inputs and outputs is a key component of
  - a. developing nutrient management plans.
  - b. designing animal waste treatment lagoons.
  - c. deciding when to apply certain fertilizers.
  - d. selecting the economically optimum rate of fertilizer to apply to a field.
3. Nutrient removal rates for crops can be calculated by
  - a. monitoring changes in soil pH over time.
  - b. multiplying grain production by the concentrations of nutrients in the grain.
  - c. carefully measuring fertilizer and manure applications.
  - d. determining residual nutrients in crop residue after harvest.
4. Nutrient balances were calculated by the researchers using all of the following EXCEPT
  - a. animal populations.
  - b. harvested crop area.
  - c. inorganic fertilizer sales.
  - d. grower-reported fertilizer application rates.
5. The region of Arkansas with the greatest excess of nutrients is
  - a. South Central.
  - b. Northwest.
  - c. Southeast.
  - d. East Central.
6. Most of the manure-derived nutrients in Arkansas come from
  - a. poultry.
  - b. swine.
  - c. cow-calf operations.
  - d. dairy.
7. A disadvantage of applying manure to land in permanent pasture is
  - a. mycotoxin problems associated with manure application.
  - b. access to fields during the growing season.
  - c. the manure causes the grass to taste bad to livestock.
  - d. the inability to mechanically incorporate manure into the soil.
8. Based on information referenced in this article, the approximate distance that poultry litter could be transported and still maintain its net worth is at least
  - a. 43 km.
  - b. 89 km.
  - c. 115 km.
  - d. 127 km.





# Continuing Education Self-Study Course

## Nutrient Management

### 9. Maintaining livestock production in areas with excess nutrients may require

- a. transporting manure into the area.
- b. developing a use for manure other than land application.
- c. composting manure to reduce nutrient levels.
- d. decreasing N to P ratios below 2:1.

### 10. A zero or net-negative balance for nutrient distribution means

- a. non-point source pollution will be eliminated.
- b. the soil is being nutrient enriched over time.
- c. nearly equal or greater amounts of nutrients are being removed by harvested crops than are land applied.
- d. only inorganic fertilizer sources are being used in crop production.



### SELF-STUDY EXAM REGISTRATION FORM

Name: \_\_\_\_\_

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City: \_\_\_\_\_ State/Province: \_\_\_\_\_ Zip: \_\_\_\_\_

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Credit Card #: \_\_\_\_\_ Type of Card: Visa  Mastercard  Discovery  Am Express

Expiration Date \_\_\_\_\_ Name on Card: \_\_\_\_\_

**Enclose a \$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 August 2005 expires August 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: \_\_\_\_\_